UK Hydrographic Office

MACHC 2021: Applying a Gridded Scheme to GB ENCs

November 2021

Nick Rodwell

ENC Gridded Scheme Project Leader

Nick.Rodwell@UKHO.gov.uk

UK Hydrographic Office

A complicated objective

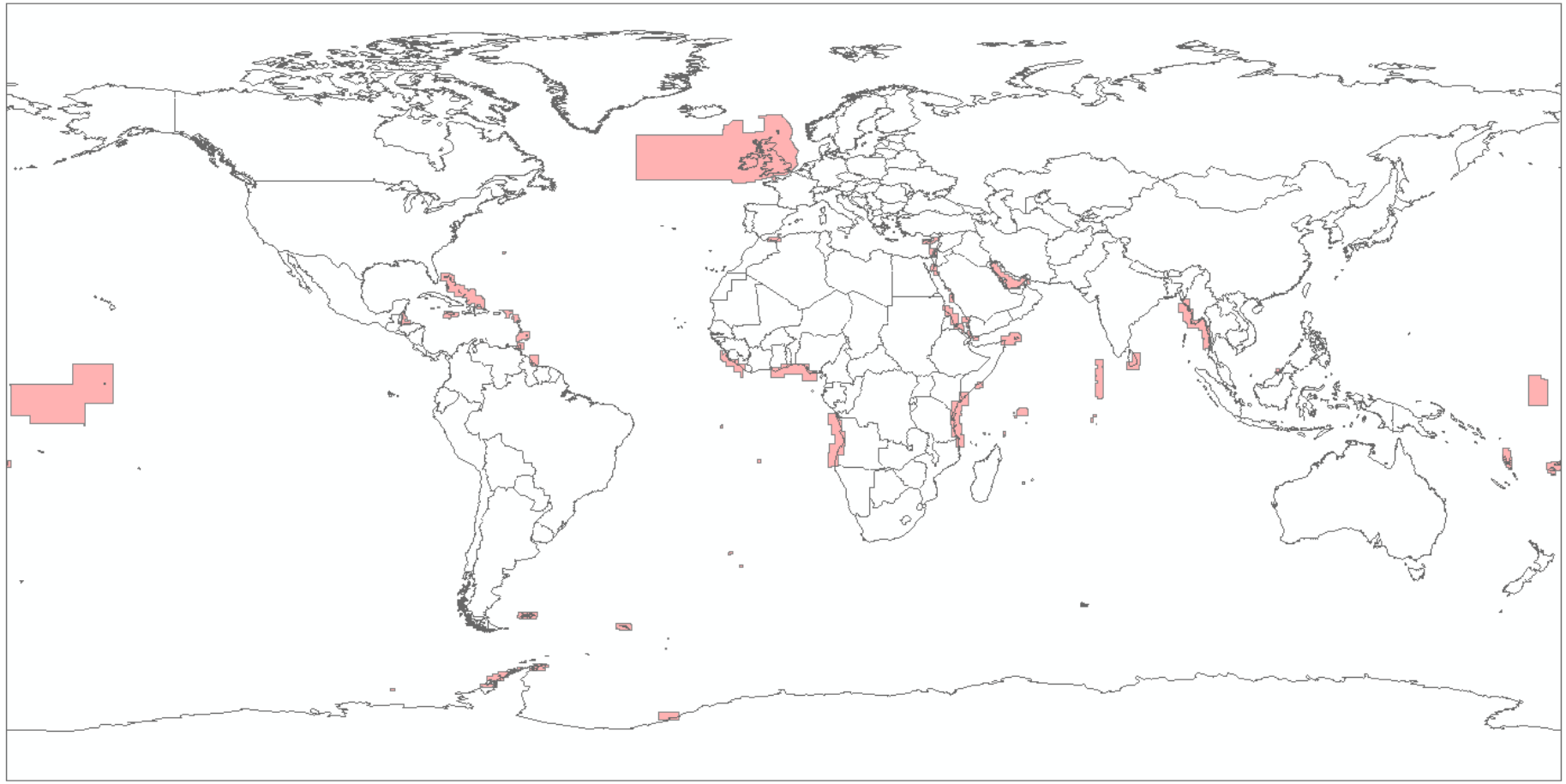


Image excludes the band 1 and band 2 coverage

Define a grid which is flexible enough to support the global coverage of 1,800 GB ENCs at all scale bands for current and future S-1XX Products

UK Hydrographic Office

Approach

Scoping Study

A two phase study to conduct research and propose options for consideration

Trialling

Each option is tested against the GB ENC coverage to consider the best fit for the coverage

Processes

Trial areas are defined to test and develop draft processes and policies

UK Hydrographic Office

The chosen grid parameters

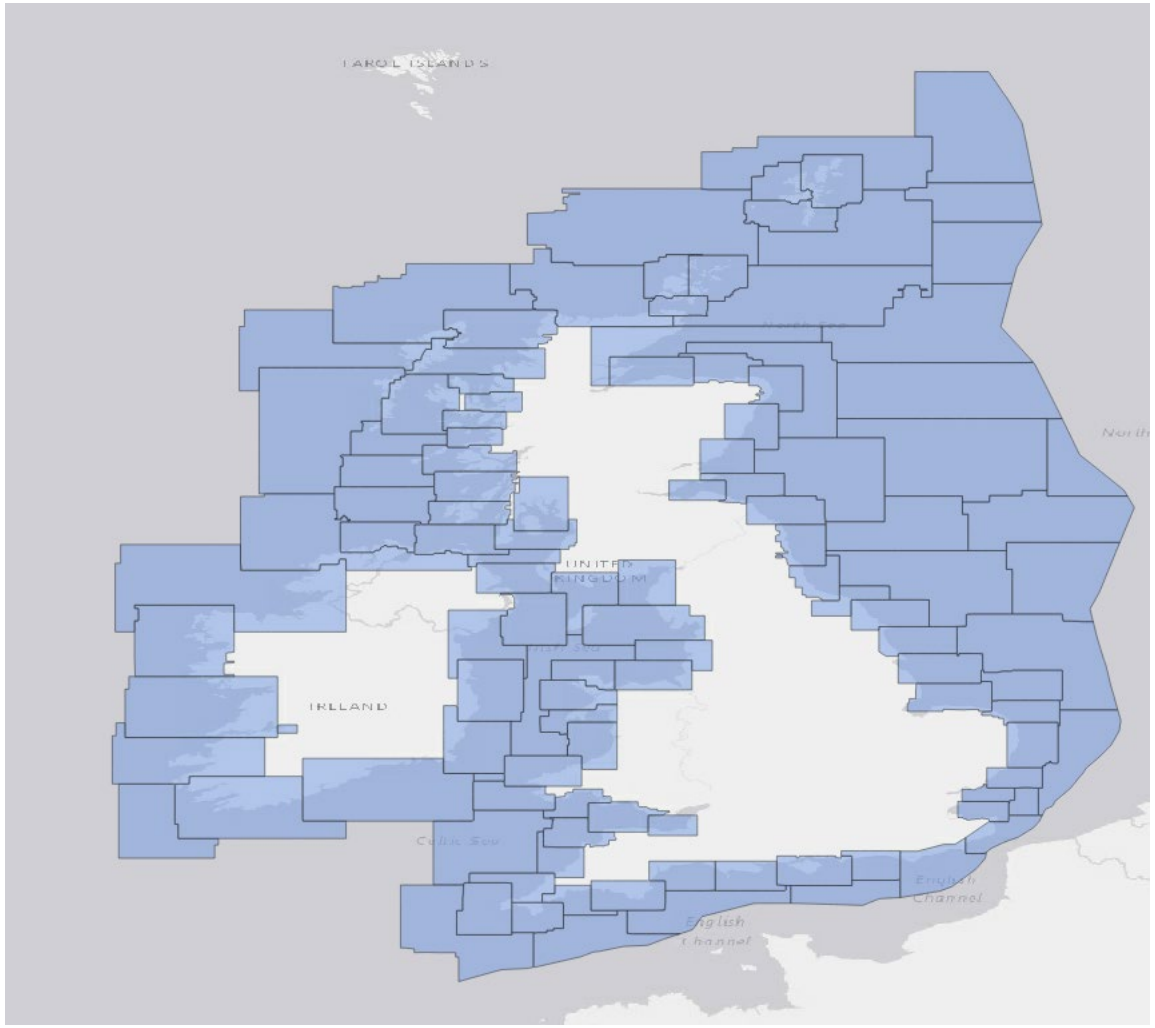
6 options were tested for the best fit against the current coverage. The chosen solution aligns best with the GB ENC coverage. It is one of many solutions, you are welcome to trial and consider.

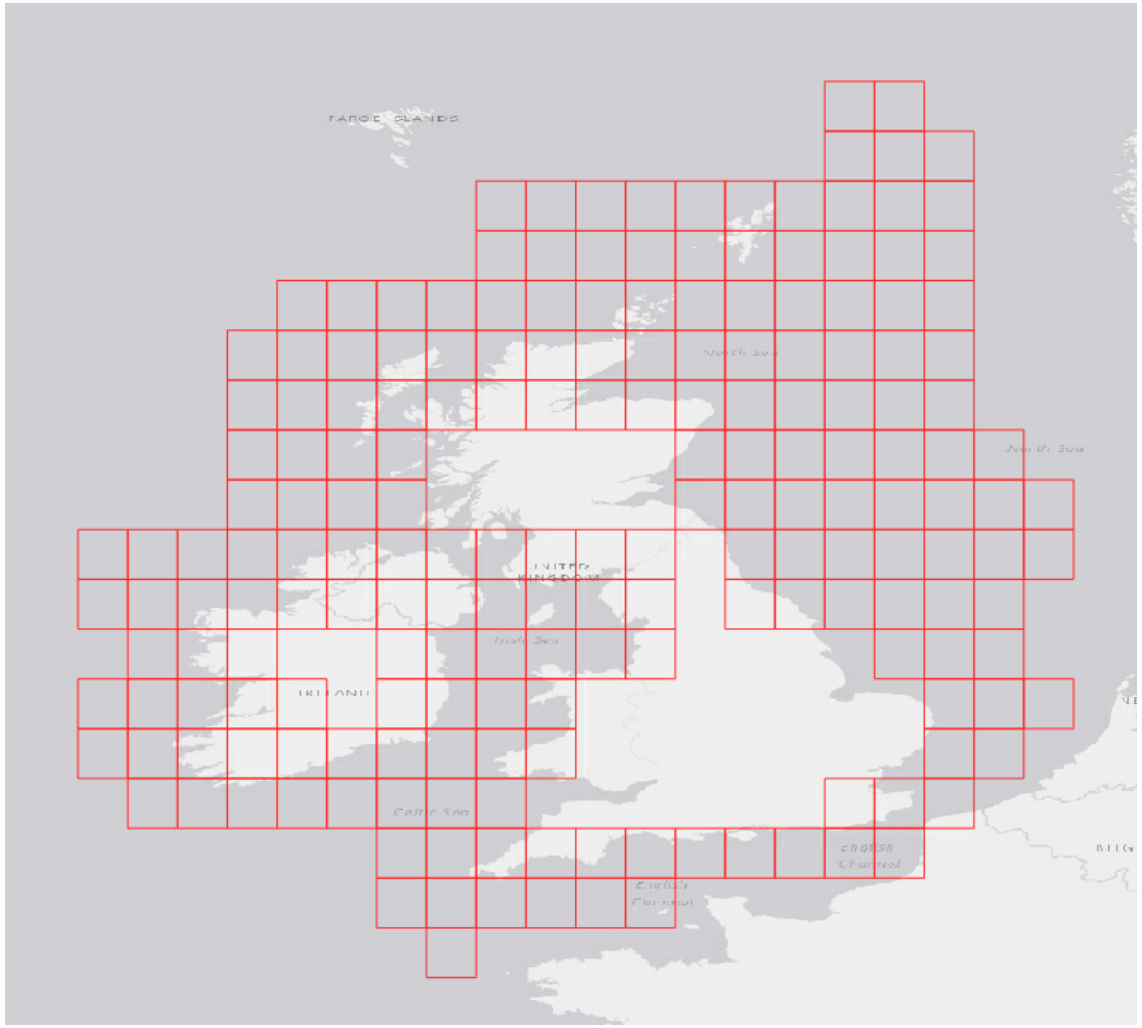
Band	1	2	3	4	5	6
Grid Size	20	4	0.8	0.2	0.1	0.05

The S-102 grid is 0.1 grid.
This will tesselate with chosen the UK's chosen grid.

UK Hydrographic Office

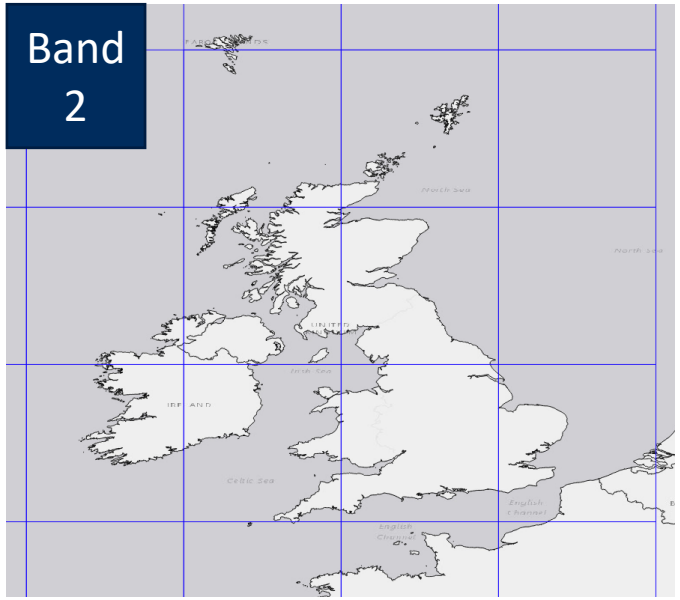
How the gridded scheme will change the band 3 GB ENC coverage

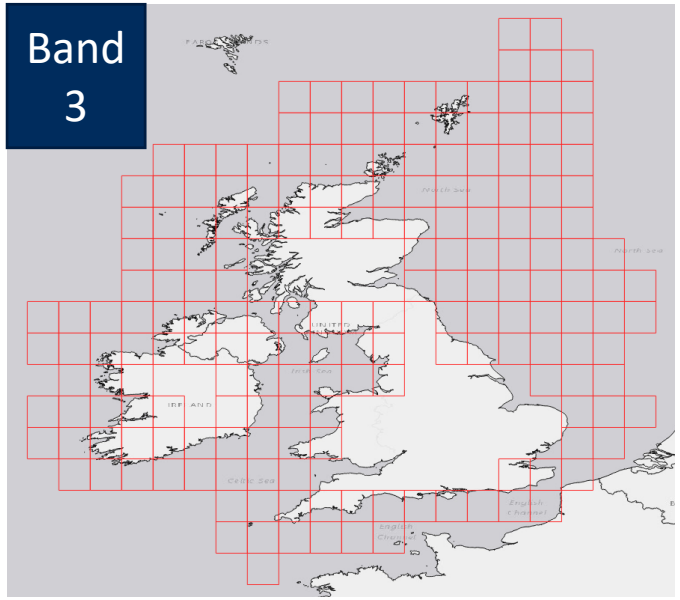


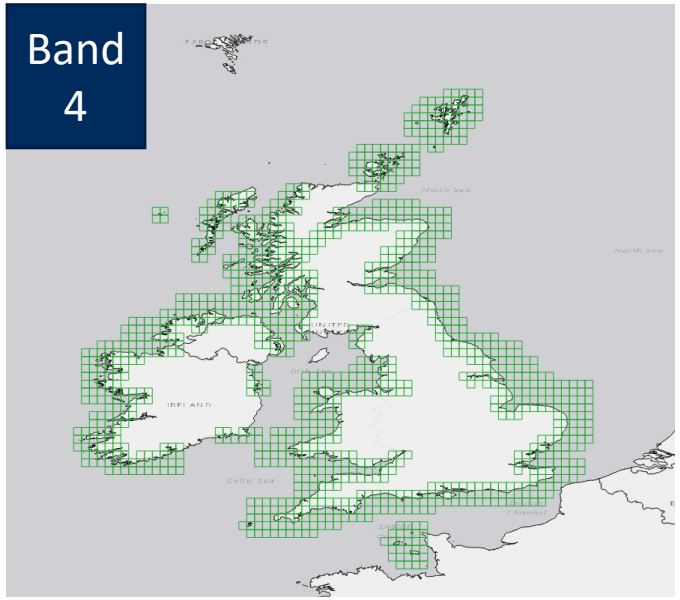


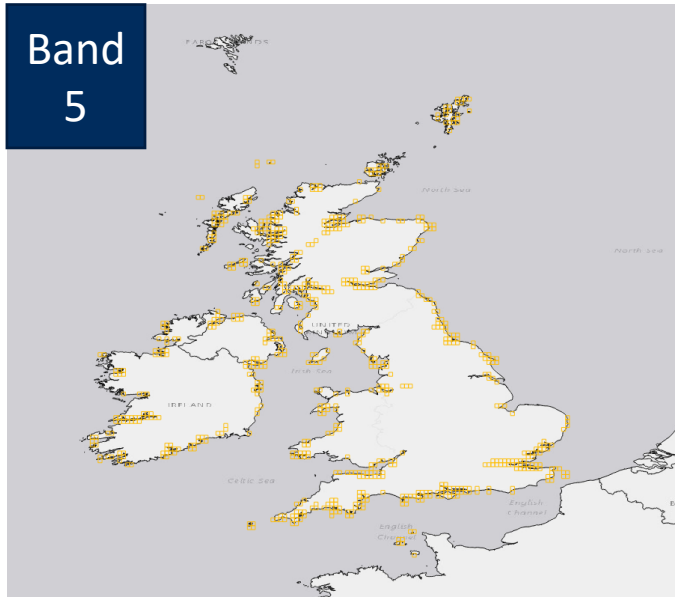
UK Hydrographic Office

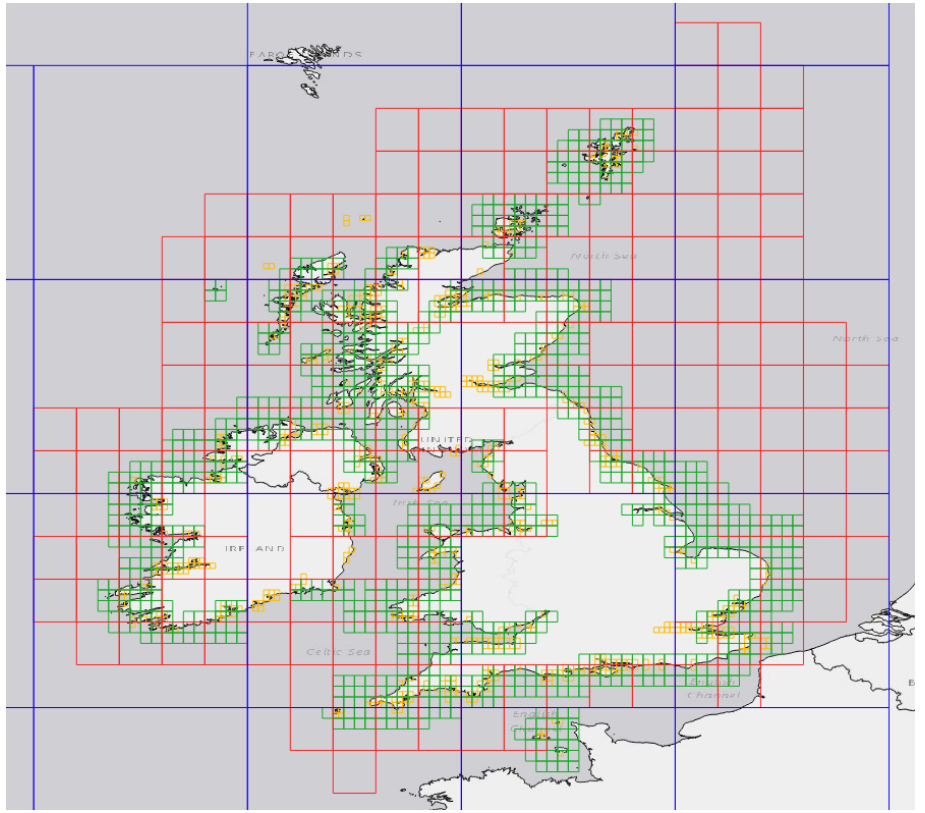
How the grid fits together and interact across scale bands





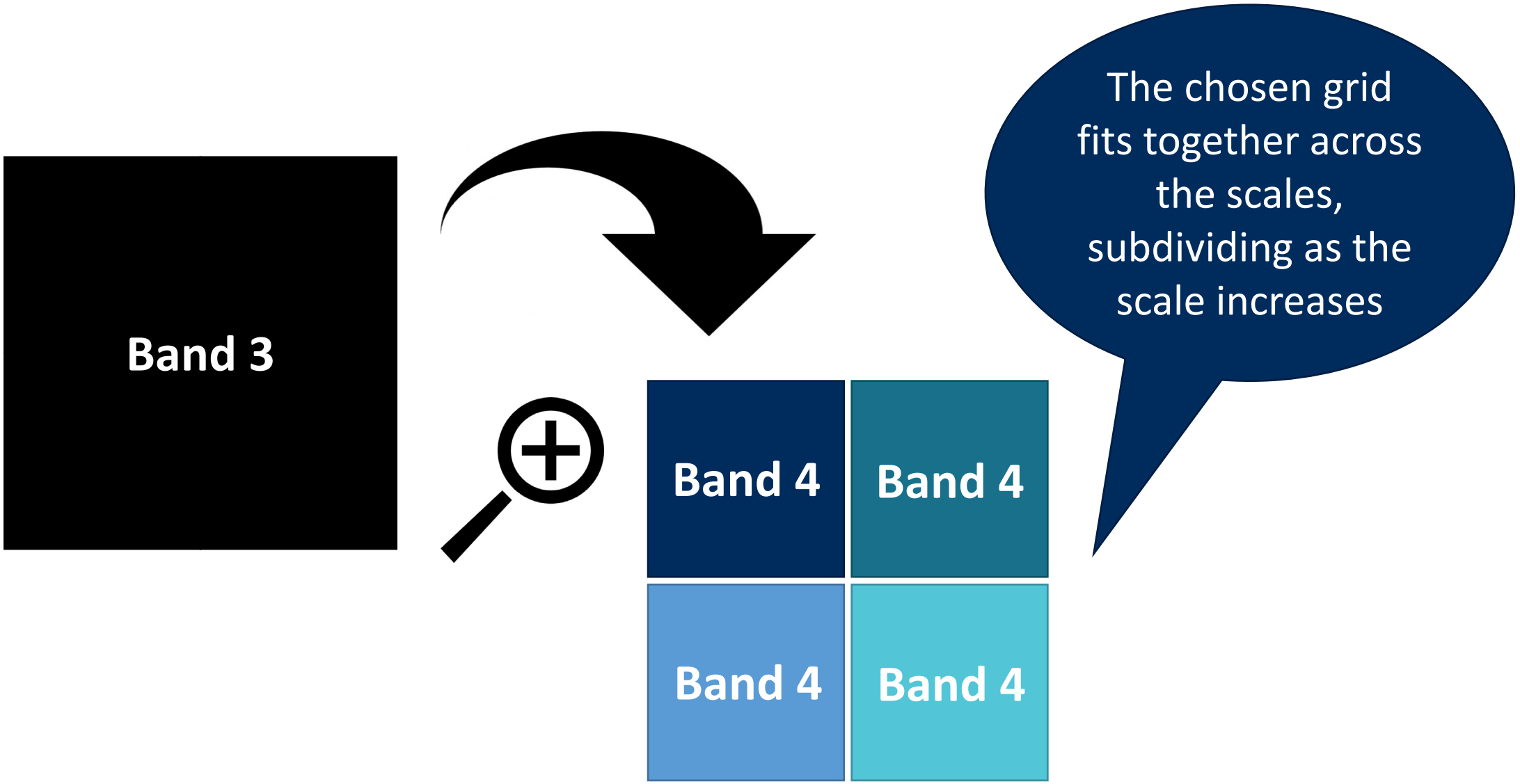






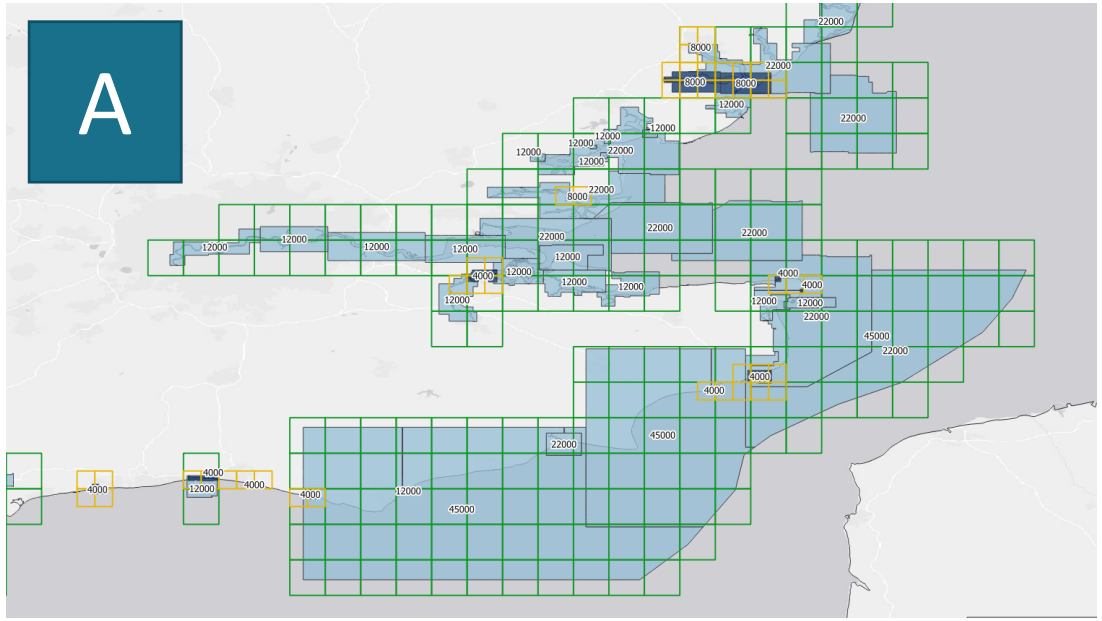
UK Hydrographic Office

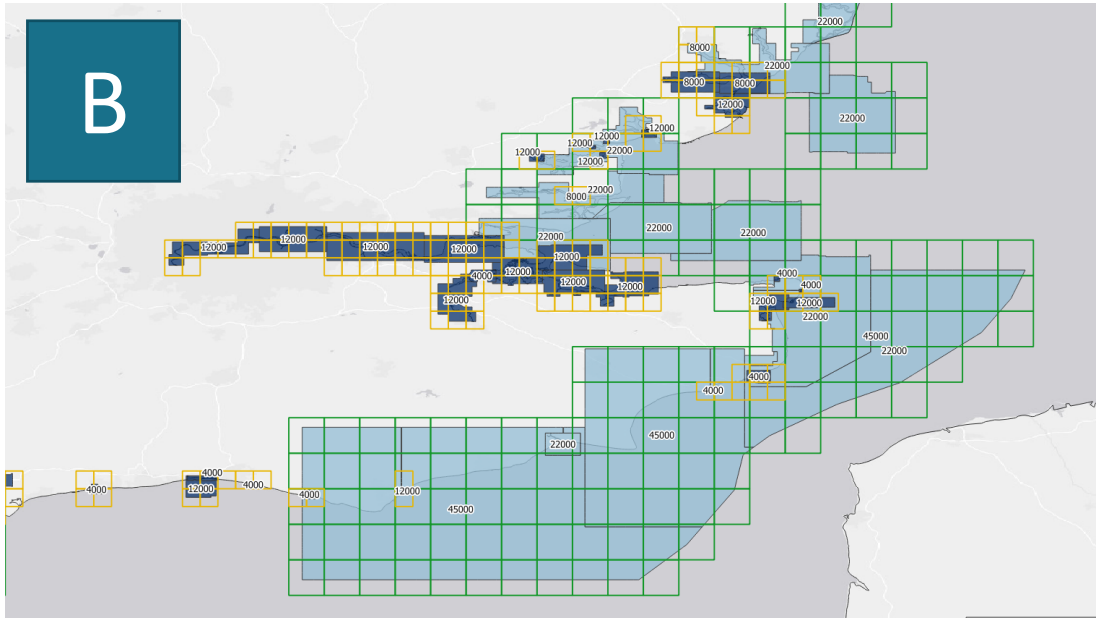
How the grid interacts across the scales

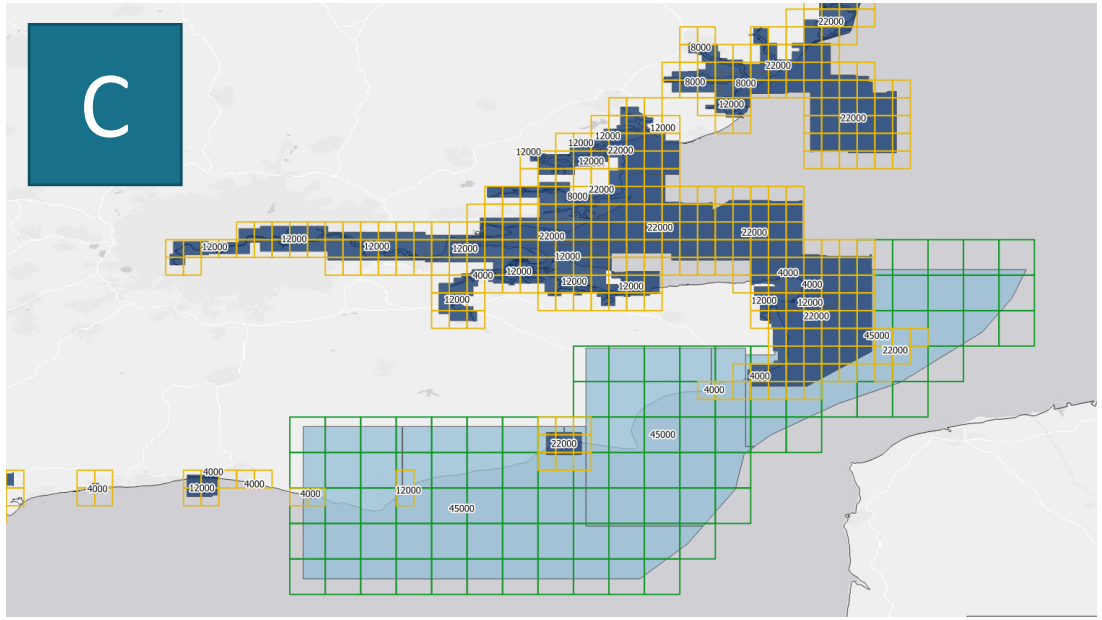


UK Hydrographic Office

How the grid interacts with the current coverage





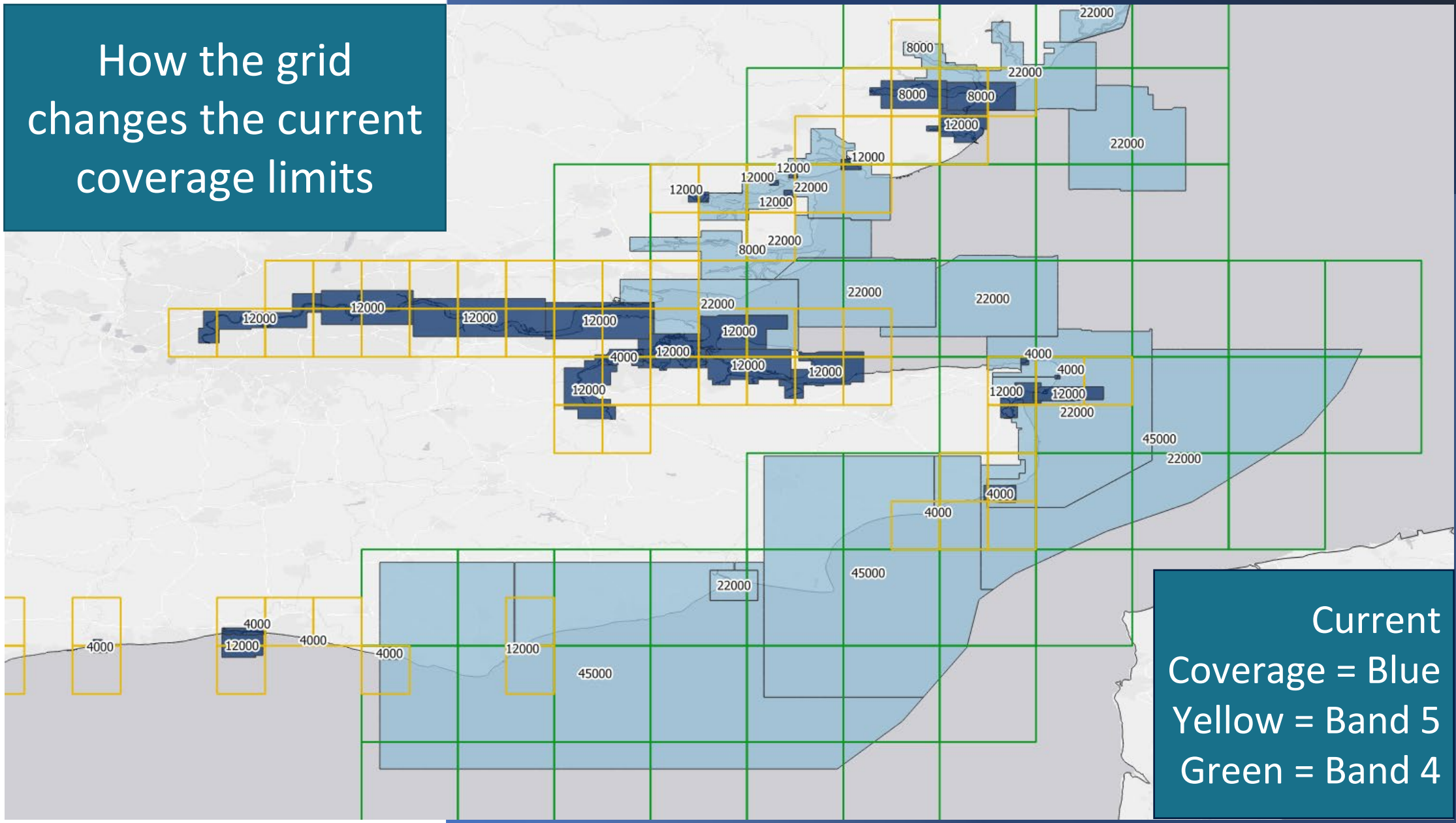


A, Subdivide at 1:12k

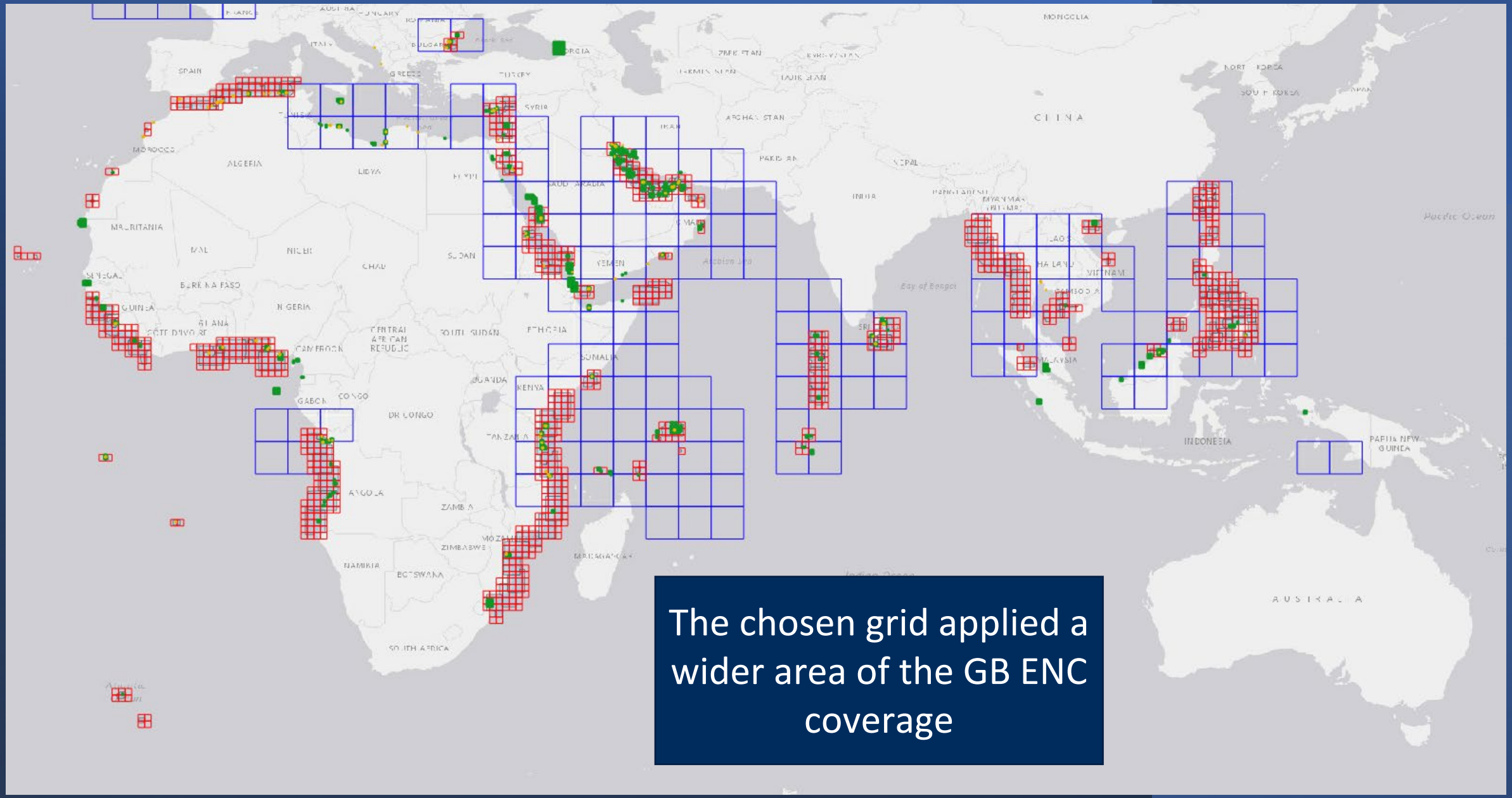
B, Subdivide at 1:22k

C, Subdivide at 1:45k

How the grid changes the current coverage limits



Current
Coverage = Blue
Yellow = Band 5
Green = Band 4


The chosen grid applied a wider area of the GB ENC coverage

UK Hydrographic Office

Flexible application of the Gridded Scheme 1

Application of a gridded scheme is how UKHO intends to manage the data going forwards.

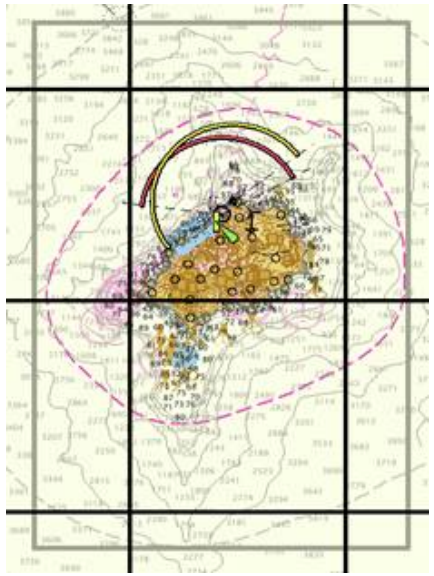
There was concern that applying a gridded scheme could undermine the skill involved with scheming i.e. to ensure significant navigational features are covered at the appropriate scale within coverage limits. This is always a compromise regardless of using a grid or a traditional scheme.

Research has shown that correct encoding of navigational features e.g. TSS means the user does not perceive the ENC limits when using ECDIS.

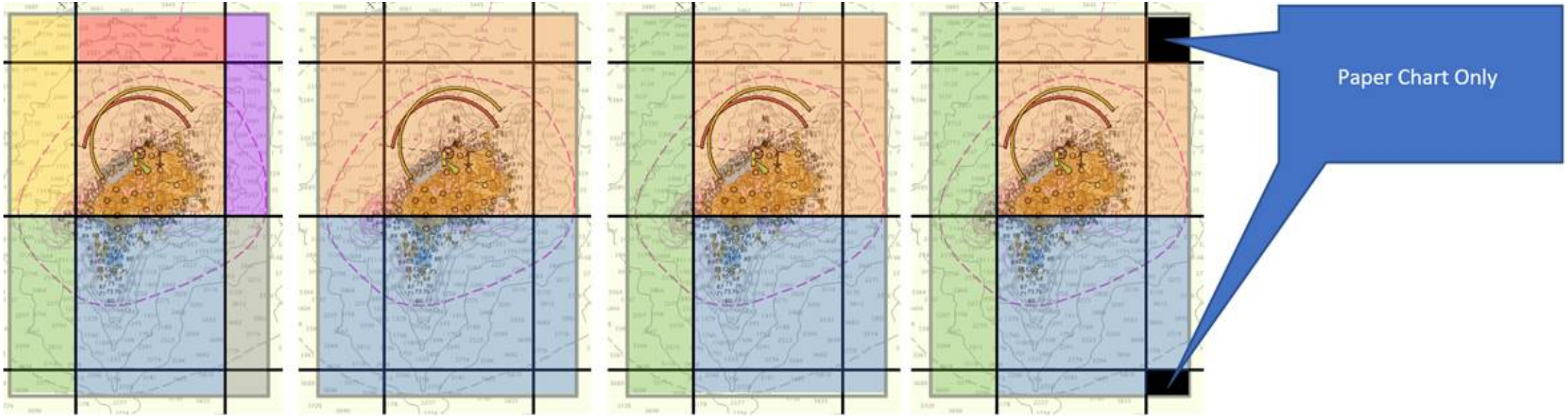
By being flexible when creating the ENC limits after applying the grid, concerns regarding division of navigational features and concerns over the value of additional numbers of ENCs can be addressed.

UK Hydrographic Office

Flexible application of the Gridded Scheme 2



For example, how to apply the gridded scheme to the new coverage of St Helena.
The grey limits (left) show the extent of the coverage, the black lines shows the gridded scheme over this area.
The coloured segments (below) show *some* of the options that can be used to recombine the grid squares in the published ENC.



UK Hydrographic Office

November 2021

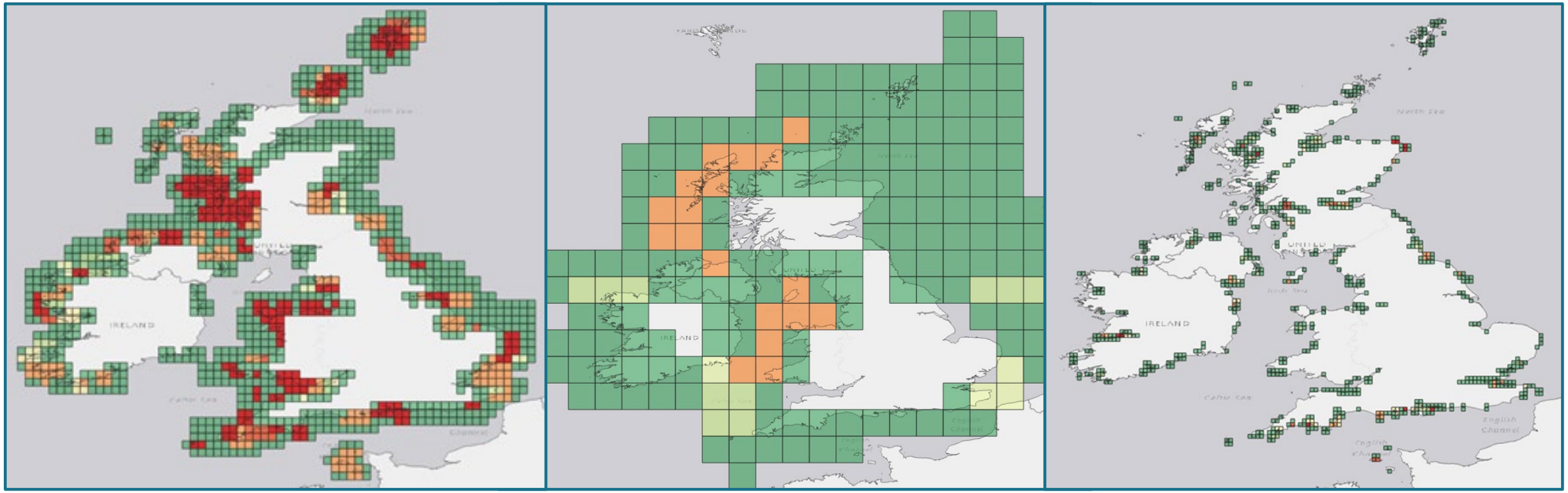
Multiple additional priority workstreams aligning with the MAIB/DMAIB report findings

UK Hydrographic Office

Data Improvement: Scale Harmonising

Scale differences between ENCs will be combined within the same grid square when applying the gridded scheme

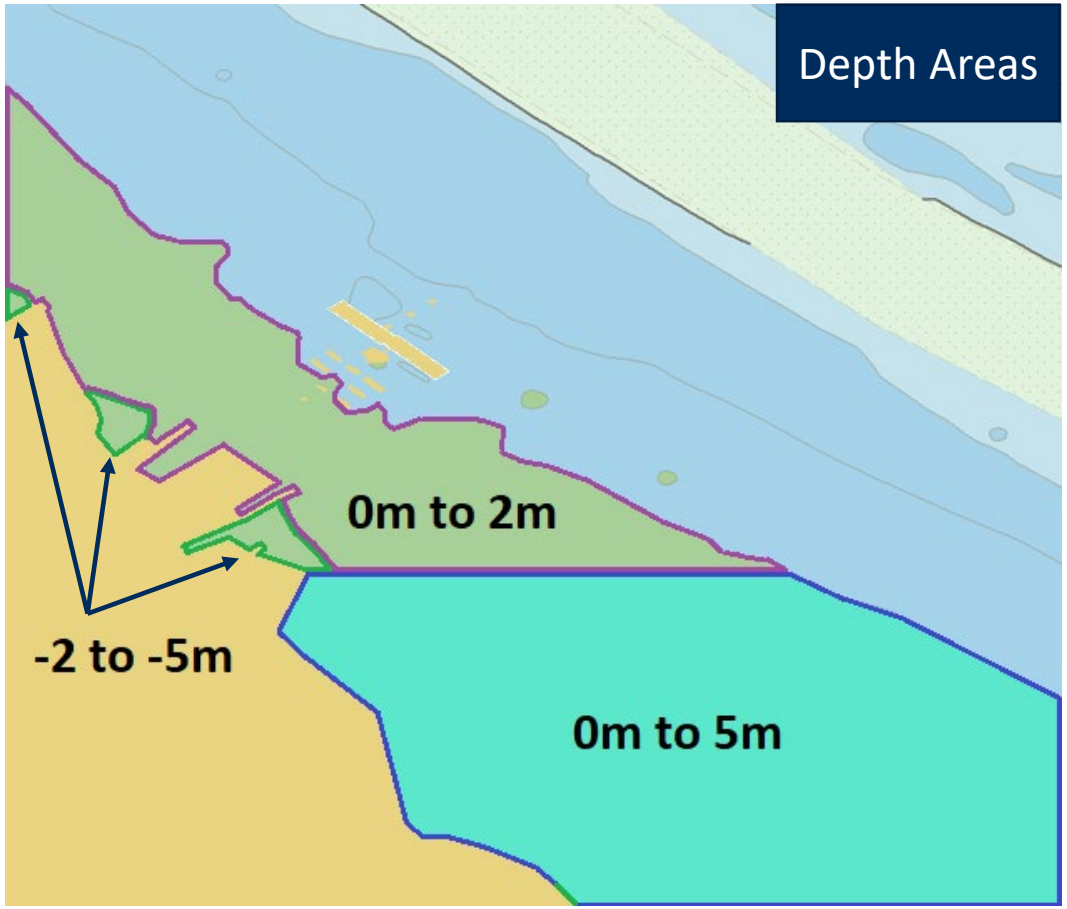
Green = Scale match closely
Amber = minor scale discrepancy
Red = significant scale discrepancy

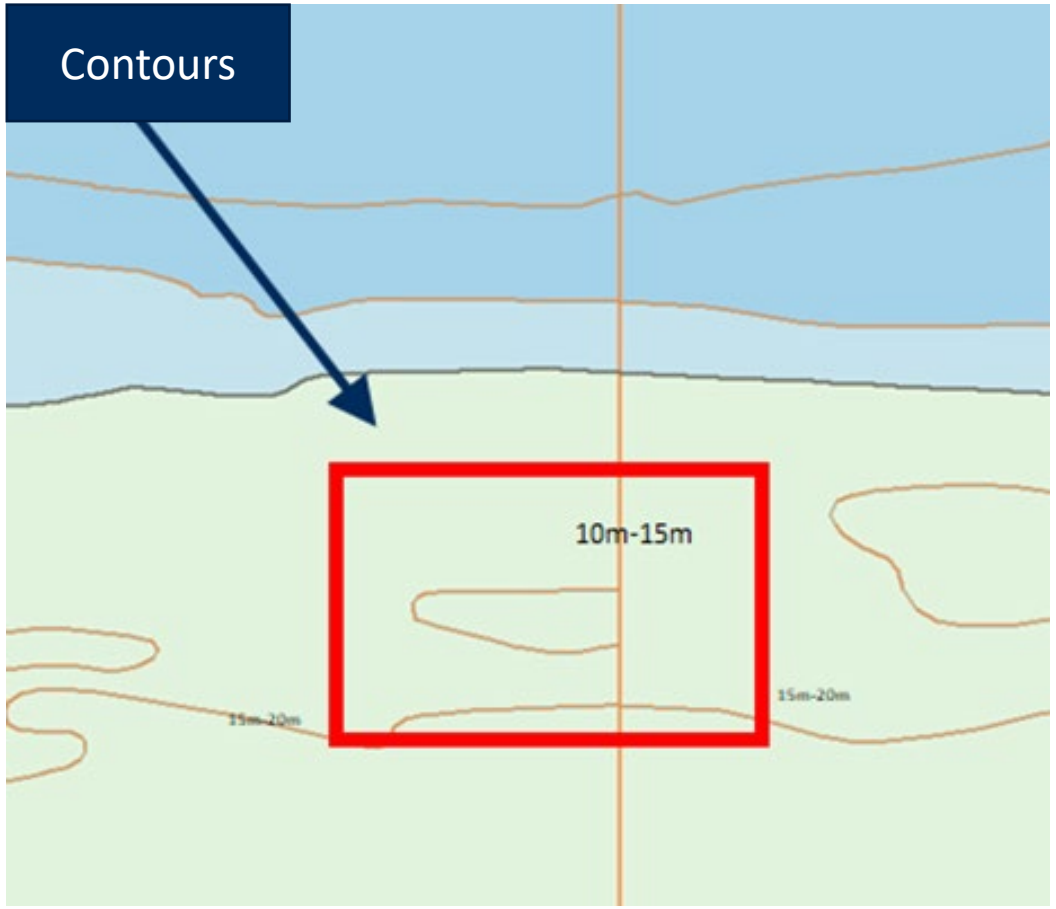


UK Hydrographic Office

Data Improvement: Consistency

Inconsistencies in linear and area features across ENC limits can undermine user confidence in ENCs by showing discrepancies of lines and colours. UKHO will work to resolve these issues as applying a grid will change existing limits and make such discrepancies more exaggerated.

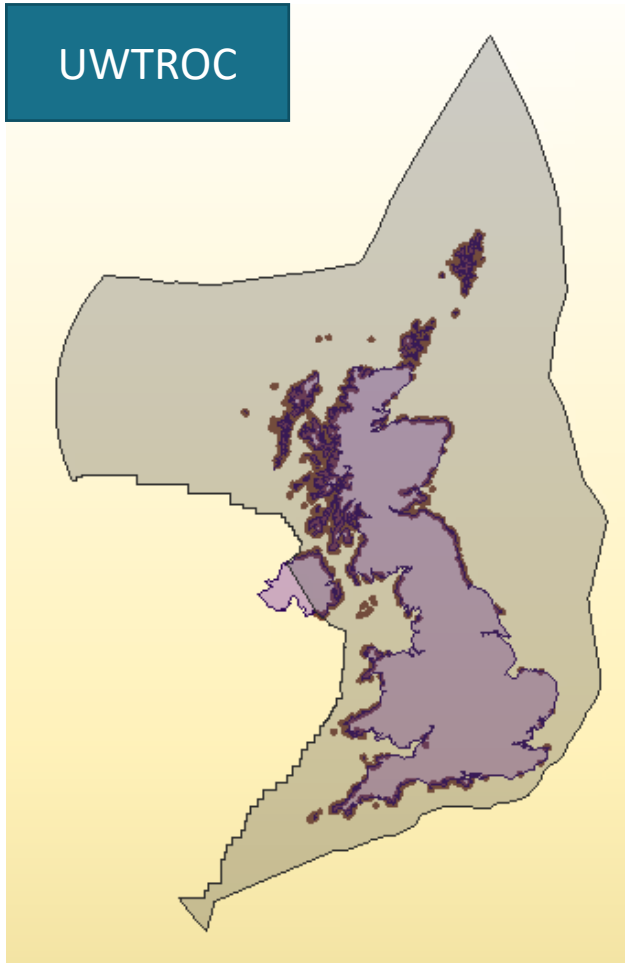




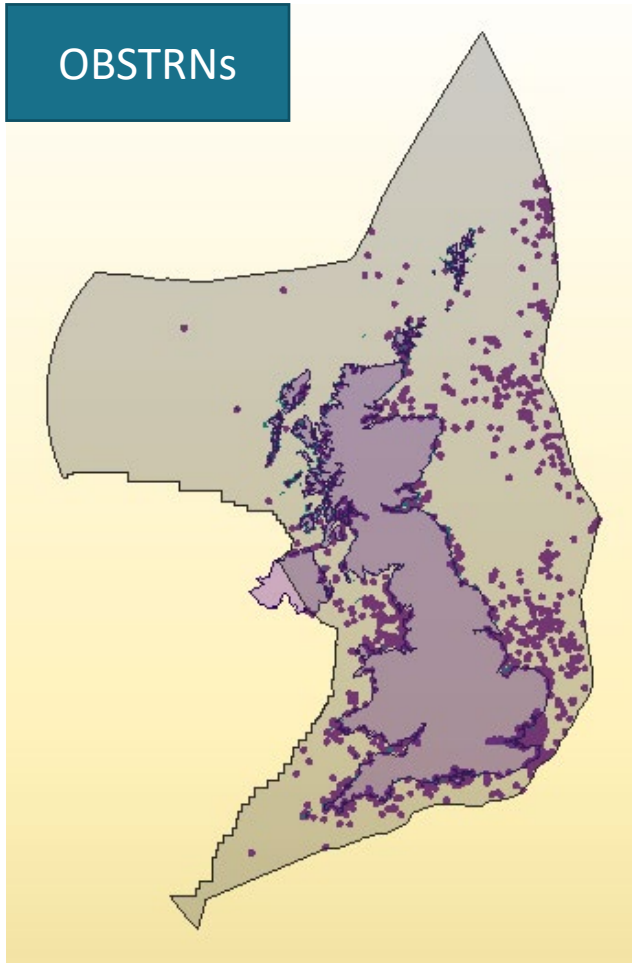
UK Hydrographic Office

Data Improvement: Isolated Dangers

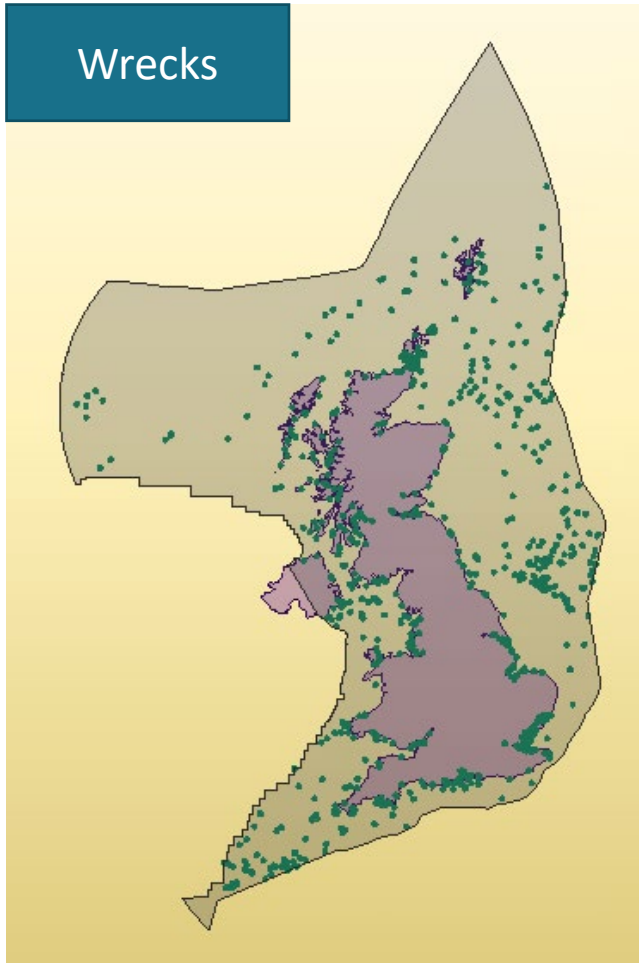
UWTROC



OBSTRNs



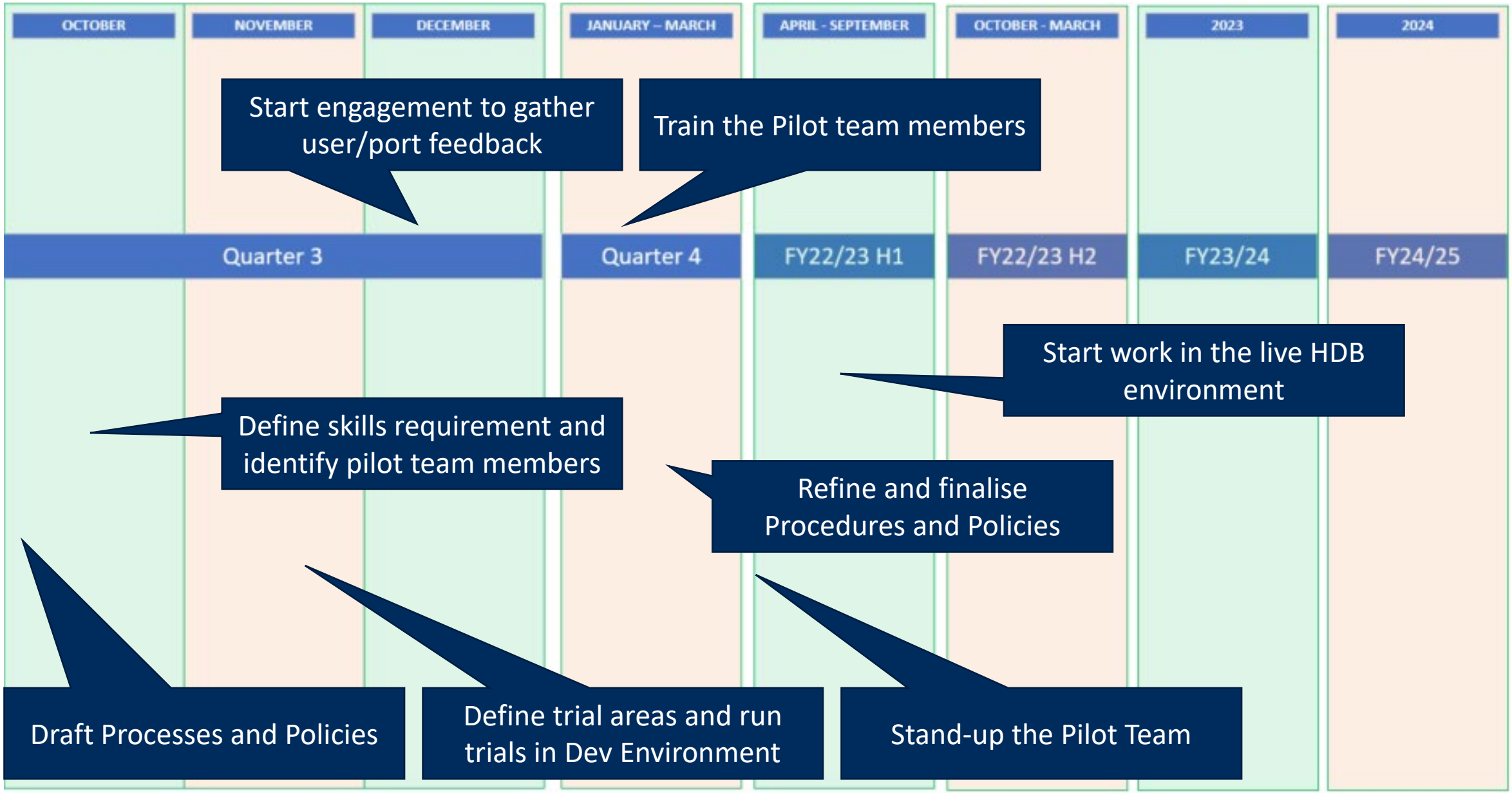
Wrecks



When Isolated Dangers do not have a depth recorded in the VALSOU attribute, the depth is taken automatically from the underlying depth area, but this process results in those objects displaying with the isolated danger symbol. UKHO will work to resolve the unknown attributes.

UK Hydrographic Office

Timeline (estimated as a 2 year project)

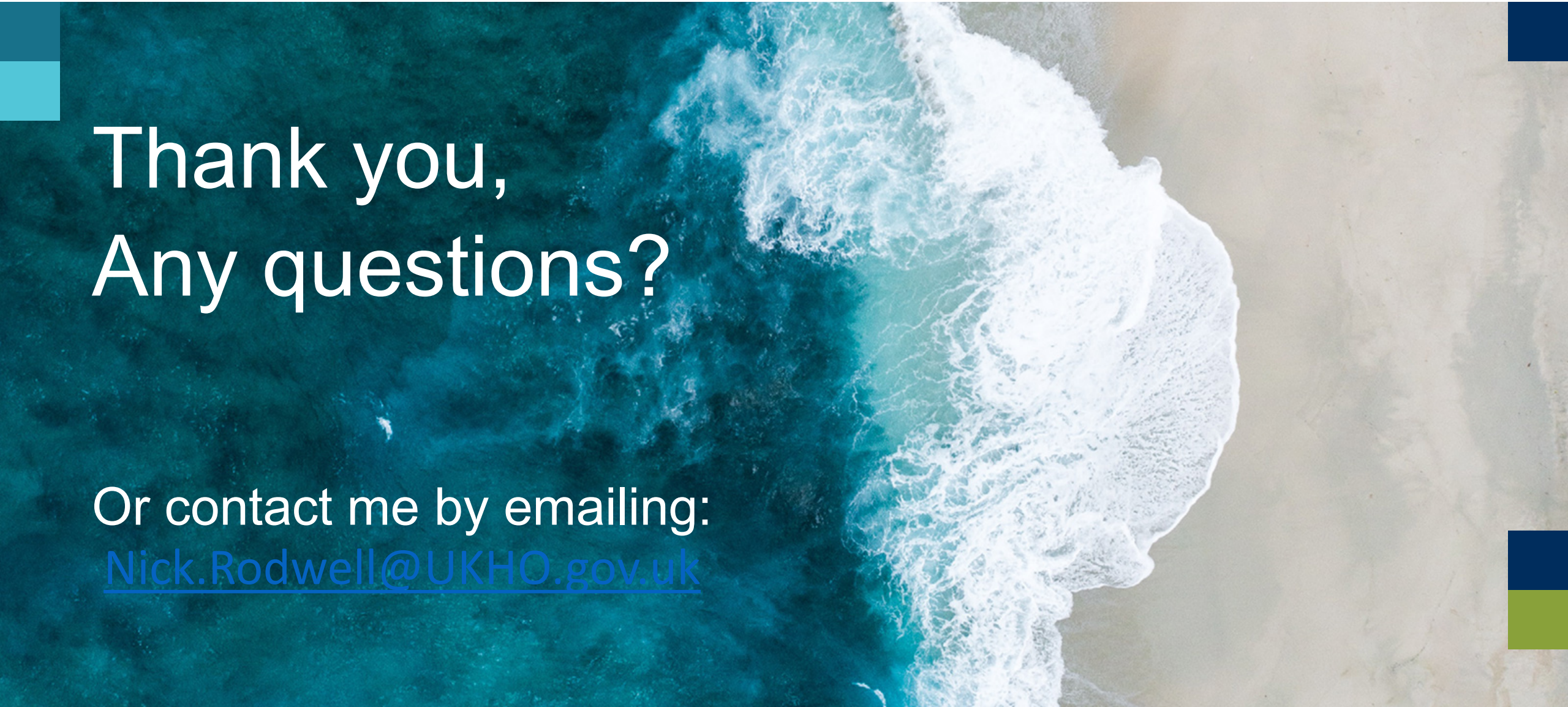


UK Hydrographic Office

In Summary…

1. A gridded scheme is how UK is choosing to manage data in the future
2. The chosen grid is a best-fit for the GB ENC coverage
3. The grid is flexible enough to support the current coverage and future S-1XX products
4. The chosen grid will tesselate with the S-102 grid
5. Application of the grid is part of a large Data improvement workstream to respond to the recommendations raised in the MAIB report including harmonising scale, improving consistency of linear and area features and isolated dangers with incomplete attribution

UK Hydrographic Office



Thank you,
Any questions?

Or contact me by emailing:
Nick.Rodwell@UKHO.gov.uk

UK Hydrographic Office

Annexes

Annex A: Scales and Scale Bands

UK Hydrographic Office

S-57 & S-101 Guidance for scale & usage bands

Selectable Range	Standard Scale (rounded)
200 NM	1:3000000
96 NM	1:1500000
48 NM	1:700000
24 NM	1:350000
12 NM	1:180000
6 NM	1:90000
3 NM	1:45000
1.5 NM	1:22000
0.75 NM	1:12000
0.5 NM	1:8000
0.25 NM	1:4000

The S-57 UOC states that HO's should use 1 of these scales (left). UKHO chose the next largest scale to the scale of the paper chart from which the ENC was derived.

Nav Purpose	Name	Scale Range
1	Overview	<1:1499999
2	General	1:350000-1:1499999
3	Coastal	1:90000-1:349999
4	Approach	1:22000-1:89999
5	Harbour	1:4000-1:21999
6	Berthing	>1:4000

S-57 Ed 3.1 does not define max and min comp scales for each Nav Purpose, above is an example of how scale ranges may be assigned to Nav Purposes.

S-101 does not give any guidance on scale ranges and navigational purpose is only for cataloguing purposes.

UK Hydrographic Office

UK grid scales and scale bands

UK are taking a flexible approach to scales within the scale bands, generally following the standardised scales, potentially flexing depending on the coverage and features being depicted in the ENCs. These decisions will be informed by the ongoing trials. The scale at which a grid square is subdivided effects the overall number of ENCs created by applying a gridded scheme.

<table>
<tr><th>Nav Purpose</th><th>Standardised S-57 Scale example</th><th>Alternate scale ‘Cut-off’ option</th><th>Alternate scale ‘Cut-off’ options</th><th>Alternate scale ‘Cut-off’ option</th></tr>
<tr><td>Scale band 1</td><td>1:1500000+</td><td></td><td></td><td></td></tr>
<tr><td>Scale band 2</td><td>1:350000-1:1499999</td><td></td><td></td><td></td></tr>
<tr><td>Scale band 3</td><td>1:90000-1:349999</td><td rowspan="2">Cut-off between bands 3 and 4 to 1:75000</td><td></td><td></td></tr>
<tr><td>Scale band 4</td><td>1:22000-1:89999</td><td rowspan="3">Cut-off between bands 4 and 5 to 20,000, 1:25000 or 1:30000</td><td></td></tr>
<tr><td>Scale band 5</td><td>1:4000-1:21999</td><td></td><td rowspan="2">Cut-off between bands 5 and 6 to 1:6000</td></tr>
<tr><td>Scale band 6</td><td>>1:4000</td><td></td><td></td></tr>
</table>