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Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM X ENG **□** PAP X Input

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

Agenda item [[2]](#footnote-3) n.n

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

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Singapore’s Charting of Dual Intensity LED Lanterns

# Summary

The Maritime and Port Authority of Singapore (MPA) recognises the need to enhance safety of navigation by improving the conspicuity of lights of Aids to Navigation (AtoNs) when there is strong backscatter of lights. MPA has explored the use of Dual Intensity Lanterns (DILs) along the approaches to the Singapore’s terminals where there is strong background lighting, over three phases of trials from 2017 to 2020. The objectives of the trials were to review the feasibility; advantages and disadvantages; and practicability of DILs including early detection, recognition and identification. DILs were installed on selected AtoNs, and harbour pilots and mariners participated in these trials. Up to 85% of those who participated gave positively feedbacked that DILs improved detection, recognition and identification of AtoNs against strong background lighting for safe navigation. Resulting from the successful trials, DILs were deployed on six selected, existing beacons.

## Purpose of the document

This paper describes the charting actions done by MPA, in consultation with the United Kingdom Hydrographic Office (UKHO), for the deployment of DILs and requests IALA notes the development of standardised charting and display symbology for DILs.

## Related documents

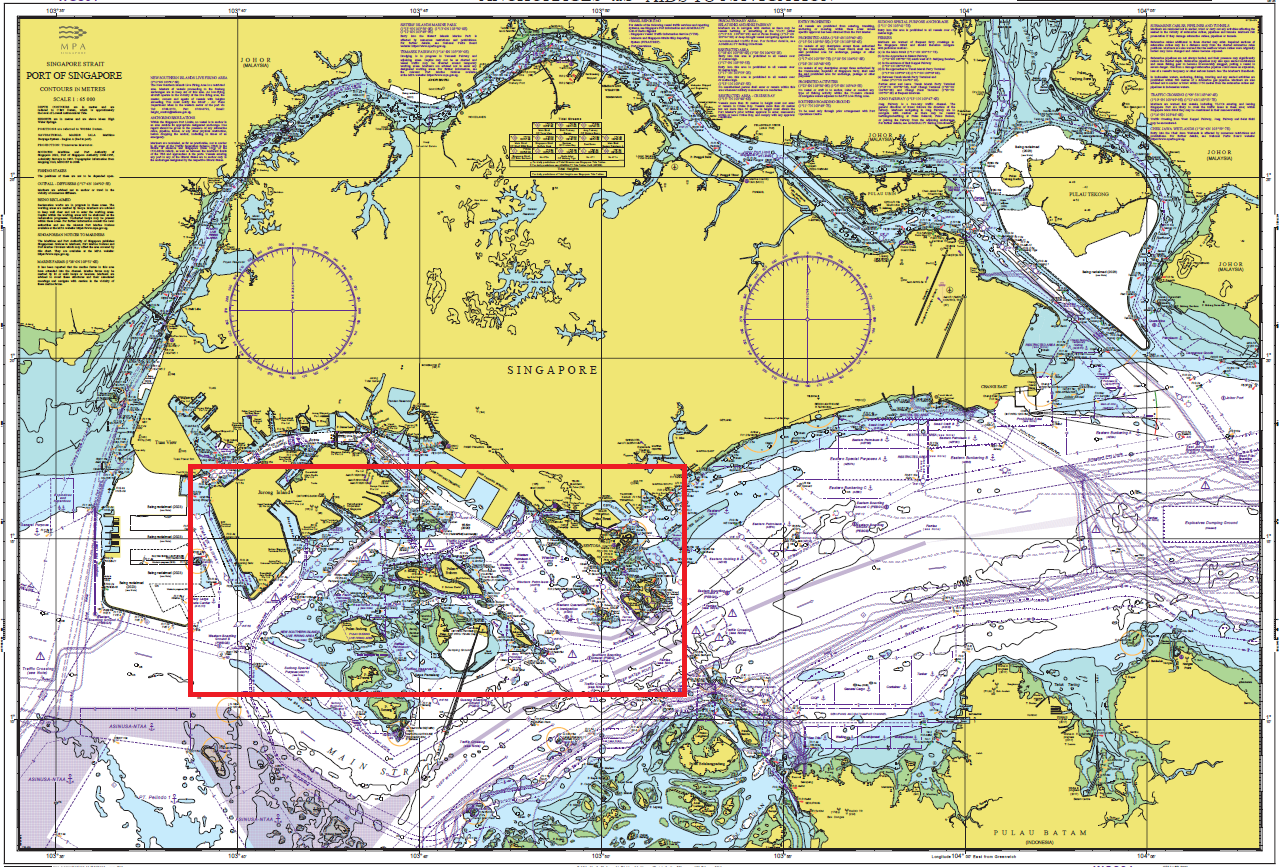
* G1073 Conspicuity of AtoN Lights at Night
* IHO S-4, Regulations for International (INT) Charts and Chart Specifications of the IHO
* IHO S-57, IHO Transfer Standard for Digital Hydrographic Data
* IHO INT 1, also Admiralty NP5011, Symbols and Abbreviations used on Paper Charts

# Background

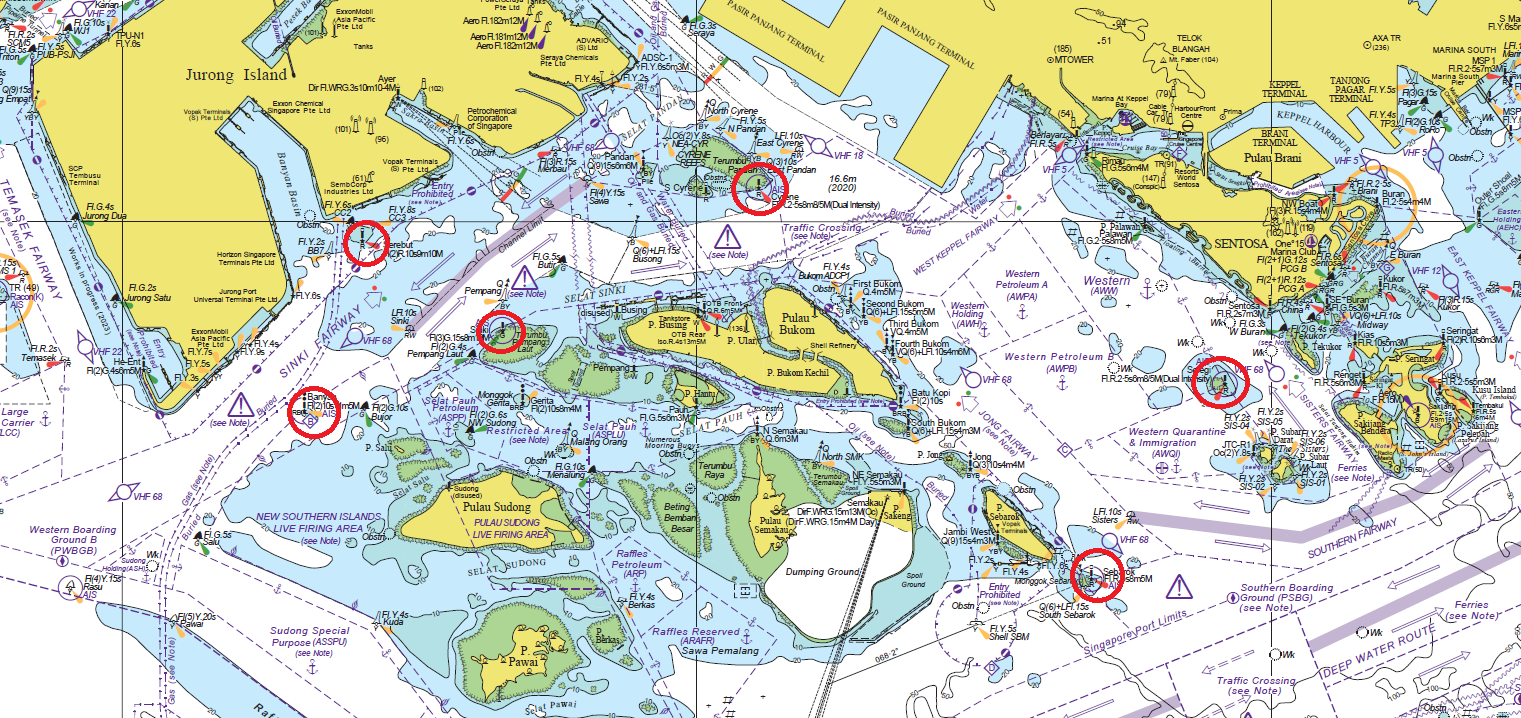
DILs were deployed in the approaches to Singapore where oil and container terminals are situated along the nearby coast. These oil and container terminals are lit throughout the night with bright lights and flares which interfered with mariners’ ability to visually detect, recognise and identify AtoNs in a timely manner while transiting the area (**Figure 1**). Six existing beacons which would benefit from improved conspicuity of AtoN lights against strong background lighting were identified for DIL deployment after consultation with stakeholders (**Figures 2 and 3** shows the locations of the six DILs).



**Figure 1**: Strong background lighting at the approaches to Singapore

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**Figure 2**: Singaporean Chart (SP1) of Anchorages and Aids to Navigation in Singapore

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**Figure 3**: Extract from SP1 (Figure 2) with DILs highlighted

# Discussion

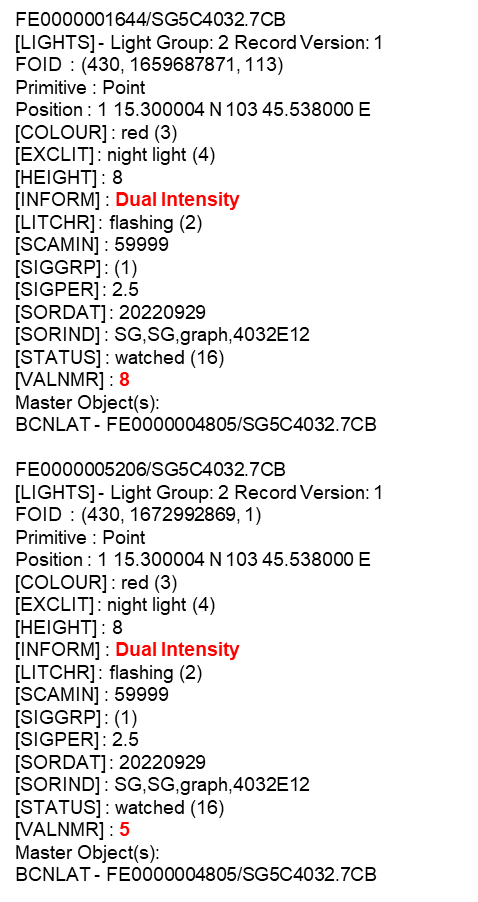
With the pending deployment of the DIL, there was a need to ensure proper charting action was established to inform mariners of the deployment. As MPA and the UKHO jointly-produce dual-badged charts covering Singapore waters, we collaborated to review how best to chart the unique light character of the DILs in both paper nautical charts and electronic navigational charts (ENCs).

Taking reference from IHO S-4 and INT 1, the following light character were charted for the DILs on paper nautical charts:

**AtoN Charting**

* 1. Cyrene - Fl.R.2,5s8m8/5M(Dual Intensity)
  2. Sinki - Fl(3)G.15s8m8/5M(Dual Intensity)
  3. Serebut - Fl(2)R.10s9m8/5M(Dual Intensity)
  4. Banyan - Fl(2)W.10s11m8/5M(Dual Intensity)
  5. Selegi - Fl.R.2,5s6m8/5M(Dual Intensity)
  6. Sebarok - Fl.R.5s8m8/5M(Dual Intensity)

On ENCs, the following attributes were encoded, taking reference from IHO S-57:

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**Figure 4**: DIL encoded in ENC

**Conclusion**

Our stakeholders had feedbacked that there was a positive impact of the developed DIL when deployed on AtoNs affected by strong background lighting. The potential benefits of the DIL allow mariners to navigate safer and more expeditiously. Following the successful deployment of the DILs, MPA recommends for the standardisation of charting and usage of DILs, particularly for critical AtoNs where strong background lighting interferes with the detection, recognition, and identification.

# References

1. G1073 Conspicuity of AtoN Lights at Night
2. IHO S-4, Regulations for International (INT) Charts and Chart Specifications of the IHO
3. IHO S-57, IHO Transfer Standard for Digital Hydrographic Data (and associated relevant Component Documents)
4. IHO INT 1, also Admiralty NP5011, Symbols and Abbreviations used on Paper Charts

# Action requested of the Committee

The Committee is requested to:

1. to review the information of this paper and
2. to note and collaborate within the IALA Committees and with the International Hydrographic Organization (IHO) for standardised charting standards.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-2)
2. Leave open if uncertain [↑](#footnote-ref-3)