ic-enc

Explanation of IC-ENC Validation Processes

Purpose of Document

The purpose of this document is to outline the validation processes applied to each ENC sent to IC-ENC.

Introduction

The S-57 Standards for ENCs are complex and, at times, open to interpretation, and the numerous ENC production tools and ECDISs available on the market handle ENCs slightly differently. The mariner requires a high quality, seamless database of ENCs and, working with all 35 of our member HOs, it is IC-ENC's aim to attain such a database for the mariner, through validation processes which complement the Standards.

IC-ENC carries out various validation processes, both automated and manual, for each ENC received in the office. Some processes are carried out for all ENCs, and others are selected by the HO from a list in the Partnership Programme (see next paragraph). After each validation, a report is created and sent to the HO which provides targeted advice on possible action that can be undertaken to improve the data, and which confirms the release status of each ENC.

Partnership Programme

Each HO selects an ENC correction strategy in the Partnership Programme when joining IC-ENC. This sets out which types of improvement action will be undertaken by the HO to attain the best possible ENC product, taking into account their production systems and resources available.

Production Support

IC-ENC's member HOs have varying levels of experience in the production of ENCs, and production and technical support is offered to those who are just starting out, creating detailed feedback as and when necessary. This can include a visit to the HO if required.

In fact, IC-ENC offers support and advice to all member HOs, regardless of their level of experience, with any production issues they encounter that they feel may need extra attention! This support level is constant, which is especially useful to naval offices where members of staff regularly rotate their postings.

Validation Approach

IC-ENC's approach to validation has to consider the impact of any issues on the end user of the ENC product - the mariner - so IC-ENC's policies are based on real and practical user experiences. These policies supplement the defined rules and encoding practices laid out in the Standards.   IC-ENC's validation team has many years of combined experience assessing data from over 30 producing nations in this way. During the last 12 months, the IC-ENC Validation team processed and validated more than 8,000 ENC files.

How does an HO send IC-ENC its data?

All that is needed is an internet connection! IC-ENC will provide the HO with software to enable it to send data securely.

What happens after IC-ENC receives data?

IC-ENC registers each ENC in order of receipt into its internal database and performs some initial checks. If a problem is found at this stage, for example, a non-sequential Update has been received, or the data is found to have been corrupted during transfer, the ENC will be returned immediately to the HO for correction or replacement.

The internal database also acts as an archive of all data received and enables monitoring of each ENC's progress so that validation is completed with a specified target time, as set by IC-ENC's Steering Committee.

What sort of checks does IC-ENC undertake?

Equal weighting is given to checking both an ENC's data structure against the S-57 and S-58 Standards, and its data content, by making a visual assessment which includes its consistency with neighbouring ENCs. All the checks are made with the mariner in mind. Other checks include the assessment of datums, compilation scales, and CATZOC suitability.

S-57 and S-58 Standards

The ENC data structure should be such that the ENC will load, display and perform correctly on the ECDIS. IC-ENC loads the data on three separate pieces of validation software – Jeppesen's dKart Inspector, and SevenCs' ENC Designer and ENC Analyzer - believing that no single piece of software is comprehensive. These validation tools check for variations from the Standards.

If any variations are found, errors and messages are generated in log files. These files are inspected and each message is classified according to IC-ENC's policy on the issue, which is defined according to the impact on the user. Please see Annex A for a breakdown of the Validation Report Classifications of Issues.

IC-ENC's detailed error information (including their cause, impact, and remedy) is described in the *IC-ENC Errors Database*. This is used by the validation team, and also by our members for their own use during their ENC production and internal data validation. A sample page of this is shown in Fig.1 below:

List

VS57_ERR_DCNT_WRONG_V ✕

LG0057: (T1771)

VS57_ERR_DCNT_WRONG_...

VS57_UOC_71]

ERROR	VS57_ERR_DCNT_WRONG_VALD...	**source**	ENC Analyzer (V3.1.1.1)
		TYPE	HO MUST CORRECT / HO SHOULD...
		Error_explanat...	The VALDCO value for a depth contour does not match the depth values of its surrounding depth areas.
EXAMPLE	VS57_ERR_DCNT_WRONG_VALDCO : DEPCNT must have a VALDCO of 2		
		DESCRIPTION...	The majority of it was fine, but a small section adjoined a 50-100 depth area and a 100-200 LDA had been used. Strictly, the contour value for this portion should have been 100, but it made greater sense to encode it as the HO had done.
DESCRIPTION	HO TO CORRECT: If the wrong depth contour value has been used and correcting this will improve the product. ACCEPT: If the depth contour has been given	**Validator_Notes**	
Impact_Assess...	Correct depiction of bathymetry / depth values is one of the most important aspects from a user's perspective. This is obviously most important in the depth range that could potentially be set as the		
User_impact	If the depth contour value does not correspond to the appropriate values of the neighbouring depth areas, the user is given a false impression of the bathymetry. As the ECDIS Safety Contour function uses the	**Required_action**	All examples of wrong depth contour values should be corrected, unless the decision has been taken to do otherwise for cartographic reasons.
Ref	S57 Appendix B.1 Annex A (Use of t...	**Cross_referenc...**	
Cross_ref	VS57_UOC_71	**c_list**	
Object_Grouping	Bathymetry / Safety Contour Functio...		
Last_Updated	7/21/2014		

Fig.1 – an example page of the IC-ENC Errors Database

Visual Assessment and Other Checks

Primarily IC-ENC concentrates on the consistency of data between ENCs within any given region. This involves assessing data at the boundaries of adjoining ENCs that have identical compilation scales, and assessing data against larger and smaller-scaled ENCs which overlap it. Any issues found are classified according to the list in Annex A.

The data consistency and coverage between adjacent ENCs is generally checked using dKart Inspector and ENC Designer. All issues found are cross-checked on three different ECDISs to assess their impact on the mariner. The three used are manufactured by ChartWorld (eGlobe), Transas (Navi-Sailor 4000) and Japan Radio Company Ltd (JRC):

In addition to the consistency assessment, all ENCs are viewed on an ECDIS which is set to "full display" mode. A route is planned and implemented at compilation scale, as this is how the mariner will be using the data, and any display anomalies are assessed. For example, some areas of an ENC may appear too cluttered, and some features may obscure other, perhaps more critical, information in the ENC.

The mariner will view the ENC at smaller scales when route-planning or looking ahead. IC-ENC therefore views the data at a range of scales to check that the ENC displays adequately and that certain objects do not disappear then reappear when the next available usage band cell is loaded.

If there are any issues for which improvements are possible, (that is, those that the producer can take action on rather than those resulting from an issue with ECDIS Display Standard S-52), the validator will make an assessment of the impact to the mariner and classify findings accordingly in the validation report, based on the HO's choices in the Partnership Programme. Two examples of such issues are shown in Fig.2 and Fig.3 below:
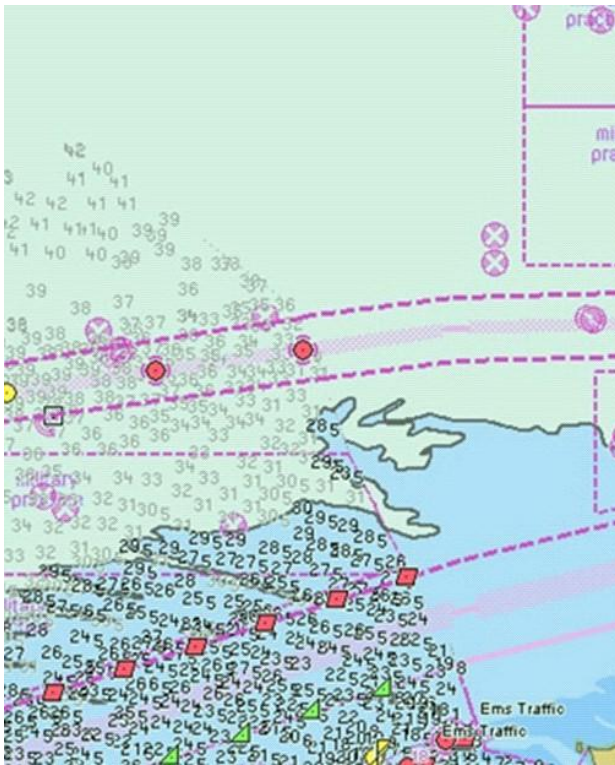
Fig. 2 - An example of where two HOs have produced ENCs up to their data limits, but the different approaches to the use of SCAMIN has resulted in a dataset that is not seamless. The ENC to the west does not have SCAMIN attributed to the soundings, resulting in much clutter in the shoaler areas, and the ENC to the east has a SCAMIN value attributed which is too large, resulting in the soundings being entirely removed from the display.

This is a good example of an issue where IC-ENC would liaise with the HOs to achieve a more seamless display for the mariner, each HO receiving different advice about SCAMIN:
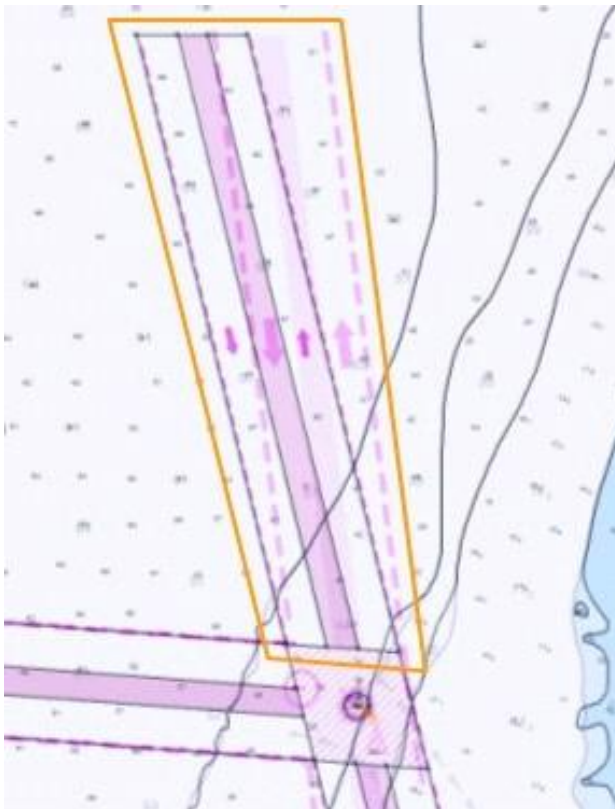

Fig. 3 - An example of where a single HO has produced two adjacent usage band ENCs, but one of them is less up-to-date, resulting in mismatched TSS objects.

This is a good example of a problem for which IC-ENC would ask for an immediate response, given the importance of the TSS objects.

How does IC-ENC report back the results of the validation to an HO?

A Validation Report is created for each ENC validated. The validation findings are considered in their entirety to gain an overall picture of each ENC's quality and its suitability for release. Even if no issues have been identified, a report will still be created to confirm this.

If any issues have been found they will be consolidated into the report according to:

- IC-ENC's assessment of their severity

- The HO's correction strategy choices in the Partnership Programme

When appropriate, specific advice is given to assist the HO in resolving the issues, and screenshots are included where possible to show the visual impact to the mariner. Observations regarding adjacent ENCs found during the validation of the ENC in question are also listed in the report.

The validation conclusion is entered at the top of the report. If improvement action is recommended before release of the ENC, this will be highlighted along with guidance as to how to resolve these more serious issues. This enables the HO to enter into a dialogue with IC-ENC regarding the possible actions they can take if they wish to do so.

If the ENC is accepted for release, dependent upon the HO's selection in the Partnership Programme either the date of release will be given, or a note will be added confirming that the ENC is ready for release and awaiting authorization. Each HO remains in control of the release of its ENC data.

An example of a P007 Validation Report is shown in Annex B.

What happens when an ENC is ready for release?

Once every week, IC-ENC collates all the relevant ENC and Update files into an Exchange Set and securely sends this to the Value Added Resellers (VARs). For more information on IC-ENC distribution polices see the IC-ENC RENC Description document, which can be found on our website www.ic-enc.org

At the end of each week an ENC Status Report is sent to you. This contains information regarding all your ENCs which have been received in the week leading up to the date of the report - for example, it will confirm which ENCs have been released that week; which are "on hold" pending resolution of data issues at the HO, and which are currently being validated.

How are IC-ENC's technical policies established?

IC-ENC contributes to various technical groups and bodies, where technical issues are raised and discussed in depth to assess their impact and find solutions. Two of these include the "Technical Expert Working Group" (TEWG) and "Transfer Standard Maintenance and Applications Development Working Group" (TSMAD).

TEWG

This group was established by IC-ENC's Steering Committee to offer support and advice to participants from member HOs on technical issues related to the production of ENCs. Participants can contribute to discussions and exchange views and ideas, with a view to attaining maximum consistency and quality of data. Additionally, participants can recommend

improvements to the technical aspects of the operating procedures of IC-ENC. The results of all these discussions have a direct bearing on IC-ENC's policies.

The TEWG works closely with PRIMAR's equivalent group under the heading "Joint TEWG". This helps to ensure that, as far as possible, best practice is shared amongst as wide a range of HOs as possible.

Fig. 4 - Participants from the Joint TEWG meeting in United Kingdom, 2012

TSMAD

This group was set up by IHO with a view to developing and maintaining digital standards - such as S-57 - for ENCs; IC-ENC is a regular contributor and work group leader. Not being biased towards any singular production system or production constraints, IC-ENC has an independent view towards improving these standards.

IC-ENC has been much involved with the development of the new encoding standards S-100 and S-101, and it is developing validation policies and encoding advice to ensure that its members have the smoothest transition possible when these new Standards come into force.

For more information on technical issues please contact Richard Fowle, IC-ENC's Technical Manager: richard.fowle@ic-enc.org

ANNEX A – Validation Report, Classifications of Issues

IC-ENC Classifications	The IC-ENC Errors Database (available to all members) lists the various classifications of validation software error messages. The same classification system is used by the ICENC Validation Team when assessing consistency and ECDIS display issues.	

	Description of classification	*Action required from HO*
HO TO CORRECT	Error messages or consistency issues which are potentially safety critical to the mariner.	Any safety critical issues must be corrected before the ENC can be released to the market.
	……………………………………….	…………………………………………
	Less severe issues which are visible to the mariner on the ECDIS, and which may undermine their confidence in the product or its utility.	The issues should be resolved, but the HO can select, under the Partnership Programme, whether to correct them before the ENC is released, or later by New Edition or Update.
HO TO CHECK	Error messages or consistency issues for which IC-ENC cannot determine whether or not they are genuine without access to the source data.	The HO needs to check their sources to see if the error messages or issues are reported genuinely and, if they are, make the necessary corrections.
ACCEPTABLE	Issues, usually reported by the validation software, which have no impact on the mariner when the ENC is used to support primary navigation.	An HO can select whether or not IC-ENC reports these types of issue. Some HOs choose to amend their encoding to remove them from subsequent internal validations.
	S-58 Error messages reported due to the validation software tests not being sufficiently refined to take into account all the S-58 encoding variables, or where the tests have been misapplied by the software.	An HO can select whether or not IC-ENC reports these types of issue. Some HOs choose to have them reported for internal reasons, but the messages themselves should be ignored for encoding purposes because they are not related to S-58 conformance. Trying to correct them may introduce genuine issues.

ERRONEOUS	Occasionally an S-58 error or warning message is reported which has not previously been seen by IC-ENC. This usually occurs during testing of new versions of the validation software. With reference to S-57 Appendix B1, Annex A (Use of the Object Catalogue for ENC) and S-58 Recommended Validation Checks, such messages are assessed to determine the impact to the mariner, and any safety critical issues are reported to the HO.
New Validation Software Messages	The new messages will be added to the IC-ENC Errors Database. This is updated on a continual basis to take account of this occurrence, and it is immediately available to HOs via the online member log-in area of the IC-ENC website to support ENC production.

IC-ENC form P007: Validation Report

Cell Information:
Cell Name – XY456123.000
Edition Number - 1
CRC - CFCC1D1B

Validated by:
Name – Shirley Smith
Phone - (+44) (0) 1823 723385
E-Mail - therenc@ic-enc.org
Validation Date - 25/09/2013

VALIDATION CONCLUSION:

NOT ACCEPTED FOR DISTRIBUTION due to the presence of data issues which you have
agreed in the Partnership Programme to correct before release.

CORRECTION REQUIRED BEFORE RELEASE:

The following data issue is considered to be safety critical and must be corrected before
the ENC is released:

INFORM CHARACTER PROBLEM - SEAARE FE1708

The following warnings have been reported because three "Carriage Returns" have been used in
the text of INFORM attributed to SEAARE object FE1708. The use of this character has been
known to "crash" some ECDISs on loading the data or, less severely, in not displaying the
information correctly when it has been loaded.

Therefore, the three "Carriage Return" characters must be removed from the wording in INFORM
of this feature before this ENC can be released:

- [FE-001708] SEAARE ERROR LG0036: (T0551) 'inform' contains formatting character
hex.000D <Sea area/named water area>

- [FE-001708] SEAARE ERROR LG0036: (T0551) 'inform' contains formatting character
hex.000A <Sea area/named water area>

VS57_ERR_LEXCHAR
    INFORM contains character 0XD (hexadecimal) not allowed for lexical level 1 encoding
    S57 Reference: S-57 Appendix B.1 Ed. 2.0: 3.11; S-58 Ed. 4.2: check 520
    FE0000001708   Feature Type: SEAARE Sea area / named water area
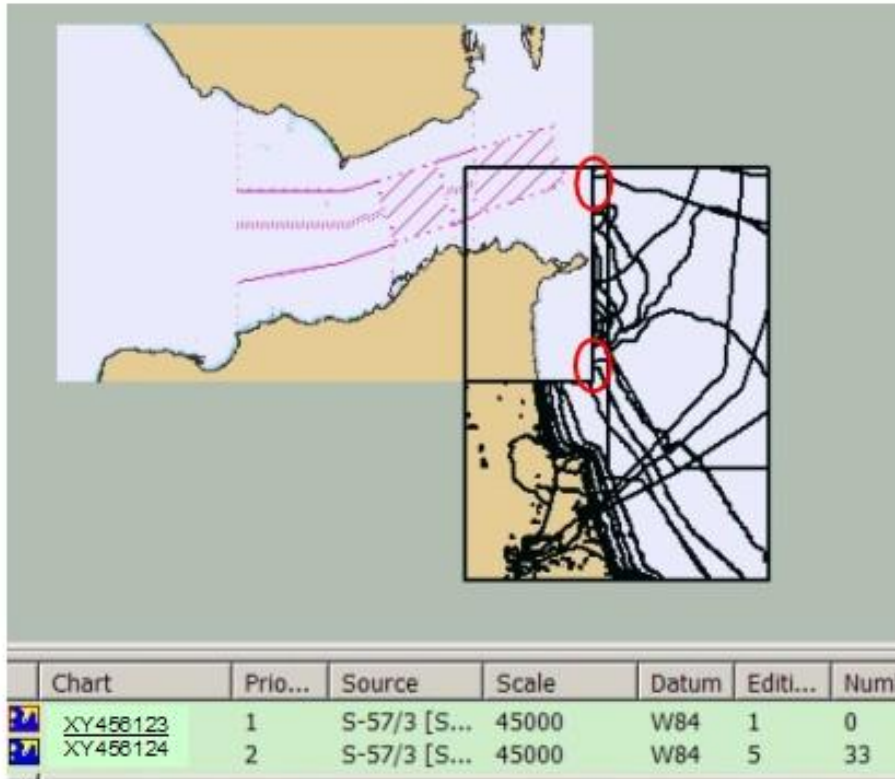
CORRECTION REQUIRED AS SOON AS PRACTICABLE:

The following data issue has been identified. This type of issue normally belongs to a category which you have agreed to check earlier. However, in this particular case, I believe it is unnecessary to withhold the ENC from distribution for this issue, but recommend that you correct it as soon as practicable:
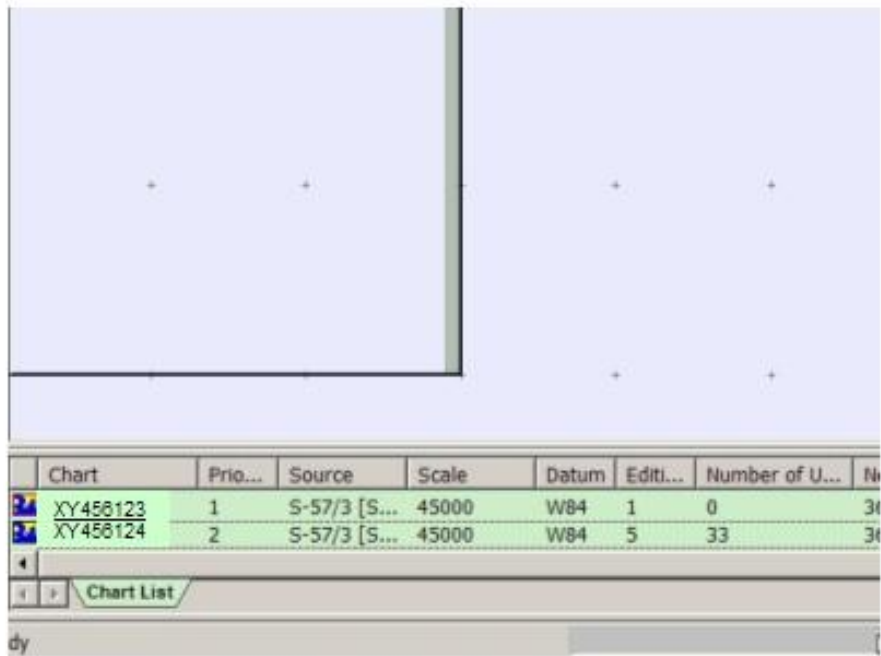
SMALL GAPS

XY456124.000 Edition: 5 Scale: 45000

There are two extremely small gaps between XY456123 and XY456124 which appear to be due to anomalous geometry at the corners of the data coverage of XY456123 (at the locations shown in the screenshots below).

When navigating over such gaps, some ECDIS displays can zoom out suddenly to the next available usage band and then zoom back in to the band 4 cell now in use. This momentary "flashing" can be disconcerting to the mariner. As the area of this cell is near a busy shipping area, the frequency of this possible situation occurring is increased. Therefore, please remove the gaps when you have a moment:

	Chart	Prio...	Source	Scale	Datum	Editi...	Numb
	XY456123	1	S-57/3 [S...	45000	W84	1	0
	XY456124	2	S-57/3 [S...	45000	W84	5	33

	Chart	Prio...	Source	Scale	Datum	Editi...	Number of U...	Nort
	XY456123	1	S-57/3 [S...	45000	W84	1	0	36.0
	XY456124	2	S-57/3 [S...	45000	W84	5	33	36.1

Chart List

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	Chart	Prio...	Source	Scale	Datum	Editi...	Number of U...	N
	XY456123	1	S-57/3 [S...	45000	W84	1	0	3
	XY456124	2	S-57/3 [S...	45000	W84	5	33	3

Chart List

dy

HO TO CHECK AS SOON AS PRACTICABLE:

The following data issue has been identified. This type of issue normally belongs to a category which you have agreed to check earlier. However, in this particular case, I believe it is unnecessary to withhold the ENC from distribution for this matter, but recommend that you make this check and, if necessary, correction as soon as practicable:

SCAMIN – Check 1

This ENC is very clear and legible when viewed at compilation scale. Also, should the mariner wish to zoom between scales (such as when route-planning), the data remains clear and legible until the next available usage band cells, XY321456 and XY321457, are displayed on the ECDIS. However, there is one *very* minor issue which, if resolved, would make the data even better for the mariner:

YZ300773 overlaps the southern section of XY456123, and it has a compilation scale of 180000. The SCAMIN value of 89999 attributed to the 50m, 100m and 200m depth contours on the band 4 cell results in these features disappearing when zooming out to smaller scales than this, but remaining on display on the surrounding band 3 cell. Therefore, please check to see if a smaller SCAMIN value of 179999 could be attributed to these DEPCNT objects (FE0238, FE0239 and FE0261) on XY456123.
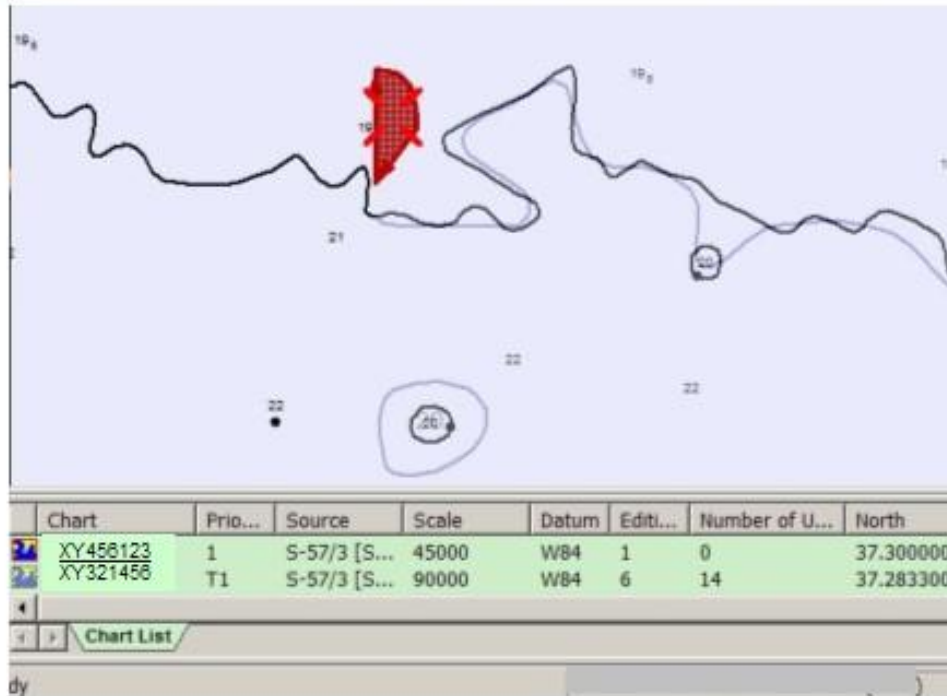
OBSERVATIONS REGARDING OTHER ENCs:

When validating this cell, the following issues were identified with other adjacent ENCs which we feel merit your attention when the relevant ENCs are next reviewed:

Vertical Consistency

XY321456, Edition 6

There is a small "20 to 30" depth area on ES30044B which is shown within a "10 to 20" depth area on ES400440 (see the screenshot below). Please amend the band 3 cell to fully reflect the shoaler depth:

Chart	Prio...	Source	Scale	Datum	Editi...	Number of U...	North
XY456123	1	S-57/3 [S...	45000	W84	1	0	37.300000
XY321456	T1	S-57/3 [S...	90000	W84	6	14	37.283300

Chart List

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XY321457, Edition 5

CTNARE object FE1825 (PSSA) on XY456123 is not currently captured on XY321457. As an equivalent CTNARE is shown on the adjacent band 3 cell, XY321456, please check to see if this feature should also be shown on XY321457.

ACCEPTABLE ERRORS:

The following errors are considered to be acceptable, but will be reported by some ECDIS, impacting on the user confidence. Under the partnership programme, you have decided not to correct these errors, but for them to be reported here:

The following error message was reported on 1 occasion:

- Edge [VE-0000000155] ERROR TG5014: (T0011) edge is not shared by 'm_covr' with 'coverage available', but has USAG=C in object [FE-000088] M_COVR

The following warning was reported on 46 occasions:

- Edge [VE-0000000154] Warning LG0074: suspicious gap in depth continuity between 'depare' (0.0 m, 5.0 m) and 'Indare'

The following error message was reported on 1 occasion:

VS57_ERR_REDUND_NODE
    Node is duplicated or in close vicinity of another
    S57 Reference: S-58 Ed. 4.2: check 83
    VC0000000294
    Related Object: VC0000000295

The following error message was reported on 2 occasions:

VS57_SPT_62A
    If the feature is a SLOGRD and the spatial type is area, then the value of CONRAD should be
1 [radar conspicuous]
    S57 Reference: Logical consistency
    FE0000000481   Feature Type: SLOGRD Sloping ground

The following warning was reported on 11 occasions:

VS57_ERR_CONNODE
    Node could possibly be connected to related edge
    S57 Reference: Logical consistency
    FE0000000157   Feature Type: ROADWY Road
    Related Object: VC0000000213
    Related Object: VE0000000188