



IALA ENG COMMITTEE

REPORT OF THE 15TH SESSION OF THE IALA ATON ENGINEERING AND SUSTAINABILITY (ENG) COMMITTEE

28 February to 17 March 2022

Jaime Alvarez
Committee Secretary

17 March 2022

10, rue des Gaudines – 78100 Saint Germain en Laye, France
Tél. +33 (0)1 34 51 70 01 – Fax +33 (0)1 34 51 82 05 – contact@iala-aism.org

www.iala-aism.org

International Association of Marine Aids to Navigation and Lighthouse Authorities
Association Internationale de Signalisation Maritime

This page intentionally blank

**Report of the 15th Virtual Session of the IALA
AtoN Engineering and Sustainability (ENG) Committee
28 February to 17 March 2022
Executive Summary**

The 15th meeting of the ENG Committee (ENG14) was held virtually from 28 February to 17 March 2022.

The session was attended by 111 registered participants from 30 countries. 16 participants attended for the first time.

Working in four working groups, the Committee considered 44 inputs and produced 16 output documents.

The Committee produced a liaison note to all committees for the proposed Workshop on Sustainability planned to be carried out in November 2023. A first technical programme was drafted with the purpose to continue the work through the selected Steering Committee.

The Committee reviewed the following recommendation:

- ENG15-12.1.2 Revision of R0204 Marine Signal Lights-Determination and Calculation of Effective Intensity
- ENG15-12.2.2 R0141 Training and Certification of Marine Aids to Navigation Personnel (E-141) Ed4.1 December 2017

The Committee reviewed and produced the following guidelines:

- ENG15-12.1.1 Revision of annex B of the G1135 on determination and calculation of effective intensity
- ENG15-12.2.1 Draft Guideline on quality checks for 3rd Party AtoN Service Providers
- ENG15-12.2.3 Draft Guideline on solar modules for a marine environment
- ENG15-12.3.1 Revision of the G1127 on systems and services for high-accuracy positioning and ranging
- ENG15-12.3.2 Revision of the G1129 on the retransmission of SBAS Corrections Using MF-radio beacon and AIS
- ENG15-12.3.3 Draft G1147 on the use of Enhanced Radar Positioning System (ERPS)

The Committee produced the following liaison notes:

- ENG15-12.0.1 Liaison note to all committees on sustainability workshop
- ENG15-12.1.3 Liaison note to ARM on definition of nominal range
- ENG15-12.3.4 Liaison note to ENAV Committee on R-Mode Standardisation
- ENG15-12.3.5 Liaison note to ENAV regarding the IMO position on VDES and digital VHF support at WRC-27
- ENG15-12.3.7 Liaison note to RTCM SC104 on R-Mode messages
- ENG15-12.4.1 Input to Council on the change of selection process of the Heritage Lighthouse of the Year

Planned intersessional work:

- Progress by steering committee meetings on the Workshop on Sustainability
- Develop E-112 Leading Lights and 1023 Leading Lines into a Guideline

- Continue work on the draft Guideline on Extreme Environmental Conditions
- Continue work on radar reflectors
- Progress the Guideline on Resilient PNT
- Progress the Guideline on R-Mode MF

The following table shows a summary of the ENG Committee task plan for the work period 2018-2023 and the progress made to date.

Overall status of the ENG Committee 2018-2023 Work Programme after ENG15:

Task		WG	Start Session	Planned End Session	Revised End Session	Progress Indicator			Status Overview
						Green	Yellow	Red	
Standard 1010 – AtoN planning and service requirements									
1.1.1	Revised guidance on Simulation Technology to revise G1097 in cooperation with ARM task 1.2.4	2	8	14					This task is continued by ARM
1.2.1	Develop Guidance on checking that 3rd party AtoN providers are providing what they are obliged to provide– 3rd party AtoN provider quality control. (Joint ARM cooperation)	2	9	14	15				Completed in ENG15, seeking approval in the Council
Standard 1020 – AtoN Design and delivery									
2.1.1	Review and update V-119 on the Implementation of Vessel Traffic Services (R0119) (Output to be a revised Recommendation and associated Guideline),(includes task 1.1.3)	1	8	12					Both for approval to Council
2.1.2	Develop Guideline on Port Traffic Signals	1	11	14					Likely to be next work plan
2.1.3	Develop E-112 Leading Lights and 1023 Leading Lines into a Guideline	1	9	14					Likely to be next work plan
2.1.4	Complete Guideline 1061 Illumination of structures	1	10	14					Likely to be next work plan
2.1.5	Update Guideline 1048 LED technologies and their use in signal lights	1	10	14					
2.1.6	Review & update guideline 1043 on Light sources Note: The old task in the 2014-2018 work period was Merge and update Guideline 1043 On Light Sources and Guideline 1048 on LED Technologies and Guideline 1049 on the Use of Modern Light Sources in Traditional Lighthouses (Task 5.1.9). Should this old task replace 2.1.5 and 2.1.6 as Task 2.1.5?	1	10	14					
2.1.7	Develop a guideline for E-106 Retroreflective materials	1	8	9					Completed
2.2.1	Develop E200-3 on light measurement into a Guideline	1	11	14					Likely to be next work plan
2.2.2	Develop new recommendation on marine light Terms of Measurement	1	12	14					Possibly needs to be pushed into new work plan

2.2.3	Develop E200-5 on Optical Performance into a Guideline	1	12	14					
2.2.4	Revise Guideline on effective intensity	1	9	11					Completed
2.2.5	Develop Guidance on monitoring of function and degradation of AtoN light sources	1	9	14					
2.2.6	Develop Guidance on service factor	1							
2.2.7	Develop Guidance on Colour fading of AtoN (plastic and painted) – methods to measure and assess	1	10	14					
2.2.8	Finish guideline G1148 Marine Signal Lights - Calculation of Luminous Intensity and Range Develop Guidance on service factors	1	8	10					Completed
2.2.9	Update Guideline 1041 on Sector Lights	1	9	14					
2.3.1	Develop guidance to identify appropriate standards for AtoN equipment with extreme environmental conditions. Humidity, temperature, enclosure ratings, UV etc) Also including peak intensity specification for LED AtoN, batteries, optic service factor, thermal cap, etc.	2/1	10	16					
2.3.2	Complete guidance on Maintenance of AtoN structures	2	8	12					Completed
2.3.3	Develop Guideline on meteorological and oceanographical data dissemination	2	8	14	16				Cancelled
2.3.4	New Recommendation on the Responsible Design & Maintenance of AtoN (updated to include safety, sustainable design, and relevant building codes and standards)	2	8	10					Completed
2.3.5	Joint workshop with all 4 technical committees on Cyber Security in AtoN operations	2	8	12	14				Completed
2.3.6	Develop Guideline on the Sustainable Structural Design of Marine Aids to Navigation	2	14	14					Completed
2.4.1	Develop Guidance on what constitutes a good marine AtoN solar panel	2	10	14	16				Completed in ENG15, seeking approval in the Council
2.4.2	Deliver a Workshop - IALA AtoN Engineering	1	11	13	14				Deferred to next work period
2.4.3	Monitor Battery development for use in AtoN	2	8	14					
2.5.1	Develop guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them	2	8	13	16				merged with 2.5.3
2.5.2	Develop new guideline on radar reflector (reflection) properties	2	8	13	16				
2.5.3	Creating an overview guidance on floating AtoN	2	8	13	14				merged in 2.5.1
2.6.1	Develop Guidance on modern equipment in traditional lighthouses	2	10	14					likely to be postponed 2023-2026

2.6.2	Monitor Climate Change to inform IALA of impact and potential adaptation requirements for AtoN providers	2	8	14					
2.6.3	1.1.1. IALA Heritage website: - Establish a World Heritage Lighthouse Cyber Centre, accessible via the IALA website. - Establish a database on World Heritage Lighthouses.	4	8	14					
2.6.4	Establish a concept for nominating one lighthouse as World Heritage Lighthouse of the year for each 'World AtoN Day'.	4	8	14					
2.6.5	Deliver Heritage Workshop	4	8	11	14				
2.7.1	Revise Recommendation R1004 to reference the UN Sustainable Development Goals	2	8	10	14				Completed
Standard 1030 – Radionavigation services									
3.1.1	Resilient PNT (applicable to all technical domains) – (identification, potential impact and mitigations)	3	8	11	16				
3.2.1	Terrestrial radionavigation systems	3	10	12					Completed
3.2.2	R-Mode (MF)	3	10	14	16				
3.2.3	R-Mode (AIS/VDES)	3	10	14					Task closed – VDES GL moved to ENAV
3.2.4	Workshop on R-Mode in 2019	3	9	10					Completed
3.2.5	Develop and maintain relevant Product Specifications eg. S-245 eLoran ASF data, S-246 eLoran transmitting station alamanac, S-247 Differential Loran reference station etc.	3	10	14	16				
3.2.6	Guidance on timing and synchronisation	3	8	14	-				Run over into the new work period
3.2.7	eRacon (standard approach) ; Review recommendations ENAV146 & R-101 & Guideline 1010	3	11	14	16				New Guideline produced as output of ENG15. Review of documents to run over into the new work period
3.3.1	Consideration of how and when to use SBAS in maritime.	3	9	13					GL updated at ENG15.
3.4.2	Review existing DGNSS infrastructure and provide guidance for current system	3	10	12	14	16			
3.4.3	New Recommendation on augmentation for maritime use	3	8	10	13				complete
3.4.4	Provide guidance, strategy and advice on potential new uses of marine beacon DGNSS infrastructure	3	9	11					Item merged with 3.4.2
3.4.5	High accuracy systems	3	10	14	15				Completed in ENG15, seeking approval in the Council

3.5.1	Review and update current documentation under the preview of PNT WG	3	8	14	16				
3.5.2	Monitor developments in GNSS, DGNSS, radar, resilient PNT, e-Pelorus, terrestrial systems, R-Mode, inertial and any other relevant areas etc.	3	8	14	16				
3.6.1	Update to ITU M.823, potential replacement for A.915, Liaison with IMO, ITU, RTCM, etc on related topics and project areas.	3	8	14	16				
3.7.1	Input to MSP, Integrity considerations for resilient PNT, cybersecurity impact for PNT data, DATUM considerations	3	10	14	16				
Standard 1050 Training and Certification									
4.1.1	Development and review of WWA courses	1,2,3	8	14					
4.2.1	Navguide updates and review	VC	9	14					
Standard 1060 – Digital communication technologies									
5.1.1	Review telemetry Guideline 1008	2	10	14					Deferred to next work period
5.1.2	Review of engineering support for e-navigation services, (including hot/cold climates & radio propagation). TO BE CONFIRMED	3	8	14	16				

Legend:

Green – progress as planned

Yellow – task needs more time, target time prolonged

Red – very little progress on the task, target time prolonged

Grey – task completed / deleted

Blank – task not started

Table of Contents

Contents

Executive Summary.....	3
Table of Contents	8
1. General	12
1.1 Welcome from the IALA Secretary-General and Deputy Secretary-General	12
1.2 Approval of the agenda	12
1.3 Apologies and Introductions	12
1.4 Working arrangements for ENG15	13
1.5 Style Guide	14
1.6 ENG committee structure	14
2. Review of action items from ENG14	14
3. Review of input papers.....	14
3.1 Input papers	14
4. Reports from other bodies	14
4.1 Reports from IALA	14
4.1.1 IALA Council	14
4.1.2 IALA Policy Advisory Panel (PAP)	15
4.2 MASS task group	16
4.3 IMO Meetings	16
4.4 IHO/IALA liaison	17
4.5 ITU	17
4.6 RTCM	18
4.7 PIANC	18
4.8 ESBN Tsunami monitoring	18
5. Reports from Rapporteurs.....	18
6. Advertising Online Presentations	18
7. Overview of planned work for ENG14.....	18
8. Establish Working Groups	19
8.1 Establishing working groups	19
9. Working Group 1 – Visual & Physical AtoN	19
9.1 Develop Guideline on Port Traffic Signals (Task 2.1.2)	19
9.2 Develop E-112 Leading Lights and 1023 Leading Lines into a Guideline (Task 2.1.3)	19

9.3	Update Guideline 1048 LED technologies and their use in signal lights (Task 2.1.5)	20
9.4	Review & update guideline 1043 on Light sources (Task 2.1.6)	20
9.5	Develop E200-3 on measurement of light into a Guideline (Task 2.2.1)	20
9.6	Develop new Recommendation on Marine Light Terms of Measurement (Task 2.2.2)	20
9.7	Develop E200-5 on Optical Performance into a Guideline (Task 2.2.3)	20
9.8	Revise Guideline on effective intensity (Task 2.2.4)	20
9.9	Develop Guidance on monitoring of function and degradation of AtoN light sources (Task 2.2.5)	21
9.10	Develop Guidance on service factors (Task 2.2.6)	21
9.11	Develop Guidance on Colour fading of AtoN (plastic and painted) – methods to measure and assess (Task 2.2.7)	21
9.12	Finish Guideline G1148 Marine Signal Lights - Calculation of Luminous Intensity and Range (Task 2.2.8)	21
9.13	Update G1041 on Sector Lights to define ‘Angle of Uncertainty’ (Task 2.2.9)	21
9.14	Deliver a Workshop - IALABATT/ IALALITE (Task 2.4.2)	21
10.	Working Group 2 – Knowledge & Sustainability	21
10.1	Third party quality control (Task 1.2.1.)	21
10.2	Extreme environmental conditions (Task 2.3.1.)	21
10.3	Develop Guideline on meteorological and oceanographical data dissemination (Task 2.3.3.)	22
10.4	Solar Panel Guideline (Task 2.4.1)	22
10.5	Develop guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them (Task 2.5.1)	22
10.6	Radar Reflector (Task 2.5.2.)	23
10.7	Modern Equipment in traditional Lighthouses (Task 2.6.1)	24
10.8	Review of IALA World-Wide Academy input paper	24
10.9	Review telemetry Guideline 1008 (Task 5.1.1.)	24
10.10	Input paper ENG15-3.1.4.2 Training for Light Keepers and Workers	24
11.	WORKING GROUP 3 – Radionavigation Services.....	25
11.1	Resilient PNT (Task 3.1.1)	25
11.2	Terrestrial radionavigation systems (Task 3.2.1)	25
11.3	R-Mode (MF) (Task 3.2.2)	25
11.4	R-Mode (AIS/VDES) (Task 3.2.3)	25
11.5	Workshop on R-Mode in 2019 (Task 3.2.4)	25
11.6	R-Mode testbed progress coordination (Task 3.2.5)	25

11.7	Develop and maintain relevant product specifications (Task 3.2.6)	26
11.8	Guidance on timing and synchronisation (Task 3.2.7)	26
11.9	eRacon (standard approach); Review recommendations ENAV146 & R-101 & Guideline 1010 (Task 3.3.1)	26
11.10	Consideration on how and when to use SBAS (Task 3.4.1)	26
11.11	Review of existing DGNSS infrastructure and provision of guidance for current system (Task 3.4.2)	26
11.12	Recommendation on augmentation for maritime use (Task 3.4.3)	27
11.13	Provide guidance, strategy and advice on new uses of marine beacon DGNSS infrastructure (Task 3.4.4.)	27
11.14	High accuracy systems (Task 3.4.5.)	27
11.15	Review and update current documentation under the purview of PNT WG (Task 3.5.1)	27
11.16	Monitor developments in GNSS, DGNSS, radar, resilient PNT, e-Pelorus, terrestrial systems, R-Mode, inertial and any other relevant areas etc. (Task 3.5.2)	27
11.17	Liaison with sister organisations (IMO, ITU, RTCM etc.) on related topics (Task 3.6.1)	27
11.18	Input to MSP, Integrity considerations for resilient PNT, cybersecurity impact for PNT data, datum considerations (Task 3.7.1)	28
12.	WORKING GROUP 4 – The Heritage Forum.....	28
12.1	Heritage seminar (Task 2.6.5)	29
12.2	IALA HLY Future Direction Update (Task 2.6.4)	29
12.3	Plaque for IALA HLY	29
12.4	IALA Heritage Lighthouse of the Year (IALA HLY) 2023 (Task 2.6.4)	29
12.4.1	Nominations and means of arriving at a commendation	30
12.4.2	The Three Lighthouses Commended for consideration at IALA HLY 2023	30
12.5	IALA Heritage Lighthouse of the Year (IALA HLY) 2023 and beyond (Task 2.6.4)	33
12.6	Publicising IALA HLY	33
12.7	Heritage Lighthouse Database and Cybercentre (tasks now combined and re-named ‘IALA Heritage Webpage’) (Task 2.6.3.& 2.6.4)	33
12.8	Celebrating the 200 Year Anniversary (in 2023) of Fresnel’s work at Cordouan Lighthouse	33
13.	Review of output and working papers	34
14.	Review of session report	34
15.	Date and venue of next meeting	34
16.	Close of the Meeting	34
17.	List of Annexes.....	34

ANNEX A Agenda 35

ANNEX B List of Participants..... 37

ANNEX C List of Input Papers 41

ANNEX D List of Output and Working Papers..... 43

ANNEX E Action Items 45

Report of the 15th Session of the IALA ENG Committee

1. GENERAL

The 15th session of the IALA AtoN Engineering and Sustainability Committee (ENG) was held virtually from 28 February to 17 March 2022.

The Dashboard area is well known at this stage by the committee participants and with the support of platforms such as Teams, Outlook groups and Nextcloud, the activities ran smoothly and coordinated across the number of task groups.

Simon Millyard introduced himself and the WG chairs and welcomed newcomers to IALA.

1.1 Welcome from the IALA Secretary-General and Deputy Secretary-General

The Secretary-General, Francis Zachariae, welcomed all participants and was glad to see them all, hopefully for the last time in virtual mode since more and more countries have lifted or are in the process of lifting the restrictions and it seems the virus is getting weaker and will allow us to return to a normal life. The Secretariat have started normal work routine in the HQ and travel is starting to fill up the agendas again. The Secretary-General believes that the next round of committee meetings will be face to face, with a possibility to participate online if travel is not an option. Face to face meetings are recommended as soon as possible. The Secretary-General noted with special interest the updated MBS, the changes in the structure of documents for leading lights, developments in sustainability, which he confirmed is close to the Chairs heart, developments in PNT from around the world, the news from the Heritage group and of course the draft Standards that needs to be finalized before the General Assembly next year. He wished all good luck since there will not be much spare time.

The Secretary-General recalled the successful signing ceremony on the new IALA IGO convention with a huge number of delegations. A fantastic day and with the great result, that 51 States signed the Convention. When 30 States have ratified, accepted, or acceded to the Convention, IALA will be an IGO. That could happen within the next few years. The Secretariat is working on all the new structures and administrative issues that need to be in place for the new Organization.

The Secretary-General reminded everyone of the difficult times for the IALA friends and their families and in particular the people of Ukraine. He emphasized on the privilege to work for an organisation that seeks to bring people together in a spirit of cooperation and compromise, and where understanding and mutual respect are important. The international institutions and global corporation have again proven to be very important.

The Secretary-General wished all the participants good luck and thanked them once again for their contribution to the global safety of navigation over this busy period.

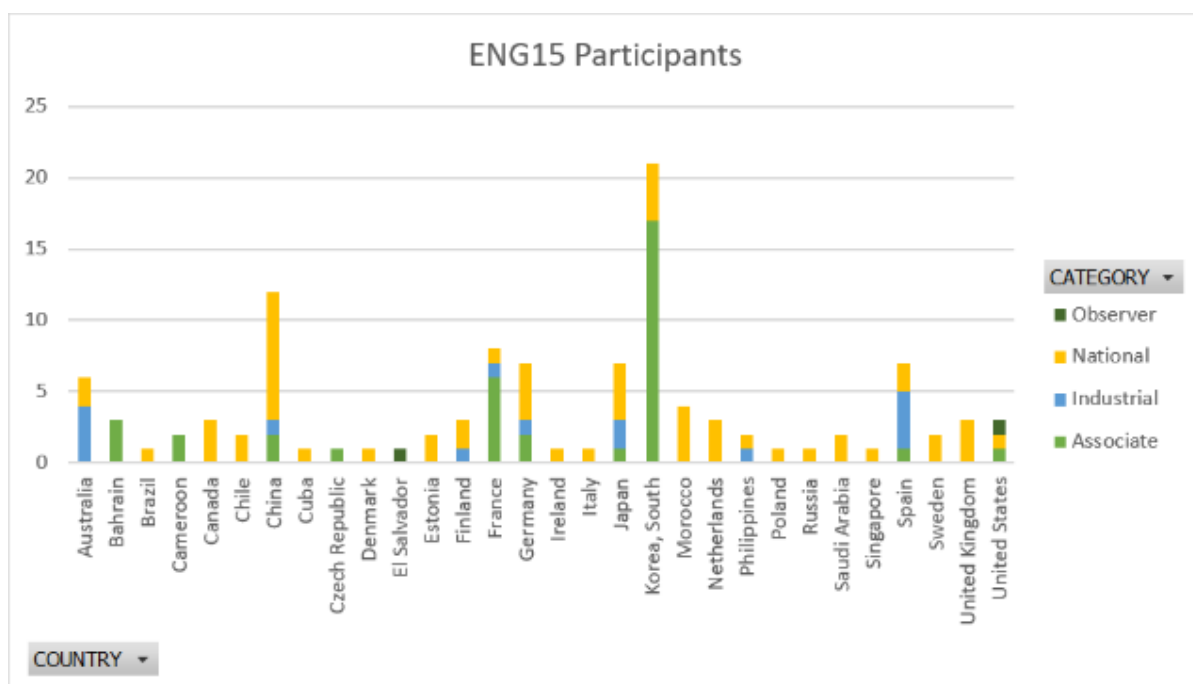
1.2 Approval of the agenda

The agenda (ENG15-1.2.1) was adopted.

1.3 Apologies and Introductions

The session was attended by 111 registered participants from 30 countries. 16 participants attended for the first time.

The following chart shows an analysis of participants:



The list of Committee Members who attended ENG15 is shown in ANNEX B. New participants were welcomed in addition to those returning to the Committee.



1.4 Working arrangements for ENG15

The following statements were read to Committee members:

IALA is required to comply with the General Data Protection Regulations of the European Union. In the report of this meeting, IALA will include a list of participants with their contact information. Any participant who wishes to remove their personal information from the participants' list should advise the Committee Secretary as soon as possible.

If anyone present has knowledge of any patents, including pending Patents, held either by themselves or by other organisations or individuals, the use of which may be required to practice or implement the content of IALA Documents being developed or worked on in this Committee to inform the IALA Secretariat.

The Secretary briefly presented the Dashboard developed by IALA staff which will continue to be the One-Stop-Shop for conducting the Committees and centralised all the information, status and meeting needs for the member during the Committee working period.

1.5 Style Guide

The Secretary recalled the [IALA Style Guide](#) designed to assist those members in preparing and reviewing IALA documentation. The purpose of this guide is to provide a common language, structure, and appearance.

This document is divided into three main parts:

- Style - Content (section 2) - this includes the preferred standards for grammar, language, punctuation, and spelling.
- Structure – Structure and formatting (section 3) - this includes how documents should be structured and ordered and includes the use of customised styles and fields in Microsoft Word.
- Appendices – including a supplementary table of spelling, a summary of the styles applied within the document templates and an extract from the IALA Brand Guidelines to illustrate the corporate colours.

1.6 ENG committee structure

The Chair then introduced and gave the floor to the Working Group Chairs and Vice Chairs:

- WG1 Light & Vision Physics chaired by Malcolm Nicholson
- WG2 Technical Knowledge and Sustainability chaired by Peter Schneider and Jörg Unterderweide
- WG3 Radionavigation Services chaired by Alan Grant
- WG4 Heritage Forum chaired by Peter Hill

2. REVIEW OF ACTION ITEMS FROM ENG14

Input paper ENG15-2.1.1 refers. Action items for the IALA Secretariat from ENG14 were noted as complete. WG chairs were requested to review Members actions.

3. REVIEW OF INPUT PAPERS

3.1 Input papers

It was noted that all input papers were available on the IALA website. The Committee considered 44 input papers, some of them were received the week before the opening plenary. Chairman requested participants to forward the input papers before the deadline in order to provide enough time to be read.

4. REPORTS FROM OTHER BODIES

4.1 Reports from IALA

4.1.1 IALA Council

Minsu Jeon, IALA Technical Manager, provided the committee with the report of Council 74 (ENG15-4.1.1.1), which was held in December 2021. The following points are relevant to note for the ENG Committee:

- The Council Strategy Drafting Group meeting revised the Drivers and Trends document
- KRISO Technical cooperation on Maritime Resource Name MoU signing ceremony
- Council workshop on MASS

The Council approved two recommendations and twelve guidelines and three model courses:

New and revised recommendations:

- Revised R0139 The Marking of Man-made Offshore Structures Ed3.0.

- Revised R0126 The Use of AIS in Marine Aids to Navigation Ed2.0.

New and revised guidelines:

- Revised G1078 The Use of AtoN in the Design of Fairways & Channels Ed2.0.
- Revised G1054 Preparing for an IMO Audit on Aids to Navigation Service Delivery Ed2.0.
- New G1162 The Marking of Offshore Man-made structures Ed1.0.
- New G1163 The Marking of Breakwaters and barriers Ed1.0.
- New G1164 Management of Maritime Resource Name Organization Identifiers Ed1.0.
- Revised G1065 AtoN Signal Light Beam Vertical Divergence Ed4.1.
- New G1165 Sustainable Structural Design of Marine Aids to Navigation Ed1.0.
- Revised G1014 Accreditation of VTS Training Organizations and Approval to Deliver IALA VTS Model Courses Ed4.0.
- Revised G1110 Use of Decision Support Tools for VTS personnel Ed2.0.
- New G1166 VTS in Inland Waters Ed1.0.
- New G1167 VTS Management Ed1.0.
- Revised G1128 The specification of e-navigation technical service Ed1.3.

Revised model courses:

- Model Course C2001-8 L2 Module 1.13 Maintenance of Steel Buoys Ed3.0.
- Model Course C2001-9 L2 Module 1.14 Power Sources on Buoys Ed3.0.
- Model Course C2007-1 L2 Module 7.1&2 Racons Ed3.0.

Other actions:

- Withdrawn IALA Recommendation R0200 overview of E-200 series (E-200-0).
- Update to VTS documentation on the adoption of revised IMO resolution A.1158(32)
- Update of the current drivers and trends
- Approved the revised committee workshop programme for 2018-2023
- Input paper on AIS ASM survey: Information paper to IMO MSC 105 on Visualization of AIS AtoN and ASM in Navigation Equipment

4.1.1.1 Heritage Lighthouse Award

WG4 Chair Mr. Peter Hill recalled the importance of the culture and the heritage that these lighthouses provide beyond their function as AtoN. Nominations have been opened for the 2022 accolade until the 28th February and a number of proposals were received— this link is at IALA members disposal <https://heritage.iala-aism.org/> for more information and get the template to submit information for the nomination.

4.1.2 IALA Policy Advisory Panel (PAP)

4.1.2.1 Technical Documents Catalogue

A new updated publication made available by the secretariat (Ed.4), putting all the Standards, Recommendations and Guidelines together, the online [version](#) is at disposal of the members to look at the IALA documents.

4.1.2.2 Sustainability

Simon Millyard underlined the sustainability matter in the scope of IALA. Simon Millyard recalled the submission of an input to PAP (ENG14-12.0.2) gathering ideas related to climate change and environmental actions in IALA. This paper was welcomed by the PAP and after a positive discussion the PAP suggested ENG consider a workshop on Sustainability and a presentation at the General Assembly. A plan for this workshop was developed at ENG15.

4.1.2.3 2023-2027 Work Plan

ENG Vice-Chair Michel Cousquer briefed about the document ENG Work plan draft 2023-2027 (ENG15-4.1.2.3) which is the result of the working groups preparations to achieve the number of tasks proposed for the next period 2023-2027. The tasks are split by Standards and the output document expected with each of the tasks. The tasks are also pre-allocated to a certain working group assuming that the working group will remain the same during the next work plan. Vice-Chairs also expressed the possibility to comment on the plan and any remark from the members will be considered. WGs are requested to review and add to this document to enable it to be considered a final draft after ENG15.

4.2 MASS task group

Simon Millyard reported the latest outcomes from this group. ENAV Committee have drafted a Guideline on MASS and each Committee (including LAP) is invited to contribute into the different sections of the Guideline with their respective technical expertise. Working Groups 1,2 & 3 in ENG are requested to develop their allocated sections. ENAV will retain overall ownership of the Guideline. This was cited as a good example of inter committee working.

The 4 topics allocated to ENG are PNT, Position augmentation, Power availability and Conventional AtoN visibility to MASS

4.3 IMO Meetings

Minsu Jeon presented the status of discussion on IMO meetings since the ENG14, the implication of IALA on them and the schedule of meetings for 2022:

- STCW
- MASS
- Maritime services
- Modernisation of GMDSS

Date	Meeting	Type	Topics
7 – 11 February	SUB-COMMITTEE ON HUMAN ELEMENT, TRAINING AND WATCHKEEPING (HTW) – 8th session	Remote meeting	• STCW
20 – 29 April	MARITIME SAFETY COMMITTEE (MSC) – 105th session	TBC	• MASS
9 – 13 May	FACILITATION COMMITTEE (FAL) – 46th session	TBC	• Compendium, MSW
16 – 20 May	6th meeting of the Expert Group on Data Harmonization	TBC	• Data elements
21 – 30 June	SUB-COMMITTEE ON NAVIGATION, COMMUNICATIONS AND SEARCH AND RESCUE (NCSR) – 9th session	TBC	• Maritime service • SOLAS, GMDSS • PS for satellite receiver • ITU • ECDIS
25 – 29 July	SUB-COMMITTEE ON IMPLEMENTATION OF IMO INSTRUMENTS (III) – 8th session	TBC	• IMSAS
2-11 Nov	MARITIME SAFETY COMMITTEE (MSC) – 106th session	TBC	

4.4 IHO/IALA liaison

Minsu Jeon informed about the date of the “IALA IHO joint workshop on S-100/200”, 5-9 Sep 2022, in Norway. He reported that the 6th IALA-IHO technical coordination meeting was held on 26 November 2021. The session covered updates on S-100, and S-200 in general:

Domain	PS	Title	Developer	Version
AtoN	S-201	AtoN information	ARM	1.0.0
	S-240	DGNSS almanac	ENG	1.0.0
Positioning	S-245	eLoran ASF	ENG	1.0.0
	S-246	eLoran almanac	ENG	1.0.0
	S-247	eLoran reference stations	ENG	1.0.0
Comms.	S-230	Application Specific Message (ASM)	ENAV	Planned
VTS	S-210	Inter VTS exchange	VTS	Started
	S-211	Port Call Message	IPCDMC	1.0.0
	S-212	VTS digital information service	VTS	0.6.4

The IHO GI Registry concept register Domain Control Body (DCB) workshop was held on February 2022 aiming at supporting IHO since IALA is acting as a DCB.

4.5 ITU

Please refer to the input paper to get further details - ENG15-4.4.1 IALA Report on ITU-R WP5B meeting 29 Nov to 12 Dec 2021. The following documents and topics, among others are, of interest for IALA were reviewed:

Maritime mobile service including Global Maritime Distress and Safety System (GMDSS) and radiodetermination service, with particular emphasis on the development of VHF Data Exchange System (VDES), Automatic Identification System (AIS), Autonomous Maritime Radio Devices (AMRD) and e-Navigation.

The input on Liaison statement to IMO on the revision of ITU-R M.1371-5 was submitted to PAP (PAP 44-4.4.2).

4.6 RTCM

Jaime Alvarez briefed about the last meeting on RTCM SC104 related to the recommended Standards for Differential GNSS Service held in January 2022. The input paper ENG15-4.5 provides an update on the meeting discussions with a focus on the status of GNSS core constellations and augmentation services.

4.7 PIANC

Minsu Jeon briefed about the monitoring activity of IALA in the work in PIANC, any subject in the scope of IALA will be coordinate with them. Some topics of interest were the PIANC MarCom Webinar – ‘Recent WG Reports and the Ever Given’, Permanent Floating Houses along the Inland Waterway Banks and Infrastructure among others.

4.8 ESNB Tsunami monitoring

IALA Secretariat is continuing supporting ESNB to contribute with their task force on Augmenting Tsunami Monitoring frame Committee. High accuracy systems are currently used as ocean observing tools.

5. REPORTS FROM RAPPORTEURS

Nothing to report during the ENG committee.

6. ADVERTISING ONLINE PRESENTATIONS

The following presentations were scheduled during the working period and the video recording is posted here:

Time (UTC)	Topic	Presenter
10.00	Measurement and Calculation of Luminous Intensity of Aids to Navigation Light	Wang Lingyan (China MSA)
10.20	Oceanographic and Tsunami monitoring buoys	Samir Benouda (Mobilis)
10.40	AtoN distribution adjustment practice of the main channel in Tianjin port, China	Li Ang (China MSA)
11.00	Introduction to the Tests Information on Next Generation Racon	Liu Chunhai (China MSA)
11.20	R-Mode status update	Michael Hoppe / Stefan Gewies (WSV / DLR)
11.40	IEC standardisation for SBAS L1 maritime receivers	Guillermo Fernandez (ESSP)
12.00	ASGARD (Development of a Shipborne receiver Galileo DFMC following international performance standards; and including OSNMA capabilities)	Marcos López Cabeceira (GMV)
12.20	Project celebrating the Cordouan lens experimentation	Jacques Manchard (IALA)

7. OVERVIEW OF PLANNED WORK FOR ENG14

The working group Chairs informed participants about the tasks expected to be developed during the Committee session. Such tasks and activities could be consulted in the ENG14 action plan section of the Dashboard.

7.1. WG 1 - Visual & Physical AtoN - Malcolm Nicholson

- 7.2. WG 2 - Knowledge & Sustainability - Peter Schneider/ Jörg Unterderweide
- 7.3. WG 3 - Radionavigation Services - Alan Grant
- 7.4. WG 4 - Heritage - Peter Hill

8. ESTABLISH WORKING GROUPS

8.1 Establishing working groups

Four working groups were established, as outlined below.

Working Group		Working Group Chair	Working Group Vice Chair
WG 1	Visual & Physical AtoN	Malcolm Nicholson	Alwyn Williams
WG 2	Knowledge & Sustainability	Peter Schneider Jörg Unterderweide	
WG 3	Radionavigation Services	Alan Grant	Michael Hoppe
WG 4	The Heritage Forum	Peter Hill	Jonghun Kim

9. WORKING GROUP 1 – VISUAL & PHYSICAL ATON

The working group met virtually during ENG15 and was made up of 19 members and they considered 10 input papers. Some of the papers received were for information, whilst others were input to developing guidelines. The main aim of this session was to continue the work identified in the work program and update the task register.

Additional tasks, not on the work programme was a minor editorial amendment to IALA G1135 with regard to a minor error in the peak-to-effective intensity factor tables. A minor edit to IALA R0204 on Marine Signal Lights – Determination and Calculation of Effective Intensity. A Liaison Note to ARM with regard to the Definition of Nominal Range. The input paper from Korea on the optical performance of bridge lights was considered and the author is requested to submit an input paper to ENG16 on the outcome of further trials. This was completed during the session and agreed by the working group.

Action Item

*The **Secretariat** is requested to send the amended G1135 on Determination and Calculation of Effective Intensity (ENG15-12.1.1) to Council for approval.*

*The **Secretariat** is requested to send the amended R0204 on Marine Signal Lights - Determination and Calculation of Effective Intensity (ENG15-12.1.2) to Council for Approval*

*The **Secretariat** is requested to send the Liaison Note on Definitions of Ranges of AtoN Lights (ENG15-12.1.3) to the ARM Committee for their consideration*

***Chungjin Lee** is requested to submit an input paper to ENG16 on further experiments on the optical performance of bridge lights.*

9.1 Develop Guideline on Port Traffic Signals (Task 2.1.2)

This task commenced at ENG10 following the results of a survey conducted by the ARM Committee and is expected to take two sessions to complete. The survey found that although authorities using the traffic signal codes could produce the codes, they were having some issues with the practical implementation. Due to other work items taking longer than anticipated, this task is postponed until the next work programme. However, some input is expected during the present work programme.

9.2 Develop E-112 Leading Lights and 1023 Leading Lines into a Guideline (Task 2.1.3)

Input papers were received and discussed during the working group task session. The main aim of this work is to produce a revised Recommendation, Guideline, Excel Calculator and a Tutorial Paper. More importantly the 'hidden' equations in the existing calculator have been revealed and captured so that this knowledge is not lost to IALA members. During the Task Group meetings, the topic of providing 'software' to members and any associated liability that might rest with IALA was raised. To that end it is requested that the Chairman bring this issue to the IALA PAP/LAP.

Action Item

Frank Hermann and Pärtel Keskküla are requested to arrange an intersessional meeting to progress the work on the development of G1023 Leading Line.

Simon Millyard is requested to bring to the attention of the PAP Committee the use of, and any liability associated with the use of, the software tools provided by IALA.

9.3 Update Guideline 1048 LED technologies and their use in signal lights (Task 2.1.5)

This task has been moved to the next work programme.

9.4 Review & update guideline 1043 on Light sources (Task 2.1.6)

Refer to 9.5 (Task 2.1.5)

9.5 Develop E200-3 on measurement of light into a Guideline (Task 2.2.1)

An input paper (ENG15-3.1.1.1.2) on this subject was received from China MSA. This task was due to start at ENG11 for four sessions. However, this work can only be started when task 2.2.2 on Marine Light Terms of Measurement has been completed. Refer to task register ENG8-12.2.12 for scope of work.

Action item

The **Secretariat** is requested to forward input paper ENG14-7.1.2 to ENG17 as a working paper.

The **Secretariat** is requested to forward input paper ENG15-3.1.1.1.2 to ENG17 as a working paper.

Alwyn Williams is requested to submit an input paper to ENG16 on the topic of a suite of Guidelines to support R0203.

9.6 Develop new Recommendation on Marine Light Terms of Measurement (Task 2.2.2)

The working paper on this subject was reviewed over one session, with some progress being made. Due to the complex and potentially far-reaching nature of the document it was decided that more consideration was to be given on the definitions. An alternative suggested title for this recommendation was proposed as 'Marine Signal Lights: Standard Performance Characteristics'.

Action item

Alwyn Williams is requested to submit an Input paper on standard measurement conditions to ENG16 with the aim of finalizing this output.

9.7 Develop E200-5 on Optical Performance into a Guideline (Task 2.2.3)

An input paper was received and briefly reviewed. However, the WG felt that the sessions dedicated to this topic would be better spent developing the Leading Lines documents. Now that the E-200 series has been converted into Recommendations and Guidelines the group discussed what to do with the Overview E-200-0. It was decided that other IALA Publications cover the topics within E-200-0 and that it should be withdrawn. In addition, it has been superseded by IALA Guideline 1148 and the Technical Documents Catalogue.

Action item

Malcolm Nicholson is requested to continue to work on the Guideline on Optical Performance and Calculation and submit an Input Paper to ENG16.

9.8 Revise Guideline on effective intensity (Task 2.2.4)

Completed at ENG12

9.9 Develop Guidance on monitoring of function and degradation of AtoN light sources (Task 2.2.5)

Moved to 2023-2027 Work Programme

9.10 Develop Guidance on service factors (Task 2.2.6)

Task completed in ENG10 as it has been incorporated into Guideline G1148.

9.11 Develop Guidance on Colour fading of AtoN (plastic and painted) – methods to measure and assess (Task 2.2.7)

Completed at ENG13

9.12 Finish Guideline G1148 Marine Signal Lights - Calculation of Luminous Intensity and Range (Task 2.2.8)

Task completed at ENG10.

9.13 Update G1041 on Sector Lights to define 'Angle of Uncertainty' (Task 2.2.9)

This task was due to start at ENG9 for two sessions. However, due to working on other documents this task was not started. The original liaison note from ENG7 was reviewed and it was agreed that although the present definition is a little confusing, it was still extant. The work on the definition is being done as part of Task 2.2.2 on Terms of Measurement. It was agreed that G1041 was in need of a general review and that should be a work item for the next work programme.

9.14 Deliver a Workshop – AtoN Engineering workshop (Task 2.4.2)

Following the approval from Council and a submission from Australia to host the workshop, a steering committee meeting was held during ENG12. A decision to postpone the workshop until the next work programme was made.

10. WORKING GROUP 2 – KNOWLEDGE & SUSTAINABILITY

The Working Group was joined by 30 members who participated in 17 Task Group sessions. The Working Group reviewed 10 input papers. The key tasks for the ENG15 session for Working Group 2 are highlighted below; however, the overarching goal was to continue with the work as identified in the 2018-2022 work programme.

Due to the intensive work of the task groups one recommendation and three guidelines were finalised for council approval. The working group chairs would like to express their gratitude for the excellent work and the finalised documents.

10.1 Third party quality control (Task 1.2.1.)

One meeting was held to incorporate suggested adjustments from ARM into the document. The draft guideline was finalised, forwarded for silent approval and to council for approval.

Action Item

*The **Secretariat** is requested to forward the guideline ENG15-12.2.1 on Third Party AtoN Provider Quality Control to Council for approval.*

10.2 Extreme environmental conditions (Task 2.3.1.)

The Task Group consisted of 14 participants, with varied assistance (between 8 to 12) in three sessions over the ENG15 period.

The Task Group continued working on the draft Guideline on Extreme Environmental Conditions. Further content and images were added on

- extreme environmental conditions and their negative impact on AtoNs;
- tsunamis (this will be merged with information on hurricanes and typhoons during the upcoming intersessional meetings);
- soils and soil geology Information;
- ice buoys;
- mitigating the effects of fog banks; and
- human health aspects.

Sarah Robinson compared the draft Guideline on Extreme Environmental Conditions and Guideline 1165 on Structural Design and it was concluded that content and purpose of the two documents are distinct and complementary.

Two additional intersessional meetings are planned for May and August 2022. It is intended to finalise the guideline at ENG16.

Action Item

*The **Secretariat** is requested to forward the draft Guideline on Extreme Environmental Conditions (ENG15-2.3.1) document to the upcoming intersessional meetings and ENG16.*

10.3 Develop Guideline on meteorological and oceanographical data dissemination (Task 2.3.3.)

The task group revisited the task and the fundamental changes suggested by the ARM-Committee. The group came to the conclusion that the task is very extensive and has many links to other areas (AIS, VHF, VDES, Visual ...), but interest in the task and participation in the working group was rather poor. Instead, it seemed reasonable to bring the available information into the guideline on complementary use of AtoN and the update of G1008 May 2009 Remote control and monitoring of AtoN, which both of which are in the next work plan.

Action Item

*The **Secretariat** is requested to delete the task on Develop Guideline on meteorological and oceanographical data dissemination (Task 2.3.3.) from the current and the upcoming work plan.*

10.4 Solar Panel Guideline (Task 2.4.1)

The task group met on three separate occasions throughout the ENG 15 period, with a broad range of participants from across the globe, providing good input to the guideline.

The main focus during the three sessions has been one of editorial checks. All sections were reviewed allowing the finalisation of the text and structure, with the addition of some photos and diagrams to conclude the document. During the final task group session, the title of the Guideline was proposed and captured as a Guideline on Solar modules for a marine environment.

The good work by the group has allowed this task to be completed during this ENG15 period, with the Guideline being submitted for silent approval.

Action Items

*The **Secretariat** is requested to forward the guideline ENG15-12.2.3 on solar modules for a marine environment to Council for approval.*

10.5 Develop guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them (Task 2.5.1)

Two intersessional meetings were completed between ENG14 and ENG15, where navigational requirements and considerations were developed and the physical buoy constraints brainstormed. The Task Group met twice during ENG15 working period, where the further development work on the Guideline was completed. The meetings were attended by 18 participants from 11 different countries.

The initial meeting continued from the intersessional work and included discussions on the buoy diagram and its component parts to be included in section 4 (Buoy characteristics), with a request for an additional plastic buoy diagram to complement the metal buoy.

A review of the new text in section 5 (Physical Environment / Environmental Considerations) was completed with a couple of additional notes added. Several other sections were reviewed and additional information added for inclusion in the text as it is developed.

The second session reviewed additions to section 6 (Buoy Types and Variations), with comments and feedback given to the author. Additional images of buoys were discussed and uploaded into the 'input document' section of file-share, a selection of these images has been added to the relevant section in the master working document by the task group leaders.

Further intersessional meetings were proposed and tentatively agreed to be in June and possibly September to allow for individuals to develop the drafting work. The task group members were asked to forward any draft text to the task group leaders for inclusion in the master working document.

Action Items

*The **Secretariat** is requested to forward the draft guideline guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them as a working document to ENG16*

*That **Committee participants** are requested to upload buoy images that can be used in the guideline to enhance understanding of the intended reader.*

10.6 Radar Reflector (Task 2.5.2.)

The task group had three meetings during ENG 15. The meetings were attended by 11 participants from 6 different countries.

Between ENG14 and ENG15 a small group had further developed the existing draft guideline. The work started on the basic structure of that document, which was discussed and validated.

The first-time participation of additional colleagues from Australia, China, France and Estonia brought helpful new content. The outcome of ENG 15 is a newly structured draft guideline with additional contents, for example:

- overview of the reflection properties and applications of the worldwide most frequently used radar reflectors on AtoNs;
- description for range calculations, applicable examples as well as a simple table for a range determination under certain common parameters;
- measurement methods of reflection properties; and
- simulation procedures as well as their practical use.

It was recognized that further intersessional meetings are required to bring in additional content, such as

- planning, implementation and results of on-site trials; and
- non-radar specific requirements such as environmental conditions, construction and installation methods as well as maintenance requirements.

The goal is to have a finished guideline after ENG16.

Action Items:

*The **Secretariat** is requested to forward the draft guideline on radar reflectors as a working document to ENG16.*

Peter Schneider is requested to organize the intersessional work on radar reflectors.

10.7 Modern Equipment in traditional Lighthouses (Task 2.6.1)

One meeting was held with seven participants from six countries. The existing draft was discussed and developed further.

This task is prolonged to the work period 2023-2027.

Action Items

*That **Committee participants** are requested to provide their experiences on Modern Equipment in traditional Lighthouses and projects as input papers to ENG16.*

10.8 Review of IALA World-Wide Academy input paper

The Working Group reviewed the input papers ENG15-3.2.7 and ENG15-3.2.7.1 on R0141 on the training and certification of aids to navigation personnel.

It was agreed to split the document into a recommendation and a guideline as it was done in other documents to.

Action items

*The **Secretariat** is requested to forward the recommendation ENG15-12.2.2 and the guideline ENG15-12.2.2.1 on Training and Certification of Marine Aids to Navigation Personnel forward to Council for approval.*

10.9 Review telemetry Guideline 1008 (Task 5.1.1.)

This task is postponed to workplan 2023-2027.

10.10 Input paper ENG15-3.1.4.2 Training for Light Keepers and Workers

Julio Fidel Sierra Almaguer presented his input paper on Training Courses for Light Keepers and AtoN Workers.

In earlier ENG meetings L3 courses were suggested as a low level introduction to the AtoN sector. The initial idea was for a one day L3 course as an introduction. Training for lighthouse keepers as described in the input paper will be focused on the particular lighthouses and its equipment.

Knowing that many countries do not have a need for these courses because they are using remote control and monitoring systems, there are some countries beside Cuba e.g. Puerto Rico, Columbia, Cap Verde ... that are not participating the ENG meetings, but they also have a need for training that is simpler than L2.

It was discussed, that L2 courses are too detailed for the anticipated training participants although many aspects of new “L3” are already covered in L2. The existing L2 courses should be a basis to create new “L3” courses with reduced content/depth. Countries with a need for these courses could collaborate on the creation of such courses and the courses could be reviewed by the ENG committee in the same manner as L2 are today.

Furthermore the availability of facilities suitable to host these theoretical-practical courses was discussed. It was agreed that training facilities should be located in the areas where there is a need for these courses.

There was also a discussion with Kevin Gregory in another meeting and it was agreed that the next step is to identify which countries have a need for these courses and agree the structure of the syllabus.

Action item

***Julio Fidel Sierra Almaguer** is requested to identify and contact other countries that have a need for the course on Light Keepers and AtoN Workers.*

*The **Secretariat** is requested to forward ENG15-3.1.4.2 Training for Light Keepers and AtoN Workers to ENG16*

11. WORKING GROUP 3 – RADIONAVIGATION SERVICES

The WG Chair and Vice Chair express their gratitude to WG participants for their hard work and effort during this busy period. The WG Chair and Vice Chair would also like to thank all of the Task Group leaders for their time and effort in progressing their work items.

As the new IALA document share will not be cleared after each meeting, working documents have been placed in a folder marked as such within each task's sub-folder.

11.1 Resilient PNT (Task 3.1.1)

During this session the draft guideline on resilient PNT was progressed, with the latest version carried over as a working document. It is envisaged that this task will continue with a view of finalising the draft at ENG16.

The Committee undertook to progress this guideline between now and ENG16 via email with the potential of a one day virtual workshop. Interested parties are invited to let the WG Chair know via email (alan.grant@gla-rad.org).

11.2 Terrestrial radionavigation systems (Task 3.2.1)

This item has been completed.

11.3 R-Mode (MF) (Task 3.2.2)

The Committee progressed the development of the draft Guideline on R-Mode implementation using MF radio beacons and VHF transmissions. The latest version of the draft Guideline has been put in the working documents folder for further consideration at ENG16.

In addition, the Committee reviewed two input documents, one on the R-Mode roadmap (ENG15-3.1.3.4) and a paper on new RTCM broadcast messages required to support MF R-Mode (ENG15-3.1.3.6).

The Committee considered that R-Mode standardisation activities would be more effective progressing both MF and VDES R-Mode variants at the same time and therefore a coordinated approach is required between ENG and ENAV Committees. As such, the Committee developed a Liaison Note to the IALA ENAV Committee that provides a copy of the latest R-Mode road map and invites the ENAV Committee to consider a common inter-sessional on standardisation activities.

The Committee considered the late paper on RTCM messages and prepared a Liaison Note to RTCM seeking to establish collaboration to develop RTCM messages that can support R-Mode navigation information.

The Committee undertook to progress this guideline between now and ENG16 via email with the potential of a one day virtual workshop. Interested parties are invited to let the WG Chair know via email (alan.grant@gla-rad.org).

Action item:

*The **Secretariat** is requested to forward liaison note ENG15-12.3.4 "Standardisation of R-Mode" to ENAV29.*

*The **Secretariat** is requested to forward liaison note ENG15- 12.3.7 for RTCM "Navigation messages for medium frequency R-Mode" to Council for approval*

11.4 R-Mode (AIS/VDES) (Task 3.2.3)

At ENG12 it was agreed that the technical specification of R-Mode activities over AIS/VDES frequencies would be managed by the IALA ENAV Committee. The R-Mode (MF) Guideline would include operational considerations for all R-Mode configurations.

11.5 Workshop on R-Mode in 2019 (Task 3.2.4)

This item has been completed.

11.6 R-Mode testbed progress coordination (Task 3.2.5)

The Committee received a presentation on the outcome of the R-Mode Baltic test bed and the R-Mode Baltic 2 project. Verbal updates on testbed's being developed in China and Republic of Korea were also received.

11.7 Develop and maintain relevant product specifications (Task 3.2.6)

The Committee continued work on the S-245 (eLoran ASF data) product specification with the aim of providing a draft version at ENG16.

11.8 Guidance on timing and synchronisation (Task 3.2.7)

Development of a new Guideline on Timing and Synchronisation has started and will run over ENG16 and into the new work programme. The latest version of the draft has been stored as a working document on the file share.

11.9 eRacon (standard approach); Review recommendations ENAV146 & R-101 & Guideline 1010 (Task 3.3.1)

The Committee finalised Guideline G1147 on the “Enhanced Radar Positioning System (ERPS)” and submit it to Council for approval.

The Committee also started the development of the ERPS standardisation plan, based on the outcome of the IALA Workshop on ERPS (ENG15-3.2.8).

The Committee reviewed a draft Information Paper to go to IMO regarding the use of ERPS as a Resilient PNT solution. The Committee is considering expanding the paper to include other Resilient PNT solutions (e.g., R-Mode) and present it as a Resilient PNT Information Paper rather than an ERPS Information Paper, with the aim to complete during ENG16.

The input paper “Introduction to the Tests Information on Next Generation Racon” (ENG15-3.1.3.3) started an interesting discussion on the “racons of the future”, resulting in review of IMO documents pertaining to radar and racon performance standards (IMO Resolutions A.615(15) and MSC.192(79)), which apparently already allow use of enhanced racons, not only ERPS, but racons capable of working with solid-state radars (NT Radars) without further work by IMO. This discussion will continue at ENG16.

Action item:

*The **Secretariat** is requested to forward draft Guideline G1147 on “Enhanced Radar Positioning System (ERPS)” to Council for approval*

11.10 Consideration on how and when to use SBAS (Task 3.4.1)

The Committee considered comments received on the proposed updates to Guideline G1129 “*The Retransmission of SBAS corrections using MF Radio beacon and AIS*” that was shared at the end of ENG14.

The Committee prepared a final version of the updated Guideline which is ready to be submitted to Council for approval.

Action item:

*The **Secretariat** is requested to forward draft Guideline G1129 on “The retransmission of SBAS corrections using MF Radio beacon and AIS” to Council for approval.*

11.11 Review of existing DGNSS infrastructure and provision of guidance for current system (Task 3.4.2)

The Committee progressed the Guideline on DGNSS and considered holding an intersessional meeting to progress the work. The latest version of the draft has been uploaded to the working document folder on the fileshare. The Committee undertook to progress this guideline between now and ENG16 via email with the potential of a one day virtual workshop. Interested parties are invited to let the WG Chair know via email (alan.grant@gla-rad.org).

The Committee discussed the future direction of RTCM broadcast messages, recognising that some maritime administrations are seeking to recapitalise their radiobeacon DGNSS equipment and have a wish to provide corrections to multiple GNSS constellations. The RTCM message format that would enable this is currently on hold pending confirmation from IALA that a need exists.

To recount events from previous meetings. RTCM invited IALA to respond to a number of questions in an input paper received at ENG13. One of these questions was for IALA guidance on whether there was a need for the development of version 2.4 of the RTCM broadcast standard, noting that this version would provide correction messages that support all constellations. Discussions during ENG13 identified that from those present at the meeting, it was not possible to identify a clear response as a) the ENG meeting participants did not represent all DGPS service providers and b) those present were not necessarily the policy makers within their organisations. The Committee discussed this topic and decided to review how best to take it forward at ENG16.

11.12 Recommendation on augmentation for maritime use (Task 3.4.3)

This item has been completed

11.13 Provide guidance, strategy and advice on new uses of marine beacon DGNSS infrastructure (Task 3.4.4.)

This work item has been merged with Task 3.4.2 and will be closed.

11.14 High accuracy systems (Task 3.4.5.)

The Committee reviewed Guideline G1127 on “systems and services for high-accuracy positioning and ranging” and provided updates. The updates were minor and therefore the document is considered ready to go to Council for approval.

Action item:

*The **Secretariat** is requested to forward draft Guideline G1127 on “Systems and services for high-accuracy positioning and ranging” to Council for approval.*

11.15 Review and update current documentation under the purview of PNT WG (Task 3.5.1)

The Committee started the review of the IALA WWRNS and considered the requirements to support a Guideline on MASS.

11.16 Monitor developments in GNSS, DGNSS, radar, resilient PNT, e-Pelorus, terrestrial systems, R-Mode, inertial and any other relevant areas etc. (Task 3.5.2)

The Committee discussed a number of general topic areas including the future work programme and the potential for GNSS to support 3D positioning. It was agreed that this high accuracy work item could be expanded to consider 3D positioning requirements through the identification of specific use cases. This topic was listed as a potential work item for the new work plan.

11.17 Liaison with sister organisations (IMO, ITU, RTCM etc.) on related topics (Task 3.6.1)

The Committee received an update on the work of the IMO Correspondence group on the development of a Generic GNSS receiver performance standards.

The Committee also identified the need to update ITU M.823 but unfortunately ran out of time during this session and will consider that during ENG16.

The Committee reviewed input papers ENG15-3.2.6 and ENG15-3.2.6.1 on a draft input paper to IMO NCSR9 regarding the IMO’s position on VDES R-Mode and digital communications agenda items for world radio conference 2027. The Committee updated the draft IMO input document (with track changes) and share it with a liaison note to the IALA ENAV Committee to consider and take forward.

Action item:

The **Secretariat** is requested to forward liaison note ENG15- 12.3.5 “LN to ENAV - IALA input to IMO regarding VDES and digital VHF support at WRC-27” and the marked up annex ENG15- 12.3.6 “Draft Input to NCSR9 on WRC23 AI10 – ENG” to ENAV29.

11.18 Input to MSP, Integrity considerations for resilient PNT, cybersecurity impact for PNT data, datum considerations (Task 3.7.1)

The Committee supported the Secretariat in a review of the proposed maritime services, including how the proposed resilient PNT service could be combined to become part of the proposed AtoN service.

The Committee also considered input paper ENG15-3.2.10 and it’s annexes on “radio and visual hindrance caused by solar parks” and will seek to provide a considered response during ENG16.

The Committee considered input paper ENG15-3.2.9 on “cyber-security workshop final report” and agreed this is an important aspect for all of our work areas.

Development and review of WWA courses (Task 4.1.1)

No updates during this session.

12. WORKING GROUP 4 – THE HERITAGE FORUM

ENG WG4 – Heritage Forum considers its overall objective to be;

“To further the declaration and recommendations contained within the Incheon Declaration and within IALA Recommendation R1005 – ‘Conserving the built heritage of lighthouses and other aids to navigation’.

Over the course of ENG 15, WG4 received the participation of 29 persons from members of 13 nationalities.

Name		Nation	Organisation
ABDALLAH	Aliati	Morocco	MATLEV Consulting, Equipements portuaires & maritimes
ALMAGUER	Julio	Cuba	Oficina Nacional Hidrografia y Geodesia - Cuba
BAE	Yong Chan	Republic of Korea	Ministry of Oceans and Fisheries
BURNS	Gillian	Scotland	Northern Lighthouse Board
CHACON	Tatiana	El Salvador	Autoridad Maritima Portuaria
DAOUDI	Sara	Morocco	Service Sécurité Portuaire et Navigation Côtière
DU	Gang	People's Republic of China	China Maritime Safety Administration
FUKUI	Hisayoshi	Japan	Japan Coast Guard
GUO	Zhenyu	People's Republic of China	China Maritime Safety Administration
HILL	Peter	UK - England	Trinity House
KIM	Jonghun	Republic of Korea	Ministry of Oceans and Fisheries - Paichai University
KIM	Songyi	Republic of Korea	The Institute of Aids to Navigation (K-AtoN).
LAGHCHIMI	Salma	Morocco	Ministère de l'Équipement et de l'Eau
LAKSHMAN	Sarah-Jane	Australia	Australian Maritime Safety Authority (AMSA)
LAZAR	Nisrine	Morocco	Ministère de l'Équipement et de l'Eau
LEE	Junhyun	Republic of Korea	The Institute of Aids to Navigation (K-AtoN).
LETTIERI	Salvatore	Italy	Italy Navy - Direzione Fari e Segnalamenti
LI	Ai	People's Republic of China	China Maritime Safety Administration
LYAZIDI	Safae	Morocco	Direction des Ports et du Domaine Public Maritime
MANCHARD	Jaques	France	Conseiller auprès de l'AIMS, Académie Mondiale de l'AIMS
NOGUCHI	Hideki	Japan	Japan Coast Guard
PARK	Sihyeon	Republic of Korea	The Institute of Aids to Navigation(K-AtoN)
PIOVESANA Jr.	Alberto	Brazil	Diretoria de Hidrografia e Navegação of the Brazilian Navy
RANXUAN	Ke	People's Republic of China	Navigation Institute of JiMei University
SHIM	Hyeseung	Republic of Korea	Korea Advanced Institute of Science and Technology (KAIST)
SON	Seong-Woo	Republic of Korea	Korea Advanced Institute of Science and Technology (KAIST)
WENTA	Kinga	Poland	Maritime Office in Gdynia

WOOD	Amy	Australia	AMS Group
ZHANG	Pu	People's Republic of China	China Maritime Safety Administration (MSA)

The group met twice over the course of ENG15 – on Wednesday 2nd March and on Thursday 10th March. In addition to the above participation list, the group were pleased to be joined for its first meeting by Jaime Alvarez and Minsu Jeon from IALA Secretariat. Meetings were chaired by Peter Hill and Jonghun Kim was Vice-Chair.

12.1 Heritage seminar (Task 2.6.5)

Alberto Piovesana Jr updated the group on plans for a Heritage Seminar with the theme 'The Challenge of Change'. The originally planned seminar in 2020 had been shelved due to the Covid pandemic and Brazil had since been investigating options around an online seminar running 29-31 August 2022. The travel situation has since improved and there was now potential an alternative option for an in-person heritage seminar over two days, Saturday May 27, and Sunday May 28 2023, – immediately preceding the 20th IALA Conference in Windsor Convention Center, Rio de Janeiro, Brazil. The seminar could closely follow the format established for the two-day heritage seminar originally intended to be held in Salvador 2020. Any associated lighthouse tour is likely to remain a virtual tour for practical reasons.

The proposal was warmly received by WG4. Suggestions were made that if possible the Heritage Seminar could be hybrid, allowing those who could not get to Brazil in person to participate online.

Action Items:

Alberto Piovesana Jr (Diretoria de Hidrografia e Navegação of the Brazilian Navy) is requested to proceed with plans for the inperson Heritage Seminar on 27th-28th May 2023, with hybrid online option if feasible, and to correspond with WG4 participants and IALA Secretariat as required.

That **Committee participants** are requested to consider whether they or their colleagues may be able to deliver a presentation at the Heritage Seminar in Rio, Brazil and on what topic, and liaise with Alberto Piovesana Jr, Peter Hill (Chair WG4) or IALA Secretariat

The **Secretariat** is requested to assist with the logistics / administration as appropriate of the Heritage seminar.

12.2 IALA HLY Future Direction Update (Task 2.6.4)

The future direction of IALA HLY was raised at PAP. Following discussion, PAP concluded that it should remain non-competitive and celebratory in nature in order to promote awareness of lighthouse heritage. It is understood that PAP noted that the IALA HLY had been a huge success and there is no obvious compelling requirement to change the format.

This position was noted and IALA HLY will continue to be implemented in accordance with that format.

12.3 Plaque for IALA HLY

WG4 were pleased to receive a presentation on Input paper: ENG15-3.1.4.3 from JunHyun Lee (National Lighthouse Museum, Republic of Korea). The paper set out various options for a plaque which would become the permanent design to be used annually. It was noted that Korea generously continue to sponsor the award up until 2026, but that after this date, an alternative sponsor or IALA funding would be required. With this in mind, qualitative considerations needed to be weighed against cost. WG4 expressed a preference for a metal design as shown in the input paper costing c. \$400.

Action Items:

The National Lighthouse Museum, Republic of Korea is requested to expedite design and production of the plaque to be ready for presentation at WAtON Day 2022.

12.4 IALA Heritage Lighthouse of the Year (IALA HLY) 2022 (Task 2.6.4)

12.4.1 Nominations and means of arriving at a commendation

WG4 was delighted to note that with 6 new nominations submitted there were now 33 IALA Heritage Lighthouse on the website, originating from 17 national members, spread across 6 continents.

All participants of WG4 were invited to complete a ranking sheet in respect to nominees. These sheets were then collated to determine the three IALA Heritage Lighthouses that WG4 would commend. A further discussion at the second WG4 meeting was held to determine which of the three it would recommend as IALA LHY 2022. With views evenly split across WG4 participants, the Chair made a casting vote.

It was agreed by all participants that any one of the nominees considered warrants being an IALA HLY and it was acknowledged that comparing and contrasting lighthouses was almost an impossible task. WG4 was grateful to all who had taken part.

12.4.2 The Three Lighthouses Commended for consideration at IALA HLY 2022

Cap Spartel Lighthouse, Morocco



All lighthouses have an international dimension, but at Cap Spartel – Morocco’s oldest lighthouse, that dimension is intrinsic to its identity. Its very origins can be traced back to an international incident – the tragic sinking of the Brazilian ship Dona Isabel in 1860 with the loss of 250 lives. Built in an Hispanic-Moorish architectural style in the form of a square minaret, this stunning lighthouse was operational by 1864.

Standing as it does in the north-western point of Morocco and Africa, where the Mediterranean Sea meets the Atlantic Ocean (and with Europe just across the narrow Strait-of-Gibraltar), the new lighthouse would guard some of the busiest and most important shipping lanes in the world. Testimony to that international importance and prestige can be found in the 1865 agreement between Morocco and 10 other nations for the operating and maintenance costs of the lighthouse. Cap Spartel’s modern history retains an international flavour, having an innovative lighthouse twinning agreement with Mamelles lighthouse in Senegal.

Featuring on stamps and banknotes Cap Spartel lighthouse remains an emblematic icon of the city of Tangier, a source of national pride and a symbol recognized by all Moroccans. An excellent website makes it clear that public accessibility and education have a strong focus here – for all the family. The

lighthouse building houses the Museum of Moroccan lighthouses, offering an educational experience on the maritime history of Morocco and promoting the role of navigation aids and their technical evolution over time.

Cap Spartel is an exemplary example of what it means to be an IALA Heritage Lighthouse.

Homigot Lighthouse, Republic of Korea



The strikingly elegant lighthouse of Homigot was constructed in 1908. It is symbolically positioned on the tail of the tiger that Korea's shape is often compared with - 'reaching out' from Asia to Europe. This symbolism finds reality through international elements of the lighthouse's design and history.

The tower's unusual octagonal curved design and exceptional height gives it an extraordinary elegance. Whereas this curved form is common in round sea-washed towers where it helps against wave loading, here it is innovatively used to secure increased resistance against seismic loads – a design principle that has self-evidently been extremely successful.

Homigot Lighthouse is especially notable for the efforts that have been made in understanding and recording its heritage value. A comprehensive study conducted in 2021 highlighted not only its historical context, functions and symbolic value, commissioned included 3D scans and detailed drawings of all aspects of the building. Such a holistic approach to understanding and recording heritage is admirable.

No heritage lighthouse in Korea can be considered entirely in isolation. Korea's joined-up approach to national lighthouse heritage and culture includes a Lighthouse Stamp Tour program, and the superb National Lighthouse Museum built next to Homigot Lighthouse – which has been extended this year to become the largest of its kind in the world. Together such initiatives have helped make Homigot Lighthouse into one of the most loved and visited tourist sites in South Korea.

Such a clear and successful vision for understating and promoting lighthouse heritage and culture makes Homigot an extraordinary example of an IALA Heritage Lighthouse.

Sumburgh Head Lighthouse



Sumburgh Head lighthouse was built by the renown Scottish lighthouse engineer Robert Stevenson and was first lit on 15th January 1821. With irony as well as tragedy, this was delayed from the originally intended date as a ship called the Freemason carrying glass and materials for the lantern sank en-route.

With a 201 year history, it is inevitable that the lighthouse has seen considerable changes during that time. Its light source has changed from oil to paraffin to electricity. Fog signal technology has been added and then changed with new technology. Living accommodation and associated infrastructure has also changed over the years. Evidence of these changes are still present on the site, allowing Sumburgh Head to tell the story of changing lighthouse technology over this long period – changes that have affected lighthouses around the world. The current optics date from 1914 when its three tonne first order lens rotating on a mercury bath was installed.

The approach to heritage and culture at Sumburgh Head is truly innovative. Whilst the Northern Lighthouse Board continue to own and operate areas essential to the Aid to Navigation, a separate charity - the Shetland Amenity Trust - took ownership of non-operational areas in 2003. This has enabled the Shetland islanders to take greater ownership of the lighthouse. The increased emphasis on heritage and conservation has led to sympathetic restoration of the buildings – not least the historic compressed air cylinder fog signal system and engine room. The addition of an education centre, overnight accommodation, visitor tours and an excellent website have all resulted from a model that others may be inspired to follow.

It is this innovation in maximising heritage and cultural opportunities together with the long tale of adaptation to changing technology that this fascinating site can tell which makes Sumburgh Head Lighthouse really stand out as an IALA Heritage Lighthouse.

After some discussion, ENG15 WG4 determined to commend Homigot Lighthouse to IALA Council as IALA Heritage Lighthouse of the Year 2022.

Action Items:

*The **Secretariat** is requested to forward the commendation of ENG15 WG4 Homigot Lighthouse to the Council to determine IALA Heritage Lighthouse of the Year 2022*

*The **Secretariat** is requested to organise a formal acknowledgement of the award to the recipient at a suitable event to which the recipient is in attendance.*

12.5 IALA Heritage Lighthouse of the Year (IALA HLY) 2023 and beyond (Task 2.6.4)

The present system of commendation by WG4 through ENG Committee each Spring and subsequent formal selection (by IALA Council) in July means that half the year is gone before a nation may celebrate the accolade of IALA Heritage Lighthouse of the Year.

An alternative option was agreed whereby the deadline for 2023 nominations could be set in the autumn, prior to ENG16 where the commendation would be made. Council could then consider this commendation in December 2022. This would provide the accolade holder with a full year in which to celebrate and give plenty of time to prepare for IALA to celebrate on World AtoN Day in the middle of the year. This pattern would then continue into the future. Hideki Noguchi (Japan Coast Guard) produced a paper to Council setting out this proposal for a change in the timings of IALA HLY.

Action Items:

*The **Secretariat** is requested to forward the paper ENG15-12.4.1 “Change of Selection Process of the IALA Heritage Lighthouse of the Year” to Council 75 for its consideration and if Council agreed, to update the webpages as appropriate to reflect the new timings.*

12.6 Publicising IALA HLY

A short discussion was held regarding other opportunities to publicise the award. Ideas included:

- IALA Bulletin (2022 accolade holder to write article about their lighthouse in time for WAtON Day)
- Social media
- Invite relevant organisations to link in with the IALA Heritage webpages
- Letter to IMO executive committee

12.7 Heritage Lighthouse Database and Cybercentre (tasks now combined and re-named ‘IALA Heritage Webpage’) (Task 2.6.3.& 2.6.4)

The IALA HLY webpages were updated to incorporate the 6 new IALA Heritage Lighthouses that had been submitted. Sihyeon Park is no longer able to take responsibilities for the Heritage webpages. In her place Seongwoo Son would join Gillian Burns in that role. Gratitude was also expressed for the work that Sihyeon Park had put into the role and to Seongwoo Son for taking this over.

Action Items:

***Gillian Burns (NLB) and Seongwoo Son (National Lighthouse Museum, ROK)** are requested to continue to ensure that the IALA Heritage website is up-to-date, accurate and complete, directly undertaking editorial changes and liaising with IALA Secretariat and with Peter Hill (WG4 Chair) as necessary.*

*The **Secretariat** is requested to assist the editing team with Heritage website editing as required.*

12.8 Celebrating the 200 Year Anniversary (in 2023) of Fresnel’s work at Cordouan Lighthouse

WG4 were delighted to welcome Jacques Manchard to its second meeting, following Jacques well-received presentation to ENG15 on the ‘Project Celebrating the Cordouan Lens Experimentation’ and thanked him for the presentation.

With further discussion planned between Jaques Manchard and IALA secretariat, it was agreed that he would keep WG4 informed and that all WG4 participants would disseminate the information to colleagues and organisations that may be interested in partaking in the celebrations. It was also agreed that Jacques would liaise directly with Alberto Piovesana Jr to explore opportunities for synergy with the planning Heritage Seminar in Brazil (see section 1 above).

Action Items:

*That **Committee participants** are requested to consider taking part in celebrations in 2023 for the 200th anniversary of Frenel's work on lenses at Cordouan lighthouse.*

13. REVIEW OF OUTPUT AND WORKING PAPERS

The Committee reviewed and endorsed the reports of each Working Group. The Committee approved the output and working documents as indicated in ANNEX D.

14. REVIEW OF SESSION REPORT

The report of the meeting (ENG15-14.1) was considered and approved. Committee Participants were requested to advise any corrections/amendments within one week, following which the final version of the report will be issued via the IALA web site.

Action item:

*The **Secretariat** is requested to forward the summary of the ENG15 Committee report (ENG15-14.1) to Council to note.*

15. DATE AND VENUE OF NEXT MEETING

The next session of the ENG Committee is planned to be held from 17 to 21 October 2022 at Headquarters, Saint Germain-en-Laye.

Other IALA events will be publicised on the IALA website.

16. CLOSE OF THE MEETING

The Committee Chairman thanked the Vice-Chair, working group Chairs and all Participants for their hard work and output during the session and the four-year work period. He thanked the IALA Secretariat for their support. Secretary-General celebrated the good outputs from ENG15, now proceeding to Council for approval. The work has progressed very conveniently virtually but as an international organisation, the preferred option will be organising face to face meetings. Francis Zachariae welcomed participants to the next ENG16 Committee in Saint-Germain-en-Laye (17 to 21 October 2022).

17. LIST OF ANNEXES

- 1 Agenda
 A copy of the agenda is at ANNEX A.
- 2 Participants
 A list of participants is at ANNEX B.
- 3 Input Papers
 A list of input papers is at ANNEX C.
- 4 Output and Working papers
 A list of output and working papers is at ANNEX D.
- 5 Action Items
 A list of action items is at ANNEX E.



15th Meeting of the AtoN Engineering and Sustainability Committee (ENG15)

The 15th meeting of the **AtoN Engineering and Sustainability Committee** will be held from 28 February – 17 March 2022 virtually.

The opening plenary will commence at 1000 – 1200 UTC on Monday 28 February 2022, and the closing plenary will begin at 1000 – 1200 UTC on Thursday 17 March.

AGENDA

Opening Plenary

2. Introduction
 - 2.1. Welcome address from the Secretary-General/Deputy Secretary-General
 - 2.2. Approval of the agenda Simon Millyard
 - 2.3. Apologies and Introductions Simon Millyard
 - 2.4. Working arrangements Jaime Alvarez
 - 2.5. Style Guide Jaime Alvarez
 - 2.6. ENG committee structure Simon Millyard
 - 2.6.1. WG1 Overview
 - 2.6.2. WG2 Overview
 - 2.6.3. WG3 Overview
 - 2.6.4. WG4 Overview
3. Review of action items from last meeting Simon Millyard / Jaime Alvarez
 - 3.1. Review of action items from ENG14
4. Review of input papers Simon Millyard
 - 4.1. Review of input papers to ENG 15
 - 4.2. Input papers for action/allocation
5. Reports from other bodies
 - 5.1. IALA
 - 5.1.1. IALA Council
 - 5.1.1.1. Documents approved by Council Minsu Jeon
 - 5.1.1.2. Heritage Lighthouse Award Peter Hill
 - 5.1.1.3. Document catalogue Minsu Jeon
 - 5.1.2. IALA Policy Advisory Panel (PAP)
 - 5.1.2.1. Sustainability Simon Millyard
 - 5.1.2.2. 2023-2027 Work Plan Michel Cousquer

- | | | |
|------|---------------------------|----------------|
| 5.2. | Update on MASS task group | Simon Millyard |
| 5.3. | IMO | Minsu Jeon |
| 5.4. | IHO | Minsu Jeon |
| 5.5. | ITU | Minsu Jeon |
| 5.6. | RTCM | Alan Grant |
| 5.7. | PIANC | Minsu Jeon |
| 5.8. | CIE | Alwyn Williams |
| 5.9. | ESBN Tsunami monitoring | Minsu Jeon |
6. Reports from rapporteurs
 - 6.1. TBC
 7. Advertising Online Presentations (planned during the working period)
 - 7.1. SBAS standardisation – Guillermo Fernandez
 - 7.2. Project celebrating the Cordouan lens experimentation – Jacques Manchard
 - 7.3. R-Mode status update – Michael Hoppe / Steffan Gewies
 - 7.4. ASGARD (Development of a Shipborne receiver Galileo DFMC following international performance standards; and including OSNMA capabilities) - Marcos López Cabeceira
 8. Overview of planned work for ENG15

8.1.	WG 1 - Visual & Physical AtoN	Malcolm Nicholson
8.2.	WG 2 - Knowledge & Sustainability	Peter Schneider/ Jörg Unterderweide
8.3.	WG 3 - Radionavigation Services	Alan Grant
8.4.	WG 4 - Heritage	Peter Hill
 9. Establish Working Groups and Task Groups
 10. END OF OPENING PLENARY
 11. Working Groups/Task Groups progress work plan
 12. CLOSING PLENARY
 13. Review of output and working papers
 14. Review of session report
 15. Date and venue of next meeting
 16. Close of meeting

Simon Millyard

ANNEX B

LIST OF PARTICIPANTS

SURNAME	NAME	AFFILIATION	E-MAIL
ABDULLA	Jaffer	Middle East Navigation Aids Services - MENAS	jaffer@menas.com.bh
AL MOSAWI	Mahdi	Middle East Navigation Aids Services - MENAS	mahdi@menas.com.bh
ALHARBY	Ahmad	Saudi Ports Authority	
ALQUIZAR	Lyn	Philippine Coast Guard Headquarters	lyn.alquizar@coastguard.gov.ph
ALVAREZ LOPEZ	Jose Manuel	ESSP-SAS	
ANDREAS FOMBUENA	Jose	Mediterraneo Senales Maritimas S.L.	
ANTOKU	Hiroyuki	Japan Coast Guard	jcghkotsuseibi5-9c9q@mlit.go.jp
ARGUL	Javier	Puertos del Estado	fjargul@puertos.es
ARRIAGADA	Henry	Directorate General of the Maritime Territory and Merchant Marine of the Chilean Navy.	harriagada@directemar.cl
AUTRET	Ronan	Cerema REM	ronan.autret@cerema.fr
BAE	Yong Chan	Ministry of Oceans and Fisheries	aton6@daum.net
BALKHAIR	Ahmad	Saudi Ports Authority	
BLANCHARD	Yves-Marie	Cerema REM	yves-marie.blanchard@cerema.fr
CAIRNS	Bill	American Pilots' Association Inc	bcairns@americanpilots.org
CARD	Michael	Zeni Lite Buoy Co Ltd	
CHACON NOVOA	Egly Tatiana	Autoridad Maritima Portuaria	echacon@amp.gob.sv
CHAE	Jeonggeun	The Korea Institute of Aids to Navigation(K-AtoN)	jcchae@katon.or.kr
CHATEAUVERT	Andre	Canadian Coast Guard	andre.chateauvert@dfo-mpo.gc.ca
CHEN	Jinhai	Jimei University	jhchen@jmu.edu.cn
CHO	Yonghun	Ministry of Oceans and Fisheries - National Maritime PNT Office	
COUSQUER	Michel	Cerema	michel.cousquer@cerema.fr
CRAWFORD	James	Directorate General of the Maritime Territory and Merchant Marine of the Chilean Navy.	jcrawford@directemar.cl
DALE	Robert	Trinity House	rob.dale@thls.org
DAOUDI	Sara	Ministère de l'Équipement et de l'Eau	
DELAGE	Pierre-Luc	Canadian Coast Guard	pierre-luc.delage@dfo-mpo.gc.ca
DIEZ	Jose Carlos	Puertos del Estado	
DOU	Lu	China Maritime Safety Administration	dldoulu@163.com
DU	Gang	China Maritime Safety Administration	
EL MEHDI	Lakhssassi	Ministère de l'Équipement et de l'Eau	
FUKUI	Hisayoshi	Japan Coast Guard	

GAIDAI	Oleg	Department of Navigation and Oceanography-Russia	
GEWIES	Stefan	German Aerospace Centre - Institute of Communications and Navigation	stefan.gewies@dlr.de
GUANZHENG	Li	China Maritime Safety Administration	
HAN	Younghoon	KRISO - Korea Research Institute of Ships and Ocean Engineering	yghan@kriso.re.kr
HAN	Jaesik	Ministry of Oceans and Fisheries	4eva4u@korea.kr
HANSEN	Greg	Australian Maritime Safety Authority	gjh@amsa.gov.au
HAY	Adam	M-NAV Solutions	adam@m-nav.com
HEIKONEN	Kaisu	Finnish Transport Infrastructure Agency	kaisu.heikonen@ftia.fi
HERMANN	Frank	Federal Waterways and Shipping Administration-Germany	frank.hermann@wsv.bund.de
HERNOE	xavier	Direction des affaires maritimes-Ministere de la Mer	xavier.hernoe@developpement-durable.gouv.fr
HILL	Peter	Trinity House	peter.hill@trinityhouse.co.uk
HOEVE	Jan Remi	Ministry of Infrastructure and Water Management	remi.hoeve@rws.nl
HOPPE	Michael	Federal Waterways and Shipping Administration-Germany	
HUOT	Caroline	Canadian Coast Guard	caroline.huot@dfo-mpo.gc.ca
IKEDA	Tamotsu	JANA (Japan Aids to Navigation Association)	ikedat@jana.or.jp
KE	Ranxuan	Jimei University	keranxuan@126.com
KESKKYLA	Partel	Estonian Transport Administration	partel.keskkyla@transpordiamet.ee
KIFFER	Harold	US Coast Guard	harold.j.kiffer@uscg.mil
KIM	Youngjin	Ministry of Oceans and Fisheries	ds3kgu@korea.kr
KIM	Hyun	Ministry of Oceans and Fisheries of the Republic of Korea	nox88@korea.kr
KIM	songyi	The Korea Institute of Aids to Navigation(K-AtoN)	ssong@katon.or.kr
KIM	Jonghun	PAI CHAI UNIVERSITY	kjh628@pcu.ac.kr
KO	Jaeyoung	The Korea Institute of Aids to Navigation(K-AtoN)	kyko@katon.or.kr
KRINGS	Marco	Federal Waterways and Shipping Administration-Germany	marco.krings@wsv.bund.de
LAGHCHIMI	Salma	Ministère de l'Équipement et de l'Eau	s.laghchimi@mtpnet.gov.ma
LAKSHMAN	Sarah-Jane	Australian Maritime Safety Authority	sarah-jane.lakshman@amsa.gov.au
LASMA	Sami	Finnish Transport Infrastructure Agency	sami.lasma@fta.fi
LAZAR	Nisrine	Ministère de l'Équipement et de l'Eau	lazar@mtpnet.gov.ma
LEE	Junhyun	The Korea Institute of Aids to Navigation(K-AtoN)	
LEE	Chungjin	The Korea Institute of Aids to Navigation(K-AtoN)	sn1883@naver.com

LEE	Sak	Korea Coast Guard	issac1015@korea.kr
LEHANE	Eoghan	Commissioners of Irish Lights	eoghan.lehane@irishlights.ie
LETTIERI	Salvatore	Italian Navy - Direzione Fari e Segnalamenti	salvatore.lettieri@marina.difesa.it
LINDBERG	Jonas	Sabik Marine	jonas.lindberg@sabik.com
LIU	Robert	Shanghai Rokem Industrial Co Ltd	robertliu@rokem.com
LIU	Juan	China Maritime Safety Administration	liujuan1633@qq.com
LLORCA LLORCA	Hector	GMV Aerospace and Defence S.A.U	
LOPEZ- MARTINEZ	Manuel	EUSPA	
LU	Chin Leong	Maritime and Port Authority of Singapore	lu_chin_leong@mpa.gov.sg
LUO	Ziwen	China Maritime Safety Administration	
MANCHESTER	Dan	Australian Maritime Systems	
MARTIN	Pierre-Yves	Cerema EMF	pierre-yves.martin@cerema.fr
MARTIN	Guillaume	AMG Microwave	guillaume.martin5@etu.univ-nantes.fr
MBENE KOAH	Alain Serge	Port Authority of Kribi	serge.mbene@pak.cm
MENARD	Johnny	Swedish Maritime Administration	johnny.menard@sjofartsverket.se
MIRZA	Shaheen	Middle East Navigation Aids Services - MENAS	mirza@menas.com.bh
MUELLER	Paul	IALA	paulfmueller@half-pi.com
NAKAJIMA	Tomoya	Japan Coast Guard	
NICHOLSON	Malcolm	Sealite	Malcolm.Nicholson@spx.com
NOGUCHI	Hideki	Japan Coast Guard	
PARK	Sanghyun	KRISO - Korea Research Institute of Ships and Ocean Engineering Maritime PNT Research Office,	shpark@kriso.re.kr
PARK	Sulgee	KRISO - Korea Research Institute of Ships and Ocean Engineering	
PARK	Sihyeon	Ministry of Oceans and Fisheries - National Lighthouse Museum	
PERSCHNICK	Bertram	Julius Marine GmbH	
PIOVESANA JNR	Alberto	Marinha do Brasil-Diretoria de Hidrografia e Navegação- Almirante Moraes Rego	piovesana@camr.mar.mil.br
PIRIZ	Ricardo	GMV Aerospace and Defence S.A.U	rpiriz@gmv.com
RAULEFS	Ronald	German Aerospace Centre - Institute of Communications and Navigation	Ronald.Raulefs@dlr.de
RENAUDIN	Philippe	CEREMA / DTecREM	Philippe.Renaudin@cerema.fr
ROYAL PETERSEN	Joergen	Danish Maritime Authority	
RUTKINEN	Andry	Estonian Transport Administration	andry.rytkinen@transpordiamet.ee
SCHUETTELER	Michael	Federal Waterways and Shipping Administration	
SCUTT	Dave	Australian Maritime Systems	dave.scutt@ams.group

SEO	Kiyeol	KRISO - Korea Research Institute of Ships and Ocean Engineering	kyseo@kriso.re.kr
SHIM	Hyeseung	Korea Advanced Institute of Science and Technology (KAIST)	hs.shim@kaist.ac.kr
SIERRA ALMAGUER	Julio Fidel	Oficina Nacional Hidrografia y Geodesia - Cuba	juliofidelsierra1973@gmail.com
SON	Pyo-Woong	KRISO - Korea Research Institute of Ships and Ocean Engineering	pwson@kriso.re.kr
SON	Seong-Woo	The Korea Institute of Aids to Navigation(K-AtoN)	amurson@katon.or.kr
STAAF	Jonas	Swedish Maritime Administration	jonas.staaf@sjofartsverket.se
STEPHAN	Emma	Cerema EMF	
SUN	Qian	China Maritime Safety Administration	qbcouple@163.com
TONGO BOKAM	john steve	Port Authority of Kribi	john.tongo@pak.cm
VAN GILS	Jeffrey	Ministry of Infrastructure and Water Management	jeffrey.van.gils@rws.nl
VERMEER	Richard	Ministry of Infrastructure and Water Management	richard.vermeer@rws.nl
WANG	Lingyan	China Maritime Safety Administration	437309118@qq.com
WENLANG	Lin	China Maritime Safety Administration	
WENTA	Kinga	Maritime Office in Gdynia	kinga.wenta@umgdy.gov.pl
WILLIAMS	Alwyn	Trinity House	alwyn.williams@gla-rad.org
WOOD	Amy	Australian Maritime Systems	
YAMAMOTO	Akira	Furuno Electric Co Ltd	akira.yamamoto@furuno.co.jp
YEO	Jimin	The Korea Institute of Aids to Navigation(K-AtoN)	yjm3754@katon.or.kr
ZANETTE	Cecile	Mediterraneo Senales Maritimas S.L.	cecile@mesemar.com
JIANG	Yi	China Maritime Safety Administration	j_y@dlmu.edu.cn

ANNEX C LIST OF INPUT PAPERS

All papers were posted to the Committee website

Meeting	Agenda Item	Output Paper Title	Source	Action
ENG15	1.2.1	Draft Agenda	IALA Secretariat	All
ENG15	2.1	Report of ENG14 (ENG14-2.1.1)	IALA Secretariat	All
ENG15	2.1.1	Review of action items from ENG14	IALA Secretariat	All
ENG15	3.0	Input paper Committee meeting template	IALA Secretariat	All
ENG15	3.0.1	List of Input papers	IALA Secretariat	All
ENG15	3.1.1.1	Clarification to Recommendation R0204	GRAD	WG1
ENG15	3.1.1.1.1	Modification Proposal for Term of Effective Intensity in R0203	China MSA	WG1
ENG15	3.1.1.1.2	Measurement and Calculation of Effective Intensity of Aids to Navigation Light_v0.1	China MSA	WG1
ENG15	3.1.1.2	Correction to the Guideline G1135	GRAD	WG1
ENG15	3.1.1.3	Request for online sessions on leading lines	WSV	WG1
ENG15	3.1.1.4	Definition of Nominal Range	Estonian Transport Administration	WG1
ENG15	3.1.1.5	Establishment of optical performance guideline for bridge lantern to improve visibility	KATON	WG1
ENG15	3.1.2.1	AtoN distribution adjustment practice of the main channel in Tianjin port, China	China MSA	WG2
ENG15	3.1.2.2	The communication methods of RCM and its advantages and disadvantages	China MSA	WG2
ENG15	3.1.2.3	Proposals on new guidelines on buoy tender crew operation	China MSA	WG2
ENG15	3.1.2.4	Current state of standardization of AtoN management&operation system in Korea	KATON	WG2
ENG15	3.1.3.1	Plan for WG3 work over the ENG15 period	WG3	WG3
ENG15	3.1.3.2	Standardisation for SBAS L1 maritime receivers	ESSP EUSPA	WG3
ENG15	3.1.3.3	Introduction to the Tests Information on Next Generation Racon	China MSA	WG3
ENG15	3.1.3.4	Standardisation of R-Mode (Updated Roadmap)	WSV / DLR / BSH	WG3
ENG15	3.1.3.5	Advanced Shipborne Galileo Receiver Double Frequency (ASGARD) - Objective, activities and expected added value	GMV	WG3
ENG15	3.1.3.6	RTCM navigation message for medium frequency R-Mode	DLR / WSV	WG3
ENG15	3.1.4.1	Plan for WG4 work over the ENG15 period	WG4	WG4
ENG15	3.1.4.2	Training for Light Keepers and Workers	GEOCUBA	WG4

ENG15	3.1.4.3	IALA Heritage Lighthouse of the year plaque 2022 and beyond	National Lighthouse Museum Republic of Korea	WG4
ENG15	3.2.1	Liaison note to ENG Committee - Recommendation R1001 The IALA Maritime Buoyage System (MBS) Edition 2	ARM	All
ENG15	3.2.2	Liaison note to ENG Committee - Guideline 1052 Quality Management Systems for AtoN Service Delivery	ARM	All
ENG15	3.2.3	Liaison note to ENG Committee - 3rd party Quality Control	ARM	All
ENG15	3.2.4	Suggestions on the Role of IALA WWA in Training Capacity Building of the ATO	China MSA	All
ENG15	3.2.5.1	ARM Committee Input Paper - G1092 Proposed Revision ARM14-3.2.6	ARM	All
ENG15	3.2.5.2	G1092 Ed2.1 Safety Management for AtoN Activities December 2017 ARM14-3.2.6.1	ARM	All
ENG15	3.2.5.3	G1092 Ed2.2 Safety Management for AtoN Activities December 2017 ARM14-3.2.6.2	ARM	All
ENG15	3.2.6	Input paper on proposal to IMO NCSR 9 regarding IMO position for WRC-23 agenda item 10	ENAV Chair	All
ENG15	3.2.6.1	Draft input to IMO NCSR9 on WRC23 AI10	ENAV Chair	All
ENG15	3.2.7	Review and update of Recommendation R0141	WWA	All
ENG15	3.2.7.1	R0141 Training and Certification of Marine Aids to Navigation Personnel (E-141) Ed4.1 December 2017	WWA	All
ENG15	3.2.8	Final report on the IALA Workshop on Enhanced Radar Positioning System	IALA	All
ENG15	3.2.9	Final report on the IALA Workshop on Cybersecurity	IALA	All
ENG15	3.2.10	Input paper report Radio and visual hindrance caused by solar parks next to waterways	RWS	All
ENG15	3.2.10.1.0	Radio and visual hindrance caused by solar parks next to waterways-1-83	RWS	All
ENG15	3.2.10.1.1	Radio and visual hindrance caused by solar parks next to waterways-84-114	RWS	All
ENG15	4.1.1.1	Council74 Report Final	Council	All
ENG15	4.1.1.3	Technical Documents Catalogue January 2022 min	IALA Secretariat	All
ENG15	4.1.2.1	Cross-committee Work (PAP44-6.1.2.1)	IALA	All
ENG15	4.1.2.3	ENG Work plan draft 2023 2027	ENG	All
ENG15	4.1.2.3.1	Task Register 2018-22 at ENG8 (ENG9-6.2.1)	ENG	All
ENG15	4.4.1	IALA Report on ITU-R WP5B meeting 29th November to 12st December 2021	Stefan B	All
ENG15	4.5	Plenary Meeting Summary RTCM SC104: Recommended Standards for Differential GNSS Service	RTCM	All

Output documents are submitted for review/action by a body other than the Committee initiating the document.

Meeting	Agenda Item	Output Paper Title	Action
ENG15	12.0.1	Liaison note to All Committees on the Sustainability workshop	All Committees
ENG15	12.0.2	Sustainability workshop proposal	All Committees
ENG15	12.1.1	Revised Guideline G1135 on Determination and calculation of effective intensity	Council
ENG15	12.1.2	Revised Recommendation R0204 on Marine signal lights - Determination and calculation of effective intensity	Council
ENG15	12.1.3	Liaison note to ARM Committee on the Definition of nominal range	ARM Committee
ENG15	12.2.1	Draft Guideline on Quality check for third party AtoN service providers	Council
ENG15	12.2.2	Revised Recommendation R0141 on Training and certification of Marine Aids to Navigation Personnel	Council
ENG15	12.2.2.1	Draft Guideline on Training and certification of Marine Aids to Navigation personnel	Council
ENG15	12.2.3	Draft Guideline on Solar modules for a marine environment	Council
ENG15	12.3.1	Revised Guideline G1127 on Systems and Services for High-accuracy Positioning and Ranging	Council
ENG15	12.3.2	Revised Guideline G1129 on Retransmission of SBAS corrections	Council
ENG15	12.3.3	Draft Guideline G1147 on the Use of Enhanced Radar Positioning System	Council
ENG15	12.3.4	Liaison note to the ENAV Committee on R-Mode Standardisation	ENAV
ENG15	12.3.5	Liaison note to the ENAV Committee on IMO position on VDES and digital VHF support at WRC-27	ENAV
ENG15	12.3.6	Draft input to NCSR9 on WRC23 AI10 – Including ENG comments for ENAV to consider	ENAV
ENG15	12.3.7	Liaison note to RTCM SC104 on R-Mode messages	Council
ENG15	12.4.1	Input paper to Council on the Change of Selection Process of the Heritage Lighthouse of the Year	Council

Working papers will remain within the Committee for further review during ENG15.

Meeting	Agenda Item	Output Paper Title	Source	Action
---------	-------------	--------------------	--------	--------

ENG15	12.0.3	WP Technical Programme sustainability workshop V1	ENG15	ENG16
ENG15	12.1.4	WP Measurement and Calculation of Effective Intensity of Aids to Navigation Light ENG15-3.1.1.1.2	WG1	ENG17
ENG15	12.2.4	WP Draft Guideline on Extreme Environmental Conditions (ENG15-2.3.1)	WG2	ENG16
ENG15	12.2.5	Draft Guideline guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them	WG2	ENG16
ENG15	12.2.6	Draft Guideline on radar reflectors as a working document	WG2	ENG16
ENG15	12.2.7	Training for Light Keepers and Workers ENG15-3.1.4.2	WG2	ENG16

Action Items for Secretariat

1. The **Secretariat** is requested to send the amended G1135 on Determination and Calculation of Effective Intensity (ENG15-12.1.1) to Council for approval. 19
2. The **Secretariat** is requested to send the amended R0204 on Marine Signal Lights - Determination and Calculation of Effective Intensity (ENG15-12.1.2) to Council for Approval 19
3. The **Secretariat** is requested to send the Liaison Note on Definitions of Ranges of AtoN Lights (ENG15-12.1.3) to the ARM Committee for their consideration 19
4. The **Secretariat** is requested to forward input paper ENG14-7.1.2 to ENG17 as a working paper. 20
5. The **Secretariat** is requested to forward input paper ENG15-3.1.1.1.2 to ENG17 as a working paper. 20
6. The **Secretariat** is requested to forward the guideline ENG15-12.2.1 on Third Party AtoN Provider Quality Control to Council for approval. 21
7. The **Secretariat** is requested to forward the draft Guideline on Extreme Environmental Conditions (ENG15-2.3.1) document to the upcoming interessional meetings and ENG16. 22
8. The **Secretariat** is requested to delete the task on Develop Guideline on meteorological and oceanographical data dissemination (Task 2.3.3.) from the current and the upcoming work plan.22
9. The **Secretariat** is requested to forward the guideline ENG15-12.2.3 on solar modules for a marine environment to Council for approval. 22
10. The **Secretariat** is requested to forward the draft guideline guidance quantifying characteristics to meet nautical and operational requirements and ways to verify them as a working document to ENG16 23
11. The **Secretariat** is requested to forward the draft guideline on radar reflectors as a working document to ENG16. 23
12. The **Secretariat** is requested to forward the recommendation ENG15-12.2.2 and the guideline ENG15-12.2.2.1 on Training and Certification of Marine Aids to Navigation Personnel forward to Council for approval. 24
13. The **Secretariat** is requested to forward ENG15-3.1.4.2 Training for Light Keepers and AtoN Workers to ENG16 24
14. This item has been completed. 25
15. The **Secretariat** is requested to forward liaison note ENG15-12.3.4 “Standardisation of R-Mode” to ENAV29. 25
16. The **Secretariat** is requested to forward liaison note ENG15- 12.3.7 for RTCM “Navigation messages for medium frequency R-Mode” to Council for approval 25
17. The **Secretariat** is requested to forward draft Guideline G1147 on “Enhanced Radar Positioning System (ERPS)” to Council for approval 26
18. The **Secretariat** is requested to forward draft Guideline G1129 on “The retransmission of SBAS corrections using MF Radio beacon and AIS” to Council for approval. 26
19. The **Secretariat** is requested to forward draft Guideline G1127 on “Systems and services for high-accuracy positioning and ranging” to Council for approval. 27
20. The **Secretariat** is requested to forward liaison note ENG15- 12.3.5 “LN to ENAV - IALA input to IMO regarding VDES and digital VHF support at WRC-27” and the marked up annex ENG15- 12.3.6 “Draft Input to NCSR9 on WRC23 AI10 – ENG” to ENAV29. 28
21. The **Secretariat** is requested to forward the commendation of ENG15 WG4 Homigot Lighthouse to the Council to determine IALA Heritage Lighthouse of the Year 2022 32

22. The **Secretariat** is requested to organise a formal acknowledgement of the award to the recipient at a suitable event to which the recipient is in attendance. 32
23. The **Secretariat** is requested to forward the paper ENG15-12.4.1 “Change of Selection Process of the IALA Heritage Lighthouse of the Year” to Council 75 for its consideration and if Council agreed, to update the webpages as appropriate to reflect the new timings. 33
24. The **Secretariat** is requested to assist the editing team with Heritage website editing as required. 33
25. The **Secretariat** is requested to forward the summary of the ENG15 Committee report (ENG15-14.1) to Council to note. 34

Action Items for Participants

26. **Chungjin Lee** is requested to submit an input paper to ENG16 on further experiments on the optical performance of bridge lights. 19
27. **Frank Hermann** and **Pärtel Keskküla** are requested to arrange an intersessional meeting to progress the work on the development of G1023 Leading Line. 20
28. **Simon Millyard** is requested to bring to the attention of the PAP Committee the use of, and any liability associated with the use of, the software tools provided by IALA. 20
29. **Alwyn Williams** is requested to submit an input paper to ENG16 on the topic of a suite of Guidelines to support R0203. 20
30. **Alwyn Williams** is requested to submit an Input paper on standard measurement conditions to ENG16 with the aim of finalizing this output. 20
31. **Malcolm Nicholson** is requested to continue to work on the Guideline on Optical Performance and Calculation and submit an Input Paper to ENG16. 20
32. That **Committee participants** are requested to upload buoy images that can be used in the guideline to enhance understanding of the intended reader. 23
33. **Peter Schneider** is requested to organize the intersessional work on radar reflectors. 24
34. That **Committee participants** are requested to provide their experiences on Modern Equipment in traditional Lighthouses and projects as input papers to ENG16. 24
35. **Julio Fidel Sierra Almaguer** is requested to identify and contact other countries that have a need for the course on Light Keepers and AtoN Workers. 24
36. **Alberto Piovesana Jr (Diretoria de Hidrografia e Navegação of the Brazilian Navy)** is requested to proceed with plans for the inperson Heritage Seminar on 27th-28th May 2023, with hybrid online option if feasible, and to correspond with WG4 participants and IALA Secretariat as required. 29
37. That **Committee participants** are requested to consider whether they or their colleagues may be able to deliver a presentation at the Heritage Seminar in Rio, Brazil and on what topic, and liaise with Alberto Piovesana Jr, Peter Hill (Chair WG4) or IALA Secretariat 29
38. **The National Lighthouse Museum, Republic of Korea** is requested to expedite design and production of the plaque to be ready for presentation at WAtON Day 2022. 29
39. **Gillian Burns (NLB) and Seongwoo Son (National Lighthouse Museum, ROK)** are requested to continue to ensure that the IALA Heritage website is up-to-date, accurate and complete, directly undertaking editorial changes and liaising with IALA Secretariat and with Peter Hill (WG4 Chair) as necessary. 33
40. That **Committee participants** are requested to consider taking part in celebrations in 2023 for the 200th anniversary of Frenel’s work on lenses at Cordouan lighthouse. 34



10, rue des Gaudines – 78100 Saint Germain en Laye, France
Tel. +33 (0) 1 34 51 70 01 – Fax +33 (0) 1 34 51 82 05 – contact@iala-aism.org
www.iala-aism.org

International Association of Marine Aids to Navigation and Lighthouse Authorities
Association Internationale de Signalisation Maritime