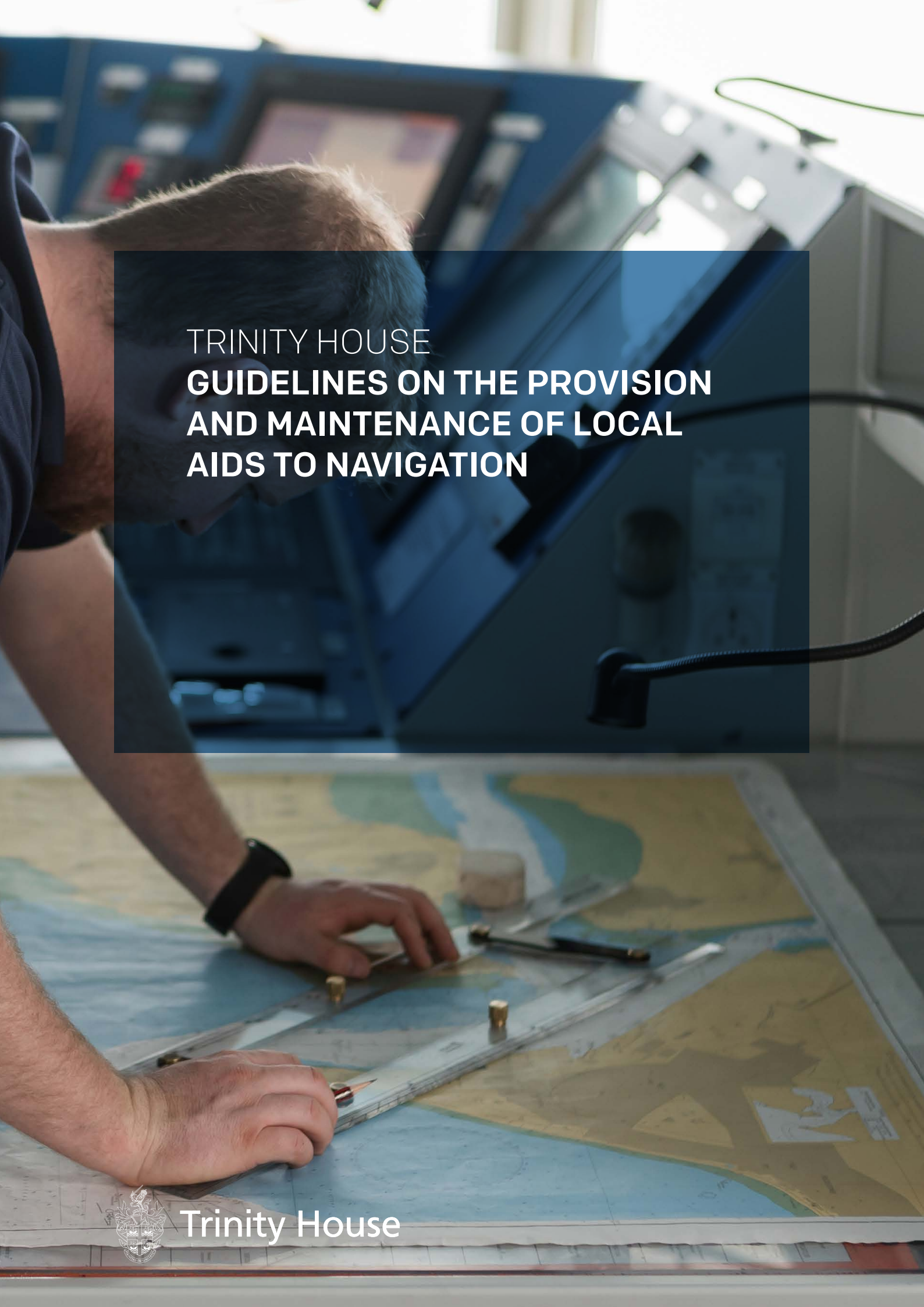


TRINITY HOUSE

GUIDELINES ON THE PROVISION AND MAINTENANCE OF LOCAL AIDS TO NAVIGATION

Trinity House

Contents

1 Executive Summary

1.1
The Merchant Shipping Act 1995 (MSA 1995) vests in the General Lighthouse Authorities (GLAs) the superintendence and management of all lighthouses, buoys and beacons within their respective areas. The same Act empowers the GLAs to inspect all lighthouses, buoys and beacons under Local Lighthouse Authority (LLA) Management, and vests in the GLAs the duty to communicate the results of any such inspections to the LLA and make general reports to the Secretary of State on the same.

1.2
Under the MSA 1995 LLAs have the duty to seek prior consent to the establishment, alteration, removal etc of any lighthouses, buoys or beacons. The Harbours Docks and Piers Clauses Act 1847 applies to third party aids within the jurisdiction of a harbour authority and to the establishment etc of temporary aids to navigation. Under the MSA 1995 all harbour authorities are deemed to be LLAs but the converse is not necessarily the case.

1.3
Under the MSA 1995 a harbour authority or conservancy authority has the duty to raise, remove, destroy, and mark wrecks which lie in, or in or near any approach to any harbour or tidal water under their control.

1.4
The manner in which Trinity House (TH) discharges its statutory duty in respect of local AtoN is a combination of consent to changes, audit and inspection. It is the current policy of TH to inspect/audit all local Aids to Navigation (AtoN) within its area of operation and to carry out a seaward inspection of all AtoN on offshore structures, annually.

1.5
The inspection/audit of local AtoN is co-ordinated with the other GLAs ensuring continuity of standards throughout the United Kingdom and the Republic of Ireland.

1.6
The annual inspection is just one of the ways in which TH can ensure that, due to changes in the degree of risk and volume of traffic, as well as to the existing circumstances and available technology, local AtoN originally consented/sanctioned/specified by TH continue to adequately meet the mariners' requirements, taking into account environmental considerations, and are therefore appropriate to the current circumstances. Many Local Lighthouse Authorities also consider the inspection to form an important external audit element of their port quality management systems.

1.7
Under the UK Government's Port Marine Safety Code all aids to navigation maintained by Harbour Authorities and any other existing LLAs must be maintained in accordance with the availability criteria laid down by the General Lighthouse Authorities and must be subject to periodic review. The characteristics of these aids to navigation must comply with Guidelines and Recommendations as laid down by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA). The GLAs require Harbour Authorities and any other existing LLAs to be responsible for ensuring that any third party AtoN, within their area of responsibility, are also established and maintained to the same standards.

1.8
Those responsible for local Aids to Navigation, which lie outside statutory Harbour Authorities' and Local Lighthouse Authorities' areas of jurisdiction, e.g. AtoN established as a result of Marine & Coastal Access Act 2009 Consents, AtoN maintained by Government Agencies and the Ministry of Defence – to name but a few, will also be responsible for ensuring that these are established and maintained to the same standards.

1.9
A review of the local AtoN Inspection regime highlighted the need to introduce an audit of all local AtoN on an ongoing basis, In addition the TH Inspector of Seamarks (IOS) making an inspection on a particular day. This is achieved by carrying out audits of local AtoN Availability Statistics and Casualty Response records.

1.10
The responsibility to state and accomplish

Availability Targets and lay down Response Priorities for individual AtoN rests with the Harbour Authorities/Local Lighthouse Authorities. These Availability Targets shall be based on IALA Guidelines.

1.11
The authority responsible for the provision of local AtoN shall keep appropriate records of Availability statistics of local AtoN and casualty response times. Summaries of these records shall be available to TH at the time of an audit.

1.12
Each Authority shall establish procedures for responding to casualties to AtoN within the timescales as laid down and applied by TH. Provision and Maintenance of Local Aids to Navigation.

1.13
Inspections of local AtoN will continue to play an important part of the statutory duty conferred upon TH. The requirement to record the Availability and Casualty information at the local level will assist in ensuring international standards are met. Scrutiny of the statistics and records mentioned above will also assist TH in identifying for inspection those areas where improvement is necessary.

The IOS and/or TH Navigation Directorate will also use these details as a basis for offering additional advice/guidance to those authorities, as appropriate.

2 Introduction

2.1

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 LLAs and other authorities are described as "aids to navigation (AtoN)", to differentiate their provision from the equipment carried on board ships for navigational purposes, which are referred to as navigational aids (Navaids).

2.2

A marine aid to navigation (AtoN) may be defined as a signal deliberately placed to provide mariners with information. The signal may be:

Visual

Sound

Electro magnetic (radio) IALA maritime buoyage system Diagram courtesy of IALA

2.3

A station may be defined as a point on the earth's surface defined by geographic coordinates. The following are the categories:

Land (a fixed station accessible by land)

Offshore (a fixed station only accessible by boat or helicopter)

Floating (Light Vessels, Light Floats, Large Automatic Navigation Buoys, Buoys)

2.4

Several AtoN components may be exhibited or transmitted from a single station and may comprise one or a number of the following AtoN components:

A Daymark and/or Topmark (including pole marker beacons, withies, perches)

Warning Notices e.g. notice boards which may or may not be illuminated

Leading Mark (one of at least two separate daymark structures that provide a leading line)

Main light

Sector light (intensified or unintensified arc of visibility and/or colour either as part of the main light or provided in addition to the main light, in which case the term subsidiary light is commonly used)

Auxiliary light (a light of noticeable less intensity than the main light(s))

Precision Direction Light (a light visible over a very narrow angle to indicate a direction to be followed)

Leading Light (one of at least two lights, which are situated on at least two separate structures that provide a leading line)

Emergency light (a light introduced upon the failure of lights, operated by a completely separate power supply, which may be of noticeable less intensity than the Main Light(s))

Fog Signal

Racon

Radar Target Enhancer

Loran C (and other radio navigation systems)

Differential GPS Signals †

Automatic Identification Systems (AIS)

2.5

The following general assumptions are inherent in the provision of AtoN:

Reliance is not placed on a single AtoN.

Visual AtoN will continue to be required for the foreseeable future for position fixing and for confirmation of position/orientation, looking carefully at the mix to provide the correct balance between traditional AtoN and radio navigation systems. Overall, it is envisaged there will be a gradual reduction across the spectrum of traditional AtoN and components, which they support, as a result of improved shipboard Navaid equipment fits and the availability of alternative systems.

No light need exceed 24 miles nominal range.

Fog signals are provided for hazard warning purposes only.

Floating aids (such as buoys and light floats) shall not be relied upon for position fixing purposes, (unless the positions of these are capable of being monitored by a Vessel Traffic

Service (VTS) or other means are in place to provide a warning to the mariner that the buoy/light float is off station.

Unlighted buoys and beacons should not be deployed in areas where there is a significant risk of vessels colliding with the AtoN station at night. (This risk can be mitigated nowadays by the fitment of low cost self-contained LED lights having a range of 1 – 2 miles, instead of the fitment of retro reflective tape).

† For the purposes of this document DGPS is classified as a local AtoN only if it is provided by a HA/LLA to enable users to fix their position within the port/harbour. It is not classified as a local AtoN if the HA/LLA provide the service for its own use in connection with pilotage, VTS or surveying.

3 Statutory Provision

3.1 Merchant Shipping Act 1995 Part VIII

3.1.1

Section 195(1) of the Merchant Shipping Act (MSA) 1995 vests in the General Lighthouse Authorities the Superintendence and Management of all lighthouses buoys and beacons within their areas of responsibility, subject to certain provisions regarding AtoN in Local Lighthouse Authority (LLA) areas.

3.1.2

THLS has a duty to carry out inspections of lighthouses, buoys and beacons under LLA Management under Section 198(1).

3.1.3

Under Section 199(1) of the MSA the Corporation of Trinity House may, with the consent of the Secretary of State, direct a LLA to lay down buoys, remove or discontinue any lighthouse, buoy or beacon or make any variation to the character of any lighthouse, buoy or beacon or to its mode of exhibition, subject to the Corporation of Trinity House (TH) first having given notice of its intention to do so.

3.1.4

Under Section 199(2) a LLA shall not erect or place any lighthouse, buoy or beacon or remove or discontinue any lighthouse buoy or beacon or vary the character or mode of exhibition of any lights of any lighthouse, buoy or beacon without the consent of TH.

3.1.5

Under Sub-section 199(4), Section 199 does not apply to any local buoy or beacon placed or erected for temporary purposes. Arising from the definitions contained within the MSA 1995, this sub-section is legally taken to refer only to temporary unlighted buoys and beacons.

3.1.6

For the purpose of Part VIII of the MSA 1995 every Harbour Authority and any other existing LLA are classified as an LLA. Section 193(2) of MSA 1995 refers. However the converse is not necessarily true.

3.1.7

Under Section 202 of MSA 1995, general transfer arrangements for local lighthouses to Harbour Authorities are laid down. This Section requires TH to transfer certain local lighthouses held by them to Harbour Authorities. Such a general transfer was made in 1991/2 when this Section first appeared as Section 33 of the Ports Act 1991. Subsequent to this general transfer, individual transfers have from time to time been made under Section 34 of the former Ports Act 1991 (now S203 of the MSA 1995).

3.1.8

Under Section 204 LLAs can surrender or sell any lighthouse, buoy or beacon held by them for general navigation to TH and, subject to consent of the Secretary of State, TH may accept or purchase it.

3.2 Harbours Docks and Piers Clauses Act 1847

3.2.1

Under Section 77 of the Harbours Docks and Piers Clauses (HDPC) Act 1847 the Corporation of Trinity House (TH) can direct a Harbour

Authority (HA) to lay down buoys for the guidance of vessels within the limits of the HA.

3.2.2

Under Section 78 of the HDPC Act 1847 a HA shall not erect any lighthouse or beacon or exhibit or allow to be exhibited any light, beacon or seamark without the sanction of TH and subsequently not alter that light, beacon or seamark without TH sanction. In addition, the power and description of the light, beacon or seamark may be as directed by TH and it may be discontinued or altered as directed.

3.2.3

Under Section 78 TH is able to exercise control over third party AtoN within a HA's jurisdiction. So, if an individual or a Company, other than the Harbour Authority itself, wishes to establish an AtoN within the jurisdiction of a HA, TH is still able to ensure that the AtoN meets internationally agreed standards by having the necessary powers of sanction. It should be noted that there is no exclusion within the HDPC Act 1847 for AtoN established for temporary purposes. Thus unlighted temporary third party AtoN require the sanction of THLS. In addition under this Act, the HA may, if it deems appropriate, apply for sanction to the establishment of any of its own temporary AtoN.

3.3 Other Miscellaneous Legislation

3.3.1

In addition to the MSA 1995 and the HDPC Act 1847, the Corporation of Trinity House (TH) is able to exercise control over marking of works and the establishment of AtoN by one of the following methods:

Through DETR consulting Trinity House Lighthouse Service (THLS) on works requiring consent under Section 34 of the Coast Protection Act 1949, as amended.

Through TH powers of direction contained within various Transport and Works Act 1992 Orders.

Though TH powers of direction contained within local harbour legislation viz Harbour Empowerment and Harbour Revision Orders.

Through TH powers of direction contained within private (Local) Acts of Parliament.

Through other marine legislation such as harbour legislation relating to Fisheries Harbours, Sea Fisheries legislation etc.

4 Review Criteria

4.1 Legal Advice

4.1.1

Legal advice indicates that the SOLAS Convention 1974, as amended, imposes a continuing duty to assess and periodically re-assess the degree of risk and volume of traffic and the AtoN thereby required.

4.1.2

This advice stipulates that this principle seems to apply equally to the duties of the GLAs to inspect and control LLAs. When consent/sanction is first given, a view as to what is required according to the existing degree of risk and volume of traffic, as well as to the existing circumstances and available technology is formed. However, what was once perfectly adequate may, due to changes to the degree of risk and volume of traffic, no longer be appropriate. If, under these changed circumstances, a new application from the LLA was received for consent/sanction the type, level and/or standard of AtoN may well be different due to either an increase or decrease in local requirements . Legal advice is that it is not necessarily sufficient to merely perpetuate the standard of the AtoN initially consented to/ sanctioned by TH, and a system of reviewing the local requirements is necessary. Whilst this is provided for within the inspection regime, it is imperative that authorities also carry out their own regular reviews of the AtoN and level of service they provide. This is a fundamental principal of any Safety Management System and is one of the requirements laid down in the Port Marine Safety Code.

4.2 Review Procedure

4.2.1

This section contains general information for the guidance of HAs/LLAs and other authorities

on AtoN reviews and highlights specific factors that should be taken into account when conducting such reviews.

4.2.2

It is recommended that:

A major review by LLAs of all their AtoN is carried out at least every 5 years. It is likely that such major reviews will be tied in with Formal Safety Assessments of the whole Port operations. Such reviews resulting in changes to the level of service/ type of AtoN need to be discussed with/consented-to by the GLAs.

Interim reviews of specific areas and AtoN type should be conducted, as required.

Users should be consulted on major AtoN changes.

4.3 Factors to be considered

4.3.1

Fixed stations will be used to provide a geographical reference for position fixing purposes. It is recommended that floating stations be not used for position fixing purposes unless the positions of these stations are capable of being monitored by VTS or other means are in place to provide a warning to the mariner that the buoy/ light float in question is off station. The following factors must be considered:

The degree of risk.

The function(s) of the station (hazard warning, waypoint/waymark).

The importance of the station within the mix of AtoN.

The accessibility of the station (monitoring and control, routine maintenance, casualty response).

4.4 The Degree of Risk

4.4.1

Examples of the types of hazard that should be identified and upon which data should be subsequently collected and analysed, include but are not limited to:

Geographical Features: headlands, points, low coastlines, islands, rock outcrops, piers, quays, locks, bridges, future developments 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, state (age) of surveys.

The Traffic: 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: 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 Special Areas of Conservation (SACs) etc. Increasingly environmental considerations play a role when studying the available options, which are suitable from a purely navigational point of view.

Present 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.

4.4.2

Zero risk is rarely achievable unless the activity generating the risk is abandoned. Risk Assessment is nothing more than a careful examination of what could cause harm, so that an authority can weigh-up whether it has taken enough precautions or whether it should do more to prevent harm. Risk can be reduced by examining the Risk Control options available and then introducing Risk Control Measures, such as the provision of aids to

navigation. By introducing such measures risk can be either reduced or minimised. Authorities should aim to reduce any risk to as low as is reasonably practicable, the ALARP concept. Risk estimation and evaluation form vital inputs to any risk assessment.

4.5 Function of the AtoN Station

4.5.1

A single AtoN station may perform several of the following functions:

Marking of underwater hazards.

Marking a low-lying coastline.

Identifying headlands, waypoints, routes, shoals, sandbanks and wrecks.

Provide leading marks.

Provide a radar target.

Provide Traffic Separation Scheme marking.

Provide turning marks.

4.6 Importance of AtoN Stations within the Mix of AtoN

4.6.1

The importance of the AtoN components carried at a particular station are governed by the station's relationship to the number of AtoN in a particular geographical area and their interdependence. This is commonly referred to as the mix of AtoN for a particular area.

4.7 Accessibility of the AtoN Station

4.7.1

Accessibility for routine maintenance and casualty attendance needs to be taken into consideration when deciding upon, not only the location, but also the type of AtoN deployed, its AtoN components, monitoring and control requirements and the level of availability desired. This factor is equally important for both new as well as existing stations.

5 Superintendence and Management

5.1 Inspection/Audit of Local AtoN

5.1.1

It is currently the policy of TH to inspect all local AtoN within its area of operation and to carry out a seaward inspection of all AtoN on offshore structures to ensure adequate discharge of, not only its duties under Section 198(1) of the MSA 1995, but also, its responsibilities of Superintendence and Management of all AtoN under Section 195(1).

5.1.2

The manner in which TH discharges its statutory duty in respect of local AtoN is a combination of consent to changes, audit and inspection. This includes the duty of superintendence and management to ensure that AtoN, maintained by authorities, are appropriate and meet the agreed international standards.

5.1.3

In addition, the annual inspection is just one of the ways in which TH can ensure that, due to changes in the degree of risk and volume of traffic, as well as to the existing circumstances and available technology, local AtoN originally consented/sanctioned by TH continue to adequately meet the mariners' requirements, taking into account environmental considerations and are therefore appropriate to the current circumstances. Such changes are taken into account by the Inspector of Seamarks (IOS) discussing and recommending changes to the LLA and/or TH during and/or subsequent to his visit. It also allows the Authorities the opportunity to discuss face to face, with the Inspecting Officer, all matters relating to their AtoN provision. Special one off site visits by the IOS, Directors and other staff may also be arranged from time to time, on request of the authority, to discuss particular aspects of AtoN provision and the level of service provided. This advice is available free of charge to all HAs/LLAs and other authorities involved in the provision of local AtoN, as part of the discharge of the GLAs' statutory duties.

5.2 Responsibility

5.2.1

Under the UK Government's Port Marine Safety Code "all aids to navigation maintained by Harbour Authorities and any other existing LLAs must be maintained in accordance with the availability criteria laid down by the GLAs and must be subject to periodic review. The characteristics of these AtoN must comply with Guidelines and Recommendations laid down by the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA)". In addition, the GLAs require Harbour Authorities and any other existing LLAs to be responsible for ensuring that any third party AtoN, within their area of responsibility, are also established and maintained to the same standards.

5.2.2

Those responsible for local Aids to Navigation which lie outside statutory Harbour Authorities' and Local Lighthouse Authorities' areas of jurisdiction, e.g. AtoN established as a result of Marine 7 Coastal Access Act 2009 Consents, AtoN maintained by Government Agencies and the Ministry of Defence – to name but a few, will also be responsible for ensuring that these are established and maintained to the same standards.

5.2.3

It is considered that far more effective management tools for performance measurement of local AtoN is for authorities to report on the availability statistics of their AtoN; for audits to be effected on these statistics, as well as on an authority's Casualty Response Records; and inspections of local AtoN to be carried out on an ongoing basis, with emphasis placed on targeting for inspection areas where improvements could be made.

5.2.4

The responsibility to state and accomplish Availability Targets and lay down Response Priorities for individual AtoN rests with the Harbour Authorities/Local Lighthouse Authorities. However, to ensure consistency in application of standards and seamless transition from GLA to LLA waters, guidelines have been laid down by the GLAs. These guidelines are based on IALA Guidelines.

5.2.5

The numerical value of availability can be used to determine the performance of the aids to navigation against the given target, set by IALA, which reflects the opinion on the importance of the AtoN.

5.2.6

Authorities are responsible for ensuring that they have the appropriate maintenance resources in place in order to meet the overall availability criteria laid down by the GLAs. Guidelines on matters related to maintenance of AtoN are laid down by IALA. Harbour Authorities and Local Lighthouse Authorities should encourage their users to report any casualties to aids to navigation that they may encounter to the designated officer.

5.2.7

The Authority responsible for the provision of local AtoN shall keep appropriate records of Availability statistics of local AtoN and Casualty Response times.

5.2.8

Each Authority is required to establish procedures for responding to casualties to AtoN within the timescales as laid down and applied by the GLAs. This will include notification to the UK Hydrographic Office/Coast Radio Stations and/or the issue of local broadcasts and also local Notices to Mariners for the longer term casualties, as appropriate.

5.2.9

The local AtoN Chain of Accountability is detailed at Annex 1.

5.2.10

Availability Targets and Casualty Response Priorities

5.2.11

Availability is the function of both Reliability and Casualty Response. Overall availability targets can only be met if both reliability and casualty response, for a particular AtoN component/group of components, conform to the Availability Category level determined by an authority, based on the IALA standards. Details of the relationship between Availability, Reliability and Casualty Response can be found in Annex 2.

5.2.12

The following IALA Availability targets are required to be adopted by Local Lighthouse Authorities and other authorities:

a Category 1 = availability = 99.8% (this equates to 17.52 hours downtime per annum)

b Category 2 = availability = 99.0% (this equates to 3.65 days downtime per annum)

c Category 3 = availability = 97.0% (this equates to 10.95 days downtime per annum

The absolute minimum level of Availability is 95.0%.

5.2.13

As mentioned above, the responsibility to state and accomplish these Availability targets, be they their own AtoN or third party AtoN within their jurisdiction, rests with the Harbour Authority/Local Lighthouse Authority. 5.2.14 To ensure consistency in application of standards, when setting individual Availability targets Harbour Authorities/Local Lighthouse Authorities are required to use the guidelines laid down in Annex3.

5.2.15

It is recommended by IALA that Availability should be calculated over no less a period than two years –with the exception of DGPS. The GLAs have opted for calculation on the basis of a three-year rolling average, so as to ensure that the calculated Availability represents long-term AtoN performance. It is this period that is required to be adopted by Harbour Authorities/ Local Lighthouse Authorities and others.

5.2.16

IALA emphasise that these long-term availability objectives must not appear in nautical publications, as they cannot represent a commitment of lighthouse authorities (and others) towards seafarers in any particular short period. They also emphasise that by availability they mean only the operation of the equipment itself. This is sometimes referred to as broadcast or station availability. It is also emphasised by IALA that where availability of an AtoN consistently falls below 95%, then consideration should be given to the discontinuance of that AtoN to enable resources to be focused on carrying out improvements elsewhere. This may include either the deployment of alternative forms of AtoN or implementation of other risk control measures.

5.2.17

The responsibility to lay down Casualty Response Priorities for individual AtoN rests with the Authority. However, to ensure consistency in application the criteria laid down in Section 2 of Annex 3 should be used. The setting of individual AtoN Casualty Response Priorities by the Harbour Authorities/ Local Lighthouse Authorities, which are for the guidance of their designated responsible officer(s), are not necessarily intended to indicate a timescale for rectification. Rather they are intended as a means of providing guidance to the designated officer on the level of response required, based on the Availability target for the AtoN/AtoN component. Casualty Response Priority levels are based on the time a failure/casualty is reported to the required mobilisation of the response.

5.3 Audits/Inspections

5.3.1

The TH Local AtoN Manager (LAM) or Inspector of Seamarks (IOS) will carry out periodic on-site audits of Authorities' availability statistics and casualty response records. The scheduling of

the audits will decided from inspection results and reported availability statistics.

5.3.2

The results of the periodic on-site audits of Authorities' Availability statistics and casualty response records, which may require either corrective action to be taken or consideration to be given to suggestions for improvements, will be forwarded to the Authority concerned.

5.3.3

Follow up audits by LAM or IOS will be carried out, as required.

5.3.4

As mentioned above, the AtoN under the responsibility of Harbour Authorities and Local Lighthouse Authorities will still be inspected by TH on an ongoing basis. However, scrutiny of the records of Availability statistics and response times to casualties to local Aids to Navigation, will assist TH in identifying for inspection those areas where improvements could be achieved. The IOS and/or TH Navigation Directorate will also use these details as a basis for offering additional advice/ guidance to those authorities as appropriate.

5.3.5

Such inspections may be either scheduled, at short notice or unannounced, depending upon the circumstances. Unannounced inspections will normally involve neither participation in the actual inspection, nor provision of resources by the authority.

5.4 Records and Reports

5.4.1

Harbour Authorities/Local Lighthouse Authorities and others who have responsibility for the provision and maintenance of local aids to navigation shall keep records of their Availability, measured against the criteria described above, the condition and performance of such AtoN. These records must contain details of the stations where the aids to navigation components have individually failed to meet the guidelines, as well as the overall performance for their area of responsibility. From these records summary quarterly reports shall be produced with statistical analysis of the overall availability performance, based on a 3 year rolling average. These summary reports are only required to detail the average availability statistics for Category 1, 2 and 3 lights, racons, fog signals, daymarks, topmarks, AIS, and position. The statistics contained in the annual summary report on overall availability are to be based on the Calendar Year. It will be the responsibility of the Harbour Authority/Local Lighthouse Authority and others to submit data relating to failures to TH as soon as practicable and also ensure all data for the previous year has been reported by 31 January of the following year. This data is to be reported through the online reporting system.

Postal enquiries are to be sent to:

Local AtoN Manager

Trinity House, Tower Hill, London EC3N 4DH

Alternatively they may be submitted:

By E-Mail to navigation.directorate@thls.org

or By fax on 020 7480 7662

5.4.2

All these above records shall be made available if requested, by the authority, to the IOS or LAM at the time of the on-site inspection/audit.

5.4.3

The summary reports provided by authorities, together with the results of the on-site audits and inspections undertaken by the IOS or LAM, will form the basis of a revised annual statistical report by TH on Local Aids to Navigation that is submitted to the Secretary of State.

5.4.4

The results of the periodic on-site audits and any follow up audits will be conveyed to the authorities on a standard proforma. These results may include corrective action requests and/or suggestions for improvement. In the case of a corrective action request and/or

suggestion for improvement authorities are required to return this proforma having entered on the form details of the action they intend to take or indeed have already taken.

5.4.5

The manner and format in which the availability records are to be compiled and presented will be the same for each authority responsible for the provision of local AtoN. To assist in this task, and ensure consistency in reporting by authorities failure/casualty reports are to be entered onto the TH online database as soon as practicable after they have been reported. It is intended that all authorities responsible for 10 or more local AtoN as well as all Competent Harbour Authorities report to TH. Programmes designed upon similar lines are also used to provide the basis of the GLAs' internal reports to their respective Boards and to government departments on their own AtoN.

5.4.6

The Harbour Authority/Local Lighthouse Authority may use the data generated by the online reporting system for their own purposes. The facility is there to export data from the online reports.

5.5 Timescales

5.5.1

It is intended that audits of local AtoN availability statistics and casualty response records will be used to monitor authorities, and audits will be targeted against poor performance. The periodic audits will still occur but with a longer period between audits.

6 Aids to Navigation Characteristics

6.1 Compliance with International Guidelines and Recommendations is required.

6.1.1

IALA, from time to time, makes Recommendations, Guidelines, Specifications and Practical Notes on technical matters relating to AtoN provision and maintenance. Such Recommendations and Guidelines include matters relating to the provision of Port Traffic Signals, the Rhythmic Characters of Lights used on Aids to Navigation, IALA Maritime Buoyage System, Solar Power Systems and Vessel Traffic Services, to name but a few. Details of the titles and latest versions can be accessed through their website. All local AtoN are required to comply with IALA Recommendations and Guidelines.

6.1.2

TH will not grant its consent/sanction to either the establishment of, or alteration to, any local AtoN unless the characteristics of the AtoN comply with the latest applicable IALA Recommendation(s)/ Guidelines.

6.1.3

This requirement will only be waived in exceptional circumstances. An example of such may be where the expense involved re-engineering the optical equipment fitted to a station, that has been in use for a considerable period of time, to comply with a particular IALA recommended light character breakdown, would be prohibitive and not justified in terms of the level of reduction of risk to the mariner.

6.1.4

All authorities are urged to ensure that any recommendation made to them either by consultants they engage to effect risk assessments or as a result of advice they may have sought from sources, other than TH, is carefully scrutinised for compliance with the requisite IALA Recommendations and Guidelines. It is recommended that all authorities also satisfy themselves that the level of provision suggested by these same consultants or from other sources, other than Trinity House, is both appropriate and practicable to mitigate the identified risk. It is particularly important to ensure, before procurement commences, that such provision will be acceptable to TH, as the GLA. In the event of any doubt arising, authorities are urged to seek the advice of TH prior to requesting consent/sanction under the appropriate legislation.

6.1.5

Authorities can also obtain guidance, free of charge, on matters not covered by existing IALA Recommendations, Guidelines and Specifications from TH, on request. This includes, but is not limited to, advice on buoy body/superstructure sizes, beacon and buoy topmark design and cable marker beacons.

IAPH is the International Association of Ports and Harbours and PIANC is the Permanent International Association of Navigation Congresses

7 Wrecks

7.1 Marking

7.1.1

If, in the opinion of an LLA a wreck, which is their responsibility, is or is likely to become a danger to navigation then the LLA has a duty to raise, remove, destroy or mark that wreck.

7.1.2

Any AtoN established to mark a dangerous wreck is required to comply with the IALA Maritime Buoyage System. The use of the Special Mark Category for the marking of dangerous wrecks is not appropriate for this purpose. The use of Special Marks should be confined to marking wrecks of historical interest and those considered non-dangerous, but for which a surface marker is required for future location purposes.

7.1.3

Emergency Wreck Markers Buoys should be used where appropriate to mark any wreck prior to permanent marking being established.

7.1.4

Under the IALA Maritime Buoyage System, Isolated Danger Marks can only be used for wreck marking purposes, if the mark can be established over, or fixed to the wreck. In the majority of cases this is neither a safe, nor a practicable proposition for the LLA, from an operational point of view. TH strongly recommends, in the interests of safety of both service personnel and assets that buoys exhibiting Isolated Danger Mark characteristics are established to mark wrecks only in exceptional circumstances. Isolated Danger Mark Beacons may be used in instances where the remains of a wreck are stable and where a suitable site either on the wreck or amongst the wreckage for fixing the beacon can be found. However, account should be taken when evaluating the risk involved that any such site must also be safely accessible for future routine maintenance of the AtoN, as well as attendance in the event of a casualty to the AtoN.

7.1.5

Any AtoN established to mark a wreck should be maintained in accordance with the Availability Targets and Casualty Response Priorities set by the LLA, based on the standards laid down by the GLAs referred to in section 5.2.10 above and Annex 3.

8 Policies and Procedures

8.1

It is recommended that all LLAs have in place appropriate policies, procedures and, where appropriate, Work Instructions covering User Consultation; the Review and Confirmation of AtoN Requirements; Wreck Notification Marking and Clearance; Maintenance of AtoN; Responding to Casualties and Inspection of the AtoN they provide.

9 Definitions

9.1

The IALA definitions relating to AtoN availability are as follows: Availability can be defined as the ‘‘probability that an aid or a system of Aids to Navigation is performing a required function under stated conditions at any randomly chosen instant of time’’. ‘‘Providing a level of service delivered to the mariner by an AtoN by way of its published character, measured as a percentage of up-time against mission time’’.

9.2

Reliability is the ability of the equipment to perform a required function under stated conditions for a stated period of time (and can be measured in terms of Mean Time Between Failure (MTBF)).

9.3

Casualty Response is the total time taken to restore an AtoN to its published character following a casualty, being the sum of times taken to prepare, travel to station and repair the casualty. Casualty Response is measured by way of Mean Time to Restore (MTTR).

9.4

Casualty Response Priority is the level of response from the time a failure/casualty is reported to the mobilisation of the response.

9.5

Normal Conditions Restored is when the published characteristics of the AtoN have been restored and the casualty rectified.

9.6

Casualty is a significant degradation of the service to the mariner of an aid to navigation.

9.7

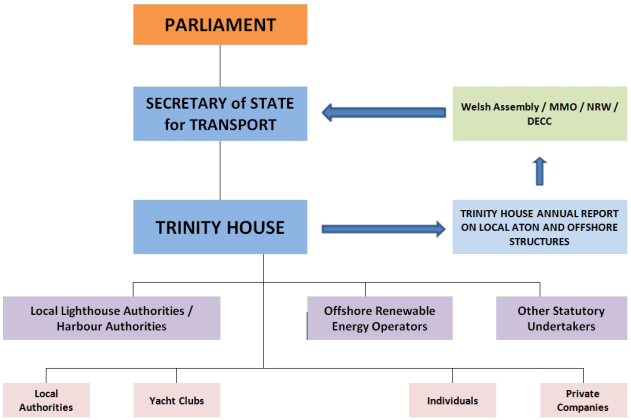
Significant degradation: For light ranges is where the light has either totally failed or for whatever light has failed the range of the backup light in place, be this a second, third etc lamp, auxiliary light or emergency light, is less than 90% of the advertised light range for that station. For light character this means where an incorrect combination or sequence or character is more than 10% fast or slow. For fog signals reduced power means where 50% or more of the emitters of an electric fog signal in any one stack are known to have failed or 50% of the tannoys on station have failed.

Abbreviations / Acronyms

A(%) Availability Objective
AIS Automatic Identification System
AtoN Aids to Navigation
DETR Department of the Environment Transport and the Regions
DGPS Differential Global Positioning System
GLA General Lighthouse Authority
GPS Global Positioning System
HA Harbour Authority
HDPC Harbours Docks and Piers Clauses Act
IALA International Association of Marine Aids to Navigation and Lighthouse Authorities
IMO International Maritime Organisation
IOS Inspector of Seamarks
LAM Local AtoN Manager
LLA Local Lighthouse Authority
MSA Merchant Shipping Act
MTBF Mean Time Between Failures
MTTR Mean Time To Restore Navaids Navigational aids (shipborne)
NCR Normal Conditions Restored
SACs Special Areas of Conservation
SOLAS Safety of Life at Sea
TH Trinity House
VTS(s) Vessel Traffic Service(s)

10 Annexes

Annex 1: Local Aids to Navigation Chain of Accountability



Annex 2: Availability, Reliability and Casualty Response

1
Availability is the function of both Reliability and Casualty Response. The Availability objective can only be met if Reliability (MTBF = Mean Time Between Failures) and Casualty Response (MTTR = Mean Time to Restore) conform to the objectives set by IALA.

2
Performance monitoring by means of numerical Availability shall thus be calculated using the formula method: calculated as:

$$\frac{MTBF \times 100}{MTBF + MTTR} = A(\%)$$

3
For the purposes of reporting on local AtoN availability statistics where A is the Availability objective, MTBF is the mean value of the length of time between one casualty and the next casualty and MTTR is the time taken to restore a casualty measured from the time of failure/ reporting of a failure to when Normal Conditions are Restored (NCR).

4
Task priority can be determined by the matrix of the importance of the aid, type of aid, resources available, and maintainability. Trinity House Lighthouse Service has adopted a failure/casualty response priority of 1 to 5, which is predetermined when the casualty is reported. However, actual time taken to reach the casualty can be influenced by time lost due to sea and weather conditions, the lack of manpower and transport resources and the distance involved.

5
In order to improve Availability to attain the target and thereby improve the performance related to the requirements of the user, a number of factors should be investigated as follows:

5.1
In the correlated equation of MTBF and MTTR, reviewing one of the possibilities below or all in combination could increase MTBF:
Specifying better quality or environmentally more suitable equipment.
Improve the quality of Preventative Maintenance.
Increase equipment redundancy.
Design for through-life maintainability.

5.2
To reduce the MTTR, the following time components need to be investigated, all of which form part of casualty response:

5.2.1
Report time; i.e. the time to report a casualty. This is affected by whether a station is monitored by the most suitable means available and, where remote control and monitoring facilities are available, whether such facilities are reliable enough to accurately respond to failure.

5.2.2
Task priority; i.e. the applicability of the Casualty Response priority level set for the station based on 2 above.

5.2.3
Time to prepare; i.e. time to alert manpower and resources and gather the necessary tools and materials to affect a repair.

5.2.4
Travel time; i.e. time taken to arrive on station, closely related to 5.2.2 and 5.2.3 above.

5.2.5
Logistics availability; i.e. the methods of

transport used to attend to the casualty.

5.2.6
Time lost; i.e. due to adverse weather or sea conditions, which is related to 5.2.4 and 5.2.5 above.

5.2.7
Time to repair on site, i.e. time taken to fully restore the equipment to its published characteristics.
It must be borne in mind when assessing the above that only discrepancies in the published characteristics of an Aid to Navigation (casualties) should be included in the Reports. Partial system or equipment failure that does not lead to a casualty, i.e. minor and major defects covered by redundancy does not need to be included in the Reports. The exception to this being where the backup systems significantly differ from the normal characteristics of the AtoN.

Annex 3: Performance Targets and Casualty 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 15 nm 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 Aids (Light Vessels, Light Floats)
Buoys equipped with racons
Buoys marking major waypoints
Buoys marking new wrecks
Buoys marking IMO Traffic Separation Schemes/Deep Water Routes

1.2.6
DGPS Systems used by vessels for position fixing purposes (see footnote 1)

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

1.4.2
Fog Signals

1.4.3
Daymarks, including withies, 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
Applying 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 designated 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 and where appropriate via UKHO.

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 action 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)

Footnote 1
For the purposes of his document DGPS is classified as a local AtoN only if it is provided by a HA/LLA to enable users to fix their position within the port/harbour. It is not classified as a local AtoN if the HA/LLA provide the service for its own use in connection with pilotage, VTS or surveying.