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**X** ARM **□** ENG **□** PAP **X** Input

**□** ENAV **□** VTS **□** Information

Agenda item [[2]](#footnote-2) Task 1.5.8

Technical Domain / Task Number 2 …………………………………

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Information on the marking of breakwaters in the Republic of Korea and Australia

# Summary

At ARM 7 and ARM 8, a number of IALA members expressed the need for IALA to provide guidance on the marking of breakwaters.

The Republic of Korea and Australia share common challenges with the marking of breakwaters. This paper provides information that will assist in the development of guidance for the marking of partially or wholly submerged breakwaters.

Breakwaters are large artificial offshore structures. Their main purpose is to serve as a barrier that protects a port and its facilities (e.g. a marina) from any seas and swell that prevail off the port. Currently, there is lack of harmonisation in the manner in which breakwaters are marked. This has the potential to jeopardise safety.

Breakwaters, particularly if they are several in a port or coastal region, can present challenges to safe navigation if not marked appropriately. Inconsistent marking can create confusion for transiting ships, domestic vessels and recreational vessels, particularly at night.

Since 2007, Australia has had a minimum of 12 significant allisions with unlit breakwaters, resulting in at least four fatalities. A lack of appropriate lighting arrangements and guidance for the marking of breakwaters has been considered a contributing factor in these incidents. The need for international consistency is evident. The information provided in this paper is offered to help develop IALA guidance.

## Purpose of the document

To inform the development of IALA guidance on the marking of breakwaters.

## Related documents

This paper relates to:

* ARM7-6.3 (Marking of Breakwaters from Korea),
* ARM8-5.3 (Marking of Breakwaters from Australia),
* ARM-9-5.1 (Status of AtoN on Submerged Breakwaters in Korea) and
* O-139 (Marking of Man-made offshore structures).

# Background

At ARM 8, the Committee agreed it was necessary for IALA to provide guidance on marking of breakwaters and that such guidance should be included as a new section in O-139 - Marking of Man-made offshore structures when it was next reviewed.

# INFORMATION ON THE marking of submerged breakwaters in the republic of korea

There are many breakwaters in the ports of the Republic of Korea. Among them, submerged breakwaters present high risk as they are underwater at high tide, and only partially above water (or fully underwater) at low tide. In the Republic of Korea, these submerged breakwaters are established along the east and south coasts, where waves are strong. Usually, vessels that transit in the proximity of such submerged breakwaters are small vessels, such as fishing boats and leisure boats. Many of these vessels have no electronic chart system or advanced navigational equipment. If a submerged breakwater is not visible to the ship’s crew, it can be very dangerous. It is for this reason that the Republic of Korea has established guidelines on the marking of submerged breakwater. It wishes to share this information with the ARM Committee.

## Types and purpose of (submerged) breakwaters

Within Korean waters, there are 60 instances of submerged breakwaters:

1. By type: 55 sites (91.7% of total) are tetrapod type, 4 sites (6.7%) are riprap type and 1 site (1.6%) is fish shelter type.
2. By length: 56 sites (93.4%) are 100-300m, 3 sites (5.0%) are less than 100m and 1 sites (1.6%) are more than 300m.
3. By purpose: There are 2 purposes of submerged breakwaters - protection of coast line and facilities. 57 sites (95%) are protection of coast line (beaches and coastal roads) and 3 sites (5%) are protections of facilities (fish farm, tidal power plant and reinforce of breakwater).

*This information current as of December 2018.*

## Status of marking (submerged) breakwaters

Submerged breakwaters are marked in a variety of ways, as outlined the table below:

1. Marking of submerged breakwaters in Korea

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Light beacon | Light pole | Light buoy | Beacon | Unlit buoy | **Total** |
| Lateral marks | 1 | 0 | 2 | 1 | 2 | **6** |
| Special marks | 10 | 5 | 24 | 6 | 0 | **45** |
| **Total** | **11** | **5** | **26** | **7** | **2** | **51** |

## Related rule of marking (submerged) breakwater

The Ministry of Oceans and Fisheries of the Republic of Korea has revised its ‘Regulations for Function and Specification of Aids to Navigation’ in May 2019, allowing for the marking of submerged breakwaters. The revised text that relates to the marking of submerged breakwater is below (Republic of Korea has adopted IALA MBS Region B):

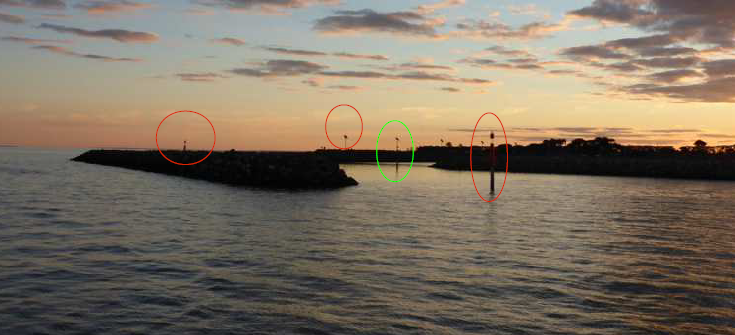
1. Part of SB marking of Regulations for Function and Specification of AtoN in Korea

|  |
| --- |
| **Article 85.** The deployment of submerged breakwater marking shall be recommended in accordance with the following criteria, taking into account various factors, including the structure of submerged breakwater and maritime conditions near the deployment site, the volume of ship passage and proximity to the port.  1. Submerged breakwater markings for prevention of collision are generally deployed as special marks  2. If there is a passageway of a vessel around a submerged breakwater, deploy it according to the IALA MBS  3. If markings are available on the top of submerged breakwater deploy on the top, if not deploy on the vessel passageway side near the submerged breakwater.  4. For single submerged breakwater, deploy at the centre or end of a submerged breakwater depending on the sea conditions.  5.If 2 or more of submerged breakwaters are exist, consider the entire submerged breakwaters as one and deploy it at both ends of the submerged breakwater at regular intervals depending on the conditions of the sea  **Article 86.** The criteria for the arrangement of submerged breakwater are as follows;  (interruption of literal explanation)  1.In case of available on the top of submerged breakwater    2.In case of not available on the top of submerged breakwater |

# marking of breakwaters in Austrailia

**Small and regional ports** - The majority of breakwaters in Australia are ‘above water’, and are associated with smaller, regional ports for Australia’s domestic and recreational industry. The vast majority of these breakwaters are marked using a combination of lateral marks, and in many cases, a set of lead and/or sector lights to assist approaching vessels in navigating between breakwaters.

The following example illustrates the layout of AtoN’s for marking the breakwaters at Wyndham Port, Victoria.

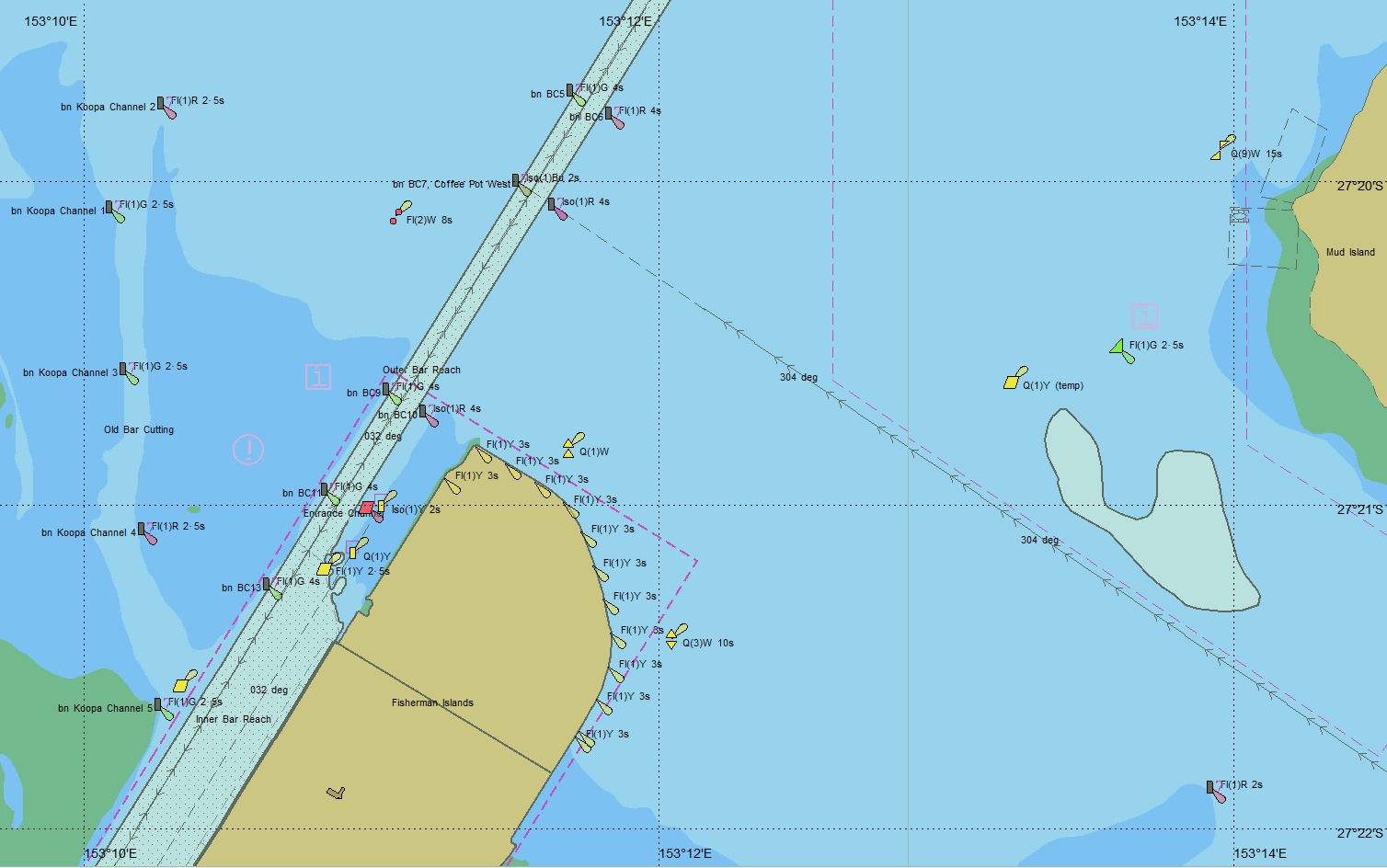




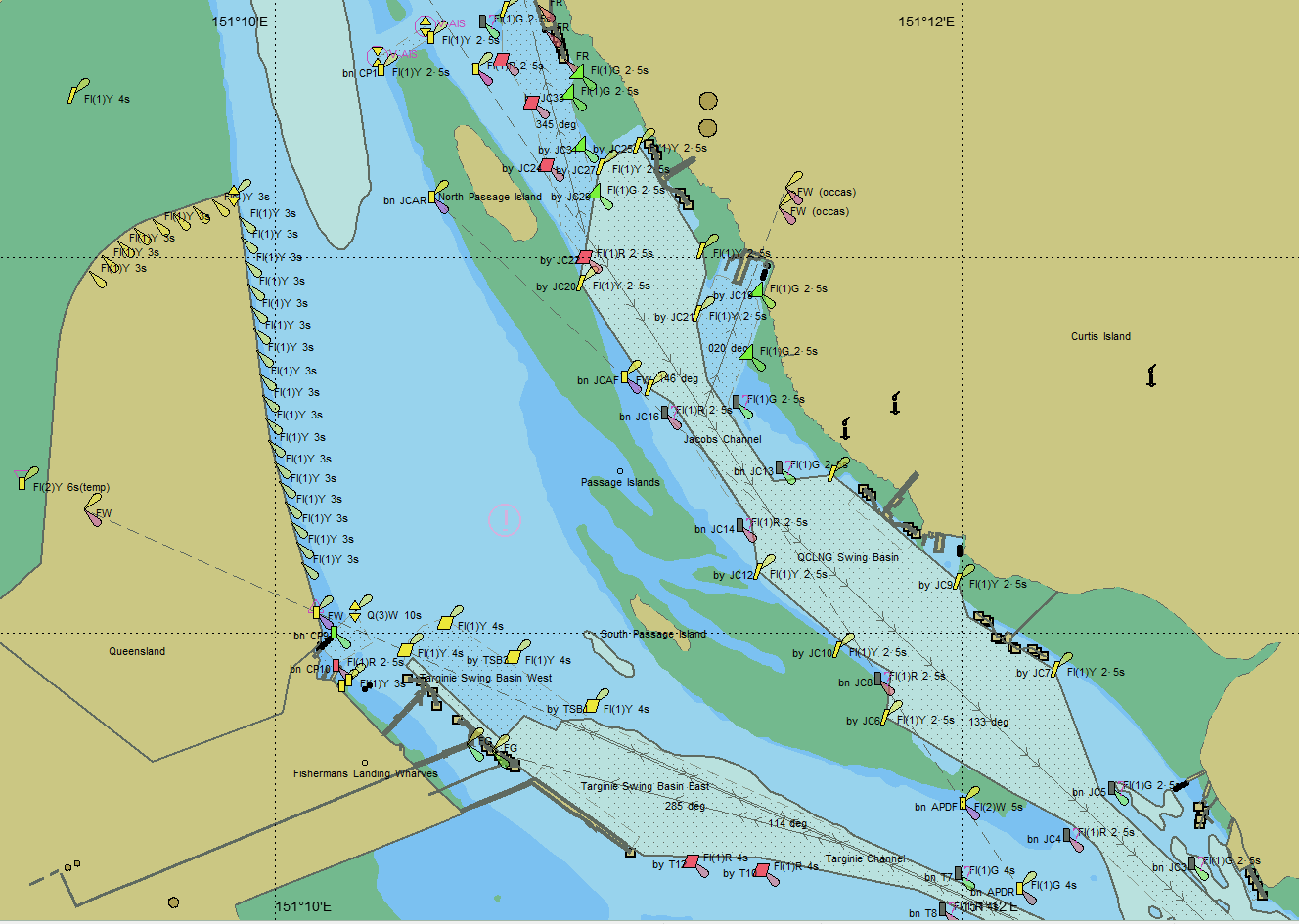
*Figure 1 - Wyndham Harbour, Victoria. (Photo courtesy: Sail Escapade)*

Where pedestrian access is permitted, pathway or street lighting is sometimes, but not always, provided. Pathway or street lighting can be used to provide a non-conventional means of ensuring breakwaters are illuminated.

**Large Commercial Ports -** A number of Australia’s larger ports incorporate a combination of special marks, spaced at an equal distance apart (approx. 200m), in a similar fashion to that illustrated in section 3.3. Examples of where ‘Special Marks’ have been used extensively to mark breakwaters include the Port of Brisbane and Port of Townsville. Examples of marking arrangements are included below:



*Figure 2 - Fisherman’s Island, Port of Brisbane*

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*Figure 3 - Fisherman’s Landing, Port of Gladstone*



*Figure 4 - Townsville Marina Breakwater, Townsville*

Maritime Safety Queensland, the state of Queensland’s maritime safety authority, identifies the need to ensure that breakwaters (bund/revetment rock wall) that present a hazard to navigation are appropriately marked. Maritime Safety Queensland provides the following extract:

*Extract from Maritime Safety Queensland’s Visual Marine Signalling Standard:*

*Note: In certain circumstances the Regional Harbour Master (RHM), in consultation with the Executive Director (Maritime Services), may require the use of unendorsed signal lanterns to suit a specific or particular AtoN application.*

*In situations where the construction of a bund/revetment rock wall has the potential to create a hazard or interfere with the safe navigation of vessels, the RHM will direct the proponent to install a series of equally spaced yellow flashing lights around the entire waterside perimeter of the wall. Spacing between lights will be dependent on the length of the wall and will be determined by the RHM.*

*In areas where mains power is not available, MSQ recommends that the proponent installs a series of equally spaced and aligned yellow SL-70 synchronised lanterns, set on a 3s flashing characteristic (0.3 +2.7 + 3s).  As the SL-70 is a low intensity (adjustable) 2Nm light, it should not interfere with any other AtoN installations within the vicinity of the rock wall.*

# Conclusion

The co-sponsors of this paper propose that small networks of special marks provide an appropriate and recognised means of marking breakwaters that present a hazard to navigation. The ARM committee is requested to consider the information provided within this paper when revising O-139.

# References

1. Regulations for Function and Specification of Aids to Navigation of Republic of Korea
2. Maritime Safety Queensland Visual Marine Signalling Standard

# Action requested of the Committee

The Committee is requested to:

1. Note the information provided within this paper, and
2. Consider the information in this paper when revising O-139.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)