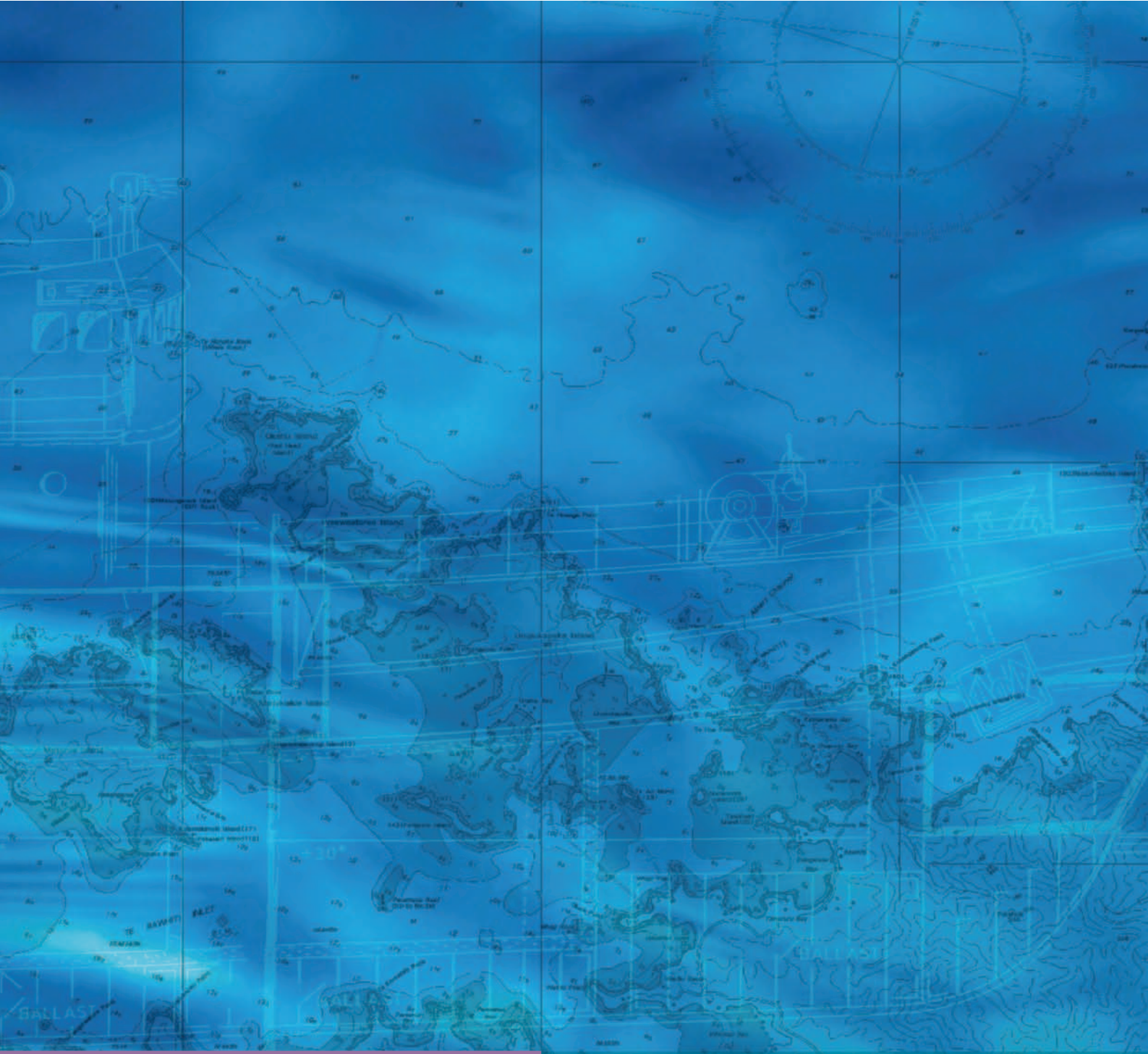

FINAL GUIDELINES FOR

Providing Aids to Navigation

in New Zealand

KEEPING YOUR SEA SAFE FOR LIFE

Maritime Safety

MARITIME SAFETY AUTHORITY OF NEW ZEALAND
Kia Maanu Kia Ora

ISBN Number

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Preface

These guidelines are one of a series supporting the New Zealand Port & Habour Marine Safety Code. They provide detailed and, in some cases, technical guidance relating to the specific measures, identified in that Code, that fall to regional councils, port companies and other participants to implement in fulfillment of their duties and exercise of powers under the law.

The guidelines, as also the Code itself, are not statements and good practice intended to stand for all time. Rather, they are living documents to be revised in the light of the lessons drawn from experience, advances in technical knowledge and capability, and the ongoing imperative of continually improving safety management within our port and harbour system.

As at August 2004, the Code is supported by –
Guidelines for Port & Harbour Risk Assessment and Safety Management Systems in New Zealand
Guidelines for Providing Aids to Navigation in New Zealand
Guidelines of Good Practice for Hydrographic Surveys in New Zealand Ports & Harbours

Additional guidance documents are in preparation or planned. Support for participants when considering the relevance of various metrological and hydrographic occurrences will be available in a report on environmental factors affecting safe access and operations in ports and harbours, due to be published in September 2004. During the next year, MSA with be working with participants to produce guidelines for vessel traffic services as well as standards for harbourmasters. It is further proposed to adopt an existing standard for the use of tugs in ports published by the Nautical Institute.

Comments and queries relating to these guidelines, as well as any questions concerning the New Zealand Port & Harbour Marine Safety Code should be addressed to –

Nautical Analyst
Maritime Safety Authority
PO Box 27006
Wellington

e-mail msa@msa.govt.nz, phone 04 473 0111 (toll free 0508 225522), fax 04 494 1263

Copies of the guidelines and the Code are available from MSA free of charge. Electronic versions are available from www.msa.govt.nz.

Russell Kilvington
Director of Maritime Safety

August 2004

Introduction

This document outlines the basic 'good practice' guidelines that should be considered in the planning, implementation and management of Aids to Navigation (AtoN) used to support the safe navigation of vessels in New Zealand Ports and Harbours. These guidelines have been developed by the Aids to Navigation Working Group of the National Port and Harbour Safety System (PHSS) development project and endorsed by the National Advisory Committee for the Port and Harbour Safety System project.

For clarity and in accordance with terminology used by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the systems provided by the Maritime Safety Authority and other operators are described as Aids to Navigation (AtoN). An AtoN is a device or system external to vessels that is designed and operated to enhance the safe and efficient navigation of vessels and/or vessel traffic. This is to differentiate their provision from the equipment carried on vessels for navigational purposes, which are referred to as navigational aids (Navaids).

New Zealand conforms to the IALA System 'A' Maritime Buoyage System.

The prime purpose of an Aid to Navigation is to assist the safe passage of a vessel. Definition, quality and availability of an AtoN impacts on safety. It follows that to ensure continuity all AtoN should comply with an International Guideline (IALA).

References & Definitions

Relevant references and definitions can be found at Annexes 1(a) and 1(b) to this document respectively or in the New Zealand Port & Harbour Marine Safety Code.

1. The Need for Aids to Navigation (AtoN)

The provider of AtoN shall establish what is required for a particular waterway for safe navigation. The key providers will be regional councils, but will also include port companies, marina operators, boating clubs, jetty operators, marine farms and other facility providers.

In order to establish the AtoN requirements a risk assessment approach should be used to identify and rank hazards. AtoN will provide:

- Position fixing
- Hazard identification and warning
- Indication of traffic arrangements.

The risk assessment should conform with the "Guidelines for Port & Harbour Risk Assessment and Safety Management Systems in New Zealand" developed as part of the Port & Harbour Safety System of New Zealand. Relevant matters to consider when carrying out the risk assessment to determine the AtoN requirement would include:

▪ **Geographical Features and Foreshore Structures**	Headlands, points, low coastlines, islands, rock, outcrops, piers, jetties, quays, locks, bridges, marine farms, future development in the area.
▪ **Hydrographical Features**	Shoals, sandbanks, pinnacles, depth of water and fairways (shoaling), sand waves, width of fairway, tidal/current features, harbour approaches, wrecks, stability of or frequency of change in bottom profile, dredging, stage (age) of surveys.
▪ **Traffic Conditions**	Volume, size and mix of shipping (dry cargo, passenger, high speed ships, fishing, hazardous cargoes, inland waterway craft, dredging craft); the need to ensure lane discipline within Traffic Separation Schemes; areas of traffic convergence; known changes in traffic patterns; competency of crew manning vessels entering the area; traffic safety records in general.
▪ **Weather Conditions**	The frequency and direction of storms and gales, fog and other factors causing reduced visibility.
▪ **Environmental Factors**	The number of vessels carrying hazardous cargoes, routes followed, the numbers of these vessels in the mix of traffic, crossing traffic and consequent collision risk, wind/current considerations, areas of high population density and other sensitive areas such as marine reserves etc. Increasingly environmental considerations play a role when studying the available options, which are suitable from a purely navigational point of view.
▪ **Traffic Management Resources**	The availability and limitations of all present traffic management resources, including other AtoN, routeing measures, anchorages, pilotage, Vessel Traffic Services (including the level of service provided), ship reporting requirements, availability of tugs, local rules and recommendations.

The outcome of the risk assessment process will dictate the category and type of AtoN to be used and the number and reliability of these AtoN. The provision of an AtoN plan should be based on this guideline and IALA recommendations.

1.1 Category of AtoN

Availability is a function of reliability and casualty response. Availability categories of AtoN are defined by performance standards such as range and time-to-repair defects. The following IALA availability targets shall apply:

Category	Type of Aid to Navigation	Availability Target *	Response Time **
Category 1	AtoN that are considered to be of primary navigational significance	At least 99.8%	Immediately
Category 2	AtoN that are considered to be of navigational significance	At least 99%	24 hours
Category 3	AtoN that are considered to be of less navigational significance than Category 1 or 2	At least 97%	Next working day

* = Time to repair should be appropriate to meet the availability target.

** = "Response Time" means the time for initiating repair. Notification of any outage shall be made without delay.

2. Roles & Responsibilities

2.1 Statutory Provision

a) Section 200 of the Maritime Transport Act 1994 applies.
b) Refer to "New Zealand Port and Harbour Marine Safety Code" part 1, section 1.3.13.

2.2 Maritime Safety Authority as the National Authority

The Maritime Safety Authority is the National Authority for Aids to Navigation in New Zealand.

The Maritime Safety Authority has overall authority for the following:

a) Supply and management of all AtoN on or near the coasts of New Zealand and the adjacent seas and islands, except those provided by regional councils or operators
b) Audit and inspection of all AtoN, including those under the management of a regional councils or operators. The Maritime Safety Authority will maintain an overview of all AtoN within NZ waters and will aim to audit annually, a minimum of 5% of the AtoN in New Zealand. The Maritime Safety Authority may give direction to regional councils and operators
c) Approving the establishment, removal, or alteration of all AtoN. The Director of Maritime Safety Authority may delegate this Authority in accordance with section 2.4 overleaf
d) Maintenance of a national AtoN register and the promulgation of all national notices regarding their operation

e) Advising regional councils and operators which AtoN outages need to be reported to Maritime Safety Authority.

2.3 Local Responsibility

The regional council is responsible at the local level for AtoN. It shall have responsibility for the following, which will be exercised through the regional harbourmaster where appointed:

a) Supply and management of all AtoN other than coastal lights provided by the Maritime Safety Authority or an operator within the council's area of harbour jurisdiction, as detailed in the relevant Navigation Bylaws

b) Audit and inspection of all AtoN within its jurisdiction, including those under the management of an operator

c) Where 'approval' delegation from the Director of Maritime Safety Authority exists, approving the establishment, removal, or alteration of local AtoN

d) Promulgation of local navigation warnings

e) Application to Maritime Safety Authority for consent of [their] applications.

2.4 Authorised Person

a) The Director of Maritime Safety Authority will therefore authorise the regional harbourmaster to carry out the functional supervision[1] of AtoN within a region. This supervision, exercised through inspection, will focus on verifying that AtoN are operated in accordance with IALA Recommendations and Guidelines and that the AtoN are appropriately maintained.

b) The Director may also delegate[2] the power to approve AtoN applications to an appropriately qualified individual.

2.5 Powers to Intervene

The Director of Maritime Safety Authority may require an operator or a regional council, for relevant reasons, to add or remove or modify an AtoN[3]. If an operator or a regional council fails to comply with this requirement within a reasonable period, to be stated in the requisition, the Director may take whatever steps necessary to give effect to the requisition and recover any resulting costs from the operator.

2.6 The Operator

The operator shall be responsible for the following:

a) Supply and management of all AtoN required for the safe operation of the facility, or as required by the approving authority. This shall include AtoN sited in the facility, and on any approaches that are created, maintained, or used for the operation of the facility

b) Gaining approval from the Maritime Safety Authority or delegated person, to establish, remove or alter all AtoN

c) Advising of failures or outages in accordance with section 3.5 & 4.2 of this document.

[1] s 200, para. 4, Maritime Transport Act 1994
[2] s 200, para. 7, Maritime Transport Act 1994
[3] s 200, para. 5, Maritime Transport Act 1994

2.7 Audits & Inspections

A program of inspections and audits, is required to ensure continuity of standards throughout New Zealand. A sample AtoN audit checklist is contained at Annex 2 of this guideline.

Maritime Safety Authority Audit:

The Maritime Safety Authority will aim to audit at its own cost a minimum of 5% of the AtoN in New Zealand. This audit will include:

- AtoN availability including methods for recording outages
- The AtoN maintenance and inspection regime
- This audit may include a physical inspection of the AtoN in association with the local Authority or operator. In this event the operator should attend at their own cost.

Regional Council

The applicable regional council should at its own cost audit and inspect all AtoN within its jurisdiction, including those under the management of an operator. The regional council will be responsible for documenting AtoN availability and the AtoN maintenance/inspection regime.

Operator

Operators should at their own cost conduct audits and inspections of their AtoN. This may be in the form of a routine planned maintenance visit to their AtoN to ensure the level of performance approved through the consents process is maintained and that this level is still appropriate.

3. Technical Considerations

3.1 Service Providers

Operators should ensure that all recommendations for approval, installation and maintenance for AtoN from service providers should comply with the requisite IALA Recommendation and Guidelines (see also Annexes 3(b) and 3(c)). It is particularly important to ensure, before procurement commences, that such provision will be acceptable to the regional council and Maritime Safety Authority.

3.2 Approval/Consent

An operator must seek prior consent to install, alter or remove any AtoN using an Maritime Safety Authority form MSA16006 (see Annex 1(a)). Requests for approval will escalate to the next highest authority, referred to as the Approving Authority

All consent applications will be considered in accordance with the process outlined in Annex 4. No consent to either the establishment of, or alteration to, any AtoN will be granted unless the characteristics of the AtoN comply with the latest applicable IALA Recommendations and Guidelines.

Consent process will normally take one month from application and the outcome will be advised to all parties.

This form is available on the Maritime Safety Authority website
http://www.msa.govt.nz/Publications/forms.htm

3.3 Installation

It is the operators' responsibility to hire competent people for the installation of the AtoN at the proposed location. Such a person should be familiar with IALA Recommendations and Guidelines and the content of Annex 1(a), 3(a) and 3(b).

3.4 Maintenance Regime

The organisation responsible for any AtoN, be it Maritime Safety Authority, regional council, or operator, is also responsible for its maintenance.

Every AtoN should be included in a planned routine maintenance schedule. The schedule will be based on various factors, including manufacturers' recommendations, local conditions, experience, risk assessment and special needs.

A record should be maintained of all visits to an AtoN, and of any work carried out.

Buoy maintenance will include periodic visual inspection of the buoy and mooring, and replacing the mooring at an interval suitable for the location, as appropriate.

3.5 Outages and Repairs

It is essential that there is a simple and robust process to ensure that any outages are reported to the authority responsible for the AtoN, and that repairs are completed as soon as possible to achieve the availability targets – see page 5 of this document. All outages shall be reported in accordance with section 4.2 of the document.

In well travelled parts of the harbour the detection of failures and outages is not an issue, but in less well visited areas this can be a problem. In these cases the authority responsible for the AtoN may consider periodic patrols to check on the AtoN. Some commercial facilities are used infrequently and the general public cannot be relied upon to advise of failures. In these cases it is recommended that the operator or authority check the AtoN immediately before the arrival, or departure, of the next vessel where the harbour risk assessment identifies the need.

If the AtoN cannot be repaired immediately the operator shall advise the harbourmaster and the regional council of the problem, the estimated time to repair, and any other relevant issues.

An operator shall satisfy themselves that the AtoN is operating correctly before canceling Notices to Mariners.

4. Administering AtoN

4.1 National AtoN System

The Maritime Safety Authority will maintain a national AtoN register. A flow diagram of the process for administering the system is contained at Annex 4.

4.2 Reporting Outages

Timely reporting of AtoN failures and outages is essential for maintaining an effective AtoN system.

The Operator shall:

- Report all failures of AtoN as defined by Maritime Safety Authority for inclusion in the national AtoN register
- Report any outages or AtoN off station to the appropriate maritime VHF services for the promulgation of navigation warnings
- Ensure that appropriate navigation warnings continue until they are satisfied that the AtoN is operating correctly
- Maintain a local log of all failures and outages, which shall include the problem, actions taken, notices issued and the date repaired
- Inform the local authority and indicate the estimated time to repair if the AtoN cannot be repaired immediately.

The Regional Council shall, in addition to those actions above for their own AtoN:

- Immediately issue a navigation warning, through the appropriate channels, on being notified of a failure or outage
- Ensure that the Maritime Safety Authority have received the necessary information for inclusion in the national AtoN register
- Inform the Maritime Safety Authority of the estimated time to repair if the AtoN cannot be repaired immediately.

The Maritime Safety Authority:

- Shall make the necessary amendments to the national AtoN register
- May follow up any repairs that are overdue or where the 'time to repair' period has expired.

4.3 Reporting changes to AtoN

To ensure the national AtoN register contains correct and up to date information on each AtoN, all changes to AtoN shall be reported to the Maritime Safety Authority immediately through the approving authority. To report changes, the operator shall resubmit a Maritime Safety Authority form MSA16006 to the approving authority

The Maritime Safety Authority shall:

- Advise Land Information New Zealand (LINZ) about any new AtoN installation, changes or removal
- Draw to the attention of operators any amendments to international best practice that will affect them
- Provide free guidance on matters not covered by existing publications on request.

4.4 Recording AtoN Information

Operators, including Regional Councils, shall:

- Record all AtoN outages and maintain records of their maintenance program
- Obtain and retain all factory performance certificates where practical for all of their AtoN.

Maritime Safety Authority shall:

- Ensure changes and updates received via MSA form 16006 are incorporated into the national AtoN register and forwarded on to LINZ for publishing in the "NZ Notice to Mariners"
- Record all outages advised by navigation warnings and local authorities
- Maintain maintenance program for Maritime Safety Authority AtoN.

LINZ shall:

- Ensure changes to AtoN are published in the NZ Notice to Mariners
- Ensure T (Temporary) notices are published in the NZ Notice to Mariners.

Annexes

Annex 1(a): References

Sources of AtoN information:

- Maritime Safety Authority website www.msa.govt.nz
- Land Information New Zealand website www.hydro.linz.govt.nz
- The New Zealand Nautical Almanac, published by LINZ
- The NZ nautical chart series
- Local authorities/facility operators
- Admiralty Sailing Directions – New Zealand Pilot
- The internet interface to the national AtoN register
- Note: The NZ Nautical Almanac, published by LINZ does not include information on buoys and daymarks; these AtoN will be captured by the national AtoN register
- The Guide to Safety Management of Power Line Waterway Crossings, this document is available from the Maritime Safety Authority and the Electrical Engineers Association (EEA).

IALA Recommendations and Guidelines

Details of the latest IALA Recommendations and Guidelines can be accessed through the IALA website at http://www.iala-aism.org.

Maritime Safety Authority Marine Farm Guidelines

Guidelines for Marine Farms are available on the Maritime Safety Authority website – www.msa.govt.nz/safety/marine%20farms/marinefarms.htm.

Application to install, alter or remove Aid to Navigation

Applications to install, alter or remove Aids to Navigation must be submitted using the application form MSA16006. This is available on the Maritime Safety Authority website http://www.msa.govt.nz/Publications/forms/NavAid_ApplicationForm_MSA16006.pdf

Technical References

▪ **Wind Loading Codes**	HB 212	Australian Draft standard for Wind Loads in the SE pacific region
	NZS 4203	New Zealand Loading code SANZ 1997
	AS 1170.2	Australian loading Code, Part 2 Wind Loads SSA 1989
▪ **Al Design Codes**	A1164	Aluminium Structures Code SSA 1979
	AS1664.1	Aluminium Structures, Part1: Limit State Design SSA 1997
	AS1664.2	Aluminium Structures, Part2: Allowable Stress Design SAA 1997
▪ **Steel Design Codes**	NZS 304	Design of steel structures SANZ 1997
	Structural Steel Structures Handbook	
	The British Constructional Steelwork Association Limited, 1978	
▪ **Concrete Design Codes**	NZS 3101	Code of Practice for the design of Concrete Structures SANZ
▪ **Electrical**	Electrical Regulations compilation 2003	
	AS/NZS 3000	Wiring Rules
	AS/NZS 3004	Electrical Installations – Marinas and pleasure craft at low voltage
▪ **Lightning Protection**	AS/NZ 1768	Lightning protection
	IEC 61024	Protection of structures against lightning
	IEC 61312	Protection against lightning electromagnetic impulses – IT systems
	BS 6651	The protection of structures against lightning
	BS 7430:1009	British Standard Code of Practice “Earthing”

Annex 1(b): Definitions

LIST OF AIDS to NAVIGATION DEFINITIONS

AIS	Universal Automatic Identification System
Approving Authority	Organisation with authority to approve AtoN application (Maritime Safety Authority form MSA16006). This is usually the Maritime Safety Authority but can be delegated.
AtoN	Aid to Navigation – is a device or system external to vessels that is designed and operated to enhance the safe and efficient navigation of vessels and/or vessel traffic.
CIE	Commission on Illumination
DGPS	Differential Global Positioning System
ECDIS	Electronic Chart Display and Information System
Failure	This is the unintentional termination of the ability of a system or part of a system to perform its required function.
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
IALA	International Association of Marine Aids to Navigation and Lighthouse Authorities
IHO	International Hydrographic Organisation
Luminous Range	The range at which a light may be sighted, irrespective of its elevation and of the observer's height of eye.
MSA	Maritime Safety Authority of New Zealand
MBS	Maritime Buoyage System
MSI	Maritime Safety Information
MTA	Maritime Transport Act
Nominal Daytime Range	Day time Range for 0.74T (Transmissivity Value) assuming background light intensity of 10.000cd/m2.
Nominal Nighttime Range	The Range is calculated at 0.74T (Transmissivity Value) with a threshold of illumination of 0.2 microlux normal observer.
Nominal Range	Is the maximum distance at which the light can just be seen by a normal observer at night, in conditions when the actual (or meteorological) visibility is 10 miles.
Operator	An operator is a person, including a regional council, or organisation responsible for the operation of a marine facility such as a commercial port, marine farm, or jetty and therefore responsible for the provision of AtoN.
Outage	Is a significant degradation of the service to the mariner of an AtoN.
Regional Harbourmaster	The Harbourmaster appointed by the Regional Council under section 650B of the Local Government Act 1974.
RACON	Radar transponder
RCS	Radar Cross Section
RTE	Radar Target Enhancer
UTC	Co-ordinated Universal Time
VTS	Vessel Traffic Services

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Annex 2: Sample AtoN Audit Check List

Site Name: ..... Top Mark Type: .....
Character: ..... Database ID: .....
Beacon Type: ..... K Number: .....
Main Lamp: ..... Stby BeaconType: .....
Light Sectors: ..... Stby Lamp: .....
Brief Description: .....
Type of AtoN: .....
Position in Lat & Long: .....
Details of Lights:
Colour ..... Nominal Range .....
Intensity ..... Elevation .....
Visibility Arcs .....
Date of Inspection: ..... Owner of AtoN: .....
Inspection performed by: ..... Maintenance Contractor: .....
Type of Access: ..... Picture of AtoN: ☐ Yes ☐ No

Beacon Checks

Lights operation		
Character correct		
Visual inspection		
Enclosure		
Lamp changer		
Operating Volts		
Condition duty lamp		
Check focus		
Optics clean		

Solar Panel Checks

Visual inspection		
Check output		

Battery Checks

Visual inspection		
Battery age		
Terminal voltage on load		
Electrolyte level		

Control System and Power Supply

Visual inspection		
Cables & connectors		
Control operation		
Mains power		
Diesel		
Diesel operation		

Structure

Visual inspection		
Paint condition		
Lightning protection		
Description		
Height		
Colour		
Top mark		

Daymark/Topmark

Visual inspection		
Position correct		
Topmark correct		
Colours correct		
Reflective tape		
Structure sound		

Documentation

Almanac correct		
Sectors correct		
Chart correct		
Date: maintenance		
Date: last failure		
Take current picture		

Health and Safety

Weather at time	
Any issues	

Work Required

Signature:……

Position: ……

Annex 3(a): Performance Targets & Outage Response Priorities

1. Aids to Navigation – availability categories

1.1 AtoN Minimum Availability Targets are based on IALA Guidelines.

1.2 **Category: 1 (99.8% Availability)**

1.2.1 Lights of primary navigational importance having a range of 15nm or greater including key direction, leading and subsidiary lights.

1.2.2 Lights of less than 15nm range marking major hazards, waypoints or situated in areas of heavy traffic including key direction, leading and subsidiary lights.

1.2.3 Lights fitted to buoys marking new wrecks.

1.2.4 Racons.

1.2.5 Position of:

- Major Floating AtoN (light vessels, light floats and buoys)
- Buoys equipped with racons
- Buoys marking major waypoints
- Buoys marking new wrecks
- Buoys marking IMO Traffic Separation Schemes/Deep Water Routes.

1.3 **Category: 2 (99.0% Availability)**

1.3.1 Lights greater than or less than 15nm range including direction, leading and subsidiary lights not assessed as Category 1 stations.

1.3.2 Lights fitted to buoys marking IMO Traffic Separation Schemes/Deep Water Routes.

1.3.3 Cardinal buoy topmarks.

1.3.4 Position of buoys marking existing wrecks and minor waypoints.

1.4 **Category: 3 (97% Availability)**

1.4.1 Buoy lights other than Category 2.

1.4.2 Fog Signals.

1.4.3 Daymarks, including pole beacons, warning notices and topmarks, other than Category 2.

1.4.4 Position of buoys other than Category 1 or 2 buoys.

2. Casualty Response Priorities

2.1 In order to apply practical resources to casualties to achieve the minimum availability requirements the following Casualty Response Priorities are laid down. For harbour authorities, casualty response should be co-ordinated by the local Port Control/VTS Centre (which should have the availability of a duty Senior Marine Officer on a 24 hour basis for complex decisions). For other authorities this response should be co-ordinated by the relevant designed department/team within their organisation.

2.2 Wrecks designated as dangers to navigation have priority over all AtoN casualties.

2.3 **AtoN Casualties – Priorities**

2.3.1 **Priority 1**
The highest priority (other than wrecks). Immediate response to investigate and mobilise or divert appropriate resources, other priorities to be amended accordingly. Radio navigation warning required via Local Port Radio/Vessel Traffic Services.

2.3.2 **Priority 2**
Urgent mobilisation of maintenance resources, subsequent to initial investigation. Radio navigation warning required (as Priority 1).

2.3.3 **Priority 3**
Personnel and transport response within 24 hours. Radio navigation warning required (as Priority 1).

2.3.4 **Priority 4**
Personnel and transport response within 48 hours. Radio navigation warning required (as Priority 1).

2.3.5 **Priority 5**
Required actions to be determined by the Port Control/VTS Centre who are authorised to re-classify the Casualty Priority 1-4 if circumstances dictate. Radio navigation warning may be required (as Priority 1).

Information Sourced from: *Local Aids to Navigation – Provision and Maintenance*
Trinity House Lighthouse Service

Annex 3(b): Installation, Supply & Provision

The following points need to be taken into account when a new Aid to Navigation is proposed.

▪ **Compliance**	To IALA guidelines and any special NZ requirements
▪ **Maintenance**	Cost to maintain and meet availability requirements
▪ **Approvals**	From regulatory body Director, Maritime Safety Authority
▪ **Information**	Reporting of position, character, category and range to the hydrographic authority
▪ **Reporting**	Advising of light outage or AtoN off station to the SSB or VHF services
▪ **Category**	Availability designated
▪ **Environmental**	Impact on Ecology and people
▪ **Recording**	On going maintenance and outages
▪ **Buoyage System**	All AtoN to comply to Buoyage System "A", see IALA publication)

Basic Requirements
Most of the check points below are covered by IALA publications. (See enclosed list)

▪ **Primary Purpose**	Mark a position Mark a channel or direction Mark a submerged or overhead cable Mark a hazard Mark a no anchorage zone Mark a no fishing zone Mark a fish farm Others
▪ **Range Required**	Conspicuity Effective intensity required Effect of background lighting and contrast Effect on other close proximity AtoN Distinguishable from non associated lights
▪ **Structures**	Ease of access for maintenance Made from the appropriate materials Electrolysis and anodic protection Safety considerations Height requirements Wind loading Protective coatings Lightning protection

Annex 3(c): Technical Considerations

Types of Aids

- Floating or fixed
- Landfall major and minor
- Entrance
- Day marks
- Racons
- Radar reflectors
- Channel marking
- Sector lights
- Fog and sound signals
- Lead
- Lateral
- Cardinal
- Isolated danger
- Safe water
- Special
- Current and wave profiling
- No anchor limits
- Bridge
- Under water cables
- Marine farms
- Wind farms
- Overhead cables
- Oil platforms
- AIS
- Others

Solar Power

The sizing of a solar array is affected by: -

- Total load
- Place and latitude
- Area insolation value for the month of June
- Proximity to land
- North facing or floating
- Battery capacity
- Autonomy required

Lights

- Range = The effective intensity not peak.
- The effective intensity Ie of a light is affected by:
  - Flash character (minimum on time)
  - Colour
  - Type of source
  - Background lightning
  - Sky or background contrast
  - Transmissivity (Normal value 0.74T = 10nm visibility
  - Vertical divergence

Buoys

The following should be taken into consideration.

- Construction (steel-aluminum-plastic)
- Size
- Mooring design
- Electrolysis prevention
- Sea state likely
- Wind loading
- Acceptable pitch and yawl
- Environmental implications
- Colour
- Recovery and ongoing maintenance
- Day marks required
- Height of aid above water
- Battery storage
- Solar panel support structure

Power Supplies

- Follow marine wiring regulations
- Cable sizing and connectors
- Keeping records:
  - Circuit diagrams/drawings
- Calculating total power requirements
- Mains:
  - Availability and back up
- Type of converters employed:
  - SMR
- Battery type
  - Date of purchase
  - Date of installation
  - Life
  - Maintenance
  - Cost
- Autonomy
  - Capacity
  - Temperature
- Solar
  - Size
  - Capacity
  - Matching to load
- Wind generation
- Fuel cells

Annex 4: The Need & Administering the System