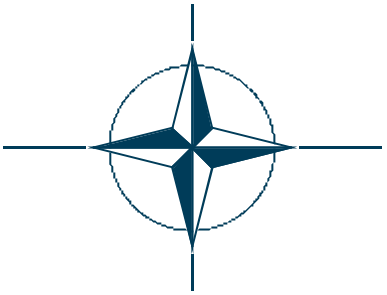
NORTH ATLANTIC TREATY ORGANISATION



(NATO)

ADDITIONAL MILITARY LAYERS

MARITIME FOUNDATION & FACILITIES

PRODUCT SPECIFICATION

Version 2.1, 1 November 2005

Produced and issued by the United Kingdom Hydrographic Office under the direction of the Geo-spatial Maritime Working Group of the NATO Geographic Conference.

Document Control

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31/07/04	B Parish	2.0	Includes amendments to AML MFF Product Specification approved by AHHWG-9 & AHHWG-10
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APPROVALS

Approver and Title	Signature	Date
Chairman Geo-spatial Maritime Working Group		21/10/05

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Contents

1 INTRODUCTION

1.1 SCOPE

The main body of this Product Specification describes the content and defines the data dictionary of the AML Maritime Foundation & Facilities (MFF) product, independent of any exchange standard data format. The schema and data format imposed by the chosen exchange standard implementation are defined in separate annexes (where provided).

It has been prepared in accordance with NATO STANAG 7170, Additional Military Layers and the draft NATO STANAG 4564, Performance Standards for Warship Electronic Chart Display and Information System (WECDIS) Data Products. It is based on the proposed Common Product Specification Framework (CPSF) which is contained as Annex B to the draft STANAG 4564.

MFF is designed to provide a suitable reference framework where users are:

a: not using AML products with standard electronic mapping or charting products (eg: VMAP, ENC, DNC or ARCS) as a backdrop / context

b: not using AML products that provide such a context, for example CLB or ESB.

Its major content is the coastline together with a variety of other information which can be categorised as follows:

- Framework

-major lights and significant buoys
-features that constrain normal vessel movement such as traffic separation schemes
-tidal information
-magnetic information
-national boundaries and major cities
-port and harbour locations and facilities

- Miscellaneous Tactical Information

-radar reflective entities such as offshore platforms, buoys and beacons
-communications facilities and coverage
-pipeline and cable information
-fish or marine farms
-oil, gas or mineral production information
-ice limits
-search and rescue information
-miscellaneous seabed obstructions which cover a significant area (note: for full information on specific seabed contacts, please refer to the AML products Small Bottom Objects and Large Bottom Objects)

It is not therefore intended to replicate the content of a navigational chart and nations may well not produce this product where suitable scale charting products are already available.

AML MARITIME FOUNDATION & FACILITIES MUST NOT BE USED IN ISOLATION FOR NAVIGATIONAL PURPOSES

1.2 GENERAL INFORMATION ON THE PRODUCT SPECIFICATION

1.2.1 Version Number

2.1

1.2.2 Date of Issue

1 November 2005

1.2.3 Custodian of the Product Specification

The Custodian of this specification is the United Kingdom Hydrographic Office:

United Kingdom Hydrographic Office
Admiralty Way
Taunton
Somerset
TA1 2DN
Telephone: +44(0) 1823 337900
Fax: +44(0) 1823 284077
E-mail: aml@ukho.gov.uk

1.2.4 Relevant STANAG Number

NATO STANAG No.7170 Additional Military Layers (AML).

1.3 STATUS OF THE PRODUCT SPECIFICATION

This product specification has been endorsed by the Geo-spatial Maritime Working Group of the NATO Geographic Conference and is subject to the change control procedures implemented by that group.

1.4 SECURITY

1.4.1 Security Classification of the Specification

The Product Specification is UNCLASSIFIED.

1.4.2 Security Classification of the Product

AML MFF can be issued at various security classification levels according to content. AML MFF products of differing security levels (specified at the dataset level by the 'Protective Marking' and 'Caveat' details) are physically partitioned.

The table at section 5.3 contains details of how AML MFF security classification information must be described in this product.

1.4.3 Copyright Statement

Producers of AML datasets must ensure that:

- the Intellectual Property Rights of those owning the information that has been used for production of the AML product is not compromised.

- sufficient mechanisms are put in place to ensure that material is not copied either in whole or part, except as specifically required within the host system, without prior agreement of the data producer and any other copyright holders

Copyright statements should be shown at the following locations:
- on the product label
- on the product packaging
- within the product

1.5 CONTENTS OF THE DOCUMENT

The AML MFF Product Specification defines the real-world features, attributes and metadata required for the production and use of the product. It is laid out as described in the table of contents.

Also included, as annexes to the product specification, are details of the implementation using the relevant exchange standard(s).

Each annex (if included) is identified as follows:
- AML MFF S-57 Implementation (ANNEX A)
- AML MFF DIGEST-C Implementation (ANNEX B)

A cross-reference in the text will be included for instances when there are relevant details in one or more of the implementation annexes.

1.6 REFERENCES

The following standards and specifications affect the content of this Product Specification.

1.6.1 Standards

NATO STANAG 1059 (Edition 6)	Distinguishing Letters for Geographical Entities for use in NATO.
NATO STANAG 2211	Geodetic Datums, Ellipsoids, Grids & Grid References
NATO STANAG 7170	Additional Military Layers.
NATO STANAG 4564	Standard for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.
NATO STANAG 7074	Digital Geographic Information Exchange Standard (DIGEST), Edition 2.1, September 2000. Part 1: General Description Part 2: Theoretical Model, Exchange Structure and Encapsulation Specifications, Annex C – Vector Relational Format (VRF) Encapsulation Specification.

	Part 3: Codes, Parameters and Tags Part 4: Feature and Attribute Coding Catalogue (FACC)
S-57	IHO Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000 Appendix A: Chapter 1, Object Classes Annex A - IHO Codes for Producing Agencies Chapter 2, Attributes Annex B - Attributes/Object Classes Cross Reference
S-52	Specifications for Chart Content and Display Aspects of ECDIS 5th Edition, dated December 1996 (amended March 1999) Appendix 1 Guidance on Updating the Electronic Navigational Chart
ISO 8859	Information processing - 8-bit single-byte coded graphic character sets Part 1: Latin alphabet No.1
ISO 9660	Information Processing - Volume and File Structure of CD-ROM for Information Interchange.
ANSI/IEEE 802.3	IEEE Standards for Local Area Networks, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
ISO/IEC 8211	Information processing - Specification for a data descriptive file for information interchange
ISO/IEC 10646	Information technology - Universal Multiple-Octet Coded Character Set (UCS) Part 1: Architecture and Basic Multilingual Plane

1.6.2 Specifications

MIL-PRF-0089049	General Performance Specification, Vector Product Format (VPF) Products, dated 24 November 1998
MIL-STD-2407	Interface Standard for Vector Product Format, dated 28 June 1996
The Open GIS Abstract Specification	Open GIS Consortium. Topic 9: Quality Version 4 1999
S-57	Edition 3.1 Appendix B.1: ENC Product Specification

1.6.3 Other References

AML	Feature and Attribute Catalogue

1.7 DEFINITIONS

AML AML is a unified range of digital geospatial data products designed to satisfy the totality of NATO non-navigational maritime defence requirements.

1.8 KEY WORDS

AML
Additional Military Layers
MFF
Maritime Foundation & Facilities
Product Specification

1.9 MAINTENANCE AND SUPPORT OF THE PRODUCT SPECIFICATION

Specific processes and mechanisms that are established for the maintenance of AML Product Specifications are described in the sections 1.9.1 to 1.9.6 below.

1.9.1 Frequency of Review

The AML MFF Product specification (version 2.0) will be frozen for a period of 2 years following endorsement.

1.9.2 Method of Maintenance

Corrections, clarifications and requests for change will be administered by the custodian. Discussion regarding proposed changes will be carried out by correspondence with national Points of Contact. Consolidated maintenance documents will be issued periodically containing published corrections and clarifications together with details of agreed extensions to the object catalogue (these will be formally incorporated into the Product Specification and become live at its next revision).
Changes to the Product Specification beyond extensions to the object catalogue will be reviewed by committee[1] during preparatory work for production of the next edition of the specification.

1.9.3 Method of Promulgation

Maintenance documents, new editions of specifications, and related documentation will be sent to nations through their appointed AML point of contact.

1.9.4 Authority Responsible for Maintenance

AML Product Specifications will be maintained by the Custodian specified in section 1.2.3.

1.9.5 Error Reporting/Change Request Procedure

Comments concerning the content of the AML Product Specifications and requests for change should be addressed to the Custodian.

[1] Will be a specific group reporting to the AHHWG or its successor.

1.9.6 Available Support

Contact the Custodian for guidance and advice relating to this product specification.

2 GENERAL PRODUCT DESCRIPTION

PRODUCT TITLE
Additional Military Layers – Maritime Foundation & Facilities.

SHORT TITLE
MFF

REFERENCE
NATO STANAG No.7170 (Additional Military Layers).

NATO STANAG No. 4564 (Performance Standards for Warship Electronic Chart Display and Information System (WECDIS), Edition 1, Annex B, Data Products.

2.1 MAINTENANCE OF THE DATA PRODUCT

The frequency and method of provision of update or replacement data will be defined by each AML producing agency.

2.2 SUPPORT FOR MULTIPLE MODES OF OPERATION

AML MFF data is compiled for a variety of purposes, providing a suitable reference framework where users are either not using standard electronic mapping or charting products as a backdrop, nor are they using any AML product(s) which would otherwise provide such a context. It may therefore be made available at the scale bands shown in the following tables.

SCALE BAND	DATA COMPILATION SCALE
1	< 1:100,000,000
2	1: 25,000,000
3	1: 5,000,000
4	1: 1,000,000
5	1:250,000
6	1:50,000
7	1:10,000
8	1:2,500
9	> 1:1,600

Data may be used or displayed in information systems at a range of scales as shown in the following table.

SCALE BAND	DISPLAY SCALE RANGE
1	< 1:40,000,000
2	1: 10,000,000 - 1:62,500,000
3	1: 2,000,000 - 1:12,500,000
4	1:400,000 - 1: 2,500,000
5	1:100,000 - 1:625,000
6	1:20,000 - 1:125,000
7	1:4,000 - 1:25,000
8	1:1,000 - 1:6,250
9	> 1:1,500

2.2.1 Arcs

Arcs may be defined on the spheroid. Where the geometric definition of an arc is not available, it may be approximated using a suitable number of straight line segments. The compilation scale of the approximation must be stated in the metadata.

Refer to the implementation standard for specific details relating to the encoding of mathematically derived arcs.

2.2.2 Defined Straight Lines

Where the geometry of a feature is denoted as a straight-line between two defined points then this may take the form of either a loxodrome (also known as a rhumb line or line of constant bearing) or a geodesic (ie the shortest distance calculated across the spheroid). Whether such lines are portrayed as straight lines or curves will depend on the type of line and the display projection in use. Suitable attribution will be included to indicate the type of line that is to be constructed for the display of such entities.

2.3 GEOGRAPHIC ORGANISATION

2.3.1 Regional Scheme

AML products will be partitioned by geographic region. This will vary widely depending upon the scale band of the product and the density of the data.

2.3.2 Tiling Scheme

See appropriate annex.

2.4 LAYER ORGANISATION

The content of the product is not layered. However, specific exchange standards may impose their own internal layering requirements.

2.5 EXCHANGE STANDARD IMPLEMENTATION

This product specification has been written to be independent of the exchange standard used. Details of exchange standard implementations are given in the relevant annex.

2.5.1 Spatial Data Type

AML MFF contains spatial objects as vector data.

2.5.2 Level of Topology

See appropriate annex.

2.5.3 Relationship with Layering

See appropriate annex.

2.5.4 Textual Information

Attributes that contain free text must not be used when it is possible to encode the information by means of any other attribute.

2.5.5 Reference to External Files

Text and picture files may also be included in the AML product to provide additional information.
Below are examples of potential formats.

- ASCII
- TIFF
- PDF
- HTML
- JPEG
- AVI
- MPEG

2.6 SIZING REQUIREMENTS

Data producers should partition datasets such that the screen refresh time in the receiving display system is acceptable to users. This will vary between data types and receiving systems. At present 5Mb is a recommended file size maximum for vector data in WECDIS type display systems.

2.7 GENERAL SOURCE DESCRIPTION

2.7.1 Minimum Source Requirements

Sources for any real-world feature detailed in section 5.5.1 meet the following requirements

- the data capture point-density fulfils the data capture requirements appropriate to the scale bands specified in section 2.2
- mandatory features specified in section 5.5.1.1 are included
- the mandatory attribution levels for each object, specified in section 5.5.1, are met

2.7.2 Applicable Sources

All sources used must meet the minimum requirements. Wherever available, sources which provide exact definitions of entities e.g. geographical co-ordinates should be used in preference to digitising from graphical representations.

3 GENERAL DATA DESCRIPTION

3.1 DATUMS

Please refer to NATO STANAG 2211 - Geodetic Datums, Ellipsoids, Grids & Grid References, which establishes the NATO guidelines to the use of horizontal and vertical datums.

3.1.1 Horizontal Datum

The horizontal datum for the AML MFF is the World Geodetic System 1984 (WGS 84).

3.1.2 Vertical Datums

3.1.2.1 Height Datum

The default height datum for the AML MFF is specified in the metadata of the dataset. The default height datum can be varied by the use of lower level metadata or feature level attribution.

3.1.2.2 Sounding Datum

The default sounding datum for AML MFF is specified in the metadata of the dataset. The default sounding datum can be varied by the use of lower level metadata or feature level attribution.

3.2 UNITS

The default units to be used in AML MFF are:

- Position: latitude and longitude in decimal degrees
- Depth: metres
- Height: metres
- Length/width: metres
- Positional accuracy: metres
- Distance: nautical miles or metres

The default units can be varied by the use of lower level metadata or feature level attribution.

3.2.1 Time

AML may contain attributes used to encode time e.g. the beginning and end of an active period for an object. When using these attributes all times should be encoded as Coordinated Universal Time (UTC). ISO 8601 states that the format for UTC time should be CCYYMMDDThhmmssZ (where 'T' is a separator). However, AML attributes that encode time using the ISO 8601 format DO NOT include the 'Z' and they should all be interpreted as UTC.

3.3 CO-ORDINATE SYSTEM

The co-ordinate system used by AML MFF is Latitude and Longitude. These will be recorded as:

Positive values: Used for latitudes **north** of the equator and longitudes **east** of the Greenwich Meridian.

Negative values: are used for latitudes **south** of the equator and longitudes **west** of the Greenwich Meridian.

3.4 PROJECTION

AML MFF is based upon geographical co-ordinates and is not projected.

3.5 LANGUAGE AND CHARACTER SETS

3.5.1 Language

The exchange language used by AML MFF is English.

3.5.2 Character Sets

ISO 8859-1 supports English and most European languages. For those languages that it does not support ISO/IEC 10646 shall be used.

3.6 DATA QUALITY

AML MFF data quality information should be encoded at an appropriate level, as specified by the exchange standard implementation.

AML data quality information encompasses the following categories:

- Accuracy
- Up-to-dateness/currency
- Source(s) of the data
- Completeness for the Product Specification

Data quality information defined for AML MFF can be encoded in the dataset as:

- dataset metadata
- meta information features[2]
- feature attributes

See section 5.3

3.6.1 Accuracy

Where applicable, the maximum two-dimensional error of AML data should be stated. All positional accuracy figures are cumulative and allow for:

- the accuracy of the original data
- additional errors introduced by the AML production process

If applicable, the cumulative error should be stated for the following:

- Horizontal Accuracy
- Sounding Accuracy
- Vertical (Height) Accuracy

3.6.2 Up-to-Dateness/Currency

Where applicable, currency information should specify the up-to-dateness of the AML dataset(s). This information should include:

- issue date
- update date[3]

[2] Only applicable if supported by the exchange standard implementation
[3] Only applicable if updating is supported by the exchange standard implementation

3.6.3 Source(s) of the data

Where available, AML source information should include the following details:

- authority (e.g. data provider)
- source type (e.g. graphic or report)
- source ID
- source date

3.6.4 Completeness for the Product Specification

AML products may be produced to fulfil operational requirements, and therefore, may not contain all the meta data, features or attributes included in this Product Specification.

All AML datasets must specify instances when:

- all available data/information has been encoded. Missing data means that the information is not available
- only specified/required data/information is encoded

3.6.5 Geometric Validation

All data produced for AML MFF must be validated for geometric anomalies.

4 DATA STRUCTURE

Refer to the appropriate implementation annex for details of specific implementation, format, and structure.

5 DATA DICTIONARY

5.1 GENERAL GUIDELINES

This section provides real-world descriptions for the metadata and features contained within the AML MFF dataset. Details of how this information is to be encoded (e.g. using the chosen Exchange Standard) can be found in the tables contained in the relevant implementation annexes.

5.2 UNKNOWN/MISSING ATTRIBUTE VALUES

The way in which an unknown or missing attribute value is handled is dependent upon the exchange standard implemented.

5.3 USE OF META INFORMATION

AML datasets contain the following meta-information, the information may be encoded at the levels in the dataset indicated in the following table depending upon the capability of the exchange standard used. Column four indicates the requirement for a feature whose sole purpose is the encoding of meta information. Column five indicates the nature of the meta attribute, where they exist. Meta attributes are either Generic or Specific as indicated.

For details of how to represent the metadata described, refer to the appropriate exchange standard implementation annex.

All meta information encoded at **Dataset** and or **Meta feature** levels in the following table are mandatory.

Meta info	Description	Dataset	Meta feature	Attribute type
Production Agency	The agency responsible for the production of the AML data (IHO Codes for Producing Agencies)	Yes	Yes	Generic
Dataset Name	The name of the dataset	Yes	No	No
Edition Number	The edition number of the dataset	Yes	No	No
Date of Release	The date of the dataset was made available by the AML data producer (e.g. edition or revision date)	Yes	No	No
Product Specification Description	The name of the AML Product Specification to which the dataset conforms (see section 2)	Yes	No	No
Product Specification Version Number	The version number of the AML Product Specification to which the dataset conforms (section 1.2.1)	Yes	No	No
Product Scale Band	The usage application scale-band of the AML dataset (see section 2.2)	Yes	No	No
Compilation Scale	The scale at which the AML data was compiled (see compilation scale band table in section 2.2)	Yes	Yes	Generic

Meta info	Description	Dataset	Meta feature	Attribute type
International Defence Organisation (IDO) status (see note)	The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO Marking. -North Atlantic Treaty Organisation (NATO) -North Atlantic Co-operation Council (NACC) -Partnership for Peace (PfP) -Western European Union (WEU)	Yes	Yes	Generic
Protective marking	A marking indicating the minimum standards of protection required of the data. - COSMIC Top Secret - focal Top Secret - Top Secret - Secret - Confidential - Restricted - Unclassified	Yes	Yes	Generic
Owner Authority	The NATO country code (NATO STANAG 1059) denoting the 'owner' that is responsible for establishing and setting the protective marking level	Yes	Yes	Generic
Caveat (see note)	A component of a security clearance and/or security class used for computing access rights and controlling information flow by authorising a specific group of subjects to have access to the information	Yes	Yes	Generic
Update Application Date	The date for which all previous updates (dated on or before) must have been applied	Yes	No	No
Update Number	The update number of the dataset	Yes	No	No
Horizontal Geodetic Datum	The horizontal geodetic datum of the dataset	Yes	No	No
Vertical Datum	The vertical datum of the dataset	Yes	Yes	No
Sounding	The horizontal plane to which the	Yes	Yes	Specific

Meta info	Description	Dataset	Meta feature	Attribute type
Datum	soundings on a hydrographic survey are reduced. (IHO SP32: 1225)			
Co-ordinate Units	The co-ordinate units of the dataset	Yes	No	No
Height/Length Units	The height & length units of the dataset	Yes	No	Specific
Depth Units	The unit of measurement for depths	Yes	No	Specific
Positional Accuracy Units	The positional accuracy units of the dataset	Yes	No	No
Capture Date	The date when the specific object was captured, edited or deleted.	No	No	Generic
Producing Country	The country responsible for the production of the AML data (IHO Codes for Producing Agencies)	No	Yes	Generic
Data Coverage	The geographical area that describes the coverage and extent of spatial objects	No	Yes	Specific (Boolean)
Source Country	The country responsible for the production of the source (IHO Codes for Producing Agencies)	No	No	Generic
Source Agency	The agency responsible for the production of the source (IHO Codes for Producing Agencies)	No	No	Generic
Source Date	The date of issue of the source information (if applicable)	No	No	Generic
Source ID	ID of the data source (e.g. chart number)	No	No	Generic
Source Type	The type of data source (e.g. chart, report, etc.)	No	No	Generic
Source Scale	The scale at which the source data has been compiled	No	No	Generic
Absolute Horizontal Accuracy	The positional error estimate for a single point, relative to the specified spatial reference system	No	No	Generic
Absolute Vertical Accuracy	The vertical error estimate for a single point, relative to the specified spatial reference system	No	No	Generic
Sounding Accuracy	The error estimate for soundings relative to the specified spatial reference system	No	No	Specific
Quality of	An indication of the reliability of a	No	No	Generic

Meta info	Description	Dataset	Meta feature	Attribute type
Position	quoted position			
Quality of Sounding Measurement	An indication of the reliability of a sounding	No	No	Specific
Technique of sounding measurement	Indicates the method or equipment used to obtain the object's depth	No	No	Specific
Error Ellipse	Also known as the Figure of Merit. 95% 2sigma value - semi-major and semi-minor axes of error ellipsoid plus orientation.	No	No	Generic
Relative Horizontal Accuracy	The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	No	No	Generic
Relative Vertical Accuracy	The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	No	No	Generic
Completeness for the Product Specification	An indication of how complete the data-set is, with reference to the full range of meta data, features and attributes included in the product specification	No	Yes	Specific (Boolean)
Supporting textual information	Supporting (free text) information relevant to the object that cannot be explicitly encoded by any other attribute	No	No	Generic
Supporting textual information (in national language characters)	Supporting (free text) information (in national language) relevant to the object that cannot be explicitly encoded by any other attribute	No	No	Generic
Copyright Statement	Indicates any copyright or releaseability restrictions on the data	Yes	Yes	Generic

NOTE:

International Defence Organisation (IDO) status and caveats are mutually exclusive. If the data has an IDO status, then the caveat is not applicable. Additionally, caveats only apply to data that has a Protective Marking of CONFIDENTIAL or above.

NOTE:

Update information is only applicable if updating is supported by the exchange standard implementation.

NOTE:
The 'Source Agency' refers to the originators of the data and not the agency responsible for producing AML. If the source agency is not listed in IHO Codes for Producing Agencies, then the agency name should prefix any details provided in the attribute 'Source ID' using a solidus (forward slash) to separate it from the ID.

5.4 EXTERNAL REFERENCING

External Reference Information	Description	Dataset	Meta feature	Attribute
Image File Link	A reference to an image file containing a pictorial representation of the object	No	No	Generic
Text File Reference	The file name relating to an external text file	No	No	Generic
Text File Reference (in national language characters)	The file name (in national language) relating to an external text file	No	No	Generic
Reference to a publication	Reference to a specific location of any relevant information within an external publication	No	No	Generic

5.5 SCHEMA

The following tables (5.5.1 & 5.5.2) provide the descriptions of meta information, real-world features, and associated attributes required for an AML MFF data-set to be attributed as complete for this Product Specification.

For details of how to represent the real-world features and associated attributes described, refer to the appropriate exchange standard implementation annex.

The terms 'specific' and 'generic' are used to indicate an attribute's association to a feature. Attributes that are 'generic' apply to all features listed in this Product Specification. Attributes listed as 'specific' relate only to those in the Features table in section 5.5.1, when included in the 'Associated Attributes' column.

NOTE:
Any feature with attribute(s) used to encode values for; height, depth, length, or width must include an attribute for the unit of measurement.

5.5.1 Features

The following table contains the information described below:

- Feature – gives the name of the feature
- Description – describes the feature
- Associated Attributes – indicates allowable attributes relevant to each feature. (see section 5.5.2 for attribute descriptions and values.)
- M – denotes that export of the attribute field is mandatory
- Form – indicates the geometric form that the feature can take (i.e. **P**oint, **L**ine, or **A**rea)

In addition to the 'associated attributes' listed for individual real-world features 'generic attributes' are used at the feature level. These encode meta and supporting information that may exist on any feature. Generic attributes used in AML MFF are described in section 5.3

For details of how to encode the features listed in this section, refer to the appropriate exchange standard implementation annex.

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
Administration area	A defined (and possibly named) administrative area.	•Jurisdiction •Name (English) •Name (national language characters) •Nationality		✔		✔
Beacons	*Note: only beacons of major importance are included in AML MFF. Attribution should be kept to a minimum, as indicated.*					
Beacon, cardinal	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. *(IHO S-32: 420)* A cardinal beacon is used in conjunction with the compass to indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked.	•**Category of cardinal mark** •Conspicuous, radar •End date •Height •Height / length units •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status •Vertical datum	✔	✔		
Beacon, isolated	A beacon is a prominent specially	•Conspicuous, radar		✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
danger	constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. *(IHO S-32: 420)* An isolated danger beacon is a beacon erected on an isolated danger of limited extent which has navigable water all around it. *(UKHO NP735, 5th edition)*	•End date •Height •Height / length units •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status •Vertical datum				
Beacon, lateral	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. *(IHO S-32: 420)* A lateral beacon is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional direction of buoyage. *(UKHO NP735, 5th edition)*	**•Category of lateral mark** •Conspicuous, radar •End date •Height •Height / length units •Marks - navigational – system of •Seasonal start date •Seasonal end date •Start date •Status •Vertical datum	✔	✔		
Beacon, safe water	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. *(IHO S-32: 420)* A safe water beacon may be used to indicate that there is navigable water around the mark. *(UKHO NP735, 5th Edition)*	•Conspicuous, radar •End date •Height •Height / length units •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status •Vertical datum		✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
Beacon, special purpose	A beacon is a prominent specially constructed object forming a conspicuous mark as a fixed aid to navigation or for use in hydrographic survey. *(IHO S-32: 420)* A special purpose beacon is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. *(UKHO NP735, 5th edition)*	•**Category of special purpose mark** •Conspicuous, radar •End date •Height •Height / length units •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status •Vertical datum	✔	✔		
Built-up area	An area containing a concentration of buildings and the supporting road or rail infrastructure. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•Condition •Conspicuous, radar •Conspicuous, visually •Height •Height / length units •Name (English) •Name (national language characters) •**Type of built-up area** •Vertical datum	✔	✔		✔
Buoys	*Note: only conical, can, spherical, pillar, spar, barrel and super buoys (LANBY and ODAS) are included in AML MFF. Attribution should be kept to a minimum, as indicated.*					
Buoy, cardinal	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* A cardinal buoy is used in conjunction with the compass to	•**Category of cardinal mark** •Conspicuous, radar •End date •Marks – navigational– system of	✔	✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	indicate where the mariner may find the best navigable water. It is placed in one of the four quadrants (North, East, South and West), bounded by inter-cardinal bearings from the point marked. *(UKHO NP 735, 5th Edition)*	•Seasonal start date •Seasonal end date •Start date •Status				
Buoy, installation	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* An installation buoy is a buoy used for loading tankers with gas or oil. *(IHO Chart Specifications, M-4)*	**•Category of installation buoy** •Conspicuous, radar •End date •Marks – navigational – system of •Product •Seasonal start date •Seasonal end date •Start date •Status	✔	✔		
Buoy, isolated danger	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* An isolated danger buoy is a buoy moored on or above an isolated danger of limited extent which has navigable water all around it. *(UKHO NP735, 5th edition)*	•Conspicuous, radar •End date •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status		✔		
Buoy, lateral	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* A lateral buoy is used to indicate the port or starboard hand side of the route to be followed. They are generally used for well defined channels and are used in conjunction with a conventional	**•Category of lateral mark** •Conspicuous, radar •End date •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status	✔	✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	direction of buoyage. *(UKHO NP735, 5th edition)*					
Buoy, safe water	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* A safe water buoy may be used to indicate that there is navigable water around the mark. *(UKHO NP735, 5th Edition)*	•Conspicuous, radar •End date •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status		✔		
Buoy, special purpose	A buoy is a floating object moored to the bottom in a particular place, as an aid to navigation or for other specific purposes. *(IHO SP-32: 565)* A special purpose buoy is primarily used to indicate an area or feature, the nature of which is apparent from reference to a chart, Sailing Directions or Notices to Mariners. *(UKHO NP735, 5th edition)*	•**Category of special purpose mark** •Conspicuous, radar •End date •Marks – navigational – system of •Seasonal start date •Seasonal end date •Start date •Status	✔	✔		
Cable area	An area which contains one or more submarine cables.	•End date •Name (English) •Name (national language characters) •Restriction(s) •Start date •Status •**Type of cable**	✔			✔
Cable, submarine	An assembly of wires or fibres, or a wire rope or chain which has been laid underwater or buried beneath the seabed. *(Hydrographic Service, Royal Australian Navy)*	•Buried depth •Condition •Depth range – shoalest value •Depth range – deepest value •Depth units			✔	

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•End date •Height / length units •Name (English) •Name (national language characters) •Restriction(s) •Sounding accuracy •Sounding datum •Start date •Status •**Type of cable**	✔			
Coastguard station	Watch keeping stations at which a watch is kept either continuously, or at certain times only. *(IHO Chart Specs, M-4)*	•End date •Start date •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Status		✔		
Coastline	The line where shore and water meet. Although the terminology of coasts and shores is rather confused, shoreline and coastline are generally used as synonyms. *(IHO Dictionary, S-32, 5th Edition, 858,4695)*	•Conspicuous, radar •Conspicuous, visually •Elevation •Height / length units •Name (English) •Name (national language characters) •Vertical datum			✔	
Completeness for the Product Specification	An indication of how complete the data-set is, with reference to the full range of meta data, features and attributes included in the product specification *(AML)*	**Category of completeness**	✔			✔
Data Coverage	A geographical area that describes the coverage and extent of spatial	**-Category of coverage**	✔			✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	objects					
Data Source Area (This feature uses the generic source information attributes to encode source information which is applicable to an area. Features within the area need not be individually attributed)	A geographical area that describes the spatial extent of a data source. *(AML)*	-Source Agency -Source Country -Source Date -Source ID **-Source Scale** -Source Type	✔			✔
Deep water route centerline	A deep water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea bottom and submerged obstacles to a minimum indicated depth of water. *(IHO Dictionary, S-32, 5th Edition, 1280)* The deep water route centerline indicates the centerline of a route, the width of which is not explicitly defined. *(AML)*	**•Category of recommended track** •Depth range – shoalest value •Depth range – deepest value •Depth units •End date •Name (English) •Name (national language characters) •Orientation •Quality of sounding measurement •Sounding accuracy •Sounding datum •Start date •Status •Traffic flow	✔		✔	
Deep water route composite	A composite feature which enables the components of a deep water route to be combined into a single feature. *(AML)*	•Name (English) •Name (national language characters)		No geometry required		
Deep water route - part	A deep water route is a route in a designated area, within defined limits, which has been accurately surveyed for clearance of sea	•Depth range – shoalest value •Depth range –				✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	bottom and submerged obstacles to a minimum indicated depth of water. *(IHO Dictionary, S-32, 5th Edition, 1280)*	deepest value •Depth units •End date •Name (English) •Name (national language characters) •Orientation •Quality of sounding measurement •Restriction(s) •Sounding accuracy •Sounding datum •Start date •Status •Traffic flow				
Fishing ground	A water area in which fishing is frequently carried on. *(IHO Dictionary, S-32, 5th Edition, 1814)*	•Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Status				✔
Harbour area (administrative)	The area over which a harbour authority has jurisdiction.	•Name (English) •Name (national language characters) •Status				✔
Harbour facility	A harbour installation with a service or commercial operation of public interest.	**•Category of harbour facility** •Condition •End date •Name (English) •Name (national language characters) •Nature of construction •Seasonal start date	✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•Seasonal end date •Start date •Status				
Ice area	An area of ice over land or water.	**•Classification of ice** •Conspicuous, visually •Elevation •Height •Height / length units •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Status •Vertical datum •Vertical length	✔			✔
Inshore Traffic Zone	A routeing measure comprising a designated area between the landward boundary of a traffic separation scheme and the adjacent coast, to be used in accordance with the provisions of the International Regulations for Preventing Collisions at Sea. *(IHO Dictionary, S-32, 5th Edition, 2457)*	**•Category of Traffic Separation Scheme** •End date •Restriction(s) •Start date •Status	✔			✔
Land area	The solid portion of the Earth's surface, as opposed to sea, or water. *(IHO SP-32: 2635)*	•Condition •Name (English) •Name (national language characters) •Status		✔	✔	✔
Major Lights	*Note: major lights are those deemed to have a nominal range equal to or greater than 15 miles; or where the light is on an island; or where the geographical distribution of lights is so sparse as to warrant the inclusion of lights with a lesser range. Attribution should be kept to a minimum, as indicated below.*					
Light	A luminous or lighted aid to	**•Category of light**	✔	✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	navigation. *(Adapted from IHO Dictionary, S-32, 5th Edition, 2766)*	•Colour •End date •Height •Height / length units •Light characteristic •Marks - navigational – system of •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Start date •Status •Value of nominal range •Vertical datum				
Light float	A boat-like structure used instead of a light buoy in waters where strong streams or currents are experienced, or when a greater elevation than that of a light buoy is necessary *(IHO Dictionary, S-32, 5th Edition, 2821).*	**•Conspicuous, radar** •End date •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Start date •Status	✔	✔		
Light vessel	A distinctively marked vessel anchored or moored at a charted point, to serve as an aid to navigation. By night, it displays a characteristic light(s) and is usually equipped with other devices, such as fog signal, submarine sound signal, and radio-beacon, to assist navigation. Also called light ship.	**•Conspicuous, radar** •End date •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date	✔	✔		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	(IHO Dictionary, S-32, 5th Edition, 2828,2829)	•Start date •Status				
Local magnetic anomaly	An anomaly of the magnetic field of the earth, extending over a relatively small area, due to local magnetic influences *(IHO SP-32: 2874)*	•Name (English) •Name (national language characters) **•Value of local magnetic anomaly**	 ✔	✔	✔	✔
Magnetic variation	The angle between the magnetic and geographic (true) north at a location, expressed in degrees east or west from the direction of true north.	•End date **•Reference year for magnetic variation** •Start date **•Value of annual change in magnetic variation** **•Value of magnetic variation**	 ✔ ✔ ✔	✔	✔	✔
Marine farm / culture	An assemblage of cages, nets, rafts, and floats or posts where fish, including shellfish, are artificially cultivated. Also called fish farm. *(IHO SP-32: 1811)*	**•Category of marine farm / culture** •Depth of water over feature •Depth units •End date •Height / length units •Name (English) •Name (national language characters) •Quality of sounding measurement •Restriction(s) •Seasonal start date •Seasonal end date •Sounding accuracy •Sounding datum •Start date •Status	✔	✔	✔	✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•Vertical datum •Vertical length •Water level effect				
Obstruction	In marine navigation, anything that hinders or prevents movement, particularly anything that endangers or prevents passage of a vessel. *(IHO Dictionary, S-32, 5th Edition, 3503)* (Note: only obstructions of a general nature, as defined in the attribute 'Category of obstruction' shall be captured, providing they cover a significant area of the seabed. Any type of obstruction which can be positioned using a single co-ordinate, or can be adequately represented by a centralised position (point geometry) must be captured in either the AML product "Large Bottom Objects" or "Small Bottom Objects" as appropriate.)	**•Category of obstruction** •Condition •Depth of water over feature •Depth units •Height •Height / length units •Nature of construction •Name (English) •Name (national language characters) •Quality of sounding measurement •Sounding accuracy •Sounding datum •Status •Vertical length •Water level effect	✔		✔	✔
Offshore platform	A permanent offshore platform, either fixed or floating, used in the production of oil or natural gas. *(IHO SP-32: 3895)*	**•Category of offshore platform** •Condition •Conspicuous, radar •Controlling authority •End date •Height •Height / length units •Limits of anchors and chains •Name (English) •Name (national	✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		language characters) •Nationality •Nature of construction •Product •Start date •Status •Vertical datum				
Offshore production area	An area at sea within which there are production facilities.	**•Category of production area** •Condition •Conspicuous, radar •Controlling authority •End date •Height •Height / length units •Name (English) •Name (national language characters) •Nationality •Product •Restriction(s) •Start date •Status •Vertical datum	✔			✔
Pipeline area	An area containing one or more pipelines.	**•Category of pipeline** •Condition •End date •Name (English) •Name (national language characters) •Product •Restriction(s) •Start date	✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•Status				
Pipeline, submarine / on land	A pipeline is a string of interconnected pipes used for the transport of matter, nowadays mainly oil or gas. *(IHO Dictionary, S-32, 5th Edition, 3857)* A submarine or land pipeline is a pipeline lying on or buried under the seabed or the land. *(AML)*	•Buried depth **•Category of pipeline** •Condition •Depth range – shoalest value •Depth range – deepest value •Depth units •End date •Height and length units •Name (English) •Name (national language characters) •Product •Restriction(s) •Sounding accuracy •Sounding datum •Start date •Status •Vertical length	✔	✔	✔	
Precautionary area	A routeing measure comprising an area within defined limits where ships must navigate with particular caution and within which the direction of traffic flow may be recommended. *(IHO Dictionary, S-32, 5th Edition, 3982)*	•End date •Name (English) •Name (national language characters) •Start date •Status •Restriction(s)				✔
Production / storage area	An area on land for the exploitation or storage of natural resources.	**•Category of production area** •Condition •Conspicuous, radar •Conspicuous, visually •End date •Elevation	✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•Height •Height / length units •Name (English) •Name (national language characters) •Product •Start date •Status •Vertical datum •Vertical length				
Rescue station	A place at which life saving equipment is held. *(IHO Chart Specifications, M-4)*	**•Category of rescue station** •End date •Name (English) •Name (national language characters) •Seasonal start date •Seasonal end date •Start date •Status	✔	✔		
Sea area	A geographically defined part of the sea or other navigable waters. It may be specified within its limits by its proper name. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**•Name (English)** •Name (national language characters)	✔	✔		✔
Signal station, warning	A signal station is a place on shore from which signals are made to ships at sea. *(IHO Dictionary, S-32, 5th Edition, 4742)*	**•Category of signal station, warning** •Name (English) •Name (national language characters) •Status	✔	✔		
Tidal stream - flood / ebb	Tide - the periodic rise and fall of the surface of the sea, due principally to the gravitational interaction between moon, sun and earth.	**•Category of tidal stream** **•Current velocity** •End date	✔ ✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	(Adapted from IHO Dictionary, S-32, 5th Edition, 5429). A tidal stream (or tidal current) is an alternating horizontal movement of water associated with the rise and fall of the tide caused by tide-producing forces. *(IHO Dictionary, S-32, 5th Edition, 1169).* Approximate tidal stream rates may be given as discrete rate values for flood and ebb flow during springs. *(AML)*	•Name (English) •Name (national language characters) **•Orientation** •Seasonal start date •Seasonal end date •Start date	✔			
Tidal stream panel data	Approximate tidal stream rates may be given as discrete rate values at a specified interval before or after a high water.	•Name (English) •Name (national language characters) **•Tidal stream – panel values**	✔	✔		✔
Tidal stream - harmonic prediction	Predicted tidal stream rates may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm.	•Name (English) •Name (national language characters) **•Tide – method of tidal prediction** **•Tide – value of harmonic constituents** •Status	✔ ✔	✔		✔
Tidal stream -non-harmonic prediction	Predicted tidal stream rates may be calculated using time and height differences with respect to a reference station (and associated tidal stream predictions).	•Name (English) •Name (national language characters) **•Tide – method of tidal prediction** **•Tide – time and height differences** •Status	✔ ✔	✔		✔
Tidal stream -time series	Tidal stream rates over time may be approximated by a series of rate values given at regular time	•Name (English) •Name (national language		✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	intervals, starting from a specified moment in time.	characters) •**Tide, current – time interval of values** •**Tidal stream current – time series values** •**Time end** •**Time start** •Status	 ✔ ✔ ✔ ✔			
Tide - harmonic prediction	Predicted tidal heights may be calculated using parameters (harmonic constituents) and an appropriate harmonic calculation algorithm.	•Name (English) •Name (national language characters) •**Tide – accuracy of water level** •**Tide – method of tidal prediction** •Tide – value of harmonic constituents •Status	 ✔ ✔	✔		✔
Tide - non-harmonic prediction	Predicted tidal heights may be calculated using time and height differences with respect to a reference port (and associated tidal predictions).	•Name (English) •Name (national language characters) •**Tide – accuracy of water level** •**Tide – method of tidal prediction** •Tide – time and height differences •Status	 ✔ ✔	✔		✔
Tide - time series	Tidal heights over time may be approximated by a series of rate values given at regular time intervals, starting from a specified moment in time.	•Name (English) •Name (national language characters) •Tide – accuracy of water level •**Tide – high and low water levels**	 ✔	✔		✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
		•Tide, current – time interval of values •Tide – time series values •**Time end** •**Time start** •Status	 ✔ ✔			
Traffic separation line	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)* A traffic separation line is a line separating traffic lanes in which ships are travelling in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction *(IMO Ships Routeing, 6th Edition)*	•**Category of traffic separation scheme** •End date •Start date •Status	✔		✔	
Traffic separation scheme boundary	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)* The boundary of a traffic separation scheme is the outer limit of a traffic lane part or a traffic separation scheme roundabout. *(AML)*	•**Category of traffic separation scheme** •End date •Start date •Status	✔		✔	
Traffic separation scheme	A composite feature which enables the components of a traffic separation scheme to be	•Name (English) •Name (national		No geometry required		

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
composite	combined into a single feature. *(AML)*	language characters)				
Traffic separation scheme crossing	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)* A traffic separation scheme crossing is a defined area where traffic lanes cross. *(AML)*	•**Category of traffic separation scheme** •End date •Restriction(s) •Start date •Status	✔			✔
Traffic separation scheme lane part	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)* A traffic lane is an area within defined limits in which one-way traffic flow is established *(IMO Ships Routeing, 6th Edition).* A traffic separation scheme lane part is an area of a traffic lane in which the direction of flow of traffic is uniform. *(AML)*	•**Category of traffic separation scheme** •End date •**Orientation** •Restriction(s) •Start date •Status	✔ ✔			✔
Traffic separation scheme roundabout	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)*	•**Category of traffic separation scheme** •End date •Restriction(s) •Start date •Status	✔			✔

Feature	Description	Associated Attributes		Form		
		Description	M	P	L	A
	A roundabout is a traffic separation scheme in which traffic moves in a counter-clockwise direction around a specified point or zone. *(IHO Dictionary S-32, 5th Edition, 4448)*					
Traffic separation zone	A traffic separation scheme is a scheme which aims to reduce the risk of collision in congested and/or converging areas by separating traffic moving in opposite, or nearly opposite, directions. *(IHO Dictionary, S-32, 5th Edition, 5585)* A traffic separation zone is a zone separating the lanes in which ships are proceeding in opposite or nearly opposite directions; or separating traffic lanes designated for particular classes of ships proceeding in the same direction. *(IMO Ships Routeing, 6th Edition)*	•**Category of traffic separation scheme** •End date •Start date •Status	✔			✔
User Defined	A feature not otherwise permissible within the AML content model	Textual description		✔	✔	✔

5.5.1.1 Mandatory Features

Real-world objects that are mandatory for this product are:

- Coastline

5.5.2 Attributes

The table below displays the following information:

- Attribute – gives the name of attribute.
- Definition – gives a more detailed description of the attribute if required.
- Values – specifies the possible values the attribute may take.

For details of how to encode the attributes listed in this section, refer to the appropriate exchange standard implementation annex.

Attribute & definition	Values & definitions
Absolute horizontal accuracy	Value: min 0

Attribute & definition	Values & definitions
The positional error estimate for a single point, relative to the specified spatial reference system. *(AML)*	Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Absolute vertical accuracy The vertical error estimate for a single point, relative to the specified spatial reference system. *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or ft)
Buried depth The depth below the sea bed to which an object is buried. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Value: 0 - 99.9 Units: metres or feet (units must be defined) Resolution: 0.1
Capture date Gives the date when the object was captured, edited or deleted *(AML)*	CCYYMMDD 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Category of cardinal mark	•**north cardinal mark.** •**south cardinal mark.** •**east cardinal mark.** •**west cardinal mark.** **Unknown** **Not Applicable**
Category of completeness Indicates the inclusion criteria and completeness regarding the feature content of the dataset *(AML)*	**complete:** The area specified has been populated for all known features. Absence of features indicates that there are no such entities available to the data producer **partial:** Certain features have not been included (or only partially included) within the specified area. Details must be provided in supporting textual information
Category of coverage The availability of coverage *(AML)*	**coverage available**: Continuous coverage of spatial objects is available within this area **no coverage available:** An area containing no spatial objects
Category of harbour facility	•**ro-ro terminal:** a terminal for roll-on roll-off ferries. •**ferry terminal:** a terminal for passenger and vehicle ferries. •**fishing harbour:** a harbour facilities for fishing boats. •**yacht harbour / marina:** a harbour with facilities for small boats and yachts *(IHO Dictionary, S-32,*

Attribute & definition	Values & definitions
	5th Edition, 3095). •**naval base:** a centre of operations for naval vessels *(adapted from The Collins Dictionary).* •**tanker terminal:** a terminal for the bulk handling of liquid cargoes. •**passenger terminal:** a terminal for the loading and unloading of passengers. •**container terminal:** a terminal for container ships. •**bulk terminal:** a terminal for the handling of bulk materials such as iron ore, coal, etc. **Unknown** **Multiple** **Not Applicable** **Other**
Category of installation buoy	•**catenary anchor leg mooring (CALM):** incorporates a large buoy which remains on the surface at all times and is moored by 4 or more anchors. Mooring hawsers and cargo hoses lead from a turn-table on top of the buoy, so that the buoy does not turn as the ship swings to wind and stream. •**single buoy mooring (SBM):** a mooring structure used by tankers to load and unload in port approaches or in offshore oil and gas fields. The size of the structure can vary between a large mooring buoy and a manned floating structure. Also known as single point mooring (SPM). *(IHO Dictionary, S-32, 4th Edition)* **Unknown** **Not Applicable** **Other**
Category of lateral mark	•**port-hand lateral mark:** indicates the port boundary of a navigational channel or suggested route when proceeding in the 'conventional direction of buoyage'. •**starboard-hand lateral mark:** indicates the starboard boundary of a navigational channel or suggested route when proceeding in the 'conventional direction of buoyage'. •**preferred channel to starboard lateral mark:** at a point where a channel divides, when proceeding in the 'conventional direction of buoyage', the preferred channel (or primary route) is indicated by a modified port-hand lateral mark.

Attribute & definition	Values & definitions
	•**preferred channel to port lateral mark:** at a point where a channel divides, when proceeding in the 'conventional direction of buoyage', the preferred channel (or primary route) is indicated by a modified starboard-hand lateral mark. **Unknown** **Not Applicable**
Category of light	•**directional function:** a light illuminating a sector of very narrow angle and intended to mark a direction to follow. *(IHO Dictionary, S-32, 5th Edition, 2778)* •**leading light:** a light associated with other lights so as to form a leading line to be followed. (*adapted from IHO Dictionary, S-32, 5th Edition, 2794)* •**aero light:** an aero light is established for aeronautical navigation and may be of higher power than marine lights and visible from well offshore. *(M-4, 476.1)* •**air obstruction light:** a light marking an obstacle which constitutes a danger to air navigation. *(IHO Dictionary, S-32, 5th Edition, 2767)* •**fog detector light:** a light used to automatically determine conditions of visibility which warrant the turning on or off of a sound signal. *(IHO Dictionary, S-32, 5th Edition, 1885)* •**flood light:** a broad beam light used to illuminate a structure or area. *(adapted from The Collins Dictionary)* •**subsidiary light:** a light placed on or near the support of a main light and having a special use in navigation. *(ALRS)* •**spotlight:** a powerful light focused so as to illuminate a small area. *(The Collins Dictionary)* •**front, rear, upper, lower:** terms used with leading lights to describe the position of the light on the lead as viewed from seaward. •**emergency light:** a light available as a back-up to a main light which will be illuminated should the main light fail. •**bearing light:** a light which enables its approximate bearing to be obtained without the use of a compass. *(M-4, 478.1)* •**horizontally disposed:** a group of lights of identical character and almost identical position, that

Attribute & definition	Values & definitions
	are disposed horizontally. •**vertically disposed:** a group of lights of identical character and almost identical position, that are disposed vertically. •**Marine Light:** A light intended primarily for marine navigation. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Unknown** **Multiple** **Not Applicable** **Other**
Category of marine farm/culture	•**crustaceans:** hard shelled animals for example crabs or lobsters. •**oysters / mussels:** edible bivalve molluscs. •**fish:** a vertebrate cold blooded animal with gills, living in water. •**seaweed:** the general name for marine plants of the Algae class which grow in long narrow ribbons. *(Int. Mar. Dictionary 2nd Ed.)* •**pearl culture farm:** an area where pearls are artificially cultivated. **Unknown** **Not Applicable** **Other**
Category of Obstruction Description of the type of obstruction. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**fish haven:** areas established by private interests, usually sport fishermen, to simulate natural reefs and wrecks that attract fish. The reefs are constructed by dumping assorted junk in areas which may be of very small extent or may stretch a considerable distance along a depth. Also called fishery reefs. *(S-57 Appendix A, Chapter 2 Attributes)* •**foul area:** an area of numerous unidentified dangers to navigation. The area serves as a warning to the mariner that all dangers are not identified individually and that navigation through the area may be hazardous. Commonly used to encode areas behind danger lines on navigation charts. *(S-57 Appendix A, Chapter 2 Attributes)* •**foul ground:** areas over which it is safe to navigate but which should be avoided for anchoring, taking the ground or ground fishing. *(S-57 Appendix A, Chapter 2 Attributes)* •**ground tackle:** equipment such as anchors,

Attribute & definition	Values & definitions
	concrete blocks, chains and cables etc., used to position floating structures such as trot and mooring buoys etc. *(S-57 Appendix A, Chapter 2 Attributes)* **Unknown** **Not Applicable** **Other**
Category of offshore platform	•**oil derrick / rig:** a temporary mobile structure, either fixed or floating, used in the exploration stages of oil and gas fields. *(IHO Dictionary, S-32, 5th Edition)* •**production platform:** a term used to indicate a permanent offshore structure equipped to control the flow of oil or gas. It does not include entirely submarine structures. *(IHO Dictionary, S-32, 5th Edition, 4037)* •**observation / research platform:** a platform from which one's surroundings or events can be observed, noted or recorded such as for scientific study. *(adapted from IHO Dictionary, S-32, 5th Edition, 3493/3500)* •**articulated loading platform (ALP):** a metal lattice tower, buoyant at one end and attached at the other by a universal joint to a concrete filled base on the sea bed. The platform may be fitted with a helicopter platform, emergency accommodation and hawser/hose retrieval. *(adapted from UKHO CSDO 607.2 (12), May 1994)* •**single anchor leg mooring (SALM):** a rigid frame or tube with a buoyancy device at its upper end , secured at its lower end to a universal joint on a large steel or concrete base resting on the sea bed, and at its upper end to a mooring buoy by a chain or wire. *(adapted from UKHO CSDO 607.2 (12), May 1994)* •**mooring tower:** a platform secured to the sea bed and surmounted by a turn-table to which ships moor. *(adapted from UKHO CSDO 607.2 (12), May 1994)* •**artificial island:** a man-made structure usually built for the exploration or exploitation of marine resources, marine scientific research, tidal observations, etc. *(adapted from IHO Dictionary, S-32, 5th Edition, 240)* •**floating production, storage and offloading vessel (FPSO):** an offshore oil/gas facility

Attribute & definition	Values & definitions
	consisting of a moored tanker/barge by which the product is extracted, stored and exported. *(adapted from UKHO CSDO 607.2 (13), May 1994)* •**accommodation platform:** a platform used primarily for eating, sleeping and recreation purposes. •**navigation, communication and control buoy (NCCB):** a floating structure with control room, power and storage facilities, attached to the sea bed by a flexible pipeline and cables. **Unknown** **Multiple** **Not Applicable** **Other**
Category of pipeline	•**outfall pipe:** a pipe (generally a sewer or drainage pipe) discharging in to the sea or a river. •**intake pipe:** a pipe taking water from a river or other body of water, to drive a mill or supply a canal, waterworks, etc. *(IHO Dictionary, S-32, 5th Edition, 2468)* •**sewer:** a pipe in a sewage system for carrying water or sewage to a disposal area. •**bubbler system:** a submerged pipe from which warm water bubbles, preventing the surrounding water from freezing. •**supply pipe:** a pipe used for supplying of gas or liquid product. **Unknown** **Not Applicable** **Other**
Category of production area	•**stockpile:** a reserve stock of material, equipment or other supplies. •**power station area:** a stationary plant containing apparatus for large-scale conversion of some form of energy (hydraulic, steam, chemical, nuclear, etc.) into electrical energy. •**refinery area:** a system of process units used to convert crude petroleum into fuels, lubricants and other petroleum derived products. •**factory area:** a group of buildings where goods are manufactured. •**tank farm:** an area in which a number of large-capacity storage tanks are located, generally used

Attribute & definition	Values & definitions
	for crude oil or petroleum products. •**wind farm:** an area in which numerous wind motors are located. •**slag heap/spoil heap:** hill of refuse from a mine, industrial plant etc. on land *(adapted from Concise Oxford Dictionary).* **Unknown** **Not Applicable** **Other**
Category of recommended track	•**based on a system of fixed marks:** a straight route (known as a recommended track, range or leading line), which comprises at least two structures (usually beacons or daymarks) and/or natural features, which may carry lights and/or top-marks. The structures/features are positioned so that when observed to be in line, a vessel can follow a known bearing with safety. *(adapted from IALA Aids to Navigation Guide, 1990)* •**not based on a system of fixed marks:** a route (known as a recommended track or preferred route) which is not based on a series of structures or features in line. **Unknown** **Not Applicable**
Category of rescue station The type of equipment or service that may be found at the rescue station. (AML)	•**lifeboat lying at a mooring:** a place where a lifeboat is moored ready or use. *(S-57 Appendix A, Chapter 2 Attributes)* **Unknown** **Not Applicable** **Other**
Category of signal station, warning	•**tidal stream:** a signal or message conveying information on condition of tidal currents in the area in question. *(IHO Dictionary, S-32, 5th Edition, 4733)* •**tide gauge:** a device for measuring the height of tide. A graduated staff in a sheltered area where visual observations can be made; or it may consist of an elaborate recording instrument making a continuous graphic record of tide height against time. Such an instrument is usually actuated by a float in a pipe communicating with the sea through a small hole which filters out shorter waves. *(IHO Dictionary, S-32, 5th Edition, 1984)* **Unknown**

Attribute & definition	Values & definitions
	Multiple **Not Applicable** **Other**
Category of special purpose mark	•**firing danger mark:** a mark used to indicate a firing danger area, usually at sea. •**target mark:** any object toward which something is directed. The distinctive marking or instrumentation of a ground point to aid its identification on a photograph. *(Adapted from IHO Dictionary, S-32, 5th Edition, 5309)* •**marker ship:** a mark marking the position of a ship which is used as a target during some military exercise. *(BSH)* •**degaussing range mark:** a mark used to indicate a degaussing range. •**cable mark:** a mark used to indicate the position of submarine cables or the point at which they run on to the land. •**ODAS:** Ocean Data Acquisition System *(IHO Dictionary, S-32, 5th Edition, 5953)* •**LANBY:** a large buoy designed to take the place of a lightship where construction of an offshore light station is not feasible. *(IHO Dictionary, S-32, 5th Edition, 2656)* •**notice mark:** a notice board or sign indicating information to the mariner. •**TSS mark:** a mark indicating a traffic separation scheme. •**general warning mark:** a mark indicating that special caution must be exercised in the vicinity of the mark. •**restricted vertical clearance mark:** a mark indicating the minimum vertical space available for passage. •**maximum vessel's draught mark:** a mark indicating the maximum draught of vessel permitted. •**restricted horizontal clearance mark:** a mark indicating the minimum horizontal space available for passage. •**strong current warning mark:** a mark warning of strong currents. •**ferry crossing mark:** a mark indicating that a ferry route crosses the ship route; often used with a

Attribute & definition	Values & definitions
	'sound ship's siren' mark. •**pipeline mark:** a mark used to indicate the position of submarine pipelines or the point at which they run on to the land. •**control mark:** a mark indicating the location at which a restriction or requirement exists. •**diving mark:** a mark indicating that diving may take place in the vicinity. •**foul ground mark:** a mark indicating a foul ground. •**heliport mark:** a mark indicating an area where helicopters may land. **Unknown** **Multiple** **Not Applicable** **Other**
Category of tidal stream	•**flood stream:** the horizontal movement of water associated with the rising tide. Flood streams generally set towards the shore, or in the direction of the tide progression. Also called flood, flood current or ingoing stream. *(Adapted from IHO Dictionary, S-32, 5th Edition)* •**ebb stream:** the horizontal movement of water associated with the falling tide. Ebb streams generally set seaward, or in the opposite direction to the tide progression. Also called ebb, ebb current or outgoing stream. *(Adapted from IHO Dictionary, S-32, 5th Edition)* •**other tidal flow:** any other horizontal movement of water associated with tides, e.g. rotary flow **Unknown** **Not Applicable**
Category of Traffic Separation Scheme	•**IMO - adopted:** a defined Traffic Separation Scheme that has been adopted as an IMO routing measure. •**not IMO - adopted:** a defined Traffic Separation Scheme that has not been adopted as an IMO routing measure. **Unknown** **Not Applicable**
Caveat A component of a security classification used for authorising a specific group to have access rights	Text string

Attribute & definition	Values & definitions
(AML)	
Classification of ice	•**fast ice:** sea ice which remains fast, generally in the position where originally formed, and which may attain a considerable thickness. It is found along coasts, where it is attached to the shore, or over shoals, where it may be held in position by islands, grounded icebergs or grounded polar ice. *(IHO Dictionary, S-32, 5th Edition, 1772)* •**sea ice:** any form of ice which has originated from sea water. Generally any ice in the sea. *(IHO Dictionary, S-32, 5th Edition, 4566)* •**growler:** a low-lying mass of flow ice which is not easily seen by approaching vessels owing to its dark indigo colour. It is therefore a menace to shipping. It is usually caused by the capsizing and disintegration of an iceberg. •**pancake ice:** pieces of new ice, usually approximately circular, about 30 cm to 3 m across, and with raised rims, due to the pieces striking against each other as the result of wind and swell. *(IHO Dictionary, S-32, 5th Edition, 3643)* •**glacier:** a mass of snow and ice continuously moving from higher to lower ground or, if afloat, continuously spreading. *(IHO Dictionary, S-32, 5th Edition, 2041)* •**pack ice:** term used in a wide sense to include any area of sea ice, other than fast ice, no matter what form it takes or how it is disposed. *(IHO Dictionary, S-32, 5th Edition, 3639)* •**polar ice:** sea ice that is more than one year old (in contrast to winter ice). The WMO code defines polar ice as any sea ice more than one year old and more than 3 metres thick. *(IHO Dictionary, S-32, 5th Edition, 3928)* **Unknown** **Not Applicable** **Other**
Colour	**-White:** **-Black:** **-Red:** **-Green:** **-Blue:** **-Yellow:** **-Grey:**

Attribute & definition	Values & definitions
	-Brown: **-Amber:** **-Violet:** **-Orange:** **-Magenta:** **-Pink:** **- Unknown** **- Multiple** **- Not Applicable** **- Other**
Condition The state of the object where it is not considered to be normal i.e. completed, undamaged or working normally. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**under construction:** a structure that is in the process of being built. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**ruined:** a structure in a decayed or deteriorated condition resulting from neglect or disuse, or a damaged structure in need of repair. *(IHO Dictionary, S-32, 5th Edition, 4456.)* •**under reclamation:** an area of the sea that is being reclaimed as land, usually by the dumping of earth and other material. •**planned construction:** an area where a future construction is planned. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **-Operational:** Completed, undamaged and working normally *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Unknown** **Multiple** **Not Applicable** **Other**
Conspicuous, Radar Indicates if the object returns a radar echo. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**radar conspicuous:** an object which returns a strong radar echo. *(IHO Dictionary, S-32, 5th Edition, 4142.)* •**not radar conspicuous:** an object which does not return a particularly strong radar echo. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*
Conspicuous, Visually Indicates if the object is distinctly visible from seaward. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**visually conspicuous:** term applied to an object either natural or artificial which is distinctly and notably visible from seaward. *(IHO Dictionary, S-32, 5th Edition, 984)* •**not visually conspicuous:** an object which is visible from seaward, but is not conspicuous. *(S-57*

Attribute & definition	Values & definitions
	Annex A, Appendix A, Chapter 2 Attributes)
Controlling Authority The recognised authority responsible for establishing and maintaining the administrative affairs of all matters relating to a particular field or subject. *(AML)*	Text string.
Copyright Statement Indicates any copyright or releaseability restrictions on the data. *(AML)*	Text string
Current velocity The rate of travel of a non-gravitational current.	Value: 0 - 99.9 Units: knot Resolution: 0.1
Depth of water over feature Average depth of water over the feature relative to the specified vertical datum. *(AML)*	Value: min 0 Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)
Depth range – deepest value The value of the maximum depth within a defined area.	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1
Depth range – shoalest value The value of the minimum depth within a defined area.	Value: min 0 Units: metres; fathoms & feet; feet; fathoms & fractions; fathoms (units must be defined) Resolution: 0.1
Depth units Unit of measurement for depths *(AML)*	•**metres:** depths are specified in metres (SI units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**fathoms and feet:** depths are specified in fathoms (units of six feet of depth) and feet. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**feet:** depths are specified in feet (imperial units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**fathoms and fractions:** depths are specified in fathoms (units of six feet of depth) and fractions of fathoms. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**fathoms:** a unit of length equal to 6 feet or 1.83 metres. *(AML)*

	Unknown **Not Applicable** **Other**
Elevation The altitude of the ground level of an object, measured from a specified vertical datum.	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1
End Date Indicates the latest date on which an object will be present. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	CCYYMMDD 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Error Ellipse Also known as the Figure of Merit. 95% 2sigma value – semi-major and semi-minor axes of error ellipsoid plus orientation. *(AML)*	Encodes in triplets: The semi-major, semi-minor and orientation of the error ellipse. Orientation is expressed as the true bearing of the major axis.
Height Value of the vertical distance to the highest point of the object, measured from a specified vertical datum. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Value: 0 - 999.9 Units: metres or feet (units must be defined) Resolution: 0.1
Height / length units Unit of measurement for heights and lengths. *(AML)*	•**metres:** depths are specified in metres (SI units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**feet:** depths are specified in feet (imperial units of length). *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* •**international nautical mile:** a unit of length equal to 1,852 metres. This value was approved by the International Hydrographic Conference of 1929 and has been adopted by nearly all maritime states. *(AML)* **Unknown** **Not Applicable** **Other**
Image file link Indicates an external file containing a pictorial representation of the object *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	Text string
International Defence Organisation (IDO) status The International Defence Organisation (IDO) status (if applicable) that must precede, and be applied to, the Protective Marking thus making it an IDO	**-North Atlantic Treaty Organisation (NATO)** **-North Atlantic Co-operation Council (NACC)** **-Partnership for Peace (PfP)**

Marking *(AML)*	**-Western European Union(WEU)** **-Unknown** **-Multiple** **-Not Applicable** **-Other**
Jurisdiction The jurisdiction applicable to an administrative area.	•**international:** involving more than one country; covering more than one national area. •**national:** an area administered or controlled by a single nation. •**national sub-division:** an area smaller than the nation in which it lies. •**NATO:** an area administered or controlled by NATO. **Unknown** **Not Applicable** **Other**
Light characteristic	•**fixed:** a signal light that shows continuously, in any given direction, with constant luminous intensity and colour. *(IHO Dictionary, S-32, 5th Edition, 2780)* •**flashing:** a rhythmic light in which the total duration of light in a period is clearly shorter than the total duration of darkness and all the appearances of light are of equal duration. *(IHO Dictionary, S-32, 5th Edition, 2783)* •**long-flashing:** a flashing light in which a single flash of not less than two seconds duration is regularly repeated. *(IHO Dictionary, S-32, 5th Edition, 2796)* •**quick-flashing:** a light exhibiting without interruption very rapid regular alternations of light and darkness. *(IHO Dictionary, S-32, 5th Edition, 2803)* •**very quick flashing:** a flashing light in which flashes are repeated at a rate of not less than 80 flashes per minute but less than 160 flashes per minute. •**ultra quick flashing:** a flashing light in which flashes are repeated at a rate of not less than 160 flashes per minute. •**isophased:** a light with all durations of light and darkness equal. *(IHO Dictionary, S-32, 5th Edition, 2779)* •**occulting:** a rhythmic light in which the total duration of light in a period is clearly longer than

	the total duration of darkness and all the eclipses are of equal duration. *(IHO Dictionary, S-32, 5th Edition, 2801)* •**interrupted quick flashing:** a quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration. *(IHO Dictionary, S-32, 5th Edition, 2790)* •**interrupted very quick flashing:** a light in which the very rapid alterations of light and darkness are interrupted at regular intervals by eclipses of long duration. *(IHO Dictionary, S-32, 5th Edition, 2792)* •**interrupted ultra quick flashing:** a light in which the ultra quick flashes (160 or more per minute) are interrupted at regular intervals by eclipses of long duration. *(IHO Dictionary, S-32, 5th Edition, 2791)* •**Morse:** a rhythmic light in which appearances of light of two clearly different durations are grouped to represent a character or characters in the Morse code. *(IHO Dictionary, S-32, 5th Edition, 2798)* •**alternating:** a signal light that shows, in any given direction, two or more colours in a regularly repeated sequence with a regular periodicity. *(IHO Dictionary, S-32, 5th Edition, 2770)* **Unknown** **Not Applicable** **Other**
Limit of anchors and chains The radius of a circular area, originating at the object's position or centre, within which the existence of chains and / or anchors are considered to be a hazard. *(AML)*	Value: 0 - 999.9 Units: metres, feet or international nautical mile (units must be defined in dataset metadata) Resolution: 0.1
Marks – navigational – system of	•**IALA A:** navigational aids conform to the IALA A system. •**IALA B:** navigational aids conform to the IALA B system. •**no system:** navigational aids do not conform to any defined system. •**other system:** navigational aids conform to a defined system other than IALA. **Unknown** **Not Applicable**
Name The principal name or identifier of an object in	Text string.

English. *(AML)*	
Name (in national language characters) The principal name or identifier of an object in national language characters. *(AML)*	Text string.
Nationality Indicates the nationality of the specified object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	IHO code for producing agencies or comma separated list.
Nature of Construction The material(s) used to make the object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	**-Loose boulders:** Constructed from large stones or blocks of concrete, often placed loosely for protection against waves or water turbulence. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* -**Masonry:** Constructed from brick or stone. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **-Metal:** Constructed from metal. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **-Concreted:** Constructed of concrete, a material made of sand and gravel that is united by cement into a hardened mass used for foundations etc. *(Adapted from the Illustrated Contemporary Dictionary, Encyclopaedic Edition, 1978)* **-Glass Reinforced Plastic (GRP):** Constructed from a plastic material strengthened with fibres of glass. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **- Paint:** constructed by the application of paint to some other construction or natural feature. **- Wooden:** Constructed from wood. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* **- Unknown** **- Multiple** **- Not Applicable** **- Other**
Orientation The angular distance measured from true north to the major axis of the object. *(Digital Geographic Information Working Group – DGIWG, Oct.87)*	Value: 0.00- 359.99 Unit: degree Resolution: 0.01
Owner authority Denotes the 'owner' that is responsible for establishing and setting the protective marking level *(AML)*	The NATO country code *(NATO STANAG 1059)*

Producing country The country responsible for the production of the data *(AML)*	IHO code for producing agencies
Product Indicates the substance(s) which are transported, stored or exploited by the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**oil:** a thick, slippery liquid that will not dissolve in water, usually petroleum based in the context of storage tanks. •**gas:** a substance with particles that can move freely, usually a fuel substance in the context of storage tanks. •**coal:** a hard black mineral that is burned as fuel. •**ore:** a solid rock or mineral from which metal is obtained. •**chemicals:** any substance obtained by or used in a chemical process. •**bauxite:** a mineral from which aluminium is obtained. •**coke:** a solid substance obtained after gas and tar have been extracted from coal, used as a fuel. •**timber:** wood prepared for use in building or carpentry. •**sawdust / wood chip:** powdery fragments of wood made in sawing timber or coarse chips produced for use in manufacturing pressed board. •**liquefied natural gas (LNG):** a compressed gas consisting of flammable light hydrocarbons and derived from natural gas. •**liquefied petroleum gas (LPG):** a compressed gas consisting of flammable light hydrocarbons and derived from petroleum **Unknown** **Multiple** **Not Applicable** **Other**
Production agency The agency responsible for the production of the data *(AML)*	IHO code for producing agencies
Protective marking A marking indicating the minimum standards of protection required of the data *(AML)*	**COSMIC Top Secret** **FOCAL Top Secret** **Top Secret** **Secret** **Confidential**

	Restricted **Unclassified** **Unknown** **Not Applicable**
Quality of position An indication of the reliability of a quoted position Note: The value 'Approximate' when applied to the attribute 'Quality of position' is prohibited for use in AML. In circumstances where the term 'Position approximate' would normally be applied to an object in a standard navigational charting sense, the value 'estimated' should be used.	**Surveyed:** The position(s) were determined by the operation of making measurements for determining the relative position of points on, above or beneath the earth's surface. Survey implies a regular, controlled survey of any date. *(adapted from IHO Dictionary, S-32, 5195, & IHO Chart Specifications, M-4, 175.2)* **Unsurveyed:** Survey data does not exist or is very poor. *(Adapted from IHO Dictionary, S-32, 5732)* **Inadequately surveyed:** Position data is of a very poor quality. *(Adapted from IHO Dictionary, S-32, 5732)* **Position doubtful:** An object whose position has been reported but which is considered to be doubtful. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Unreliable:** An object's position obtained from questionable or unreliable data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Reported (not surveyed):** An object whose position has been reported and its position confirmed by some means other than a formal survey such as an independent report of the same object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Reported (not confirmed):** An object whose position has been reported and its position has not been confirmed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Estimated:** The most probable position of an object determined from incomplete data or data of questionable accuracy. *(Adapted from IHO Dictionary, S-32, 3960)* **Precisely known:** A position that is of a known value, such as the position of an anchor berth or other defined object. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Calculated:** A position that is computed from data. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Unknown** **Multiple**

	Not Applicable **Other**
Quality of sounding measurement Indicates the reliability of the value of the sounding *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	**Depth Known:** The depth from chart datum to the bottom is a known value. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Depth Unknown:** The depth from chart datum to the bottom is unknown. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Doubtful Sounding:** A depth that may be less than indicated. (*Adapted from IHO Dictionary, S-32, 5th Edition, 4840)* **Unreliable sounding:** A depth that is considered to be an unreliable value. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **No Bottom Found at Value Shown:** Upon investigation the bottom was not found at this depth. *(Adapted from IHO Dictionary, S-32, 5th Edition, 4848)* **Not regularly maintained:** Depths may be altered by human influence, but will not be routinely maintained. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Maintained Depth**: The depth at which a channel is kept by human influence, usually be dredging. *(IHO Dictionary, S-32, 5th Edition, 3057)* **Least Depth Known:** The shoalest depth over an object is of known value. *(Adapted from IHO Dictionary, S-32, 5th Edition, 2705)* **Least Depth Unknown, Safe Clearance at Depth Shown:** The least depth over an object is unknown, but there is considered to be safe clearance at this depth. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Value Reported (Not Surveyed):** Depth value obtained from a report, but not fully surveyed. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Value Reported (Not Confirmed):** Depth Value obtained from a report, which it has not been possible to confirm. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Not Applicable** **Other**
Reference to a publication Reference to a specific location of any relevant information within an external publication	Text string

(AML)	
Reference year for magnetic variation The reference year for magnetic variation values.	CCYY The date should be encoded using 4 digits for the calendar year (CCYY).
Relative Horizontal Accuracy The horizontal error estimate for the distance between two points, or the accuracy of one point with respect to another	Text string
Relative Vertical Accuracy The vertical error estimate for the distance between two points, or the accuracy of one point with respect to another	Text string
Restriction(s) Specific restrictions regarding entry and / or activities that may / may not be permitted. *(AML)*	•**anchoring prohibited:** an area within which anchoring is not permitted. •**anchoring restricted:** a specified area designated by appropriate authority, within which anchoring is restricted in accordance with certain specified conditions. •**fishing prohibited:** an area within which fishing is not permitted. •**fishing restricted:** a specified area designated by appropriate authority, within which fishing is restricted in accordance with certain specified conditions. •**trawling prohibited:** an area within which trawling is not permitted. •**trawling restricted:** a specified area designated by appropriate authority, within which trawling is restricted in accordance with certain specified conditions. •**diving prohibited:** an area within which diving is not permitted. •**diving restricted:** a specified area designated by appropriate authority, within which diving is restricted in accordance with certain specified conditions. •**area to be avoided:** an IMO designated area to be avoided, defined as a routeing measure. *(adapted from M-4, 435.7)* **Unknown** **Multiple** **Not Applicable** **Other**
Seasonal end date	CCYYMMDD

The end of the active period for a seasonal period. *(AML)*	The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Seasonal start date The start of the active period for a seasonal period. *(AML)*	CCYYMMDD The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Sounding Accuracy The best estimate of the accuracy of the sounding data. The error is assumed to be positive and negative. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	Value: 0 - 99.9 Units: metres, fathoms or feet (units must be defined) Resolution: 0.1
Sounding datum Indicates the datum to which soundings are referred. *(Adapted from S-57 Annex A, Appendix A, IHO Object Catalogue)*	**Approximate Lowest Astronomical Tide:** An arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Low Water Springs:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water (MLW). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Lower Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Lower Low Water (MLLW). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Sea Level:** An arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* **Equinoctial Spring Low Water:** The level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **High Water Springs:** An arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* **High Water:** The highest level reached at a place by the water surface in one tidal cycle. Also called high tide. *(IHO Dictionary, S-32, 5th Edition, 2251)* **Higher High Water Large Tide (HHWLT):** The average of the highest high waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix*

	A, IHO Object Catalogue) **Highest Astronomical Tide (HAT):** The highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(Adapted from Admiralty Tide Tables)* **Indian Spring Low Water (ISLW):** An arbitrary tidal datum approximating the level of the mean of the lower low water at spring tides. Also called Indian tidal plane. *(IHO Dictionary, S-32, 5th Edition, 2427)* **International Great Lakes Datum 1985 (IGLD 1985):** A vertical reference system with its zero based on the mean water level at Rimouski/Pointe-au-Père, Quebec, over the period 1970 to 1988. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Local Datum:** An arbitrary datum defined by a local harbour authority, from which levels and tidal heights are measured by this authority. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Low Water Springs:** An arbitrary level, approximating that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* **Low Water:** An approximation of mean low water adopted as the reference level for a limited area, irrespective of better determinations at a later date. Used mostly in harbour and river engineering. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Lower Low Water Large Tide (LLWLT):** The average of the lowest low waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Lowest Astronomical Tide (LAT):** The lowest tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(IHO Dictionary, S-32, 5th Edition, 2936)* **Lowest Low Water:** An arbitrary level conforming to the lowest tide observed at a place, or somewhat lower. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Lowest Low Water Springs:** An arbitrary level conforming to the lowest water level observed at a place at spring tides during a period of time shorter than 19 years. *(Hydrographic Service, Royal*

	Australian Navy) **Mean High Water (MHW):** The average height of all high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3141)* **Mean High Water Springs (MHWS):** The average height of the high waters of spring tides. Also called spring high water. *(IHO Dictionary, S-32, 5th Edition, 3144)* **Mean Higher High Water (MHHW):** The average height of higher high waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3140)* **Mean Low Water (MLW):** The average height of all low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3147)* **Mean Low Water Springs (MLWS):** The average height of the low waters of spring tides. Also called spring low water. *(IHO Dictionary, S-32, 5th Edition, 3150)* **Mean Lower Low Water (MLLW):** The average height of the lower low waters at a place over a 19-year period. *(IHO Dictionary, S-32, 5th Edition, 3145)* **Mean Lower Low Water Springs (MLLWS):** The average height of lower low water springs at a place. *(IHO Dictionary, S-32, 5th Edition, 3146)* **Mean Sea Level (MSL):** The average height of the surface of the sea at a tide station for all stages of the tide over a 19-year period, usually determined from hourly height readings measured from a fixed predetermined reference level. *(IHO Dictionary, S-32, 5th Edition, 3156)* **Mean Tide Level (MTL):** The level mid-way between one or more successive high and low waters. It may be computed by averaging the four tidal levels (MHWS, MHWN, MLWN and MLWS or MHHW, MLHW, MHLW and MLLW) for the place concerned. *(UKHO Tidal Branch)* **Mean Water Level:** The average of all hourly water levels over the available period of record. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Nearly Highest High Water:** An arbitrary level approximating the highest water level observed at a place, usually equivalent to the high water springs. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Nearly Lowest Low Water:** An arbitrary level

	approximating the lowest water level observed at a place, usually equivalent to the Indian Spring Low Water (ISLW). *(Hydrographic Service, Royal Australian Navy)* **Unknown** **Not Applicable** **Other**
Source agency The agency responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies
Source country The country responsible for the production of the source. *(AML)*	IHO Codes for Producing Agencies
Source date The date of issue of the source information, if applicable. *(AML)*	Indication: 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Source ID Any ID of the source (e.g. chart number). *(AML)*	Text string
Source scale The scale at which the source data has been compiled. *(AML)*	Unit: None Resolution: 1
Source type The type of the source (e.g. chart or report). (*AML)*	Text string
Start Date Indicates the earliest date on which an object will be present. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Indication:** CCYYMMDD The "start date" should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) (e.g. April = 04) and 2 digits for the day (DD).
Status Indicates the condition of the object in terms of permanency or usage. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	•**permanent:** intended to last or function indefinitely. *(The Concise Oxford Dictionary, 7th Edition)* •**occasional:** acting on special occasions; happening irregularly. *(The Concise Oxford Dictionary, 7th Edition)* •**recommended:** presented as worthy of confidence, acceptance, use, etc. *(The Macquarie Dictionary 1988)* •**not in use:** no longer used for the purpose intended; disused. •**periodic / intermittent:** recurring at intervals. *(The Concise Oxford Dictionary, 7th Edition)* •**reserved:** set apart for some specific use. *(adapted*

	from The Concise Oxford Dictionary, 7th Edition) •**temporary:** meant to last only for a time. *(The Concise Oxford Dictionary)* •**private:** not in public ownership or operation. •**mandatory:** compulsory; enforced. *(The Concise Oxford Dictionary, 7th Edition)* •**extinguished:** no longer illuminated. •**illuminated:** lit by floodlights, strip lights, etc. •**historic:** famous in history; of historic interest. *(The Concise Oxford Dictionary, 7th Edition.)* •**public:** belonging to, available to, used, or shared by the community as a whole and not restricted to private use. *(adapted from The New Shorter Oxford English Dictionary, 1993)* •**synchronized:** occur at a time, coincide in point of time, be contemporary or simultaneous. *(The New Shorter Oxford English Dictionary, 1993)* •**watched:** looked at or observed over a period of time especially so as to be aware of any movement or change. *(adapted from The New Shorter Oxford English Dictionary, 1993)* •**un-watched:** usually automatic in operation, without any permanently-stationed personnel to superintend it. *(adapted from IHO Dictionary, S-32, 5th Edition, 2814)* •**existence doubtful:** an object that has been reported but has not been definitely determined to exist. **Unknown** **Multiple** **Not Applicable** **Other**
Supporting textual information Supporting (free text) information relevant to the object that cannot be explicitly encoded in any other attribute	Text string
Supporting textual information (in national language characters Supporting (free text) information in national language characters relevant to the object that cannot be explicitly encoded in any other attribute	Text string
Text file reference The file name relating to an external text file	Text string
Text file reference (in national language	Text string

characters) The file name (in national language characters) relating to an external text file	
Textual description The actual words used to define a particular thing, for the capture of information related to the feature "User Defined" *(adapted from SOED)*	Text string
Tidal stream – panel values Identifies the reference station with reference water level and the direction of the flow and the springs rate from 6 hours before to 6 hours after high water (HW) or low water (LW) at the reference station at hourly intervals.	REFSTA,WL,ddd,v.v,ddd,v.v etc **REFSTA:** reference station (text string) **WL:** reference water level and encoded in comma separated pairs **ddd:** flow direction (degrees) **v.v:** velocity (knots)
Tidal stream, current – time series values Values for a direction and velocity time series.	ddd,v.vddd,v.v etc Encoded as comma separated values. **ddd:** direction (degrees) **v.v:** velocity (knots)
Tide – accuracy of water level The accuracy of the water level, comparative to the accuracy of standard port predictions.	•better than 0.1 m and 10 minutes •worse than 0.1 m and 10 minutes
Tide – high and low water levels Information on the times and heights of high and low waters for each day of the duration of the time series.	CCYYMMDDThhmm,xxx.x Dates / times and heights should be encoded in pairs, each value separated by a comma. The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh) and minutes (mm). Height value: 0 - 99.9 Height units: metres Resolution: 0.1
Tide – method of tidal prediction	•**simplified harmonic method of tidal prediction:** prediction of tidal heights by combining a simplified set of harmonic constituents into a single time/height curve. •**full harmonic method of tidal prediction:** prediction of tidal heights by combining a complete set of harmonic constituents into a single time/height curve. •**time and height difference non-harmonic method:** prediction of high and low water times and heights by modification of the high and low water times and heights of a known time/height

	curve. **Unknown** **Not Applicable** **Other**
Tide – time and height differences The time and tidal height or tidal stream rate difference comparative to a reference station.	REFSTA,hhmm,x.x,v.v, **REFSTA:** reference station (text string) **hhmm:** time difference (±) **x.x:** height difference ((-) metres) **v.v:** rate difference (-) knots)
Tide – time series values Indicates the values of a time series.	x.x,x.x,x.x,x.x etc **x.x** ± height (metres)
Tide – value of harmonic constituents Harmonic constituents are the harmonic elements in a mathematical expression for the tide producing force and in the corresponding formula for the tidal curve. Each constituent represents a periodic change or variation in the relative positions of the earth, moon and sun.	A table defined by comma separated values which define the following: number of columns, number of rows, column headings, row headings, cell values.
Tide, current – time interval of values Indicates the interval between the values in any time series i.e. tidal, current or other data.	mm.m,mm.m,mm.m etc **mm.m** time interval (minutes)
Time end Indicates the end of an active period.	CCYYMMDDThhmmss The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh), minutes (mm), and seconds(ss).
Time start Indicates the start of an active period.	CCYYMMDDThhmmss The date should be encoded using 4 digits for the calendar year (CCYY), 2 digits for the month (MM) and 2 digits for the day (DD), separated by a capital T from the hour (hh), minutes (mm), and seconds(ss).
Traffic flow An indication of the general traffic flow in relation to, or associated with, the feature. *(AML)*	•**inbound:** traffic flow in a general direction toward a port or similar destination. •**outbound:** traffic flow in a general direction away from a port or similar point of origin. •**one-way:** traffic flow in one general direction only. •**two-way:** traffic flow in two generally opposite directions. **Unknown** **Not Applicable**

	Other
Type of built-up area	•**urban area:** an area predominantly occupied by man-made structures used for residential, commercial, and industrial purposes. *(Nautical Chart Manual, US Department of Commerce, 1992)* •**settlement:** a small collection of dwellings in a remote area. •**town:** any considerable collection of dwellings and other buildings larger than a village, but not incorporated as a city. •**city:** a major town inhabited by a large permanent community with all essential services. **Unknown** **Not Applicable** **Other**
Type of cable	•**power line:** a cable used for the supply of electricity. •**telephone:** a cable used for the transmission of telephone signals. •**telegraph:** a cable used for the transmission of telegraph signals. •**data transmission:** a cable used for the transmission of data. •**fibre optic:** a cable comprised of multiple bundles of extremely thin flexible glass, transmitting light by total internal reflection. *(Adapted from Chambers Concise Dictionary)* **Unknown** **Multiple** **Not Applicable** **Other**
Value of annual change in magnetic variation The annual change in magnetic variation values.	sxx.x s: negative sign for west (-) Value: 0.1 - 99.9 Units: minute Resolution: 0.1
Value of local magnetic anomaly The value of the deviation from the normal magnetic variation.	xx.x Value: 0.1 - 99.9 Units: minute Resolution: 0.1
Value of magnetic variation The magnetic variation value.	sxx.xx s: negative sign for west (-)

	Value: 0.1 - 99.99 Units: degree Resolution: 0.01
Value of nominal range The nominal range at which an object can be seen or a signal detected.	xx.x Value: 0.1 - 99.9 Units: nautical mile Resolution: 0.1
Vertical Datum Indicates the datum to which both heights and soundings are referred. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	**Approximate Lowest Astronomical Tide:** An arbitrary level, usually within ± 0.3m from that of Lowest Astronomical Tide (LAT). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Low Water Springs:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water Springs (MLWS). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Low Water (MLW). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Lower Low Water:** An arbitrary level, usually within ± 0.3m from that of Mean Lower Low Water (MLLW). *(Hydrographic Service, Royal Australian Navy)* **Approximate Mean Sea Level:** An arbitrary level, usually within ± 0.3m from that of Mean Sea Level (MSL). *(Hydrographic Service, Royal Australian Navy)* **Equinoctial Spring Low Water:** The level of low water springs near the time of an equinox. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **High Water Springs:** An arbitrary level, approximating that of Mean High Water Springs (MHWS). *(Hydrographic Service, Royal Australian Navy)* **High Water:** The highest level reached at a place by the water surface in one tidal cycle. Also called high tide. *(IHO Dictionary, S-32, 5th Edition, 2251)* **Higher High Water Large Tide (HHWLT):** The average of the highest high waters, one from each of 19 years of observations. *(S-57 Annex A, Appendix A, IHO Object Catalogue)* **Highest Astronomical Tide (HAT):** The highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. *(Adapted*

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	Not Applicable **Other**
Vertical Length The effective vertical length of an object, measured from the highest (lowest) point of the object to either the seabed or ground (if fixed), or the water level (if floating) *(S-57 Annex A, Appendix A, IHO Object Catalogue)*	Units: metres or feet (units must be defined) Resolution: 0.1 (metres or feet)
Water Level Effect Indicates the effect of the surrounding water on the object. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)*	• **partly submerged at high water:** partially covered and partially dry at high water. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* Note: not allowable for objects Impact Scour; Sensor Anomaly: Underwater/awash Rock. • **always dry:** not covered at high water under normal meteorological conditions. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **always under water / submerged:** remains covered by water at all times under average meteorological conditions. *(S-57 Annex A, Appendix A, Chapter 2 Attributes)* • **covers and uncovers:** expression intended to indicate an area of a reef or other projection from the bottom of a body of water which periodically extends above and is submerged below the surface. Also referred to as dries or uncovers. *(IHO Dictionary, S-32, 5th Edition, 1111)* • **awash:** flush with, or washed by the waves at low water under average meteorological conditions. *(Adapted from IHO Dictionary, S-32, 5th Edition, 308)* •**subject to inundation or flooding:** an area periodically covered by flood water, excluding tidal waters. *(Digest 1.2)* **Unknown** **Not Applicable** **Other**

5.5.3 Relationships Between Features

5.5.3.1 Feature Dependency

No parent child relationships exist in MFF AML

5.5.3.2 Feature Association

The following table lists the features in AML MFF that have an association (i.e. not dependent but linked to provide additional information) with other features.

Feature 1	Feature 2
Tide - time series or Tide - harmonic prediction	Tide - non-harmonic prediction
Tidal stream - time series or Tidal stream - harmonic prediction	Tidal stream - non-harmonic prediction

6 DATA CAPTURE GUIDELINES

6.1 CONTINUITY

Features crossing the boundaries of digital source files or other media should be continuous whenever possible. Datasets consisting of multiple digital source files should also aim to be contiguous for consistency of display.

6.2 GUIDANCE ON FEATURE CODING

The 'AML MFF Guidance on Feature Coding and Attribution' section of the carrier format annex provides guidance on the conventions that are to be used to encode features, their geometry, and associated attribution, using a relevant implementation standard.

The content of the AML MFF product is at the discretion of the producing authority, provided that the conventions described in the 'AML MFF Guidance on Feature Coding and Attribution' section of the carrier format annex are followed.

7 DATA PRESENTATION

7.1 SCOPE

The way in which AML MFF is displayed is dependent upon an individual customer's requirement. How their systems are developed to display AML MFF data will largely be governed by the:

- environment in which the data is to be viewed
- types of products that are to be displayed with the AML product

This Product Specification is designed to support the production and supply of MFF. It does not address data presentation.

8 PROVISION OF DATA

8.1 GENERAL

8.1.1 File Format (Encapsulation)

The file format or encapsulation is exchange standard specific.

8.1.2 Auxiliary Information

All media containing AML products will contain cataloguing information regarding the coverage of the products contained within it. A complete AML catalogue is planned for future development.

8.2 DISTRIBUTION MEDIA

AML is available in the following format(s):

- **CD-ROM**
- **DVD**

Other approved means of distribution will be promulgated in due course. While data must be available to users on standard media, other media/transmission means may be agreed directly between producers and recipients.

8.3 VOLUME NAMING

AML volumes (defined as packages) may contain several datasets, each from a different product specification. The volume naming convention for AML 'Packages' is not defined by AML Product Specifications.

8.4 FILE NAMING

CD-ROM AML file naming conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange. See appropriate implementation annex.

8.5 DIRECTORY STRUCTURE

CD-ROM The directory structure conforms to ISO 9660, International Standards Organisation, Information Processing - Volume and File Structure of CD-ROM for Information Interchange. See appropriate implementation annex.

8.6 ERROR DETECTION

Datasets will undergo file integrity checks that are dependent upon the exchange standard implemented.

8.7 COMPRESSION

AML products do not use compression techniques.

8.8 ENCRYPTION

All AML products are unencrypted, irrespective of security classification.

8.9 HARDWARE AND SOFTWARE REQUIREMENTS

N/A.

9 TESTING METHOD

This product specification has been designed to achieve interoperability of AML data products and other digital data products. This is achieved by the separation of the data dictionary from the standard used to encode the data and by the use of internationally recognised standards for the transfer of the data.

It is the responsibility of the data producer to ensure that AML data products fully conform to this Product Specification and to the chosen transfer standard.