S-65

Annex C

S-101 to S-57 ENC Conversion Guidance

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CONTENTS

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Summary of Substantive Changes in Edition 2.0.0

Bold references in the Clauses Effected column indicate the principle sections/clauses that are impacted by the described change.

Change Summary	Clauses Affected

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1 Overview

1.1 Preface

The following clauses specify the conventions that are recommended for preparing and finalising S-101 Edition 2.0.0 ENC datasets for conversion to S-57 ENC compliant data. This document is laid out, as far as possible, along the lines of the IHO publication S-101: *ENC Product Specification*, Annex A – *Data Classification and Encoding Guide*.

This document describes how to use S-101 ENC data for the automation of conversion to S-57 data; and possible post-conversion manual intervention that may be required for fully optimised and compliant S-57 ENC datasets. It is important to note that the S-57 Object Catalogue is not a "clone" or "duplication" of the S-101 Feature Catalogue (S-101 Annex C) and the S-101 ENC Product Specification. New functionality introduced in S-100 and improvements from the S-57 data model that have been implemented in S-101 as a result of lessons learned from S-57 ENC operational use mean that there is not a direct "one to one" equivalence between S-101 encoding and the corresponding S-57 encoding in some cases. Also, automated conversion processes differ in their capabilities and operations and the model for co-production of both S-101 and S-57 data from a common database may vary between individual Data Producers. This may result in an inability for full automated conversion of an operational S-101 ENC dataset to a fully operational and compliant S-57 dataset, thus requiring the Data Producer to apply further manual changes to the converted dataset.

It is important to note the following:

- **Unlike conversion from S-57 to S-101 (see S-65 Annex B – *S-57 ENC to S-101 Conversion Guidance*), there is no pre-preparatory additional manipulation of S-101 data required in order to optimise the data for the automated conversion process.**
- **If, however, a Data Producer requires some additional manipulation of their S-101 data to be applied in order to optimise their automated conversion to S-57 they must, where possible, ensure that every effort is made such that the performance of officially published S-101 ENCs in ECDIS is not compromised.**
- **It is strongly recommended that, where possible, these changes are made at the database or product source dataset level only, and not included in the officially published S-101 ENC dataset for use in ECDIS.**

Because of the differences between the S-101 and S-57 data models, there are instances where an S-101 Feature class, attribute or enumerate value will not be converted to S-57 during the automated conversion process due to an equivalent concept not being included in S-57. These instances are identified individually throughout this document in the relevant S-101 Feature class and Attribute-specific clauses, along with any recommendations for post-conversion encoding. Data Producers should also note that conversion tools may be customised so as to adapt to their specific data encoding policies and practices (for example variations in national spelling conventions and conventions for the encoding of specific text strings in the attribute **text**/INFORM). Where such customisation has been implemented, Data Producers should take this into account when implementing the guidance included in this document.

Appendix A includes two Tables intended as quick references to assist in preparing and managing data during the S-57 to S-101 data conversion process:

- Table A-1 is a summary Table of the possible post-conversion work that may be required. This Table provides a quick reference for Data Producers to indicate, by S-101 Feature class, where post-conversion manual Data Producer intervention may be required in accordance with the guidance included in the body of this document.
- Table A.2 highlights the differences between S-101 and S-57 in allowable enumeration lists for enumeration type attributes as applicable for the binding Feature/Object. The "allowable enumerate list" for S-57 enumeration type attributes is based on IHO Publication S-58 – *ENC Validation Checks*, Check 2000. This Table also indicates new enumerate values that have been included in S-101; and also includes S-101 Boolean type attributes that convert to a S-57 enumeration type attribute.

1.2 S-65 Annex C; S-101 to S-57 ENC Conversion Guidance

Note: This information uniquely identifies this Annex IHO Publication S-65 and provides information about its creation and maintenance.

Title: The International Hydrographic Organization Electronic Navigational Charts (ENCs) "Production, Maintenance and Distribution Guidance", Annex C – S-101 to S-57 ENC Conversion Guidance

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Maintenance: Changes to S-65 Annex C; S-101 to S-57 ENC Conversion Guidance are coordinated by the ENC Maintenance Working Group (ENCWG), a Working Group under the IHO Hydrographic Services and Standards Committee (HSSC), and must be made available via the IHO web site.

1.3 Terms, definitions and abbreviations

1.3.1 Terms and definitions

Not applicable.

1.3.2 Abbreviations

Not applicable.

1.4 Use of language

Within this document:

"Must" indicates a mandatory requirement;

"Should" indicates an optional requirement, that is the recommended process to be followed, but is not mandatory;

"May" means "allowed to" or "could possibly", and is not mandatory.

1.5 Maintenance

Changes to the S-101 to S-57 ENC Conversion Guidance document must occur in accordance with the S-101 ENC Product Specification clause 1.6.

2 General

2.1 Feature types

Guidance specific to the conversion of all S-101 Feature types from S-101 to S-57 are included in clauses 3-23.

S-101 includes the Cartographic feature type **Text Placement**. In S-57 the use of cartographic Objects is prohibited, therefore all instances of encoding of **Text Placement** will be removed automatically from the resultant S-57 ENC dataset during the automated conversion process. See also clause 23.1.

2.1.1 Multiple features

In S-101, the indication of the existence of multiple real-world features represented by a single encoded feature instance is done using the complex attribute **multiplicity of features**. However this complex attribute has not been bound to all S-101 Geo Features.

There is no corresponding attribute in S-57, therefore during the S-101 to S-57 conversion process, all instances of the encoding of the complex attribute **multiplicity of features** will convert to the S-57 attribute INFORM (see clause 2.4.6). Where the sub-attribute **multiplicity known** is set to *True*, the number of features populated in the sub-attribute **number of features** will be converted to INFORM, for example *3 features*. Where the sub-attribute **multiplicity known** is set to *False*, the text string populated in INFORM will be in a standardized format, such as *Multiple features*.

See clauses 27.131 and 27.139.

2.2 Information types

See Section 24.

2.3 Geometric primitives

The differences between the allowable geometric primitives by S-101 Feature class and the corresponding S-57 Object class are shown in Table 2-1 below. In general, these differences reflect the experience gained through S-57 ENC implementation and as such, where a geometric primitive is allowable in S-57 but is prohibited in S-101, this indicates that the geometric primitive is not considered to be required for that Feature class in ENC and no resultant action is required during the automated conversion process. Where a geometric primitive is allowable in S-101 but is prohibited for the corresponding Object class in S-57, Data Producers should refer to the referenced clause in this document for further information on the conversion process.

Table 2-1 only lists those S-101 Features for which the corresponding S-57 Object has different allowable geometric primitives. Combinations not appearing in this Table will convert directly from S-101 to a S-57 Object class / geometric primitive instance in all cases.

S-101 Feature Class	S-57 Object Class	Geometric Primitive Difference
Administration Area	**ADMARE**	Line primitive not allowed in S-57. See clause 16.9.
Land Region	**LNDRGN**	Line primitive not allowed in S-57. See clause 5.11.
Bridge	**BRIDGE**	Point primitive not allowed in S-101 (encoded, where required, as **Landmark** feature). See clause 7.2
Coast Guard Station	**CGUSTA**	Area primitive not allowed in S-57. See clause 22.3.
Collision Regulations Limit	**CTNARE**	Curve primitive only allowed for S-101; Area primitive only allowed for S-57. See clause 16.27.
Contiguous Zone	**CONZNE**	Line primitive not allowed in S-57. See clause 16.13.
Dam	**DAMCON**	Point primitive not allowed in S-101 (encoded, where required, as **Landmark** feature). See clause 7.2
Exclusive Economic Zone	**EXEZNE**	Line primitive not allowed in S-57. See clause 16.16.
Foul Ground	**OBSTRN**	Curve primitive not allowed in S-101.
Gridiron	**GRIDRN**	Point primitive not allowed in S-101.
Pile	**PILPNT**	Line and area primitives not allowed in S-57. See clause 8.4.
Pipeline Submarine/On Land	**PIPSOL**	Point primitive not allowed in S-101.
Range System	**C_AGGR**	Line and area primitives not allowed in S-57. See clause 15.6.
Rescue Station	**RSCSTA**	Area primitive not allowed in S-57. See clause 22.6.
Road	**ROADWY**	Point primitive not allowed in S-101.

Runway	**RUNWAY**	Point primitive not allowed in S-101 (encoded, where required, as **Helipad** feature). See clause 6.5
Signal Station Traffic	**SISTAT**	Area primitive not allowed in S-57. See clause 22.5.
Signal Station Warning	**SISTAW**	Area primitive not allowed in S-57. See clause 22.4.
Territorial Sea Area	**TESARE**	Line primitive not allowed in S-57. See clause 16.24.

Table 2-1 – S-101/S-57 Geometric Primitives - Differences

2.3.1 Capture density guideline

Not applicable.

2.4 Attributes

See Sections 27-30.

2.4.1 Multiplicity

The concept of attribute multiplicity does not exist in S-57; that is, the binding of attributes to features is such that only a single instance of an attribute can be populated for a single feature instance. Additionally, in some cases an attribute that is mandatory for a Feature class in S-101 may not be mandatory for the corresponding Object class in S-57, and vice-versa.

General conventions for automated data conversion related to S-101 multiplicity are as follows:

- Where a S-101 attribute is optional and the corresponding S-57 attribute is mandatory and the S-101 attribute is not populated (or is populated with an enumerate value that will not be converted), the corresponding S-57 attribute will be populated with an empty (null) value.
- Where an enumeration type attribute has an upper limit of multiplicity greater than 1 and the corresponding S-57 attribute is of type “List”, multiple encoded S-101 values will be listed as ordered for the S-101 Feature instance and separated by commas.
- Where an enumeration type attribute has an upper limit of multiplicity greater than 1 and the corresponding S-57 attribute is of type “Enumerated”, only the first value in the order populated for the corresponding S-101 attribute will be converted. Data Producers will be required to check their converted S-57 dataset to confirm that the required value has been populated.
- Where the conversion results in multiple discrete text strings being populated for the S-57 attributes INFORM or NINFOM, these text strings will be separated by a standard separator, such as a semicolon “;”.

More detailed conversion guidance related to attribute multiplicity is included, where required, in Sections 3-30.

2.4.2 Simple attribute types

Specific conversion guidance regarding simple attribute types can be found in clauses 3-24 and 27-28. In general, conversion of S-101 attribute types is as follows:

- Enumeration: In most cases a one to one conversion is achieved. Exceptions include enumerate values in S-101 that do not exist in S-57 and therefore convert to the S-57 attribute INFORM or not at all; and enumeration type attributes that are included in S-101 but have no corresponding attribute in S-57 that convert to other S-57 attributes or not at all. See Sections 27 and 28, and Annex A Table A-2.
- Boolean: Boolean type does not exist in S-57. However, in all cases Boolean type attributes will convert to a corresponding feature/attribute type combination. See Section 27 and Annex A Table A-2.
- Real: Will generally convert one to one. See Sections 27 and 28.
- Integer: Will generally convert one to one. See Sections 27 and 28.
- Free text: Will generally convert one to one. See Sections 27 and 28.
- Truncated Date: Will generally convert one to one. However, where the mandatory S-101

requirement to include the dashes (-) to indicate that the day and/or month are not needed have been encoded, these will be removed during the automated conversion process. See Sections 27 and 28.

- Time: All time type attributes included in S-101 have no corresponding S-57 attribute, therefore will not be converted.
- URI: All URI type attributes included in S-101 have no corresponding S-57 attribute, therefore will not be converted.
- URN: All URN type attributes included in S-101 have no corresponding S-57 attribute, therefore will not be converted.

2.4.3 Mandatory and conditional attributes

In most cases attributes that are mandatory in S-101 (multiplicity having lower bound >= 1) are also mandatory in S-57. Where a S-101 attribute is optional and the corresponding S-57 attribute is mandatory and the S-101 attribute is not populated (or is populated with an enumerate value that will not be converted), the corresponding S-57 attribute will be populated with an empty (null) value.

In all cases, where a S-57 mandatory attribute must be populated with a value for a Feature type because a feature instance requires a value for portrayal purposes, makes no logical sense without a populated value, or is required for safe navigation (that is, the attribute should not be populated with an empty (null) value), the corresponding S-101 attribute(s) has the same requirement.

More detailed conversion guidance related to mandatory attributes is included, where required, in Sections 3-30.

2.4.4 Missing attribute values

Not applicable.

2.4.5 Portrayal feature attributes

Not applicable.

2.4.5.1 ECDIS “system” (portrayal) attributes

See Section 30.

2.4.6 Textual information

The S-101 data model has been refined such that much of the guidance for the inclusion of information in ENC using the S-57 attributes INFORM and NINFOM as a “work-around” has been implemented through the introduction of new Features, attributes and enumerate values. In order for this information to be retained when converting S-101 datasets to S-57, it will be required to revert back to instances of INFORM and/or NINFOM. Guidance on this conversion for individual encoding scenarios is included in the Features and Attributes Sections of this document.

In addition, where the S-101 sub-attribute **text** has been populated for an instance of any of the complex attributes **information**, **sector information** or **shape information** this will also require conversion to INFORM and/or NINFOM, noting also that these complex attributes in most cases carry multiplicity where bound to S-101 Features of [0..*] (see clause 27.177). The complex attribute **information** may also be populated for an associated instance of the Information type **Nautical Information** (see clause 24.4). This means that it will not be uncommon for several S-101 encoding combinations within a single feature instance to require conversion to INFORM and/or NINFOM.

Where several S-101 encoding combinations are required to be converted to INFORM or NINFOM for a single converted S-57 feature instance, each text string will be separated by a standard separator such as a semicolon “;” during the automated conversion process. Data Producers will be required to examine their converted datasets to ensure that the required text strings have been encoded and amend as required, noting the recommendation that the number of characters in INFORM and NINFOM should not exceed 300.

Data Producers should also note that many enhancements have been introduced in S-101 that are not required in S-57 for datasets to be “fully compliant” with S-57 encoding guidance as included in the S-57 UOC. As such, the conversion of these enhancements to S-57 as instances of INFORM/NINFOM may be considered to be optional. Where this is the case, this is indicated in Sections 27 and 28 by the conversion guidance having a grey background. Data Producers will be required to determine whether they wish to include this information in their converted S-57 datasets, and configure their data converter accordingly. Considerations may include (but are not limited to):

- The attribute value to be converted to INFORM may be a mandatory attribute (the attribute will therefore be populated as empty (null)). The inclusion of this value in INFORM may therefore be considered to be necessary;
- The 300 character limit for the INFORM and NINFOM attributes; and
- Excessive screen clutter (display of “information” symbols) in certain S-57 ECDIS display settings. Data Producers should evaluate the impact for the Mariner of conversion to INFORM in excess to the requirements of the S-57 UOC and consider options to mitigate this impact.

Remarks:

- For Guidance on conversion of names of features, see clause 2.5.8.

2.4.7 Spatial attribute types

See clause 24.5.

2.4.8 Dates

The S-101 complex attributes **fixed date range**, **periodic date range** and **survey date range**; and the attributes **dredged date**, **reported date** and **swept date** are encoded in S-57 using the S-57 attributes DATEND, DATSTA, PEREND, PERSTA, SORDAT, SUREND and SURSTA. Unless otherwise stated against an individual Feature type within this document, all encoded dates will be converted to the appropriate S-57 attribute automatically on conversion. This includes the S-57 requirement to remove the dashes (-) to indicate that the day and/or month are not needed, which are not required in S-57 ENCs.

Data Producers should consider interrogating their S-101 data holdings and deleting any objects where the date indicated by the complex attribute **fixed date range**, sub-attribute **date end** means that the object is time expired (that is, the date in **date end** is earlier than the date of conversion).

2.4.8.1 Seasonal features

Unless otherwise stated against an individual Feature type within this document, all instances of encoding of attribute **status** = *5* (periodic/intermittent) will be converted to the S-57 attribute STATUS on conversion. See also Appendix A, Table A-2.

Unless otherwise stated against an individual Feature type within this document, all instances of encoding of the S-101 complex attribute **periodic data range** will be converted to the S-57 attributes PEREND and PERSTA on conversion.

The encoding guidance for taking into account leap years (“last day in February”) for **periodic data range** is the same in S-57.

2.4.9 Times

All time type attributes included in S-101 have no corresponding S-57 attribute, therefore will not be converted.

2.4.9.1 Schedules

See clause 24.3.

2.4.10 Colours and colour patterns

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **colour** will be converted to the S-57 attribute **colour** during the automated conversion process.

All instances of encoding of the S-101 attribute **colour pattern** will be converted to an instance of the S-57 attribute COLPAT during the automated conversion process.

2.4.11 Radar conspicuous features (see S-4 – B-485.2)

In S-101 the attribute **radar conspicuous** is a Boolean type attribute (see S-101 DCEG clause 27.146) while the S-57 attribute CONRAD is an enumeration type attribute having the value *3* (radar conspicuous (has radar reflector)) in addition to values *1* (radar conspicuous) and *2* (not radar conspicuous. During the automated conversion process, all encoded instances of **radar conspicuous** will be converted to CONRAD as follows:

radar conspicuous = *True* -> CONRAD = *1*

radar conspicuous = *False* -> CONRAD = *2*

If if it is known that a converted S-57 feature of geometric primitive point or area is radar conspicuous because it is fitted with a radar reflector, Data Producers may manually amend CONRAD to value *3*.

2.4.12 Attributes referencing external files

2.4.12.1 Reference to textual ENC support files

Information contained in the S-101 complex attribute **information**, sub-attribute **file reference** on the feature instance or on an associated instance of the information type **Nautical Information** will be converted to the S-57 attributes TXTDSC and NTXTDS on individual Object instances during the automated conversion process. The attribute that an instance of **file reference** converts to is based on the population of the sub-attribute **language** as follows:

language = *eng* or empty (null) -> TXTDSC

language ≠ *eng* -> NTXTDS *

* Where multiple instances of **information** having **language** ≠ *eng* have been encoded, the converter may be configured to select the instance to be converted to NTXTDS based on the value encoded for **language**; otherwise the first instance encountered by the conversion software will be used.

The following issues must be noted:

- The file naming convention for support files in S-57 is different from the convention used in S-101. Data Producers will be required to revisit automatically converted instances of TXTDSC and NTXTDS during the conversion process and apply the S-57 convention for both the attribute value and the name of the referenced file itself (see S-57 Appendix B-1 – *ENC Product Specification*, clause 5.6.4).

2.4.12.2 Reference to pictorial ENC support files

Information contained in the S-101 attribute **pictorial reference** on the feature instance or on an associated instance of the Information type **Nautical Information** will be converted to the S-57 attribute PIICREP on individual Object instances during the automated conversion process.

However, the following issues must be noted:

- The file naming convention for support files in S-57 is different from the convention used in S-101. Data Producers will be required to revisit automatically converted instances of PICREP during the conversion process and apply the S-57 convention for both the attribute value and the name of the referenced file itself (see S-57 Appendix B-1 – *ENC Product Specification*, clause 5.6.4); and
- The binding of the complex attribute **information** to Feature and Information types in S-101 carries a multiplicity of [0..*] or [1..*], meaning that multiple picture files may be referenced to a single feature instance. Where two or more picture files have been referenced, the first instance will be converted to PICREP.

2.5 Datasets

2.5.1 ENC data coverage

For conversion guidance regarding the conversion of the S-101 Meta Feature type **Data Coverage** to instances of the S-57 Meta Object class **M_COVR** and, where required, the Meta Object class **M_CSCL**, see clause 3.5.

2.5.1.1 Skin of the Earth

The S-57 Objects comprising the Skin of the Earth (Group 1) include **FLODOC**, **HULKES** and **PONTON** of geometric primitive area.. The corresponding S-101 Feature types (**Floating Dock**, **Hulk** and **Pontoon**) are not included in the list of Feature types that comprise the Skin of the Earth in S-101, which means that the S-101 Skin of the Earth features need to be effectively “cookie cut” to accommodate converted **FLODOC**, **HULKES** and **PONTON** of geometric primitive area in the S-57 Skin of the Earth coverage. See clauses 8.3, 8.18 and 8.19.

2.5.2 Discovery metadata

Not applicable.

2.5.3 Minimal depiction areas

2.5.3.1 Wide blank areas

For conversion of areas of a dataset which contain no data, see clause 3.5.

The requirement to avoid leaving “holes” in data coverage for an ENC dataset on the assumption that the end user also has the larger scale ENC(s) available is the same in S-57.

2.5.3.2 Simplified or minimum depiction areas

The S-57 encoding guidance for the encoding of simplified or minimal depiction areas in ENCs is the same as for S-101 (see also clause 16.11).

2.5.4 Units

Not applicable.

2.5.5 Seamless ENC coverage

The rules regarding ENC coverage (gaps in data coverage) are the same in S-57.

The rules regarding ENC data overlaps in S-57 are described in terms of Navigational Purpose rather than the optimum display scale for the data and the S-101 attribute **drawing index** (see clause 3.5), and are out of scope for this document. See S-57 UOC clause 2.1.8.

2.5.6 Feature Object Identifiers

The value for Feature Object Identifiers (FOIDs) may be retained for S-101 Feature instances during conversion to S-57 Object instances where a one-to-one Feature/Object relationship exists, if it is considered that this may aid in data management. The encoding guidance for assigning FOIDs to representations of real-world features (that is, each feature must have a unique FOID, however multiple parts of an individual real-world feature within the cell may have the same FOID) is the same in S-57.

2.5.7 Heights and elevations

All instances of encoding of the attribute **elevation** will be converted automatically to an instance of the S-57 attribute ELEVAT during the automated conversion process.

Unless otherwise stated against an individual Feature class within this document, all instances of encoding of the attributes **height** and **vertical length** will be converted automatically to an instance of the S-57 attributes HEIGHT and VERLEN, respectively, during the automated conversion process.

2.5.8 Geographic names

Instances of the S-101 complex attribute **feature name** may be converted to an instance of the S-57 attributes OBJNAM and/or NOBJNM during the automated conversion process. The attribute that an instance of **feature name** converts to is based on the population of the sub-attribute **name usage** as follows:

name usage = *1* (default name) -> OBJNAM

name usage = *2* (alternate name) -> NOBJNM *

name usage = empty (null) -> Will not be converted

* Where multiple instances of **feature name** having **name usage** = *2* (alternate name) have been encoded, the converter may be configured to select the instance to be converted to NOBJNM based on the value encoded for the sub-attribute **language**; otherwise the first instance encountered by the conversion software will be used.

See clause 27.132 and S-57 UOC clause 14.

The following additional requirements for S-57 attribution must be noted:

- The S-101 Feature type **Island Group** is used to provide a dedicated method for the encoding of named groups of islands and archipelagos (see S-101 DCEG clause 5.5). This information may be encoded in S-57 using an instance of the S-57 Object class **LNDRGN** covering or centred in the group of islands. For guidance on ENC conversion from **Island Group** to **LNDRGN**, see clause 5.5.
- Where the complex attribute **feature name** has been populated for the S-101 Feature type **Pilotage District**, the S-57 attributes OBJNAM and/or NOBJNM will be populated as appropriate. In addition, where the **Pilotage District** is associated to one or more instances of the S-101 Feature **Pilot Boarding Place** using the feature association **Pilotage District Association**, the S-57 attributes PILDST and/or NPLDST will also be populated as appropriate for the corresponding converted **PILBOP** Objects (see clauses 16.26 and 22.1).

2.5.8.1 Text placement

Instances of the S-101 Cartographic Feature type **Text Placement** and its relevant binding attributes will not be converted. This Cartographic Feature type is an enhancement included in S-101 – there is no corresponding S-57 encoding for this Cartographic Feature type.

2.5.9 Sample scale minimum policy

The S-57 sample SCAMIN policy is consistent with that for the S-101 attribute **scale minimum**. There is no requirement to amend **scale minimum** in this regard.

2.5.10 Masking

The guidance for masking the same in S-57. See S-57 UOC clause 17.

2.6 Description of clause format for S-101 meta, geo and information features

The following conventions are used fro presentation:

- Presentation conventions:
  - S-101 Feature type: **Wreck**
  - S-57 Object class: **WRECKS**
  - Geometric primitive: (P,S); (P,A)*
  - S-101 Attribute: **exposition of sounding**
  - S-57 Attribute: EXPSOU
  - Attribute value: *-2.4*

* For geometric primitives: P = point; [C = S-100 curve; L = line]; [S = S-100 surface; A = area]; N = none.

Content Conventions:

1. Guidance is included in this document on the restriction of allowable values for enumerate type attributes by Feature type that has been introduced in S-101. This guidance is only included where the list of allowable values in S-101 differs from the list of recommended allowable values by S-57 Object class as included in S-58 – *ENC Validation Checks*, Check 2000. **Data producers are to note that the failure of any encoded S-57 Object against S-58 Check 2000 will result in the instance of the attribute responsible for the Check failure not converting across to the corresponding S-101 attribute instance**. Further information can be found in Appendix A, Table A.2.
2. Where the term “Not applicable” has been used in any clause within this document, this means that there is no impact of this information as presented in S-101 Annex A on the S-101 to S-57 conversion process. This is generally because the clause relates to encoding which is prohibited for S-57 ENC; or not relevant in relation to the conversion of S-101 base datasets.
3. Many S-101 attributes are enhancements introduced in S-101 and therefore have no equivalent attribute in S-57. These attributes will generally not convert to S-57, however it must be noted that this will not impact on the performance of the converted S-57 data in ECDIS against the requirements of the ECDIS Performance Standards. Within this document, the conventions related to the guidance on the conversion of attributes from S-101 to S-57 is as follows:
   a. Attributes that are new in S-101: Guidance (generally stating that the attribute will not be converted) is included in the attributes Sections 27 and 28 of this document. In the interest of efficiency, this information is not repeated for the features included in Sections 3 to 24 unless the attribute is used in the automated conversion process to inform the conversion of other attributes.
   b. S-101 attributes derived from S-57 that are newly bound to S-101 features: Guidance as to how (or if) these attributes are to be addressed during the automated conversion process are included against the relevant features included in clauses 3 to 24.

3 Metadata Features

Data Coverage: See clause 3.5.

Navigational System of Marks: See clause 3.6.

Quality of Bathymetric Data: See clause 3.8.

3.1 Horizontal uncertainty

The S-101 attribute **quality of horizontal measurement** will be converted to the S-57 spatial attribute QUAPOS.

The sum of the sub-attributes **uncertainty fixed** and **uncertainty variable factor** for the complex attribute **horizontal position uncertainty** will be converted to the S-57 spatial attribute POSACC (see clause 29.8).

See clauses 24.5, 28.5 and 28.15.

3.2 Vertical uncertainty

The sum of the sub-attributes **uncertainty fixed** and **uncertainty variable factor** for the complex attribute **vertical uncertainty** will be converted to the S-57 spatial attribute SOUACC (see clause 29.40).

3.3 Hierarchy of metadata

Not applicable.

3.4 Quality of non-bathymetric data

S-101 Meta Feature:	**Quality of Non-Bathymetric Data**	(S)	
S-57 Meta Object:	Accuracy of data (**M_ACCY**)	(A)	(S-57 UOC Clause 2.2.4.1)

All instances of encoding of the S-101 Meta Feature type **Quality of Non-Bathymetric Data** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **M_ACCY** during the automated conversion process.

3.5 Data coverage

S-101 Meta Feature:	**Data Coverage**	(S)	
S-57 Meta Object:	Coverage (**M_COVR**)	(A)	(S-57 UOC Clause 2.8.1)
S-57 Meta Object:	Coverage (**M_CSCL**)	(A)	(S-57 UOC Clause 2.2.6)

All instances of encoding of the S-101 Meta Feature type **Data Coverage** and its relevant binding attributes will be converted to instances of the S-57 Meta Object class **M_COVR** and, where required, the Meta Object class **M_CSCL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **optimum display scale** is only converted if a corresponding **M_CSCL** feature is created.
- If the complex attribute **information** is populated for a **Data Coverage** feature, this information will only be converted if a corresponding **M_CSCL** feature is created during the automated conversion process.

The resultant configuration of **M_COVR** and **M_CSCL** in the converted S-57 dataset is based on the following:

- If the S-101 dataset contains a single **Data Coverage** feature that covers the full extent of the dataset bounding box, a single **M_COVR** having attribute CATCOV = *1* (coverage available) covering the entire extent of the dataset is created. There is no requirement for **M_CSCL** in this case.

- If the S-101 dataset contains a single **Data Coverage** feature that partially covers the full extent of the dataset bounding box, a single **M_COVR** feature having attribute CATCOV = *1* (coverage available) covering the extent of the **Data Coverage** is created. For the remainder of the area covering the bounding box for the dataset, one or more **M_COVR** features having attribute CATCOV = *2* (no coverage available) is created as required, such that full, non-overlapping **M_COVR** coverage is achieved for the entire bounding box. There is no requirement for **M_CSCL** in this case.
- If the S-101 dataset contains multiple **Data Coverage** features:
  - Where there are adjoining **Data Coverage** features, a single **M_COVR** feature having CATCOV = *1* (coverage available) covering the extent of the adjoining **Data Coverage** features is created. In addition, separate **M_CSCL** features are created, having values for the attribute CSCALE equal to the value for the attribute **optimum display scale** for the respective **Data Coverage** features*.
  - If any of the **Data Coverage** features are not adjoining, separate **M_COVR** features are created for each of the non-adjoining areas (taking into account the above sub-bullet for any adjoining areas within the dataset); and the corresponding **M_CSCL** features are created in accordance with the above sub-bullet*.
  - If the combined extent of the **Data Coverage** features does not cover the entire extent of the dataset bounding box, one or more **M_COVR** features having attribute CATCOV = *2* (no coverage available) is created as required such that full, non-overlapping **M_COVR** coverage is achieved for the entire bounding box.

* Exception: A **M_CSCL** is not created for any of the **Data Coverage** features that have a value for **optimum display scale** that is equal to the smallest (largest scale) value for **optimum display scale** for the entire dataset.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **drawing index** has been introduced in S-101 to optionally assist with the seamless presentation of a series of ENC datasets in ECDIS. Guidance in S-101 recommends that where **drawing index** is populated, it is populated with the same value as the Navigational Purpose of any S-57 ENCs for which the S-101 dataset is intended to be displayed seamlessly in a dual-fuel environment. While **drawing index** has no corresponding attribution in S-57, a suitably configured converter may utilize **drawing index** to automatically populate the mandatory Navigational Purpose component (third character) of the ENC dataset file name for the converted S-57 dataset.

3.6 Navigational system of marks

S-101 Meta Feature: **Navigational System of Marks** (S)

S-57 Meta Object: Navigational system of marks (**M_NSYS**) (A) (S-57 UOC Clause 12.2)

All instances of encoding of the S-101 Meta Feature type **Navigational System of Marks** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **M_NSYS** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

marks navigational – system of (MARSYS) see clause 27.124

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

3.7 Local direction of buoyage

S-101 Meta Feature: **Local Direction of Buoyage** (S)

S-57 Meta Object: Navigational system of marks (**M_NSYS**) (A) (S-57 UOC Clause 12.2)

All instances of encoding of the S-101 Meta Feature type **Local Direction of Buoyage** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **M_NSYS** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **marks navigational – system of** will not be converted. This attribute is required on **Local Direction of Buoyage** only for S-101 portrayal purposes in ECDIS; the

underlying navigational system of marks is included in converted S-57 datasets through the conversion of the S-101 feature **Navigational System of Marks** (see clause 3.6).

3.8 Quality of bathymetric data

S-101 Meta Feature: **Quality of Bathymetric Data** (S)

S-57 Meta Object: Quality of data (**M_QUAL**) (A) (S-57 UOC Clause 2.2.3.1)

All instances of encoding of the S-101 Meta Feature type **Quality of Bathymetric Data** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **M_QUAL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **category of temporal variation**, **data assessment**, **features detected** (complex attribute), **full seafloor coverage achieved** and **zone of confidence** (**fixed data range**) will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **M_QUAL**.
- In S-101 it is allowable for **Quality of Bathymetric Data** features to overlap vertically so as define the quality of bathymetric data at varying depths in the water column. In S-57 **M_QUAL** objects cannot overlap. During the automated conversion process, where **Quality of Bathymetric Data** features overlap vertically, only the "bottom level" of **Quality of Bathymetric Data** will be converted (that is, the **Quality of Bathymetric Data** feature providing quality information to the seabed or the deepest depths measured for **Depth – No Bottom Found** features). Data Producers may be required to review the converted S-57 dataset to ensure the desired outcome is achieved and amend as required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57 complete, non-overlapping coverage of **M_QUAL** meta Objects is required for all areas of the dataset containing depth data (NOTE: This includes areas covered by the S-57 Object class **UNSARE**). In S-101, it is not required to encode **Quality of Bathymetric Data** features for areas covered by the feature **Unsurveyed Area** or on areas of ENC datasets at optimum display scale smaller than 1:700000. Where **Unsurveyed Area** is not covered by a **Quality of Bathymetric Data** feature, a **M_QUAL** having attribute CATZOC = *5* (zone of confidence D) should be created coincident with the converted **UNSARE**. Where an area of the S-101 dataset is at optimum display scale smaller than 1:700000 and no **Quality of Bathymetric Data** features have been encoded, one or more non-overlapping **M_QUAL** having attribute CATZOC = *4* (zone of confidence C) should be created covering all areas of the dataset containing depth data.
- The binding of the S-101 complex attribute **zone of confidence** to **Quality of Bathymetric Data** in S-101 carries a multiplicity of [1..*], meaning that multiple Zone of Confidence values may be referenced to a single instance of **Quality of Bathymetric Data**. This is so as to allow for the encoding of degrading bathymetric data quality over time where an area is changeable. During the automated conversion process, where multiple instances of **zone of confidence** have been encoded for **Quality of Bathymetric Data** in S-101, the **zone of confidence** instance corresponding to the date of conversion in the sequence (that is, the instance having the current date range) will be used in the conversion. Data Producers will be required to check their converted S-57 data to ensure that the desired value for CATZOC has been included. In addition, an instance of the S-57 Object class **CTNARE** will be created covering the area of overlapping bathymetric quality information, having the attribute INFORM populated with a standardised text string similar to *Area of continual change in depth*.

3.9 Sounding datum

S-101 Meta Feature: **Sounding Datum** (S)

S-57 Meta Object: Sounding datum (**M_SDAT**) (A) (S-57 UOC Clause 2.1.3)

In S-101, it is mandatory for all areas of the dataset containing depth data or bathymetry to be covered by **Sounding Datum** features, while in S-57 it is only required to encode **M_SDAT** features if the sounding datum for an area is different to the value given in the "Sounding Datum" [SDAT] subfield of the "Data Set Parameter" [DSPM] field for the dataset. During the automated conversion process, conversion of **Sounding Datum** will occur as follows:

- If a single **Sounding Datum** feature is included in the S-101 dataset, this will not be converted.

- If multiple **Sounding Datum** features are included in the S-101 dataset, only features that have a value for attribute **vertical datum** that is different to the value stored in the "Dataset Coordinate Reference System" record and referred by the "Vertical CRS Id" [VCID] subfield of the "3-D Integer Coordinate Tuple" [C3IT] field or the "3-D Integer Coordinate List" [C3IL] field for the dataset will be converted. Alternatively, a suitably configured converter my assign a "default" sounding datum that is not to be converted to **M_SDAT**.

Data Producers are advised that the following enumeration type attribute has differing allowable enumerate values in S-101 and S-57:

vertical datum (VERDAT) see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

3.10 Vertical datum of data

S-101 Meta Feature: **Vertical Datum of Data** (S)

S-57 Meta Object: Vertical datum (**M_VDAT**) (A) (S-57 UOC Clause 2.1.2)

In S-101, it is mandatory for all areas of the dataset containing data to be covered by **Vertical Datum of Data** features, while in S-57 it is only required to encode **M_VDAT** features if the vertical datum for an area is different to the value given in the "Vertical Datum" [VDAT] subfield of the "Data Set Parameter" [DSPM] field for the dataset. During the automated conversion process, conversion of **Vertical Datum** will occur as follows:

- If a single **Vertical Datum of Data** feature is included in the S-101 dataset, this will not be converted.
- If multiple **Vertical Datum of Data** features are included in the S-101 dataset, all features will be converted; and Data Producers will be required to remove any instance of **M_VDAT** that are not required in the converted S-57 dataset. Alternatively, a suitably configured converter my assign a "default" vertical datum that is not to be converted to **M_VDAT**.

Data Producers are advised that the following enumeration type attribute has differing allowable enumerate values in S-101 and S-57:

vertical datum (VERDAT) see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

3.11 Quality of survey

S-101 Meta Feature: **Quality of Survey** (C,S)

S-57 Meta Object: Survey reliability (**M_SREL**) (L,A) (S-57 UOC Clause 2.2.3.2)

All instances of encoding of the S-101 Meta Feature type **Quality of Survey** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **M_SREL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **technique of vertical measurement** will not be converted. If it is considered important to retain this information in the converted S-57 dataset, Data Producers should consider manually populating the attribute TECSOU on the appropriate **M_QUAL** Object(s). See S-57 UOC Clause 2.2.3.1.
- The S-101 attributes **depth range maximum value** and **depth range minimum value** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **M_SREL**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

survey type (SURTYP) see clause 28.23

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

3.12 Update information

The S-101 Meta Feature **Update Information** will not be converted. This feature is an enhancement included in S-101 to provide additional information to the Mariner related to applied ENC Updates – there is no corresponding S-57 encoding for this feature.

4 Geo Features – Magnetic Data

4.1 Magnetic variation

S-101 Geo Feature: **Magnetic Variation** (P,C,S)

S-57 Geo Object: Magnetic variation (**MAGVAR**) (P,L,A) (S-57 UOC Clause 3.1.1)

All instances of encoding of the S-101 Feature type **Magnetic Variation** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MAGVAR** during the automated conversion process.

4.2 Local magnetic anomaly

S-101 Geo Feature: **Local Magnetic Anomaly** (P,C,S)

S-57 Geo Object: Lical magnetic anomaly (**LOCMAG**) (P,L,A) (S-57 UOC Clause 3.1.2)

All instances of encoding of the S-101 Meta Feature type **Local Magnetic Anomaly** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **LOCMAG** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 mandatory complex attribute **value of local magnetic anomaly**, having sub-attributes **magnetic anomaly value** (mandatory) and **reference direction**, has been remodelled from the S-57 mandatory attribute VALLMA. During the automated conversion process:
  - Where only a single instance of **value of local magnetic anomaly** is encoded, having no populated value for **reference direction**, the value populated for **magnetic anomaly value** will be converted to VALLMA.
  - Where only a single instance of **value of local magnetic anomaly** is encoded and **reference direction** is populated, the value populated for **magnetic anomaly value** will be converted to VALLMA; and the attribute INFORM should be populated with a standardised text string similar to *Anomaly is in and [Easterly/Westerly] direction* (*[Easterly/Westerly]* dependant on the value populated for **reference direction**).
  - Where two instances of **value of local magnetic anomaly** are encoded and **reference direction** is populated for both instances, the converter should populate the larger of the two values for **magnetic anomaly value** in VALLMA; and the attribute INFORM should be populated with a standardised text string similar to *From [x] West to [y] East* (where *[x]* and *[y]* are the westerly and easterly local magnetic anomaly values respectively).

5 Geo Features – Natural Features

5.1 Cliffs (see S-4 – B-312.3)

See clauses 5.3, 5.14 and 5.15.

5.2 Cuttings and embankments (see S-4 – B-363.2 and B-364.1)

See clauses 5.14 and 5.15.

5.3 Coastline

S-101 Geo Feature:	**Coastline**	(C)	
S-57 Geo Object:	Coastline (**COALNE**)	(L)	(S-57 UOC Clause 4.5.1)

All instances of encoding of the S-101 Feature type **Coastline** and its relevant binding attributes will be converted to an instance of the S-57 Object class **COALNE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **nature of surface** will not be converted, except for the following:
  nature of surface = *4* (sand) -> CATCOA = *3* (sandy shore)
  nature of surface = *5* (stone) -> CATCOA = *4* (stony shore)
  nature of surface = *7* (pebbles) -> CATCOA = *5* (shingly shore)
  nature of surface = *14* (coral) -> CATCOA = *9* (coral reef)
  nature of surface = *17* (shells) -> CATCOA = *11* (shelly shore)

NOTE: The binding of the complex attribute **nature of surface** to **Coastline** in S-101 carries a multiplicity of [0..*], meaning that multiple natures of surface may be referenced to a single feature instance. Where two or more of the above listed values of **nature of surface** are encoded for an instance of **Coastline**, the first instance will be converted to CATCOA.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

5.4 Land Area

S-101 Geo Feature:	**Land Area**	(P,C,S)	
S-57 Geo Object:	Land area (**LNDARE**)	(P,L,A)	(S-57 UOC Clause 4.1)

All instances of encoding of the S-101 Feature type **Land Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LNDARE** during the automated conversion process.

5.5 Island group

S-101 Geo Feature:	**Island Group**	(S,N)	
S-57 Geo Object:	Land region (**LNDRGN**)	(P,A)	(S-57 UOC Clauses 4.7.1 and 14)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clause 15)

All instances of encoding of the S-101 Feature type **Island Group** of geometric primitive surface and its relevant binding attributes will be converted to an instance of the S-57 Object classes **LNDRGN** and **C_AGGR** during the automated conversion process.

All instances of encoding of the S-101 Feature type **Island Group** having no geometry and its relevant binding attributes will be converted to an instance of the S-57 Object class **C_AGGR** during the automated conversion process.

5.6 Land elevation

S-101 Geo Feature: **Land Elevation** (P,C)

S-57 Geo Object: Land elevation (**LNDELV**) (P,L) (S-57 UOC Clause 4.7.2)

All instances of encoding of the S-101 Feature type **Land Elevation** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LNDELV** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

5.7 River

S-101 Geo Feature: **River** (C,S)

S-57 Geo Object: River (**RIVERS**) (L,A) (S-57 UOC Clause 4.7.6)

All instances of encoding of the S-101 Feature type **River** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RIVERS** during the automated conversion process.

5.8 Rapids

S-101 Geo Feature: **Rapids** (P,C,S)

S-57 Geo Object: Rapids (**RAPIDS**) (P,L,A) (S-57 UOC Clause 4.7.7.1)

All instances of encoding of the S-101 Feature type **Rapids** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RAPIDS** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, **RAPIDS** objects of geometric primitive point do not display in ECDIS. During the automated conversion process, an instance of the S-57 Object class **LNDMRK** will also be created in addition to **RAPIDS** for **Rapids** of geometric primitive point. The converted **LNDMRK** Object will have mandatory attributes CATLMK = empty (null) and CONVIS = *2* (not visually conspicuous). In addition, a suitably configured converter may populate the attribute INFORM with a standardised text string similar to *Rapids*.

5.9 Waterfall

S-101 Geo Feature: **Waterfall** (P,C)

S-57 Geo Object: Waterfall (**WATFAL**) (P,L) (S-57 UOC Clause 4.7.7.2)

All instances of encoding of the S-101 Feature type **Waterfall** and its relevant binding attributes will be converted to an instance of the S-57 Object class **WATFAL** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

5.10 Lake

S-101 Geo Feature: **Lake** (S)

S-57 Geo Object: Lake (**LAKARE**) (A) (S-57 UOC Clause 4.7.8)

All instances of encoding of the S-101 Feature type **Lake** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LAKARE** during the automated conversion process. However, the following exceptions apply:

- Intermittent lakes (S-101 attribute **status** = *5* (periodic/intermittent)) are encoded in S-57 ENC using the Object class **RIVERS** (see S-57 UOC clause 4.7.6). During the automated conversion process, any incidence of **Lake** having **status** = *5* (periodic/intermittent) will be converted to a **RIVERS** Object. Note that where this occurs, the S-101 attribute **elevation** on the **Lake** Feature will not be converted.

5.11 Land region

S-101 Geo Feature: **Land Region** (P,C,S)

S-57 Geo Object: Land region (**LNDRGN**) (P,A) (S-57 UOC Clause 4.7.1)

All instances of encoding of the S-101 Feature type **Land Region** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **LNDRGN** during the automated conversion process. However, the following exceptions apply:

- **Land Region** of geometric primitive curve will not be converted.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of land region (CATLND) see clause 27.34

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

5.12 Vegetation

S-101 Geo Feature: **Vegetation** (P,C,S)

S-57 Geo Object: Vegetation (**VEGATN**) (P,L,A) (S-57 UOC Clause 4.7.11)

All instances of encoding of the S-101 Feature type **Vegetation** and its relevant binding attributes will be converted to an instance of the S-57 Object class **VEGATN** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, **VEGATN** objects of geometric primitive point or area and having attribute CATVEG = *11* (reed) do not display in ECDIS. During the automated conversion process, an instance of the S-57 Object class **LNDMRK** will also be created in addition to **VEGATN** where a **Vegetation** feature has been encoded with attribute **category of vegetation** = *11*. The converted **LNDMRK** Object will have mandatory attributes CATLMK = empty (null) and CONVIS = *1* (visually conspicuous) if the attribute **visually conspicuous** = *1* (visually conspicuous) on the **Vegetation** feature; or *2* (not visually conspicuous) if the attribute **visually conspicuous** = *2* (not visually conspicuous), *3* (prominent) or is not populated for the **Vegetation** feature. In addition, a suitably configured converter may populate the attribute INFORM with a standardised text string, such as *Reed*.

5.13 Ice area

S-101 Geo Feature: **Ice Area** (S)

S-57 Geo Object: Ice area (**ICEARE**) (A) (S-57 UOC Clauses 4.7.10 and 11.13.1)

All instances of encoding of the S-101 Feature type **Ice Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ICEARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

5.14 Sloping ground

S-101 Geo Feature: **Sloping Ground** (P,S)

S-57 Geo Object: Sloping ground (**SLOGRD**) (P,A) (S-57 UOC Clauses 4.7.4, 4.7.5 and 4.8.4)

All instances of encoding of the S-101 Feature type **Sloping Ground** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SLOGRD** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, **SLOGRD** objects of geometric primitive area and having attributes CATSLO ≠ *6* (cliff) and CONRAD ≠ *1* (radar conspicuous); or CATSLO = empty (null) do not display in ECDIS. During the automated conversion process, an instance of the S-57 Object class **LNDMRK** will also be created in addition to **SLOGRD** where a **Sloping Ground** feature includes these encoding combinations. The converted **LNDMRK** Object will have mandatory attributes CATLMK = empty (null) and CONVIS = *1* (visually conspicuous) if the attribute **visually conspicuous** = *1* (visually conspicuous) on the **Sloping Ground** feature; or *2* (not visually conspicuous) if the attribute **visually conspicuous** = *2* (not visually conspicuous), *3* (prominent) or is not populated for the **Sloping Ground** feature. In addition, a suitably configured converter may populate the attribute INFORM with a standardised text string equivalent to the value populated for the attribute **category of slope**.

5.15 Slope topline

S-101 Geo Feature: **Slope Topline** (C)

S-57 Geo Object: Slope topline (**SLOTOP**) (L) (S-57 UOC Clauses 4.7.5 and 4.8.4)

All instances of encoding of the S-101 Feature type **Slope Topline** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SLOTOP** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

5.16 Tideway

S-101 Geo Feature: **Tideway** (C,S)

S-57 Geo Object: Tideway (**TIDEWY**) (L,A) (S-57 UOC Clause 7.2.4)

All instances of encoding of the S-101 Meta Feature type **Tideway** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **TIDEWY** during the automated conversion process.

6 Geo Features – Cultural Features

6.1 Built-up area

S-101 Geo Feature: **Built-Up Area** (P,S)

S-57 Geo Object: Built-up area (**BUAARE**) (P,A) (S-57 UOC Clause 4.8.14)

All instances of encoding of the S-101 Meta Feature type **Built-Up Area** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **BUAARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where a **Built-Up Area** feature of geometric primitive surface extends over navigable water ("system" attribute **in the water** = *True*), a **COALNE** object having spatial attribute QUAPOS = *4* (approximate) must also be created along the seaward edge of the converted **BUAARE** Object (see S-57 UOC clause 4.8.14).

6.2 Building, single

S-101 Geo Feature: **Building** (P,S)

S-57 Geo Object: Building, single (**BUISGL**) (P,A) (S-57 UOC Clause 4.8.15)

All instances of encoding of the S-101 Feature type **Building** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BUISGL** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

function	(FUNCTN)	see clause 27.103
nature of construction	(NATCON)	see clause 27.136
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.
- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **BUISGL**, during the automated conversion process.

6.3 Airport/airfield

S-101 Geo Feature: **Airport/Airfield** (P,S)

S-57 Geo Object: Airport / airfield (**AIRARE**) (P,A) (S-57 UOC Clause 4.8.12)

All instances of encoding of the S-101 Meta Feature type **Airport/Airfield** and its relevant binding attributes will be converted to an instance of the S-57 Meta Object class **AIRARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of airport/airfield (CATAIR) see clause 27.9

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

6.4 Runway

S-101 Geo Feature:	**Runway**	(C,S)	
S-57 Geo Object:	Runway (**RUNWAY**)	(P,L,A)	(S-57 UOC Clause 4.8.12)

All instances of encoding of the S-101 Feature type **Runway** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RUNWAY** during the automated conversion process.

6.5 Helipad

S-101 Geo Feature:	**Helipad**	(P)	
S-57 Geo Object:	Runway (**RUNWAY**)	(P,L,A)	(S-57 UOC Clause 4.8.12)

All instances of encoding of the S-101 Feature type **Helipad** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RUNWAY**, having attribute CATRUN = *2* (helicopter landing pad) during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, **RUNWAY** objects of geometric primitive point do not display in ECDIS. During the automated conversion process, an instance of the S-57 Object class **LNDMRK** will also be created in addition to **RAPIDS** for **Rapids** of geometric primitive point. The converted **LNDMRK** Object will have mandatory attributes CATLMK = empty (null) and CONVIS = *2* (not visually conspicuous). In addition, a suitably configured converter may populate the attribute INFORM with a standardised text string similar to *Helicopter landing pad*.

6.6 Bridge

S-101 Geo Feature:	**Bridge**	(C,S,N)	
S-57 Geo Object:	Bridge (**BRIDGE**)	(P,L,A)	(S-57 UOC Clause 4.8.10)

All instances of encoding of the S-101 Feature type **Bridge** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BRIDGE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **height** and **status** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **BRIDGE**.
- The S-57 list type attribute CATBRG has been remodelled in S-101 to a combination of the enumeration type attributes **bridge construction**, **bridge function**, **category of opening bridge** and the mandatory Boolean type attribute **opening bridge**. The attribute **category of opening bridge** is mandatory if **opening bridge** is populated as *True*; otherwise these attributes are not mandatory for **Bridge**. During the automated conversion process, CATBRG will be converted as follows:
  - Enumeration type attributes not populated; **opening bridge** = *False* -> CATBRG = *1* (fixed bridge).
  - **opening bridge** = *True*; **category of opening bridge** = empty (null) -> CATBRG = *2* (opening bridge).
  - **category of opening bridge** = *3* (swing bridge); **opening bridge** = *True* -> CATBRG = *2,3* (opening bridge, swing bridge).
  - **category of opening bridge** = *4* (lifting bridge); **opening bridge** = *True* -> CATBRG = *2,4* (opening bridge, lifting bridge).
  - **category of opening bridge** = *5* (bascule bridge); **opening bridge** = *True* -> CATBRG = *2,5* (opening bridge, bascule bridge).
  - **bridge construction** = *3* (pontoon bridge); **opening bridge** = *False* -> CATBRG = *1,6* (fixed bridge, pontoon bridge).

- **category of opening bridge** = *7* (drawbridge); **opening bridge** = *True* -> CATBRG = *2,7* (opening bridge, draw bridge).
- **bridge construction** = *5* (transporter bridge); **opening bridge** = *False* -> CATBRG = *1,8* (fixed bridge, transporter bridge).
- **bridge function** = *3* (pedestrian); **opening bridge** = *False* -> CATBRG = *1,9* (fixed bridge, footbridge).
- **bridge construction** = *2* (viaduct); **opening bridge** = *False* -> CATBRG = *1,10* (fixed bridge, viaduct).
- **bridge function** = *4* (aqueduct); **opening bridge** = *False* -> CATBRG = *1,11* (fixed bridge, aqueduct).
- **bridge construction** = *4* (suspension bridge); **opening bridge** = *False* -> CATBRG = *1,12* (fixed bridge, suspension bridge).

It is recommended that Data Producers check all converted **BRIDGE** features to ensure that the required attribute encoding combinations are present, including the association, if required, of associated **BRIDGE** features using **C_AGGR**. Data Producers should note, in particular:

- Pontoon bridges may have a section of the bridge that is temporarily removed or rotated so as to allow passage of vessels. In such cases the bridge should be encoded as an opening bridge; that is, **bridge construction** = *3* (pontoon bridge); **opening bridge** = *True*. During the automated conversion process, this will convert to a **BRIDGE** feature having attribute CATBRG = *2,6* (opening bridge, pontoon bridge).

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

nature of construction	(NATCON)	see clause 27.136
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where a bridge has been encoded over navigable water, a **BRIDGE** Object will be created for each associated instance of the Feature types **Span Fixed** or **Span Opening** (see clauses 6.7 and 6.8). The geometry of each converted **BRIDGE** Object will take the geometry of the associated bridge span. Data Producers are advised to check all resultant **BRIDGE** features to ensure the adequacy of S-57 encoding (for example, remove duplicate instances of the attribute OBJNAM repeated on multiple **BRIDGE** Objects).
- Where a bridge has been encoded entirely over non-navigable water or on land, the geometry of the converted **BRIDGE** Object will take the same geometry as the **Bridge** feature, unless the **Bridge** is associated with one or more instances of **Span Fixed** or **Span Opening**, in which case the bridge will be converted as for a bridge encoded over navigable water.

6.7 Span fixed

S-101 Geo Feature: **Span Fixed** (C,S)

S-57 Geo Object: Bridge (**BRIDGE**) (P,L,A) (S-57 UOC Clause 4.8.10)

All instances of encoding of the S-101 Feature type **Span Fixed** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BRIDGE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

vertical datum	(VERDAT)	see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The attribution for each instance of **Span Fixed** will be concatenated with the attribution for the associated **Bridge** feature to provide full attribution for the resultant **BRIDGE** Object, which will take the geometry of the **Span Fixed**. See clause 6.6.

6.8 Span opening

S-101 Geo Feature: **Span Opening** (C,S)

S-57 Geo Object: Bridge (**BRIDGE**) (P,L,A) (S-57 UOC Clause 4.8.10)

All instances of encoding of the S-101 Feature type **Span Opening** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BRIDGE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

vertical datum (VERDAT) see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The attribution for each instance of **Span Opening** will be concatenated with the attribution for the associated **Bridge** feature to provide full attribution for the resultant **BRIDGE** Object, which will take the geometry of the **Span Opening**. See clause 6.6.
- Where the complex attribute **vertical uncertainty**, sub-attribute **uncertainty fixed** is populated for both the complex attributes **vertical clearance closed** and **vertical clearance open** the value populated for **vertical clearance closed** will be the value that converts to the S-57 attribute VERACC.

6.9 Conveyor

S-101 Geo Feature: **Conveyor** (C,S)

S-57 Geo Object: Conveyor (**CONVYR**) (L,A) (S-57 UOC Clause 4.8.11)

All instances of encoding of the S-101 Feature type **Conveyor** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CONVYR** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of conveyor	(CATCON)	see clause 27.18
product	(PRODCT)	see clause 27.144
vertical datum	(VERDAT)	see clause 27.196
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.

6.10 Cable overhead

S-101 Geo Feature: **Cable Overhead** (C)

S-57 Geo Object: Cable, overhead (**CBLOHD**) (L) (S-57 UOC Clause 11.5.2)

All instances of encoding of the S-101 Feature type **Cable Overhead** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CBLOHD** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

status	(STATUS)	see clause 27.171
vertical datum	(VERDAT)	see clause 27.196
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.

6.11 Pipeline overhead

S-101 Geo Feature: **Pipeline Overhead** (C)

S-57 Geo Object: Pipeline overhead (**PIPOHD**) (L) (S-57 UOC Clause 11.6.3)

All instances of encoding of the S-101 Feature type **Pipeline Overhead** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PIPOHD** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

vertical datum	(VERDAT)	see clause 27.196
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.

6.12 Pylon/bridge support

S-101 Geo Feature: **Pylon/Bridge Support** (P,S)

S-57 Geo Object: Pylon / bridge support (**PYLONS**) (P,A) (S-57 UOC Clause 4.8.18)

All instances of encoding of the S-101 Feature type **Pylon/Bridge Support** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PYLONS** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **status** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **PYLONS**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of pylon	(CATPYL)	see clause 27.52
nature of construction	(NATCON)	see clause 27.136
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.

6.13 Fence/wall

S-101 Geo Feature: **Fence/Wall** (C)

S-57 Geo Object: Fence/wall (**FNCLNE**) (L) (S-57 UOC Clause 4.8.16)

All instances of encoding of the S-101 Feature type **Fence/Wall** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FNCLNE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

nature of construction	(NATCON)	see clause 27.136

visual prominence (CONVIS) see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attributes **nature of construction** and **status** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

6.14 Railway

S-101 Geo Feature: **Railway** (C)

S-57 Geo Object: Railway (**RAILWY**) (L) (S-57 UOC Clause 4.8.2)

All instances of encoding of the S-101 Feature type **Railway** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RAILWY** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attributes **condition** and **status** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

6.15 Road

S-101 Geo Feature: **Road** (C,S)

S-57 Geo Object: Road (**ROADWY**) (P,L,A) (S-57 UOC Clause 4.8.8)

All instances of encoding of the S-101 Feature type **Road** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ROADWY** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

6.16 Tunnel

S-101 Geo Feature: **Tunnel** (C,S)

S-57 Geo Object: Tunnel (**TUNNEL**) (P,L,A) (S-57 UOC Clause 4.8.3)

All instances of encoding of the S-101 Feature type **Tunnel** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TUNNEL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **vertical datum** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **TUNNEL**.

7 Geo Features – Landmarks

7.1 Buildings, landmarks, tanks, silos: Common encoding combinations

Not applicable. See clauses 6.2, 7.1, 7.3, 7.4 and 8.7.

7.2 Landmark

S-101 Geo Feature: **Landmark** (P,C,S)

S-57 Geo Object: Landmark (**LNDMRK**) (P,L,A) (S-57 UOC Clause 4.8.15)

All instances of encoding of the S-101 Feature type **Landmark** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LNDMRK** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **category of special purpose mark** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **LNDMRK**.
- **Landmark** having attribute **category of landmark** = *22* (triangulation mark) or *23* (boundary mark) will be converted to an instance of the S-57 Object class **CTRPNT**, having attribute CATCTR = *1* (triangulation mark) or *5* (boundary mark) respectively, during the automated conversion process.
- **Landmark** having attribute **category of landmark** = *26* (bridge) will be converted to an instance of the S-57 Object class **BRIDGE** during the automated conversion process.
- **Landmark** having attribute **category of landmark** = *27* (dam) will be converted to an instance of the S-57 Object class **DAMCON** during the automated conversion process.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of landmark	(CATLMK)	see clause 27.35
function	(FUNCTN)	see clause 27.103
nature of construction	(NATCON)	see clause 27.136
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **LNDMRK**, during the automated conversion process.

7.3 Silo/tank

S-101 Geo Feature: **Silo/Tank** (P,S)

S-57 Geo Object: Silo / tank (**SILTNK**) (P,A) (S-57 UOC Clause 4.8.15)

All instances of encoding of the S-101 Feature type **Silo/Tank** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SILTNK** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

product	(PRODCT)	see clause 27.144
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- The S-101 attribute **product** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.
- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **SILTNK**, during the automated conversion process.

7.4 Wind turbine

S-101 Geo Feature: **Wind Turbine** (P)

S-57 Geo Object: Landmark (**LNDMRK**) (P,L,A) (S-57 UOC Clause 4.8.15)

All instances of encoding of the S-101 Feature type **Wind Turbine** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LNDMRK**, having attribute CATLMK = *19* (windmotor), during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range**, **vertical clearance fixed**, **vertical datum** and **water level effect** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **LNDMRK**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

nature of construction	(NATCON)	see clause 27.136
status	(STATUS)	see clause 27.171
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 attribute CONVIS is mandatory for **LNDMRK**, however the S-101 attribute **visual prominence** is not mandatory for **Wind Turbine**. For instances of **Wind Turbine** having no value populated for **visual prominence**, the converted **LNDMRK** Object will have CONVIS populated with value *2* (not visually conspicuous)
- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **LNDMRK**, during the automated conversion process.

7.5 Fortified structure

S-101 Geo Feature: **Fortified Structure** (P,C,S)

S-57 Geo Object: Fortified structure (**FORSTC**) (P,L,A) (S-57 UOC Clause 4.8.17)

All instances of encoding of the S-101 Feature type **Fortified Structure** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FORSTC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **status** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attributes on **FORSTC**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of fortified structure	(CATFOR)	see clause 27.28
status	(STATUS)	see clause 27.171

visual prominence (CONVIS) see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **FORSTC**, during the automated conversion process.

7.6 Production/storage area

S-101 Geo Feature: **Production/Storage Area** (P,S)

S-57 Geo Object: Production / storage area (**PRDARE**) (P,A) (S-57 UOC Clause 4.8.13)

All instances of encoding of the S-101 Feature type **Production/Storage Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PRDARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of production area	(CATPRA)	see clause 27.51
product	(PRODCT)	see clause 27.144
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

8 Geo Features – Ports

8.1 Works in progress and projected (see S-4 – B-329)

The encoding guidance for the indication of works in progress or projected remains unchanged in S-57, and as such all indications of works in progress or projected in S-101 data will be included in the converted S-57 dataset. See S-57 UOC clause 4.6.10.

8.2 Checkpoint

S-101 Geo Feature:	**Checkpoint**	(P,S)	
S-57 Geo Object:	Checkpoint (**CHKPNT**)	(P,A)	(S-57 UOC Clause 4.6.4)

All instances of encoding of the S-101 Feature type **Checkpoint** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CHKPNT** during the automated conversion process.

8.3 Hulks

S-101 Geo Feature:	**Hulk**	(P,S)	
S-57 Geo Object:	Hulk (**HULKES**)	(P,A)	(S-57 UOC Clause 4.6.8)

All instances of encoding of the S-101 Feature type **Hulk** and its relevant binding attributes will be converted to an instance of the S-57 Object class **HULKES** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range**, **periodic date range** (for **Hulk** of geometric primitive point and surface) and **scale minimum** (for **Hulk** of geometric primitive surface) will not be converted. In S-57, the **HULKES** object of geometric primitive area is included as a Group 1 (Skin of the Earth) object, and as such cannot be removed from the ECDIS portrayal based on date or viewing scale dependency. See additional requirements below.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of hulk	(CATHLK)	see clause 27.31
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- As **HULKES** of geometric primitive area is included as a Skin of the Earth (Group 1) feature in S-57, the geometry of the S-101 Skin of the Earth coverage will be “cookie cut” to incorporate the geometry of the **HULKES**, and the associated features amended accordingly, including removal of the S-101 Skin of the Earth overlapping area(s). In order to simplify the creation of the required geometry in the S-57 ENC dataset, Data Producers may consider amending their S-101 Skin of the Earth coverage to have a discrete Skin of the Earth feature, such as **Unsurveyed Area**, coincident with the **Hulk**.
- Periodicity for **HULKES** of geometric primitive area in S-57, if required, is indicated by including this information in an instance of the Object class **CTNARE** (see S-57 UOC clause 4.6.8). Data Producers are advised to check for the appropriate encoding where an instance of the S-57 Object class **CTNARE** has been created during the automated conversion process to indicate periodicity of the hulk using the attributes INFORM or TXTDSC; or create a **CTNARE** as appropriate.

8.4 Piles

S-101 Geo Feature:	**Pile**	(P,C,S)	
S-57 Geo Object:	Pile (**PILPNT**)	(P)	(S-57 UOC Clause 4.6.7.2)

Instances of encoding of the S-101 Feature type **Pile** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PILPNT** during the automated conversion process. However, the following exceptions apply:

- **Pile** of geometric primitive curve; or of geometric primitive surface and having attribute **category of pile** ≠ *5* (area of piles), will be converted to an instance of the S-57 Object class **MORFAC**, having mandatory attribute CATMOR = *5* (post or pile) during the automated conversion process.
- **Pile** of geometric primitive surface having attribute **category of pile** = *5* (area of piles) will be converted to an instance of the S-57 Object class **CTNARE**, having mandatory attribute INFORM = *Area of piles* during the automated conversion process.
- **Pile** of geometric primitive point and having attribute **radar conspicuous** = *True* will be converted to an instance of the S-57 Object class **BCNSPP** during the automated conversion process, having attribute CONRAD = *3* (radar conspicuous, has radar reflector); mandatory attributes BCNSHP = *1* (stake, pole, perch) and CATSPM = *52* (mark with unknown purpose); and mandatory attribute COLOUR populated with an empty (null) value if the S-101 attribute **colour** has not been populated for **Pile**. The following additional requirements for S-101 dataset conversion must be noted:
  - The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.
- For **Pile** of geometric primitive point converted to **PILPNT**, the S-101 attribute **status** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **PILPNT**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of pile	(CATPLE)	see clause 27.47
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

8.5 Dyke

S-101 Geo Feature:	**Dyke**	(C,S)	
S-57 Geo Object:	Dyke (**DYKCON**)	(L,A)	(S-57 UOC Clause 4.8.7)

All instances of encoding of the S-101 Feature type **Dyke** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DYKCON** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **feature name** and **visual prominence** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **DYKCON**.

8.6 Shoreline construction

S-101 Geo Feature:	**Shoreline Construction**	(P,C,S)	
S-57 Geo Object:	Shoreline construction (**SLCONS**)	(P,L,A)	(S-57 UOC Clause 4.5.2)

All instances of encoding of the S-101 Feature type **Shoreline Construction** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SLCONS** during the automated conversion process. However, the following exceptions apply:

- **Shoreline Construction** having attribute **category of shoreline construction** = *23* (tie-up wall), will be converted to an instance of the S-57 Object class **MORFAC**, having mandatory attribute CATMOR = *4* (tie-up wall) during the automated conversion process. When converting to **MORFAC**, the attributes **horizontal length** and **horizontal width** will not be converted.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of shoreline construction	(CATSLC)	see clause 27.61
nature of construction	(NATCON)	see clause 27.136
status	(STATUS)	see clause 27.171
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

8.7 Structure over navigable water

S-101 Geo Feature:	**Structure Over Navigable Water**	(S)	
S-57 Geo Object:	Building, single (**BUISGL**)	(P,A)	(S-57 UOC Clause 4.8.15)
S-57 Geo Object:	Harbour facility (**HRBFAC**)	(P,A)	(S-57 UOC Clause 4.6.1)

All instances of encoding of the S-101 Feature type **Structure Over Navigable Water** and its relevant binding attributes will be converted to an instance of the S-57 Object classes **BUISGL** and, optionally, **HRBFAC** during the automated conversion process. However, the following exceptions apply:

- During the automated conversion process, an instance of **HRBFAC** will only be created, in addition to **BUISGL**, if the **Structure Over Navigable Water** Feature has the attribute **category of structure** populated with values *2* (covered bulk terminal) or *5* (covered passenger terminal) (see clause 27.68).
- The S-101 attributes **horizontal length**, **horizontal width**, **product** and **vertical datum** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **BUISGL**. If the **Structure Over Navigable Water** is additionally converted to **HRBFAC**, the attributes NATCON and STATUS on the **HRBFAC** will not be populated as it will be included on the converted **BUISGL**.
- In S-101 the mandatory complex attributes **horizontal clearance fixed** and **vertical clearance fixed** are used to encode the value of the horizontal and vertical clearances and their uncertainties. In S-57 the horizontal and vertical clearances are encoded using the attribute INFORM. During the automated conversion process, the values of **horizontal clearance fixed**/**horizontal clearance value** and **vertical clearance fixed**/**vertical clearance value** will be populated in INFORM on the **BUISGL** Object with a standardised text string similar to "*Horizontal clearance = [xx.x] metres; Vertical clearance = [yy.y] metres*", where *[xx.x]* and *[yy.y]* are the clearance values.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of structure	(CATHAF)	see clause 27.68
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

8.8 Causeway

S-101 Geo Feature:	**Causeway**	(C,S)	
S-57 Geo Object:	Causeway (**CAUSWY**)	(L,A)	(S-57 UOC Clause 4.8.9)

All instances of encoding of the S-101 Feature type **Causeway** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CAUSWY** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

8.9 Canal

S-101 Geo Feature:	**Canal**	(C,S)	
S-57 Geo Object:	Canal (**CANALS**)	(L,A)	(S-57 UOC Clause 4.8.1)

All instances of encoding of the S-101 Feature type **Canal** and its relevant binding attributes will be converted automatically to an instance of the S-57 Object class **CANALS** during the automated conversion process.

8.10 Distance mark

S-101 Geo Feature:	**Distance Mark**	(P)	
S-57 Geo Object:	Distance mark (**DISMAR**)	(P)	(S-57 UOC Clauses 4.4)

All instances of encoding of the S-101 Feature type **Distance Mark** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DISMAR** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 mandatory attribute **distance mark visible** will be converted to an instance of the S-57 attribute CATDIS. See clause 27.90.
- In S-101 the mandatory complex attribute **measured distance value** having sub-attributes **distance unit of measurement** and **waterway distance** is used to encode the value of the measured distance and its unit of measurement. In S-57 this information is encoded using the attribute INFORM. During the automated conversion process, the values of **distance unit of measurement** and **waterway distance** are concatenated so as to populate INFORM with a standardised text string similar to "*Waterway distance = [xxx] [yyyy]*", where *[xxx]* is the value of the distance relevant to the mark and *[yyyy]* is the units of measure for the measured distance. For example *Waterway distance = 300 metres*. See clauses 27.91 and 27.203.

8.11 Gate

S-101 Geo Feature:	**Gate**	(P,C,S)	
S-57 Geo Object:	Gate (**GATCON**)	(P,L,A)	(S-57 UOC Clause 4.6.6.4)

All instances of encoding of the S-101 Feature type **Gate** and its relevant binding attributes will be converted to an instance of the S-57 Object class **GATCON** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

vertical datum (VERDAT) see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

8.12 Dam

S-101 Geo Feature: **Dam** (C,S)

S-57 Geo Object: Dam (**DAMCON**) (P,L,A) (S-57 UOC Clause 4.8.5)

All instances of encoding of the S-101 Feature type **Dam** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DAMCON** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **status** and **water level effect** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **DAMCON**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status	(STATUS)	see clause 27.171
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

8.13 Crane

S-101 Geo Feature: **Crane** (P,S)

S-57 Geo Object: Crane (**CRANES**) (P,A) (S-57 UOC Clause 4.6.9.3)

All instances of encoding of the S-101 Feature type **Crane** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CRANES** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **vertical clearance fixed** and **vertical datum** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **BUISGL**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of crane	(CATCRN)	see clause 27.19
vertical datum	(VERDAT)	see clause 27.196
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where the system attribute **in the water** has been populated as *True*, an instance of the S-57 feature **PILPNT** will be created, coincident with the **CRANES**, during the automated conversion process.

8.14 Berth

S-101 Geo Feature: **Berth** (P,C,S)

S-57 Geo Object: Berth (**BERTHS**) (P,L,A) (S-57 UOC Clause 4.6.2)

All instances of encoding of the S-101 Feature type **Berth** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BERTHS** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **horizontal clearance length** and **horizontal clearance width** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **BERTHS**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of cargo	see clause 27.15

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

8.15 Dolphin

S-101 Geo Feature: **Dolphin** (P,S)

S-57 Geo Object: Mooring / warping facility (**MORFAC**) (P,L,A) (S-57 UOC Clause 4.6.7.1)

All instances of encoding of the S-101 Feature type **Dolphin** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MORFAC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **elevation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **MORFAC**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 mandatory attribute **category of dolphin** will be converted to an instance of the S-57 mandatory attribute CATMOR. See clause 27.22.

8.16 Bollard

S-101 Geo Feature: **Bollard** (P)

S-57 Geo Object: Mooring / warping facility (**MORFAC**) (P,L,A) (S-57 UOC Clause 4.6.7.1)

All instances of encoding of the S-101 Feature type **Bollard** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MORFAC** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- For all **Bollard** converted to **MORFAC**, the mandatory S-57 attribute CATMOR will be populated with value *3* (bollard).

8.17 Dry dock

S-101 Geo Feature: **Dry Dock** (S)

S-57 Geo Object: Dry dock (**DRYDOC**) (A) (S-57 UOC Clause 4.6.6.1)

All instances of encoding of the S-101 Feature type **Dry Dock** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DRYDOC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **elevation**, **horizontal clearance length** and **horizontal clearance width** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **DRYDOC**.

8.18 Floating dock

S-101 Geo Feature: **Floating Dock** (C,S)

S-57 Geo Object: Floating dock (**FLODOC**) (L,A) (S-57 UOC Clause 4.6.6.2)

All instances of encoding of the S-101 Feature type **Floating Dock** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FLODOC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **horizontal clearance length** and **horizontal clearance width** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **FLODOC**.

- The S-101 attributes **fixed date range** and **scale minimum** will not be converted for **Floating Dock** of geometric primitive surface. In S-57, **FLODOC** of geometric primitive area is included as a Group 1 (Skin of the Earth) object, and as such cannot be removed from the ECDIS portrayal based on date or viewing scale dependency. See additional requirements below.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- As **FLODOC** of geometric primitive area is included as a Skin of the Earth (Group 1) feature in S-57, the geometry of the S-101 Skin of the Earth coverage will be “cookie cut” to incorporate the geometry of the **FLODOC**, and the associated features amended accordingly, including removal of the S-101 Skin of the Earth overlapping area. In order to simplify the creation of the required geometry in the S-57 ENC dataset, Data Producers may consider amending their S-101 Skin of the Earth coverage to have a discrete Skin of the Earth feature, such as **Unsurveyed Area**, coincident with the **Floating Dock**.
- Date dependency for **FLODOC** of geometric primitive area in S-57, if required, is indicated by including this information in an instance of the Object class **CTNARE** (see S-57 UOC clause 4.6..6.2). Data Producers are advised to check for the appropriate encoding where an instance of the S-57 Object class **CTNARE** has been created during the automated conversion process to indicate date dependency of the floating dock using the attributes INFORM or TXTDSC; or create a **CTNARE** as appropriate.

8.19 Pontoon

S-101 Geo Feature: **Pontoon** (C,S)

S-57 Geo Object: Pontoon (**PONTON**) (L,A) (S-57 UOC Clause 4.6.7.3)

All instances of encoding of the S-101 Feature type **Pontoon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PONTON** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range**, **periodic date range** and **scale minimum** will not be converted for **Pontoon** of geometric primitive surface. In S-57, **PONTON** of geometric primitive area is included as a Group 1 (Skin of the Earth) object, and as such cannot be removed from the ECDIS portrayal based on date or viewing scale dependency. See additional requirements below.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- As **PONTON** of geometric primitive area is included as a Skin of the Earth (Group 1) feature in S-57, the geometry of the S-101 Skin of the Earth coverage will be “cookie cut” to incorporate the geometry of the **PONTON**, and the associated features amended accordingly including removal of the S-101 Skin of the Earth overlapping area. In order to simplify the creation of the required geometry in the S-57 ENC dataset, Data Producers may consider amending their S-101 Skin of the Earth coverage to have a discrete Skin of the Earth feature, such as **Unsurveyed Area**, coincident with the **Pontoon**.
- Periodicity for **PONTON** of geometric primitive area in S-57, if required, is indicated by including this information in an instance of the Object class **CTNARE** (see S-57 UOC clause 4.6.8). Data Producers are advised to check for the appropriate encoding where an instance of the S-57 Object class **CTNARE** has been created during the automated conversion process to indicate periodicity of the hulk using the attributes INFORM or TXTDSC; or create a **CTNARE** as appropriate.

8.20 Dock area

S-101 Geo Feature:	**Dock Area**	(S)	
S-57 Geo Object:	Dock area (**DOCARE**)	(A)	(S-57 UOC Clause 4.6.6.3)

All instances of encoding of the S-101 Feature type **Dock Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DOCARE** during the automated conversion process.

8.21 Gridiron

S-101 Geo Feature:	**Gridiron**	(S)	
S-57 Geo Object:	Gridiron (**GRIDRN**)	(P,A)	(S-57 UOC Clause 4.6.6.6)

All instances of encoding of the S-101 Feature type **Gridiron** and its relevant binding attributes will be converted to an instance of the S-57 Object class **GRIDRN** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

nature of construction	(NATCON)	see clause 27.136
status	(STATUS)	see clause 27.171

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

8.22 Lock basin

S-101 Geo Feature:	**Lock Basin**	(S)	
S-57 Geo Object:	Lock basin (**LOKBSN**)	(A)	(S-57 UOC Clause 4.6.6.5)

All instances of encoding of the S-101 Feature type **Lock Basin** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LOKBSN** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **periodic date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **LOKBSN**.

8.23 Mooring trot

S-101 Geo Feature:	**Mooring Trot**	(S,N)	
S-101 Association:	**Mooring Trot Aggregation**	(N)	(See Clause 25.10)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clauses 9.2.5 and 15)
S-57 Geo Object:	Sea area (**SEAARE**)	(P,A)	(S-57 UOC Clauses 8 and 14)

All instances of encoding of the S-101 Feature type **Mooring Trot** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **fixed date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the mooring trot as defined by the The Component role of the S-101 Association **Mooring Trot Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.10).
- If the **Mooring Trot** is encoded using geometric primitive surface, the geometry of the **Mooring Trot** will be utilized during the automated conversion process to encode an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**.

9 Geo Features – Topographic Terms

9.1 Sea area/named water area

S-101 Geo Feature: **Sea Area/Named Water Area** (P,S)

S-57 Geo Object: Sea area (**SEAARE**) (P,A) (S-57 UOC Clause 8)

All instances of encoding of the S-101 Feature type **Sea Area/Named Water Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SEAARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of sea area (CATSEA) see clause 27.60

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

10 Geo Features – Tides, Currents

10.1 Tidal data (see S-4 – B-406 to B-408)

Not applicable.

10.2 Tidal stream – flood/ebb

S-101 Geo Feature:	**Tidal Stream – Flood/Ebb**	(P,S)	
S-57 Geo Object:	Tidal stream-flood/ebb (**TS_FEB**)	(P,A)	(S-57 UOC Clause 3.3.1)

All instances of encoding of the S-101 Feature type **Tidal Stream – Flood/Ebb** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TS_FEB** during the automated conversion process. However, the following exceptions apply:

- The S-101 complex attribute **speed**, sub-attribute **speed minimum** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **TS_FEB**.

10.3 Current – non-gravitational

S-101 Geo Feature:	**Current – Non-Gravitational**	(P)	
S-57 Geo Object:	Current (**CURENT**)	(P)	(S-57 UOC Clause 3.4)

All instances of encoding of the S-101 Feature type **Current – Non-Gravitational** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CURENT** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **speed minimum** and **status** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **CURENT**.

10.4 Water turbulence

S-101 Geo Feature:	**Water Turbulence**	(P,C,S)	
S-57 Geo Object:	Water turbulence (**WATTUR**)	(P,L,A)	(S-57 UOC Clause 6.4)

All instances of encoding of the S-101 Feature type **Water Turbulence** and its relevant binding attributes will be converted to an instance of the S-57 Object class **WATTUR** during the automated conversion process.

10.5 Tidal stream panel data

S-101 Geo Feature:	**Tidal Stream Panel Data**	(P,S)	
S-57 Geo Object:	Tidal steam panel data (**TS_PAD**)	(P,A)	(S-57 UOC Clause 3.3.5)

All instances of encoding of the S-101 Feature type **Tidal Stream Panel Data** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TS_PAD** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **reference tide type**, **stream depth** and **time relative to tide** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **TS_PAD**.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101 the mandatory attributes **station name** and **station number** and mandatory complex attribute **tidal stream panel values** are used to populate the formatted text string attribute TS_TSP as follows:
  - **station number** -> First value of TS_TSP (tidal station number). If **station number** is not included in the instance of **TS_PAD** or is populated as empty (null), the first value of TS_TSP must be a delimiting comma.

- **station name** -> Second value of TS_TSP (tidal station name). If **station name** = empty (null) the second value of TS_TSP must be a delimiting comma only.
- **tidal stream panel values**/**reference tide** -> Third value of TS_TSP (reference tide). See clause 27.150. If **reference tide** = empty (null) the third value of TS_TSP must be a delimiting comma only. NOTE: The binding of the complex attribute **tidal stream panel values** to **Tidal Stream Panel Data** in S-101 carries a multiplicity of [1..*], meaning that multiple sets of tidal stream panel values may be referenced to a single feature instance. Where two or more instances of **tidal stream panel values** are encoded for an instance of **Tidal Stream Panel Data**, the first instance will be the instance from which **reference tide** only is converted.
- **tidal stream panel values**/**tidal stream value** -> Fourth to 29th values (stream orientation and rate, 13 x ordered pairs derived from sub-attributes **orientation value** and **speed maximum** respectively). If an instance of **orientation value** = empty (null) the corresponding value of TS_TSP must be a delimiting comma only. NOTE 1: The binding of the complex attribute **tidal stream panel values** to **Tidal Stream Panel Data** in S-101 carries a multiplicity of [1..*], meaning that multiple sets of tidal stream panel values may be referenced to a single feature instance. Where two or more instances of **tidal stream panel values** are encoded for an instance of **Tidal Stream Panel Data**, the first instance will be the instance from which stream orientations and rates are converted. NOTE 2: Exactly 13 pairs of values defining the stream orientations and rates must be populated within TS_TSP. Values converted from **tidal stream panel values** will be based on the values populated for the sub-attribute **time relative to tide** as follows:

time relative to tide Value	Conversion to TS_TSP
-6	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 4th and 5th values (corresponding to 1st ordered pair).
-5	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 6th and 7th values (corresponding to 2nd ordered pair).
-4	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 8th and 9th values (corresponding to 3rd ordered pair).
-3	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 10th and 11th values (corresponding to 4th ordered pair).
-2	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 12th and 13th values (corresponding to 5th ordered pair).
-1	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 14th and 15th values (corresponding to 6th ordered pair).
0	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 16th and 17th values (corresponding to 7th ordered pair).
1	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 18th and 19th values (corresponding to 8th ordered pair).
2	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 20th and 21st values (corresponding to 9th ordered pair).
3	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 22nd and 23rd values (corresponding to 10th ordered pair).
4	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 24th and 25th values (corresponding to 11th ordered pair).
5	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 26th and 27th values (corresponding to 12th ordered pair).
6	Corresponding values for sub-attributes **orientation value** and **speed maximum** populated in the 28th and 29th values (corresponding to 13th ordered pair).

Only orientations and rates corresponding to values of **time relative to tide** as listed above will be converted. Missing values will be populated with delimiting comma's only corresponding to the positions in the sequence.

In the following example, the position of values for **orientation value** in the text string is indicated in bold text.

TS_TSP = *63230,Darwin,HW,**124**,2.2,**128**,2.1,**125**,2.9,**116**,2.8,**110**,2.0,**095**,0.6,**020**,0.2, **320**,1.9,**315**,2.1,**300**,2.8,**268**,2.6,**200**,2.4,**165**,2.5*

Similarly, the position of values for **speed maximum** in the text string is indicated in bold text.

TS_TSP = *63230,Darwin,HW,124,**2.2**,128,**2.1**,125,**2.9**,116,**2.8**,110,**2.0**,095,**0.6**,020,**0.2**, 320,**1.9**,315,**2.1**,300,**2.8**,268,**2.6**,200,**2.4**,165,**2.5***

11 Geo Features – Depths

11.1 Generalisation of depth portrayal

Not applicable.

11.2 Representation of depth: General

Not applicable.

11.3 Sounding

S-101 Geo Feature: **Sounding** (P,Pointset)

S-57 Geo Object: Sounding (**SOUNDG**) (P) (S-57 UOC Clause 5.3)

All instances of encoding of the S-101 Meta Feature type **Sounding** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SOUNDG** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, **SOUNDG** includes the allowable attribute EXPSOU to indicate whether a sounding is shoaler than, within or deeper than the depth range of the covering **DEPARE** Object. In S-101 the attribute **exposition of sounding** is not an allowable attribute for **Sounding**. During the automatic conversion process, the converter should interrogate the covering **Depth Area** features and, where required, populate EXPSOU on converted **SOUNDG** with values *2* (shoaler than the range of depth of the surrounding depth area) or *3* (deeper than the range of depth of the surrounding depth area) where appropriate.
- Where an encoded **Sounding** has an associated instance of the S-101 Information type **Spatial Quality** (see S-101 DCEG clause 24.5), attribute **quality of horizontal measurement** = *4* (approximate) to indicate approximate depths, this will be populated on the converted **SOUNDG** with the spatial attribute QUAPOS = *4* (approximate) during the automated conversion process. See clause 24.5.

11.4 Dredged area

S-101 Geo Feature: **Dredged Area** (S)

S-57 Geo Object: Dredged area (**DRGARE**) (A) (S-57 UOC Clause 5.5)

All instances of encoding of the S-101 Feature type **Dredged Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DRGARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **maximum permitted draught** and **vessel speed limit** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **DRGARE**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

restriction (RESTRN) see clause 27.155
technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57 the depth of dredging as populated in attribute DRVAL1 does not display in ECDIS. In order to display an indication of the dredged depth, encoders are advised to encode one or more

SOUNDG objects having the same depth as the dredged area within the **DRGARE**; or to encode a **SEAARE** object coincident with or within the **DRGARE** having attribute OBJNAM include a text string similar to *Dredged depth [xx.x]m*, where *[xx.x]* is the value of the dredged depth. Encoders are advised that a suitably configured converter may be capable of implementing one of these options during the automated conversion process, however a check should be carried out on the converted S-57 dataset to ensure the desired result is achieved.

11.5 Swept area

S-101 Geo Feature:	**Swept Area**	(S)	
S-57 Geo Object:	Swept area (**SWPARE**)	(A)	(S-57 UOC Clause 5.6)

All instances of encoding of the S-101 Feature type **Swept Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SWPARE** during the automated conversion process.

11.6 Depth contour

S-101 Geo Feature:	**Depth Contour**	(C)	
S-57 Geo Object:	Depth contour (**DEPCNT**)	(L)	(S-57 UOC Clause 5.2)

All instances of encoding of the S-101 Feature type **Depth Contour** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SWPARE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- Where an encoded **Depth Contour** has an associated instance of the S-101 Information type **Spatial Quality** (see S-101 DCEG clause 24.5), attribute **quality of horizontal measurement** = *4* (approximate) to indicate approximate contours, this will be populated on the converted **DEPCNT** with spatial attribute QUAPOS = *4* (approximate) during the automated conversion process. See clause 24.5.

11.7 Depth area

S-101 Geo Feature:	**Depth Area**	(S)	
S-57 Geo Object:	Depth area (**DEPARE**)	(A)	(S-57 UOC Clause 5.4)

All instances of encoding of the S-101 Feature type **Depth Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DEPARE** during the automated conversion process.

11.8 Depth – no bottom found

S-101 Geo Feature:	**Depth – No Bottom Found**	(P - Pointset)	
S-57 Geo Object:	Sounding (**SOUNDG**)	(P)	(S-57 UOC Clause 5.3)

All instances of encoding of the S-101 Meta Feature type **Depth – No Bottom Found** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SOUNDG**, having attribute QUASOU = *5* (no bottom found at value shown), during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement	(TECSOU)	see clause 27.167

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

11.9 Areas with inadequate depth information

Not applicable.

11.10 Unsurveyed area

S-101 Geo Feature: **Unsurveyed Area** (S)

S-57 Geo Object: Unsurveyed area (**UNSARE**) (A) (S-57 UOC Clause 5.8)

All instances of encoding of the S-101 Feature type **Unsurveyed Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **UNSARE** during the automated conversion process.

12 Geo Features – Nature of the Seabed

12.1 Seabed area

S-101 Geo Feature: **Seabed Area** (P,C,S)

S-57 Geo Object: Seabed area (**SBDARE**) (P,L,A) (S-57 UOC Clause 7.1)

All instances of encoding of the S-101 Feature type **Seabed Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SBDARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **underlying layer** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **SBDARE**. However, **underlying layer**, where populated, will generate the "slash" (/) character in the S-57 formatted attributes NATQUA and NATSUR to indicate the encoding of underlying material (see S-57 UOC clause 7.1, example (b) in Figure 8).

The following additional requirements for S-101 dataset conversion must be noted:

- Where multiple instances of the S-101 complex attribute **surface characteristics** are populated for **Seabed Area**, all having the same or no value populated for the sub-attribute **underlying layer**, the converted values (in the same order) for the S-57 formatted attributes NATSUR and NATQUA based on the sub-attributes **nature of surface** and **nature of surface – qualifying terms** will be delimited by commas. If and instance of **nature of surface** or **nature of surface – qualifying terms** is populated as empty (null) or is not populated, the corresponding entry in NATSUR or NATQUA must be a delimiting comma only.

EXAMPLE: Nature of seabed: fine sand and mud over rock (*fS M/R*)

surface characteristics (1): **nature of surface** = *4* (sand); **nature of surface – qualifying terms** = *1* (fine); **underlying layer** (not populated)

surface characteristics (2): **nature of surface** = *1* (mud); **nature of surface – qualifying terms** (not populated); **underlying layer** (not populated)

surface characteristics (3): **nature of surface** = *9* (rock); **nature of surface – qualifying terms** (not populated); **underlying layer** = *1*

Converts to: NATSUR = *4,1/9* NATQUA = *1,/*

12.2 Weed/kelp

S-101 Geo Feature: **Weed/Kelp** (P,S)

S-57 Geo Object: Weed / Kelp (**WEDKLP**) (P,A) (S-57 UOC Clause 7.2.2)

All instances of encoding of the S-101 Feature type **Weed/Kelp** and its relevant binding attributes will be converted to an instance of the S-57 Object class **WEDKLP** during the automated conversion process.

12.3 Seagrass

S-101 Geo Feature: **Seagrass** (P,S)

S-57 Geo Object: Weed / Kelp (**WEDKLP**) (P,A) (S-57 UOC Clause 7.2.2)

All instances of encoding of the S-101 Meta Feature type **Seagrass** and its relevant binding attributes will be converted to an instance of the S-57 Object class **WEDKLP**, having attribute CATWED = *3* (sea grass), during the automated conversion process.

12.4 Sandwave

S-101 Geo Feature:	**Sandwave**	(P,C,S)	
S-57 Geo Object:	Sandwaves (**SNDWAV**)	(P,L,A)	(S-57 UOC Clause 7.2.1)

All instances of encoding of the S-101 Feature type **Sandwave** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SNDWAV** during the automated conversion process.

12.5 Spring

S-101 Geo Feature:	**Spring**	(P)	
S-57 Geo Object:	Spring (**SPRING**)	(P)	(S-57 UOC Clause 7.2.3)

All instances of encoding of the S-101 Feature type **Spring** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SPRING** during the automated conversion process.

13 Geo Features – Rocks, Wrecks, Foul Ground, Obstructions

13.1 Danger line limiting an area of wrecks or obstructions

Not applicable.

13.2 Danger line bordering an area through which navigation is not safe (see S-4 – B-420.1)

Not applicable.

13.3 Doubtful dangers (see S-4 – B-424)

Not applicable.

13.4 Underwater/awash rock

S-101 Geo Feature:	**Underwater/Awash Rock**	(P)	
S-57 Geo Object:	Underwater / awash rock (**UWTROC**)	(P)	(S-57 UOC Clause 6.1.2)

All instances of encoding of the S-101 Feature type **Underwater/Awash Rock** and its relevant binding attributes will be converted to an instance of the S-57 Object class **UWTROC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **default clearance depth** and **surrounding depth** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **UWTROC**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where an encoded **Underwater/Awash Rock** has an associated instance of the S-101 Information type **Spatial Quality** (see S-101 DCEG clause 24.5), attribute **quality of horizontal measurement** = *4* (approximate) to indicate approximate edge(s), this will be populated on the converted **UWTROC** with spatial attribute QUAPOS = *4* (approximate) during the automated conversion process. See clause 24.5.

13.5 Wreck

S-101 Geo Feature:	**Wreck**	(P,S)	
S-57 Geo Object:	Wreck (**WRECKS**)	(P,A)	(S-57 UOC Clause 6.2.1)

All instances of encoding of the S-101 Feature type **Wreck** and its relevant binding attributes will be converted to an instance of the S-57 Object class **WRECKS** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **default clearance depth** and **surrounding depth** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **WRECKS**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement	(TECSOU)	see clause 27.174
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- Where an encoded **Wreck** has an associated instance of the S-101 Information type **Spatial Quality** (see S-101 DCEG clause 24.5), attribute **quality of horizontal measurement** = *4* (approximate) to indicate approximate edge(s), this will be populated on the converted **WRECKS** with spatial attribute QUAPOS = *4* (approximate) during the automated conversion process. See clause 24.5.

13.6 Obstruction

S-101 Geo Feature:	**Obstruction**	(P,C,S)	
S-57 Geo Object:	Obstruction (**OBSTRN**)	(P,L,A)	(S-57 UOC Clause 6.2.2)

All instances of encoding of the S-101 Feature type **Obstruction** and its relevant binding attributes will be converted to an instance of the S-57 Object class **OBSTRN** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **maximum permitted draught**, **default clearance depth** and **surrounding depth** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **OBSTRN**.
- **Obstruction** of geometric primitive surface and having attribute **category of obstruction** = *23* (mangrove) will be converted to an instance of the S-57 Object class **VEGATN**, having mandatory attribute CATVEG = *7* (mangroves) during the automated conversion process. Where this is the case, the attributes **category of obstruction**, **condition**, **exposition of sounding**, **maximum permitted draught**, **product**, **quality of vertical measurement**, **status**, **technique of vertical measurement**, **maximum permitted draught**, **value of sounding**, **water level effect**, **default clearance depth** and **surrounding depth** will not be converted – these attributes are not relevant for **VEGATN** in S-57. A **COALNE** object having attribute CATCOA = *7* (mangrove) and spatial attribute QUAPOS = *4* (approximate) must also be encoded along the seaward edge of the converted **VEGATN** Object (see S-57 UOC clause 4.7.11).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of obstruction	(CATOBS)	see clause 27.42
product	(PRODCT)	see clause 27.144
status	(STATUS)	see clause 27.171
technique of vertical measurement	(TECSOU)	see clause 27.174

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101, exactly one of the attributes **height** or **value of sounding** must be populated for **Obstruction**. In S-57, the attribute VALSOU is mandatory. If **height** has been populated for an instance of **Obstruction**, the attribute VALSOU on the converted **OBSTRN** Object will be populated as empty (null) during the automated conversion process.
- Where an encoded **Obstruction** has an associated instance of the S-101 Information type **Spatial Quality** (see S-101 DCEG clause 24.5), attribute **quality of horizontal measurement** = *4* (approximate) to indicate approximate edge(s), this will be populated on the converted **OBSTRN** with spatial attribute QUAPOS = *4* (approximate) during the automated conversion process. See clause 24.5.

13.7 Foul ground

S-101 Geo Feature:	**Foul Ground**	(P,S)	
S-57 Geo Object:	Obstruction (**OBSTRN**)	(P,A)	(S-57 UOC Clause 6.2.2)

All instances of encoding of the S-101 Feature type **Foul Ground** and its relevant binding attributes will be converted to an instance of the S-57 Object class **OBSTRN**, having attribute CATOBS = *7* (foul ground), during the automated conversion process. However, data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

status	(STATUS)	see clause 27.171

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- At least one of the S-57 attribute HEIGHT or VALSOU is mandatory for **OBSTRN**, however the S-101 attribute **value of sounding** is not mandatory for **Foul Ground**. For instances of **Foul Ground** having no value populated for **value of sounding**, the converted **OBSTRN** Object will have VALSOU populated with an empty (null) value.
- The S-57 attribute WATLEV is mandatory for **OBSTRN**, however the S-101 attribute **water level effect** is not an allowable attribute for **Foul Ground**. For instances of **Foul Ground**, the converted **OBSTRN** Object will have WATLEV populated with value *3* (always under water/submerged).

13.8 Discoloured water

S-101 Geo Feature: **Discoloured Water** (P,S)

S-57 Geo Object: Caution area (**CTNARE**) (P,A) (S-57 UOC Clause 6.5)

All instances of encoding of the S-101 Feature type **Discoloured Water** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CTNARE**, having attribute INFORM = *Discoloured water*, during the automated conversion process.

13.9 Fishing facility

S-101 Geo Feature: **Fishing Facility** (P,C,S)

S-57 Geo Object: Fishing facility (**FSHFAC**) (P,L,A) (S-57 UOC Clause 11.9.1)

All instances of encoding of the S-101 Feature type **Fishing Facility** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FSHFAC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **condition** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **FSHFAC**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

13.10 Marine farm/culture

S-101 Geo Feature: **Marine Farm/Culture** (P,C,S)

S-57 Geo Object: Marine farm / culture (**MARCUL**) (P,L,A) (S-57 UOC Clause 11.9.2)

All instances of encoding of the S-101 Feature type **Marine Farm/Culture** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MARCUL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **height** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **MARCUL**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

restriction (RESTRN) see clause 27.155
status (STATUS) see clause 27.171

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 attribute VALSOU is mandatory for **MARCUL**, however the S-101 attribute **value of sounding** is not mandatory for **Marine Farm/Culture** if the attribute **height** has been populated. For instances of **Marine Farm/Culture** having no value populated for **value of sounding**, the converted **MARCUL** Feature will have VALSOU populated with an empty (null) value.
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

14 Geo Features – Offshore Installations

14.1 Offshore platform

S-101 Geo Feature: **Offshore Platform** (P,S)

S-57 Geo Object: Offshore platform (**OFSPLF**) (P,A) (S-57 UOC Clause 11.7.2)

All instances of encoding of the S-101 Feature type **Offshore Platform** and its relevant binding attributes will be converted to an instance of the S-57 Object class **OFSPLF** during the automated conversion process. However, the following exceptions apply:

- An **Offshore Platform** having attribute **flare stack** = *True* will, in addition to **OFSPLF**, be converted to an instance of the S-57 Object class **LNDMRK** with attribute CATLMK = *6* (flare stack) during the automated conversion process. See clause 27.100. Where the **Offshore Platform** is of geometric primitive surface, Data Producers may, if required, examine source material and revise the converted **LNDMRK** to be of geometric primitive point at the correct location on the offshore platform.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of offshore platform	(CATOFP)	see clause 27.43
product	(PRODCT)	see clause 27.144
status	(STATUS)	see clause 27.171
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **product** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

14.2 Submarine cable

S-101 Geo Feature: **Cable Submarine** (C)

S-57 Geo Object: Cable, submarine (**CBLSUB**) (L) (S-57 UOC Clause 11.5.1)

All instances of encoding of the S-101 Feature type **Cable Submarine** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CBLSUB** during the automated conversion process. However, the following exceptions apply:

- A **Cable Submarine** having attribute **category of cable** = *9* (junction cable) will be converted to an instance of the S-57 Object class **MORFAC** with attribute CATMOR = *6* (chain/wire/cable) during the automated conversion process. Where this is the case, the attribute **buried depth** will not be converted – this attribute is not relevant for **MORFAC** in S-57.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of cable	(CATCBL)	see clause 27.12

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

14.3 Submarine cable area

S-101 Geo Feature: **Cable Area** (S)

S-57 Geo Object: Cable area (**CBLARE**) (A) (S-57 UOC Clause 11.5.3)

All instances of encoding of the S-101 Feature type **Cable Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CBLARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of cable	(CATCBL)	see clause 27.12
restriction	(RESTRN)	see clause 27.155

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

14.4 Pipeline

S-101 Geo Feature: **Pipeline Submarine/On Land** (C)

S-57 Geo Object: Pipeline, submarine / on land (**PIPSOL**) (P,L) (S-57 UOC Clause 11.6.1)

All instances of encoding of the S-101 Feature type **Pipeline Submarine/On Land** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PIPSOL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **restriction** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attributes on **PIPSOL**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of pipeline/pipe	(CATPIP)	see clause 27.49

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.

14.5 Submarine pipeline area

S-101 Geo Feature: **Submarine Pipeline Area** (P,S)

S-57 Geo Object: Pipeline area (**PIPARE**) (P,A) (S-57 UOC Clause 11.6.4)

All instances of encoding of the S-101 Feature type **Submarine Pipeline Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PIPARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

restriction	(RESTRN)	see clause 27.155

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

14.6 Offshore production area

S-101 Geo Feature: **Offshore Production Area** (S)

S-57 Geo Object: Offshore production area (**OSPARE**) (A) (S-57 UOC Clause 11.7.4)

All instances of encoding of the S-101 Feature type **Offshore Production Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **OSPARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **water level effect** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attributes on **OSPARE**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of offshore production area		see clause 27.44
product	(PRODCT)	see clause 27.144
restriction	(RESTRN)	see clause 27.155
status	(STATUS)	see clause 27.171
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attributes **condition** and **restriction** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15 Geo Features – Tracks and Routes

15.1 Leading, clearing and transit lines and recommended tracks (see S-4 – B-433 and B-434)

Not applicable.

15.1.1 Range systems - relationship

See clause 25.13.

15.2 Traffic Lanes

Not applicable.

15.3 Traffic separation schemes and traffic separation scheme systems (see S-4 – B-435.1-3)

Not applicable.

15.4 Navigation line

S-101 Geo Feature: **Navigation Line** (C)

S-57 Geo Object: Navigation line (**NAVLNE**) (L) (S-57 UOC Clause 10.1.1)

All instances of encoding of the S-101 Feature type **Navigation Line** and its relevant binding attributes will be converted to an instance of the S-57 Object class **NAVLNE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **measured distance** will be converted to an instance of the S-57 attribute INFORM having a standardised text string similar to "*Measured distance = [xxxx] metres*", where *[xxxx]* is the measured distance.. See clause 27.127.

15.5 Recommended track

S-101 Geo Feature: **Recommended Track** (C)

S-57 Geo Object: Recommended track (**RECTRC**) (L) (S-57 UOC Clause 10.1.1)

All instances of encoding of the S-101 Feature type **Recommended Track** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RECTRC** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **technique of vertical measurement** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.6 Range system

S-101 Geo Feature:	**Range System**	(C,S,N)	
S-101 Association:	**Range System Aggregation**	(N)	(See Clause 25.13)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clauses 10.1.2 and 15)

All instances of encoding of the S-101 Feature type **Range System** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **fixed date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attributes on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the range system as defined by the The Component role of the S-101 Association **Range System Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.13).
- If the **Range System** is encoded using geometric primitive curve or surface, the geometry of the **Range System** will not be utilized during the conversion process.
- In S-57,the name of the range system as populated in the attributes OBJNAM and/or NOBJNM on **C_AGGR** will not display in ECDIS. If it is required to display the name of a range system in ECDIS, Data Producers will be required to examine the converted S-57 dataset and encode the name using an appropriate method (see S-57 UOC clause 15).

15.7 Fairway

S-101 Geo Feature:	**Fairway**	(S)	
S-57 Geo Object:	Fairway (**FAIRWY**)	(A)	(S-57 UOC Clause 10.4)

All instances of encoding of the S-101 Feature type **Fairway** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FAIRWY** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

restriction	(RESTRN)	see clause 27.155
status	(STATUS)	see clause 27.171

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **quality of vertical measurement** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to ensure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.8 Fairway systems

S-101 Geo Feature:	**Fairway System**	(S,N)	
S-101 Association:	**Fairway Aggregation**	(N)	(See Clause 25.7)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clauses 10.4 and 15)
S-57 Geo Object:	Sea area (**SEAARE**)	(P,A)	(S-57 UOC Clauses 8 and 14)

All instances of encoding of the S-101 Feature type **Fairway System** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range** and **periodic date range** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the fairway system as defined by the The Component role of the S-101 Association **Fairway Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.7).
- If the **Fairway System** is encoded using geometric primitive surface, the geometry of the **Fairway System** will be utilized during the automated conversion process to create an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**.
- The S-101 attribute **maximum permitted draught** will be converted to an instance of the S-57 attribute INFORM on each instance of the S-57 Object class **FAIRWY** included within the **C_AGGR** (see clause 27.125), unless a value has already been populated for the **FAIRWY** through the conversion of the S-101 Feature type **Fairway** (see clause 15.7).

15.9 Recommended route centreline

S-101 Geo Feature: **Recommended Route Centreline** (C)

S-57 Geo Object: Recommended route centreline (**RCRTCL**) (L) (S-57 UOC Clause 10.2.4)

All instances of encoding of the S-101 Feature type **Recommended Route Centreline** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RCRTCL** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attributes **quality of vertical measurement** and **technique of vertical measurement** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.10 Two-way route part

S-101 Geo Feature: **Two-Way Route Part** (S)

S-57 Geo Object: Two-way route part (**TWRTPT**) (A) (S-57 UOC Clause 10.2.6)

All instances of encoding of the S-101 Feature type **Two-Way Route Part** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TWRTPT** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attributes **quality of vertical measurement** and **technique of vertical measurement** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.11 Two-way route

S-101 Geo Feature:	**Two-Way Route**	(S,N)	
S-101 Association:	**Two-Way Route Aggregation**	(N)	(See Clause 25.19)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clauses 10.2.6 and 15)
S-57 Geo Object:	Sea area (**SEAARE**)	(P,A)	(S-57 UOC Clauses 8 and 10.2.6)

All instances of encoding of the S-101 Feature type **Two-Way Route** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **fixed date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the two-way route as defined by the The Component role of the S-101 Association **Two-Way Route Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.19).
- If the **Two-Way Route** is encoded using geometric primitive surface, the geometry of the **Two-Way Route** will be utilized during the automated conversion process to create an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**.
- The S-101 attribute **maximum permitted draught** will be converted to an instance of the S-57 attribute INFORM on each instance of the S-57 Object class **TWRTPT** included within the **C_AGGR** (see clause 27.125), unless a value has already been populated for the **TWRTPT** through the conversion of the S-101 Feature type **Two-Way Route Part** (see clause 15.10).

15.12 Recommended traffic lane part

S-101 Geo Feature:	**Recommended Traffic Lane Part**	(P,S)	
S-57 Geo Object:	Recommended traffic lane part (**RCTLPT**)	(P,A)	(S-57 UOC Clause 10.2.5)

All instances of encoding of the S-101 Feature type **Recommended Traffic Lane Part** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RCTLPT** during the automated conversion process.

15.13 Deep water route centreline

S-101 Geo Feature:	**Deep Water Route Centreline**	(C)	
S-57 Geo Object:	Deep water route centreline (**DWRTCL**)	(L)	(S-57 UOC Clause 10.2.2.2)

All instances of encoding of the S-101 Feature type **Deep Water Route Centreline** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DWRTCL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **IMO adopted** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **DWRTCL**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

technique of vertical measurement (TECSOU) see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attributes **quality of vertical measurement** and **technique of vertical measurement** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.14 Deep water route part

S-101 Geo Feature: **Deep Water Route Part** (S)

S-57 Geo Object: Deep water route part (**DWRTPT**) (A) (S-57 UOC Clause 10.2.2.1)

All instances of encoding of the S-101 Feature type **Deep Water Route Part** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DWRTPT** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **IMO adopted** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **DWRTPT**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status	(STATUS)	see clause 27.171
technique of vertical measurement	(TECSOU)	see clause 27.174

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attributes **quality of vertical measurement** and **technique of vertical measurement** include allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.15 Deep Water route

S-101 Geo Feature: **Deep Water Route** (S,N)

S-101 Association: **Deep Water Route Aggregation** (N) (See Clause 25.6)

S-57 Collection Object: Aggregation (**C_AGGR**) (N) (S-57 UOC Clauses 10.2.2.1 and 15)

S-57 Geo Object: Sea area (**SEAARE**) (P,A) (S-57 UOC Clauses 8 and 10.2.2.1)

All instances of encoding of the S-101 Feature type **Deep Water Route** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range** and **IMO adopted** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the Deep Water route as defined by the The Component role of the S-101 Association **Deep Water Route Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.6).
- If the **Deep Water Route** is encoded using geometric primitive surface, the geometry of the **Deep Water Route** will be utilized during the automated conversion process to encode an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**.

15.16 Inshore traffic zone

S-101 Geo Feature: **Inshore Traffic Zone** (S)

S-57 Geo Object: Inshore traffic zone (**ISTZNE**) (A) (S-57 UOC Clause 10.2.1.7)

All instances of encoding of the S-101 Feature type **Ice Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ISTZNE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.17 Precautionary area

S-101 Geo Feature: **Precautionary Area** (P,S)

S-57 Geo Object: Precautionary area (**PRCARE**) (P,A) (S-57 UOC Clause 10.2.1.8)

All instances of encoding of the S-101 Feature type **Precautionary Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PRCARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **feature name** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **PRCARE**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.
- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.18 Traffic separation scheme lane part

S-101 Geo Feature: **Traffic Separation Scheme Lane Part** (S)

S-57 Geo Object: Traffic separation scheme lane part (**TSSLPT**) (A) (S-57 UOC Clause 10.2.1.1)

All instances of encoding of the S-101 Feature type **Traffic Separation Scheme Lane Part** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TSSLPT** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 attribute ORIENT is mandatory for **TSSLPT**, however the S-101 attribute **orientation value** is not mandatory for **Traffic Separation Scheme Lane Part** if the part is a junction. For instances of **Traffic Separation Scheme Lane Part** encoded to represent a junction, the converted **TSSLPT** Object will have ORIENT populated with an empty (null) value.
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

15.19 Separation zone or line

S-101 Geo Feature: **Separation Zone or Line** (C,S)

S-57 Geo Object: Traffic separation line (**TSELNE**) (L) (S-57 UOC Clause 10.2.1.3)

S-57 Geo Object: Traffic separation zone (**TSEZNE**) (A) (S-57 UOC Clause 10.2.1.4)

All instances of encoding of the S-101 Feature type **Separation Zone or Line** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TSELNE** (if **Separation Zone or Line** is of geometric primitive curve) or **TSEZNE** (if **Separation Zone or Line** is of geometric primitive surface) during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

15.20 Traffic separation scheme boundary

S-101 Geo Feature: **Traffic Separation Scheme Boundary** (C)

S-57 Geo Object: Traffic separation scheme boundary (**TSSBND**) (L) (S-57 UOC Clause 10.2.1.2)

All instances of encoding of the S-101 Feature type **Traffic Separation Scheme Boundary** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TSSBND** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.164

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

15.21 Traffic separation scheme crossing

S-101 Geo Feature: **Traffic Separation Scheme Crossing** (S)

S-57 Geo Object: Traffic separation scheme crossing (**TSSCRS**) (A) (S-57 UOC Clause 10.2.1.5)

All instances of encoding of the S-101 Feature type **Traffic Separation Scheme Crossing** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TSSCRS** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

15.22 Traffic separation scheme roundabout

S-101 Geo Feature: **Traffic Separation Scheme Roundabout** (S)

S-57 Geo Object: Traffic separation scheme roundabout (**TSSRON**) (A) (S-57 UOC Clause 10.2.1.6)

All instances of encoding of the S-101 Feature type **Traffic Separation Scheme Roundabout** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TSSRON** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

15.23 Traffic separation scheme

S-101 Geo Feature: **Traffic Separation Scheme** (S,N)

S-101 Association: **Traffic Separation Scheme Aggregation** (N) (See Clause 25.18)

S-57 Collection Object: Aggregation (**C_AGGR**) (N) (S-57 UOC Clauses 10.2.3 and 15)

S-57 Geo Object: Sea area (**SEAARE**) (P,A) (S-57 UOC Clauses 8 and 10.2.3)

All instances of encoding of the S-101 Feature type **Traffic Separation Scheme** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **fixed date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **C_AGGR**.

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the two-way route as defined by the The Component role of the S-101 Association **Traffic Separation Scheme Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.18).
- If the **Traffic Separation Scheme** is encoded using geometric primitive surface, the geometry of the **Traffic Separation Scheme** will be utilized during the automated conversion process to encode an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**.
- The S-101 attribute **IMO adopted** will be converted to an instance of the S-57 attribute CATTSS on each instance of the S-57 Object classes included within the **C_AGGR**, unless a value has already been populated for an individual S-57 Object instance through the conversion of the corresponding S-101 Feature type.
- The S-101 attribute **maximum permitted draught** will be converted to an instance of the S-57 attribute INFORM on each instance of the S-57 Object classes included within the **C_AGGR**, unless a value has already been populated for an individual S-57 Object instance through the conversion of the corresponding S-101 Feature type.

15.24 Archipelagic Sea Lane area

S-101 Geo Feature: **Archipelagic Sea Lane Area** (S)

S-57 Geo Object: Archipelagic Sea Lane (**ARCSLN**) (A) (S-57 UOC Clause 10.5.1)

All instances of encoding of the S-101 Feature type **Archipelagic Sea Lane Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ARCSLN** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 attribute NATION is mandatory for **ARCSLN**, however the S-101 attribute **nationality** is not mandatory for **Archipelagic Sea Lane Area** if it is associated with the feature **Archipelagic Sea Lane** using the association **ASL Aggregation**. For instances of **Archipelagic Sea Lane Area** that are associated with the feature **Archipelagic Sea Lane** and that do not have a value populated for **nationality**, the converted **ARCSLN** Object will have NATION populated with the value populated for **nationality** on the associated **Archipelagic Sea Lane**.

15.25 Archipelagic Sea Lane Axis

S-101 Geo Feature: **Archipelagic Sea Lane Axis** (C)

S-57 Geo Object: Archipelagic Sea Lane Axis (**ASLXIS**) (L) (S-57 UOC Clause 10.5.2)

All instances of encoding of the S-101 Feature type **Archipelagic Sea Lane Axis** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ASLXIS** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 attribute NATION is mandatory for **ASLXIS**, however the S-101 attribute **nationality** is not mandatory for **Archipelagic Sea Lane Axis** if it is associated with the feature **Archipelagic**

Sea Lane using the association **ASL Aggregation**. For instances of **Archipelagic Sea Lane Axis** that are associated with the feature **Archipelagic Sea Lane** and that do not have a value populated for **nationality**, the converted **ASLXIS** Object will have NATION populated with the value populated for **nationality** on the associated **Archipelagic Sea Lane**.

15.26 Archipelagic Sea Lane

S-101 Geo Feature:	**Archipelagic Sea Lane**	(S,N)	
S-101 Association:	**ASL Aggregation**	(N)	(See Clause 25.3)
S-57 Collection Object:	Aggregation (**C_AGGR**)	(N)	(S-57 UOC Clauses 10.5.3 and 15)
S-57 Geo Object:	Sea area (**SEAARE**)	(P,A)	(S-57 UOC Clauses 8 and 10.5.3)

All instances of encoding of the S-101 Feature type **Archipelagic Sea Lane** and its relevant binding attributes will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **fixed date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **C_AGGR**.
- The attribute **nationality** will only be converted if the associated instances of the S-101 Features **Archipelagic Sea Lane Area** and **Archipelagic Sea Lane Axis** do not have **nationality** populated (see clauses 15.24 and 15.25).

The following additional requirements for S-101 dataset conversion must be noted:

- All the components of the range system as defined by Consists Of role of the S-101 Association **ASL Aggregation** will be included in the converted **C_AGGR** (see S-101 DCEG clause 25.3).
- If the **Archipelagic Sea Lane** is encoded using geometric primitive surface, the geometry of the **Archipelagic Sea Lane** will be utilized during the automated conversion process to encode an instance of the S-57 Object class **SEAARE**, having attributes OBJNAM and NOBJNM populated in accordance with the values populated for the S-101 complex attribute **feature name**, in addition to the **C_AGGR**..

15.27 Radio calling-in point

S-101 Geo Feature:	**Radio Calling-In Point**	(P,C)	
S-57 Geo Object:	Radio calling-in point (**RDOCAL**)	(P,L)	(S-57 UOC Clause 12.13)

All instances of encoding of the S-101 Feature type **Radio Calling-In Point** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RDOCAL** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- For S-57 ENCs a two-way radio-calling-in point of geometric primitive point having non-reciprocal directions of traffic flow requires the encoding of separate instances of **RDOCAL** for each direction. For S-101 ENCs this is done by encoding both directions using a single instance of **Radio Calling-In Point** having two instances of the attribute **orientation value**. Where a **Radio Calling-In Point** of geometric primitive point has two values populated for **orientation value**, two instances of **RDOCAL** will be created, sharing the same geometry, during the automated conversion process.
- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.
- The S-57 attribute ORIENT is mandatory for **RDOCAL**, however **orientation value** is not mandatory for **Radio Calling-In Point** of geometric primitive curve. For instances of **Radio Calling-In Point** of geometric primitive curve having no value populated for **orientation value**, the converted **RDOCAL** Object will have ORIENT populated as empty (null) during the automated conversion process.

15.28 Ferry route

S-101 Geo Feature: **Ferry Route** (C,S)

S-57 Geo Object: Ferry route (**FERYRT**) (L,A) (S-57 UOC Clause 10.3)

All instances of encoding of the S-101 Feature type **Ferry Route** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FERYRT** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of ferry (CATFRY) see clause 27.25

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **category of ferry**, see clause 27.25.
- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.29 Radar line

S-101 Geo Feature: **Radar Line** (C)

S-57 Geo Object: Radar line (**RADLNE**) (L) (S-57 UOC Clause 12.11.2)

All instances of encoding of the S-101 Feature type **Radar Line** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RADLNE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

15.30 Radar range

S-101 Geo Feature: **Radar Range** (S)

S-57 Geo Object: Radar range (**RADRNG**) (A) (S-57 UOC Clause 12.11.1)

All instances of encoding of the S-101 Feature type **Radar Range** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RADRNG** during the automated conversion process.

The following additional requirements for S-57 dataset conversion must be noted:

- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.

15.31 Radar station

S-101 Geo Feature: **Radar Station** (P)

S-57 Geo Object: Radar station (**RADSTA**) (P) (S-57 UOC Clause 12.11.3)

All instances of encoding of the S-101 Feature type **Radar Station** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RADSTA** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **call sign** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **RADSTA**.

The following additional requirements for S-57 dataset conversion must be noted:

- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.

16 Geo Features – Areas, limits

16.1 International boundaries and national limits (see S-4 – B-440)

Not applicable.

16.2 Maritime jurisdiction areas

S-101 includes the Boolean type attribute **in dispute** in order to indicate that the boundary of two or more Coastal States may be in dispute regarding the establishment of maritime jurisdiction. In S-57, this information is encoded using a **CTNARE** Object. During the automated conversion process, where a maritime jurisdiction area is identified as being in dispute (**in dispute** = *True*), a **CTNARE**, having attribute INFORM populated in a standardised format such as *In dispute*, will be created coincident with the disputed area in addition to the corresponding S-57 maritime jurisdiction area Object(s). In most cases the area is covered by more than one feature indicating that the area is in dispute (for example overlapping **Territorial Sea Area** and **Exclusive Economic Zone** features). Where this occurs, only one **CTNARE** Object must be created. See S-57 UOC clause 11.2.4.

16.3 Anchorage area

S-101 Geo Feature:	**Anchorage Area**	(P,S)	
S-57 Geo Object:	Anchorage area (**ACHARE**)	(P,A)	(S-57 UOC Clause 9.2.1)

All instances of encoding of the S-101 Feature type **Anchorage Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ACHARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of anchorage	(CATACH)	see clause 27.10
category of cargo	(CATACH)	see clause 27.15
restriction	(RESTRN)	see clause 27.155

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.4 Mooring area

S-101 Geo Feature:	**Mooring Area**	(P,S)	
S-57 Geo Object:	Anchorage area (**ACHARE**)	(P,A)	(S-57 UOC Clause 9.2.1)

All instances of encoding of the S-101 Feature type **Mooring Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ACHARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of mooring	(-)	see clause 27.40
restriction	(RESTRN)	see clause 27.155

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **restriction** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.5 Anchor berth

S-101 Geo Feature: **Anchor Berth** (P,S)

S-57 Geo Object: Anchor berth (**ACHBRT**) (P,A) (S-57 UOC Clause 9.2.2)

All instances of encoding of the S-101 Feature type **Anchor Berth** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ACHBRT** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of anchorage	(CATACH)	see clause 27.10
category of cargo	(INFORM)	see clause 27.15

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

16.6 Seaplane landing area

S-101 Geo Feature: **Seaplane Landing Area** (P,S)

S-57 Geo Object: Seaplane landing area (**SPLARE**) (P,A) (S-57 UOC Clause 11.12)

All instances of encoding of the S-101 Feature type **Seaplane Landing Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SPLARE** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

restriction	(RESTRN)	see clause 27.155

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.7 Dumping ground

S-101 Geo Feature: **Dumping Ground** (P,S)

S-57 Geo Object: Dumping ground (**DMPGRD**) (P,A) (S-57 UOC Clause 11.4)

All instances of encoding of the S-101 Feature type **Dumping Ground** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DMPGRD** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **date disused** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **DMPGRD**.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.8 Military practice area

S-101 Geo Feature: **Military Practice Area** (P,S)

S-57 Geo Object: Military practice area (**MIPARE**) (P,A) (S-57 UOC Clause 11.3.1)

All instances of encoding of the S-101 Feature type **Military Practice Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MIPARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **nationality** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **MIPARE**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

restriction (RESTRN) see clause 27.155

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.9 Administration area

S-101 Geo Feature: **Administration Area** (C,S)

S-57 Geo Object: Administration area (**ADMARE**) (A) (S-57 UOC Clause 11.2.1)

All instances of encoding of the S-101 Feature type **Administration Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ADMARE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:
- In S-57, line is not an allowable geometric primitive for **ADMARE**. During the automated conversion process, where an **Administration Area** in S-101 has been encoded using geometric primitive curve, this will be converted to an **ADMARE** Object of geometric primitive area. The area will be centred along the geometry of the **Administration Area** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.
- For additional guidance regarding conversion of the attribute **in dispute**, see clauses 16.2 and 27.113.

16.10 Cargo transhipment area

S-101 Geo Feature: **Cargo Transhipment Area** (P,S)

S-57 Geo Object: Cargo transhipment area (**CTSARE**) (P,A) (S-57 UOC Clause 11.13.4)

All instances of encoding of the S-101 Feature type **Cargo Transhipment Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CTSARE** during the automated conversion process. However, the following exceptions apply:
- The S-101 attribute **restriction** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **CTSARE**.

The following additional requirements for S-101 dataset conversion must be noted:
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.11 Caution area

S-101 Geo Feature: **Caution Area** (P,S)

S-57 Geo Object: Caution area (**CTNARE**) (P,A) (S-57 UOC Clause 6.6)

All instances of encoding of the S-101 Feature type **Caution Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CTNARE** during the automated conversion process. However, the following exceptions apply:
- The S-101 attributes **condition**, **status** and **pictorial representation** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **CTNARE**.
- An instance of **Caution Area** having a value populated for **pictorial representation** and where the complex attribute **information** does not exist or has sub-attributes populated as empty (null) will

not be converted. Data Producers will be required to check their S-101 data to determine whether the **Caution Area** will be required in the corresponding S-57 dataset and amend as required.

16.12 Information area

S-101 Geo Feature:	**Information Area**	(P,S)	
S-57 Geo Object:	Nautical publication information (**M_NPUB**)	(P,A)	(S-57 UOC Clause 2.5)

All instances of encoding of the S-101 Feature type **Information Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **M_NPUB** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **feature name**, **fixed date range**, **periodic date range** and **reported date** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **M_NPUB**.
- The complex attribute **information**, sub-attribute **headline** will be converted to the S-57 attribute PUBREF.

16.13 Contiguous Zone

S-101 Geo Feature:	**Contiguous Zone**	(C,S)	
S-57 Geo Object:	Contiguous Zone (**CONZNE**)	(A)	(S-57 UOC Clause 11.2.5)

All instances of encoding of the S-101 Feature type **Contiguous Zone** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CONZNE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, line is not an allowable geometric primitive for **CONZNE**. During the automated conversion process, where a **Contiguous Zone** in S-101 has been encoded using geometric primitive curve, this will be converted to a **CONZNE** Object of geometric primitive area. The area will be centred along the geometry of the **Contiguous Zone** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.
- For additional guidance regarding conversion of the attribute **in dispute**, see clauses 16.2 and 27.113.

16.14 Continental Shelf area

S-101 Geo Feature:	**Continental Shelf Area**	(C,S)	
S-57 Geo Object:	Continental Shelf area (**COSARE**)	(A)	(S-57 UOC Clause 11.2.7)

All instances of encoding of the S-101 Feature type **Continental Shelf Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **COSARE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, line is not an allowable geometric primitive for **COSARE**. During the automated conversion process, where a **Continental Shelf Area** in S-101 has been encoded using geometric primitive curve, this will be converted to a **COSARE** Object of geometric primitive area. The area will be centred along the geometry of the **Continental Shelf Area** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.

16.15 Custom zone

S-101 Geo Feature:	**Custom Zone**	(S)	
S-57 Geo Object:	Custom zone (**CUSZNE**)	(A)	(S-57 UOC Clause 11.2.2)

All instances of encoding of the S-101 Feature type **Custom Zone** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CUSZNE** during the automated conversion process.

16.16 Exclusive Economic Zone

S-101 Geo Feature: **Exclusive Economic Zone** (C,S)

S-57 Geo Object: Exclusive Economic Zone (**EXEZNE**) (A) (S-57 UOC Clause 11.2.8)

All instances of encoding of the S-101 Feature type **Exclusive Economic Zone** and its relevant binding attributes will be converted to an instance of the S-57 Object class **EXEZNE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, line is not an allowable geometric primitive for **EXEZNE**. During the automated conversion process, where an **Exclusive Economic Zone** in S-101 has been encoded using geometric primitive curve, this will be converted to an **EXEZNE** Object of geometric primitive area. The area will be centred along the geometry of the **Exclusive Economic Zone** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.
- For additional guidance regarding conversion of the attribute **in dispute**, see clauses 16.2 and 27.113.

16.17 Fishery zone

S-101 Geo Feature: **Fishery Zone** (S)

S-57 Geo Object: Fishery zone (**FSHZNE**) (A) (S-57 UOC Clause 11.2.6)

All instances of encoding of the S-101 Feature type **Fishery Zone** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FSHZNE** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **feature name**, sub-attribute **name** will be converted to the S-57 attribute INFORM. If there are multiple instances of **feature name**, only the first instance will be converted.

16.18 Fishing ground

S-101 Geo Feature: **Fishing Ground** (S)

S-57 Geo Object: Fishing ground (**FSHGRD**) (A) (S-57 UOC Clause 11.9.4)

All instances of encoding of the S-101 Feature type **Fishing Ground** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FSHGRD** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **restriction** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **FSHGRD**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.19 Free port area

S-101 Geo Feature: **Free Port Area** (S)

S-57 Geo Object: Free port area (**FRPARE**) (A) (S-57 UOC Clause 11.2.3)

All instances of encoding of the S-101 Feature type **Free Port Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FRPARE** during the automated conversion process.

16.20 Harbour area (administrative)

S-101 Geo Feature: **Harbour Area (Administrative)** (S)

S-57 Geo Object: Harbour area (**HRBARE**) (A) (S-57 UOC Clause 9.1.1)

All instances of encoding of the S-101 Feature type **Harbour Area (Administrative)** and its relevant binding attributes will be converted to an instance of the S-57 Object class **HRBARE** during the automated conversion process.

16.21 Log pond

S-101 Geo Feature: **Log Pond** (P,S)

S-57 Geo Object: Log pond (**LOGPON**) (P,A) (S-57 UOC Clause 11.13.2)

All instances of encoding of the S-101 Feature type **Log Pond** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LOGPON** during the automated conversion process. However, the following exceptions apply:

- The S-101 complex attribute **periodic date range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **LOGPON**.

16.22 Oil barrier

S-101 Geo Feature: **Oil Barrier** (C)

S-57 Geo Object: Oil barrier (**OILBAR**) (L) (S-57 UOC Clause 4.8.19)

All instances of encoding of the S-101 Feature type **Oil Barrier** and its relevant binding attributes will be converted to an instance of the S-57 Object class **OILBAR** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **status** includes allowable enumerate values that are not allowable in S-57 as defined in IHO Publication S-58 – *ENC Validation Checks*, Check 2000. Data Producers should ignore any associated S-58 Errors generated during the S-57 ENC validation process so as to assure that the information included in the converted S-57 dataset is equivalent to the corresponding S-101 dataset.

16.23 Straight Territorial Sea Baseline

S-101 Geo Feature: **Straight Territorial Sea Baseline** (C)

S-57 Geo Object: Straight Territorial Sea Baseline (**STSLNE**) (L) (S-57 UOC Clause 11.2.4)

All instances of encoding of the S-101 Feature type **Straight Territorial Sea Baseline** and its relevant binding attributes will be converted to an instance of the S-57 Object class **STSLNE** during the automated conversion process.

16.24 Territorial Sea area

S-101 Geo Feature: **Territorial Sea Area** (C,S)

S-57 Geo Object: Territorial Sea area (**TESARE**) (A) (S-57 UOC Clause 11.2.4)

All instances of encoding of the S-101 Feature type **Territorial Sea Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **TESARE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-57, line is not an allowable geometric primitive for **TESARE**. During the automated conversion process, where a **Territorial Sea Area** in S-101 has been encoded using geometric primitive curve, this will be converted to a **TESARE** Object of geometric primitive area. The area will be

centred along the geometry of the **Territorial Sea Area** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.
- For additional guidance regarding conversion of the attribute **in dispute**, see clauses 16.2 and 27.113.
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.25 Submarine transit lane

S-101 Geo Feature: **Submarine Transit Lane** (S)

S-57 Geo Object: Submarine transit lane (**SUBTLN**) (A) (S-57 UOC Clause 11.3.2)

All instances of encoding of the S-101 Feature type **Submarine Transit Lane** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SUBTLN** during the automated conversion process. However, the following exceptions apply:
- The S-101 attribute **nationality** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **SUBTLN**.

The following additional requirements for S-101 dataset conversion must be noted:
- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

16.26 Pilotage district

S-101 Geo Feature: **Pilotage District** (S)

S-57 Geo Object: Administration area (**ADMARE**) (A) (S-57 UOC Clauses 11.2.1 and 13.1.2)

All instances of encoding of the S-101 Feature type **Pilotage District** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ADMARE** during the automated conversion process. However, the following exceptions apply:
- If the **Pilotage District** Feature is coincident with a **Harbour Area** Feature, the **Pilotage District** will not be converted.
- The S-101 attribute **communication channel** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **ADMARE**.

The following additional requirements for S-101 dataset conversion must be noted:
- The S-57 mandatory attribute JURSDN for the converted **ADMARE** Object will be populated with the value *3* (national sub-division) during the automated conversion process.
- Where the complex attribute **feature name** has been populated, the S-57 attributes OBJNAM and/or NOBJNM will be populated as appropriate (see clause 27.132). In addition, where the **Pilotage District** is associated to one or more instances of the S-101 Feature **Pilot Boarding Place** using the feature association **Pilotage District Association**, the S-57 attributes PILDST and/or NPLDST will also be populated as appropriate for the corresponding converted **PILBOP** Objects (see clause 22.1).

16.27 Collision regulations limit

S-101 Geo Feature: **Collision Regulations Limit** (C)

S-57 Geo Object: Caution area (**CTNARE**) (A) (S-57 UOC Clauses 6.6 and 11.13.5)

All instances of encoding of the S-101 Feature type **Collision Regulations Limit** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CTNARE** during the automated conversion process. However, the following exceptions apply:
- The S-101 attributes **feature name** (however see exception below) and **regulation citation** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **CTNARE**.

The following additional requirements for S-101 dataset conversion must be noted:
- In S-57, line is not an allowable geometric primitive for **CTNARE**. During the automated conversion process, where a **Collision Regulations Limit** in S-101 has been encoded using geometric

primitive curve, this will be converted to a **CTNARE** Object of geometric primitive area. The area will be centred along the geometry of the **Collision Regulations Limit** and will have a minimum width of 0.3mm at the compilation scale of the converted S-57 ENC dataset.

- If the complex attribute **information**, sub-attribute **text** has not been populated for an instance of **Collision Regulations Limit**, the value for the complex attribute **feature name**, sub-attribute **name** will be populated in the S-57 mandatory attribute INFORM on the **CTNARE**. If both **information/text** and **feature name** are not populated, INFORM will be populated with a standardised text string such as *Collision regulations limit*.

16.28 Marine pollution regulations area

S-101 Geo Feature: **Marine Pollution Regulations Area** (S)

S-57 Geo Object: Administration area (**ADMARE**) (A) (S-57 UOC Clauses 11.2.1 and 11.16)

All instances of encoding of the S-101 Feature type **Marine Pollution Regulations Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ADMARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **regulation citation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **ADMARE**.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-57 mandatory attribute JURSDN will be populated with the value *3* (national sub-division) during the automated conversion process.

17 Geo Features – Restricted Areas – Overview

Not applicable.

17.1 Minefields (see S-4 – B-441.8)

Not applicable.

17.2 Degaussing ranges (see S-4 – B-448)

Not applicable.

17.3 Nature reserves (see S-4 – B-437.3)

Not applicable.

17.4 Speed limits (see S-4 – B-430.2)

In S-101 the complex attribute **vessel speed limit** having sub-attributes **speed limit** and **speed units** is used to encode the speed limit and its unit of measurement where the speed within an area is restricted. In S-57 this information is encoded using the attribute INFORM (see S-57 UOC cluse 9.1.2). During the automated conversion process, the values of **speed limit** and **speed units** are concatenated so as to populate INFORM with a standardised text string similar to "*Speed limit = [xxx] [yyyy]*", where *[xxx]* is the speed limit and *[yyyy]* is the units of measure for the speed limit value. For example *Speed limit = 5 knots*. See clauses 27.165 and 27.168.

The binding of the complex attribute vessel speed limit in S-101 carries a multiplicity of [0..*], meaning that multiple speed limits may be referenced to a single Feature instance for different classes of vessels. Where **vessel speed limit** has multiple instances for a feature instance, the first instance only of **vessel speed limit** will be converted. Data Producers are advised to check converted instances of INFORM and amend as required, which may be amendment of INFORM to include a reference to Nautical Publications; or if it is considered that inclusion of all speed limits by vessel class are required, encoding this information using a text file referenced by the attribute TXTDSC or in a tabular representation referenced by the attribute PICREP.

17.5 Anchoring restricted (see S-4 – B-431.4)

Not applicable.

17.6 Areas to be avoided (see S-4 – B-435.7)

Not applicable.

17.7 Environmentally Sensitive Sea Areas (see S-4 – B-437)

Not applicable.

17.8 Restricted area

S-101 Geo Feature:	**Restricted Area**	(S)	
S-57 Geo Object:	Restricted area (**RESARE**)	(A)	(S-57 UOC Clause 11.1)

All instances of encoding of the S-101 Feature type **Restricted Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RESARE** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **vessel class** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **RESARE**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of restricted area	(CATREA)	see clause 27.57
restriction	(RESTRN)	see clause 27.155
status	(STATUS)	see clause 27.171

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

18 Geo Features – Aids to Navigation – Overview

18.1 Geo features forming parts of navigational aids

Generally, there is a one-for-one relationship between the S-101 Feature types comprising aids to navigation and the corresponding S-57 Object classes.

However, in S-101 topmarks are encoded as part of the navigational aid structure, using the complex attribute **topmark** (see clause 29.34 and clauses 20.1-20.13). During the automated conversion process, all instances of encoding of **topmark** and its sub-attributes will be converted to an instance of the S-57 Object class **TOPMAR**.

S-57 Geo Object: Topmark (**TOPMAR**) (P) (S-57 UOC Clause 12.6)

The following additional requirements for S-101 dataset conversion must be noted:

- Where the complex attributes **fixed date range** and/or **periodic date range** have been populated for the Feature (structure) instance containing the populated **topmark** complex, these will be converted to the attributes DATEND, DATSTA, PEREND and/or PERSTA on the converted **TOPMAR** as appropriate, in addition to being converted to the corresponding attributes on the structure Object, during the automated conversion process.
- The converted **TOPMAR** Object will be included as an equipment Object within the master to slave relationship established for the navigational aid (see clause 18.2).

18.2 Relationships

All Features included in an S-101 **Structure/Equipment** feature association for a navigational aid (see clause 25.16) will be included in an S-57 master to slave relationship during the automated conversion process.

18.3 Buoyage systems and direction of buoyage (see S-4 – B-461)

See clauses 3.5 and 3.6.

19 Geo Features – Lights

Not applicable.

19.1 Lights: General

Not applicable.

19.2 Light all around

S-101 Geo Feature: **Light All Around** (P)

S-57 Geo Object: Light (**LIGHTS**) (P) (S-57 UOC Clause 12.8.1)

All instances of encoding of the S-101 Feature type **Light All Around** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LIGHTS** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **major light**, **multiplicity known** and **signal generation** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **LIGHTS**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
signal generation	(SIGGEN)	see clause 27.161
vertical datum	(VERDAT)	see clause 27.196

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- The S-101 attribute **vertical length** will be converted to an instance of INFORM, having a standardised format such as *Height of light [xx.x] metres*, where *[xx.x]* is the value populated for **vertical length** (decimal part not required if the value is whole metres).
- The converted **LIGHTS** Object will be included as an equipment Object within the master to slave relationship established for the navigational aid (see clause 18.2).

19.3 Light sectored

S-101 Geo Feature: **Light Sectored** (P)

S-57 Geo Object: Light (**LIGHTS**) (P) (S-57 UOC Clauses 12.8.1 and 12.8.6.1)

All instances of encoding of the S-101 Feature type **Light Sectored** and its relevant binding attributes will be converted to one or more instances of the S-57 Object class **LIGHTS** during the automated conversion process (see additional requirements below). However, the following exceptions apply:

- The S-101 attributes **sector line length** and **sector extension** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **LIGHTS**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

light visibility	(LITVIS)	see clause 27.120
marks navigational – system of	(MARSYS)	see clause 27.124
signal generation	(SIGGEN)	see clause 27.161
vertical datum	(VERDAT)	see clause 27.196

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- For S-101 ENC all sectors of a sectored light are encoded within a single **Light Sectored** Feature using the complex attribute **sector characteristics** and its sub-complex attribute **light sector**. For S-57 ENC each light sector of a sectored light is required to be encoded as an individual **LIGHTS** Object. During the automated conversion process, a **Light Sectored** Feature will be converted into one or more **LIGHTS** Objects based on the number of instances of **sector characteristics** and/or **light sector** as follows:
  - One **LIGHTS** Object will be included in the converted S-57 dataset for each instance of the sub-complex attribute **light sector** included in an instance of **sector characteristics**.
  - Attributes of **Light Sectored** that are included as sub-attributes of **sector characteristics** will be populated for each **LIGHTS** instance created during the automated conversion process. If the sub-complex attribute **directional character** has been populated for an instance of **light sector**, the S-57 attribute CATLIT = *1* (directional function) will be included for the converted **LIGHTS**. If sub-attribute **moiré effect** is populated as *True*, attribute CATLIT = *16* (moiré effect) will also be included.
  - Sub-attributes of **sector characteristics** that are included as sub-attributes of **light sector** will be populated for each corresponding **LIGHTS** instance created from a single instance of **sector characteristics** during the automated conversion process.
  - Where the sub-complex attribute **sector information**, sub-attribute **text**, has been populated for an instance of **light sector**, this will override any value that has been populated for the complex attribute **information**, sub-attribute **text** for the converted **LIGHTS** instance.
- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- The converted **LIGHTS** Object(s) will be included as equipment Object(s) within the master to slave relationship established for the navigational aid (see clause 18.2).

19.4 Light fog detector

S-101 Geo Feature: **Light Fog Detector** (P)

S-57 Geo Object: Light (**LIGHTS**) (P) (S-57 UOC Clauses 12.8.1 and 12.8.7)

All instances of encoding of the S-101 Feature type **Light Fog Detector** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LIGHTS**, having attribute CATLIT = *7* (fog detector light), during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **flare bearing** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **LIGHTS**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

signal generation	(SIGGEN)	see clause 27.161
vertical datum	(VERDAT)	see clause 27.196

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 attribute **vertical length** will be converted to an instance of INFORM, having a standardised format such as *Height of light [xx.x] metres*, where *[xx.x]* is the value populated for **vertical length** (decimal part not required if the value is whole metres).
- The converted **LIGHTS** Object will be included as an equipment Object within the master to slave relationship established for the navigational aid (see clause 18.2).

19.5 Air obstruction lights

S-101 Geo Feature: **Light Air Obstruction** (P)

S-57 Geo Object: Light (**LIGHTS**) (P) (S-57 UOC Clauses 12.8.1 and 12.8.7)

All instances of encoding of the S-101 Feature type **Light All Around** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LIGHTS**, having attribute CATLIT = *6* (air obstruction light), during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **flare bearing** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **LIGHTS**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

light visibility	(LITVIS)	see clause 27.120
vertical datum	(VERDAT)	see clause 27.196

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The S-101 complex attribute **multiplicity of features** will be converted to an instance of the S-57 attribute INFORM in accordance with the values populated for its sub-attributes **multiplicity known** and **number of features**. See clauses 27.131 and 27.139.
- The converted **LIGHTS** Object will be included as an equipment Object within the master to slave relationship established for the navigational aid (see clause 18.2).

20 Geo Features – Buoys, Beacons

20.1 Lateral buoy

S-101 Geo Feature: **Lateral Buoy** (P)

S-57 Geo Object: Buoy, lateral (**BOYLAT**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Lateral Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYLAT** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.2 Cardinal buoy

S-101 Geo Feature: **Cardinal Buoy** (P)

S-57 Geo Object: Buoy, cardinal (**BOYCAR**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Cardinal Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYCAR** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.3 Isolated danger buoy

S-101 Geo Feature: **Isolated Danger Buoy** (P)

S-57 Geo Object: Buoy, isolated danger (**BOYISD**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Isolated Danger Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYISD** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.4 Safe water buoy

S-101 Geo Feature: **Safe Water Buoy** (P)

S-57 Geo Object: Buoy, safe water (**BOYSAW**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Safe Water Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOSAW** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.5 Special purpose/general buoy

S-101 Geo Feature: **Special Purpose/General Buoy** (P)

S-57 Geo Object: Buoy, special purpose (**BOYSPP**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Special Purpose/General Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYSPP** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of special purpose mark	(CATSPM)	see clause 27.67
marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.6 Emergency wreck marking buoy

S-101 Geo Feature: **Emergency Wreck Marking Buoy** (P)

S-57 Geo Object: Buoy, special purpose (**BOYSPP**) (P) (S-57 UOC Clause 12.4.1.1)

All instances of encoding of the S-101 Feature type **Emergency Wreck Marking Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYSPP**, having attribute CATSPM = *27* (general warning mark), during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.7 Installation buoy

S-101 Geo Feature: **Installation Buoy** (P)

S-57 Geo Object: Buoy, installation (**BOYISD**) (P) (S-57 UOC Clause 12.4.1)

All instances of encoding of the S-101 Feature type **Installation Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BOYINB** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **visual prominence** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **BOYINB**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

nature of construction (NATCON) see clause 27.136

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.8 Mooring buoy

S-101 Geo Feature: **Mooring Buoy** (P)

S-57 Geo Object: Mooring / warping facility (**MORFAC**) (P,L,A) (S-57 UOC Clause 4.6.7.1)

All instances of encoding of the S-101 Feature type **Mooring Buoy** and its relevant binding attributes will be converted to an instance of the S-57 Object class **MORFAC**, having mandatory attribute CATMOR = *7* (mooring buoy), during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **maximum permitted draught** and **maximum permitted vessel length** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **MORFAC**.
- A **Mooring Buoy** having Boolean type attribute **visitors mooring** = *True* will be converted to an instance of the S-57 Object class **SMCFAC** with mandatory attribute CATSCF = *29* (visitors mooring) during the automated conversion process. Where this is the case, the attributes **buoy shape**, **colour**, **colour pattern**, **fixed date range**, **maximum permitted draught**, **maximum permitted vessel length**, **nature of construction** and **vertical length** will not be converted – these attributes are not relevant for **SMCFAC** in S-57.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

nature of construction (NATCON) see clause 27.136

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.9 Lateral beacon

S-101 Geo Feature: **Lateral Beacon** (P)

S-57 Geo Object: Beacon, lateral (**BCNLAT**) (P) (S-57 UOC Clause 12.3.1)

All instances of encoding of the S-101 Feature type **Lateral Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BCNLAT** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of (MARSYS) see clause 27.124
visual prominence (CONVIS) see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.10 Cardinal beacon

S-101 Geo Feature: **Cardinal Beacon** (P)

S-57 Geo Object: Beacon, cardinal (**BCNCAR**) (P) (S-57 UOC Clause 12.3.1)

All instances of encoding of the S-101 Feature type **Cardinal Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BCNCAR** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.11 Isolated danger beacon

S-101 Geo Feature: **Isolated Danger Beacon** (P)

S-57 Geo Object: Beacon, isolated danger (**BCNISD**) (P) (S-57 UOC Clause 12.3.1)

All instances of encoding of the S-101 Feature type **Isolated Danger Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BCNISD** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.12 Safe water beacon

S-101 Geo Feature: **Safe Water Beacon** (P)

S-57 Geo Object: Beacon, safe water (**BCNSAW**) (P) (S-57 UOC Clause 12.3.1)

All instances of encoding of the S-101 Feature type **Safe Water Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BCNSAW** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

marks navigational – system of	(MARSYS)	see clause 27.124
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.13 Special purpose/general beacon

S-101 Geo Feature: **Special Purpose/General Beacon** (P)

S-57 Geo Object: Beacon, special purpose (**BCNSPP**) (P) (S-57 UOC Clause 12.3.1)

All instances of encoding of the S-101 Feature type **Special Purpose/General Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **BCNSPP** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of special purpose mark	(CATSPM)	see clause 27.67
marks navigational – system of	(MARSYS)	see clause 27.124
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.14 Daymark

S-101 Geo Feature: **Daymark** (P)

S-57 Geo Object: Daymark (**DAYMAR**) (P) (S-57 UOC Clause 12.3.3)

All instances of encoding of the S-101 Feature type **Daymark** and its relevant binding attributes will be converted to an instance of the S-57 Object class **DAYMAR** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **radar conspicuous** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **DAYMAR**.

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

category of special purpose mark	(CATSPM)	see clause 27.67
nature of construction	(NATCON)	see clause 27.136

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.15 Light float

S-101 Geo Feature: **Light Float** (P)

S-57 Geo Object: Light float (**LITFLT**) (P) (S-57 UOC Clause 12.4.2)

All instances of encoding of the S-101 Feature type **Light Float** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LITFLT** during the automated conversion process. However, the following exceptions apply:

- The complex attribute **topmark**, where encoded, will be converted to an instance of the S-57 Object class **TOPMAR** during the automated conversion process (see clause 18.1).

Data Producers are advised that the following enumeration type attributes have enumerate values in S-101 that do not exist in S-57:

nature of construction	(NATCON)	see clause 27.136
visual prominence	(CONVIS)	see clause 27.201

See the above referenced clauses for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.16 Light vessel

S-101 Geo Feature: **Light Vessel** (P)

S-57 Geo Object: Light float (**LITVES**) (P) (S-57 UOC Clause 12.4.2)

All instances of encoding of the S-101 Feature type **Light Vessel** and its relevant binding attributes will be converted to an instance of the S-57 Object class **LITVES** during the automated conversion process. However, Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

visual prominence (CONVIS) see clause 27.201

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

20.17 Retroreflector

S-101 Geo Feature: **Retroreflector** (P)

S-57 Geo Object: Retroreflector (**RETRFL**) (P) (S-57 UOC Clause 12.7)

All instances of encoding of the S-101 Feature type **Retroreflector** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RETRFL** during the automated conversion process.

20.18 Radar reflector

S-101 Geo Feature: **Radar Reflector** (P)

S-57 Geo Object: Radar reflector (**RADRFL**) (P) (S-57 UOC Clause 12.12)

All instances of encoding of the S-101 Feature type **Radar Reflector** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RADRFL** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **fixed date range** and **periodic date range** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **RADRFL**.

20.19 Fog signal

S-101 Geo Feature: **Fog Signal** (P)

S-57 Geo Object: Fog signal (**FOGSIG**) (P) (S-57 UOC Clause 12.5)

All instances of encoding of the S-101 Feature type **Fog Signal** and its relevant binding attributes will be converted to an instance of the S-57 Object class **FOGSIG** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **signal generation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **FOGSIG**. However, see additional requirements below.

The following additional requirements for S-101 dataset conversion must be noted:

- For S-101 ENCs, information regarding the ability for a fog signal to be activated by radio or phone call is encoded using the attribute **signal generation**, values *5* (radio activated) and *6* (call activated). In S-57, this is done using the attribute INFORM on **FOGSIG** (see S-57 UOC clause 12.5). For conversion guidance on the conversion of **signal generation** values *5* and *6*, see clause 27.161, noting that only these values for **signal generation** will be converted for **Fog Signal**.

21 Geo Features – Radar, Radio

21.1 Automatic Identification System (AIS) aids to navigation (see S-4 – B-480-484)

Not applicable.

21.2 Physical AIS aid to navigation

S-101 Geo Feature: **Physical AIS Aid to Navigation** (P) (S-57 UOC Clause 12.14.1)

The S-101 Feature type **Physical AIS Aid to Navigation** has been introduced in S-101 to provide the capability to encode a dedicated feature to indicate the presence of an AIS signal that is actually transmitted from a physical aid to navigation, or appears to be transmitted from the location of a physical aid to navigation but is actually transmitted from an AIS base station. There is no corresponding S-57 Object class to which **Physical AIS Aid to Navigation** can be converted.

All instances of encoding of the S-101 Feature type **Physical AIS Aid to Navigation** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Automatic Identification System (AIS) aid to navigation*, on the physical aid to navigation structure Object instance, during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:
- None of the attributes populated for **Physical AIS Aid to Navigation** will be converted.

21.3 Virtual AIS aid to navigation

S-101 Geo Feature: **Virtual AIS Aid to Navigation** (P)

S-57 Geo Object: New object (**NEWOBJ**) (P) (S-57 UOC Clause 12.14.1.1)

All instances of encoding of the S-101 Feature type **Virtual AIS Aid to Navigation** and its relevant binding attributes will be converted to an instance of the S-57 Object class **NEWOBJ** during the automated conversion process. However, the following exceptions apply:
- The S-101 attributes **estimated range of transmission** and **periodic date range** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **NEWOBJ**.

The following additional requirements for S-101 dataset conversion must be noted:
- Data Producers may be required to check on the values populated for the S-57 mandatory attributes CLSDEF, CLSNAM, INFORM and SYMINS based on the conversion of the S-101 attribute **virtual AIS aid to navigation type**. In particular, the value populated for the attribute SYMINS must be exactly as listed for the relevant value for **virtual AIS aid to navigation type** at clause 27.199.

21.4 Radio station

S-101 Geo Feature: **Radio Station** (P)

S-57 Geo Object: Radio station (**RDOSTA**) (P) (S-57 UOC Clause 12.9)

All instances of encoding of the S-101 Feature type **Radio Station** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RDOSTA** during the automated conversion process. However, the following exceptions apply:
- The S-101 attribute **frequency shore station receives** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **RDOSTA**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of radio station (CATROS) see clause 27.55

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-57 dataset conversion must be noted:

- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.

21.5 Radar transponder beacon

S-101 Geo Feature: **Radar Transponder Beacon** (P)

S-57 Geo Object: Radar transponder beacon (**RTPBCN**) (P) (S-57 UOC Clause 12.10)

All instances of encoding of the S-101 Feature type **Radar Transponder Beacon** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RTPBCN** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **sector line length** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **RTPBCN**.

22 Geo Features – Services

22.1 Pilot boarding place

S-101 Geo Feature: **Pilot Boarding Place** (P,S)

S-57 Geo Object: Pilot boarding place (**PILBOP**) (P,A) (S-57 UOC Clause 13.1.2)

All instances of encoding of the S-101 Feature type **Pilot Boarding Place** and its relevant binding attributes will be converted to an instance of the S-57 Object class **PILBOP** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **category of preference**, **destination** and **pilot movement** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **PILBOP**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

status (STATUS) see clause 27.171

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-101 dataset conversion must be noted:

- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.
- Where the **Pilot Boarding Place** is associated to an instance of the S-101 Feature **Pilotage District**, the **PILBOP** attributes PILDST and/or NPLDST will be populated based on the encoding of the complex attribute **feature name** on the **Pilotage District** Feature (see clause 16.26).

22.2 Vessel traffic service

S-101 Geo Feature: **Vessel Traffic Service Area** (S)

S-57 Geo Object: Administration area (**ADMARE**) (A) (S-57 UOC Clauses 11.2.1 and 12.13)

All instances of encoding of the S-101 Feature type **Vessel Traffic Service Area** and its relevant binding attributes will be converted to an instance of the S-57 Object class **ADMARE** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The mandatory attribute JRSDTN for the converted **ADMARE** Object will be populated with the value *3* (national sub-division).

22.3 Coast Guard station

S-101 Geo Feature: **Coast Guard Station** (P,S)

S-57 Geo Object: Coastguard station (**CGUSTA**) (P) (S-57 UOC Clause 13.2)

All instances of encoding of the S-101 Feature type **Coast Guard Station** and its relevant binding attributes will be converted to an instance of the S-57 Object class **CGUSTA** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **communication channel** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **CGUSTA**.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101 the geometric primitive surface is allowable for **Coast Guard Station** while in S-57 the geometric primitive area is prohibited for **CGUSTA**. Where a **Coast Guard Station** Feature has been encoded using geometric primitive surface this will be converted to geometric primitive point for the converted **CGUSTA**, positioned in the centre of the S-101 polygon geometry, during the automated conversion process.

22.4 Warning signal stations

S-101 Geo Feature: **Signal Station Warning** (P,S)

S-57 Geo Object: Signal station, warning (**SISTAW**) (P) (S-57 UOC Clause 13.4)

All instances of encoding of the S-101 Feature type **Signal Station Warning** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SISTAW** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101 the geometric primitive surface is allowable for **Signal Station Warning** while in S-57 the geometric primitive area is prohibited for **SISTAW**. Where a **Signal Station Warning** Feature has been encoded using geometric primitive area this will be converted to geometric primitive point for the converted **SISTAW**, positioned in the centre of the S-101 polygon geometry, during the automated conversion process.
- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.

22.5 Traffic signal stations

S-101 Geo Feature: **Signal Station Traffic** (P,S)

S-57 Geo Object: Signal station, traffic (**SISTAT**) (P) (S-57 UOC Clause 13.4)

All instances of encoding of the S-101 Feature type **Signal Station Traffic** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SISTAT** during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101 the geometric primitive surface is allowable for **Signal Station Traffic** while in S-57 the geometric primitive area is prohibited for **SISTAT**. Where a **Signal Station Traffic** Feature has been encoded using geometric primitive area this will be converted to geometric primitive point for the converted **SISTAT**, positioned in the centre of the S-101 polygon geometry, during the automated conversion process.
- The format for the S-57 attribute COMCHA is different from the format used for the S-101 attribute **communication channel** (see clause 27.77). Data Producers may be required to revisit converted instances of COMCHA and adjust to comply with the S-57 format convention as required.

22.6 Rescue station

S-101 Geo Feature: **Rescue Station** (P,S)

S-57 Geo Object: Rescue station (**RSCSTA**) (P) (S-57 UOC Clause 13.3)

All instances of encoding of the S-101 Feature type **Rescue Station** and its relevant binding attributes will be converted to an instance of the S-57 Object class **RSCSTA** during the automated conversion process. However, the following exceptions apply:

- The S-101 attribute **communication channel** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute on **RSCSTA**.

The following additional requirements for S-101 dataset conversion must be noted:

- In S-101 the geometric primitive surface is allowable for **Rescue Station** while in S-57 the geometric primitive area is prohibited for **RSCSTA**. Where a **Rescue Station** Feature has been encoded using geometric primitive area this will be converted to geometric primitive point for the converted **RSCSTA**, positioned in the centre of the S-101 polygon geometry, during the automated conversion process.

22.7 Harbour facility

S-101 Geo Feature: **Harbour Facility** (P,S)

S-57 Geo Object: Harbour facility (**HRBFAC**) (P,A) (S-57 UOC Clause 4.6.1)

All instances of encoding of the S-101 Feature type **Harbour Facility** and its relevant binding attributes will be converted to an instance of the S-57 Object class **HRBFAC** during the automated conversion process. However, the following exceptions apply:

- The S-101 attributes **communication channel**, **pictorial representation**, **product** and **restriction** will not be converted. These attributes are enhancements included in S-101 – there is no corresponding S-57 encoding for these attributes on **HRBFAC**.

Data Producers are advised that the following enumeration type attribute has enumerate values in S-101 that do not exist in S-57:

category of harbour facility (CATHAF) see clause 27.30

See the above referenced clause for the mapping of these differences as part of the automated conversion process; and guidance on any additional post-conversion work that may be required.

The following additional requirements for S-57 dataset conversion must be noted:

- For guidance regarding the conversion of the complex attribute **vessel speed limit**, see clause 17.4.

22.8 Small craft facility

S-101 Geo Feature: **Small Craft Facility** (P,S)

S-57 Geo Object: Small craft facility (**SMCFAC**) (P,A) (S-57 UOC Clause 4.6.5)

All instances of encoding of the S-101 Feature type **Small Craft Facility** and its relevant binding attributes will be converted to an instance of the S-57 Object class **SMCFAC** during the automated conversion process.

23 Cartographic Features

23.1 Text placement

S-101 Geo Feature: **Text Placement** (P)

S-57 Geo Object: -

Instances of the S-101 Cartographic Feature type **Text Placement** and its relevant binding attributes will not be converted. This Cartographic Feature type is an enhancement included in S-101 – there is no corresponding S-57 encoding for this Cartographic Feature type.

24 Information types

Information types are used in S-101 to carry information particular to the feature(s) or geometry to which they are associated. Information types carry attributes containing the information relevant to the associated feature(s), but not geometry. There is no corresponding encoding for Information types in S-57.

Instances of S-101 Information types included in a feature/information association will have their populated attributes converted to corresponding attributes for the associated converted S-101 feature instance(s) during the automated conversion process in accordance with the guidance included in the following clauses.

The following additional requirements for S-101 dataset conversion must be noted:

- In many cases, attributes for the Information types will be converted to an instance of the S-57 attribute INFORM, in addition to any populated value for the complex attribute **information**, sub-attribute **text** on the Information type itself or on the associated S-101 Geo feature(s). Where this occurs, the converted text string will include both the attribute name and the value (and if required units of measurement) in a standardised format, for example *Communication channel = [VHF0007]*.
- Where multiple discrete instances of information are converted to a single instance of INFORM, the discrete text strings should be separated by a standard separator, for example a semicolon ";", which may be defined by a suitably configured converter in accordance with the conventions of the Data Producer.
- Where multiple discrete text strings are included in INFORM for a converted S-57 feature, Data Producers are to note the recommended text string limit of 300 characters (see S-57 UOC clause 2.3). Where this limit is exceeded during the automated conversion process, consideration should be given to reducing the number of characters by, for example, abbreviating the text string or removing sections of the text that are not considered to be critical to safe navigation.

24.1 Contact details

S-101 Information Feature: **Contact Details** (N)

Associated S-57 Geo Objects: **ACHARE**, **ACHBRT**, **ADMARE**, **AIRARE**, **BCNCAR**, **BCNISD**, **BCNLAT**, **BCNSAW**, **BCNSPP**, **BERTHS**, **BOYCAR**, **BOYINB**, **BOYISD**, **BOYLAT**, **BOYSAW**, **BOYSPP**, **BRIDGE**, **BUISGL**, **CBLARE**, **CBLOHD**, **CBLSUB**, **CGUSTA**, **CHKPNT**, **CONVYR**, **CRANES**, **DAYMAR**, **DOCARE**, **DRYDOC**, **FLODOC**, **FOGSIG**, **FSHFAC**, **GATCON**, **HRBARE**, **HRBFAC**, **LNDARE**, **LNDRGN**, **LIGHTS**, **LITFLT**, **LITVES**, **LOKBSN**, **MARCUL**, **MORFAC**, **OFSPLF**, **OSPARE**, **PILBOP**, **PIPARE**, **PIPOHD**, **PIPSOL**, **PRDARE**, **RADRNG**, **RADSTA**, **RAILWY**, **RDOCAL**, **RDOSTA**, **RSCSTA**, **RUNWAY**, **SILTNK**, **SISTAT**, **SISTAW**, **SMCFAC**, **SPLARE**, **TUNNEL**

During the automated conversion process, all binding attributes for an encoded instance of the S-101 Information type **Contact Details** will be converted to the relevant attributes for the associated S-57 Geo Objects listed above as follows:

- The S-101 attributes **call sign**, **communication channel** and **frequency shore station transmits** will be converted to the S-57 attributes CALSGN, COMCHA and SIGFRQ respectively where these are allowable on the associated S-57 Geo Objects (see clauses 27.8, 27.77 and 27.160). Where CALSGN, COMCHA and/or SIGFRQ are not allowable, the value(s) will be converted to the S-57 attribute INFORM (see clauses 2.4.6 and 27.177).
- The S-101 attribute **contact instructions** will be converted to the S-57 attribute INFORM (see clause 27.79).
- The attribute **MMSI code**; the complex attributes **fixed date range**, **online resource** and **telecommunications**; and the complex attribute **frequency pair**, sub-attribute **frequency shore station receives** will not be converted. Data Producers may consider populating the information included in these attributes in the S-57 attribute INFORM or a referenced attribute TXTDSC text file manually; or the converter may be configured to automatically populate the values included in these attributes, in accordance with national requirements.

24.2 Service hours

S-101 Information Feature: **Service Hours** (N)

Associated S-57 Geo Objects: **ACHARE, ACHBRT**, **AIRARE**, **BERTHS**, **BRIDGE**, **BUISGL**, **CGUSTA**, **CHKPNT**, **CONVYR**, **CRANES**, **DOCARE**, **DRYDOC**, **FLODOC**, **GATCON**, **LNDMRK**, **LOKBSN**, **PRDARE**, **RDOCAL**, **RUNWAY**, **SPLARE**

All binding attributes for an encoded instance of the S-101 Information type **Service Hours** will be converted to the relevant attributes for the associated S-57 Geo Objects listed above as follows:

- All attributes will not be converted. Data Producers may consider populating the information included in these attributes in the S-57 attribute INFORM or a referenced attribute TXTDSC text file manually; or the converter may be configured to automatically populate the values included in these attributes, in accordance with national requirements.

24.3 Non-standard working day

S-101 Information Feature: **Non-Standard Working Day** (N)

Associated S-57 Geo Objects: **ACHARE, ACHBRT**, **AIRARE**, **BERTHS**, **BRIDGE**, **BUISGL**, **CGUSTA**, **CHKPNT**, **CONVYR**, **CRANES**, **DOCARE**, **DRYDOC**, **FLODOC**, **GATCON**, **LNDMRK**, **LOKBSN**, **PRDARE**, **RDOCAL**, **RUNWAY**, **SPLARE**

All binding attributes for an encoded instance of the S-101 Information type **Non-Standard Working Day** will be converted to the relevant attributes for the associated S-57 Geo Objects listed above as follows:

- All attributes will not be converted. Data Producers may consider populating the information included in these attributes in the S-57 attribute INFORM or a referenced attribute TXTDSC text file manually; or the converter may be configured to automatically populate the values included in these attributes, in accordance with national requirements.

24.4 Nautical information

S-101 Information Feature: **Nautical Information** (N)

Associated S-57 Geo Objects: All Meta and Geo Object classes

All binding attributes for an encoded instance of the S-101 Information type **Nautical Information** will be converted to the relevant attributes for the associated S-57 Geo Objects listed above as follows:

- The S-101 attribute **pictorial representation** will be converted to the S-57 attribute PICREP (see clause 27.142); and the S-101 complex attribute **information**, sub-attributes **file reference** and **text** will be converted to the S-57 attributes TXTDSC/NTXTDS and INFORM/NINFOM respectively (see clauses 27.98 and 27.177).
- The complex attributes **fixed date range** and **periodic date range**; and the complex attribute **information**, sub-attributes **file locator**, **headline** and **language** will not be converted. Data Producers may consider populating the information included in these attributes in the S-57 attribute INFORM or a referenced attribute TXTDSC text file manually; or the converter may be configured to automatically populate the values included in these attributes, in accordance with national requirements.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the S-101 complex attribute **information** to features in S-101 carries a multiplicity of [0..*], meaning that multiple text strings and associated text files may be referenced to a single instance of **Nautical Information**. In general, this is so as to allow a single English language version of the text/file and one or more national language versions of the text/file to be referenced to the **Nautical Information** instance. In addition, **information** may also be populated for the associated S-101 Geo feature(s). In S-57 only a single instance of INFORM, NINFOM, TXTDSC and NTXTDS may exist for any encoded feature instance. Where multiple instances of **file reference** or **text** have been encoded for **Nautical Information** in S-101; or if one or more instances of **information** has also been encoded for the associated Geo feature, Data producers will be required to check their converted S-57 data to ensure that the required information is included.

- The S-101 attribute **pictorial representation** may be populated for the associated S-101 Geo feature(s) in addition to **Nautical Information**. In S-57 only a single instance of PICREP may exist for any encoded feature instance. Where an instance of **pictorial representation** has also been encoded for the associated Geo feature, Data producers will be required to check their converted S-57 data to ensure that the required information is included.

24.5 Spatial quality

S-101 Information Feature: **Spatial Quality** (N)

Associated S-57 Objects: Spatial Objects

The following guidance applies only to **Spatial Quality** Information features associated to the S-101 Spatial types using the association **Spatial Association**. **Spatial Quality** associated to **Quality of Bathymetric Data** Meta features using the association **Quality of Bathymetric Data Composition** will not be converted.

All binding attributes for an encoded instance of the S-101 Information type **Spatial Quality** will be converted to the relevant spatial attributes for the associated S-57 Spatial Objects as follows:

- The S-101 attribute **quality of horizontal measurement** will be converted to the S-57 spatial attribute QUAPOS (see clause 28.15).
- The sum of the sub-attributes **uncertainty fixed** and **uncertainty variable factor** for the complex attribute **horizontal position uncertainty** will be converted to the S-57 spatial attribute POSACC (see clause 29.8). The sum of the sub-attributes **uncertainty fixed** and **uncertainty variable factor** for the complex attribute **vertical uncertainty** will be converted to the S-57 spatial attribute SOUACC (see clause 29.40).
- The complex attribute **fixed date range** will not be converted.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the S-101 complex attribute **spatial accuracy** to **Spatial Quality** in S-101 carries a multiplicity of [0..*], meaning that multiple spatial accuracies may be referenced to a single instance of **Spatial Quality**. In general, this is so as to allow for the encoding of degrading horizontal position and vertical accuracy over time where the binding feature(s) is changeable. During the automated conversion process, where multiple instances of **spatial accuracy** have been encoded for **Spatial Quality** in S-101, the first **spatial accuracy** instance in the sequence (that is, the instance having the earliest date range) will be used in the conversion. Data producers will be required to check their converted S-57 data to ensure that the desired values for POSACC and SOUACC have been included.

25 Association Names

25.1 Additional information

S-101 Association Name: **Additional Information**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/information association **Additional Information** will not be converted to a S-57 Collection Object during the automated conversion process. The information included in the encoding of the Information features included in the “The Information” role of **Additional Information** will be converted to attributes of the associated S-57 Geo Objects as appropriate. See clauses 24.1-4.

25.2 Aids to navigation association

S-101 Association Name: **Aids to Navigation Association**

S-57 Collection Object: **C_ASSO** (S-57 UOC Clause 15)

All instances of encoding of the S-101 feature/feature association **Aids to Navigation Association** will be converted to an instance of the S-57 Collection Object **C_ASSO** during the automated conversion process. The converted **C_ASSO** will include all converted traffic systems (routeing measures) corresponding to the feature instances included in the **“**The Collection” role; and the associated converted navigational aids and other structures included in the **“**The Component Feature” role of the **Aids to Navigation Association**.

25.3 ASL aggregation

S-101 Association Name: **ASL Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.5.3 and 15)

All instances of encoding of the S-101 feature/feature association **ASL Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **ARCSLN** and **ASLXIS** Object instances corresponding to the feature instances included in the **“**The Component” role of the **ASL Aggregation**. See also clause 15.26.

25.4 Bridge aggregation

S-101 Association Name: **Bridge Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clause 15)

All instances of encoding of the S-101 feature/feature association **Bridge Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **BRIDGE** Object instances corresponding to the feature instances included in the **“**The Component” role of the **Bridge Aggregation**.

25.5 Caution area association

S-101 Association Name: **Caution Area Association**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/information association **Caution Area Association** will not be converted to a S-57 Collection Object during the automated conversion process. There is no requirement to identify this association in S-57 data.

25.6 Deep Water route aggregation

S-101 Association Name: **Deep Water Route Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.2.2 and 15)

All instances of encoding of the S-101 feature/feature association **Deep Water Route Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **DWRTCL** and **DWRTPT** Object instances corresponding to the feature instances included in the **"**The Component" role of the **Deep Water Route Aggregation**. See also clause 15.15.

25.7 Fairway aggregation

S-101 Association Name: **Fairway Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.4 and 15)

All instances of encoding of the S-101 feature/feature association **Fairway Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **FAIRWY** Object instances corresponding to the feature instances included in the **"**The Component" role of the **Fairway Aggregation**. See also clause 15.8.

25.8 Fairway auxiliary

S-101 Association Name: **Fairway Auxiliary**

S-57 Collection Object: **C_ASSO** (S-57 UOC Clauses 10.4 and 15)

All instances of encoding of the S-101 feature/feature association **Fairway Auxiliary** will be converted to an instance of the S-57 Collection Object **C_ASSO** during the automated conversion process. The converted **C_ASSO** will include all converted **FAIRWY** Object instances corresponding to the feature instances included in the **"**The Primary Feature" role; and the associated converted navigational aids, recommended tracks, dredged areas, and other regulated areas included in the **"**The Auxiliary Feature" role of the **Fairway Auxiliary**.

25.9 Island aggregation

S-101 Association Name: **Island Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 14 and 15)

All instances of encoding of the S-101 feature/feature association **Island Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **LNDARE** Object instances corresponding to the feature instances; and **C_AGGR** (where the **Island Aggregation** contains a smaller named group of islands (**Island Group**) as a sub-component) included in the **"**The Component" role of the **Island Aggregation**.

25.10 Mooring trot aggregation

S-101 Association Name: **Mooring Trot Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 9.2.5 and 15)

All instances of encoding of the S-101 feature/feature association **Mooring Trot Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **BERTHS**, **CBLSUB**, **MORFAC** and **OBSTRN** Object instances corresponding to the **Mooring Trot** feature instance included in the **"**The Component" role of the **Mooring Trot Aggregation**. See also clause 8.23.

25.11 Pilotage district association

S-101 Association Name: **Pilotage District Association**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clause 15)

All instances of encoding of the S-101 feature/feature association **Pilotage District Association** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **PILBOP** Object instances corresponding to the feature instances included in the **"**The Component" role and the converted **ADMARE** Object instance corresponding to the feature instance included in the **"**The Collection" role of the **Pilotage District Association**.

25.12 Quality of bathymetric data composition

S-101 Association Name: **Quality of Bathymetric Data Composition**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/information association **Quality of Bathymetric Data Composition** will not be converted to a S-57 Collection Object during the automated conversion process. The information included in the encoding of the Information feature **Spatial Quality** will be converted to attributes of the associated S-57 attributes as appropriate. See clause 24.5.

25.13 Range system aggregation

S-101 Association Name: **Range System Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.1.2 and 15)

All instances of encoding of the S-101 feature/feature association **Range System Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted tracks and defining navigational aids; and **C_AGGR** (where the **Range System Aggregation** contains a smaller range system as a sub-component) included in the **"**The Component" role of the **Range System Aggregation**. See also clause 15.6.

25.14 Roofed structure aggregation

S-101 Association Name: **Roofed Structure Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clause 15)

All instances of encoding of the S-101 feature/feature association **Roofed Structure Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **PYLONS** Object instances corresponding to the feature instances included in the **"**The Support" role and the converted **BUISGL** (and converted **HRBFAC** if created – see clause 8.7) Object instance(s) corresponding to the **Structure Over Navigable Water** feature instance included in the **"**The Roofed Structure" role of the **Roofed Structure Aggregation**.

25.15 Spatial association

S-101 Association Name: **Spatial Association**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/information association **Spatial Association** will not be converted to a S-57 Collection Object during the automated conversion process. The information included in the encoding of the Information feature **Spatial Quality** will be converted to attributes of the associated S-57 attributes as appropriate. See clause 24.5.

25.16 Structure/equipment

S-101 Association Name: **Structure/Equipment**

S-57 Collection Object: None (S-57 UOC Clause 12.1)

All instances of encoding of the S-101 feature/feature association **Structure/Equipment** will be converted to an S-57 master to slave relationship during the automated conversion process. The converted master to slave relationship will include the converted aid to navigation structure Object instance included in the **"**The Structure" role (and also including any converted **TOPMAR** Object created by conversion of the complex attribute **topmark**); and the converted aid to navigation equipment Object instance(s) included in the **"**The Equipment" role of the **Structure/Equipment** association.

25.17 Text association

S-101 Association Name: **Text Association**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/feature association **Text Association** will not be converted to a S-57 Collection Object during the automated conversion process. The Cartographic Feature type **Text Placement** is an enhancement included in S-101 – there is no corresponding S-57 encoding for this Cartographic Feature type. See clause 23.1.

25.18 Traffic Separation Scheme aggregation

S-101 Association Name: **Traffic Separation Scheme Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.2.3 and 15)

All instances of encoding of the S-101 feature/feature association **Traffic Separation Scheme Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted Traffic Separation Scheme components; and **C_AGGR** (where the **Traffic Separation Scheme Aggregation** system contains a smaller Traffic Separation Scheme(s) as a sub-component) included in the **"**The Component" role of the **Traffic Separation Scheme Aggregation**. See also clause 15.23.

25.19 Two-way route aggregation

S-101 Association Name: **Two-Way Route Aggregation**

S-57 Collection Object: **C_AGGR** (S-57 UOC Clauses 10.2.6 and 15)

All instances of encoding of the S-101 feature/feature association **Two-Way Route Aggregation** will be converted to an instance of the S-57 Collection Object **C_AGGR** during the automated conversion process. The converted **C_AGGR** will include all converted **TWRTPT** Object instances corresponding to the feature instances included in the **"**The Component" role of the **Two-Way Route Aggregation**. See also clause 15.11.

25.20 Update aggregation

S-101 Association Name: **Update aggregation**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/feature association **Update aggregation** will not be converted to a S-57 Collection Object during the automated conversion process. The Meta Feature type **Update Information** is an enhancement included in S-101 – there is no corresponding S-57 encoding for this Meta Feature type. See clause 3.11.

25.21 Updated information

S-101 Association Name: **Updated Information**

S-57 Collection Object: None

Instances of encoding of the S-101 feature/feature association **Updated Information** will not be converted to a S-57 Collection Object during the automated conversion process. The Meta Feature type **Update Information** is an enhancement included in S-101 – there is no corresponding S-57 encoding for this Meta Feature type. See clause 3.11.

26 Association Roles

Not applicable.

27 Geo Feature Attribute and Enumerate Descriptions

The following clauses provide specific guidance, where required, for the conversion of S-101 attributes to the corresponding S-57 attribute. For enumeration type attributes, only values for which there is no direct “one-to-one” mapping are listed.

NOTE 1: Where a S-57 attribute is a “List” enumeration type and more than one instance of the corresponding S-101 enumeration type attribute has been populated for a Feature instance, these values will be listed as ordered for the S-101 Feature instance and separated by commas during the automated conversion process. Where the S-57 attribute is an “Enumerated” enumeration type (that is, only a single enumerate may be populated for the attribute), only the first value in the order populated for the corresponding S-101 attribute will be converted. Data Producers will be required to check their converted S-57 dataset to confirm that the required value has been populated.

NOTE 2: Where an enumerate value maps to a S-57 text string (for example INFORM), the converted text string shown in the clauses below is an example only; a suitably configured converter may be capable of populating the attribute with an alternative text string as required by the Data Producer. See clause 2.4.6.

NOTE 3: Where the guidance in the following clauses specifies conversion of an enumerate value to a standardised text string populated for the attribute INFORM, a suitably configured converter may also optionally populate a national language version of the text string for the attribute NINFOM, if required.

NOTE 4: Data Producers should note that many enhancements have been introduced in S-101 that are not required in S-57 for datasets to be “fully compliant” with S-57 encoding guidance as included in the S-57 UOC. As such, the conversion of these enhancements to S-57 as instances of INFORM/NINFOM may be considered to be optional. Where this is the case, this is indicated by the conversion guidance having a grey background.

27.1 based on fixed marks *(CATTRK)*

All instances of encoding of the S-101 Boolean type attribute **based on fixed marks** will be converted to an instance of the S-57 enumeration type attribute CATTRK during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
True	CATTRK = *1* (based on a system of fixed marks)	
False	CATTRK = *2* (not based on a system of fixed marks)	

27.2 beacon shape (BCNSHP)

All instances of encoding of the S-101 attribute **beacon shape** will be converted to an instance of the S-57 attribute BCNSHP during the automated conversion process.

27.3 bridge construction *(CATBRG)*

A direct equivalent to the S-101 attribute **bridge construction** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **bridge construction** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (arch)	-	This value is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
2 (viaduct)	CATBRG = *10* (viaduct)	

3 (pontoon bridge)	CATBRG = *6* (pontoon bridge)	
4 (suspension bridge)	CATBRG = *12* (suspension bridge)	
5 (transporter bridge)	CATBRG = *8* (transporter bridge)	

27.4 bridge function *(CATBRG)*

A direct equivalent to the S-101 attribute **bridge function** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **bridge function** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (vehicular)	-	This value is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
2 (rail)	-	This value is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
3 (pedestrian)	CATBRG = *9* (footbridge)	
4 (aqueduct)	CATBRG = *11* (aqueduct)	

27.5 building shape (BUISHP)

All instances of encoding of the S-101 attribute **building shape** will be converted to an instance of the S-57 attribute BUISHP during the automated conversion process.

27.6 buoy shape (BOYSHP)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **buoy shape** will be converted to an instance of the S-57 attribute BOYSHP during the automated conversion process.

27.7 buried depth (BURDEP)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **buried depth** will be converted to an instance of the S-57 attribute BURDEP during the automated conversion process.

27.8 call sign (CALSGN)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **call sign** will be converted to an instance of the S-57 attribute CALSGN during the automated conversion process.

27.9 category of airport/airfield (CATAIR)

With the exception of the following, all instances of encoding of the S-101 attribute **category of airport/airfield** will be converted to an instance of the S-57 attribute CATAIR during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
9 (search and rescue airfield)	INFORM = *Search and rescue airfield*	

27.10 category of anchorage (CATACH)

With the exception of the following, all instances of encoding of the S-101 attribute **category of anchorage** will be converted to an instance of the S-57 attribute CATACH during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
14 (waiting anchorage)	INFORM = *Waiting anchorage*	
15 (reported anchorage)	CATACH = *1* (unrestricted anchorage) INFORM = *Reported anchorage* STATUS = *3* (recommended)	

27.11 category of built-up area (CATBUA)

All instances of encoding of the S-101 attribute **category of built-up area** will be converted to an instance of the S-57 attribute CATBUA during the automated conversion process.

27.12 category of cable (CATCBL)

With the exception of the following, all instances of encoding of the S-101 attribute **category of cable** will be converted to an instance of the S-57 attribute CATCBL during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
7 (ferry)	INFORM = *Ferry cable*	
9 (junction cable)	CATMOR = *6* (chain/wire/cable)	On **MORFAC** Object.
10 (telecommunications cable)	CATCBL = *4* (telephone)	

27.13 category of canal (CATCAN)

All instances of encoding of the S-101 attribute **category of canal** will be converted to an instance of the S-57 attribute CATCAN during the automated conversion process.

27.14 category of cardinal mark (CATCAM)

All instances of encoding of the S-101 attribute **category of cardinal mark** will be converted to an instance of the S-57 attribute CATCAM during the automated conversion process.

27.15 category of cargo

The S-101 attribute **category of cargo** will only be converted to an instance of the S-57 attribute INFORM during the automated conversion process if it is populated as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
category of cargo = *7* (dangerous or hazardous)	CATACH = *4* (explosives anchorage)	For conversion of **Anchorage Area** Feature.
category of cargo = *7* (dangerous or hazardous)	INFORM = *Dangerous or hazardous cargo berth*	For conversion of **Berth** Feature.

All other values for **category of cargo** will not be converted. However, a suitably configured converter may populate INFORM similar to above for other values of **category of cargo** to meet national requirements.

27.16 category of checkpoint (CATCHP)

All instances of encoding of the S-101 attribute **category of checkpoint** will be converted to an instance of the S-57 attribute CATCHP during the automated conversion process.

27.17 category of coastline (CATCOA)

All instances of encoding of the S-101 attribute **category of coastline** will be converted to an instance of the S-57 attribute CATCOA during the automated conversion process. Additionally, selected values for the S-101 attribute **nature of surface**, when encoded on the S-101 feature **Coastline**, will be converted to CATCOA as follows (see clause 5.3):

S-101 Attribute Value	S-57 Attribute/Value	Comments
nature of surface = *4* (sand)	CATCOA = *3* (sandy shore)	
nature of surface = *5* (stone)	CATCOA = *4* (stony shore)	
nature of surface = *7* (pebbles)	CATCOA = *5* (shingly shore)	
nature of surface = *14* (coral)	CATCOA = *9* (coral reef)	
nature of surface = *17* (shells)	CATCOA = *11* (shelly shore)	

27.18 category of conveyor (CATCON)

With the exception of the following, all instances of encoding of the S-101 attribute **category of conveyor** will be converted to an instance of the S-57 attribute CATCON during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
3 (flume)	INFORM = *Flume*	
4 (lift/elevator)	INFORM = *Lift/elevator*	

27.19 category of crane (CATCRN)

With the exception of the following, all instances of encoding of the S-101 attribute **category of crane** will be converted to an instance of the S-57 attribute CATCRN during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
6 (goliath crane)	INFORM = *Goliath crane*	

27.20 category of dam (CATDAM)

All instances of encoding of the S-101 attribute **category of dam** will be converted to an instance of the S-57 attribute CATDAM during the automated conversion process.

27.21 category of dock (CATDOC)

All instances of encoding of the S-101 attribute **category of dock** will be converted to an instance of the S-57 attribute CATDOC during the automated conversion process.

27.22 category of dolphin

Instances* of encoding of the S-101 attribute **category of dolphin** will be converted to an instance of the S-57 attribute CATMOR during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (mooring dolphin)	CATMOR = *1* (dolphin)	On **MORFAC** Object.
2 (deviation dolphin)	CATMOR = *2* (deviation dolphin)	On **MORFAC** Object.
3 (berthing dolphin)	CATMOR = *1* (dolphin)	On **MORFAC** Object.
4 (fender or breaching dolphin)	CATMOR = *1* (dolphin)	On **MORFAC** Object.

* In S-101 **category of dolphin** has multiplicity [1..*], while in S-57 CATMOR is an Enumerated type attribute and can therefore carry only a single value. Where **category of dolphin** has multiple instances for a feature instance, only the first instance will be converted during the automated conversion process.

27.23 category of dumping ground (CATDPG)

All instances of encoding of the S-101 attribute **category of dumping ground** will be converted to an instance of the S-57 attribute CATDPG during the automated conversion process.

27.24 category of fence (CATFNC)

All instances of encoding of the S-101 attribute **category of fence** will be converted to an instance of the S-57 attribute CATFNC during the automated conversion process.

27.25 category of ferry (CATFRY)

With the exception of the following, all instances of encoding of the S-101 attribute **category of ferry*** will be converted to an instance of the S-57 attribute CATFRY during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
5 (high speed ferry)	CATFRY = empty (null) INFORM = *High speed ferry*	

* In S-101 **category of ferry** has multiplicity [1..*], while in S-57 CATFRY is an Enumerated type attribute and can therefore carry only a single value. Where **category of ferry** has multiple instances for a feature instance, only the first instance will be converted during the automated conversion process.

27.26 category of fishing facility (CATFIF)

All instances of encoding of the S-101 attribute **category of fishing facility** will be converted to an instance of the S-57 attribute CATFIF during the automated conversion process.

27.27 category of fog signal (CATFOG)

All instances of encoding of the S-101 attribute **category of fog signal** will be converted to an instance of the S-57 attribute CATFOG during the automated conversion process.

27.28 category of fortified structure (CATFOR)

With the exception of the following, all instances of encoding of the S-101 attribute **category of fortified structure** will be converted to an instance of the S-57 attribute CATFOR during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
8 (fortified submarine shelter)	INFORM = *Fortified submarine shelter*	
9 (rampart)	INFORM = *Rampart*	

27.29 category of gate (CATGAT)

All instances of encoding of the S-101 attribute **category of gate** will be converted to an instance of the S-57 attribute CATGAT during the automated conversion process.

27.30 category of harbour facility (CATHAF)

With the exception of the following, all instances of encoding of the S-101 attribute **category of harbour facility** will be converted to an instance of the S-57 attribute CATHAF during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
14 (service harbour)	CATHAF = empty (null) INFORM = *Service harbour*	
15 (pilotage service)	CATHAF = empty (null) INFORM = *Pilotage service*	

27.31 category of hulk (CATHLK)

With the exception of the following, all instances of encoding of the S-101 attribute **category of hulk** will be converted to an instance of the S-57 attribute CATHLK during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
6 (casino)	INFORM = *Casino*	
7 (training vessel)	INFORM = *Training vessel*	

27.32 category of ice (CATICE)

All instances of encoding of the S-101 attribute **category of ice** will be converted to an instance of the S-57 attribute CATICE during the automated conversion process.

27.33 category of installation buoy (CATINB)

All instances of encoding of the S-101 attribute **category of installation buoy** will be converted to an instance of the S-57 attribute CATINB during the automated conversion process.

27.34 category of land region (CATLND)

With the exception of the following, all instances of encoding of the S-101 attribute **category of land region** will be converted to an instance of the S-57 attribute CATLND during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
21 (wadi)	CATLMK = empty (null) INFORM = *Wadi*	Only if complex attribute **feature name** is not encoded; otherwise not converted.

27.35 category of landmark (CATLMK)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **category of landmark** will be converted to an instance of the S-57 attribute CATLMK during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
24 (observation wheel)	CATLMK = empty (null) INFORM = *Observation wheel*	
25 (torii)	CATLMK = empty (null) INFORM = *Torii*	

27.36 category of lateral mark (CATLAM)

All instances of encoding of the S-101 attribute **category of lateral mark** will be converted to an instance of the S-57 attribute CATLAM during the automated conversion process.

27.37 category of light (CATLIT)

All instances of encoding of the S-101 attribute **category of light** will be converted to an instance of the S-57 attribute CATLIT during the automated conversion process.

27.38 category of marine farm/culture (CATMFA)

All instances of encoding of the S-101 attribute **category of marine farm/culture** will be converted to an instance of the S-57 attribute CATMFA during the automated conversion process.

27.39 category of military practice area (CATMPA)

All instances of encoding of the S-101 attribute **category of military practice area** will be converted to an instance of the S-57 attribute CATMPA during the automated conversion process.

27.40 category of mooring area

A direct equivalent to the S-101 attribute **category of mooring area** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **category of mooring area** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (small craft mooring area)	CATACH = *8* (small craft mooring area)	On **ACHARE** Object.
2 (mooring area for visitors)	INFORM = *Mooring area for visitors*	On **ACHARE** Object.
3 (mooring area for tankers)	INFORM = *Mooring area for tankers*	On **ACHARE** Object.

27.41 category of navigation line (CATNAV)

All instances of encoding of the S-101 attribute **category of navigation line** will be converted to an instance of the S-57 attribute CATNAV during the automated conversion process.

27.42 category of obstruction (CATOBS)

With the exception of the following, all instances of encoding of the S-101 attribute **category of obstruction** will be converted to an instance of the S-57 attribute CATOBS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
12 (wave energy device)	INFORM = *Wave energy device*	
13 (subsurface ocean data acquisition system)	INFORM = *Subsurface ocean data acquisition system*	
14 (artificial reef)	INFORM = *Artificial reef*	
15 (template)	INFORM = *Template*	
16 (manifold)	INFORM = *Manifold*	
17 (submerged pingo)	INFORM = *Submerged pingo*	
18 (remains of platform)	INFORM = *Remains of platform*	
19 (scientific instrument)	INFORM = *Scientific instrument*	
20 (underwater turbine)	INFORM = *Underwater turbine*	
21 (active submarine volcano)	INFORM = *Active submarine volcano*	
22 (shark net)	INFORM = *Shark net*	
23 (mangrove)	INFORM = *Mangrove*	Only for **Obstruction** of geometric primitive point. **Obstruction** of geometric primitive surface will convert to a **VEGATN** Object. See clause 13.6.

27.43 category of offshore platform (CATOFP)

With the exception of the following, all instances of encoding of the S-101 attribute **category of offshore platform** will be converted to an instance of the S-57 attribute CATOFP during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
11 (floating oil tank)	INFORM = *Floating oil tank*	

27.44 category of offshore production area *(CATPRA)*

A direct equivalent to the S-101 attribute **category of offshore production area** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **category of offshore production area** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (wind farm)	CATPRA = *9* (wind farm)	
2 (wave farm)	INFORM = *Wave farm*	
3 (current farm)	INFORM = *Current farm*	
4 (tank farm)	CATPRA = *8* (tank farm)	
5 (seabed material extraction area)	INFORM = *Seabed material extraction area*	
6 (solar farm)	INFORM = *Solar farm*	

27.45 category of oil barrier (CATOLB)

All instances of encoding of the S-101 attribute **category of oil barrier** will be converted to an instance of the S-57 attribute CATOLB during the automated conversion process.

27.46 category of opening bridge *(CATBRG)*

A direct equivalent to the S-101 attribute **category of opening bridge** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **category of opening bridge** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
3 (swing bridge)	CATBRG = *3* (swing bridge)	
4 (lifting bridge)	CATBRG = *4* (lifting bridge)	
5 (bascule bridge)	CATBRG = *5* (bascule bridge)	
7 (drawbridge)	CATBRG = *7* (draw bridge)	

27.47 category of pile (CATPLE)

With the exception of the following, all instances of encoding of the S-101 attribute **category of pile** will be converted to an instance of the S-57 attribute CATPLE during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
5 (piling)	INFORM = *Piling*	If **Pile** is of geometric primitive curve, is encoded in INFORM on **MORFAC** Object.
6 (area of piles)	INFORM = *Area of piles*	If **Pile** is of geometric primitive surface, is encoded in INFORM on **CTNARE** Object.
7 (pipe)	INFORM = *Pipe*	If **Pile** is of geometric primitive curve or surface, is encoded in INFORM on **MORFAC** Object.
8 (mooring post)	CATMOR = *5* (post or pile)	On **MORFAC** Object.

27.48 category of pilot boarding place (CATPIL)

All instances of encoding of the S-101 attribute **category of pilot boarding place** will be converted to an instance of the S-57 attribute CATPIL during the automated conversion process.

27.49 category of pipeline/pipe (CATPIP)

All instances of encoding of the S-101 attribute **category of pipeline/pipe** will be converted to an instance of the S-57 attribute CATPIP during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
7 (bubble curtain)	CATPIP = *5* (bubbler system)	

27.50 category of preference

The S-101 attribute **category of preference** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.51 category of production area (CATPRA)

With the exception of the following, all instances of encoding of the S-101 attribute **category of production area** will be converted to an instance of the S-57 attribute CATPRA during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
11 (production plant)	CATPRA = empty (null) INFORM = *Production plant*	
12 (solar farm)	CATPRA = empty (null) INFORM = *Solar farm*	

27.52 category of pylon (CATPYL)

With the exception of the following, all instances of encoding of the S-101 attribute **category of pylon** will be converted to an instance of the S-57 attribute CATPYL during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
6 (pipeline pylon)	CATPYL = empty (null) INFORM = *Pipeline pylon*	

27.53 category of radar station (CATRAS)

All instances of encoding of the S-101 attribute **category of radar station** will be converted to an instance of the S-57 attribute CATRAS during the automated conversion process.

27.54 category of radar transponder beacon (CATRTB)

All instances of encoding of the S-101 attribute **category of radar transponder beacon** will be converted to an instance of the S-57 attribute CATRTB during the automated conversion process.

27.55 category of radio station (CATROS)

With the exception of the following, all instances of encoding of the S-101 attribute **category of radio station** will be converted to an instance of the S-57 attribute CATROS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
19 (radio telephone station)	INFORM = *Radio telephone station*	
20 (AIS base station)	INFORM = *AIS base station*	

27.56 category of rescue station (CATRSC)

All instances of encoding of the S-101 attribute **category of rescue station** will be converted to an instance of the S-57 attribute CATRSC during the automated conversion process.

27.57 category of restricted area (CATREA)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **category of restricted area** will be converted to an instance of the S-57 attribute CATREA during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
29 (disengagement area)	INFORM = *Disengagement area*	
30 (port security area)	INFORM = *Port security area*	
31 (coral sanctuary)	INFORM = *Coral sanctuary*	
32 (recreation area)	INFORM = *Recreation area*	May be amended to CATREA = *26* (water skiing area) if the area is actually a water skiing area.

NOTE: If more than one instance of the above values have been populated for **category of restricted area**, each value will be included in INFORM as above separated by a semicolon ";".

27.58 category of road (CATROD)

All instances of encoding of the S-101 attribute **category of road** will be converted to an instance of the S-57 attribute CATROD during the automated conversion process.

27.59 category of schedule

The S-101 attribute **category of schedule** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.60 category of sea area (CATSEA)

With the exception of the following, all instances of encoding of the S-101 attribute **category of sea area** will be converted to an instance of the S-57 attribute CATSEA during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
55 (intertidal cay)	INFORM = *Intertidal cay*	
56 (submarine volcano)	INFORM = *Submarine volcano*	

27.61 category of shoreline construction (CATSLC)

With the exception of the following, all instances of encoding of the S-101 attribute **category of shoreline construction** will be converted to an instance of the S-57 attribute CATSLC during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
20 (swimming facility)	INFORM = *Swimming facility*	
22 (quay)	CATSLC = *6* (wharf (quay))	
23 (tie-up wall)	CATMOR = *4* (tie-up wall)	On **MORFAC** Object.

27.62 category of signal station, traffic (CATSIT)

All instances of encoding of the S-101 attribute **category of signal station, traffic** will be converted to an instance of the S-57 attribute CATSIT during the automated conversion process.

27.63 category of signal station, warning (CATSIW)

All instances of encoding of the S-101 attribute **category of signal station, warning** will be converted to an instance of the S-57 attribute CATSIW during the automated conversion process.

27.64 category of silo/tank (CATSIL)

All instances of encoding of the S-101 attribute **category of silo/tank** will be converted to an instance of the S-57 attribute CATSIL during the automated conversion process.

27.65 category of slope (CATSLO)

All instances of encoding of the S-101 attribute **category of slope** will be converted to an instance of the S-57 attribute CATSLO during the automated conversion process.

27.66 category of small craft facility (CATSCF)

All instances of encoding of the S-101 attribute **category of small craft facility** will be converted to an instance of the S-57 attribute CATSCF during the automated conversion process.

27.67 category of special purpose mark (CATSPM)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **category of special purpose mark** will be converted to an instance of the S-57 attribute CATSPM during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
57 (ice mark)	CATSPM = *27* (general warning mark) INFORM = *Ice mark*	CATSPM = *27* only if CATSPM is mandatory for the binding Object.
58 (nature reserve mark)	CATSPM = *27* (general warning mark) INFORM = *Marine farm mark*	CATSPM = *27* only if CATSPM is mandatory for the binding Object.
59 (fish aggregating device)	CATSPM = empty (null) INFORM = *Fish aggregating device*	CATSPM = empty (null) only if CATSPM is mandatory for the binding Object.
60 (wreck mark)	CATSPM = *27* (general warning mark) INFORM = *Wreck mark*	CATSPM = *27* only if CATSPM is mandatory for the binding Object.
61 (customs mark)	CATSPM = *27* (general warning mark) INFORM = *Customs mark*	CATSPM = *27* only if CATSPM is mandatory for the binding Object.
62 (causeway mark)	CATSPM = *27* (general warning mark) INFORM = *Causeway mark*	CATSPM = *27* only if CATSPM is mandatory for the binding Object.
63 (wave recorder)	CATSPM = empty (null) INFORM = *Wave recorder*	CATSPM = empty (null) only if CATSPM is mandatory for the binding Object.

27.68 category of structure

A direct equivalent to the S-101 attribute **category of structure** does not exist in S-57. Therefore, all instances of encoding of the S-101 attribute **category of structure** will be converted during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
1 (boathouse)	INFORM - *Boathouse*	On **BUISGL** Object.
2 (covered bulk terminal)	CATHAF = *11* (bulk terminal)	On **HRBFAC** Object.
3 (covered wharf)	INFORM = *Covered wharf*	On **BUISGL** Object.

4 (covered service terminal)	INFORM = *Covered service terminal*	On **BUISGL** Object.
5 (covered passenger terminal)	CATHAF = *8* (passenger terminal)	On **HRBFAC** Object.

27.69 category of tidal stream (CAT_TS)

All instances of encoding of the S-101 attribute **category of tidal stream** will be converted to an instance of the S-57 attribute CAT_TS during the automated conversion process.

27.70 category of vegetation (CATVEG)

All instances of encoding of the S-101 attribute **category of vegetation** will be converted to an instance of the S-57 attribute CATVEG during the automated conversion process.

27.71 category of water turbulence (CATWAT)

All instances of encoding of the S-101 attribute **category of water turbulence** will be converted to an instance of the S-57 attribute CATWAT during the automated conversion process.

27.72 category of weed/kelp (CATWED)

All instances of encoding of the S-101 attribute **category of weed/kelp** will be converted to an instance of the S-57 attribute CATWED during the automated conversion process.

27.73 category of wreck (CATWRK)

All instances of encoding of the S-101 attribute **category of wreck** will be converted to an instance of the S-57 attribute CATWRK during the automated conversion process.

27.74 category of zone of confidence in data (CATZOC)

All instances of encoding of the S-101 attribute **category of zone of confidence in data** will be converted to an instance of the S-57 attribute CATZOC during the automated conversion process.

27.75 colour (COLOUR)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **colour** will be converted to an instance of the S-57 attribute COLOUR during the automated conversion process.

27.76 colour pattern (COLPAT)

All instances of encoding of the S-101 attribute **colour pattern** will be converted to an instance of the S-57 attribute COLPAT during the automated conversion process.

27.77 communication channel (COMCHA)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **communication channel** will be converted to an instance of the S-57 attribute COMCHA during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the complex attribute **communication channel** to features in S-101 carries a multiplicity of [0..*], meaning that multiple channels may be referenced to a single feature instance. In S-57 only a single instance of COMCHA may exist for any encoded feature instance, however COMCHA is a formatted text string attribute allowing more than one communication channel (VHF only) to be encoded with a semicolon ";" as the separator between channels. Where multiple

instances of **communication channel** have been encoded for a feature instance, the following will occur during the automated conversion process:

- An encoded VHF channel will be converted to COMCHA. For example *[VHF0007]* will convert to *[07]*. If there is more than one instance of **communication channel** populated with a VHF channel, each value will be converted to COMCHA as above, with each channel separated by a semicolon ";".
- All other types of communication channel will be converted to the S-57 attribute INFORM. For example *[NBPD5555]* will convert to a text string similar to *Communication channel [NBPD5555]*. If there is more than one instance of **communication channel** populated with a channel type other than a VHF channel, Each value will be converted to INFORM as above, with each channel separated by a semicolon ";".

27.78 condition (CONDTN)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **condition** will be converted to an instance of the S-57 attribute CONDTN during the automated conversion process.

27.79 contact instructions

All instances of encoding of the S-101 attribute **contact instructions** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Contact instructions: xxxxx…* .

27.80 date disused

The S-101 attribute **date disused** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.81 date end (DATEND, *PEREND*, *SUREND*)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **date end** will be converted to an instance of the S-57 attributes DATEND, PEREND or SUREND during the automated conversion process. The S-57 attribute that **date end** will be converted to is dependent on the binding S-101 feature and the complex attribute to which **date end** is bound as a sub-attribute. See clauses 29.4, 29.15 and 29.29.

27.82 date fixed

The S-101 attribute **date fixed** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.83 date start (DATSTA, *PERSTA*, *SURSTA*)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **date start** will be converted to an instance of the S-57 attributes DATSTA, PERSTA or SURSTA during the automated conversion process. The S-57 attribute that **date start** will be converted to is dependent on the binding S-101 feature and the complex attribute to which **date start** is bound as a sub-attribute. See clauses 29.4, 29.15 and 29.29.

27.84 date variable

The S-101 attribute **date variable** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.85 day of week

The S-101 attribute **day of week** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.86 day of week is range

The S-101 attribute **day of week is range** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.87 depth range maximum value (DRVAL2)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **depth range maximum value** will be converted to an instance of the S-57 attribute DRVAL2 during the automated conversion process.

27.88 depth range minimum value (DRVAL1)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **depth range minimum value** will be converted to an instance of the S-57 attribute DRVAL1 during the automated conversion process.

27.89 destination

The S-101 attribute **destination** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.90 distance mark visible *(CATDIS)*

All instances of encoding of the S-101 Boolean attribute **distance mark visible** will be converted to an instance of the S-57 attribute CATDIS during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
distance mark visible = *True*	CATDIS = *4* (visible mark, unknown shape)	Data Producers should check the encoding of the structure for the distance mark (see S-101 DCEG clause 8.9) and amend CATDIS as required.
distance mark visible = *False*	CATDIS = *1* (distance mark not physically visible)	

27.91 distance unit of measurement

All instances of encoding of the S-101 sub-attribute **distance unit of measurement** will be concatenated with the corresponding value for the S-101 sub-attribute **waterway distance** (as included in the complex attribute **measured distance value**) and converted to an instance of the S-57 attribute INFORM during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
distance unit of measurement = *1* (metres)	INFORM = *[…] metres*	
distance unit of measurement = *2* (yards)	INFORM = *[…] yards*	
distance unit of measurement = *3* (kilometres)	INFORM = *[…] kilometres*	
distance unit of measurement = *4* (statute miles)	INFORM = *[…] statute miles*	
distance unit of measurement = *5* (nautical miles)	INFORM = *[…] nautical miles*	

NOTE: In the S-57 Attribute/Value column above, *[…]* corresponds to the value populated for the S-101 attribute **waterway distance** (see clauses 8.10 and 27.203).

27.92 dredged date

All instances of encoding of the S-101 attribute **dredged date** will be converted to an instance of the S-57 attribute SORDAT during the automated conversion process.

27.93 elevation (ELEVAT)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **elevation** will be converted to an instance of the S-57 attribute ELEVAT during the automated conversion process.

27.94 estimated range of transmission (ESTRNG)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **estimated range of transmission** will be converted to an instance of the S-57 attribute ESTRNG during the automated conversion process.

27.95 exhibition condition of light (EXCLIT)

All instances of encoding of the S-101 attribute **exhibition condition of light** will be converted to an instance of the S-57 attribute EXCLIT during the automated conversion process.

27.96 exposition of sounding (EXPSOU)

All instances of encoding of the S-101 attribute **exposition of sounding** will be converted to an instance of the S-57 attribute EXPSOU during the automated conversion process.

27.97 file locator

The S-101 attribute **file locator** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.98 file reference (*TXTDSC*, *NTXTDS*)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **file reference** will be converted to an instance of the S-57 attributes TXTDSC or NTXTDS during the automated conversion process. The S-57 attribute that **file reference** will be converted to is dependent on the population of the sub-attributes for the complex attribute **information** (see clause 29.9) as follows:

- If the sub-attribute **language** is populated with the value *eng*, **file reference** will be converted to TXTDSC.
- If the sub-attribute **language** is populated with a value other than *eng*, **file reference** will be converted to NTXTDS.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the complex attribute **information** to features in S-101 carries a multiplicity of [0..*] or [1..*], meaning that multiple text files may be referenced to a single feature instance. In general, this is so as to allow a single English language version of the text file and one or more national language versions of the text file to be referenced to the feature instance. In S-57 only a single instance of TXTDSC and NTXTDS may exist for any encoded feature instance. Where multiple instances of **file reference** have been encoded for a feature instance, the first instance only that satisfies each of the bullet points in the above paragraph will be converted. Data Producers may be required to check the converted S-57 dataset to ensure that the preferred files have been referenced.

- Support file naming convention in S-101 is significantly different to S-57. Data Producers may be required to manually assign S-57 compliant support file names during the conversion process, however a suitably configured converter may be capable of assisting with this process.

27.99 flare bearing

The S-101 attribute **flare bearing** will not be converted. This attribute is an extension in S-101 used to provide a mechanism for additional cartographic enhancement – there is no corresponding S-57 encoding for this attribute.

27.100 flare stack

The S-101 attribute **flare stack** value *True* is used to indicate that a offshore platform is equipped with a flare stack. During the automated conversion process, all instances of encoding of the S-101 attribute **flare stack** = *True* will be converted to an instance of the S-57 Object class **LNDMRK** with mandatory attributes CATLMK = *6* (flare stack) and CONVIS = *2* (not visually conspicuous) coincident with the converted **OFSPLF** Object. Where the **Offshore Platform** is of geometric primitive surface, Data producers will be required to assess the converted dataset and amend the geometric primitive of the converted **LNDMRK** Object to point, positioned at the true position of the flare stack, if required.

Where **flare stack** has been populated as *False*, the attribute will not be converted.

27.101 frequency shore station receives

The S-101 attribute **frequency shore station receives** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.102 frequency shore station transmits (SIGFRQ)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **frequency shore station transmits** will be converted to an instance of the S-57 attribute SIGFRQ during the automated conversion process.

27.103 function (FUNCTN)

With the exception of the following, all instances of encoding of the S-101 attribute **function** will be converted to an instance of the S-57 attribute FUNCTN during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
44 (sea rescue control)	INFORM = *Sea rescue control*	
45 (observatory)	INFORM = *Observatory*	
46 (ore crusher)	INFORM = *Ore crusher*	
47 (boathouse)	INFORM = *Boathouse*	
48 (pumping station)	INFORM = *Pumping station*	

27.104 headline

Unless stated otherwise for the individual features included in Sections 3 to 24, the S-101 attribute **headline** will not be converted. This attribute is an enhancement included in S-101 – there is generally no corresponding S-57 encoding for this attribute.

27.105 height (HEIGHT)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **height** will be converted to an instance of the S-57 attribute HEIGHT during the automated conversion process.

27.106 horizontal clearance length

The S-101 attribute **horizontal clearance length** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.107 horizontal clearance value (HORCLR)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **horizontal clearance value** will be converted to an instance of the S-57 attribute HORCLR during the automated conversion process.

27.108 horizontal clearance width

The S-101 attribute **horizontal clearance width** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.109 horizontal length (HORLEN)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **horizontal length** will be converted to an instance of the S-57 attribute HORLEN during the automated conversion process.

27.110 horizontal width (HORWID)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **horizontal width** will be converted to an instance of the S-57 attribute HORWID during the automated conversion process.

27.111 ice factor (ICEFAC)

All instances of encoding of the S-101 attribute **ice factor** will be converted to an instance of the S-57 attribute ICEFAC during the automated conversion process.

27.112 IMO adopted *(CATTSS)*

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 Boolean type attribute **IMO adopted** will be converted to an instance of the S-57 enumeration type attribute CATTSS during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
True	CATTSS = *1* (IMO - adopted)	
False	CATTSS = *2* (not IMO - adopted)	

27.113 in dispute

The S-101 attribute **in dispute** value *True* is used to indicate that a area of national jurisdiction is in dispute. All S-101 Feature instances having the S-101 attribute **in dispute** = *True* will be converted to an instance of the S-57 Object class **CTNARE** with mandatory attribute INFORM = *In dispute*, coincident with the converted feature for which **in dispute** is present, during the automated conversion process.

Where **in dispute** has been populated as *False*, the attribute will not be used in the automated conversion process.

27.114 interoperability identifier

The S-101 attribute **interoperability identifier** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.115 is MRCC

All instances of encoding of the S-101 Boolean attribute **is MRCC** = *True* will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Maritime Rescue and Coordination Centre*.

Where **is MRCC** has been populated as *False*, the attribute will not be used in the automated conversion process.

27.116 jurisdiction (JRSDTN)

All instances of encoding of the S-101 attribute **jurisdiction** will be converted to an instance of the S-57 attribute JRSDTN during the automated conversion process.

27.117 language

The S-101 attribute **language** will not be converted. This attribute has been included in S-101 as part of the remodelling of the S-57 attributes INFORM and NINFOM; OBJNAM and NOBJNM; PILDST and NPLDST; and TXTDSC and NTXTDS. See clauses 2.4.12.1, 16.26, 27.98, 27.132 and 27.177.

27.118 lifting capacity (LIFCAP)

All instances of encoding of the S-101 attribute **lifting capacity** will be converted to an instance of the S-57 attribute LIFCAP during the automated conversion process.

27.119 light characteristic (LITCHR)

All instances of encoding of the S-101 attribute **light characteristic** will be converted to an instance of the S-57 attribute LITCHR during the automated conversion process.

27.120 light visibility (LITVIS)

With the exception of the following, all instances of encoding of the S-101 attribute **light visibility** will be converted to an instance of the S-57 attribute LITVIS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
9 (visible in line of range)	INFORM = *Visible in line of range*	

27.121 linkage

The S-101 attribute **linkage** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.122 magnetic anomaly value (VALLMA)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **magnetic anomaly value** will be converted to an instance of the S-57 attribute VALLMA during the automated conversion process. See clause 4.2.

Note that, during the automated conversion process the value populated for **magnetic anomaly value**, where converted, will be converted from decimal degrees to decimal minutes for VALLMA.

27.123 major light

The S-101 attribute **major light** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.124 marks navigational – system of (MARSYS)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **marks navigational – system of** will be converted to an instance of the S-57 attribute MARSYS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
11 (main European inland waterway marking system)	MARSYS = *10* (other system) INFORM = *Main European inland waterway marking system*	

27.125 maximum permitted draught

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **maximum permitted draught** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Maximum draught permitted = [xx.x] metres*, where *[xx.x]* is the value populated for **maximum permitted draught** (decimal part not required if the value is whole metres), during the automated conversion process.

27.126 maximum permitted vessel length

All instances of encoding of the S-101 attribute **maximum permitted vessel length** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Maximum vessel length permitted permitted = [xx.x] metres*, where *[xx.x]* is the value populated for **maximum permitted vessel length** (decimal part not required if the value is whole metres), during the automated conversion process.

27.127 measured distance

All instances of encoding of the S-101 attribute **measured distance** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Measured distance = [xxxx] metres*, where *[xxxx]* is the value populated for **measured distance**, during the automated conversion process. See also clause 27.91.

27.128 minimum berth depth (*DRVAL1*)

All instances of encoding of the S-101 attribute **minimum berth depth** will be converted to an instance of the S-57 attribute DRVAL1 during the automated conversion process.

27.129 MMSI code

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **MMSI code** will be converted to an instance of the S-57 attribute OBJNAM, having a standardised format such as *MMSI [xxxxxxxxx]*, where *[xxxxxxxxx]* is the value populated for **MMSI code**. If a name is populated for OBJNAM by conversion of the attribute **name** during the automated conversion process, the value for the converted **MSSI code** will be appended after the name, separated by a semicolon ";", for example *Nab Rock; MMSI 995031014*.

27.130 moiré effect

All instances of encoding of the S-101 attribute **moiré effect** = *True* will be converted to an instance of the S-57 attribute CATLIT, value *16* (moiré effect), during the automated conversion process.

Where **moiré effect** has been populated as *False*, the attribute will not be used in the automated conversion process.

27.131 multiplicity known

All instances of encoding of the S-101 attribute **multiplicity known** will be converted to an instance of the S-57 attribute INFORM during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
True	INFORM = *[X] features*	*[X]* is derived from the value populated for the attribute **number of features** (see clause 27.139).
False	INFORM = *Multiple features*	

See also clause 2.1.1.

27.132 name (*OBJNAM*, *NOBJNM*)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **name** will be converted to an instance of the S-57 attributes OBJNAM or NOBJNM during the automated conversion process. The S-57 attribute that **name** will be converted to is dependent on the population of the sub-attribute **name usage** (see clause 27.134) for the complex attribute **feature name** (see clause 29.2) as follows:

- If the sub-attribute **name usage** is populated with the value *1* (default name display), **name** will be converted to OBJNAM.
- If the sub-attribute **name usage** is populated with value *2* (alternate name display), **name** will be converted to NOBJNM.
- If the sub-attribute **name usage** is not populated or is populated with an empty (null) value for all instances of **feature name**, Data Producers will be required to select the appropriate instances of **name** to be populated for OBJNAM and NOBJNM in the converted S-57 dataset if it is considered that the name should be included.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the complex attribute **feature name** to features in S-101 carries a multiplicity of [0..*], meaning that multiple names may be referenced to a single feature instance. In general, this is so as to allow a single English language version of the name and one or more national language versions of the name to be referenced to the feature instance. In S-57 only a single instance of OBJNAM or NOBJNM may exist for any encoded feature instance. Where there are multiple instances of **feature name** for a feature instance having **name usage** = *2*, the converter may be configured to select the instance to be converted to NOBJNM based on the value encoded for the sub-attribute **language**; otherwise the first instance encountered by the conversion software will be used.

27.133 name of resource

Unless stated otherwise for the individual features included in Sections 3 to 24, the S-101 attribute **name of resource** will not be converted. This attribute is an enhancement included in S-101 – there is generally no corresponding S-57 encoding for this attribute.

27.134 name usage

The S-101 attribute **name usage** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute. However, **name usage** may be used during the automated conversion process to determine which instances of the complex attribute **feature name** are to be used for the population of the S-57 attributes OBJNAN and NOBJNM. See clauses 2.5.8 and 27.132.

27.135 nationality (NATION)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **nationality** will be converted to an instance of the S-57 attribute NATION during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- The multiplicity for **nationality** when bound to some features (such as national jurisdiction area features carrying Boolean attribute **in dispute**) may be [0..*] or [1..*]. Where multiple values of **nationality** have been encoded for a single feature instance, the first instance only will be converted during the automated conversion process.

27.136 nature of construction (NATCON)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **nature of construction** will be converted to an instance of the S-57 attribute NATCON during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
11 (latticed)	INFORM = *Latticed construction*	
12 (glass)	INFORM = *Glass construction*	

27.137 nature of surface (NATSUR)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **nature of surface** will be converted to an instance of the S-57 attribute NATSUR during the automated conversion process.

27.138 nature of surface – qualifying terms (NATQUA)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **nature of surface – qualifying terms** will be converted to an instance of the S-57 attribute NATQUA during the automated conversion process.

27.139 number of features

All instances of encoding of the S-101 attribute **number of features** will be converted to an instance of the S-57 attribute INFORM during the automated conversion process. The value populated for INFORM will be determined in conjunction with the conversion of the complex attribute **multiplicity of features**, sub-attribute **multiplicity known** (see clauses 2.1.1 and 27.131).

27.140 opening bridge *(CATBRG)*

All instances of encoding of the S-101 Boolean attribute **opening bridge** will be converted to an instance of the S-57 attribute CATBRG during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
opening bridge = *True*	CATBRG = *2* (opening bridge)	See clause 6.6.
opening bridge = *False*	CATBRG = *1* (fixed bridge)	See clause 6.6.

27.141 orientation value (ORIENT)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **orientation value** will be converted to an instance of the S-57 attribute ORIENT during the automated conversion process.

27.142 pictorial representation (PICREP)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **pictorial representation** will be converted to an instance of the S-57 attribute PICREP during the automated conversion process.

The following additional requirements for S-101 dataset conversion must be noted:

- Support file naming convention in S-101 is significantly different to S-57. Data Producers may be required to manually assign S-57 compliant support file names during the conversion process, however a suitably configured converter may be capable of assisting with this process.
- The binding of the complex attribute **information** to Feature and Information types in S-101 carries a multiplicity of [0..*] or [1..*], meaning that multiple picture files may be referenced to a single feature instance. Where two or more picture files have been referenced, the first instance will be converted to PICREP.

27.143 pilot movement

The S-101 attribute **pilot movement** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.144 product (PRODCT)

With the exception of the following, all instances of encoding of the S-101 attribute **product** will be converted to an instance of the S-57 attribute PRODCT during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
23 (electricity)	INFORM = *Product: Electricity*	
24 (ice)	INFORM = *Product: Ice*	
25 (clay)	INFORM = *Product: Clay*	

27.145 radar band

All instances of encoding of the S-101 attribute **radar band** will be converted to an instance of the S-57 formatted text type attribute RADWAL during the automated conversion process, noting that:

- **radar band** is a mandatory sub-attribute, in combination with the mandatory sub-attribute **wave length value** (see clause 27.204), of the complex attribute **radar wave length** (see clause 29.16). In S-101 all instances of the binding of **radar wave length** to a Feature type carries the multiplicity [0..2]. The format for the converted **radar wave length** is in the order **wave length value** then **radar band**, separated by a hyphen "-".
- Where two instances of **radar wave length** have been encoded for a Feature instance, the converted RADWAL will be populated with the combined list of values in the same order as has been included in the S-101 dataset, with each value separated by a comma ",".

See example at clause 29.16.

27.146 radar conspicuous (CONRAD)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 Boolean type attribute **radar conspicuous** will be converted to an instance of the S-57 enumeration type attribute CONRAD during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
True	CONRAD = *1* (radar conspicuous)	If a converted S-57 feature of geometric primitive point or area is radar conspicuous because it is fitted with a radar reflector, Data Producers may amend CONRAD to value *3* (radar conspicuous, has radar reflector).
False	CONRAD = *2* (not radar conspicuous)	

27.147 radius (RADIUS)

All instances of encoding of the S-101 attribute **radius** will be converted to an instance of the S-57 attribute RADIUS during the automated conversion process.

27.148 reference direction

The S-101 attribute **reference direction** will not be converted. This attribute has been included in S-101 as part of the remodelling of the S-57 attribute VALLMA. See clause 4.2.

27.149 reference location

All instances of encoding of the S-101 attribute **reference location** will be converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Reference location: Xxxxx*, where *Xxxxx* is the point of origin for a measured distance as referenced for a distance mark.

27.150 reference tide

All instances of encoding of the S-101 attribute **station number** will be converted to the third value for an instance of the S-57 formatted text string attribute TS_TSP during the automated conversion process (see clause 10.5).

S-101 Attribute Value	S-57 Attribute TS_TSP 3rd Value	Comments
1 (high water)	*HW*	
2 (low water)	*LW*	

In the following example, the position of **reference tide** in the text string is indicated in bold text.

TS_TSP = *63230,Darwin,**HW**,124,2.2,128,2.1,125,2.9,116,2.8,110,2.0,095,0.6,020,0.2,320,1.9,315, 2.1,300,2.8,268,2.6,200,2.4,165,2.5*

27.151 reference tide type

The S-101 attribute **reference tide type** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.152 reference year for magnetic variation (RYRMGV)

All instances of encoding of the S-101 attribute **reference year for magnetic variation** will be converted to an instance of the S-57 attribute RYRMGV during the automated conversion process.

27.153 regulation citation

The S-101 attribute **regulation citation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.154 reported date *(SORDAT)*

All instances of encoding of the S-101 attribute **reported date** will be converted to an instance of the S-57 attribute SORDAT during the automated conversion process.

27.155 restriction (RESTRN)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, instances of encoding of the S-101 attribute **restriction** will be converted to an instance of the S-57 attribute RESTRN during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments

39 (swimming prohibited)	RESTRN = empty (null) INFORM = *Swimming prohibited*	RESTRN = empty (null) only if RESTRN is mandatory for the binding Object.
42 (power-driven vessels prohibited)	RESTRN = empty (null) INFORM = *Power-driven vessels prohibited*	RESTRN = empty (null) only if RESTRN is mandatory for the binding Object.

27.156 scale minimum (SCAMIN)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **scale minimum** will be converted to an instance of the S-57 attribute SCAMIN during the automated conversion process.

27.157 sector bearing (*SECTR1*. *SECTR2*)

All instances of encoding of the S-101 attribute **sector bearing** will be converted to an instance of the S-57 attributes SECTR1 or SECTR2 during the automated conversion process. The S-57 attribute that **sector bearing** will be converted to is dependent on the complex attribute to which **sector bearing** is bound as a sub-attribute as follows:

sector limit one / sector bearing -> SECTR1

sector limit two / sector bearing -> SECTR2

27.158 sector line length

The S-101 attribute **sector line length** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.159 signal duration

All instances of encoding of the S-101 attribute **signal duration** will be converted to an instance of the S-57 formatted text type attribute SIGSEQ during the automated conversion process, noting that:

- **signal duration** is a mandatory sub-attribute, in combination with the mandatory sub-attribute **signal status** (see clause 27.164), of the complex attribute **signal sequence** (see clause 29.25). In S-101 all instances of the binding of **signal sequence** to a Feature type carries the multiplicity [0..*]. Where multiple instances of **signal sequence** have been encoded for a Feature instance, the converted SIGSEQ will be populated with the combined list of values in the same order as has been included in the S-101 dataset, with each value separated by a plus “+” sign.

See example at clause 29.25.

27.160 signal frequency (SIGFRQ)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **signal frequency** will be converted to an instance of the S-57 attribute SIGFRQ during the automated conversion process.

27.161 signal generation (SIGGEN)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **signal generation** will be converted to an instance of the S-57 attribute SIGGEN during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
5 (radio activated)	INFORM = *Radio activated*	
6 (call activated)	INFORM = *Call activated*	

27.162 signal group (SIGGRP)

All instances of encoding of the S-101 attribute **signal group** will be converted to an instance of the S-57 attribute SIGGRP during the automated conversion process.

Where **signal group** has multiplicity [0..*] and has been populated with multiple values, the converted SIGGRP will be populated with the combined list of values in the same order as has been included in the S-101 dataset.

27.163 signal period (SIGPER)

All instances of encoding of the S-101 attribute **signal period** will be converted to an instance of the S-57 attribute SIGPER during the automated conversion process.

27.164 signal status

All instances of encoding of the S-101 attribute **signal status** will be converted to an instance of the S-57 formatted text type attribute SIGSEQ during the automated conversion process, noting that:

- **signal status** is a mandatory sub-attribute, in combination with the mandatory sub-attribute **signal duration** (see clause 27.159), of the complex attribute **signal sequence** (see clause 29.25). In S-101 all instances of the binding of **signal sequence** to a Feature type carries the multiplicity [0..*]. Where multiple instances of **signal sequence** have been encoded for a Feature instance, the converted SIGSEQ will be populated with the combined list of values in the same order as has been included in the S-101 dataset, with each value separated by a plus "+" sign. For each instance of **signal sequence**:
  - Where **signal status** has been populated with value *1* (lit/sound), there is no change to the corresponding value for **signal duration** as included in SIGSEQ.
  - Where **signal status** has been populated with value *2* (eclipsed/silent), the corresponding value for **signal duration** as included in SIGSEQ will be enclosed by brackets ().

See example at clause 29.25.

27.165 speed limit

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 sub-attribute **speed limit** will be concatenated with the corresponding value for the S-101 mandatory sub-attribute **speed units** (as included in the complex attribute **vessel speed limit**) and converted to an instance of the S-57 attribute INFORM, having a standardised format such as *Speed limit is [xx.x] [yyy]*, where *[xx.x]* is the value populated for **speed limit** (decimal part not required if the value is a whole number) and *[yyy]* is the text string corresponding to the value populated for **speed units** (see clause 27.168). Variations in attribute conversion include:

- The attribute **speed limit** is included as a mandatory sub-attribute of the complex attribute **vessel speed limit** in S-101 (see clause 29.41), which carries a multiplicity of [1..*]. This means that multiple speed limits may be referenced to a single Feature instance for different classes of vessels. Where two or more values of **vessel speed limit** are encoded for a Feature instance, the value of **speed limit** contained in the first instance only will be converted to INFORM.

27.166 speed maximum (CURVEL)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **speed maximum** will be converted to an instance of the S-57 attribute CURVEL during the automated conversion process.

27.167 speed minimum

The S-101 attribute **speed minimum** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.168 speed units

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 sub-attribute **speed units** will be concatenated with the corresponding value for the S-101 mandatory sub-attribute **speed limit** (as included in the complex attribute **vessel speed limit**) and converted to an instance of the S-57 attribute INFORM during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value	Comments
speed units = *2* (kilometres per hour)	INFORM = *Speed limit is […] kilometres per hour*	
speed units = *3* (miles per hour)	INFORM = *Speed limit is […] miles per hour*	
speed units = *4* (knots)	INFORM = *Speed limit is […] knots*	

NOTE: In the S-57 Attribute/Value column above, *[…]* corresponds to the value populated for the S-101 attribute **speed limit** (see clause 27.165).

Variations in attribute conversion include:

- The attribute **speed units** is included as a mandatory sub-attribute of the complex attribute **vessel speed limit** in S-101 (see clause 29.41), which carries a multiplicity of [1..*]. This means that multiple speed limits may be referenced to a single Feature instance for different classes of vessels. Where two or more values of **vessel speed limit** are encoded for a Feature instance, the value of **speed units** contained in the first instance only will be converted to INFORM.

27.169 station name

All instances of encoding of the S-101 attribute **station name** will be converted to the second value for an instance of the S-57 formatted text string attribute TS_TSP during the automated conversion process (see clause 10.5). In the following example, the position of **station name** in the text string is indicated in bold text.

TS_TSP = *63230,**Darwin**,HW,124,2.2,128,2.1,125,2.9,116,2.8,110,2.0,095,0.6,020,0.2,320,1.9,315, 2.1,300,2.8,268,2.6,200,2.4,165,2.5*

27.170 station number

All instances of encoding of the S-101 attribute **station number** will be converted to the first value for an instance of the S-57 formatted text string attribute TS_TSP during the automated conversion process (see clause 10.5). In the following example, the position of **station number** in the text string is indicated in bold text.

TS_TSP = ***63230**,Darwin,HW,124,2.2,128,2.1,125,2.9,116,2.8,110,2.0,095,0.6,020,0.2,320,1.9,315, 2.1,300,2.8,268,2.6,200,2.4,165,2.5*

27.171 status (STATUS)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **status** will be converted to an instance of the S-57 attribute STATUS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
28 (buoyed)	INFORM = *Buoyed*	

27.172 stream depth

The S-101 attribute **stream depth** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.173 swept date

All instances of encoding of the S-101 attribute **swept date** will be converted to an instance of the S-57 attribute SORDAT during the automated conversion process.

27.174 technique of vertical measurement (TECSOU)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **technique of vertical measurement** will be converted to an instance of the S-57 attribute TECSOU during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
15 (found by lidar)	TECSOU = *7* (found by laser)	
16 (synthetic aperture radar)	INFORM = *Synthetic aperture radar*	
17 (hyperspectral imagery)	TECSOU = *14* (computer generated)	
18 (mechanically swept)	TECSOU = *6* (swept by wire-drag)	

27.175 telecommunication identifier

The S-101 attribute **telecommunication identifier** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.176 telecommunication service

The S-101 attribute **telecommunication service** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.177 text (*INFORM*, *NINFOM*)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **text** will be converted to an instance of the S-57 attributes INFORM or NINFOM during the automated conversion process. The S-57 attribute that **text** will be converted to is dependent on the population of the sub-attributes for the complex attributes **information** (see clause 29.9), **sector information** (see clause 29.20) and **shape information** (see clause 29.24) as follows:

- If the sub-attribute **language** is populated with the value *eng* or is not populated, **text** will be converted to INFORM.
- If the sub-attribute **language** is populated with a value other than *eng*, **text** will be converted to NINFOM.

The following additional requirements for S-101 dataset conversion must be noted:

- The binding of the complex attributes **information**, **sector information** and **shape information** to features in S-101 carries a multiplicity of [0..*] or [1..*], meaning that multiple text strings may be referenced to a single feature instance. In general, this is so as to allow a single English language version of the text and one or more national language versions of the text to be referenced to the feature instance. In S-57 only a single instance of INFORM and NINFOM may exist for any encoded feature instance. Where multiple instances of **text** have been encoded for a feature instance in S-101, each instance will be converted in accordance with the bullet points in the above paragraph, with consecutive instances being separated in INFORM or NINFOM by a standard separator such as a semicolon ";". Data Producers may be required to check the converted S-57 dataset to ensure that the required text strings have been populated. See also clause 2.4.6.

27.178 text offset bearing

The S-101 attribute **text offset bearing** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.179 text offset distance

The S-101 attribute **text offset distance** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.180 text rotation

The S-101 attribute **text rotation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.181 text type

The S-101 attribute **text type** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.182 time of day end

The S-101 attribute **time of day end** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.183 time of day start

The S-101 attribute **time of day start** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.184 time relative to tide

The S-101 attribute **time relative to tide** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.185 topmark/daymark shape (TOPSHP)

All instances of encoding of the S-101 attribute **topmark/daymark shape** will be converted to an instance of the S-57 attribute TOPSHP during the automated conversion process.

27.186 traffic flow (TRAFIC)

All instances of encoding of the S-101 attribute **traffic flow** will be converted to an instance of the S-57 attribute TRAFIC during the automated conversion process.

27.187 underlying layer

The S-101 attribute **underlying layer** will not be converted, however this attribute contributes, when populated, to conversion to the S-57 attribute NATQUA. This attribute has been included in S-101 as part of the remodelling of the S-57 attributes NATSUR and NATQUA for the S-101 feature **Seabed Area**. See clause 12.1.

27.188 value of annual change in magnetic variation (VALACM)

All instances of encoding of the S-101 attribute **value of annual change in magnetic variation** will be converted to an instance of the S-57 attribute VALACM during the automated conversion process.

27.189 value of depth contour (VALDCO)

All instances of encoding of the S-101 attribute **value of depth contour** will be converted to an instance of the S-57 attribute VALDCO during the automated conversion process.

27.190 value of magnetic variation (VALMAG)

All instances of encoding of the S-101 attribute **value of magnetic variation** will be converted to an instance of the S-57 attribute VALMAG during the automated conversion process.

27.191 value of maximum range (VALMXR)

All instances of encoding of the S-101 attribute **value of maximum range** will be converted to an instance of the S-57 attribute VALMXR during the automated conversion process.

27.192 value of nominal range (VALNMR)

All instances of encoding of the S-101 attribute **value of nominal range** will be converted to an instance of the S-57 attribute VALNMR during the automated conversion process.

27.193 value of sounding (VALSOU)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **value of sounding** will be converted to an instance of the S-57 attribute VALSOU during the automated conversion process.

27.194 vertical clearance unlimited

The S-101 attribute **vertical clearance unlimited** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.195 vertical clearance value (VERCLR) *(VERCCL, VERCOP, VERCSA)*

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **vertical clearance value** will be converted to an instance of the S-57 attributes VERCCL, VERCLR, VERCOP or VERSCA during the automated conversion process. The S-57 attribute that **vertical clearance value** will be converted to is dependent on the binding S-101 feature and the complex attribute to which **vertical clearance value** is bound as a sub-attribute as follows:

vertical clearance closed / vertical clearance value -> VERCCL
vertical clearance fixed / vertical clearance value -> VERCLR
vertical clearance open / vertical clearance value -> VERCOP
vertical clearance safe / vertical clearance value -> VERCSA

27.196 vertical datum (VERDAT)

Unless stated otherwise for the individual features included in Sections 3 to 24 or below, all instances of encoding of the S-101 attribute **vertical datum** will be converted to an instance of the S-57 attribute VERDAT during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
44 (Baltic Sea chart datum 2000)	VERDAT = empty (null) INFORM = *Vertical Datum = Baltic Sea chart datum 2000*	VERDAT = empty (null) only if VERDAT is mandatory for the binding Object.

27.197 vertical length (VERLEN)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **vertical length** will be converted to an instance of the S-57 attribute VERLEN during the automated conversion process.

27.198 vessel class

The S-101 attribute **vessel class** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

27.199 virtual AIS aid to navigation type

All instances of encoding of the S-101 attribute **virtual AIS aid to navigation type** will be converted to an instance of the S-57 mandatory attributes CLSDEF, INFORM, CLSNAM and SYMINS during the automated conversion process as follows:

S-101 Attribute Value	S-57 Attribute/Value
1 (north cardinal)	CLSDEF = *A Virtual object which indicates navigable water lies northwards* CLSNAM = *Virtual AtoN, North Cardinal* INFORM = *Virtual AtoN, North Cardinal; A Virtual object which indicates navigable water lies northwards.* SYMINS = *SY(BRTHNO01);SY(BCNCAR01);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
2 (east cardinal)	CLSDEF = *A Virtual object which indicates navigable water lies eastwards* CLSNAM = *Virtual AtoN, East Cardinal* INFORM = *Virtual AtoN, East Cardinal; A Virtual object which indicates navigable water lies eastwards.* SYMINS = *SY(BRTHNO01);SY(BCNCAR02);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
3 (south cardinal)	CLSDEF = *A Virtual object which indicates navigable water lies southwards* CLSNAM = *Virtual AtoN, South Cardinal* INFORM = *Virtual AtoN, South Cardinal; A Virtual object which indicates navigable water lies southwards.* SYMINS = *SY(BRTHNO01);SY(BCNCAR03);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
4 (west cardinal)	CLSDEF = *A Virtual object which indicates navigable water lies westwards* CLSNAM = *Virtual AtoN, West Cardinal* INFORM = *Virtual AtoN, West Cardinal; A Virtual object which indicates navigable water lies westwards.* SYMINS = *SY(BRTHNO01);SY(BCNCAR04);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
5 (port lateral (IALA A))	CLSDEF = *A Virtual object marking the port side of a channel* CLSNAM = *Virtual AtoN, Port Lateral* INFORM = *Virtual AtoN, Port Lateral; A Virtual object marking the port side of a channel.* SYMINS = *SY(BRTHNO01);SY(BOYLAT24);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
6 (starboard lateral (IALA A))	CLSDEF = *A Virtual object marking the starboard side of a channel* CLSNAM = *Virtual AtoN, Starboard Lateral* INFORM = *Virtual AtoN, Starboard Lateral; A Virtual object marking the starboard side of a channel.* SYMINS = *SY(BRTHNO01);SY(BOYLAT13);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
7 (port lateral (IALA B))	CLSDEF = *A Virtual object marking the port side of a channel* CLSNAM = *Virtual AtoN, Port Lateral* INFORM = *Virtual AtoN, Port Lateral; A Virtual object marking the port side of a channel.* SYMINS = *SY(BRTHNO01);SY(BOYLAT23);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*

8 (starboard lateral (IALA B))	CLSDEF = *A Virtual object marking the starboard side of a channel* CLSNAM = *Virtual AtoN, Starboard Lateral* INFORM = *Virtual AtoN, Starboard Lateral; A Virtual object marking the starboard side of a channel.* SYMINS = *SY(BRTHNO01);SY(BOYLAT14);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
9 (isolated danger)	CLSDEF = *A Virtual object marking an isolated danger* CLSNAM = *Virtual AtoN, Isolated Danger* INFORM = *Virtual AtoN, Isolated Danger; A Virtual object marking an isolated danger.* SYMINS = *SY(BRTHNO01);SY(BCNISD21);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
10 (safe water)	CLSDEF = *A Virtual object marking safe water* CLSNAM = *Virtual AtoN, Safe Water* INFORM = *Virtual AtoN, Safe Water; A Virtual object marking safe water.* SYMINS = *SY(BRTHNO01);SY(BOYSAW12);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
11 (special purpose)	CLSDEF = *A Virtual object used to mark an area or feature referred to in nautical documents* CLSNAM = *Virtual AtoN, Special Purpose* INFORM = *Virtual AtoN, Special Purpose; A Virtual object used to mark an area or feature referred to in nautical documents.* SYMINS = *SY(BRTHNO01);SY(BOYSPP11);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*
12 (emergency wreck marking)	CLSDEF = *A Virtual object marking a wreck* CLSNAM = *Virtual AtoN, Emergency Wreck Marking* INFORM = *Virtual AtoN, Emergency Wreck Marking; A Virtual object marking a wreck.* SYMINS = *SY(BRTHNO01);SY(BOYSPP11);TX('V-AIS',3,2,2,'15110',2,0,CHMGD,11)*

NOTE: While the text strings populated for CLSDEF and CLSNAM may be varied in accordance with national convention, SYMINS must be populated exactly as listed for each converted value of **virtual AIS aid to navigation type**.

27.200 visitors mooring

All S-101 Feature instances having the S-101 attribute **visitors mooring** = *True* will be converted to an instance of the S-57 Object class **SMCFAC** with mandatory attribute CATSCF = *29* (visitors mooring) during the automated conversion process. See clause 20.8.

Where **visitors mooring** has been populated as *False*, the binding S-101 Feature instance will be converted to an instance of the S-101 Object Class **MORFAC**. See clause 20.8.

27.201 visual prominence (CONVIS)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **visual prominence** will be converted to an instance of the S-57 attribute CONVIS during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
3 (prominent)	CONVIS = *2* (not visually conspicuous)	Only if CONVIS is mandatory. If not mandatory **visual prominence** will not be converted.

27.202 water level effect (WATLEV)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **water level effect** will be converted to an instance of the S-57 attribute WATLEV during the automated conversion process.

27.203 waterway distance

All instances of encoding of the S-101 sub-attribute **waterway distance** will be concatenated with the corresponding value for the S-101 sub-attribute **distance unit of measurement** (as included in the complex attribute **measured distance value** (see clause 29.11)) and converted to an instance of the S-57 attribute INFORM, having a standardised format such as *[xx.x] [yyy]*, where *[xx.x]* is the value populated for **waterway distance** (decimal part not required if the value is a whole number) and *[yyy]* is the text string corresponding to the value populated for **distance unit of measurement** (see clauses 8.10 and 27.91).

27.204 wave length value

All instances of encoding of the S-101 attribute **wave length value** will be converted to an instance of the S-57 formatted text type attribute RADWAL during the automated conversion process, noting that:

- **wave length value** is a mandatory sub-attribute, in combination with the mandatory sub-attribute **radar band** (see clause 27.145), of the complex attribute **radar wave length** (see clause 29.16). The format for the converted **radar wave length** is in the order **wave length value** then **radar band**, separated by a hyphen "-".
- In S-101 all instances of the binding of **radar wave length** to a Feature type carries the multiplicity [0..2]. Where two instances of **radar wave length** have been encoded for a Feature instance, the converted RADWAL will be populated with the combined list of values in the same order as has been included in the S-101 dataset, with each value separated by a comma ",".

See example at clause 29.16.

28 Meta Feature and Spatial Attribute and Enumerate Descriptions

The following clauses provide specific guidance, where required, for the conversion of S-101 Meta and spatial attributes to the corresponding S-57 attribute. For enumeration type attributes, only values for which there is no direct “one-to-one” mapping are listed.

NOTE 1: Where a S-57 attribute is a “List” enumeration type and more than one instance of the corresponding S-101 enumeration type attribute has been populated for a Feature instance, these values will be listed as ordered for the S-101 Feature instance and separated by commas during the automated conversion process. Where the S-57 attribute is an “Enumerated” enumeration type (that is, only a single enumerate may be populated for the attribute), only the first value in the order populated for the corresponding S-101 attribute will be converted. Data Producers will be required to check their converted S-57 dataset to confirm that the required value has been populated.

NOTE 2: Where an enumerate value maps to a S-57 text string (for example INFORM), the converted text string shown in the clauses below is an example only; a suitably configured converter may be capable of populating the attribute with an alternative text string as required by the Data Producer. See clause 2.4.6.

NOTE 3: Where the guidance in the following clauses specifies conversion of an enumerate value to a standardised text string populated for the attribute INFORM, a suitably configured converter may also optionally populate a national language version of the text string for the attribute NINFOM, if required.

NOTE 4: Data Producers should note that many enhancements have been introduced in S-101 that are not required in S-57 for datasets to be “fully compliant” with S-57 encoding guidance as included in the S-57 UOC. As such, the conversion of these enhancements to S-57 as instances of INFORM/NINFOM may be considered to be optional. Where this is the case, this is indicated by the conversion guidance having a grey background.

28.1 category of temporal variation

The S-101 attribute **category of temporal variation** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.2 data assessment

The S-101 attribute **data assessment** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.3 drawing index

The S-101 attribute **drawing index** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute. However, **drawing index** may be utilised to auto-populate the Navigational Purpose component of the converted S-57 ENC dataset file name. See clause 3.5.

28.4 full seafloor coverage achieved

The S-101 attribute **full seafloor coverage achieved** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.5 horizontal distance uncertainty (HORACC)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **horizontal distance uncertainty** will be converted to an instance of the S-57 attribute HORACC during the automated conversion process.

28.6 least depth of detected features measured

The S-101 attribute **least depth of detected features measured** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.7 line spacing maximum

The S-101 attribute **line spacing maximum** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.8 line spacing minimum

The S-101 attribute **line spacing minimum** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.9 maximum display scale

The S-101 attribute **maximum display scale** will not be converted. This attribute has been included in S-101 as part of the revised procedures for ECDIS data loading/unloading and display of the gross overscale indication. See clauses 3.5 and S-101 Product Specification Main document, clauses 4.5-7.

28.10 measurement distance maximum (SDISMX)

All instances of encoding of the S-101 attribute **measurement distance maximum** will be converted to an instance of the S-57 attribute SDISMX during the automated conversion process.

28.11 measurement distance minimum (SDISNM)

All instances of encoding of the S-101 attribute **measurement distance minimum** will be converted to an instance of the S-57 attribute SDISMN during the automated conversion process.

28.12 minimum display scale

The S-101 attribute **minimum display scale** will not be converted. This attribute has been included in S-101 as part of the revised procedures for ECDIS data loading/unloading. See clauses 3.5 and S-101 Product Specification Main document, clauses 4.5-7.

28.13 optimum display scale (*CSCALE*)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **optimum display scale** will be converted to an instance of the S-57 attribute CSCALE during the automated conversion process. However, the following exceptions apply:

- **optimum display scale** will only convert to CSCALE where instances of the Meta Feature **M_CSCL** are created during the automated conversion process (see clause 3.5).

28.14 orientation uncertainty

The S-101 attribute **orientation uncertainty** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.15 quality of horizontal measurement (QUAPOS)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **quality of horizontal measurement** will be converted to an instance of the S-57 spatial attribute QUAPOS during the automated conversion process.

28.16 quality of vertical measurement (QUASOU)

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **quality of vertical measurement** will be converted to an instance of the S-57 attribute QUASOU during the automated conversion process.

28.17 scale value maximum (SCVAL1)

All instances of encoding of the S-101 attribute **scale value maximum** will be converted to an instance of the S-57 attribute SCVAL1 during the automated conversion process.

28.18 scale value minimum (SCVAL2)

All instances of encoding of the S-101 attribute **scale value minimum** will be converted to an instance of the S-57 attribute SCVAL2 during the automated conversion process.

28.19 significant features detected

The S-101 attribute **significant features detected** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.20 size of features detected

The S-101 attribute **size of features detected** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.21 source

The S-101 attribute **source** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.22 survey authority (SURATH)

All instances of encoding of the S-101 attribute **survey authority** will be converted to an instance of the S-57 attribute SURATH during the automated conversion process.

28.23 survey type (SURTYP)

With the exception of the following, all instances of encoding of the S-101 attribute **survey type** will be converted to an instance of the S-57 attribute SURTYP during the automated conversion process. Variations in enumerate conversion include:

S-101 Attribute Value	S-57 Attribute/Value	Comments
7 (full coverage)	INFORM = *Full coverage*	
8 (systematic survey)	INFORM = *Systematic survey*	
9 (non-systematic survey)	INFORM = *Non-systematic survey*	
10 (inadequately surveyed)	INFORM = *Inadequately surveyed*	
11 (spot-sounding survey)	INFORM = *Spot-sounding survey*	
12 (found by levelling)	INFORM = *Found by levelling*	
13 (mechanically swept survey)	INFORM = *Mechanically swept survey*	

28.24 update number

The S-101 attribute **update number** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.25 update type

The S-101 attribute **update type** will not be converted. This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

28.26 uncertainty fixed

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **uncertainty fixed** will be converted to an instance of the S-57 attributes POSACC, SOUACC or VERACC during the automated conversion process, noting that:

- The value populated in the converted S-57 attribute will be the sum of the value populated in **uncertainty fixed** and the value based on the population of the S-101 attribute **uncertainty variable factor** (see clause 28.27).

The S-57 attribute that **uncertainty fixed** will be converted to is dependent on the binding S-101 feature and the complex attribute to which **uncertainty fixed** is bound as a sub-attribute as follows:

horizontal position uncertainty / uncertainty fixed	->	POSACC
vertical uncertainty / uncertainty fixed	->	SOUACC or VERACC (see clause 29.40)

28.27 uncertainty variable factor

Unless stated otherwise for the individual features included in Sections 3 to 24, all instances of encoding of the S-101 attribute **uncertainty variable factor** will be converted to an instance of the S-57 attributes POSACC, SOUACC or VERACC during the automated conversion process, noting that:

- The value populated in the converted S-57 attribute will be the sum of the value calculated from **uncertainty variable factor** and the value populated for the S-101 attribute **uncertainty fixed** (see clause 28.26).
- The value to be used for the converted S-57 value is calculated as {**uncertainty variable factor** x [depth or horizontal length value]}.

The S-57 attribute that **uncertainty variable factor** will be converted to is dependent on the binding S-101 feature and the complex attribute to which **uncertainty fixed** is bound as a sub-attribute as follows:

horizontal position uncertainty / uncertainty variable factor	->	POSACC
vertical uncertainty / uncertainty variable factor	->	SOUACC or VERACC (see clause 29.40)

29 Complex Attributes

The following clauses provide specific guidance, where required, for the conversion of S-101 complex attributes to the corresponding S-57 attribute(s).

29.1 directional character

S-101 Sub-Attribute	S-57 Attribute	Comments
moiré effect	CATLIT = *16*	Only if **moiré effect** = *True*. See clause 27.130.
orientation	-	Complex attribute – see clause 29.14

29.2 feature name

S-101 Sub-Attribute	S-57 Attribute	Comments
language	-	This attribute may be used to determine which instance of the sub-attribute **name** is converted to NOBJNM. See clause 27.132.
name	OBJNAM, NOBJNM	See clause 27.132.
name usage	-	This attribute is used to determine the instance(s) of **feature name** to be converted to OBJNAM and NOBJNM. See clauses 27.132 and 27.134.

29.3 features detected

S-101 Sub-Attribute	S-57 Attribute	Comments
least depth of detected features measured	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
significant features detected	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
size of features detected	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.4 fixed date range

S-101 Sub-Attribute	S-57 Attribute	Comments
date end	DATEND	See clause 27.81.
date start	DATSTA	See clause 27.83.

29.5 frequency pair

S-101 Sub-Attribute	S-57 Attribute	Comments
frequency shore station receives	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
frequency shore station transmits	SIGFRQ	See clause 27.102.

29.6 horizontal clearance fixed

S-101 Sub-Attribute	S-57 Attribute	Comments
horizontal clearance value	HORCLR	See clause 27.107.
horizontal distance uncertainty	HORACC	See clause 28.5.

29.7 horizontal clearance open

S-101 Sub-Attribute	S-57 Attribute	Comments
horizontal clearance value	HORCLR	See clause 27.107.
horizontal distance uncertainty	HORACC	See clause 28.5.

29.8 horizontal position uncertainty (*POSACC*)

S-101 Sub-Attribute	S-57 Attribute	Comments
uncertainty fixed	*POSACC*	The total value to be populated for the S-57 attribute POSACC during the automated conversion process is the sum of the value populated in **uncertainty fixed** (see clause 28.26) and the value based on the population of the S-101 attribute **uncertainty variable factor** (see clause 28.27).
uncertainty variable factor	*POSACC*	

29.9 information

S-101 Sub-Attribute	S-57 Attribute	Comments
file locator	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
file reference	TXTDSC, NTXTDS	See clause 27.98.
headline	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
language	-	This attribute is used to determine whether the sub-attribute **file reference** is converted to TXTDSC or NTXTDS (see clause 27.98); or attribute **text** is converted to INFORM or NINFOM (see clause 27.177).
text	INFORM, NINFOM	See clause 27.177.

29.10 light sector

S-101 Sub-Attribute	S-57 Attribute	Comments
colour	COLOUR	See clause 27.75.
directional character	-	Complex attribute – see clause 29.1.
light visibility	LITVIS	See clause 27.120.
sector limit	-	Complex attribute – see clause 29.21.
value of nominal range	VALNMR	See clause 27.192.
sector information	-	Complex attribute – see clause 29.20.

sector arc extension	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.11 measured distance value

S-101 Sub-Attribute	S-57 Attribute	Comments
distance unit of measurement	INFORM	Concatenated with **waterway distance** (see clauses 8.10 and 27.91).
reference location	INFORM	See clause 27.149.
waterway distance	INFORM	Concatenated with **distance unit of measurement** (see clauses 8.10 and 27.203).

29.12 multiplicity of features

S-101 Sub-Attribute	S-57 Attribute	Comments
multiplicity known	INFORM	See clause 27.131.
number of features	INFORM	See clause 27.139.

29.13 online resource

S-101 Sub-Attribute	S-57 Attribute	Comments
headline	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
linkage	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
name of resource	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.14 orientation

S-101 Sub-Attribute	S-57 Attribute	Comments
orientation uncertainty	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
orientation value	ORIENT	See clause 27.141. For conversion of **orientation value** on feature **Tidal Stream Panel Data**, see clause 10.5.

29.15 periodic date range

S-101 Sub-Attribute	S-57 Attribute	Comments
date end	PEREND	See clauses 2.4.8 and 27.81.
date start	PERSTA	See clauses 2.4.8 and 27.83.

29.16 radar wave length *(RADWAL)*

S-101 Sub-Attribute	S-57 Attribute	Comments
radar band	*RADWAL*	For the converted RADWAL, the values for **radar wave length** and **radar band**, in that order, will be separated by a hyphen "-". Where two values of **radar wave length** have been populated for a Feature instance, the converted RADWAL will be populated with the combined list of values in the same order as has been included in the S-101 dataset, separated by a comma ",". See clauses 27.145 and 27.204.
wave length value	*RADWAL*	

EXAMPLE:

radar wave length (1): **radar band** = *0.03* **wave length value** = *X*
radar wave length (2): **radar band** = *0.10* **wave length value** = *S*

Converts to: RADWAL = *0.03-X,0.10-S*

29.17 rhythm of light

S-101 Sub-Attribute	S-57 Attribute	Comments
light characteristic	LITCHR	See clause 27.119.
signal group	SIGGRP	See clause 27.162.
signal period	SIGPER	See clause 27.163.
signal sequence	-	Complex attribute – see clause 29.25

29.18 schedule by day of week

S-101 Sub-Attribute	S-57 Attribute	Comments
category of schedule	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
time intervals by day of week	-	Complex attribute – see clause 29.33.

29.19 sector characteristics

S-101 Sub-Attribute	S-57 Attribute	Comments
light characteristic	LITCHR	See clause 27.119.
light sector	-	Complex attribute – see clause 29.10
signal group	SIGGRP	See clause 27.162.
signal period	SIGPER	See clause 27.163.
signal sequence	-	Complex attribute – see clause 29.25

29.20 sector information

S-101 Sub-Attribute	S-57 Attribute	Comments
language	-	This attribute is used to determine whether the sub-attribute **text** is converted to INFORM or NINFOM. See clause 27.177.

text	INFORM, NINFOM	See clause 27.177.

29.21 sector limit

S-101 Sub-Attribute	S-57 Attribute	Comments
sector limit one	-	Complex attribute – see clause 29.22
sector limit two	-	Complex attribute – see clause 29.23

29.22 sector limit one *(SECTR1)*

S-101 Sub-Attribute	S-57 Attribute	Comments
sector bearing	SECTR1	See clause 27.157.
sector line length	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.23 sector limit two *(SECTR2)*

S-101 Sub-Attribute	S-57 Attribute	Comments
sector bearing	SECTR2	See clause 27.157.
sector line length	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.24 shape information

S-101 Sub-Attribute	S-57 Attribute	Comments
language	-	This attribute is used to determine whether the sub-attribute **text** is converted to INFORM or NINFOM. See clause 27.177.
text	INFORM, NINFOM	On **TOPMAR** Object. See clause 27.177.

29.25 signal sequence *(SIGSEQ)*

S-101 Sub-Attribute	S-57 Attribute	Comments
signal duration	SIGSEQ	See clause 27.159. Where multiple values of **signal sequence** have been populated for a Feature instance, the converted SIGSEQ will be populated with the combined list of values of **signal duration** in the same order as has been included in the S-101 dataset, separated by a plus "+" sign.
signal status	SIGSEQ	See clause 27.164. Where the value of **signal status** = *2* (eclipsed/silent), the corresponding value of **signal duration** in the converted SIGSEQ will be enclosed by brackets ().

EXAMPLE:

signal sequence (1): **signal duration** = *00.8* **signal status** = *1* (lit/sound)
signal sequence (2): **signal duration** = *02.2* **signal status** = *2* (eclipsed/silent)
signal sequence (3): **signal duration** = *00.8* **signal status** = *1* (lit/sound)
signal sequence (4): **signal duration** = *05.2* **signal status** = *2* (eclipsed/silent)

Converts to: SIGSEQ = *00.8+(02.2)+00.8+(05.2)*

29.26 spatial accuracy

S-101 Sub-Attribute	S-57 Attribute	Comments
fixed date range	-	Complex attribute – see clause 29.4
horizontal position uncertainty	-	Complex attribute – see clause 29.8
vertical uncertainty	-	Complex attribute – see clause 29.40

29.27 speed

S-101 Sub-Attribute	S-57 Attribute	Comments
speed maximum	CURVEL	See clause 27.166.
speed minimum	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.28 surface characteristics

S-101 Sub-Attribute	S-57 Attribute	Comments
nature of surface	NATSUR	See clauses 12.1 and 27.137.
nature of surface – qualifying terms	NATQUA	See clauses 12.1 and 27.138.
underlying layer	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute. See clause 12.1.

29.29 survey date range

S-101 Sub-Attribute	S-57 Attribute	Comments
date end	SUREND	See clauses 2.4.8 and 27.81.
date start	SURSTA	See clauses 2.4.8 and 27.83.

29.30 telecommunications

S-101 Sub-Attribute	S-57 Attribute	Comments
contact instructions	INFORM	See clause 27.79.
telecommunication identifier	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
telecommunication service	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.31 tidal stream panel values

S-101 Sub-Attribute	S-57 Attribute	Comments
reference tide	TS_TSP	3rd value in formatted text string. See clauses 10.5 and 27.150.

reference tide type	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
stream depth	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
tidal stream value	-	Complex attribute – see clause 29.32.

29.32 tidal stream value

S-101 Sub-Attribute	S-57 Attribute	Comments
orientation	-	Complex attribute – see clause 29.14.
speed maximum	TS_TSP	Stream rate in 4th to 29th values in formatted text string. See clauses 10.5 and 27.166.
time relative to tide	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.33 time intervals by day of week

S-101 Sub-Attribute	S-57 Attribute	Comments
day of week	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
day of week is range	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
time of day end	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.
time of day start	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.34 topmark *(TOPMAR)*

S-101 Sub-Attribute	S-57 Attribute	Comments
colour	COLOUR	On **TOPMAR** Object. See clause 27.75.
colour pattern	COLPAT	On **TOPMAR** Object. See clause 27.76
topmark/daymark shape	TOPSHP	On **TOPMAR** Object. See clause 27.185.
shape information	-	Complex attribute – see clause 29.24.

29.35 value of local magnetic anomaly

S-101 Sub-Attribute	S-57 Attribute	Comments
magnetic anomaly value	VALLMA	See clauses 4.2 and 27.122.
reference direction	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.36 vertical clearance closed

S-101 Sub-Attribute	S-57 Attribute	Comments
vertical clearance value	VERCCL	See clause 27.195.
vertical uncertainty	-	Complex attribute – see clause 29.40.

29.37 vertical clearance fixed

S-101 Sub-Attribute	S-57 Attribute	Comments
vertical clearance value	VERCLR	See clause 27.195.
vertical uncertainty	-	Complex attribute – see clause 29.40.

29.38 vertical clearance open

S-101 Sub-Attribute	S-57 Attribute	Comments
vertical clearance unlimited	-	See clause 27.194
vertical clearance value	VERCOP	See clause 27.195.
vertical uncertainty	-	Complex attribute – see clause 29.40.

29.39 vertical clearance safe

S-101 Sub-Attribute	S-57 Attribute	Comments
vertical clearance value	VERCSA	See clause 27.195.
vertical uncertainty	-	Complex attribute – see clause 29.40.

29.40 vertical uncertainty *(SOUACC, VERACC)*

S-101 Sub-Attribute	S-57 Attribute	Comments
uncertainty fixed	SOUACC or VERACC	Dependant on **vertical uncertainty** related to depth (SOUCC) or heights/vertical clearances (VERACC). The total value to be populated for the S-57 attributes SOUACC or VERACC during the automated conversion process is the sum of the value populated in **uncertainty fixed** (see clause 28.26) and the value based on the population of the S-101 attribute **uncertainty variable factor** (see clause 28.27).
uncertainty variable factor	SOUACC or VERACC	

29.41 vessel speed limit

S-101 Sub-Attribute	S-57 Attribute	Comments
speed limit	INFORM	Concatenated with **speed units** (see clause 27.165).
speed units	INFORM	Concatenated with **speed limit** (see clause 27.168).
vessel class	-	This attribute is an enhancement included in S-101 – there is no corresponding S-57 encoding for this attribute.

29.42 zone of confidence

S-101 Sub-Attribute	S-57 Attribute	Comments
category of zone of confidence in data	CATZOC	See clause 27.74.
fixed date range	-	This complex attribute is an enhancement included in S-101 – see clause 3.8.
horizontal position uncertainty	-	Complex attribute – see clause 29.8.
vertical uncertainty	-	Complex attribute – see clause 29.40.

30 ECDIS System (Portrayal) Attributes

30.1 default clearance depth

The S-101 attribute **default clearance depth** will not be converted. This attribute is an extension in S-101 used to aid with conditional ECDIS portrayal – there is no corresponding S-57 encoding for this attribute.

30.2 in the water

The S-101 attribute **in the water** value *True* is used to indicate that a feature that is located offshore or extends from the land over navigable water is to be included in ECDIS Base display. All instances of encoding of the S-101 attribute **in the water** = *True* on a point feature will be converted automatically to an instance of the S-57 feature **PILPNT**, coincident with the converted feature for which **in the water** is present and taking the same value for the attribute SCAMIN as the converted feature, during the automated conversion process.

Where **in the water** has been populated as *False*, the attribute will not be used in the automated conversion process.

30.3 sector arc extension

The S-101 attribute **sector arc extension** will not be converted. This attribute is an extension in S-101 used to aid with conditional ECDIS portrayal – there is no corresponding S-57 encoding for this attribute.

30.4 surrounding depth

The S-101 attribute **surrounding depth** will not be converted. This attribute is an extension in S-101 used to aid with conditional ECDIS portrayal – there is no corresponding S-57 encoding for this attribute.

31 Updating (see S-4 – B-600)

Not applicable.

31.1 Issuing Updates in advance

Not applicable.

31.1.1 Advance notification of changes to traffic separation schemes

Not applicable.

31.2 Guidelines for encoding Temporary and Preliminary ENC Updates

31.2.1 Introduction

Not applicable.

31.2.2 Temporary (T) Notices to Mariners (see S-4 – B-633)

Not applicable

31.2.3 Preliminary (P) Notices to Mariners (see S-4 – B-634)

Not applicable.

32 ECDIS Chart 1 Features and Attributes

32.1 Chart 1 feature

Not applicable.

32.2 drawing instruction

Not applicable.

Appendix A: S-101 to S-57 conversion quick references

A-1 Summary of possible manual intervention required by the Data Producer

Table A-1 below provides a summary of the pre- or post-conversion manual intervention that may be required by the Data Producer when converting S-101 ENCs so as to provide an "equivalent" S-57 ENC. For a more comprehensive description of the intent for the requirement to perform this manual intervention, see clause 1.1.

The level of manual intervention required is dependent on the extent that conversion tools may be customised so as to adapt to the specific data encoding policies and practices of the Data Producer. The summary information contained in Table A-1 is intended to cater for conversion tools having a minimal customization capability. However, where it is considered that the data converter can be customised in order to achieve the desired result in all cases (such as conversion of attribute values to the S-57 attribute INFORM), or if it is not considered that the difference in the converted S-57 dataset is not an issue for safe navigation, this is indicated in the Table by a grey background.

More concise guidance within this document can be found in the clause numbers listed in the 2nd column. Where there are multiple clause numbers listed against an S-101 Feature, the clause number listed in **bold** is the principle reference. Where the 3rd column indicates that one or more binding attributes for an S-101 Feature class has a restricted allowable list of enumerate values in S-57, which may therefore require the value to be populated using a standardised text string for the S-57 attributes INFORM and optionally NINFOM, refer to Table A-2 for the relevant attribute values and, where required, a suggested standardised text string to be automatically populated.

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Various	**2.5.8**, 27.132	S-101 complex attribute **feature name** has multiplicity [0..*]. Where multiple instances of **feature name** are encoded for a feature instance, Data Producers may be required to check the converted combinations of NOBJNM.	Various
Various	-	S-101 complex attributes **information**, **sector information** and **shape information** have multiplicity [0..*]. Where multiple instances of these complex attributes are encoded for a feature instance, Data Producers may be required to check the converted instances of INFORM/NINFOM; and (for **information** only) TXTDSC/NTXTDS and PICREP. See clauses 27.97, 27.142 and 27.170.	Various
Various	-	Many attributes included in S-101 do not have direct corresponding attributes in S-57. In most cases where this occurs, the information contained in the S-101 attribute converts to a text string included in the S-57 attribute INFORM. This may result in multiple discrete text strings being populated for a single instance of INFORM. Data Producers will be required to ensure that a standard separator (for example a semicolon ";") is used to separate these discrete text strings; and to check that the combination of discrete text strings does not exceed 300 characters.	Various
Various	**27.98**, **27.142**	The S-101 attributes **file reference** and **pictorial representation** are populated using a file naming convention that is significantly changed from the format required for S-57. Data Producers may be required to check and manually amend converted values for the attributes TXTDSC, NTXTDS and PICREP. See S-101 ENC Product Specification Main document clause 11.4.1 and S-57 Appendix B.1 – *ENC Product Specification*, clause 5.6.4.	Various
Administration Area	**16.9**	Reconcile conversion of **Administration Area** of geometric primitive curve. Reconcile conversion of areas that are in dispute (see S-57 UOC clause 11.2.4).	**ADMARE**, **CTNARE**
Airport/Airfield	**6.3**	Restricted allowable S-57 enumerate values for **category of airport/airfield**.	**AIRARE**
Anchor Berth	**16.5**	Restricted allowable S-57 enumerate values for **category of cargo** and **restriction**.	**ACHBRT**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Anchorage Area	**16.3**	Restricted allowable S-57 enumerate values for **category of anchorage**, **category of cargo** and **restriction**.	**ACHARE**
Archipelagic Sea Lane	**15.25**	Attribute **fixed date range** will not be converted.	**C_AGGR**, **SEAARE**
Archipelagic Sea Lane Area	**15.24**	None	**ARCSLN**
Archipelagic Sea Lane Axis	**15.25**	None	**ASLXIS**
Berth	**8.14**	Attributes **horizontal clearance length** and **horizontal clearance width** will not be converted. Restricted allowable S-57 enumerate values for **category of cargo**.	**BERTHS**
Bollard	**8.16**	None.	**MORFAC**
Bridge	**6.6**, 6.7, 6.8	Reconcile instances and attribution of converted **BRIDGE** features (**Bridge**, **Span Fixed** and **Span Opening** to **BRIDGE**; conversion to CATBRG; and creation of **C_AGGR**). See clauses 6.6, 6.7 and 6.8; and S-57 UOC clause 4.8.10. Restricted allowable S-57 enumerate values for **nature of construction**.	**BRIDGE**
Building	**6.2**	Restricted allowable S-57 enumerate values for **function** and **nature of construction**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**BUISGL**
Built-Up Area	**6.1**	Check the mandatory inclusion of a **COALNE** Object along the seaward edge of a converted **BUAARE** extending over navigable water.	**BUAARE**
Cable Area	**14.3**	Restricted allowable S-57 enumerate values for **category of cable** and **restriction**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**CBLARE**
Cable Overhead	**6.10**	Restricted allowable S-57 enumerate values for **status** and **vertical datum**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**CBLOHD**
Cable Submarine	**14.2**	Attribute **buried depth** will not be converted when converting to **MORFAC**. Restricted allowable S-57 enumerate values for **category of cable**.	**CBLSUB**, **MORFAC**
Canal	**8.9**	None.	**CANALS**
Cardinal Beacon	**20.10**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **visual prominence**.	**BCNCAR**, **TOPMAR**
Cardinal Buoy	**20.2**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **nature of construction**.	**BOYCAR**, **TOPMAR**
Cargo Transhipment Area	**16.10**	Attribute **restriction** will not be converted. Check INFORM for conversion of complex attribute **vessel speed limit**.	**CTSARE**
Causeway	**8.8**	None.	**CAUSWY**
Caution Area	**16.11**	Attributes **condition**, **status** and **pictorial representation** will not be converted. **Caution Area** having a value populated for **pictorial representation** and where the complex attribute **information** does not exist or has sub-attributes populated as empty (null) will not be converted.	**CTNARE**
Checkpoint	**8.2**	None.	**CHKPNT**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Coast Guard Station	**22.3**	Attribute **communication channel** will not be converted. Area is not an allowable geometric primitive for **CGUSTA**. A **Coast Guard Station** of geometric primitive surface will be converted to **CGUSTA** of geometric primitive point.	**CGUSTA**
Coastline	**5.3**	Reconcile conversion of multiple instances of attribute **nature of surface**.	**COALNE**
Collision Regulations Limit	**16.27**	Attribute **regulation citation** will not be converted. Reconcile conversion of **feature name** (if required). Reconcile conversion to very narrow **ADMARE** of geometric primitive surface.	**CTNARE**
Contact Details	**24.1**	Attributes for an instance of the Information type **Contact Details** will be converted to the corresponding attributes on the associated S-57 Object instance(s) (see clause 24.1). Attributes **fixed date range**, **frequency shore station receives**, **MMSI code, online resource** and **telecommunications** will not be converted, unless required in accordance with national requirements.	
Contiguous Zone	**16.13**	Reconcile conversion of **Contiguous Zone** of geometric primitive curve. Reconcile conversion of areas that are in dispute (see S-57 UOC clause 11.2.4).	**CONZNE**, **CTNARE**
Continental Shelf Area	**16.14**	Reconcile conversion of **Continental Shelf Area** of geometric primitive curve.	**COSARE**, **CTNARE**
Conveyor	**6.9**	Restricted allowable S-57 enumerate values for **category of conveyor**, **product** and **vertical datum**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**CONVYR**
Crane	**8.13**	Attributes **vertical clearance fixed** and **vertical datum** will not be converted. Restricted allowable S-57 enumerate values for **category of crane** and **vertical datum**.	**CRANES**
Current – Non-Gravitational	**10.3**	Attribute **status** and sub-attribute **speed minimum** will not be converted.	**CURENT**
Custom Zone	**16.15**	None.	**CUSZNE**
Dam	**8.12**	Attributes **status** and **water level effect** will not be converted.	**DAMCON**
Data Coverage	**3.5**	None.	**M_COVR**, **M_NSYS**
Daymark	**20.14**	Attribute **radar conspicuous** will not be converted. Restricted allowable S-57 enumerate values for **category of special purpose mark** and **nature of construction**.	**DAYMAR**
Deep Water Route	**15.15**	Attribute **IMO adopted** will not be converted.	**C_AGGR**, **SEAARE**
Deep Water Route Centreline	**15.13**	Attribute **IMO adopted** will not be converted. Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**DWRTCL**
Deep Water Route Part	**15.14**	Attribute **IMO adopted** will not be converted. Restricted allowable S-57 enumerate values for **status** and **technique of vertical measurement**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**DWRTCL**
Depth Area	**11.8**	None.	**DEPARE**
Depth Contour	**11.6**	None.	**DEPCNT**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Depth – No Bottom Found	**11.8**	Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**SOUNDG**
Discoloured Water	**13.8**	None.	**CTNARE**
Distance Mark	**8.10**	Reconcile converted value of CATDIS where distance mark is visible. See clause 27.90. Check INFORM for conversion of complex attribute **measured distance value** and attribute **reference location**..	**DISMAR**
Dock Area	**8.20**	Attributes **horizontal clearance length**, **horizontal clearance width**, **maximum permitted draught** and **periodic date range** will not be converted.	**DOCARE**
Dolphin	**8.15**	Attribute **elevation** will not be converted. Where multiple instances of attribute **category of dolphin** have been populated, only the first instance will be converted to the S-57 attribute CATMOR.	**MORFAC**
Dredged Area	**11.4**	Attribute **maximum permitted draught** will not be converted. Restricted allowable S-57 enumerate values for **restriction** and **technique of vertical measurement**. Check the converted dataset to ensure that a **SOUNDG** or **SEAARE** Object has been created to display the dredged depth.	**DRGARE**
Dry Dock	**8.17**	Attributes **elevation**, **horizontal clearance length** and **horizontal clearance width** will not be converted.	**DRYDOC**
Dumping Ground	**16.7**	Attribute **date disused** will not be converted. Check INFORM for conversion of complex attribute **vessel speed limit**.	**DMPGRD**
Dyke	**8.5**	Attributes **feature name** and **visual prominence** will not be converted.	**DYKCON**
Emergency Wreck Marking Buoy		Restricted allowable S-57 enumerate values for **marks navigational – system of** and **nature of construction**.	**BOYSPP**, **TOPMAR**
Exclusive Economic Zone	**16.16**	Reconcile conversion of **Exclusive Economic Zone** of geometric primitive curve. Reconcile conversion of areas that are in dispute (see S-57 UOC clause 11.2.4).	**EXEZNE**, **CTNARE**
Fairway	**15.7**	Restricted allowable S-57 enumerate values for **restriction** and **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**FAIRWY**
Fairway System	**15.8**	Attributes **fixed date range** and **periodic date range** will not be converted.	**C_AGGR**, **SEAARE**
Fence/Wall	**6.13**	Restricted allowable S-57 enumerate values for **nature of construction**.	**FNCLNE**
Ferry Route	**15.28**	Restricted allowable S-57 enumerate values for **category of ferry**. Where multiple instances of attribute **category of ferry** have been populated, only the first instance will be converted to the S-57 attribute CATFRY.	**FERYRT**
Fishery Zone	**16.17**	None.	**FSHZNE**
Fishing Facility	**13.9**	Attribute **condition** will not be converted. Restricted allowable S-57 enumerate values for **status**.	**FSHFAC**
Fishing Ground	**16.18**	Attribute **restriction** will not be converted. Restricted allowable S-57 enumerate values for **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**FSHGRD**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Floating Dock	**8.18**	Attributes **horizontal clearance length** and **horizontal clearance width** will not be converted. Reconcile **FLODOC** of geometric primitive area as a Group 1 object in S-57, including creation of **CTNARE** for date-dependant **FLODOC** area features. See clause 8.18 and S-57 UOC clause 4.6.6.2.	**FLODOC**
Fog Signal	**20.19**	Restricted allowable S-57 enumerate values for **signal generation**.	**FOGSIG**
Fortified Structure	**7.5**	Restricted allowable S-57 enumerate values for **category of fortified structure** and **status**.	**FORSTC**
Foul Ground	**13.7**	Restricted allowable S-57 enumerate values for **status** and **technique of vertical measurement**.	**OBSTRN**
Free Port Area	**16.19**	None.	**FRPARE**
Gate	**8.11**	Restricted allowable S-57 enumerate values for **vertical datum**.	**GATCON**
Gridiron	**8.21**	Restricted allowable S-57 enumerate values for **nature of construction** and **status**.	**GRIDRN**
Harbour Area (Administrative)	**16.20**	None.	**HRBARE**
Harbour Facility	**22.7**	Attributes **communication channel**, **product** and **restriction** will not be converted. Restricted allowable S-57 enumerate values for **category of harbour facility**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**HRBFAC**
Helipad	**6.5**	Population of standardised text string in INFORM for converted **LNDMRK** Object of type point.	**RUNWAY**, **LNDMRK**
Hulk	**8.3**	Restricted allowable S-57 enumerate values for **category of hulk**. Reconcile **HULKES** of geometric primitive area as a Group 1 object in S-57, including creation of **CTNARE** for date-dependant **HULKES** area features. See clause 8.3 and S-57 UOC clause 4.6.8.	**HULKES**
Ice Area	**5.13**	None.	**ICEARE**
Information Area	**16.12**	Attributes **feature name**, **fixed date range**, **periodic date range** and **reported date** will not be converted.	**M_NPUB**
Inshore Traffic Zone	**15.16**	None.	**ISTZNE**
Installation Buoy	**20.7**	Attribute **visual prominence** will not be converted. Restricted allowable S-57 enumerate values for **nature of construction**.	**BOYINB**
Island Group	**5.5**	**Island Group** having no geometry will not be converted.	**LNDRGN**, **C_AGGR**
Isolated Danger Beacon	**20.11**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **visual prominence**.	**BCNISD**, **TOPMAR**
Isolated Danger Buoy	**20.3**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **nature of construction**.	**BOYISD**, **TOPMAR**
Lake	**5.10**	None.	**LAKARE**, **RIVERS**
Land Area	**5.4**	None.	**LNDARE**
Land Elevation	**5.6**	None.	**LNDELV**
Land Region	**5.5**	**Land Region** of geometric primitive curve will not be converted. Restricted allowable S-57 enumerate values for **category of land region**.	**LNDRGN**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Landmark	**7.2**	Attribute **category of special purpose mark** will not be converted. Restricted allowable S-57 enumerate values for **category of landmark**, **function** and **nature of construction**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**LNDMRK**, **BRIDGE**, **CTRPNT**, **DAMCON**
Lateral Beacon	**20.9**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **visual prominence**.	**BCNLAT**, **TOPMAR**
Lateral Buoy	**20.1**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **nature of construction**.	**BOYLAT**, **TOPMAR**
Light Air Obstruction	**19.5**	Attribute **flare bearing** will not be converted. Restricted allowable S-57 enumerate values for **light visibility** and **vertical datum**. Check INFORM for conversion of complex attributes **multiplicity of features**.	**LIGHTS**
Light All Around	**19.2**	Attributes **flare bearing**, **major light** and **multiplicity known** will not be converted. Restricted allowable S-57 enumerate values for **marks navigational – system of**, **signal generation** and **vertical datum**. Check INFORM for conversion of complex attributes **multiplicity of features** and **vertical length**.	**LIGHTS**
Light Float	**20.15**	Restricted allowable S-57 enumerate values for **nature of construction** and **visual prominence**.	**LITFLT**, **TOPMAR**
Light Fog Detector	**19.4**	Attribute **flare bearing** will not be converted. Restricted allowable S-57 enumerate values for **signal generation** and **vertical datum**. Check INFORM for conversion of complex attributes **vertical length**.	**LIGHTS**
Light Sectored	**19.3**	Attributes **sector line length** and **sector extension** will not be converted. Restricted allowable S-57 enumerate values for **light visibility**, **marks navigational – system of**, **signal generation** and **vertical datum**. Check converted combinations of INFORM/NINFOM. See clause 27.177. Check INFORM for conversion of complex attributes **multiplicity of features**.	**LIGHTS**
Light Vessel	**20.16**	Restricted allowable S-57 enumerate values for **visual prominence**.	**LITVES**
Local Direction of Buoyage	**3.7**	None.	**M_NSYS**
Local Magnetic Anomaly	**4.2**	Reconcile conversion of multiple instances of attribute **local magnetic anomaly**.	**LOCMAG**
Lock Basin	**8.22**	Attribute **periodic date range** will not be converted.	**LOKBSN**
Log Pond	**16.21**	Attribute **periodic date range** will not be converted.	**LOGPON**
Magnetic Variation	**4.1**	None.	**MAGVAR**
Marine Farm/Culture	**13.10**	Attribute **height** will not be converted. Restricted allowable S-57 enumerate values for **restriction** and **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**MARCUL**
Marine Pollution Regulations Area	**16.28**	Attribute **regulation citation** will not be converted.	**ADMARE**
Military Practice Area	**16.8**	Attribute **nationality** will not be converted. Restricted allowable S-57 enumerate values for **restriction**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**MIPARE**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Mooring Area	**16.4**	Restricted allowable S-57 enumerate values for **category of mooring area** and **restriction**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**ACHARE**
Mooring Buoy	**20.8**	Attributes **maximum permitted draught** and **maximum permitted vessel length** will not be converted. Restricted allowable S-57 enumerate values for **nature of construction**. Attributes **buoy shape**, **colour**, **colour pattern**, **fixed date range**, **maximum permitted draught**, **maximum permitted vessel length**, **nature of construction** and **vertical length** will not be converted when converting to **SMCFAC**.	**MORFAC**, **SMCFAC**
Mooring Trot	**8.23**	Attribute **fixed date range** will not be converted.	**C_AGGR**, **SEAARE**
Nautical Information	**24.4**	Attributes for an instance of the Information type **Nautical Information** will be converted to the corresponding attributes on the associated S-57 Object instance(s) (see clause 24.4). Attributes **file locator**, **fixed date range**, **headline**, **language** and **periodic date range** will not be converted, unless required in accordance with national requirements.	
Navigation Line	**15.4**	Check INFORM for conversion of attribute **measured distance**.	**NAVLNE**
Navigational System of Marks	**3.6**	Restricted allowable S-57 enumerate values for **marks navigational – system of**.	**M_NSYS**
Non-Standard Working Day	**24.4**	No attributes will be converted to the corresponding attributes on the associated S-57 Object instance(s) (see clause 24.3), unless required in accordance with national requirements.	
Obstruction	**13.6**	Attributes **maximum permitted draught**, **condition** and **surrounding depth** will not be converted when converting to **OBSTRN**. Attributes **category of obstruction**, **exposition of sounding**, **maximum permitted draught**, **product**, **quality of vertical measurement**, **status**, **technique of vertical measurement**, **maximum permitted draught**, **value of sounding**, **water level effect**, **default clearance depth** and **surrounding depth** will not be converted when converting to **VEGATN**. Restricted allowable S-57 enumerate values for **category of obstruction**, **product**, **status** and **technique of vertical measurement**.	**OBSTRN**, **VEGATN**, **COALNE**
Offshore Platform	**14.1**	If required, reconcile conversion of **Offshore Platform** of geometric primitive surface to **LNDMRK**. Restricted allowable S-57 enumerate values for **category of offshore platform**, **product** and **status**.	**OFSPLF**, **LNDMRK**
Offshore Production Area	**14.6**	Attribute **water level effect** will not be converted. Restricted allowable S-57 enumerate values for **category of offshore production area**, **product**, **restriction** and **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**OSPARE**
Oil Barrier	**16.22**	None.	**OILBAR**
Physical AIS Aid to Navigation	**21.2**	No attributes will be converted.	Aid to navigation structure
Pile	**8.4**	Attribute **status** will not be converted for **Pile** of geometric primitive point when converting to **PILPNT**. Population of standardised text string in INFORM for converted **CTNARE** or **MORFAC** Objects. Restricted allowable S-57 enumerate values for **category of pile**.	**PILPNT**, **BCNSPP**, **CTNARE**, **MORFAC**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Pilot Boarding Place	**22.1**	Attributes **category of preference**, **destination** and **pilot movement** will not be converted. Restricted allowable S-57 enumerate values for **status**. Reconcile conversion of S-101 attribute **communication channel**.	**PILBOP**
Pilotage District	**16.26**	Check for existence of converted **ADMARE** and delete where coincident with **HRBARE**. Attribute **communication channel** will not be converted.	**ADMARE**
Pipeline Overhead	**6.11**	Restricted allowable S-57 enumerate values for **vertical datum**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**PIPOHD**
Pipeline Submarine/On Land	**14.4**	Restricted allowable S-57 enumerate values for **category of pipeline/pipe**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**PIPSOL**
Pontoon	**8.19**	Reconcile **PONTON** of geometric primitive area as a Group 1 object in S-57, including creation of **CTNARE** for date-dependant **PONTON** area features. See clause 8.19 and S-57 UOC clause 4.6.7.3.	**PONTON**
Precautionary Area	**15.17**	Attribute **feature name** will not be converted. Restricted allowable S-57 enumerate values for **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**PECARE**
Production/Storage Area	**7.6**	Restricted allowable S-57 enumerate values for **category of production area** and **product**.	**PRDARE**
Pylon/Bridge Support	**6.12**	Restricted allowable S-57 enumerate values for **nature of construction** and **vertical datum**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**PYLONS**
Quality of Bathymetric Data	**3.8**	Attributes **category of temporal variation**, **data assessment**, **features detected**, **full seafloor coverage achieved** and **zone of confidence** (**fixed data range**) will not be converted. Review the converted S-57 dataset to ensure the desired outcome is achieved for conversion of overlapping **Quality of Bathymetric Data** and amend as required. See S-57 UOC clause 2.2.3.1; Reconcile creation of **M_QUAL** required to cover areas of depth data or bathymetry that do not have a corresponding **Quality of Bathymetric Data** feature in S-101; Reconcile converted value of CATZOC where multiple instances of complex attribute **category of zone of confidence in data** have been encoded, including population of standardised text string in INFORM for encoded **CTNARE** Object indicating an area of continual change.	**M_QUAL**
Quality of Non-Bathymetric Data	**3.4**	None.	**M_ACCY**
Quality of Survey	**3.11**	Attribute **technique of vertical measurement** will not be converted. May be encoded using TECSOU on **M_QUAL**. See clause 3.10 and S-57 UOC clause 2.2.3.1; Restricted allowable S-57 enumerate values for **survey type**.	**M_SREL**
Radar Line	**15.29**	None.	**RADLNE**
Radar Range	**15.30**	Reconcile conversion of S-101 attribute **communication channel**.	**RADRNG**
Radar Reflector	**20.18**	Attributes **fixed date range** and **periodic date range** will not be converted.	**RADRFL**
Radar Station	**15.31**	Attribute **call sign** will not be converted. Reconcile conversion of S-101 attribute **communication channel**.	**RADSTA**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Redar Transponder Beacon	**21.5**	Attribute **sector line length** will not be converted.	**RTPBCN**
Radio Calling-In Point	**15.27**	Reconcile conversion of S-101 attribute **communication channel**.	**RDOCAL**
Radio Station	**21.4**	Attribute **frequency shore station receives** will not be converted. Reconcile conversion of S-101 attribute **communication channel**.	
Railway	**6.14**	None.	**RAILWY**
Range System	**15.6**	Attribute **fixed date range** will not be converted. Reconcile conversion of S-101 attribute **feature name**.	**C_AGGR**
Rapids	**5.8**	Population of standardised text string in INFORM for converted **LNDMRK** Object of type point.	**RAPIDS**, **LNDMRK**
Recommended Route Centreline	**15.9**	Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**RCRTCL**
Recommended Track	**15.5**	Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**RECTRC**
Recommended Traffic Lane Part	**15.12**	None.	**RTCLPT**
Rescue Station	**22.6**	Attribute **communication channel** will not be converted. Area is not an allowable geometric primitive for **RSCSTA**. A **Rescue Station** of geometric primitive surface will be converted to **RSCSTA** of geometric primitive point.	**RSCSTA**
Restricted Area	**17.8**	Attribute **vessel class** will not be converted. Restricted allowable S-57 enumerate values for **category of restriction**, **restriction** and **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**RESARE**
Retroreflector	**20.17**	None.	**RETRFL**
River	**5.7**	None.	**RIVERS**
Road	**6.15**	None.	**ROADWY**
Runway	**6.4**	None.	**RUNWAY**
Safe Water Beacon	**20.12**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **visual prominence**.	**BCNSAW**, **TOPMAR**
Safe Water Buoy	**20.4**	Restricted allowable S-57 enumerate values for **marks navigational – system of** and **nature of construction**.	**BOYSAW**, **TOPMAR**
Sandwave	**12.4**	None.	**SNDWAV**
Sea Area/Named Water Area	**9.1**	Restricted allowable S-57 enumerate values for **category of sea area**.	**SEAARE**
Seabed Area	**12.1**	Attribute **underlying layer** will not be converted. Check NATSUR and NATQUA for conversion of complex attribute **surface characteristics**. See clause 12.1 and S-57 UOC clause 7.1.	**SBDARE**
Seagrass	**12.3**	None.	**WEDKLP**
Seaplane Landing Area	**16.6**	Restricted allowable S-57 enumerate values for **restriction**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**SPLARE**
Service Hours	**24.2**	No attributes will be converted to the corresponding attributes on the associated S-57 Object instance(s) (see clause 24.2), unless required in accordance with national requirements.	

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Shoreline Construction	**8.6**	Attributes **horizontal length** and **horizontal width** will not be converted when converting to **MORFAC**. Restricted allowable S-57 enumerate values for **category of shoreline construction**, **nature of construction** and **status**.	**SLCONS**, **MORFAC**
Signal Station Traffic	**22.5**	Area is not an allowable geometric primitive for **SISTAT**. A **Signal Station Traffic** of geometric primitive surface will be converted to **SISTAT** of geometric primitive point. Reconcile conversion of S-101 attribute **communication channel**.	**SISTAT**
Signal Station Warning	**22.4**	Area is not an allowable geometric primitive for **SISTAW**. A **Signal Station Warning** of geometric primitive surface will be converted to **SISTAW** of geometric primitive point. Reconcile conversion of S-101 attribute **communication channel**.	**SISTAW**
Silo/Tank	**7.3**	Restricted allowable S-57 enumerate values for **product**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**SILTNK**
Slope Topline	**5.15**	None.	**SLOTOP**
Sloping Ground	**5.14**	Population of standardised text string in INFORM for converted **LNDMRK** Objects. See clause 5.14.	**SLOGRD**, **LNDMRK**
Small Craft Facility	**22.8**	None.	**SMCFAC**
Sounding	**11.3**	Restricted allowable S-57 enumerate values for **technique of vertical measurement**. Ensure appropriate population of S-57 attribute EXPSOU where appropriate. See clause 11.3 and S-57 UOC clause 5.3.	**SOUNDG**
Sounding Datum	**3.9**	Restricted allowable S-57 enumerate values for **vertical datum**.	**M_SDAT**
Span Fixed	6.6, **6.7**, 6.8	See entry for **Bridge** above. Restricted allowable S-57 enumerate values for **vertical datum**.	**BRIDGE**
Span Opening	6.6, 6.7, **6.8**	See entry for **Bridge** above. Restricted allowable S-57 enumerate values for **vertical datum**.	**BRIDGE**
Spatial Quality	**24.5**	Attributes for an instance of the Information type **Spatial Quality** will be converted to the corresponding spatial attributes on the associated S-57 Object instance(s) only if included in association **Spatial Association** (see clause 24.5). Attribute **fixed date range** will not be converted. Check converted values for S-57 spatial attributes POSACC and SOUACC if more than one instance of **spatial accuracy** has been encoded.	
Special Purpose/General Beacon	**20.13**	Restricted allowable S-57 enumerate values for **category of special purpose mark**, **marks navigational – system of** and **visual prominence**.	**BCNSPP**, **TOPMAR**
Special Purpose/General Buoy	**20.5**	Restricted allowable S-57 enumerate values for **category of special purpose mark**, **marks navigational – system of** and **nature of construction**.	**BOYSPP**, **TOPMAR**
Spring	**12.5**	None.	**SPRING**
Straight Territorial Sea Baseline	**16.23**	None.	**STSLNE**
Structure Over Navigable Water	**8.7**	Attributes **horizontal length**, **horizontal width**, **product** and **vertical datum** will not be converted. Check INFORM for conversion of attributes **horizontal clearance fixed** and **vertical clearance fixed**. Restricted allowable S-57 enumerate values for **category of structure** and **nature of construction**.	**BUISGL**, **HRBFAC**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Submarine Pipeline Area	**14.5**	Restricted allowable S-57 enumerate values for **restriction**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**PIPARE**
Submarine Transit Lane	**16.25**	Attribute **nationality** will not be converted. Check INFORM for conversion of complex attribute **vessel speed limit**.	**SUBTLN**
Swept Area	**11.5**	None.	**SWPARE**
Territorial Sea Area	**16.24**	Reconcile conversion of **Territorial Sea Area** of geometric primitive curve. Reconcile conversion of areas that are in dispute (see S-57 UOC clause 11.2.4). Check INFORM for conversion of complex attribute **vessel speed limit**.	**TESARE**
Text Placement	**23.1**	Will not convert to S-57.	
Tide Stream Panel Data	**10.5**	Attributes **reference tide type**, **stream depth** and **time relative to tide** will not be converted. Ensure that the mandatory attributes **station name** and **station number** and mandatory complex attribute **tidal stream panel values** are consistent for the population of the S-57 formatted text attribute TS_TSP. See clause 10.5.	**TS_PAD**
Tidal Stream – Flood/Ebb	**10.2**	Attribute **speed minimum** will not be converted.	**TS_FEB**
Tideway	**5.16**	None.	**TIDEWY**
Traffic Separation Scheme	**15.23**	Attribute **fixed date range** will not be converted.	**C_AGGR**, **SEAARE**
Traffic Separation Scheme Boundary	**15.20**	Restricted allowable S-57 enumerate values for **status**.	**TSSBND**
Traffic Separation Scheme Crossing	**15.21**	Check INFORM for conversion of complex attribute **vessel speed limit**.	**TSSCRS**
Traffic Separation Scheme Lane Part	**15.18**	Restricted allowable S-57 enumerate values for **status**. Check INFORM for conversion of complex attribute **vessel speed limit**.	**TSSLPT**
Traffic Separation Scheme Roundabout	**15.22**	Check INFORM for conversion of complex attribute **vessel speed limit**.	**TSSRON**
Traffic Separation Zone or Line	**15.19**	Restricted allowable S-57 enumerate values for **status**.	**TSELNE**, **TSEZNE**
Tunnel	**6.16**	None.	**TUNNEL**
Two-Way Route	**15.11**	Attribute **fixed date range** will not be converted.	**C_AGGR**, **SEAARE**
Two-Way Route Part	**15.10**	Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**TWRTPT**
Update Information	**3.12**	Will not convert to S-57.	
Vegetation	**5.12**	Population of standardised text string in INFORM for converted **LNDMRK** Objects. See clause 5.12.	**VEGATN**, **LNDMRK**
Vertical Datum of Data	**3.10**	Remove instances of **M_VDAT** that replicate the vertical datum in the dataset header information; Restricted allowable S-57 enumerate values for **vertical datum**.	**M_VDAT**
Virtual AIS Aid to Navigation	**21.3**	Attributes **estimated range of transmission** and **periodic date range** will not be converted. Check CLSDEF, CLSNAM, INFORM and SYMINS for conversion of attribute **virtual AIS aid to navigation type**.	**NEWOBJ**

S-101 Feature type	Clause	Possible Pre- or Post-Conversion Wok Required:	Converts to
Underwater/Awash Rock	**13.4**	Attributes **default clearance depth** and **surrounding depth** will not be converted. Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**UWTROC**
Unsurveyed Area	**11.10**	None.	**UNSARE**
Vessel Traffic Service Area	**22.2**	None.	**ADMARE**
Water Turbulence	**10.4**	None.	**WATTUR**
Waterfall	**5.9**	None.	**WATFAL**
Weed/Kelp	**12.2**	None.	**WEDKLP**
Wind Turbine	**7.4**	Attributes **fixed date range**, **vertical clearance fixed**, **vertical datum** and **water level effect** will not be converted. Restricted allowable S-57 enumerate values for **nature of construction** and **status**. Check INFORM for conversion of complex attribute **multiplicity of features**.	**LNDMRK**
Wreck	**13.5**	Attributes **default clearance depth** and **surrounding depth** will not be converted. Restricted allowable S-57 enumerate values for **technique of vertical measurement**.	**WRECKS**

Table A-1

A-2 Allowable S-57 enumerate values

Table A-2 below provides an indication of the differences in the allowable values that may be populated for enumeration type attributes in S-57 when converting S-101 datasets to S-57. The allowable S-57 enumerate values have been derived from IHO Publication S-58 – *ENC Validation Checks*, Check 2000.

Within the Table, the following conventions apply:

- Colour:
  - Black text, with the exception of text within "squared" brackets ([ ]), indicates a direct one-for-one relationship between the allowable S-101 feature/attribute/enumerate encoding combinations and the corresponding allowable S-57 object/attribute/enumerate encoding combinations as listed in S-58 Check 2000.
  - **Red** text indicates differences between the allowable feature/attribute/enumerate encoding combinations in S-101 and the corresponding S-57 object/attribute/enumerate encoding combinations as listed in S-58 Check 2000. These may be allowable values in S-101 for which the corresponding S-57 values are not allowable in S-58 Check 2000; or values permitted in S-101 that do not exist in S-57 (indicated by double strike-through) that as such will not be converted.
  - **Blue** text indicates enumerate values for the corresponding S-57 attribute for which there is no direct corresponding enumerate value in S-101. These values are populated for the corresponding S-57 attribute as a result of the conversion of another S-101 enumerate value, attribute or feature.
  - **Grey** text indicates S-101 feature/attribute/enumerate encoding combinations that do not exist in S-57 and will convert to S-57, but not on a direct one-for-one basis. General conversion conventions are indicated within "squared" brackets ([ ]) in the "Allowable Attribute Values" column.
- **Attribute** column: Alphabetised list of all enumeration type attributes included in S-101. The corresponding S-57 enumeration type attribute that the S-101 attribute will be converted to is stated in the "Allowable Attribute Values" column. Note that S-101 Boolean type attributes that convert to S-57 enumeration type attributes are also included in the Table.
- **Feature** column: Where no Feature class is listed against an attribute in Table A-2, this indicates that all instances of the encoding of this attribute will be converted as indicated in the "Allowable Attribute Values" column to an instance of the corresponding S-57 Object class (that is, some values will convert one-to-one while some values will not convert or will convert but not one-for-one); or there are different values available in S-57.
- **Allowable Attribute Values** column: Values will (or will not) be converted in accordance with the colour conventions described above. Values listed against the S-101 attribute itself indicate the full list of allowable values in S-101 (as included in S-101 DCEG Sections 27 and 28). Additionally, values allowable for the corresponding S-57 attribute that are not allowable values in S-101 but are converted to from other S-101 feature/attribute/enumerate encoding combinations are included in blue text. Values listed against the associated S-101 Feature class indicate the allowable constricted S-57 attribute list for this object/attribute combination. It is important for Data Producers to note that allowable S-101 feature/attribute/enumerate encoding combinations indicated in Table A-2 with red double strike-through text will not convert to S-57. Values shown in red (not struck-though) colour may be considered for additional manual encoding in S-57 as required.

Attribute	Feature	Allowable Attribute Values
based on fixed marks		**1-2** [Boolean type attribute in S-101. Converts to S-57 attribute CATTRK. See clause 27.1]
bridge construction		~~**1**~~**-2-3-4-5** [No equivalent attribute in S-57. Values 2-5 convert to values of S-57 attribute CATBRG. See clause 27.3]

Attribute	Feature	Allowable Attribute Values
bridge function		~~1-2-~~3-4 [No equivalent attribute in S-57. Values 3 and 4 convert to values of S-57 attribute CATBRG. See clause 27.4]
buoy shape		1-2-3-4-5-6-7-8 [Converts to S-57 attribute BOYSHP. For S-101 Feature **Buoy Emergency Wreck Marking** converts to BOYSHP on S-57 Object Class **MORFAC**. For S-101 Feature **Mooring Buoy** converts to BOYSHP on S-57 Object Class **BOYSPP**. See clauses 20.6 and 20.8]
category of anchorage		1-2-3-**4**-5-6-7-**8**-9-10-14-15 [Converts to S-57 attribute CATACH. Value 14 converts to the S-57 attribute INFORM. Value 15 converts to CATACH = 1 and INFORM. See clauses 27.10, 27.15 and 27.40]
category of cable		1-3-4-5-6-7-9-10 [Converts to S-57 attribute CATCBL. Value 7 converts to the S-57 attribute INFORM. Value 9 converts to attribute CATMOR on S-57 Object class **MORFAC**. Value 10 converts to CATCBL = 4. See clause 27.12]
category of cargo		**1-2-3-4-5-6**-7-**8-9-10-11-12-13-14-15** [No equivalent attribute in S-57. Value 7 converts to S-57 attribute INFORM. See clause 27.15]
category of coastline		1-2-**3-4-5**-6-7-8-**9**-10-**11** [Converts to S-57 attribute CATCOA. See clause 27.17]
category of conveyor		1-2-3-4 [Converts to S-57 attribute CATCON. Values 3 and 4 convert to S-57 attribute INFORM. See clause 27.18]
category of crane		2-3-4-5-6 [Converts to S-57 attribute CATCON. Value 6 converts to S-57 attribute INFORM. See clause 27.19]
category of dolphin		1-2-3-4 [No equivalent attribute in S-57. Converts to attribute CATMOR on S-57 Object class **MORFAC**. Values 1,3,and 4 convert to CATMOR = 1. Value 2 converts to CATMOR = 2. See clause 27.22]
category of ferry		1-2-3-5 [Converts to S-57 attribute CATFRY. Value 5 converts to CATFRY = empty (null) and the S-57 attribute INFORM. See clause 27.25]
category of fortified structure		1-2-3-4-5-6-8-9 [Converts to S-57 attribute CATFOR. Values 8 and 9 convert to S-57 attribute INFORM. See clause 27.28]
category of harbour facility		1-3-4-5-6-7-8-9-10-11-12-13-14-15 [Converts to S-57 attribute CATHAF. Values 14 and 15 convert to S-57 attribute INFORM. See clause 27.30]
category of hulk		1-2-3-4-5-6-7 [Converts to S-57 attribute CATHLK. Values 6 and 7 convert to S-57 attribute INFORM. See clause 27.31]

Attribute	Feature	Allowable Attribute Values
category of land region		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21 [Converts to S-57 attribute CATLND. Value 5 converts to CATLND = empty (null) and S-57 attribute INFORM. See clause 27.34]
category of landmark		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27 [Converts to S-57 attribute CATLMK. Values 22 and 23 convert to S-57 Object class **CTRPNT**. Values 24 and 25 convert to CATLMK = empty (null) and S-57 attribute INFORM. Value 26 converts to S-57 Object class **BRIDGE**. Value 27 converts to S-57 Object class **DAMCON**. See clauses 7.2, 7.4 and 27.35]
category of light		1-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20 [Converts to attribute CATLIT on S-57 Object class **LIGHTS**. See clauses 19.3, 19.4 and 19.5]
category of mooring area		1-2-3 [No equivalent attribute in S-57. Value 1 converts to attribute CATACH on S-57 Object class **ACHARE**. Values 2 and 3 convert to INFORM on **ACHARE**. See clause 27.40]
category of obstruction		1-2-3-4-5-6-7-8-9-10-12-13-14-15-16-17-18-19-20-21-22-23 [Converts to S-57 attribute CATOBS. Values 12-22 convert to S-57 attribute INFORM. Value 23 converts to INFORM (for point feature) or S-57 Object class **VEGATN** (for surface feature). See clauses 13.7 and 27.42]
category of offshore platform		1-2-3-4-5-6-7-8-9-10-11 [Converts to S-57 attribute CATOFP. Value 11 converts to S-57 attribute INFORM. See clause 27.43]
category of offshore production area		1-2-3-4-5-6 [No equivalent attribute in S-57. Values 1 and 4 convert to S-57 attribute CATPRA. Values 2, 3, 5 and 6 convert to INFORM. See clause 27.44]
category of opening bridge		3-4-5-7 [No equivalent attribute in S-57. Converts to S-57 attribute CATBRG. See clause 27.46]
category of pile		1-3-4-5-6-7-8 [Converts to S-57 attribute CATPLE. Values 5-7 convert to S-57 attribute INFORM. Value 8 converts to attribute CATMOR on S-57 Object class **MORFAC**. See clause 27.47]
category of pipeline/pipe		2-3-4-5-6-7 [Converts to S-57 attribute CATPIP. Value 7 converts to CATPIP = 5. See clause 27.49]
~~**category of preference**~~		~~1 2~~ [No equivalent attribute in S-57. Will not be converted]
category of production area		1-2-3-4-5-6-7-8-9-10-11-12 [Converts to S-57 attribute CATPRA. Values 11 and 12 convert to CATPRA = empty (null) and S-57 attribute INFORM. See clause 27.51]

Attribute	Feature	Allowable Attribute Values
category of pylon		1-2-3-4-5-6 [Converts to S-57 attribute CATPYL. Value 6 converts to CATPYL = empty (null) and S-57 attribute INFORM. See clause 27.52]
category of radio station		5-10-11-14-19-20 [Converts to S-57 attribute CATROS. Values 19 and 20 convert to S-57 attribute INFORM. See clause 27.55]
category of restricted area		1-4-5-6-7-8-9-10-12-14-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32 [Converts to S-57 attribute CATREA. Values 29-32 convert to S-57 attribute INFORM. See clause 27.57]
~~**category of schedule**~~		~~1-2-3~~ [No equivalent attribute in S-57. Will not be converted]
category of sea area		2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56 [Converts to S-57 attribute CATSEA. Values 55 and 56 convert to S-57 attribute INFORM. See clause 27.60]
category of shoreline construction		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-20-22-23 [Converts to S-57 attribute CATSLC. Value 20 convert to S-57 attribute INFORM. Value 22 convert to CATSLC = 6. Value 23 converts to attribute CATMOR on S-57 Object class **MORFAC**. See clause 27.61]
category of small craft facility		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33 [Converts to S-57 attribute CATSCF. See clause 20.8]
category of special purpose mark		1-2-3-4-5-6-7-8-9-10-11-12-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-60-61-62-63 [Converts to S-57 attribute CATSPM. Values 57, 58, 60, 61 and 62 convert to CATSPM = 27 and INFORM. Values 59 and 63 convert to CATSPM = empty (null) and INFORM. See clause 27.67]
	Landmark	~~16-17-41~~ [CATSPM is not an allowable attribute for **LNDMRK** in S-57. Will not be converted]
category of structure		1-2-3-4-5 [No equivalent attribute in S-57. Values 1, 3 and 4 convert to INFORM on S-57 Object class **BUISGL**. Values 2 and 5 convert to CATHAF on S-57 Object class **HRBFAC**. See clause 27.68]
~~**category of temporal variation**~~		~~1-2-3-4-5-6~~ [No equivalent attribute in S-57. Will not be converted]
category of vegetation		3-4-5-6-7-11-13-14-15-16-17-18-19-20-22 [Converts to S-57 attribute CATVEG. See clause 13.6]
category of weed/kelp		1-2-3-4 [Converts to S-57 attribute CATWED. See clause 12.3]

Attribute	Feature	Allowable Attribute Values
condition		1-2-3-4-5 [Converts to S-57 attribute CONDTN]
	Caution Area	~~1-3-5~~ [CONDTN is not an allowable attribute for **CTNARE** in S-57. Will not be converted]
	Fishing Facility	~~1-2-5~~ [CONDTN is not an allowable attribute for **FSHFAC** in S-57. Will not be converted]
	Offshore Production Area	1-2-4-5 [Value 4 is not an allowable value on **OSPARE** (S-58 Check 2000)]

~~**data assessment**~~		~~1-2-3~~ [No equivalent attribute in S-57. Will not be converted]

~~**day of week**~~		~~1-2-3-4-5-6-7~~ [No equivalent attribute in S-57. Will not be converted]

distance mark visible		1-4 [Boolean type attribute in S-101. Converts to S-57 attribute CATDIS. See clause 27.90]

distance unit of measurement		1-2-3-4-5 [No equivalent attribute in S-57. Converts to S-57 attribute INFORM. See clause 27.91]

exposition of sounding		1-2-3 [Converts to S-57 attribute EXPSOU]
	Sounding	2-3 [**exposition of sounding** is not a valid attribute for **Sounding**, however a suitably configured converter may populate EXPSOU as required. See clause 11.3]

function		2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-44-45-46-47-48 [Converts to S-57 attribute FUNCTN. Values 44-48 convert to S-57 attribute INFORM. See clause 27.103]

IMO adopted		1-2 [Boolean type attribute in S-101. Converts to S-57 attribute CATTSS. See clause 27.112]
light visibility		1-2-3-4-5-6-7-8-9 [Converts to S-57 attribute LITVIS. Value 9 converts to S-57 attribute INFORM. See clause 27.120]

marks navigational – system of		1-2-9-10-11 [Converts to S-57 attribute MARSYS. Value 11 converts to S-57 attribute MARSYS = 10 and INFORM. See clause 27.124]

~~**name usage**~~		~~1-2~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.134]

nature of construction		1-2-3-4-5-6-7-8-11-12 [Converts to S-57 attribute NATCON. Values 11 and 12 convert to S-57 attribute INFORM. See clause 27.136]
	Airport/Airfield	~~1-2-4-5-6-7~~ [NATCON is not an allowable attribute for **AIRARE** in S-57. Will not be converted]

Attribute	Feature	Allowable Attribute Values
	Structure Over Navigable Water	1-2-6-7-8-11-12 [NATCON will only be populated for converted **BUISGL**. Will not be populated for converted **HRBFAC**. See clause 8.7]

nature of surface		1-2-3-4-5-6-7-8-9-11-14-17-18 [Converts to S-57 attribute NATSUR]
	Coastline	~~1-2-3~~-4-5-~~6~~-7-~~8-9-11~~-14-17 [NATSUR is not an allowable attribute for **COALNE** in S-57. Will convert to S-57 attribute CATCOA. See clause 27.17]

nature of surface – qualifying terms		1-2-3-4-5-6-7-8-9-10 [Converts to S-57 attribute NATQUA]

opening bridge		1-2 [Boolean type attribute in S-101. Converts to S-57 attribute CATBRG. See clause 27.141]

~~**pilot movement**~~		~~1-2-3~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.143]

product		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25 [Converts to S-57 attribute PRODCT. Values 23-25 convert to S-57 attribute INFORM. See clause 27.144]
	Harbour Facility	~~1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25~~ [PRODCT is not an allowable attribute for **HRBFAC** in S-57. Will not be converted]
	Offshore Platform	1-2-3-18-19-23 [Values 3, 18 and 19 are not allowable values on **OFSPLF** (S-58 Check 2000)]
	Silo/Tank	1-2-3-5-7-8-9-13-14-16-18-19-20-21-22-24 [Values 5, 13 and 16 are not allowable values on **SILTNK** (S-58 Check 2000)]
	Structure Over Navigable Water	~~7-12-13-21-22-25~~ [PRODCT is not an allowable attribute for **BUISGL** and **HRBFAC** in S-57. Will not be converted]

quality of horizontal measurement		4 [Converts to S-57 attribute QUAPOS. See clause 24.5]

quality of vertical measurement		1-2-3-4-5-6-7-8-9-10-11 [Converts to S-57 attribute QUASOU. See clauses 11.8 and 28.16]
	Deep Water Route Centreline	1-2-3-4-6-7 [Values 6 and 7 are not allowable values on **DWRTCL** (S-58 Check 2000)]
	Deep Water Route Part	1-2-3-4-6-7 [Values 6 and 7 are not allowable values on **DWRTPT** (S-58 Check 2000)]
	Fairway	1-2-6 [Value 6 is not an allowable value on **FAIRWY** (S-58 Check 2000)]
	Recommended Route Centreline	1-2-3-4-6 [Value 6 is not an allowable value on **RCRTCL** (S-58 Check 2000)]
	Two-Way Route Part	1-2-3-4-6 [Value 6 is not an allowable value on **TWRTPT** (S-58 Check 2000)]

Attribute	Feature	Allowable Attribute Values
radar conspicuous		1-2-3 [Boolean type attribute in S-101. Converts to S-57 attribute CONRAD. See clause 27.146]
	Daymark	~~1-2-3~~ [CONRAD is not an allowable attribute for **DAYMAR** in S-57. Will not be converted]
	Pile	~~1-2-3~~ [CONRAD is not an allowable attribute for **PILPNT** in S-57. Will not be converted]

~~**reference direction**~~		~~5-13~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.148]

reference tide		1-2 [Converts, along with attributes **station name**, **station number** and **tide stream panel values**, to S-57 attribute TS_TSP. See clause 27.150]

~~**reference tide type**~~		~~1-2-3~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.150]

restriction		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-39-42 [Converts to S-57 attribute RESTRN. Values 38 and 42 convert to S-57 attribute INFORM. See clause 27.155]
	Cable Area	1-2-3-4-5-6-7-8-9-11-12-13-14-16-17-18-20-23-24-25-27-39 [Value 14 is not an allowable value on **CBLARE** (S-58 Check 2000)]
	Cargo Transhipment Area	~~2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-24-27-39~~ [RESTRN is not an allowable attribute for **CTSARE** in S-57. Will not be converted]
	Fishing Ground	~~1-2-4-5-6-8-9-10-11-12-15-16-17-18-19-20-21-22-23-24-25-26-27-39~~ [RESTRN is not an allowable attribute for **FSHGRD** in S-57. Will not be converted]
	Harbour Facility	~~1-2-3-4-5-6-8-9-10-11-12-13-15-16-17-18-19-20-21-23-24-27~~ [RESTRN is not an allowable attribute for **HRBFAC** in S-57. Will not be converted]
	Inshore Traffic Zone	1-2-3-4-5-6-8-9-10-11-12-13-16-17-18-19-20-21-22-23-24-25-27 [Values 16 and 17 are not allowable values on **OSPARE** (S-58 Check 2000)]
	Marine Farm/Culture	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-27 [Value 14 is not an allowable value on **MARCUL** (S-58 Check 2000)]
	Military Practice Area	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18-19-20-21-22-23-24-25-26-27-39 [Value 26 is not an allowable value on **MIPARE** (S-58 Check 2000)]
	Mooring Area	1-2-3-4-5-6-8-9-10-11-12-13-15-16-17-18-19-20-21-23-24-25-27-39-42 [Values 1 and 25 are not allowable values on **ACHARE** (S-58 Check 2000)]
	Offshore Production Area	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-39 [Values 14 and 26 are not allowable values on **OSPARE** (S-58 Check 2000)]
	Pipeline Area	1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-39 [Values 14 and 26 are not allowable values on **PIPARE** (S-58 Check 2000)]
	Pipeline Submarine/On Land	~~1-3-4-5-8-9-11-12-13-14-16-17-18-20-23-24-25-26-39~~ [RESTRN is not an allowable attribute for **PIPSOL** in S-57. Will not be converted]
	Precautionary Area	1-2-3-4-5-6-8-9-10-11-12-13-14-16-17-18-19-20-21-22-23-24-25-27 [Value 14 is not an allowable value on **PRCARE** (S-58 Check 2000)]

Attribute	Feature	Allowable Attribute Values
signal generation		1-2-3-4-5-6 [Converts to S-57 attribute SIGGEN. Values 5 and 6 convert to S-57 attribute INFORM. See clause 27.161]
	Light All Around	~~5-6~~ [SIGGEN is not an allowable attribute for **LIGHTS** in S-57. Will not be converted]
	Light Sectored	~~5-6~~ [SIGGEN is not an allowable attribute for **LIGHTS** in S-57. Will not be converted]
	Light Fog Detector	~~5-6~~ [SIGGEN is not an allowable attribute for **LIGHTS** in S-57. Will not be converted]

signal status		1-2 [Converts, along with sub-attribute **signal duration**, to S-57 attribute SIGSEQ. See clause 27.164]

speed units		2-3-4 [Converts, along with sub-attribute **speed limit**, to S-57 attribute INFORM. See clause 27.168]

status		1-2-3-4-5-6-7-8-9-11-12-13-14-15-16-17-18-28 [Converts to S-57 attribute STATUS. Value 28 converts to S-57 attribute INFORM. See clause 27.171]
	Bridge	~~1-2-4-5-7-12~~ [STATUS is not an allowable attribute for **BRIDGE** in S-57. Will not be converted]
	Cable Submarine	1-4-13-18 [Value 18 is not an allowable value on **CBLSUB** (S-58 Check 2000)]
	Causeway	1-7-8-12-14 [Value 7 is not an allowable value on **CAUSWY** (S-58 Check 2000)]
	Caution Area	~~5~~ [STATUS is not an allowable attribute for **CTNARE** in S-57. Will not be converted]
	Current	~~5-7~~ [STATUS is not an allowable attribute for **CURENT** in S-57. Will not be converted]
	Dam	~~1-2-6-7-8-14-28~~ [STATUS is not an allowable attribute for **DAMCON** in S-57. Will not be converted]
	Fence/Wall	1-7-12-13 [Values 7 and 13 are not allowable values on **FNCLNE** (S-58 Check 2000)]
	Ferry Route	1-2-4-5-6-7-8-9-14 [Value 14 is not an allowable value on **FERYRT** (S-58 Check 2000)]
	Fishing Facility	1-4-5-6-7-8-12-18-28 [Value 18 is not an allowable value on **FSHFAC** (S-58 Check 2000)]
	Fortified Structure	~~4-7-8-12-13-14-28~~ [STATUS is not an allowable attribute for **FORSTC** in S-57. Will not be converted]
	Helipad	1-2-4-5-6-7-8-12-14 [Value 7 is not an allowable value on **RUNWAY** (S-58 Check 2000)]
	Lake	5 [STATUS is not an allowable attribute for **LAKARE** in S-57. Will convert to STATUS on S-57 Feature **RIVERS**. See clause 5.10]
	Oil Barrier	1-2-4-5-7-8 [Value 5 is not an allowable value on **OILBAR** (S-58 Check 2000)]
	Physical AIS Aid to Navigation	~~1-5-7~~ [No corresponding S-57 Object class. Will not be converted. See clause 21.2]
	Pile	~~1-4-6-7-8-12-14~~ [STATUS is not an allowable attribute for **PILPNT** in S-57. Will not be converted]

Attribute	Feature	Allowable Attribute Values
	Production/Storage Area	4-12 [Value 12 is not an allowable value on **PRDARE** (S-58 Check 2000)]
	Pylon	~~4-12~~ [STATUS is not an allowable attribute for **PYLONS** in S-57. Will not be converted]
	Radar Line	1-2-3-4-7 [Value 3 is not an allowable value on **RADLNE** (S-58 Check 2000)]
	Railway	1-4-6-12-13-14 [Values 13 and 14 are not allowable values on **RAILWY** (S-58 Check 2000)]
	Road	1-4-6-7-8-12-13-14 [Values 7 and 13 are not allowable values on **ROADWY** (S-58 Check 2000)]
	Runway	1-2-4-5-6-7-8-12-14 [Value 7 is not an allowable value on **RUNWAY** (S-58 Check 2000)]
	Shoreline Construction	1-2-3-4-6-7-8-9-12-13-14-28 [Value 13 is not an allowable value on **SLCONS** (S-58 Check 2000)]
	Silo/Tank	4-12-13 [Value 13 is not an allowable value on **SILTNK** (S-58 Check 2000)]
	Structure Over Navigable Water	1-4-5-7-8-12-14 [Value 5 is not an allowable value on **BUISGL** (S-58 Check 2000)]
	Virtual AIS Aid to Navigation	1-5-7 [Converts to STATUS on S-57 Object class **NEWOBJ**. See clause 21.3]

survey type		1-2-4-5-6-7-8-9-10-11-12-13 [Converts to S-57 attribute SURTYP. Values 7-13 convert to S-57 attribute INFORM. See clause 28.23]

technique of vertical measurement		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18 [Converts to S-57 attribute TECSOU. Value 15 converts to value 7; value 16 converts to S-57 attribute INFORM; value 17 converts to value 14; and value 18 converts to value 6. See clause 27.174]
	Deep Water Route Centreline	1-3-5-6-7-8-9-13-15-16-17-18 [Values 5 and 14 (converting from S-101 value 17) are not allowable values on **DWRTCL** (S-58 Check 2000)]
	Deep Water Route Part	1-3-5-6-7-8-9-13-15-16-17-18 [Values 5 and 14 (converting from S-101 value 17) are not allowable values on **DWRTPT** (S-58 Check 2000)]
	Dredged Area	1-2-3-6-7-8-9-11-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **DRGARE** (S-58 Check 2000)]
	Foul Ground	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **OBSTRN** (S-58 Check 2000)]
	Obstruction	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **OBSTRN** (S-58 Check 2000)]
	Quality of Survey	~~1-2-3-4-5-8-9-10-11-12-13-15-16-17-18~~ [TECSOU is not a valid attribute for **M_SREL** in S-57. May be converted to TECSOU on **M_QUAL**. See clause 3.11]
	Recommended Route Centreline	1-3-6-7-8-9-13-15-16-17-18 [Value 14 (converting from S-101 value 18) is not an allowable value on **RCRTCL** (S-58 Check 2000)]
	Recommended Track	1-2-3-6-7-8-9-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **RECTRC** (S-58 Check 2000)]
	Two-Way Route Part	1-3-5-6-7-8-9-13-15-16-17-18 [Values 5 and 14 (converting from S-101 value 17) are not allowable values on **TWRTPT** (S-58 Check 2000)]
	Underwater/Awash Rock	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **UWTROC** (S-58 Check 2000)]

Attribute	Feature	Allowable Attribute Values
	Wreck	1-2-3-4-5-6-7-8-9-10-11-12-13-15-16-17-18 [Value 14 (converting from S-101 value 17) is not an allowable value on **WRECKS** (S-58 Check 2000)]
~~**telecommunication service**~~		~~1-2-3-4-5-6-7-8~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.176]
~~**text type**~~		~~1-2~~ [No equivalent attribute in S-57. Will not be converted. See clause 27.181]
topmark/daymark shape		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33 [Converts to S-57 attribute TOPSHP. See clause 18.1]
traffic flow		1-2-3-4 [Converts to S-57 attribute TRAFIC.]
~~**update type**~~		~~1-2-3-4~~ [No equivalent attribute in S-57. Will not be converted]
vertical datum		1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-44 [Converts to S-57 attribute VERDAT. Value 44 converts to S-57 attribute INFORM. See clause 27.196]
	Cable Overhead	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on C**BLOHD** (S-58 Check 2000)]
	Conveyor	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **CONVYR** (S-58 Check 2000)]
	Crane	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **CRANES** (S-58 Check 2000)]
	Gate	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **GATCON** (S-58 Check 2000)]
	Light Air Obstruction	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **LIGHTS** (S-58 Check 2000)]
	Light All Around	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **LIGHTS** (S-58 Check 2000)]
	Light Fog Detector	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **LIGHTS** (S-58 Check 2000)]
	Light Sectored	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **LIGHTS** (S-58 Check 2000)]
	Pipeline Overhead	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **PIPOHD** (S-58 Check 2000)]
	Span Fixed	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **BRIDGE** (S-58 Check 2000)]
	Span Opening	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **BRIDGE** (S-58 Check 2000)]
	Structure Over Navigable Water	~~3-13-16-17-18-19-20-21-24-25-26-28-29-30-44~~ [VERDAT is not a valid attribute for **BUISGL** in S-57. Will not be converted]
	Tunnel	~~3-13-16-17-18-19-20-21-24-25-26-28-29-30-44~~ [VERDAT is not a valid attribute for **TUNNEL** in S-57. Will not be converted]
	Vertical Datum of Data	3-13-16-17-18-19-20-21-24-25-26-28-29-30-44 [Value 13 is not an allowable value on **M_VDAT** (S-58 Check 2000)]

Attribute	Feature	Allowable Attribute Values
	Wind Turbine	~~3 13 16 17 18 19 20 21 24 25 26 28 29 30 44~~ [VERDAT is not a valid attribute for **LNDMRK** in S-57. Will not be converted]

virtual AIS aid to navigation type		1-2-3-4-5-6-7-8-9-10-11-12 [No equivalent attribute in S-57. Converts to S-57 attributes CLSDEF, CLSNAM, INFORM and SYMINS. See clause 27.199]

visual prominence		1-2-3 [Converts to S-57 attribute CONVIS. Value 3 may convert to value 2. See clause 27.201]
	Dyke	~~1 2 3~~ [CONVIS is not a valid attribute for **DYKCON** in S-57. Will not be converted]
	Installation Buoy	~~1 2 3~~ [CONVIS is not a valid attribute for **BOYINB** in S-57. Will not be converted]

water level effect		1-2-3-4-5-6-7
	Dam	~~1 2 3 6~~ [WATLEV is not a valid attribute for **DAMCON** in S-57. Will not be converted]
	Offshore Production Area	~~2 3 4 7~~ [WATLEV is not a valid attribute for **OSPARE** in S-57. Will not be converted]
	Wind Turbine	~~2 7~~ [WATLEV is not a valid attribute for **LNDMRK** in S-57. Will not be converted]

Table A-2

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