Land Information New Zealand
Toitū te whenua

LINZ Source Data Specification

Version 4.0
New Zealand Hydrographic Authority

December 2013

Revision History

Version	Ref.	Description of change	Date	Authorised
3.0	1.5.2	Updated guidance for capturing according to navigational purpose	2 Dec 2013	N Hughes
3.0	1.5.6.2	New guidance for sounding rounding in the database	2 Dec 2013	R Ryan
3.0	3.1.1	Guidance added for rounding magnetic variation values	2 Dec 2013	R Ryan
3.0	4	Guidance added for capture of topographic information from the LINZ Data Service	13 Nov 2013	C Clarke
3.0	4.7.4	Clarity added for capture of sand dunes	2 Dec 2013	R Ryan
3.0	5.3.1	New guidance for capture of soundings within intertidal areas	2 Dec 2013	J O'Brien
3.0	5.3.2	Clarity added to define small and large scale charts	2 Dec 2013	R Ryan
3.0	5.5	Content added from section 11.8	13 Nov 2013	N Hughes
3.0	5.8.1	Guidance added for capture of unsurveyed area chart notes	13 Nov 2013	C Clarke
3.0	5.8.2	QUAPOS values updated for unsurveyed areas in line with UOC	2 Dec 2013	C Roberts N Hughes
3.0	6.2.1	Wrecks policy updated	2 Dec 2013	N Hughes
3.0	11.2.4	Clarity added of territorial sea areas relating to navigational purpose	2 Dec 2013	R Ryan
3.0	11.8	Section deleted and content moved to 5.5	13 Nov 2013	N Hughes
3.0	16	Values updated	2 Dec 2013	C Roberts N Hughes
4.0		New version to incorporate above amendments	20 Dec 2013	N Hughes

Contents

1. Introduction

LINZ HPD source data is to be maintained to the International Hydrographic Organisation (IHO) S-57 standard. This document should be used as a supplement to "S-57 Appendix B.1 Annex A - Use of the Object Catalogue for ENC" (UOC), providing guidance by adding clarification to information specific to New Zealand.

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1.1 General

This specification is provided as the authoritative reference for the maintenance of New Zealand's source data, and is to be used as a supplement to the IHO publication "S-57 Appendix B.1 Annex A – Use of the Object Catalogue for ENC" (UOC).

This specification has three purposes:

1. To clarify where necessary and provide additional guidance where an IHO specification may not be mandatory.
2. To expand those clauses in the UOC which are left open to national discretion and require further definition.
3. To ensure a seamless data coverage in regards to horizontal and vertical consistency.

Unless otherwise specified in this document the UOC will be followed.

This document must be used in conjunction with the standards and publications listed in section *1.1.1 Related Standards and Publications.*

When compiling new areas, the Report of Survey, Sailing Directions and any additional files supplied by the surveyor should be referred to when making encoding decisions.

The numbering and naming of the sections in this document follow the UOC. All sections that have been created by the NZHA have been marked by a (L) in front of the title.

It is suggested that if this document is to be printed, it should be in colour due to the nature of encoding examples included in the document. This will ensure clarity.

1.1.1 Related Standards and Publications

INT 1 Symbols, Terms and Abbreviations used on charts, Edition 5, April 2011, *International Hydrographic Organisation*.

S-4 Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO, Edition 4.4.0, September 2013, *International Hydrographic Organisation*.

NP 9 Admiralty Sailing Directions Antarctic Pilot, Edition 7, 2009, *United Kingdom Hydrographic Office*.

NP 51 Admiralty Sailing Directions New Zealand Pilot, Edition 18, 2010, *United Kingdom Hydrographic Office*.

NP 61 Admiralty Sailing Directions Pacific Islands Pilot, Volume II, Edition 12, 2011, *United Kingdom Hydrographic Office*.

NP 62 Admiralty Sailing Directions Pacific Islands Pilot, Volume III, Edition 12, 2010, *United Kingdom Hydrographic Office*.

NP 83 Admiralty List of Lights and Fog Signals, Indian and Pacific Oceans, South of the Equator, Vol. K, 2012/13, *United Kingdom Hydrographic Office*.

NZ 204 New Zealand Nautical Almanac, Current Edition, *Land Information New Zealand*.

NtMs New Zealand Notices to Mariners, *Land Information New Zealand*.

S-52 Specifications for chart content and display aspects of ECDIS, Edition 6, March 2010, *International Hydrographic Organisation*.

S-57 Transfer Standard for Digital Hydrographic Data, Edition 3.1, November 2000, *International Hydrographic Organisation*.

UOC S-57 Appendix B.1 Annex A – Use of the Object Catalogue for ENC, Edition 3.0.0, October 2011, *International Hydrographic Organisation*.

S-58 Recommended ENC Validation Checks, Edition 4.2.0, February 2011, *International Hydrographic Organisation*.

S-62 ENC Producer Codes, current edition, *International Hydrographic Organisation*.

New Zealand's System of Buoys and Beacons, 2008, *Maritime Safety Authority of New Zealand*.

1.2 Presentation of this Document

1.3 Use of Language (Glossary)

ECDIS	Electronic Chart Display and Information System
ENC	Electronic Navigational Chart
IHO	International Hydrographic Organisation
LINZ	Land Information New Zealand
NZHA	New Zealand Hydrographic Authority
HPD	Hydrographic Production Database
NI form	Nautical Information description
NI number	Nautical Information tracking identification number
NtMs	Notices to Mariners
NZ Pilot	Used in conjunction with the charts quoted in the text to amplify charted detail not available from charts or other publications.
(L)	LINZ specific encoding guidance

Further abbreviations can be found in:

S-52	Appendix 3, Glossary of ECDIS related Terms.
S-57	Appendix A, Chapter 1, Object Catalogue.
	Appendix A, Chapter 2, Attribute Catalogue.
INT 1	Symbols, Terms and Abbreviations used on charts

1.4 Maintenance

1.5 (L) NZHA Specific Guidance

The information presented in this section (1.5) is not intended to contradict the S-57 standard except where explicitly stated.

1.5.1 (L) Source Discrepancies

When encoding in the database and an error is found in the source that is not significant to navigation:

- Confirm the significance with the Notices to Mariners team.
- The database should not be amended, as this will make the database different from the source.
- The discrepancy should be documented in the Open Points spreadsheet (N:\HPD\HPD Implementation\Data-Documents\Open Points.xls).

If the discrepancy is **safety critical**, alert the Notice to Mariners team and a Notice to Mariners will be issued. The database will be updated accordingly.

1.5.2 (L) Encoding According to Navigational Purpose

Everything shown in navigable water on the paper chart should be captured. As a general rule of thumb, on-land features should be captured if they are:

- large and significant,
- close to the coast,
- mentioned in the relevant pilot/sailing directions,
- mentioned in any note or title of the chart, or
- visually conspicuous.

Table 1 should be used (in addition to these rules of thumb) as a guide for capturing features according to navigational purpose.

Please note that some features do not require capture if they are obscured from the mariner's view. In such cases the surrounding topography (e.g. elevation, built up areas, etc) should be taken into account.

Table 1: Capturing features according to navigational purpose (NP)

FEATURE	NP 1 and 2	NP 3	NP 4, 5 and 6
Airfields	-	If not obscured from view	√ All
Bridges & causeways	-	If over navigable water	If over navigable water
Buildings *	-	See section 4.8.15	See section 4.8.15
Built-up areas *	See section 4.8.14	See section 4.8.14	See section 4.8.14
Cliffs	-	If adjacent to the coast OR **VC**	If adjacent to the coast OR **VC**
Contour lines	-	-	-
Control points *	If named OR not obscured from view	If named OR not obscured from view	√ All
Dams & dykes	-	If edge borders coast OR **VC**	If close to the coast
Lakes	**If VC**	If large & close to the coast OR if navigable	If close to the coast OR if navigable
Land elevations *	If named OR not obscured from view	If named OR not obscured from view	√ All
Landmarks *	See section 4.8.15	See section 4.8.15	See section 4.8.15
Mangrove	-	√ All	√ All
Marsh	-	If edge borders coast	If edge borders coast
Railways & roads	-	-	-
Rivers	Source, paper and ENC products should match	Source, paper and ENC products should match	Source, paper and ENC products should match
Saltpans	-	√ All	√ All
Sandhills & dunes	-	√ All	√ All
Shoreline constructions	√ All	√ All	√ All
Tanks & silos	-	√ All	√ All
Vegetation	If for island height	If for island height OR **VC**	If for island height OR **VC**
Waterfalls	-	If not obscured from view	If not obscured from view

Capture all. Capture if conditions apply. Capture if close to the coast.
VC Capture if visually conspicuous. * Rules apply only when features cannot be sourced from LDS data

1.5.3 (L) Defining Visually Conspicuous

Encoding conspicuous sourced from a pre-existing paper chart**:**

Objects are shown as conspicuous if they are charted with capital letters.

CONVIS (conspicuous, visually) is only mandatory for LNDMRK objects. However, there are some instances where non-landmark objects can be shown as conspicuous on the chart (e.g. text in capital letters). Such objects should be encoded with CONVIS = 1 (visually conspicuous). Examples of these instances are BUISGL (building, single) and BUAARE (built-up area) (see Fig. 1). CONVIS = 2 (not visually conspicuous) is not required for these objects.

a) 

b) 

Figure 1: Visually conspicuous objects (a) are encoded with CONVIS = 1 (visually conspicuous). CONVIS is not encoded for non-landmark objects that are not visually conspicuous (b).

Landmarks that are light support structures should be encoded with CONVIS = "UNKNOWN", unless specifically stated otherwise (e.g. on the chart, in the light list, or in other documentation).

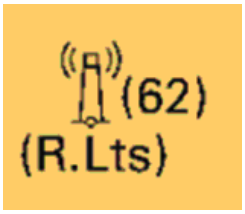
1.5.4 (L) Mandatory Attribute Values

All S-57 mandatory and conditional mandatory attributes and those required in this specification should be populated. Where a mandatory attribute cannot be populated, it should be encoded with "UNKNOWN" unless otherwise specified in this document.

1.5.5 (L) Interpretation of Numbers in Brackets

Numbers occasionally occur in brackets to indicate the value of a sounding or elevation. Where the exact position of the sounding or elevation is not known (i.e. its position is not marked by a landmark or a position point), QUAPOS = 4 (approximate) should be encoded (see Fig. 2 to 5).

For more information on QUAPOS (quality of position), please refer to Appendix 1 – "How to encode QUAPOS for different features".

a) 

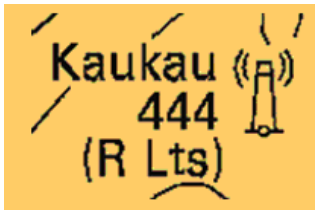
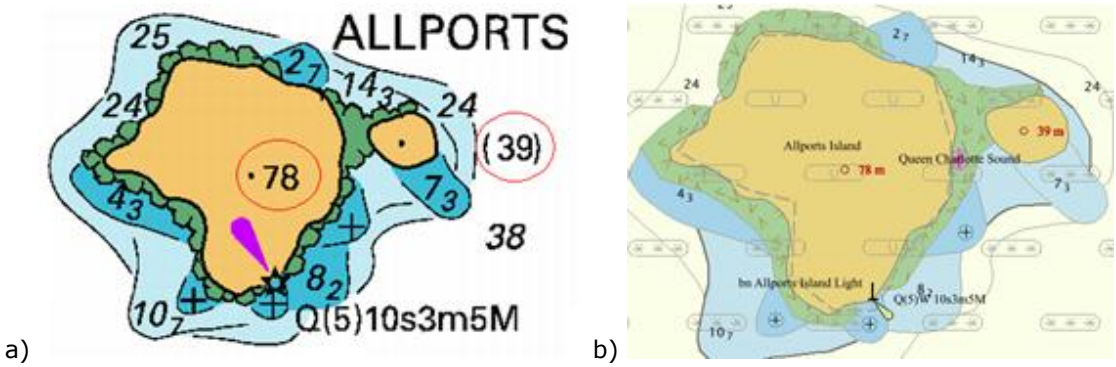
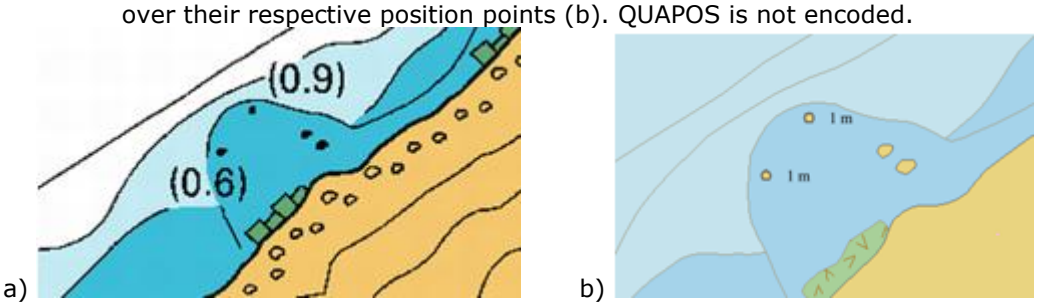
b) 

Figure 2: The first representation (a) is captured as a LNDMRK point with HEIGHT = 62. The second representation (b) is captured as a LNDMRK point with ELEVAT = 444. QUAPOS is not encoded.



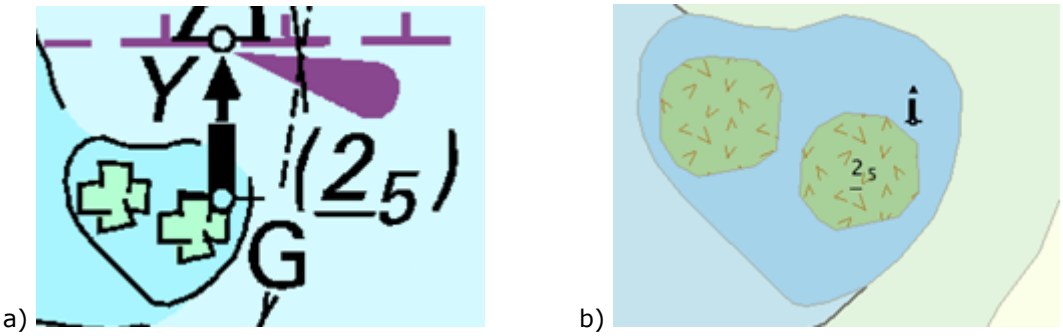
a) b)

Figure 3: The circled numbers in this representation (a) are captured as LNDELV points positioned over their respective position points (b). QUAPOS is not encoded.



a) b)

Figure 4: The numbers in brackets in this representation (a) are captured as LNDELV points snapped to their respective LNDARE points (b). QUAPOS is not encoded. (Note that elevation values are rounded due to software settings.)



a) b)

Figure 5: This representation of a drying height (a) is captured as a SOUNDG object positioned in the centre of the DEPARE (b). The SOUNDG is encoded with QUAPOS = 4 (approximate).

1.5.6 (L) Digitising Tolerances

1.5.6.1 (L) Line Objects

The vector line created when digitising a linear feature from a raster image should follow the centre of the raster line, and should remain within the width of the raster line when viewed at the source data compilation scale. This excludes where data has been moved to match adjoining or overlapping data.

1.5.6.2 (L) Soundings

Soundings digitised from charts should be positioned in the centre of the sounding figures.

Figure 6: The centre of sounding figures is to be derived as shown here.

Soundings are rounded following IHO S4 Section B-412

Multibeam surveys we receive will mainly have depths to 3dp. However LINZ will only store one decimal place in the database. For instructions see N:\HPD\PAPER CHART EDITOR\HPD PAPER CHART FORMS GUIDELINES AND WORKFLOWS\HPD Paper Chart Production Guidelines\Sounding Rounding for Source Editor.docx

2. General rules

2.1. Cartographic framework

2.1.1 Horizontal datum

2.1.2 Vertical datum

2.1.3 Sounding datum

2.1.4 Units

2.1.5 Dates

2.1.5.1 Seasonal objects

2.1.6 Times

2.1.7 Cells

2.1.8 Seamless ENC coverage

2.1.8.1 Feature object identifiers

2.1.8.2 180 Meridian of Longitude

Some NZ charts cross the 180° Meridian of Longitude. CARIS HPD Source Editor gives the illusion that lines and areas can be merged across the 180° Meridian. It is important not to merge features across the 180° Meridian within the database. This can create problems in Source Editor and Product Editor.

It should be ensured that lines and areas are not merged, and if possible, lines should be offset so that they do not share the same spatial.

The recommended co-ordinates near the 180° Meridian are 179-59.999898000E and 179-59.999898000W. This will leave a very slight gap in the database and products.

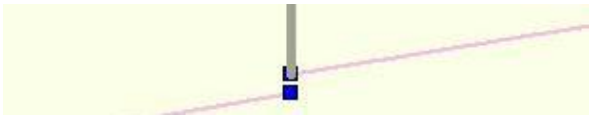


Figure 7: The two MAGVAR lines are offset to ensure they do not share the same spatial.

2.2 Data quality description

2.2.1 Production information

2.2.2 Up-to-datedness information

2.2.3 Quality, reliability and accuracy of bathymetric data

2.2.3.1 Quality of bathymetric data

M_QUAL (quality of data) should be populated according to the guidance in the ZOC Attribute Migration spreadsheet (N:\HPD\HPD_Implementation\Data-Documents\HPD Workflows\Guidance\ZOC Attribute migration for Source data.xls)

However, outlined below are rules that are not covered in the spreadsheet:

- The smallest survey scale should always be used (e.g. 5000 instead of 10000)
- The oldest survey date should always be used (e.g. Feb 2003 instead of Feb 2004)
- If only one survey date is provided, both SURSTA (survey date - start) and SUREND (survey date end) should be encoded (e.g. Feb 2003: SURSTA = 20030201, SUREND = 20030201). If the survey date is not known, both SURSTA and SUREND should be encoded as "UNKNOWN"
- SORDAT (source date) and SORIND (source indication) are not required for polygons covering land
- If there is no SORDAT in the ZOC report, the survey start date should be added to SORDAT if available. If neither can be defined, then SORDAT should be encoded as "UNKNOWN"
- If the ZOC assessment report shows "Sidescan Sonar used" as blank, then tecsss = 1 (not used) should be encoded
- If the ZOC report shows a decimal place for line spacing, then linesp should be rounded up (e.g. 37.5 becomes 38)
- Dashes (-) or symbols (&) should not be used in the attribute fields, as this will result in validation errors.

2.2.3.1.1 (L) Encoding QUAPOS for depth contours

QUAPOS = 4 (approximate) should be encoded for:

- DEPARE edges which are depicted without contours for cartographic reasons (see Fig. 8 and 9).
- DEPCNT edges which are interpolated over cartographic objects that obscure the actual shape of the contour (e.g. text and compass roses) (see Fig. 10).

However, it is not practical to encode QUAPOS for all instances where depth contours are not depicted for cartographic reasons. Table 2 should be used as a guide for when QUAPOS should be encoded.

Table 2 should be used as a guide for capturing QUAPOS = 4 (approximate) for DEPARE edges depicted without depth contours. QUAPOS should be encoded if the depth contour is disrupted for a distance greater than or equal to the distance in column 3.

Table 2: QUAPOS for DEPARE without DEPCNT

Chart Scale	Need for accuracy (m)	Corresponding Distance of Disruption (m) *
10,000,000	10,000	50,000
2,500,000	2,500	12,500
750,000	750	3,750
300,000	300	1,500
100,000	100	500
50,000	50	250
15,000	15	75
10,000	10	50
5,000	5	25

***** This distance equates to the approximate width of a pencil dot (0.5 mm) multiplied by ten (an arbitrary number).

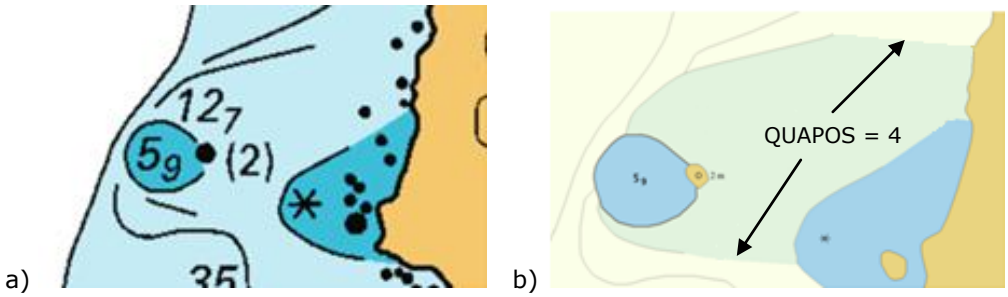


Figure 8: A representation of a depth area with a hanging depth contour (a). The highlighted DEPARE edges (see arrows) have QUAPOS = 4 (approximate) encoded, and are not bordered by DEPCNT (b).

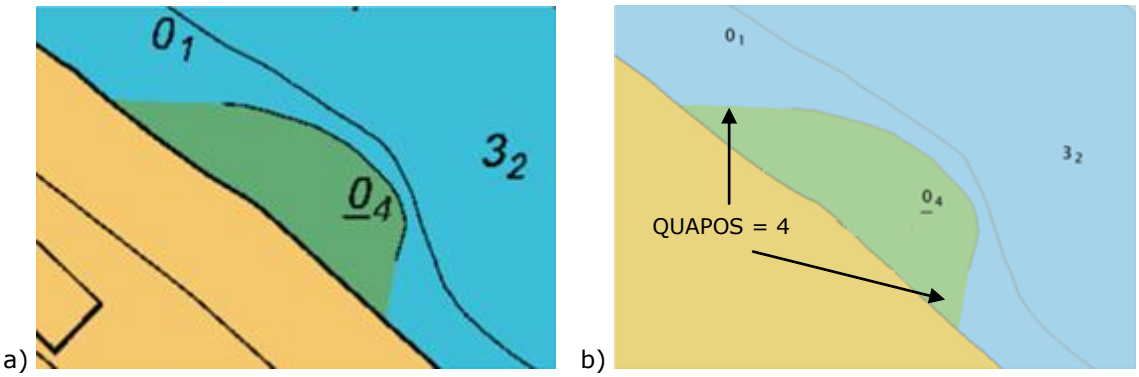


Figure 9: A representation of a depth area with a missing depth contour (a). The highlighted DEPARE edges (see arrows) have QUAPOS = 4 (approximate) encoded, and are not bordered by DEPCNT (b).

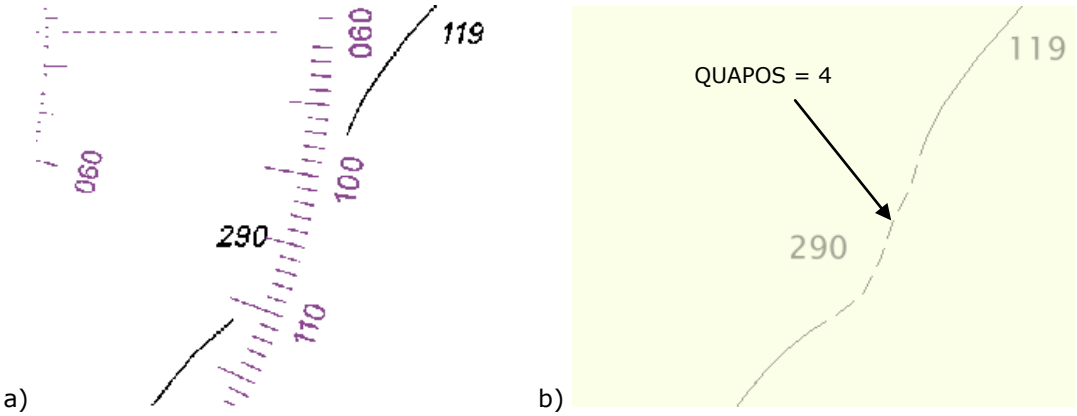


Figure 10: The depth contour edge obscured by a compass rose in the representation (a) is captured with QUAPOS = 4 (approximate) (b).

2.2.3.2 Survey reliability

2.2.3.3 Quality of sounding

2.2.3.4 Technique of sounding measurement

2.2.4 Accuracy of non-bathymetric data

2.2.4.1 Quality of positions

Features with quality information should have QUAPOS (quality of position), QUASOU (quality of sounding measurement) or STATUS encoded. QUAPOS should not be encoded for features unless specified in the sections below, or in *Appendix 1 How to encode QUAPOS for different features.*

2.2.4.2 Horizontal accuracy

2.2.4.3 Vertical accuracy

2.2.5 Source of data

2.2.5.1 Source of bathymetric data

All objects should have SORDAT (source date) and SORIND (source indication) populated, unless stated otherwise in this specification. SORDAT and SORIND are not required for M_QUAL (quality of data) polygons over land.

New nautical information received by LINZ regarding source data changes needs to be assessed and assigned a unique Nautical Instruction (NI) number. If assessment determines that action is required in the source, the change should be made and the SORDAT and SORIND populated with information from the NI form. SORDAT and SORIND should only be changed for all objects directly connected to the object described in the NtM change.

The LINZ customised attribute 'sorhis' (source history) is for keeping a record of all updates to an object. When SORIND is updated for a subsequent NtM or new edition, the previous NtM/NI should be captured in sorhis. This may result in multiple entries in sorhis, which are not to be deleted at new edition.

2.2.5.1.1 (L) Source Date (SORDAT)

- SORDAT should be the latest publication date on the chart if the paper chart is the source. This should be considered the New Edition date, and not the reprint date
- SORDAT should be the publication or NI date if a publication or NI is the source
- The value 01 should be used if the month or day is not known (e.g. SORDAT = 20030101)
- When a feature on the chart includes a date in its label (see Fig. 11), the date should be encoded in INFORM. The print / publication date should take precedence when encoding SORDAT.

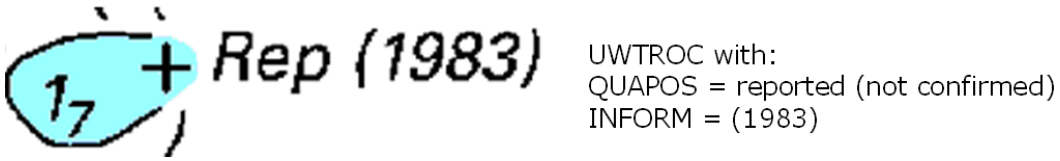


Figure 11: The year of the UWTROC object is encoded in INFORM as it appears on the paper chart (in this case in brackets).

2.2.5.1.2 (L) Source Indication (SORIND)

SORIND is made up of four parts: Country, Authority, Source and ID.

NZ Chart	NZ, NZ, graph, Chart NZ(chart number) *NZ, NZ, graph, Chart NZ463*
NZ Publication	NZ, NZ, publn, Publication name *NZ, NZ, publn, NtM 64/2005 (NtMs pre 2010)* **NZ, NZ, publn, NtM Ed 17*
Nautical Instruction (NI)	NZ,NZ,reprt,NI (space) <NI number>/<4 digit year> *NZ,NZ,reprt,NI 140/2010*

*(Updates not in an NtM notice, such as changes to the Light List, should be updated with the NtM edition).

2.2.5.1.3 (L) New Edition SORDAT and SORIND

- Objects in the database that have the old edition date in the SORDAT (or NtMs that pre-date the NE) should be updated with the new edition date
- SORDAT of scale-less and collection objects should only be changed if they originate from the chart being updated
- The SORDAT and SORIND of M_QUAL (quality of data) objects should not be changed, as these attributes are populated according to the applicable ZOC Report

2.2.6 Compilation scale

2.2.7 Use of the attribute SCAMIN

2.2.7.1 Sample SCAMIN policy

2.3 Textual Information

2.3.1 (L) Use of INFORM

INFORM should only be used for information of importance to navigation, or if otherwise specified in this document. This is because the overuse of this attribute results in numerous magenta question marks appearing on the ECDIS display.

Text on the paper chart should be encoded in INFORM if it varies slightly from the S-57 attribute value. This contradicts the UOC, but ensures information from the source is captured in the database.

2.3.2 (L) Chart notes

Chart notes exceeding 300 characters should be captured as an external text file. This file should be linked to the TXTDSC (textual description) attribute. Within the text file, the title should be in capital letters followed by a full stop, followed by the body of the note.

Notes less than 300 characters should be captured in INFORM. As above, the title should be in capital letters followed by a full stop, followed by the body of the note.

2.3.2.1 (L) Text files

External text files with different content should have unique filenames. The following file naming convention should be used:

NZxxxnnn.TXT

Where: xxx = subject of note (see list below)
nnn = an incremental number

Subject of Note	Subject Acronym
Buoyage/Beacons/Lights	AID
Restricted Area	RES
Area to be Avoided	TBA
Cable Protection Zone	CPZ
Cautionary Area	CAU
Rips	RIP
Currents	CUR
Tides	TID
Depths	DEP
Ferries	FER
Routeing	ROU
Cable Protection Area	CPA
Precautionary Area	PRC

The three digit number (nnn) in the filename should be incremented by one if more than one file with the same subject exists.

E.g. NZCAU001.TXT
NZCAU002.TXT
NZCAU003.TXT

Chart notes should be captured as a single entry within a text file if the chart notes (i) apply to the entire chart, or (ii) do no refer to a specific feature or area. This text file should be linked to TXTDSC (textual description) of M_NPUB (nautical publication information), and should follow the following naming convention:

NZPUBnnn.TXT

Where: nnn = an incremental number

The M_NPUB text file template should be used to ensure that the correct format is used, and for guidance as to which chart notes should be included (N:\HPD\HPD Implementation\ExternalFiles\NZPUB_TEMPLATE.TXT). See also Fig. 12.

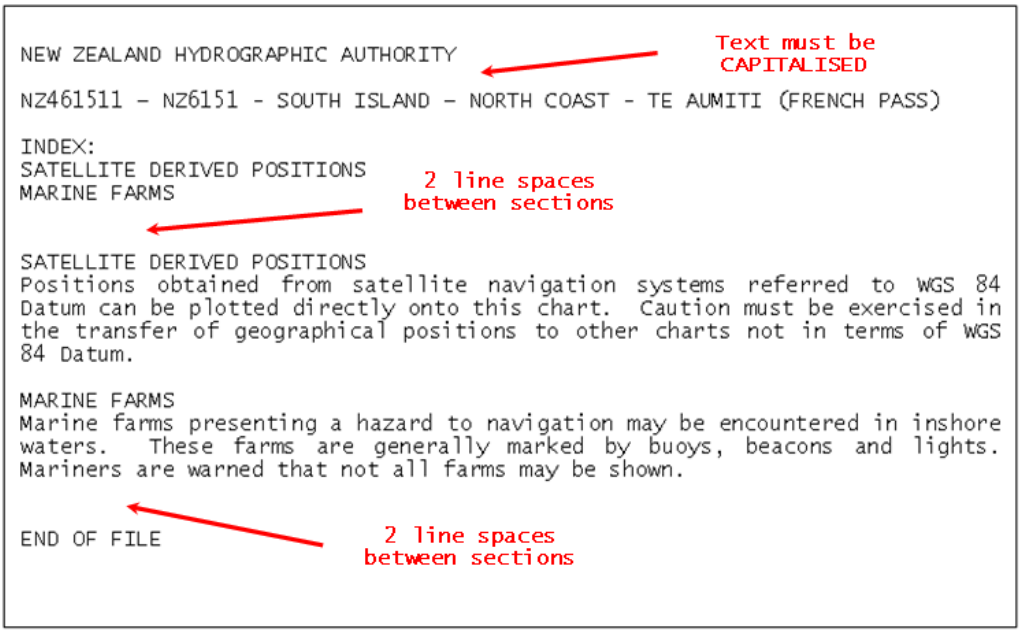


Figure 12: Example of a M_NPUB text file. Note that (i) the first two lines of the text file (with the organisation name and the chart name) should always be CAPITILIZED, and (ii) two line spaces are required between sections.

If it is unclear whether a chart note belongs to one particular plan in a chart or all plans in the chart, the note should be captured for every product based on a plan of that chart. In such cases, chart notes that refer to data potentially not included in the extents of a product should be captured in NZPUBnnn.TXT.

A number of chart notes text files are often created for the production of an individual product. An example of a set of chart notes text files is shown below:

NZPUB001.TXT
NZCAU001.TXT
NZCAU002.TXT
NZCUR001.TXT
NZFER001.TXT

2.3.2.2 (L) Image files

Diagrams, tables or other images from a paper chart or other source should be captured as external files, and linked to the PICREP (pictorial representation) attribute. For

example, a diagram of a lateral beacon can be attached using PICREP of a BCNLAT (lateral beacon).

The image format for black and white images should be 1-bit (black and white) at a resolution of 300 dpi and saved as an uncompressed TIFF file. The image should be cropped to leave as little unused white space at the edges as possible. Please refer to the pre-processing workflows (N:\HPD\HPD Implementation\Data-Documents\HPD Workflows\1.Pre Processing) for more guidance on in-house documentation of files, and the upload and storage of external files.

The following file naming convention should be followed for image files:

Chart number + P + <picture id>

e.g. NZ7142 picture 1 will be NZ7142P1.TIF

<picture id> = sequential numerical identifier using the numbers 1 to 9.

2.4 Colours and colour patterns

2.5 Reference to other publications

PUBREF (publication reference) of M_NPUB (nautical publication information) should not be used for referring to other publications.

2.6 Updating

2.6.1 Issuing updates in advance

2.6.1.1 Advance notification of changes to traffic separation schemes

2.6.2 Guidelines for encoding temporary and preliminary ENC updates

2.6.2.1 Introduction

2.6.2.2 Temporary (T) Notices to Mariners

2.6.2.3 Preliminary (P) Notices to Mariners

2.7 Multiple objects

2.8 Minimal depiction areas

2.8.1 Wide blank areas

2.8.2 Simplified or minimal depiction areas

3. Time Varying Objects

3.1 Magnetic data

3.1.1 Magnetic variation

MAGVAR should be encoded as an area when VALACM (value of annual change in magnetic) and VALMAG (value of magnetic variation) do not vary over the entire

chart. In other cases, MAGVAR should be encoded as either points (using the centre of the compass rose) or lines (for isogonals).

Isogonals should be captured as MAGVAR lines, and split approximately halfway between the magnetic variation values (see Fig. 13). Each line segment should have its relevant VALACM encoded.

The rounding of MAGVAR should follow S4 section B272.3.

> *Variation must be given to the nearest 5', change to the nearest 1'. To both, values E or W must be added as appropriate. Where the increase or decrease in the rate of annual change is 0.5' or less, it must be shown as (0')*

The value of magnetic variation for a paper chart is in Degrees and minutes. S57 and Source database requires VALMAG to be encoded in decimal degrees.

Inset plans with no magnetic variation depicted should have MAGVAR encoded as an area. VALACM and VALMAG should be populated according to the compass rose on the main chart closest to the inset plan. See NZ 542 for an example.

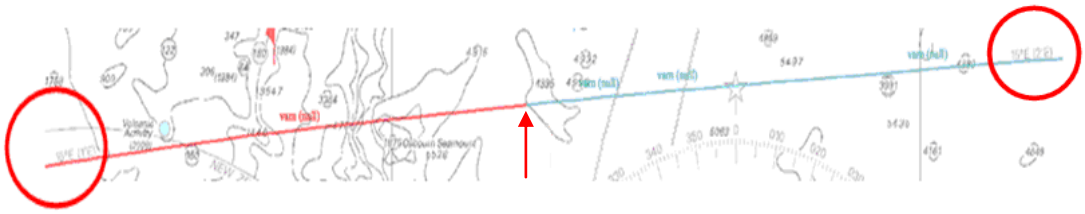


Figure 13: An isogonal captured as two MAGVAR lines that meet halfway (see arrow) between the two magnetic variation values (circled in red).

3.1.2 Abnormal magnetic variation

Local magnetic anomalies, where they exist, should be encoded as LOCMAG areas (see INT 1, B82.1). The limits and VALLMA (value of local magnetic anomaly) should be sourced from the paper chart using the limits of the area (see INT 1, B82.1).

Where the deviation has a direction (i.e. only + (east) or – (west), as opposed to ±) one of the following notes should be added to INFORM: "Deviation is positive" or "Deviation is negative" (see Fig. 14). The + or – sign should not be captured in VALLMA. No note should be encoded in INFORM if the deviation is both positive and negative (i.e. ±).

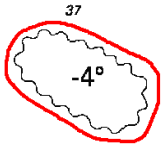


Figure 14: Abnormal magnetic variation captured as a LOCMAG area with INFORM = "Deviation is negative".

3.2 Tidal Data

The 4-digit port number found in the Secondary Ports table in the New Zealand Nautical Almanac should be encoded in TS_TSP (tidal stream – panel values) of TS_PAD (tidal stream panel data) objects.

Tidal Streams referred to HW at NELSON

Hours	Geographical Position		
		40°46'.4S 173 00.0E	
Before High Water 6	Directions of streams (degrees)	Rates at spring tides (knots)	Rates at neap tides (knots)
Before High Water 5			
Before High Water 4			
Before High Water 3			
Before High Water 2			
Before High Water 1			
High Water			
After High Water 1			
After High Water 2			
After High Water 3			
After High Water 4			
After High Water 5			
After High Water 6			
-6	217	0.2	0.1
-5	306	0.9	0.5
-4	316	1.1	0.6
-3	305	1.1	0.6
-2	297	1.1	0.6
-1	292	1.0	0.5
0	319	0.7	0.4
+1	318	0.1	0.0
+2	095	1.4	0.7
+3	141	1.4	0.7
+4	126	1.1	0.6
+5	109	0.8	0.4
+6	132	0.5	0.3

TS_TSP = 6458,Nelson,HW,217,0.2,306,0.9,316,1.1...

Figure 15: An example of how TS_TSP is encoded.

3.2.1 Time series data

3.2.2 Prediction by harmonic methods

3.2.3 Prediction by non-harmonic methods

3.3 Tidal Stream Data

3.3.1 Tidal steam (flood / ebb)

In some cases, flood and ebb arrows are accompanied by a range in current velocity (see Fig. 16).

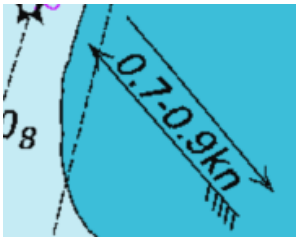


Figure 16: A representation (NZ4633) of flood and ebb tide streams with a range in velocity.

Where flood and ebb arrows are accompanied by a range in current velocity, the following encoding policy should be followed:

CAT_TS (category if tidal stream) = 1 (flood stream) or 2 (ebb stream)
CURVEL (current velocity) = value of the maximum rate
ORIENT = orientation of the tidal stream
INFORM = "Velocity ranges from X to Y knots." (Where X is the minimum rate and Y is the maximum rate).

Note: If a range applies to both a flood and ebb stream arrow, INFORM should be populated for both objects (see Fig. 17).

Selection

Acronym	Name	Category of Tidal stream	Current velocity	Information
TS_FEB	Tidal streams - Flood/Ebb	1	0.9	Velocity ranges from 0.7 to 0.9 knots.
TS_FEB	Tidal streams - Flood/Ebb	2	0.9	Velocity ranges from 0.7 to 0.9 knots.

Figure 17: Both TS_FEB (tidal stream – flood/ebb) are encoded with CURVEL = 0.9 and INFORM = "Velocity ranges from 0.7 to 0.9 knots."

3.3.2 Tidal steam time series

3.3.3 Tidal steam panels

3.4 Current Data

4. Topography

LDS should be used for the source of topographic information where available.

4.1 Land area

4.1.1 (L) Topographic terms

The following is intended as a guide for encoding.

Peninsulas should be captured as LNDRGN areas, with the charted name encoded in OBJNAM (object name). The area should be formed using the coastline and a closing line at the end of the feature.

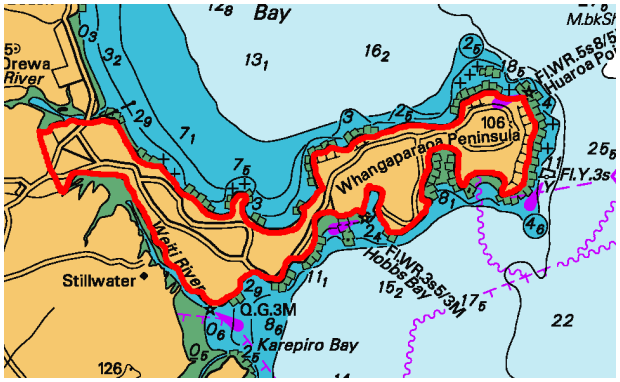


Figure 18: A LNDRGN area object captured using the geometry of the depicted peninsula. "Whangaparaoa Peninsula" is captured in OBJNAM.

Points, Headlands, Capes and Bluffs should be captured as LNDRGN points, with the charted name encoded in OBJNAM. The point should be positioned on the landward side of the coastline to ensure the point object does not share the geometry of the coastline.

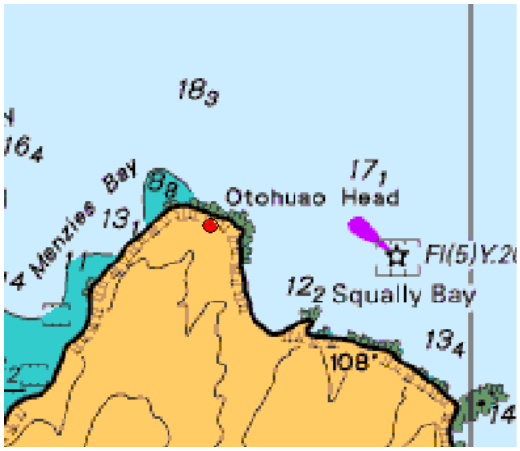


Figure 19: A headland captured as a LNDRGN point on the landward side of the coastline.

Named beaches should be captured as a LNDRGN point in the most appropriate position, with the charted name encoded in OBJNAM.

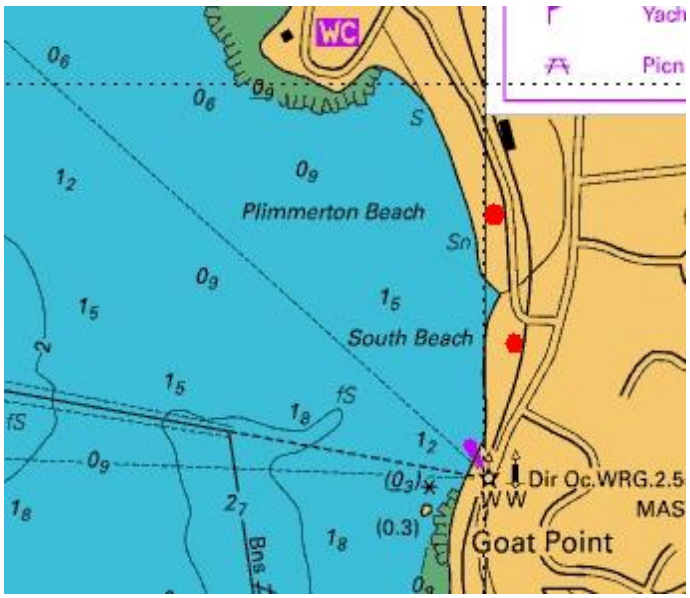
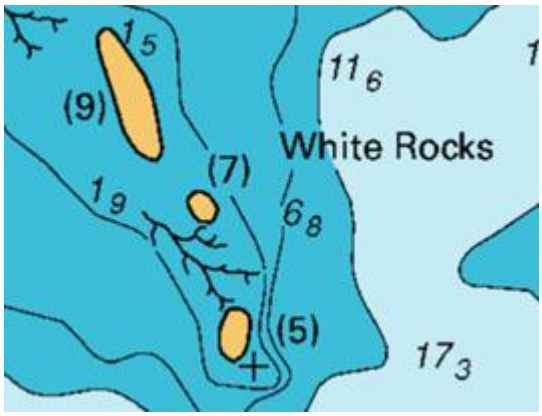


Figure 20: LNDRGN points (red dots) positioned in the most appropriate place on the landward side of the coastline. "South Beach" and "Plimmerton Beach" are captured in OBJNAM.

Where a group of 'dry' features represents a geographic area positioned at sea (such as a named group of islands), the area should be captured as a SEAARE. If existing geometry can be followed (e.g. DEPCNT), the SEAARE should be captured as an area (see Fig. 21); otherwise it should be captured as a point. The overarching SEAARE should have the general name encoded in OBJNAM. If the individual areas have names, they should be encoded in OBJNAM of each individual object.

a) 

b) 

Figure 21: This representation (a) is captured as a SEAARE area object (b) using the geometry of the depth contours, but excluding the land areas. "White Rocks" is encoded in OBJNAM.

4.2 Vertical measurements

4.2.1 Vertical datum

4.2.2 Heights and elevations

4.3 Control points

4.4 Distance marks

4.5 Coastline

4.5.1 Natural

4.5.2 Artificial (shoreline constructions)

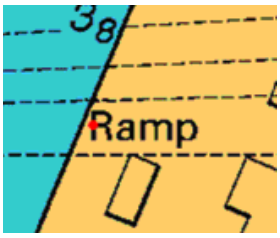
Larger scale charts and Google Earth can be referred to when defining the attributes of SLCONS (shoreline constructions).

4.5.2.1 (L) Encoding shoreline construction text

Where the position of a shoreline construction is only indicated by text (e.g. "Ramp"), it should be captured as a SLCONS point with the following attributes:

- OBJNAM = charted text
- CATSLC (category of shoreline construction) = as appropriate
- QUAPOS = 4 (approximate), as the exact position is not defined

The same principle applies to public slipways, as the magenta symbol does not define the actual location of the slipway (see Fig. 22). Slipways should therefore be captured as SLCONS points with OBJNAM = "Public slipway", QUAPOS = 4 (approximate), and CATSLC = 13 (slipway).

a) 

b) 

c) 

Figure 22: The exact location of the ramp/slipway location is not defined in these representations (a, b and c). The red spot defines where the SLCONS point should be positioned.

4.6 Harbour Installations

4.6.1 Harbour facilities

4.6.2 Berths

A berth symbolised on the paper chart (see INT 1, section F Ports, item 19) should be captured as a BERTHS point on top of the corresponding SLCONS (shoreline construction). When the feature is depicted as text, the text should be encoded in INFORM of the SLCONS object, and not as a separate BERTHS point.

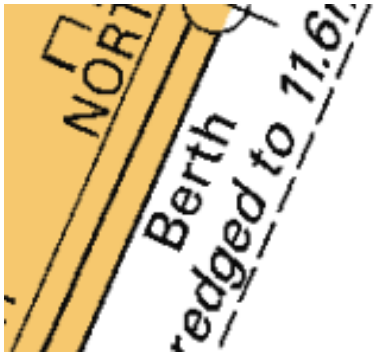


Figure 23: An example of a berth represented by only text.

4.6.3 Harbour offices

4.6.4 Checkpoints

4.6.5 Small craft facilities

4.6.6 Docks

4.6.6.1 Dry docks

4.6.6.2 Floating docks

4.6.6.3 Tidal and non-tidal basins

4.6.6.4 Gates

4.6.6.5 Locks

4.6.6.6 Gridirons

4.6.7 Mooring / warping facilities and pontoons

4.6.7.1 Mooring / warping facilities

4.6.7.2 Piles

4.6.7.3 Pontoons

4.6.8 Hulks

4.6.9 Dockside buildings and structures

4.6.9.1 Transit sheds

4.6.9.2 Timber yards

4.6.9.3 Cranes

4.6.10 Works in progress and projected

4.7 Natural Features

4.7.1 Natural sceneries

4.7.2 Height contours, spot heights

4.7.3 Marsh

Marsh area that is landlocked (i.e. marsh edge is not bordered by coast) should not be captured. COALNE (coastline) bordering areas of marsh should have QUAPOS = 4 (approximate) encoded.

Where sandy shore borders marsh, "sandy shore" should be encoded in INFORM of the COALNE object (see Fig. 24).

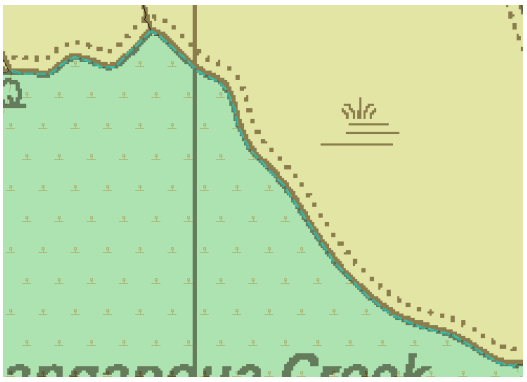


Figure 24: This representation is captured as COALNE with CATCOA = 8 (marshy shore) and INFORM = "sandy shore".

4.7.4 Dunes, sand hills

Where the position of a sand hill/dune is only indicated by text, capture as a LNDRGN point, positioned centrally on the source depiction (see Fig. 25). This could include a range in elevation with the source text encoded in INFORM, and CATLND (category of land region) = "UNKNOWN". A SLOGRD Area feature does not display in an ECDIS unless CONRAD = 1.

If sand hills/dunes are indicated by INT 1 C8, then a SLOGRD (sloping ground) point object should be encoded (as per UOC 4.7.4).

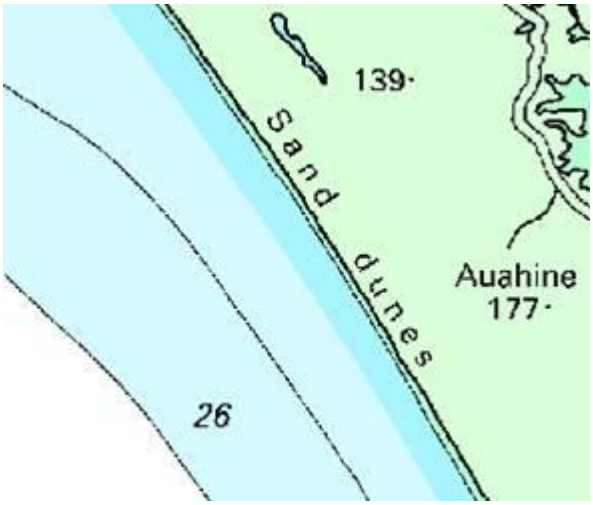


Figure 25: This representation does not define the location of the sand dunes. This is captured as a LNDRGN point with INFORM = "Sand dunes".

4.7.5 Cliffs

Only cliffs that are conspicuous to the mariner should be encoded. Where the cliff is adjacent to the coastline, the COALNE should be encoded with CATCOA (category of coastline) = 1 (steep coast). The crest of the cliff line should be captured as a SLOTOP (slope topline) line object with CATSLO (category of slope) = 6 (cliff).

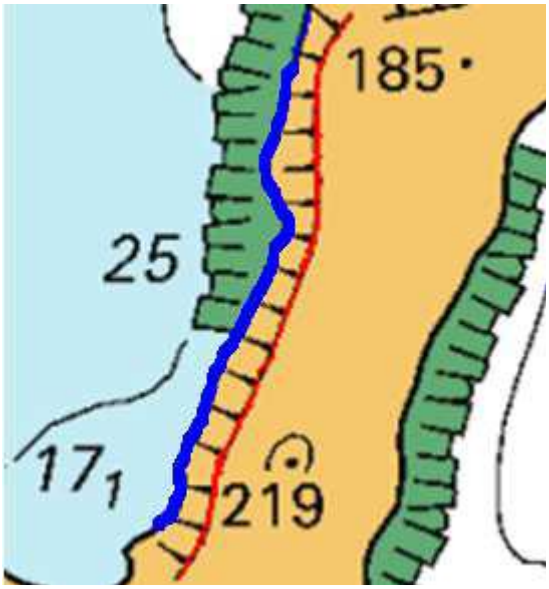


Figure 26: An example of a cliff. The blue line represents COALNE with CATCOA = 1 (steep coast), and the red line represents a SLOTOP with CATSLO = 6 (cliff).

In places where the cliff is not adjacent to the coastline, but is still visually conspicuous to the mariner or has text accompanying it, the crest of the cliff should be captured as a SLOTOP line object. If a range in elevation is depicted on the source, both of the following attributes should be encoded with the lowest height in ELEVAT (elevation) and the range in elevation in INFORM (see Fig. 27).

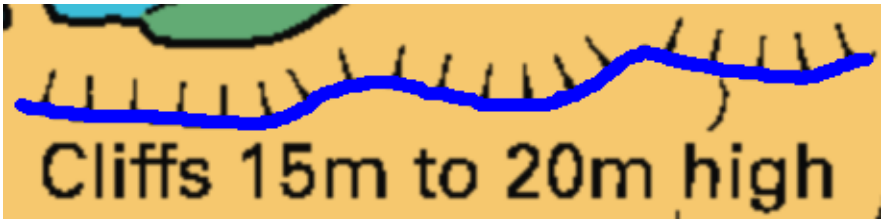


Figure 27: This representation is captured as a SLOTOP line with ELEVAT = 15.00m and INFORM = "Cliffs 15m to 20m high".

Rock outcrops (see Fig. 28) should be encoded as LNDMRK with CATLMK (category of landmark) = 21 (large rock or boulder on land).

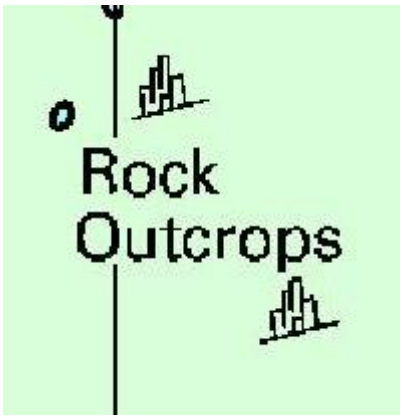


Figure 28: An example of a rock outcrop.

4.7.6 Rivers

Please refer to Table 1 in section *1.5.2 (L) Encoding According to Navigational Purpose* for guidance on how to encode rivers at different scales.

Rivers and streams should not be captured beyond the first bend or bridge crossing. Where the river is shown on the chart as an area and is not captured beyond a bridge, the bridge should be captured as a BRIDGE area with LNDARE beneath. No COALNE is required along the seaward edge of the BRIDGE.

Compilers should refer to LINZ Data Service for official names for waterways.

4.7.7 Rapids, waterfalls

4.7.7.1 Rapids

4.7.7.2 Waterfalls

4.7.8 Lakes

Inland lakes charted as non-navigable should not be captured; unless they meet the criteria stated in section *1.5.2 (L) Encoding According to Navigational Purpose.*

See Fig. 29 for an example of when inland lakes should be captured.

a)  b) 

Figure 29: The non-navigable water body in this representation is beyond the bridge (a). However, it is encoded because it is conspicuous to the mariner. In this case, LAKARE should be encoded over LNDARE (b).

4.7.9 Saltpans

4.7.10 Glaciers

4.7.11 Vegetation

Vegetation should not be captured unless it is depicted as visually conspicuous on the chart (e.g. denoted by a word in bold upper case, such as **TREES**) or mentioned in the relevant Pilot.

The height of vegetation is indicated by a number in brackets with a line above it (see Fig. 30). This should be encoded as a VEGATN object with HEIGHT populated. The VEGATN object should share the geometry of the LNDARE. A separate LNDELV point should not be encoded.

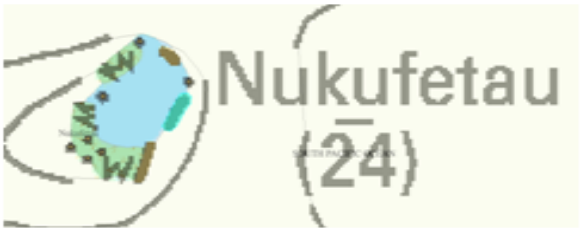


Figure 30: Height of vegetation.

4.7.11.1 (L) Mangroves

Mangroves should be captured as VEGATN objects with CATVEG (category of vegetation) = 7 (mangrove). VEGATN areas should be captured on top of intertidal DEPARE (see Fig. 31). The seaward edge should be encoded as COALNE with CATCOA (category of coast) = 7 (mangrove) and QUAPOS = 4 (approximate). The landward edge should be encoded as COALNE with no CATCOA or QUAPOS encoded. Please refer to Encoding Bulletin 47 – "UOC Clause 4.7.11 Vegetation" for more guidance.

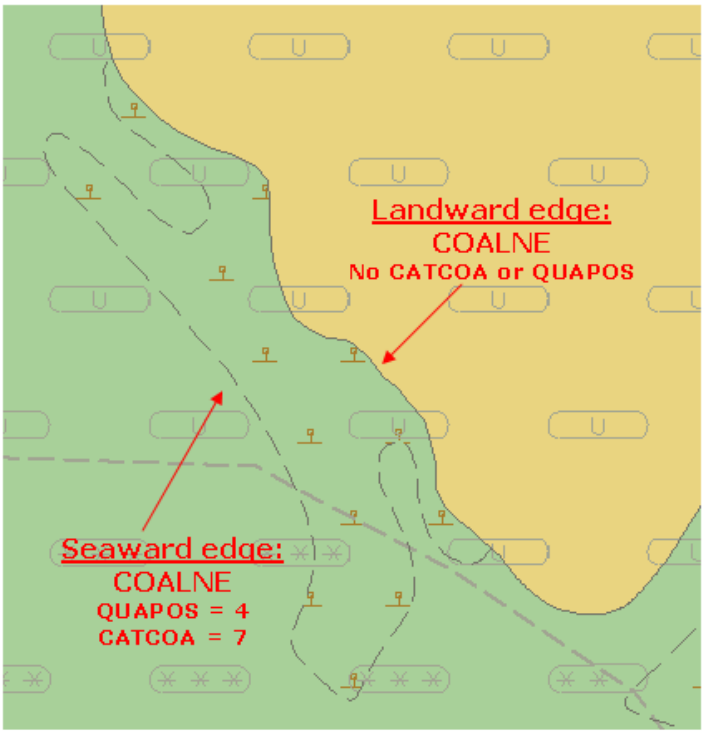


Figure 31: How to capture mangroves according to Encoding Bulletin 47.

4.7.12 Lava flows

4.8 Artificial Features

4.8.1 Canals

4.8.2 Railways

4.8.3 Tunnels

4.8.4 Cuttings and embankments

4.8.5 Dams

A dam with its seaward edge bordered by coastline should be captured as a DAMCON area with a SLCONS (shoreline construction) line object along its seaward edge. The SLCONS object should have CATSLC (category of shoreline constructed) = "UNKNOWN".

4.8.6 Flood barrages

4.8.7 Dykes

4.8.8 Roads and tracks

4.8.9 Causeways

4.8.10 Bridges

Unless otherwise specified, CATBRG (category of bridge) = 1 (fixed bridge) should be encoded for BRIDGE objects. Please note that VERCLR (vertical clearance) will therefore be mandatory. If the value is unknown, it should be populated with "UNKNOWN". If the VERCLR value has two decimal places, it should be rounded down for safety (e.g. 5.68m to 5.6m).
When a bridge signals the end of a RIVERS/SEAARE object, it should be captured as a BRIDGE area with LNDARE beneath.

For more information on capturing bridges please refer to Table 1 – "Capturing features according to navigational purpose".

4.8.10.1 (L) Features beneath bridges

Figure 32: The DEPCNT (dotted line) beneath the bridge has QUAPOS = 4 (approximate) encoded.

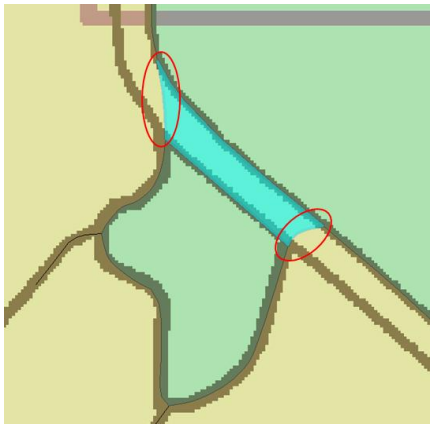


Figure 33: The COALNE circled in red has QUAPOS = 4 (approximate) encoded. There is no COALNE along the seaward edge.

Objects beneath BRIDGE areas, such as COALNE and DEPCNT, should have QUAPOS = 4 (approximate) encoded for their spatial edges. COALNE is not required for the seaward edge of the BRIDGE.

4.8.11 Conveyors

4.8.12 Airfields

4.8.13 Production and storage areas

4.8.14 Built up areas

The LINZ Data Service (LDS) is the preferred source of built-up area data. If it is not available for the chart area, Table 3 below gives some guidelines on how to capture BUAAREs (built-up areas).

NB: CATBUA (category of built-up area) should not be encoded.

Table 3: Capturing BUAARE according to navigational purpose where LDS data is not available

SETTLEMENT – depiction on paper chart			**Navigational Purpose**	
			1, 2	**3, 4, 5, 6**
COASTAL	**Named**	**Extent indicated on paper chart**	BUAARE area	BUAARE area
		Text	BUAARE point	BUAARE point
		Text and one or two buildings	N/A	BUAARE point positioned over one of the single buildings. Do not encode the buildings.
		Text and a cluster of buildings or road network	N/A	BUAARE area encompassing all buildings and/or road network.
	Unnamed	**One or two buildings**	-	BUISGL point(s)
		A few localised buildings	N/A	BUISGL point positioned on the building closest to the coast.
		Group of buildings spanning a significant area	N/A	BUAARE area
INLAND	**Named**	**Text in capitals**	BUAARE point	BUAARE point or area
		Text in lower case	-	BUAARE point (Capture for **NP 3** only if not obscured from view).
	Un-named	Do not encode.		

4.8.15 Buildings, landmarks, tanks and silos

BUISGL (building, single), LNDMRK, or SILTNK (silo/tank) features that fall within navigable water should be encoded snapped to a LNDARE point or within a LNDARE area as appropriate.

Table 4 gives some guidelines on how to capture buildings and landmarks when there are no LDS data available for an area.

Table 4: How to capture BUISGL and LNDMRK where no LDS data is available

BUILDING or LANDMARK		Within a BUAARE Area	Not within a BUAARE area
Prominent *	NP 4,5,6	Capture if within a thumbs width from the coast	Capture all
	NP 3	Capture if next to coast	Capture unless obscured from view
	NP 1,2	-	Capture if next to coast
Building with spire or tower		Capture as LNDMRK with CATLMK = 17 or 20	Capture as LNDMRK with CATLMK = 17 or 20
Height is given		Capture as LNDMRK with HEIGHT	Capture as LNDMRK with HEIGHT
Other landmarks (e.g. radio mast)	NP 4,5,6	Capture if within a thumbs width from the coast	Capture all
	NP 3	Capture if next to coast	Capture unless obscured from view
	NP 1,2	-	Capture if next to coast
Church (no spire, tower or height)	NP 4,5,6	-	Capture all
	NP 3	-	Capture unless obscured from view
	NP 1,2	-	Capture if next to coast
Single Building	NP 4,5,6	-	Capture if next to coast
	NP 3	-	Capture if next to coast
	NP 1,2	-	-

* An object is prominent if considered significant (Google Earth can be used as a reference) without necessarily being defined as visually conspicuous.

4.8.15.1 (L) Supplementary attributes

Air obstruction lights (see Fig. 34) are commonly on radio and television masts to warn aeroplanes of their danger to their flight path. However, they can also be on other landmarks such as chimneys (see Fig. 35). Air obstruction light supports should be encoded as depicted on the source.

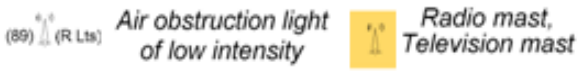


Figure 34: Air obstruction light representation.

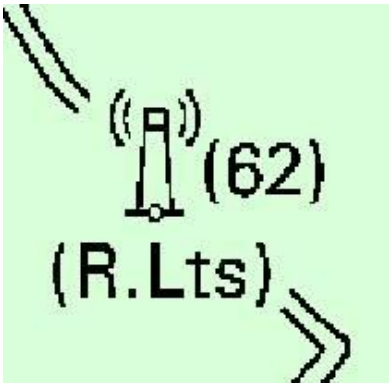


Figure 35: An example of an air obstruction light on a tower.

4.8.16 Fences and walls

4.8.17 Fortified structures

4.8.18 Pylons and bridge support

4.8.19 Oil barriers

4.8.20 Views and sketches, viewpoints

4.8.20.1 Signs and notice boards

5. Depths

5.1 Sounding datum

5.2 Depth contours

5.3 Soundings

5.3.1 (L) Exposition of sounding

EXPSOU = 2 (shoaler than the range of depth of the surrounding depth area) **should not be encoded** for any SOUNDG objects. If a SOUNDG is shoaler than the range of depths, further investigation of the source material should be conducted, and the encoding changed as applicable.

EXPSOU = 2 should be encoded in situations where soundings match the values given for the mean high water springs (MHWS) and is in an intertidal area. For example, if the MHWS value is -2.7 and the sounding has a value of-2.7, then EXPSOU = 2 should be encoded.

An example of a SOUNDG with EXPSOU = 2 is provided (see Fig. 36), however each case is subjective.

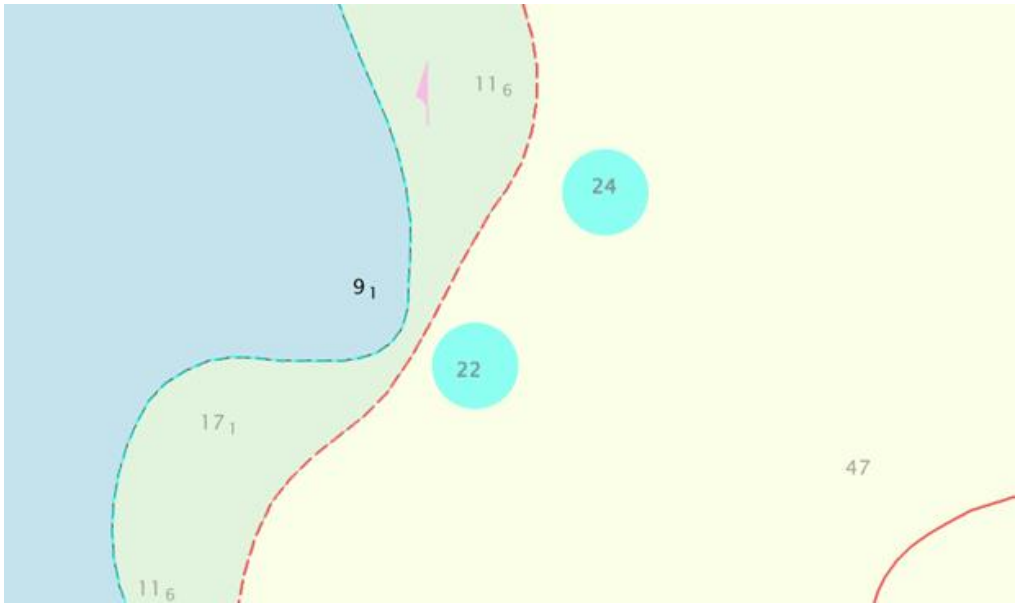
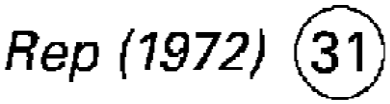


Figure 36: The two highlighted SOUNDGs (22 and 24) were both encoded with EXPSOU = 2 due to the depth area being 30-50m. This was solved by encoding 20-30m DEPARE areas with no contour and QUAPOS = 4 (approximate) around the SOUNDGs.

5.3.2 (L) Soundings with dotted danger lines

A sounding with quality information may appear with a dotted danger line around it on small scale charts, while the same feature may have a solid circle on the large scale equivalent. In such cases, the sounding should be captured as an OBSTRN point on the small scale charts, and as a SOUNDG on the large scale charts (see Table 5).

Table 5: An example of how to encode a sounding with and without a danger circle

		(Nav Purpose 1 and 2	**Nav purpose 3,4,5,6**
Example			
Feature		OBSTRN point	SOUNDG DEPCNT
Attribute	**QUAPOS**	8 (reported, not confirmed)	8 (reported, not confirmed)
	QUASOU	9 (value reported, not confirmed)	-
	VALSOU	31	-
	EXPSOU	2 or UNDEFINED (depends on surrounding depth area)	-
	INFORM	(1972)	(1972)

Soundings with dotted danger lines (OBSTRN points) in UNSARE should have QUAPOS = 4 (approx) if the surrounding soundings have QUAPOS = 4 (see Fig 37).

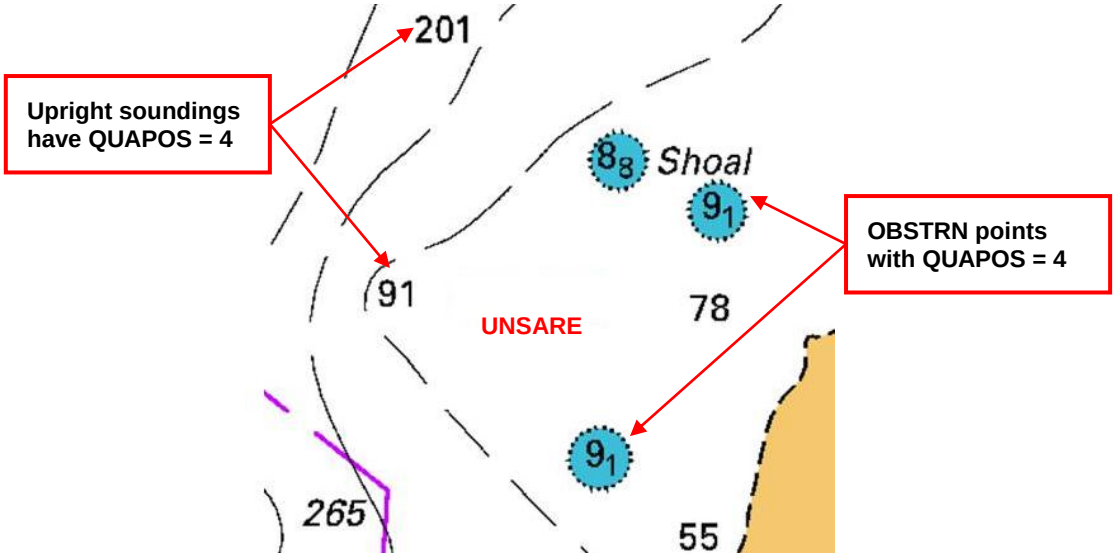


Figure 37: Encoding QUAPOS = 4 for soundings with dotted danger lines in UNSARE.

5.4 Depth areas

5.4.1 Geo object depth areas

5.4.2 Geometry of depth areas

Where depth contours are absent in the source, the depth area should be closed using edges without an associated depth contour. Please refer to section *2.2.3.1.1 (L) Encoding QUAPOS for depth contours*.

5.4.3 Use of attributes DRVAL1 and DRVAL2 for depth areas in general

5.4.3.1 (L) Standard depth ranges

Standard depth ranges should generally be used; with the exceptions being outlined in sections *5.4.3.2 Consistent encoding of depth areas* and *5.4.3.2 Guidance for encoding depth areas adjacent to the coastline*.

Standard depth ranges on New Zealand charts are:

Nav. Purpose 1 and 2	Nav. Purpose 3, 4, 5, 6
0-30m	-h – 0m
30–100m	0 – 2m
100–200m	2 – 5m
200–500m	5 – 10m
500m–1000m	10 – 20m
then 1000m increments	20 – 30m
	30 – 50m
	50 – 100m

100 – 200m
200 – 300m
300 – 400m
400 – 500m
500 – 1000m
then 1000m increments

Where necessary, drying contours should also be encoded, for example:

-h – -2m
-2 – 0m

In cases where a paper chart has non-standard depth contours (e.g. NZ4314 Inset has 2, 4, 6 and 8m), DEPARE should be created with those depth ranges.

5.4.3.2 (L) Encoding depths in shoaler and deeper areas

Deeper depth areas ("holes") within shoaler areas should be encoded as follows (see Fig. 38):

- The DEPCNT bordering the deeper area should be encoded with the DRVAL2 (depth range value 2) value of the shoaler area.
- DRVAL1 and DRVAL2 (depth range values 1 and 2) for the deeper area should be encoded based on the sounding values within the area.

Shoaler depth areas (shoals) within deeper areas should be encoded as follows (see Fig. 39):

- The DEPCNT bordering the shoal depth area should be encoded with the value of the standard range immediately deeper than or equal to the value of the sounding.
- DRVAL1 and DRVAL2 for the shoaler area should be encoded based on the sounding values within the area.

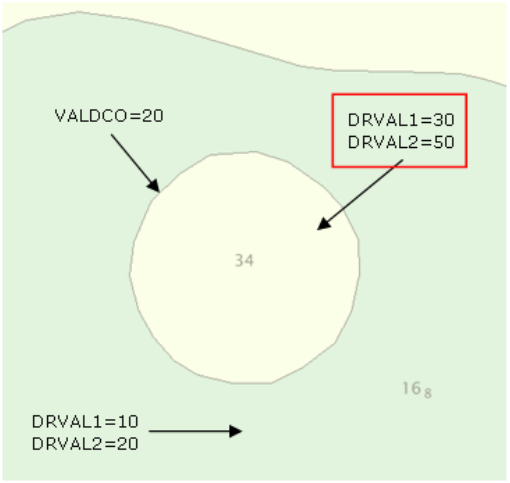


Figure 38: The VALDCO of the DEPCNT surrounding the "hole" should have the same value as the DRVAL2 of the surrounding area (20m).

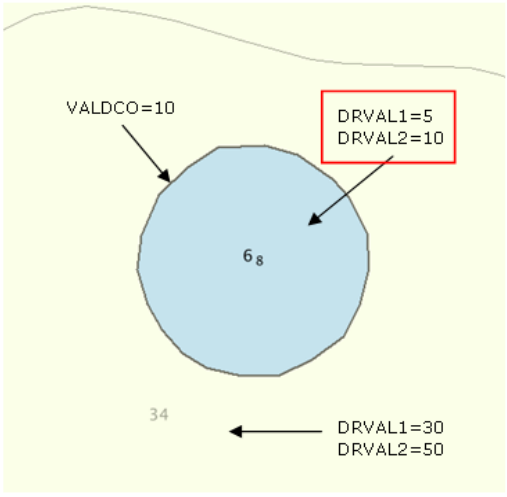


Figure 39: The VALDCO of the DEPCNT surrounding the shoal should have the same value as the DRVAL2 of the shoal (10m).

5.4.3.3 (L) Defining DRVAL1 and DRVAL2 values

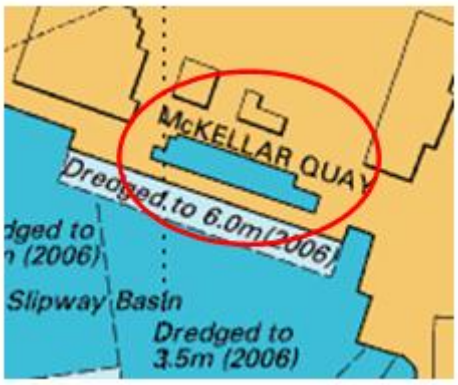


Figure 40: A dock area with unknown depth. The DEPARE is encoded with DRVAL1 = 0m and DRVAL2 = 2m.

If the depth range is unknown for a dock area, the depth range should be encoded as DRVAL1 = 0 and DRVAL2 = 2.

If the DEPARE is bordered by two or more DEPCNT, and the contours do not follow the standard depth ranges, then (see Fig. 41 and 42):

- DRVAL2 should take the value of the deepest depth area bounding the area.
- DRVAL1 should take the value of the next shoalest standard depth value for DRVAL2.

The exception to this rule is when depth areas are bordered by coastline.

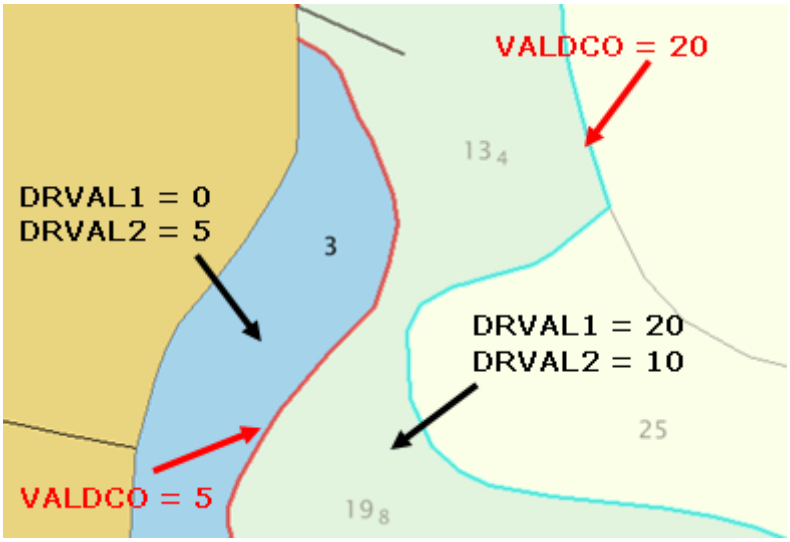


Figure 41: The standard depth contours are 20m, 10m, 5m, 2m, 0m. The deepest depth contour bounding the area is 20m, thus DRVAL1 must be 10m. The correct depth range for this DEPARE is therefore 10-20m (not 5-20m).

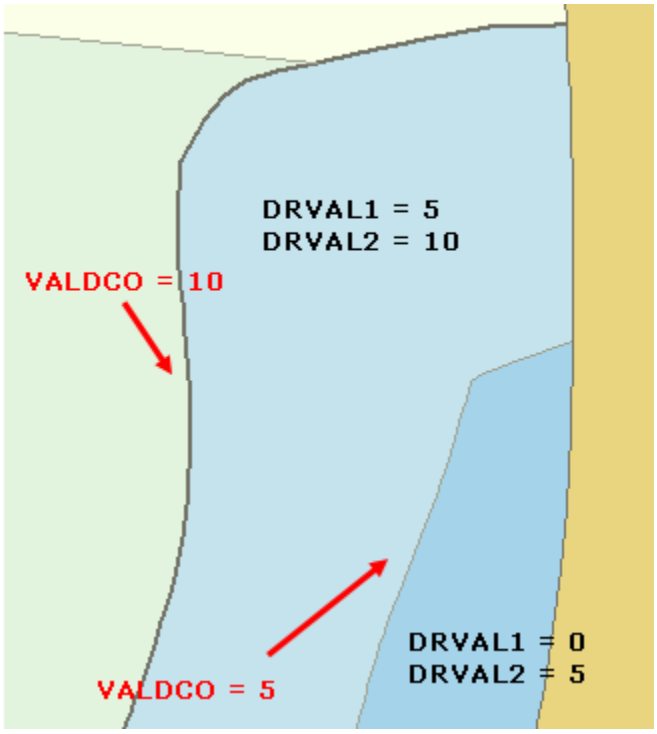


Figure 42: The standard depth contours are 10m, 5m, 2m, 0m. The deepest depth area bounding the area is 10m, thus DRVAL1 must = 5m. The correct depth range for this DEPARE is therefore 5-10m (not 0-10m).

5.4.3.4 (L) Depth areas adjacent to the coastline

A DEPARE bordered by one DEPCNT and coastline should be encoded with the following depth range (see fig. 43):

- DRVAL1 = 0
- DRVAL2 = value of the bounding depth contour.

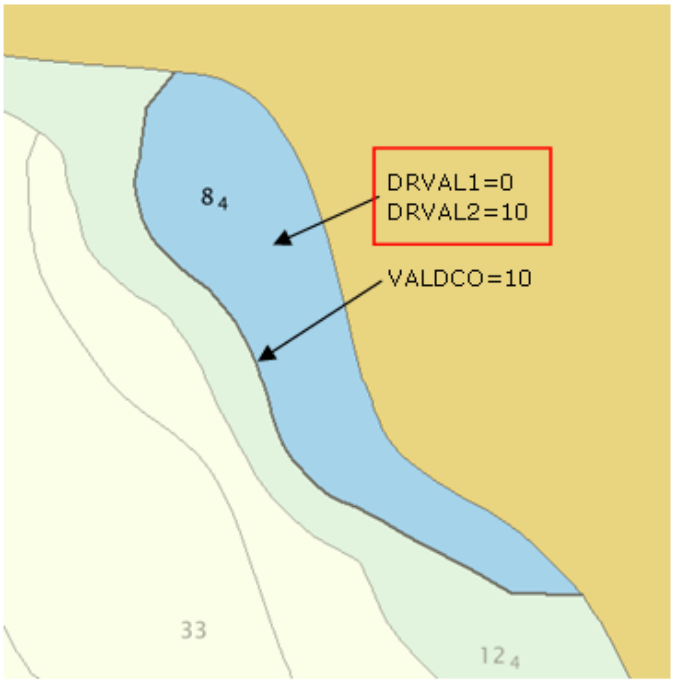


Figure 43: The DEPARE adjacent to the COALNE is bounded by a 10m DEPCNT, therefore DRVAL1 = 0m and DRVAL2 = 10m.

A DEPARE bordered by two or more DEPCNT and coastline should be encoded with the following depth range:

- DRVAL1 = value of the next shoalest standard depth contour, or where there is no DEPCNT, it should equal DRVAL2 of the next shoalest DEPARE (see Fig. 44).
- DRVAL2 = value of the deeper contour.

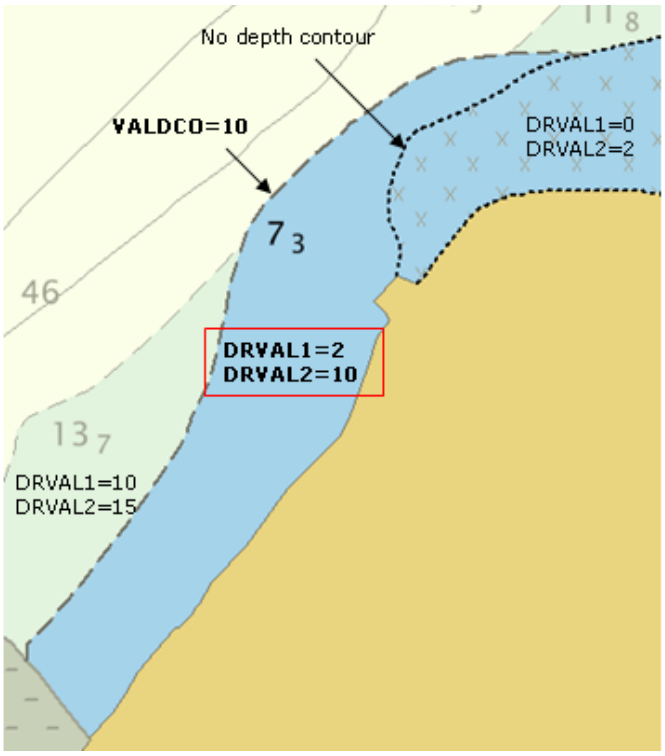


Figure 44: The DEPARE bounded by a 10m DEPCNT is adjacent to the COALNE, and also bordered by a shoaler DEPARE with no DEPCNT – this is the next shoalest depth area. Therefore the depth values for the DEPARE bounded by the 10m DEPCNT will be DRVAL1 = 2m and DRVAL2 = 10m.

If a DEPARE has no soundings or depth contour labels on the source, and no larger scale coverage is available, the effect of the surrounding data (e.g. COALNE, DEPCNT, etc) should be established (see Fig. 45). The shoalest value possible for the tint of the depth area should be used for VALDCO (value of depth contour). The survey sheets can also be used as a reference if required.

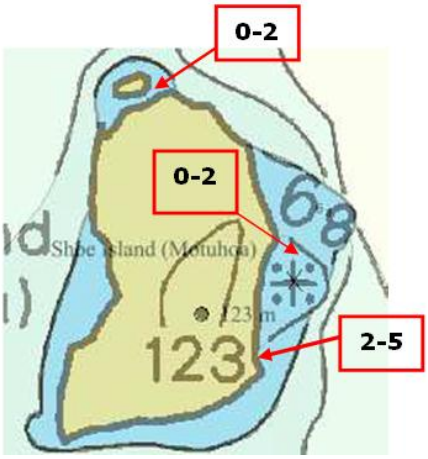


Figure 45: There is no larger scale coverage available and the DEPARE shown are bordered by COALNE. The DEPCNT are encoded with VALDCO = 2m, as this is the shoalest value possible for the blue tint on the paper chart.

5.4.4 Not currently used

5.4.5 Not currently used

5.4.6 Not currently used

5.4.7 Not currently used

5.4.8 Rivers, canals, lakes and basins

5.4.9 (L) Intertidal areas

Intertidal areas (green tinted areas seaward of the coastline) should be captured as DEPARE area objects following the edge of the tint, regardless of whether or not a contour is shown. Intertidal DEPARE should be encoded with the following depth range values:

- DRVAL1 = -h
- DRVAL2 = 0

Where '-h' is the MHWS (mean high water springs) value given on the paper chart.

When there are two or more '-h' values on the chart, two options are available:

- If the extents of the regions are not clearly defined, the shoalest value should be used.
- If the extents are clearly defined, each area should be encoded with its relevant '-h' value (see Fig. 46).

Tidal Levels referred to Datum of Soundings

Place	Lat S	Long W	Heights in metres above Datum				Datum and Remarks
			MHWS	MHWN	MLWN	MLWS	
Nukunonu Island	9°12'	171°51'	1.5	1.2	0.6	0.4	4.530m below BM Nukunonu Church, an RNZN brass benchmark set in concrete at the base of the steps at the main entrance to the church at Nukunonu Island.
Fakaofo	9 23	171 15	0.9	–	–	–	

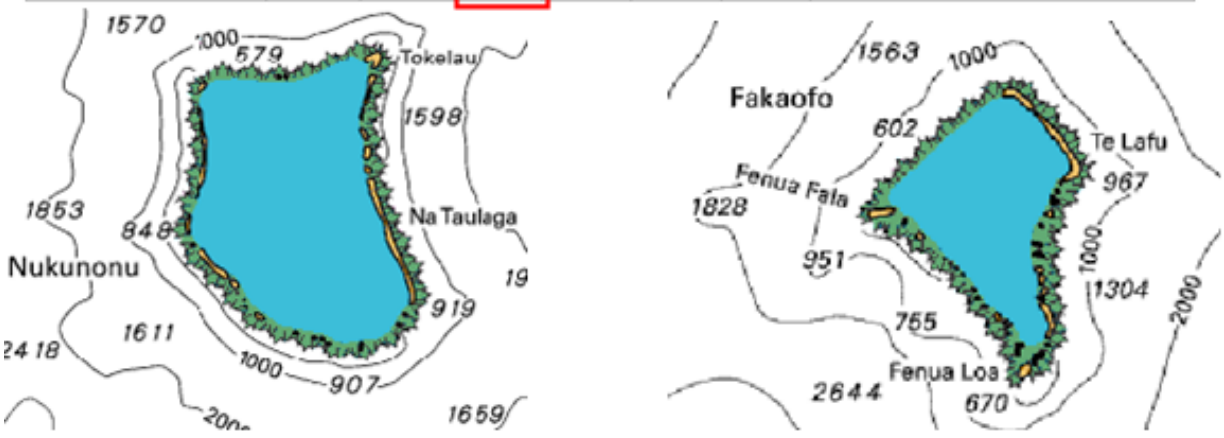


Figure 46: Example of when there are two '-h' values available. The extents of the Islands are clearly defined, so each –h value is applied to the intertidal areas of its respective island.

Intertidal depth areas are sometimes depicted with the text "Dries X to Y m" or "Dries X m". This text should be encoded in INFORM of the DEPARE. DRVAL1 and DRVAL2 should

still be encoded as '–h' and 0m, respectively. In some situations, this encoding may require the intertidal DEPARE to be split (see Fig. 47).

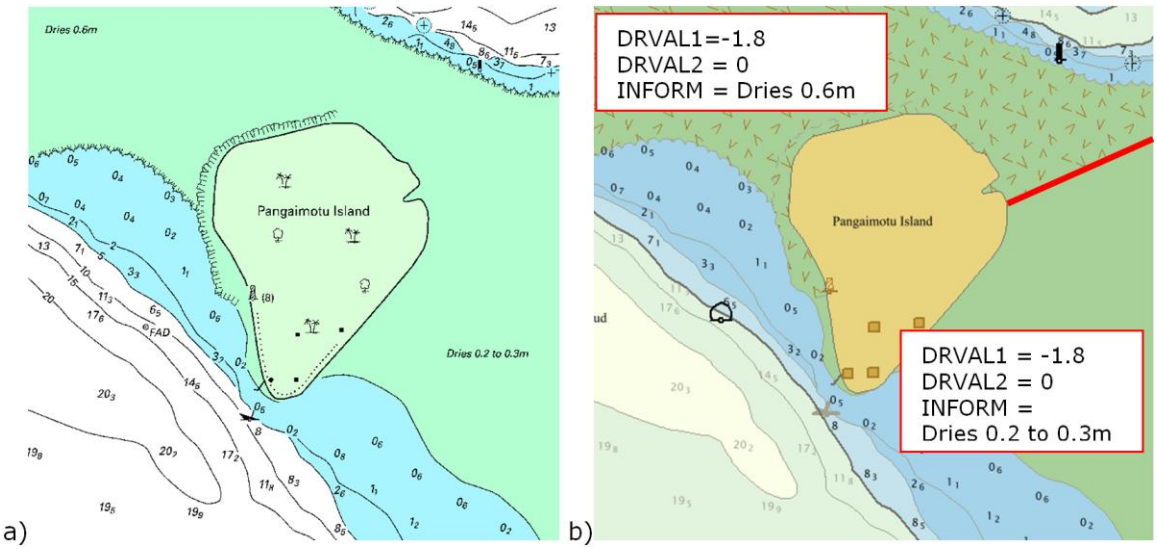


Figure 47: A representation of an intertidal depth area with the text "Dries 0.6m" and "Dries 0.2 to 0.3m" (a). This is captured as two separate intertidal DEPARE with the text in INFORM (b). QUAPOS = 4 (approximate) is encoded for the arbitrary edge between the two intertidal DEPARE (see red line).

5.5 Dredged areas

Please refer to section 5.5 of the UOC for guidance on how to encode DRGARE (dredged areas).

The date of dredging (if specified) should be encoded in INFORM of the DRGARE.

If a chart note is also encoded in INFORM, then the date should be encoded in brackets, followed by the chart note.

Example:

Date:	INFORM = 2006.
Date and Chart note:	INFORM = (2006). DREDGED AREAS. Dredged areas may not be regularly maintained. Mariners should contact the harbourmaster for information on the latest depths.

QUASOU (quality of sounding measurement) for DRGARE should only be encoded for maintained depths or not regularly maintained depths based on the associated cautionary note on the source.

Occasionally smaller scale charts depict two dredged areas as one generalized area. When this occurs, DRVAL1 (depth range value 1) should equal the shoalest dredged depth, and DRVAL2 (depth range value 2) should equal the deepest dredged depth. No other attributes should be captured (see Fig. 48).

a) b)

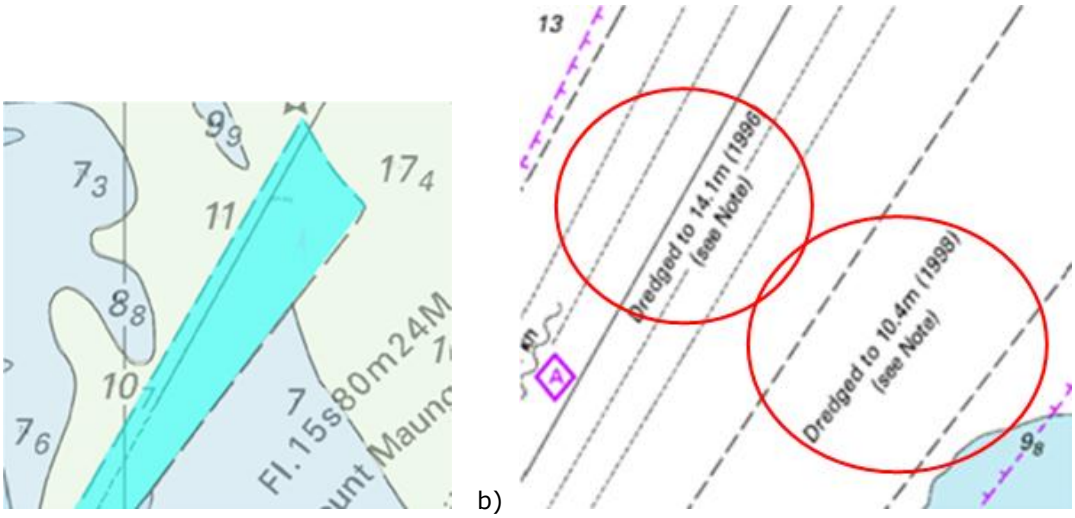


Figure 48: The smaller scale chart has a generalized dredged area (a); while the larger scale chart shows two separate dredged areas (b).The shoalest value is captured as DRVAL1 and the deepest value as DRVAL2.

5.6 Swept areas

5.7 Areas of continual change

5.8 Areas with inadequate depth information

5.8.1 Unsurveyed areas

If the report of survey mentions any specific information about the unsurveyed area, this should be captured as a chart note.

Solid depth contours within unsurveyed areas require QUAPOS = 3 (inadequately surveyed) for their spatial edges (see Fig. 49). The exception to this is if the depth contour borders an intertidal area: 0m DEPCNT should not be encoded with any spatial attribute (see Fig. 50).

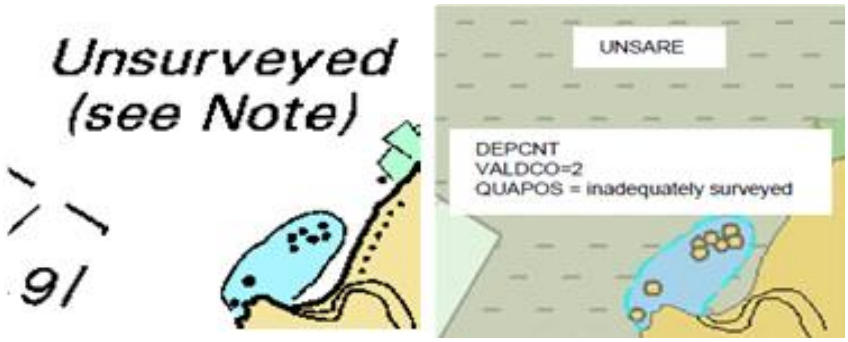
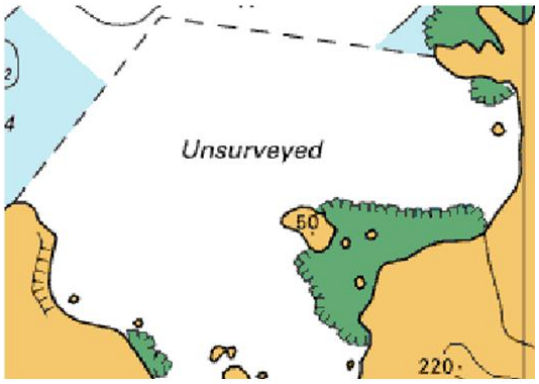


Figure 49: Solid depth contour within unsurveyed area.

a) 

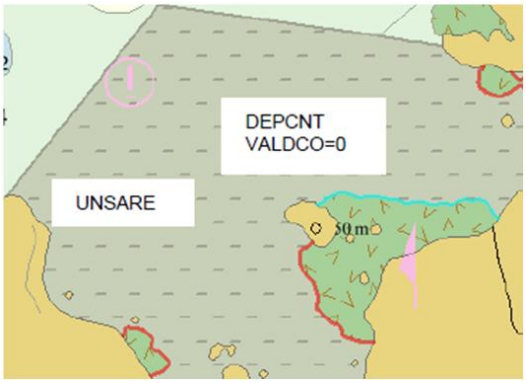
b) 

Figure 50: Inter-tidal areas within unsurveyed areas. No QUAPOS is required for the DEPCNT.

Pecked depth contours within unsurveyed areas require QUAPOS = 6 (unreliable). Upright soundings and underwater rocks within unsurveyed areas should be encoded with QUAPOS = 4 (approximate) (see Fig. 51 and 52).

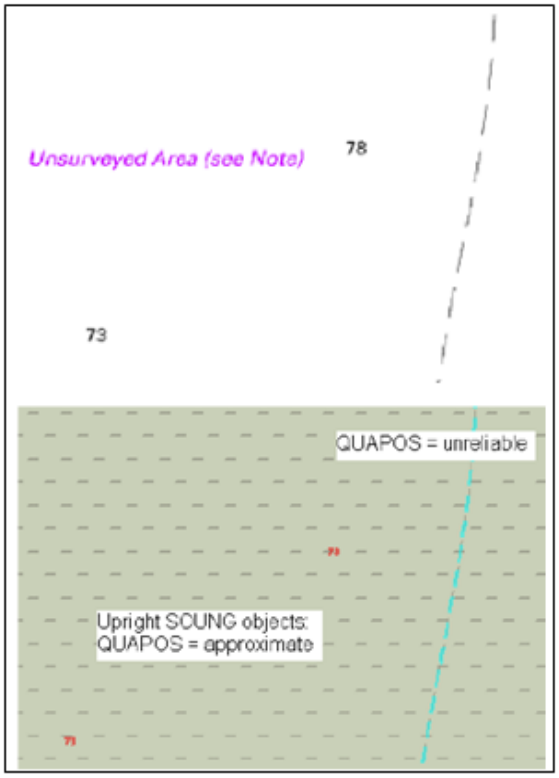


Figure 51: Pecked depth contour within unsurveyed area

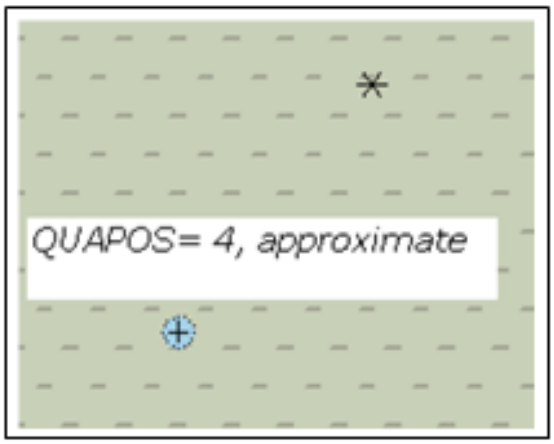


Figure 52: UWTROC within unsurveyed area.

5.8.2 Incompletely surveyed areas

An inadequately surveyed area should be captured as a CTNARE (caution area). The chart note should be captured both in the M_NPUB (nautical publication information) text file, as well as the CTNARE INFORM (or text file).

Table 6: How to encode QUAPOS for DEPCNT, UWTROC, SOUNDG and COALNE

HOW TO ENCODE QUAPOS FOR	Surveyed	Inadequately Surveyed	Unsurveyed
0m DEPCNT	UNDEFINED	UNDEFINED	UNDEFINED
Solid DEPCNT	UNDEFINED	UNDEFINED	3 (inadequately surveyed) *
Pecked DEPCNT	4 (approximate)	6 (unreliable)	6 (unreliable)
UWTROC	UNDEFINED	UNDEFINED	4 (approximate)
Upright SOUNDG	4 (approximate)	4 (approximate)	4 (approximate)
Pecked COALNE	6 (unreliable)	6 (unreliable)	2 (unsurveyed)

NB: Please note that QUAPOS = 3 or 6 takes precedence over QUAPOS = 4 for depth contours broken by cartographic presentation.

5.8.3 Bathymetry in areas of minimal depiction of detail on paper charts

5.8.3.1 Areas of omitted bathymetry

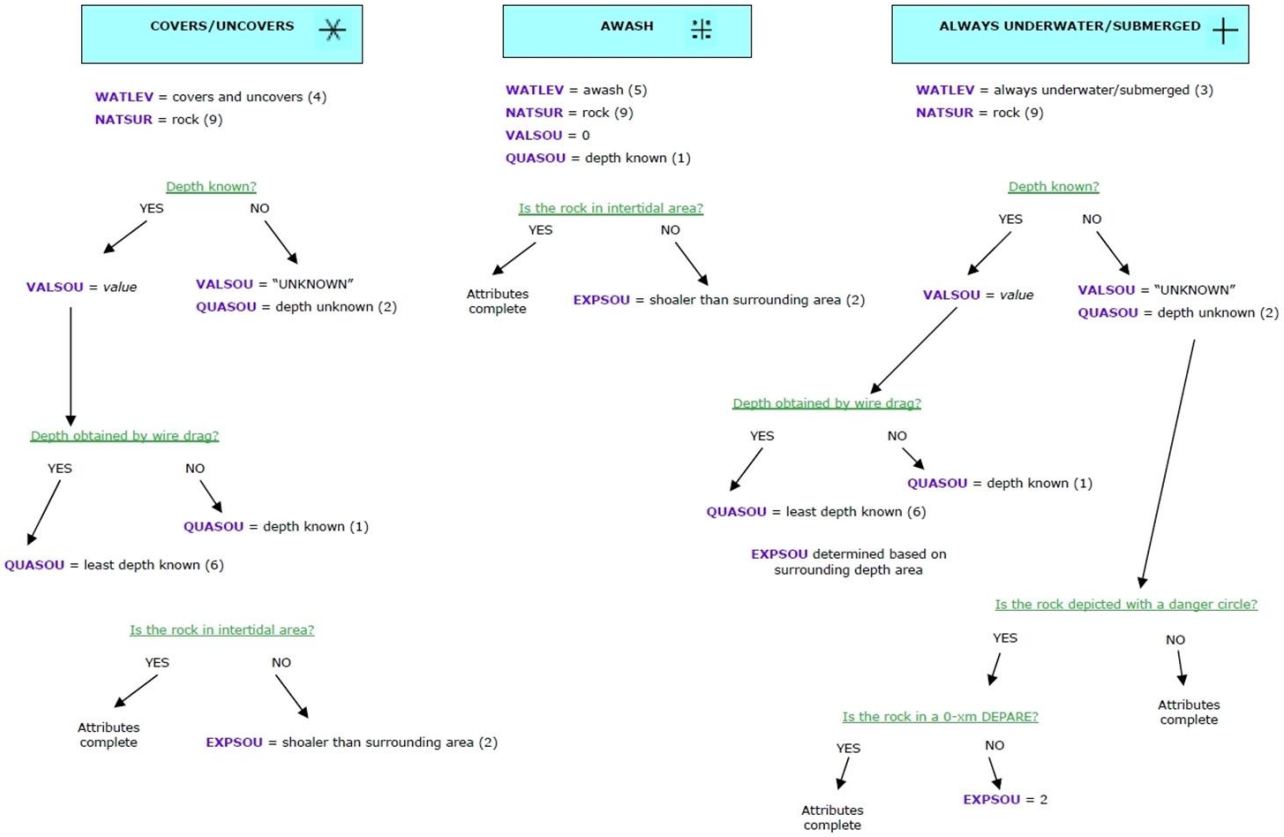
5.8.3.2 Areas of simplified bathymetry

6. Dangers

6.1 Rocks and coral reefs

6.1.1 Rocks which do not cover (islets)

6.1.2 Rocks which may cover



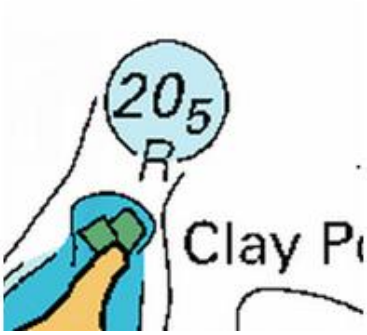
6.1.2.1 (L) Quality of sounding associated with rocks

QUASOU=1 (depth known) should be encoded for UWTROC objects if the value of sounding has not been obtained by wire drag.

QUASOU=6 (least depth known) should be encoded for rocks if the value of sounding has been obtained by wire drag.

6.1.2.2 (L) Depths associated with rocks

A paper chart may show a rock as a sounding enclosed by a distinctive circle with an "R" next to it (see Fig. 53a). This should be captured as an UWTROC point. A depth contour and depth area should not be encoded around the distinctive black circle (see Fig. 53b).

a) 

b) 

Figure 53: The encoding of this representation follows the guidance above, with the depth contour following a natural progression around the UWTROC. The rock should also be encoded with EXPSOU = 2.

6.2 Wrecks, foul ground and obstructions

6.2.1 Wrecks

When the UOC gives a choice for CATWRK and WATLEV (water level), the safest option should be encoded:

- Encode CATWRK = 5, when given a choice between CATWRK = 4 (showing mast) and CATWRK = 5 (showing any portion of hull or superstructure).
- Encode WATLEV = 4, when given a choice between WATLEV = 2 (always dry) and WATLEV = 4 (covers and uncovers).

EXPSOU (exposition of sounding) = 2 (shoaler than the range of depth of the surrounding depth area) should be encoded for WRECKS following the same principles as for OBSTRN (see Table 7). EXPSOU should not be encoded for WRECKS with WATLEV = 2 (always dry) or non-dangerous wrecks with this symbol:

VALSOU (value of sounding) should be encoded ("UNKNOWN" or # value) for all WRECKS except those with WATLEV = 2 (always dry).

WRECKS areas (as seen on large scale charts) should be captured as shown in the example (see Fig. 54).

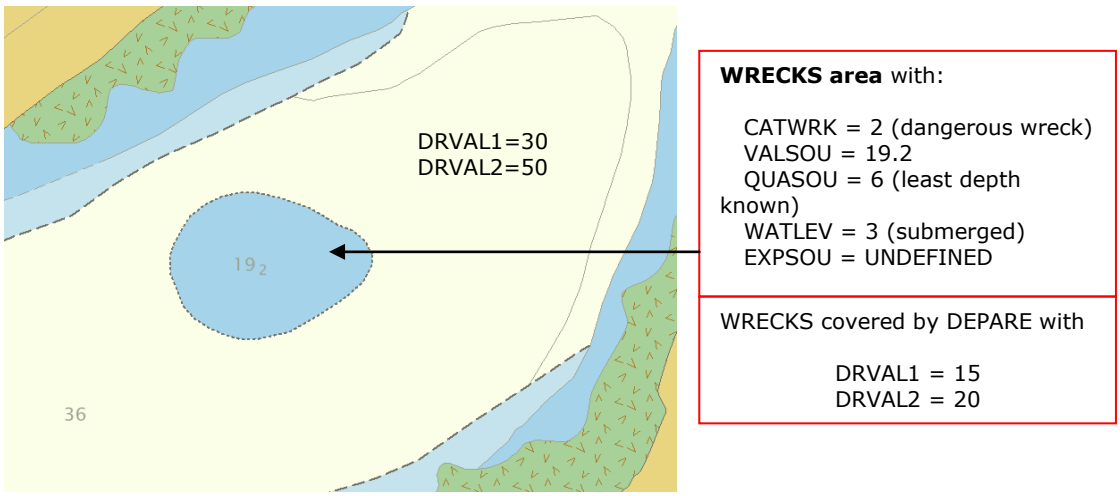


Figure 54: Example of a WRECKS area.

6.2.2 Obstructions, foul areas and foul ground

6.2.2.1 (L) Depths beneath OBSTRN areas

OBSTRN areas should be covered by DEPARE or DRGARE that share the same geometry (where appropriate). There must be no DEPCNT along the boundary of the OBSTRN area.

If there is no additional source information for the DEPARE (e.g. soundings), then the depth range values should be DRVAL1 = 0 and DRVAL2 = 2. If there is additional information, then the depth range values should be DRVAL1 = 0, while DRVAL2 should have the same value as the DEPCNT immediately deeper than (or equal to) the value of the SOUNDG.

QUAPOS = 4 (approximate) should be encoded for the edge of the OBSTRN, except if the surrounding DEPARE is 0-2m (see Fig. 55)

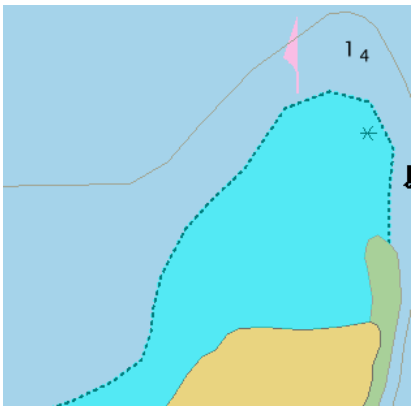


Figure 55: This OBSTRN area is surrounded by a DEPARE with DRVAL1 = 0m and DRVAL2 = 2m. Therefore QUAPOS should not be encoded, and a separate depth area beneath the OBSTRN area should not be created.

6.2.2.2 (L) Defining obstruction area attributes

An area enclosed by a danger line should be encoded as an OBSTRN area, where the attributes reflect the characteristics of the shoalest point object encoded within the area.

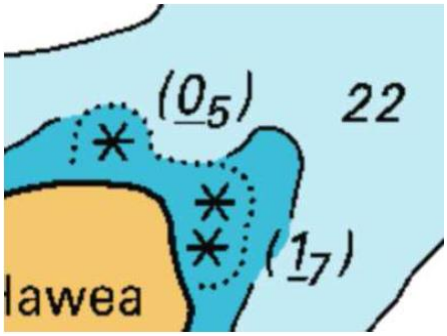


Figure 56: The OBSTRN area has several rocks within its extent. The shoalest UWTROC has a drying height of -1.7m.

The guidelines set out in Table 7 should be followed when encoding OBSTRN area attributes.

Table 7: How to encode OBSTRN area attributes according to the shoalest UWTROC or WRECKS point

		EXPSOU	QUASOU	VALSOU	WATLEV	CATOBS
Shoalest rock or wreck type in area	Covers/ uncovers	2 (except intertidal DEPARE)	Depth unknown (2)	UNKNOWN	Covers/ uncovers (4)	Foul area (6) unless specified
	Awash	2 (except intertidal DEPARE)	Depth unknown (2)	UNKNOWN	Awash (5)	
	Underwater/ submerged	2 (except 0-Xm DEPARE)	Depth unknown (2)	UNKNOWN	Underwater/ submerged (3)	
	No UWTROC Or WRECKS	Undefined	Depth unknown (2)	UNKNOWN	Underwater/ submerged (3)	
OBSTRN Point	Depth known	According to surrounding DEPARE	Least depth known (6)	# value	Underwater/ submerged (3)	Undefined (unless specified)
	Depth unknown	2 (except 0-Xm DEPARE).	Depth unknown (2)	UNKNOWN	Underwater/ submerged (3)	
	Foul Ground (#)	Undefined	Depth unknown (2)	UNKNOWN	Underwater/ submerged (3)	Foul ground (7)

6.2.2.3 (L) Duplicate obstruction points

Due to generalisation, an OBSTRN with a VALSOU can be positioned in deep water on a small scale chart resulting in EXPSOU = '2' attribution (see Fig. 57 a). However, on the larger scale equivalent, capture of EXPSOU may not be required (see Fig. 57 b).

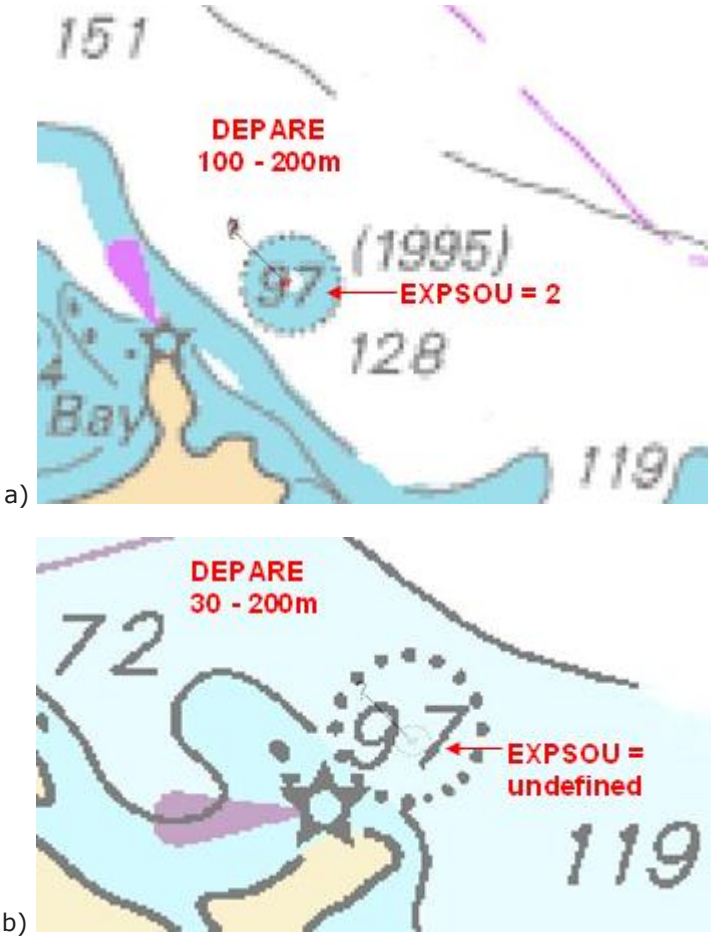


Figure 57: The OBSTRN point in a) requires EXPSOU = 2. Conversely, the OBSTRN in b) does not require the same attribute.

In such a case, two OBSTRN points will be created on the Wrecks and Obstructions scale-less usage. The position and SORIND/SORDAT of both objects will be those of the best scale chart, and the appropriate EXPSOU for each object applied. Each object can then be assigned to the appropriate usage.

6.3 Danger lines

6.3.1 Danger line around a point danger or an isolated sounding

A danger line surrounding a LNDARE point should be captured as an OBSTRN area with the LNDARE point positioned inside it (see Fig. 58).

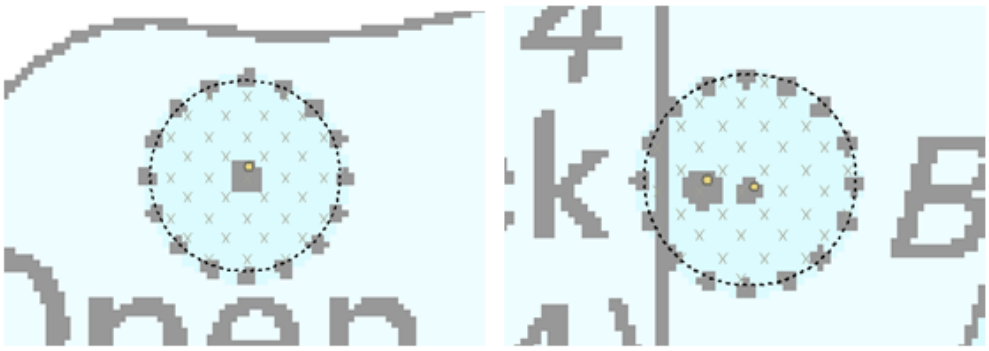


Figure 58: Examples of LNDARE points within OBSTRN areas

6.3.2 Danger line limiting an area of wrecks or obstructions

6.3.3 Danger line bordering an area through which navigation is not safe

6.4 Overfalls, races, breakers and eddies

WATTUR (water turbulence) points should be positioned on top of the textual representation in the source (e.g. "*Breaks*" or "*Br*") if it is not clear which feature is causing the turbulence. If text such as "*breaks"*, "*breaks heavily"* or "*breaks occas"* is associated with the breakers on the source, this text should be encoded in INFORM, without abbreviation (see Fig. 59 and 60).

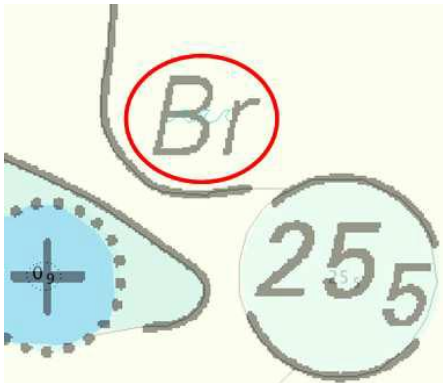


Figure 59: WATTUR point positioned on top of the textual representation.

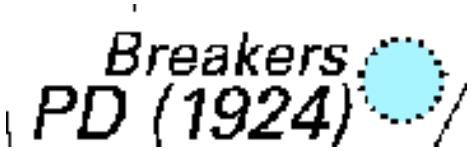


Figure 60: "Breakers" text accompanying the obstruction symbol on the source.

6.5 Doubtful dangers

6.6 Caution areas

Caution areas should not share the same spatial edge as depth contours, as this will mask the symbology of the caution area in the ECDIS, making a navigational caution less obvious to the mariner.

6.6.1 (L) Volcanic activity

- Volcanic activity indicated in textual format i.e. 'Volcanic Activity (year)' without an obvious link to another feature should be captured as a CTNARE point. The text should be captured in INFORM of the CTNARE object (see Fig.61).

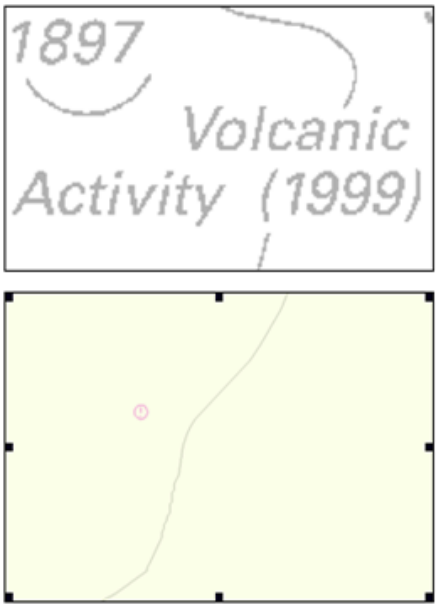


Figure 61: 'Volcanic Activity (year)' captured as a CTNARE point.

- Volcanic activity indicated in textual format i.e. 'Volcanic Activity (year)' which relates to an adjacent feature should be captured as an OBSTRN point. The text should be captured in INFORM of the object. The text should be captured in INFORM of the OBSTRN object (see Fig. 62). Where the text is positioned near several features i.e. OBSTRN or UWTROC, but it is unclear which feature the activity is related to, capture a CTNARE point. The text should be captured in INFORM of the CTNARE object (see Fig. 63).

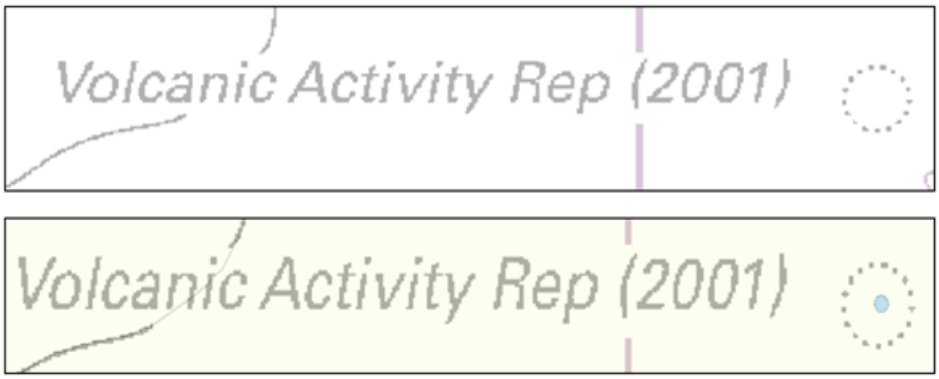


Figure 62: 'Volcanic Activity (year)' captured as an OBSTRN point.

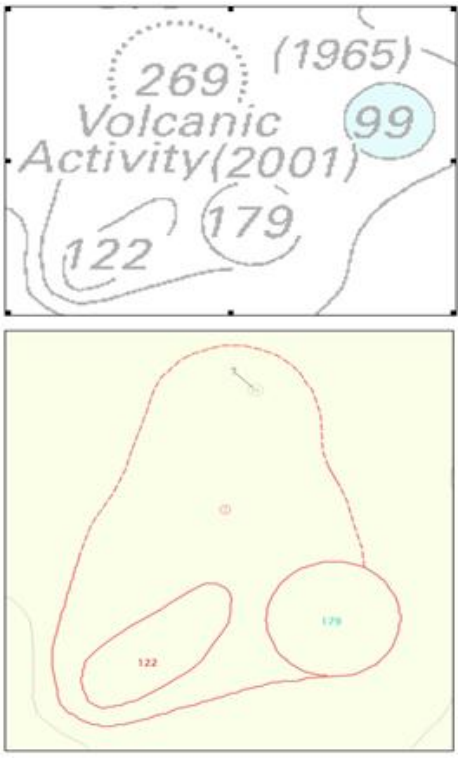


Figure 63: 'Volcanic Activity (year)' captured as a CTNARE point.

- A volcanic island indicated in textual format i.e. 'Volcanic Island (year)' which relates to an adjacent LNDARE object within an OBSTRN area should be captured in INFORM of the LNDARE object (see Fig. 64).

a)

b)

Figure 64: 'Volcanic Island (year)' captured in INFORM of the LNDARE object.

7. Nature of the seabed

7.1 Description of the bottom

All bottom qualities on charts should be captured as SBDARE point or area objects where appropriate (see Fig. 65). Where multiple descriptions are stated at one position, for

example *"bkSh.S.M"*, only one SBDARE object should be captured. Where multiple qualifying terms are used, for example *"fbkSh.Co"*, the SBDARE should be encoded as follows:

NATSUR = shells, shells, coral
NATQUA = fine, broken, NULL

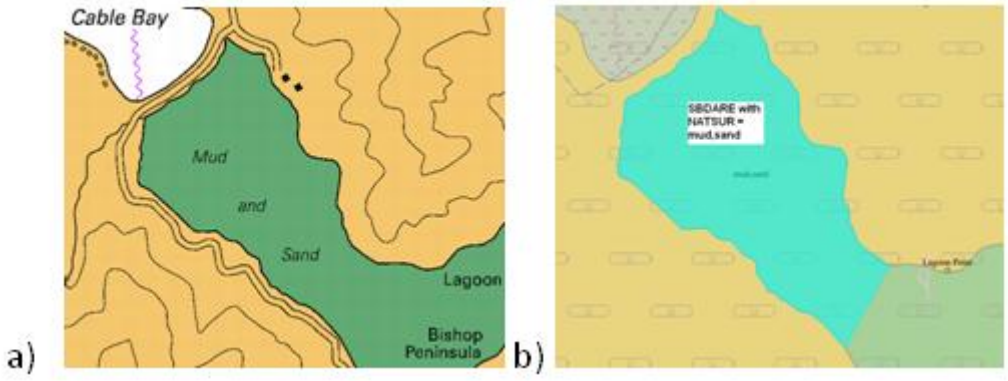


Figure 65: Example of how to capture a SBDARE. In this case QUAPOS = 4 (approximate) should be captured for the SBDARE edge which is arbitrary.

Where a description is not a recognised NATSUR (nature of surface) or NATQUA (nature of surface – qualifying terms) attribute value (e.g. basalt or cinders), an alternative value should be used, and the name of the SBDARE captured in INFORM. The description (e.g. cinders) should be researched and NATSUR encoded with the best available S-57 option.

The type of seabed "Pt" (Pteropods) should not be captured when present on the paper chart.

The seabed areas listed in Table 8 are not included in the S-57 attribute values, and should therefore be encoded as specified here.

Table 8: How to encode SBDARE objects that are not described by S-57 attribute values.

SBDARE	NATSUR	NATQUA	INFORM
Fr, Gl or Rd	Silt/Ooze	UNDEFINED	Foraminifera, Globigerina or Radiolaria
Gl.Oz	Silt/Ooze	UNDEFINED	Globigerina Ooze
Pm	Rock	Volcanic	Pumice
Mn	Rock	UNDEFINED	Manganese
Ck	Rock	Calcareous	Chalk
Sn	Gravel	UNDEFINED	Shingle
Po	Coral	UNDEFINED	Polyzoa
sm.St	Stones	UNDEFINED	Small stones
Cn	Rock	Volcanic	Cinders
If SBDARE is a combination of types…			
SBDARE	**NATSUR**	**NATQUA**	**INFORM**
Gl. Oz. Pm	silt/Ooze, Rock	null, Volcanic	Globigerina Ooze, Pumice
Gl. Cy. Pm	Ooze/silt, Clay, Rock	null, null, Volcanic	Globigerina, Pumice
Gl.Oz.Fr	silt/ooze	UNDEFINED	Globigerina Ooze Foraminifera

7.2 Special bottom types

7.2.1 Sandwaves

7.2.2 Weed – Kelp

Weed is not included in the S-57 attribute value dropdown list. There are two ways to encode this based on the circumstances. The text "Wd" should be captured as WEDKLP. However if there are multiple types, then it should be captured as SBDARE (see Table 9).

Table 9: How to encode weed and kelp

INT 1 representation	Object Acronym	Attribute Acronym	Attribute values
Wd or **Kelp**	WEDKLP		
St.Wd	SBDARE	**NATSUR** **NATQUA** **INFORM**	Stone UNKNOWN Weed

7.2.3 Springs in the seabed

7.2.4 Tideways

8. Sea areas

The following is intended as a guide for encoding SEAARE:

- The attribute CATSEA (category of sea area) is not required for SEAARE objects, as this often results in duplicate information (e.g. CATSEA= 5 (bay) and OBJNAM = "Blue Bay").
- Bays should be captured as SEAARE area objects. The area shouldl be formed using the coastline and a closing line at the end of the feature (e.g. headlands). The SEAARE of a small bay may overlap that of the larger bay. The charted name should be encoded in OBJNAM (see Fig. 66).
- Straits, channels, passages and features described as a pass should be captured as SEAARE point or area objects (as appropriate). The charted name should be encoded in OBJNAM (See Fig. 67).
- Gulfs, harbours and firths should be captured as SEAARE point or area objects (as appropriate). The area should be formed using the coastline and a closing line at the end of the feature. The charted name should be encoded in OBJNAM (See Fig. 68)
- Where a group of objects makes up another object (such as a reef), the area should be captured as a SEAARE point or as an area (where appropriate, covering the physical extent of the objects). The names of individual objects should be encoded in OBJNAM of each individual object. The name of the group of objects should be encoded in OBJNAM of the overarching SEAARE (see Fig. 69).
- If a sea area has the same geometry as another feature (i.e. OBSTRN area), encode the name in that feature and do not create a separate SEAARE feature.

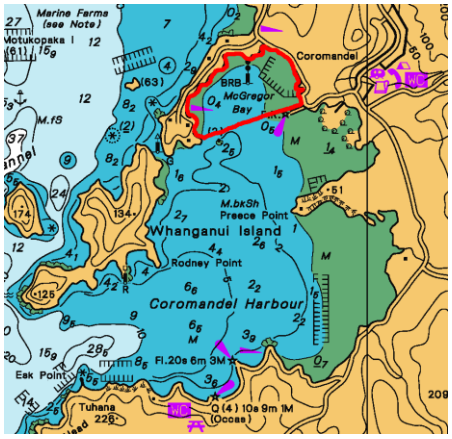


Figure 66: A bay captured as a SEAARE area object using the geometry of the coastline.

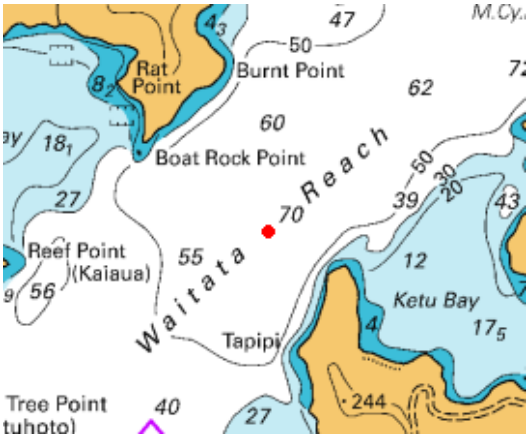


Figure 67: A pass captured as a SEAARE point positioned in the centre of the text.

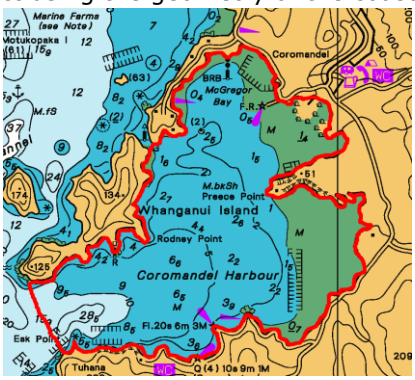


Figure 68: A harbour captured as a SEAARE area object using the geometry of the coastline.

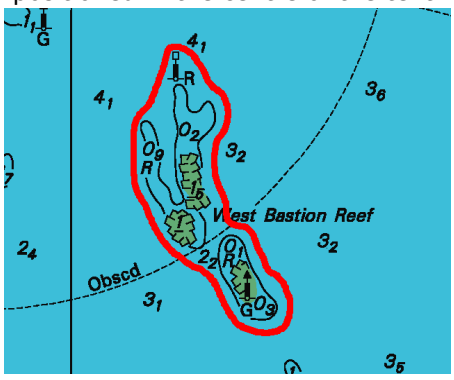


Figure 69: A reef captured as a SEAARE area object with OBJNAM = "West Bastion Reef".

9. Harbour regulations

9.1 Regulations within harbour limits

9.1.1 Administrative harbour areas

9.1.2 Speed limits

9.2 Anchorages and prohibited / restricted anchorages; moorings

9.2.1 Anchorages

9.2.2 Anchor berths

9.2.3 Anchoring restricted

9.2.4 Mooring buoys

9.2.5 Mooring trots

9.2.6 Anchorage – relationships

10. Recommend tracks and routes

10.1 Leading, clearing and transit lines and recommended tracks

a) b)

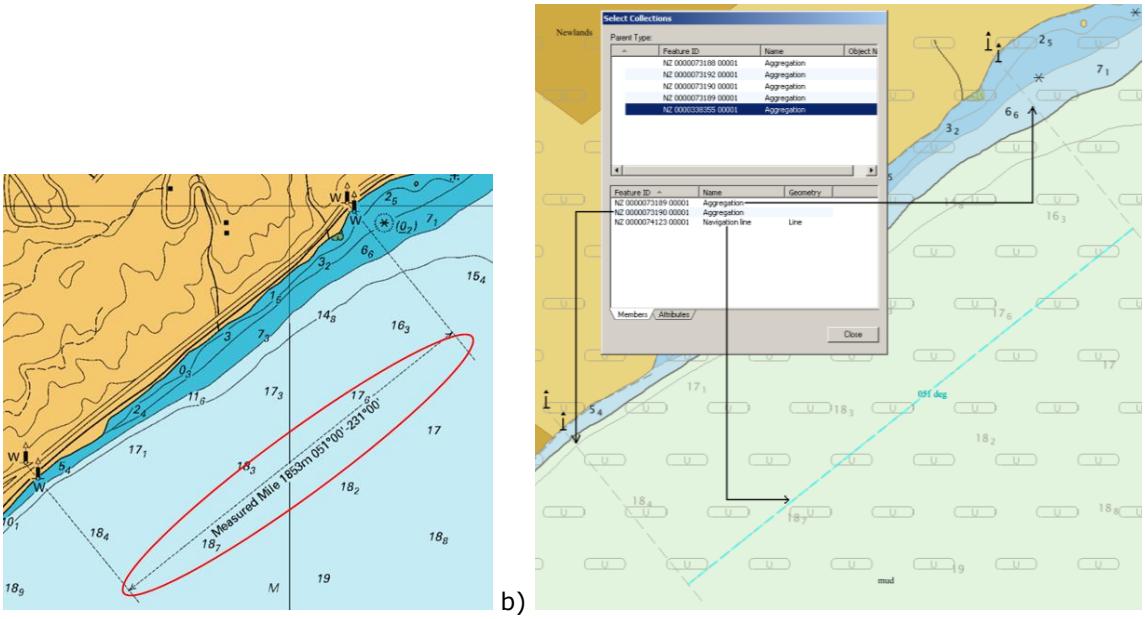


Figure 70: A representation of a measured distance transit line (circled) and two paired transit lines (a). This is captured as three NAVLNE objects each with its own collection object (C_AGGR) (b). The collection objects (C_AGGR) of the paired transit lines consists of a NAVLNE and its navigation marks. The collection object of the circled transit line consists of its NAVLNE and the two collection objects created for the paired transit lines.

10.1.1 Navigation lines and recommended tracks

STATUS = 3 (recommended) should not be encoded as RECTRC is by definition recommended.

The digitising direction of a line should be the same as the direction of the traffic flow if TRAFIC (traffic flow) = 3 (one-way). This avoids any possible ECDIS display problems.

TRAFIC = 4 (two-way) should be encoded if the source does not indicate the direction of traffic flow.

Please be aware that changing from two-way to one-way causes a validation error – this is due to tolerance issues in the database software.

10.1.2 Range systems – relationships

10.1.3 Measured distances

10.2 Routeing measures

10.2.1 Traffic separation schemes

10.2.1.1 Traffic separation scheme lanes

10.2.1.2 Traffic separation scheme boundaries

10.2.1.3 Traffic separation lines

10.2.1.4 Traffic separation zones

10.2.1.5 Traffic separation scheme crossing

10.2.1.6 Traffic separation scheme roundabout

10.2.1.7 Inshore traffic zones

10.2.1.8 Precautionary areas

10.2.2 Deep water routes

10.2.2.1 Deep water route parts

10.2.2.2 Deep water route centerlines

10.2.3 Traffic separation schemes

10.2.4 Recommended routes

If the main navigable channel for vessels is depicted on the source as an area bordered by black pecked lines, it should be captured as an ADMARE (administration area), with JRSDTN (jurisdiction) = 2 (national) and INFORM = "Recommended Channel" (see Fig. 71).

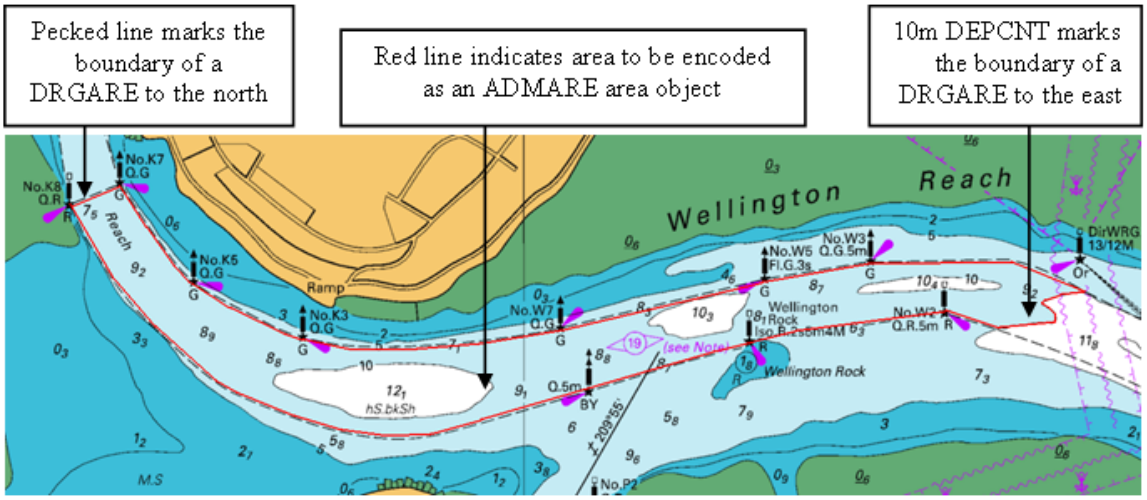


Figure 71: The black pecked line (marked in red) is used as a guide when capturing the ADMARE area object.

10.2.5 Recommended direction of traffic flow

10.2.6 Two-way routes

10.2.7 Areas to be avoided

10.3 Ferries

10.4 Fairways

A FAIRWY area object is not required for maintained channels (i.e. dredged areas, including those next to wharves and berths); unless the source representation matches INT M-18 (see Fig. 72).

Figure 72: Representation of a fairway.

10.5 Archipelagic sea lanes

10.5.1 Archipelagic sea lanes

10.5.2 Archipelagic sea lane axis

10.5.3 Archipelagic sea lane system

11. Regulated areas

11.1 Restricted areas in general

11.2 Maritime jurisdiction areas

11.2.1 National territories

11.2.2 Custom zones

11.2.3 Free port zones

11.2.4 Territorial seas

Territorial Seas should be captured as TESARE area objects with INFORM = "Twelve Nautical Mile Territorial Sea Zone".

TESARE should only be encoded if you can display part of the 12 nautical mile limit. This is generally Overview, General and Coastal charts. Approach, Harbour and Berthing Charts often do not need this encoded.

11.2.5 Contiguous zones

11.2.6 Fishery zones

11.2.7 Continental shelves

11.2.8 Exclusive economic zones

Exclusive Economic Zones should be captured as EXEZNE with INFORM = "200 Nautical Mile Exclusive Economic Zone". EXEZNE should only be encoded if you can display part of the 200 nautical mile boundary. This is generally Overview and General charts. Coastal Approach, Harbour and Berthing Charts often do not need this encoded.

11.3 Military practice areas, submarine transit lanes; minefields

11.3.1 Military practice areas

11.3.2 Submarine transit lines

11.3.3 Minefields

11.4 Dumping grounds

11.5 Cables and cable areas

11.5.1 Submarine cables

11.5.2 Overhead cables

CBLOHD (overhead cables) with a magenta clearance value on the paper chart should have VERCSA (vertical clearance, safe) encoded. If the clearance value is depicted in black, VERCLR (vertical clearance) should be encoded instead. If there is no value, "UNKNOWN" should be encoded for both VERCSA and VERCLR.

11.5.3 Submarine cable areas

11.6 Pipelines and pipeline areas

11.6.1 Pipeline, submarine or on land

11.6.2 Diffusers, cribs

11.6.3 Overhead pipelines

11.6.4 Pipeline areas

11.7 Oil and gas fields

11.7.1 Wellheads

11.7.2 Offshore platforms

11.7.3 Offshore safety zones

11.7.4 Offshore production areas

11.7.5 Offshore tanker loading systems

11.7.6 Flare stacks

11.8 Spoil grounds, dredging areas

11.9 Fishing equipment and aquaculture areas

11.9.1 Fishing facilities

11.9.2 Marine farms

All marine farms on New Zealand charts should be captured as MARCUL (marine farm/culture). If the category of farm is not given in the source, CATMFA (category of marine farm/culture) should be encoded as "UNKNOWN".

11.9.3 Fish havens

11.9.4 Fishing grounds

11.9.5 (L) Fish aggregating devices (FADS)

Fish Aggregating Devices (FAD) should be encoded as BOYSPP with INFORM = "Fish Aggregating Device". The attributes BOYSHP, CATSPM and COLOUR should be encoded as unknown FADs on INT charts should be encoded as per the paper chart, but also recorded in the Open Points spreadsheet. This is because FADs are temporary, and should therefore not be encoded in the long-term.

11.10 Degaussing ranges

11.11 Historic wrecks

11.12 Seaplane landing areas

11.13 Various maritime areas

11.13.1 Ice areas

11.13.2 Log ponds

11.13.3 Incineration areas

11.13.4 Cargo transshipment areas

11.13.5 Collision regulations

11.14 Nature reserves

Where the source text describes a marine reserve of another type, the CATREA (category of restricted area) or RESTRN (restriction) should be encoded to reflect the nature of the reserve. For example, a wildlife sanctuary should be captured as a RESARE (restricted area) with INFORM = "Wildlife Sanctuary", and CATREA = 4 (nature reserve).

11.15 Environmentally sensitive areas

12. Aids to navigation

The Maritime New Zealand publication, "New Zealand's System of Buoys and Beacons", should be used for guidance on NZ navigational aid characteristics. The paper chart, relevant Light List, NI forms and the relevant Pilot should also be used as information sources for navigational aids. IF there is a discrepancy between the relevant Light List and the paper chart information for a navigational aid, a comment should be added to the Open Points spreadsheet for further investigation. NtMs and better scale charts should be used in the interim to make encoding decisions.

12.1 Lighthouses, navigation marks – relationships

12.1.1 Geo objects forming parts of navigational aids

12.1.2 Relationships

A master/slave relationship should be created between the supporting structure (master) and its LIGHTS, TOPMAR and/or FOGSIG (slaves).

12.2 Buoyage systems and direction of buoyage

Buoys and beacons that do not fit the IALA A System should have MARSYS (marks navigation – system of) = 9 (no system) encoded. The exceptions are BCNSPP and BOYSPP (special purpose beacons and buoys), which do not require MARSYS to be populated.

12.3 Fixed structures

12.3.1 Beacons

12.3.2 Lighthouses

12.3.3 Daymarks

12.4 Floating structures

12.4.1 Buoys

12.4.1.1 Emergency wreck marking buoys

12.4.1.2 (L) Special purpose buoys

If CATSPM (category of special mark) is not defined, it should be captured as CATSPM = 27 (general mark).

Dart buoys should be captured as BOYSPP with CATSPM = 10 (recording mark) and INFORM = "Tsunami detection buoy".

Note: **DO NOT** use the acronym "DART" in INFORM, as this is not an approved international abbreviation.

12.4.2 Light floats and light vessels

12.5 Fog signals

12.6 Top marks

Please refer to the relevant Light List in the first instance when encoding TOPMAR. The COLOUR of the TOPMAR should be determined from the paper chart if no information is available in the Light List (see Fig. 73).

The COLOUR of TOPMAR on BCNLAT should be encoded according to the IALA A Buoyage system: green for starboard, red for port.

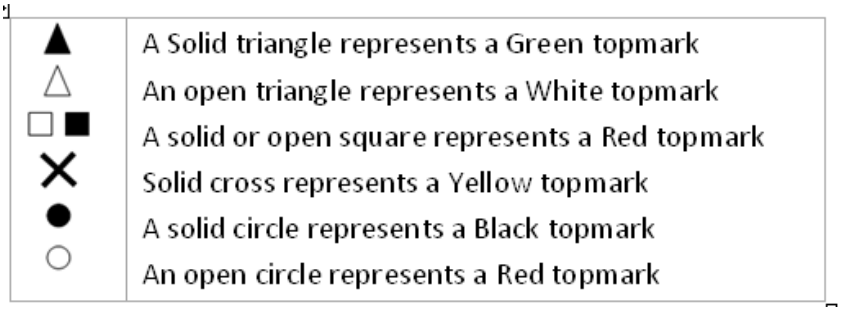


Figure 73: How to determine the COLOUR of TOPMAR from the paper chart.

12.7 Retroreflectors

12.8 Lights

12.8.1 Description of lights

- If the COLOUR of LIGHTS is not specified in the description of the light, the COLOUR should be encoded as white. The exceptions are some lights listed in the Light List, such as emergency lights and day lights - see section *12.8.8.1 Emergency Lights*.

- EXCLIT (exhibition condition of light) should only be populated for day lights, not night lights. The only exception to this is where day lights and night lights exist on the same structure – in this case EXCLIT should be encoded for all LIGHTS.

- Identical lights on one light support should be encoded as a singular LIGHTS object with MLTYLT (multiplicity of lights) populated.

12.8.1.1 (L) General Encoding Guidance

- A light support listed in the NZ Light list with '(M)' at the end of its name, should have 'Owned by Maritime New Zealand' encoded in INFORM.

- Additional information about a light contained in 'Remarks' (column 8) of the NZ Light List should be encoded in INFORM for the LIGHTS object.

- Additional information about a light that includes the note '(T)' (temporary) or '(TE)' (temporarily extinguished), should not be encoded.

3983.2	- Breakwater	39 28.17 176 55.20	VQ(2)W 5s	12	5	White Mast 9		*fl 0.3, ec 0.3, fl 0.3, ec 4.1.* **TE (2010)**

Figure 74: Do not encode "TE (2010)" in INFORM.

- Text referring to the distance between a front and rear light is also redundant, as is text in 'Remarks' (column 8) referring to the distance between two lights both on the paper chart.

3765.1	- - - Rear. 275 m from front	36 49.9 174 48.0	F R			△ on white beacon	Marks E cables

Figure 75: The text "275 m from front" is not required in INFORM.

4329	- Eastern Extension Mole. Spur Breakwater Head	44 23.2 171 16.0	Fl R 5s	17	11	Tower	*fl 1.* F R lights on radio mast 2.5 M N.

Figure 76: The text "F R lights on radio mast 2.5 M N" is not required in INFORM.

12.8.2 Types and functions of lights

12.8.2.1 (L) VALNMR attribute for LIGHTS objects

The VALNMR attribute for LIGHTS objects, e.g. 5.0, can be sourced from column (6) 'Range miles' in the Light List (if that information is listed).

12.8.2.2 (L) Alternating lights

Alternating lights with a nominal range which varies should have the largest range encoded in VALNMR, and the shortest range encoded in INFORM. See the example in Fig. 77.

	WHANGAREI HARBOUR						
3716	Marsden Point Dir Lt 320° 35'.	35 50.4 174 30.0	Dir WRG 5s	22	W10 R7 G7	Orange ⌓ on metal framework tower	*ec 1, fl 4.* OcG 311.6°-319.1° (7.5°), AlWG 319.1°-320.1° (1°), W phase increasing with bearing. OcW 320.1°-321.1° (1°), AlWR 321.1°-322.1° (1°), R phase increasing with bearing, OcR 322.1°–329.6° (7.5°). R lights on chimney 540m WSW. Conspicuous flare on chimney 0.6M SW

Figure 77: The VALNMR attribute for the ALWG light will be 10.0 with INFORM = Light range green 7.0. The VALNMR attribute for the ALWR light will be 10.0 with INFORM = Light range red 7.0

12.8.3 Rhythm of lights

12.8.3.1 (L) SIGGRP for quick and very quick flashing lights

There is a discrepancy between S-57 Appendix B.1 Annex D (INT1 to S-57/52) and the UOC with regards to how to encode the SIGGRP of quick and very quick flashing lights. Please use the UOC Table 12.4 when encoding these features.

Rhythms of lights	Q	Q(3)	IQ	VQ	VQ(3)	IVQ	UQ	IUQ
LITCHR	*4*	*4*	*9*	*5*	*5*	*10*	*6*	*11*
SIGGRP	*(1)*	*(3)*	*( )*	*(1)*	*(3)*	*( )*	*(1)*	*( )*

Figure 78: Unless otherwise specified, SIGGRP for VQ or Q should be attributed with (1)

12.8.4 Elevations of lights

12.8.4.1 (L) HEIGHT attribute for LIGHTS objects

The HEIGHT attribute for LIGHTS objects, e.g. 3.00m, can be sourced from column (5) 'Elevation metres' in the Light List (if that information is listed).

12.8.5 Times of exhibition and exhibition conditions

12.8.5.1 Night lights

12.8.5.2 Unwatched lights

12.8.5.3 Occasional lights

12.8.5.4 Daytime lights

12.8.5.5 Fog lights

12.8.6 Sector lights and lights not visible all round

12.8.6.1 Sector lights

The 'Remarks' (column 8) in the NZ Light List may indicate that there are partially obscured or obscured light sectors which are not shown on the paper chart. This may also be the case in reverse – the paper chart shows these lights but they are not listed in the NZ Light List. Therefore, both the NZ Light List and paper chart must be consulted prior to encoding sector lights.

Limits of sectors should be encoded using the attributes SECTR1 and SECTR2. The deepest bay should be used as a guideline, when defining the bearing for a sector (see Fig. 79).

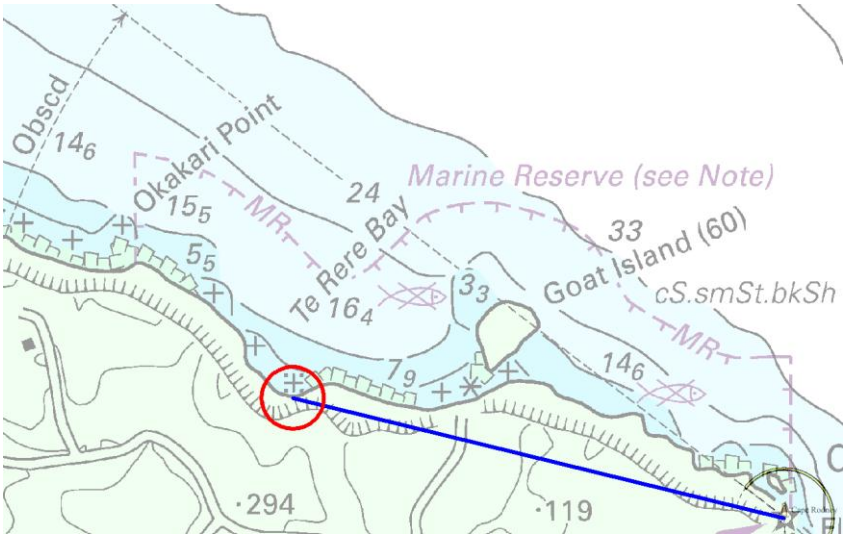


Figure 79: The deepest bay is used as a guide to capture the sector limit.

A light obscured by an offshore obstruction should be captured as a LIGHTS object with LITVIS (light visibility) = 8 (partially obscured) and INFORM = "Sector obscured only beyond…".

The visible sectors should be encoded in the normal way.

12.8.6.2 (L) Descriptions associated with sector lights

Notes in the NZ Light list about the appearance and coverage of light sectors are important to navigation. This information should be encoded in INFORM of the LIGHTS object to which it relates.

3740	- **Tiritiri Matangi Island**. SE part (M)	36 36.4 174 53.8	Fl W 15s	91	18	White round metal tower 20	*fl 0.1.* Obscured within 4M by NW end of island.

Figure 80: This LIGHTS object will have "Obscured within 4M by NW end of island" encoded in INFORM.

4109	- Papakura Channel. No. 2	37 01.6 174 40.1	Dir WR	4	7	Red □ on red metal tripod structure	Fl W 077.5°-079° (1.5°) W phase increasing with bearing, F W 079°-081° (2°), Fl WR 081°-082.5° (1.5°) R phase increasing with bearing
			Q R	6	3	Same structure	*fl 0.3*

Figure 81: LIGHTS object with SECTR1 = 077.5 and SECTR2 = 079 will have "White phase increasing with bearing" encoded in INFORM of that particular light.

12.8.6.3 White fairway sectors

12.8.6.4 Leading lights

Front and rear lights may appear on the paper chart as one symbol. If LIGHTS objects in the database are snapped to a single position, then they should be placed in their true position to avoid redundancy issues. The true position of each LIGHTS object can be determined from the relevant Light List, or alternatively the LIGHTS objects should be positioned slightly apart.

12.8.6.5 Directional lights

CATLIT (category of light) =1 (directional light) should only be encoded to the white sector of a light.
If there is no RECTRC (recommended track) or NAVLNE (navigation line) associated with a directional light, ORIENT should be encoded as "UNKNOWN", and the narrow sector attributes in SECTR1 and SECTR2 should be retained.

12.8.6.6 Moiré Effect lights

12.8.7 Various special types of lights

Reserve Lights: Reserve lights normally retain the character of the main light, but have a reduced range. Installation is usually restricted to major stations. If the light is listed in the relevant Light List as a reserve light, it should be encoded as a separate LIGHTS object with CATLIT (category of light) = 17 (Emergency Light). COLOUR, LITCHR (light characteristic), SIGPER (signal period) and SIGGRP (signal group) should be based on the main light.

Emergency Lights: Emergency lights are of lesser intensity and are automatically activated by failure of the main light. They are normally visible at 5m. If the light is listed in the relevant Light List as an emergency or standby light, it should be captured as a separate LIGHTS object with CATLIT = 17 (Emergency Light). The mandatory attributes, COLOUR, LITCHR, SIGPER and SIGGRP, should be encoded as "UNKNOWN".

Standby Lights: "Standby light" is another term for either a reserve or emergency light. Standby lights should therefore be encoded as an emergency light (above). If both a reserve and standby light exist at the same location, the standby light should have INFORM encoded with "Standby light".

12.8.8 Light structures

12.8.8.1 (L) Light support structures

- LNDMRK objects that are light supports require FUNCTN = 33 (light support). If a light support has multiple functions, the light support function should always be encoded first (e.g. FUCNTN = 33, 31). This will prevent SCAMIN from being incorrectly applied (caused by a bug within CARIS).

- The text "more than one" should be encoded in INFORM if the source depicts multiplicity of light support objects (e.g. "Bns" or "Beacons").

- If the light support structure cannot be determined from the relevant Light List or the paper chart, the light support should be captured as a BCNSPP with BCNSHP (beacon shape) = "UNKNOWN".

- If a light support is on land and is described as a tower in the Light List, or is marked by a landmark symbol (INT 1, E2) on the paper chart, it should be captured as a LNDMRK with CATLMK (category of landmark) = 17 (tower).

- A light support depicted in water generally should not be captured as a LNDMRK, such structures should be captured as a BCN*** (e.g. BCNSPP). However, the Light List description should be used to ascertain the validity of the guidance above. If the structure of the light support is deemed to be a LNDMRK, a LNDARE point should be snapped to the LNDMRK object.

- If the source, such as the Light List, describes a light support structure as two structures (e.g. a tower on top of a pile beacon), the more significant structure should be encoded. Text describing the less prominent features should be encoded in INFORM.

4010	**Main Entrance** Ldg Lts 016° 24' Front	41 19.1 174 51.3	Q W	7	21	White tower on black metal pile structure 4

Figure 82: An example of a light support with two structures. This light support is captured as a BCNSPP with BCNSHP = 3 (beacon tower) and INFORM = "black metal pile structure".

- A master/slave relationship cannot be created for light support structures that are captured as areas (e.g. BUISGL or BRIDGE areas). Therefore, such light support structures should be captured as BCNSPP with BCNSHP (beacon shape) = "UNKNOWN". Text describing the building/bridge characteristics should be encoded in INFORM.

12.8.8.2 (L) Light support attributes

The relevant Light List should be used in the first instance to determine beacon shape and colour. If a beacon's attributes are described in the Light List, but its colour is not stated, COLOUR should be encoded as "UNKNOWN".

If the light support is a LNDMRK object, the VERLEN attribute, e.g. 4.00m, can be sourced from column (7) 'Structure Height in metres' in the Light List (if that information is listed).

If a light support on land is described as a column, it should be captured as a LNDMRK with CATLMK (category of landmark) = 10 (column). If a beacon is described as a pillar or a column in the Light List, it should be encoded with BCNSHP = 5 (pile beacon) and INFORM = "pillar" or "column".

The paper chart symbol should be used to determine beacon shape if no information is available in the light list.

12.8.9 (L) Light list naming

The name of the light is detailed in the light list and should be encoded in OBJNAM of the light support structure (LNDMRK, BCN***, etc.). OBJNAM should only be encoded with information related to its actual name (see Table 10). Information describing its POSITION IN RELATION TO ANOTHER NAVIGATIONAL AID (INCLUDING BEARING) should not be included, as this is encoded in the other associated objects (e.g. LIGHTS, NAVLNE, etc.).

Table 10: Examples of how to encode OBJNAM for light support structures.

Example	OBJNAM	Comments
3770.15 - -	/	
3722.8 - - N Cardinal beacon	N Cardinal beacon	• Abbreviations of compass directions (e.g. S, NW) are acceptable. • Words such as 'cardinal' and 'lateral' should be capitalised. • Words such as 'beacon' can begin in lower case format.
3866 - - Shortland Wharf. Head. Ldg Lts 079° 45'. Front	Shortland Wharf. Head. Front	
3866.1 - - - Rear. 40 m from front	Shortland Wharf. Head. Rear	
3712.13 - T4	T4	Encoded with no spaces.
3705.5 - No. 2	No.2	The full stop ('.') is required after the 'No'.
3690.9 - Pukenui Wharf. Head SE corner	Pukenui Wharf. Head SE corner	

/ = not encoded

If there is a discrepancy between the Light List and the paper chart for names, light characteristics, etc., an informed decision about the most appropriate encoding should be made. The discrepancy should be noted in the Open Points spreadsheet for further investigation.

12.8.10 (L) International numbers

The numbers assigned to lights in the NZ Light List are the International Numbers from Volume K of the "Admiralty List of Lights and Fog Signals" (NP83) (see Fig. 83).

This International Number is to be encoded in the llknum attribute for all objects that constitute an aid to navigation in the NZ Light List (e.g. LIGHTS, TOPMAR, BCNSPP).

4094	- Moturoa Wharf. Lts in line 242°47'. Front	39 03.5 174 01.9	VQ W	8	4	Orange △ on metal mast 7

Figure 83: An example of a light in the NZ Light List. The International number of the light is 4094.

12.9 Radio stations

Objects such as BUISGL (building, single) and LNDMRK (landmark) should not to be encoded as default master objects for radio station (RDOSTA), unless specifically depicted as support structures.

12.9.1 Marine and aero-marine radiobeacons

12.9.2 Aeronautical radiobeacons

12.9.3 Radio direction-finding stations

12.9.4 Coast radio stations providing QTG service

12.10 Radar beacons

12.11 Radar surveillance systems

12.11.1 Radar ranges

12.11.2 Radar reference lines

12.11.3 Radar station

12.12 Radar conspicuous objects

12.13 Radio reporting (calling in) points

12.14 Automatic Identification Systems (AIS)

12.14.1 AIS equipped aids to navigation

13. Marine services and signal stations

13.1 Pilot stations

13.1.1 Pilot stations ashore

13.1.2 Pilot boarding places

If it is required to capture a pilot boarding place, then it should be captured as a PILBOP. If the pilot boarding area has a name associated with it (e.g. Charlie), this should be encoded as OBJNAM = "Pilot Boarding Area 'name'". OBJNAM will appear in the ECDIS display, which ensures that the mariner is aware of crossing a pilotage limit and entering a pilotage area.

An area of compulsory pilotage should be captured as an ADMARE (administration area) area object with JRSDTN = 2 (National) and OBJNAM = "Compulsory Pilotage".

13.2 Coastguard stations

13.3 Rescue stations

13.4 Signal stations

14. Geographic names

Geographic names on the paper chart that relate to individual features must be encoded in OBJNAM. The name must be encoded as depicted on the chart (i.e. upper or lower case).

Table 11: Geographic Place names table

Name on Chart	OBJNAM attribute
MOUNT TARANAKI or MOUNT EGMONT	MOUNT TARANAKI or MOUNT EGMONT
Mount Taranaki or Mount Egmont	Mount Taranaki or Mount Egmont
STEWART ISLAND / RAKIURA	STEWART ISLAND / RAKIURA
Motumahanga (Saddleback Island)	Motumahanga (Saddleback Island)
Young Nicks Head (Te Kuri)	Young Nicks Head (Te Kuri)
Is	Islet (however may differ and be Island – investigate)

Geographic names must not be encoded with acronyms or abbreviations, even if this contradicts paper chart depiction. For example, "Mount" must be encoded instead of "Mt", and "South" must be encoded instead of "S". The exception to this rule is the encoding of navigational aids - see section *12 Aids to Navigation* for further detail.

Conversely, text other than geographic names must not contradict the paper chart (e.g. acronyms and abbreviations are acceptable) unless otherwise stated in this Specification.

14.1 (L) Macrons

NOBJNM (national object name) should only be used when the name of the charted feature includes macrons (see Table 12).

Table 12: How to capture names that include macrons for charted features

Name on Chart	OBJNAM attribute	NOBJNM
Manawatāwhi / Three Kings Islands	Manawatawhi / Three Kings Islands	Manawatāwhi / Three Kings Islands

15. Collection objects

A C_AGGR (aggregation) object is used to combine objects that are related in some way. Collections should be created in each HPD usage, and can include the following objects:

- RECTRC (recommended track)
- NAVLNE (navigational line)
- The affected navigational aids (support structure only)
- Other navigational marks (e.g. LNDMRK, BUISGL or LNDRGN points)

"Navigation lines and tracks" should be encoded in INFORM of C_AGGR as standard wording.

The attribute sornfo is the identification number for the collection, and should be populated with the usage and product number (e.g. "4d,406422").

16. Appendix

Appendix 1: How to encode QUAPOS (quality of position) for different features

FEATURE ACRONYM	FEATURE DESCRIPTION			QUAPOS		See Section
COALNE	Pecked line	In surveyed / inadequately surveyed area		6	(unreliable)	2.2.4 and 5.8.2
		In unsurveyed area		2	(unsurveyed)	
	Edge shared with BRIDGE			4	(approx)	4.8.10.1(L)
	Edge bordering marsh			4	(approx)	4.7.3
	With CATCOA = 7 (mangrove)			4	(approx)	4.7.11.1(L)
DEPARE	Edge with hanging or missing contour			4	(approx)	2.2.3.1.1(L)
DEPCNT	Solid contour	In surveyed / inadequately surveyed area			UNDEFINED	5.8
		In unsurveyed area (except 0 m)		3	(Inadequately surveyed)	
	Pecked contour	In surveyed area		4	(approx)	
		In inadequately / unsurveyed area		6	(unreliable)	
	Broken by cartographic presentation	Solid contour	In surveyed area	4	(approx)	5.8
			In inadequately surveyed area	6	(unreliable)	
			In unsurveyed area	3	(Inadequately surveyed)	
		Pecked contour	In surveyed area	4	(approx)	
			In inadequately /unsurveyed area	6	(unreliable)	
	Edge under BRIDGE			4	(approx)	4.8.10.1(L)
LNDELV	Number in brackets	Exact position of point known			UNDEFINED	1.5.5(L)
		Exact position of point unknown		4	(approx)	
OBSTRN	Area	Not within 0 – χ m DEPARE		4	(approx)	6.2.2.1(L)
		Within 0 – χ m DEPARE			UNDEFINED	
		Sounding with dotted danger line in UNSARE		4	(approx)	5.3.2(L)
SBDARE	Area	Position of edge arbitrary		4	(approx)	7.1
SLCONS	Point	Exact position of point known			UNDEFINED	
		Exact position of point unknown		4	(approx)	4.5.2.2(L)

SOUNDG	Text in italics			UNDEFINED	*5.8*
	Text upright		**4**	(approx)	
	Number in brackets	Exact position of point known		UNDEFINED	*1.5.5(L)*
		Exact position of point unknown	**4**	(approx)	
UWTROC	In surveyed / inadequately surveyed area			UNDEFINED	*5.8*
	In unsurveyed area		**4**	(approx)	
WRECKS	Area		**4**	(approx)	*6.2.1*
	Point	In surveyed / inadequately surveyed area		UNDEFINED	*5.8*
		In unsurveyed area	**4**	(approx)	
Any features with other quality information (eg. doubtful)			*See 2.2.4.1, 5.3.2(L) and UOC Table 6.4*		

Appendix 2: How to encode QUASOU for different features

FEATURE ACRONYM	FEATURE DESCRIPTION		QUASOU		See Section
DRGARE	Depth is maintained		**10**	(maintained depth)	*11.8*
	Depth is not regularly maintained		**11**	(not regularly maintained)	
OBSTRN	Area		**2**	(depth unknown)	*6.2.2.2(L)*
	Point	Value of sounding not known	**2**	(depth unknown)	
		Known sounding / Swept by wire drag	**6**	(least depth known)	
SOUNDG	Known sounding / Swept by wire drag			UNDEFINED	*S-58, Check no. 2000.*
UWTROC	Value of sounding not known		**2**	(depth unknown)	*6.1*
	Known sounding		**1**	(depth known)	
	Swept by wire drag		**6**	(least depth known)	
WRECKS	Area	Value of sounding not known	**2**	(depth unknown)	*UOC Table 6.2*
		Known sounding	**6**	(least depth known)	
	Point	Value of sounding not known	**2**	(depth unknown) or UNDEFINED	
		Known sounding / Swept by wire drag	**6**	(least depth known)	
Any features with other quality information (eg. doubtful)			*See 2.2.4.1, 5.3.2(L) and UOC Table 6.4*		