Establishment of Real-time Wave Monitoring Stations in the Central Water of Hong Kong

Purpose

Members are invited to note the details of the deployment of two real-time wave monitoring stations in the central water of Hong Kong as set out in this information paper.

Background

2. Collection of wave data helps understand how waves behave in calm and stormy weather conditions within Hong Kong waters. The Civil Engineering and Development Department (CEDD) has been monitoring wave data in Hong Kong water since 1994. Two wave monitoring stations are set-up in the central waters of Hong Kong near Kau Yi Chau and West Lamma Channel to collect wave data (including spectral significant wave height, maximum recorded wave height, peak wave period, zero crossing wave period, mean wave direction and average water depth) by using underwater wave recorders.

3. In order to cope with the challenges of extreme weather due to climate change and the pace of infrastructural development in Hong Kong, it is considered beneficial to extend the wave monitoring systems to cover the central waters of Hong Kong where future port works are being/will be undertaken. This could provide important information for the planning and design of marine structures/works which are crucial to protect lives and properties.

Proposal

4. The CEDD proposes to set-up two real-time wave monitoring stations in the central water of Hong Kong. The real-time wave monitoring station comprises three main components including an Acoustic Doppler Current Profiler (ADCP) deployed on the sea-bed for measurement of wave and current data, a special mark buoy with a modem for transmission of wave and current data, and an office server for the storage of wave and current data. The proposed location and the schematic diagram of the real-time wave monitoring stations are shown in **Appendices A and B**. The performance monitoring is proposed to be conducted for 34 months, tentatively from Q2 2024 to Q2 2027.

5. The proposed ADCP will be installed in a Trawl Resistance Bottom Mount (TRBM) with height of about 0.5m and sufficient weight for stable deployment on the seabed. The TRBM will be deployed on the sea-bed (about -7mCD to -11mCD) in the central water of Hong Kong for measurement of wave and currentdata. The proposed special mark buoy will be equipped with a modem, internal batteries and solar panels (see **Appendix B**).

6. The special mark 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 7m-11m, an about 36m-45m long single mooring chain connected to a sinker with weight of about 10 tonnes will be used for the special mark buoy. The particulars of the special mark buoy are as follows:

Name	:	A01	
Position (WGS 84 Datum)	:	22º17.253'N	114º04.879'E
Shape	:	Pillar	
Colour	:	Yellow	
Light Characteristics	:	Fl (5)Y.20s	
Top Mark	:	Yellow "X"	
Radar Reflector	:	Fitted	
Automatic Identification System	:	Fitted	

Name	:	A02	
Position (WGS 84 Datum)	:	22º15.400'N	114º03.629'E
Shape	:	Pillar	
Colour	:	Yellow	
Light Characteristics	:	Fl (5)Y.20s	
Top Mark	:	Yellow "X"	
Radar Reflector	:	Fitted	
Automatic Identification System	:	Fitted	

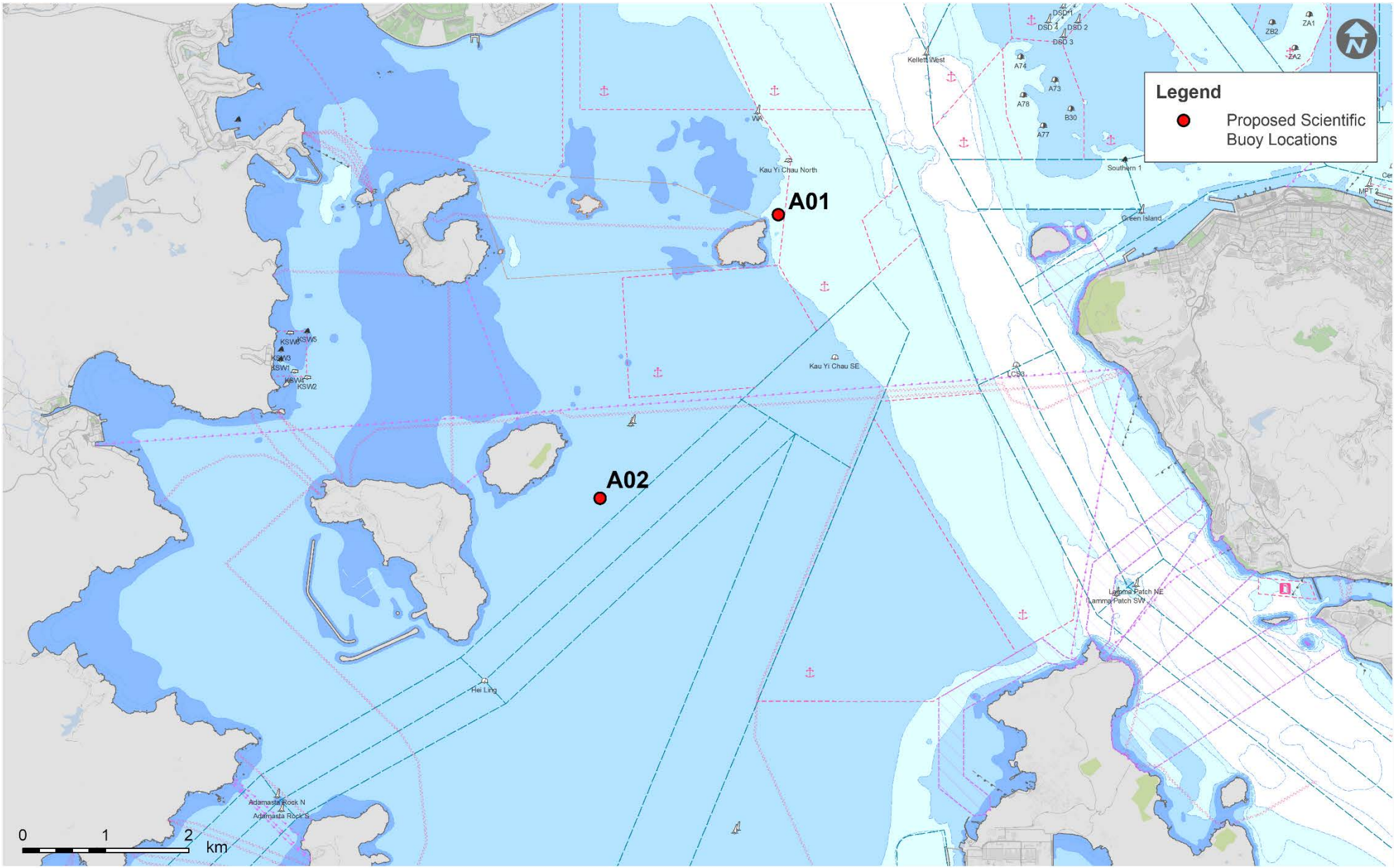
7. Regular maintenance service (usually once every 3 months) will be provided by the contractor including cleansing of equipment and replacement of batteries, etc. During routine maintenance, if any chemical would be used, it will be stored and disposed of properly. The position of the special mark buoy will be real-time monitored by GPS device in the buoy. Any drift of the buoy from its original position for more than 100m, the contractor will perform inspection and relocate the buoy back to its original position within 1 day if the weather allows.

Way Forward

8. Members are invited to note the details described in paragraphs 4 to 7 above. In case of any enquiry on the related matters, please contact Mr. Woody LAU of CEDD by phone at 3894 9530, or by email: woodylau@cedd.gov.hk.

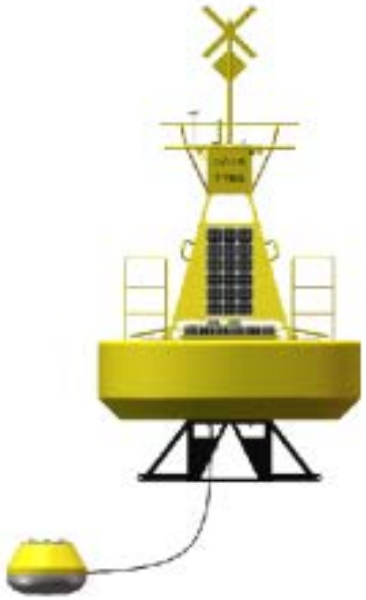
Sustainable Lantau Office
Civil Engineering and Development Department
April 2024

Appendix A

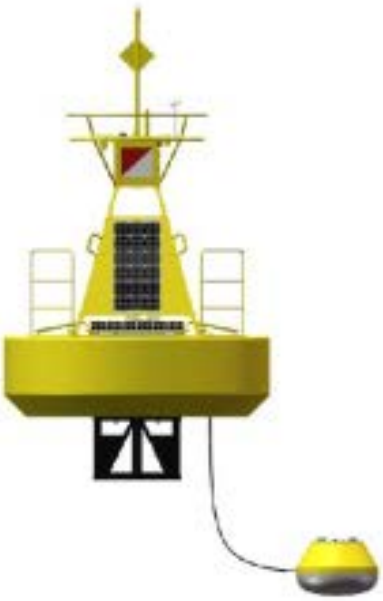

Legend
Proposed Scientific Buoy Locations
A01
A02
Kau Yi Chau North
Kau Yi Chau SE
Kellett West
Southern 1
Green Island
Lamma Patch NE
Lamma Patch SW
Hei Ling
Adamasta Rock N
Adamasta Rock S
0
1
2
km

Appendix B

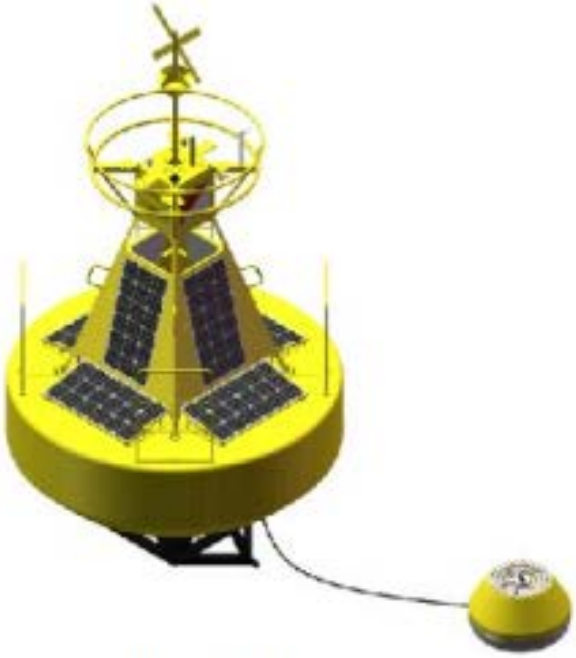
3D Diagram of WCMS



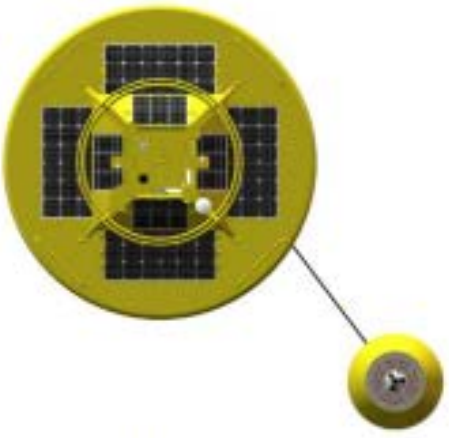
Front View



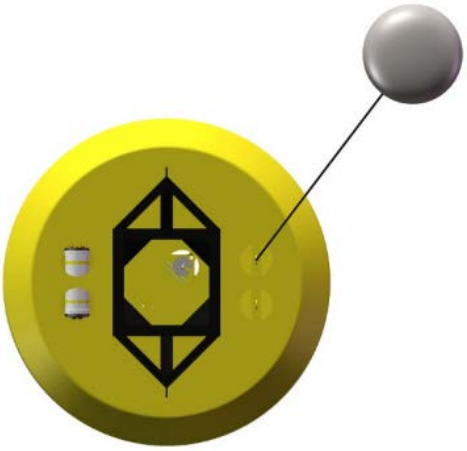
Side View



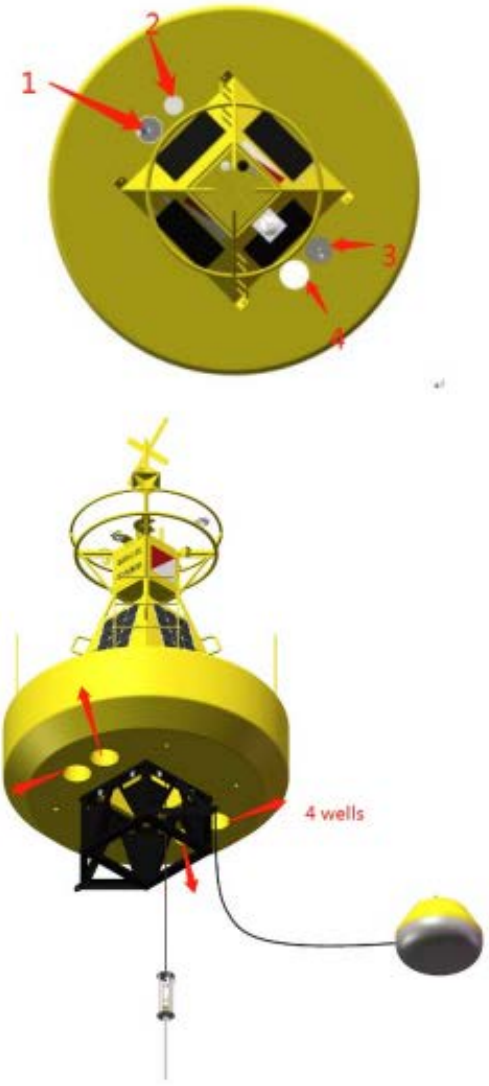
Isometric View



Top View



Upward View



Schematic Diagram（4 wells）

Remarks：The solar panels are hided from the first diagram for better illustration of the wells

Reference photo of Buoy Platform