Paper for Consideration by TSMAD DCEG sub-working group

Surrounding Depth of Wrecks, Rocks and Obstructions

Submitted by:	CARIS
Executive Summary:	Asking for reconsideration of the definition an logic related to populating a surrounding depth value for Wrecks, Underwater rocks and Obstructions
Related Documents:	TSMAD26 DCEG paper 10 and 12
Related Projects:	S-101 DCEG Baseline

Introduction / Background

At the DCEG subworking group meeting prior to TSMAD26 in Silver Spring, one of the discussion topics was the inclusion of new system attributes "minimum surrounding depth" and "default clearance depth" to help eliminate the portrayal CSPs for wrecks, underwater rocks and obstructions. TSMAD accepted both of these system attributes and they have been included in the baseline of the DCEG and will be used in the S-101 Portrayal Catalgoue and will be calculated in the S-57 to S-101 convertor process. However, as Caris was investigating the S-101 Portrayal Catalogue they are requesting that TSMAD reconsider the methodology used for calculating the surrounding depth.

Analysis/Discussion

The conditional procedure for underwater hazards looks for isolated dangers. Isolated dangers are identified as situations where an object is shoaler than the Safety Contour but is sitting in navigable water which is deeper than the Safety Contour. Ideally a wreck, underwater rock or Obstruction has a populated Value of Sounding that can be used to determine if the object is shoaler than the Safety Contour. In some cases the actual Value of Sounding is not available and in that situation the Default Clearance Depth needs to be set. In S-52 there is some complicated logic that uses the shoalest surrounding depth and attribute tests about the Exposition of Sounding etc to calculate a Default Clearance Depth. It is this logic that sometimes identifies isolated dangers in situations where an object is known not to be a danger. It would be best if this logic be included in the DCEG so that a data producer can assign a sensible Default Clearance Depth based on known information about the object.

The conditional procedure can use the Value of Sounding or Default Clearance Depth to check if the object is shoaler than the Safety Contour and then it needs to determine if the water around the object is navigable.

With S-57 the ECDIS had to implement conditional procedures that would search the surrounding depth and dredged areas to determine if any of the surrounding depths have a DRVAL1 deeper than the Safety Contour. The proposal for S-101 is to carry the value of surrounding depth as an attribute on the object so that the portrayal logic need only test if the surrounding depth is deeper than the Safety Contour and is thus navigable. The value of the surrounding depth should be populated using the deepest minimum depth of all the surrounding Depth or Dredged areas.
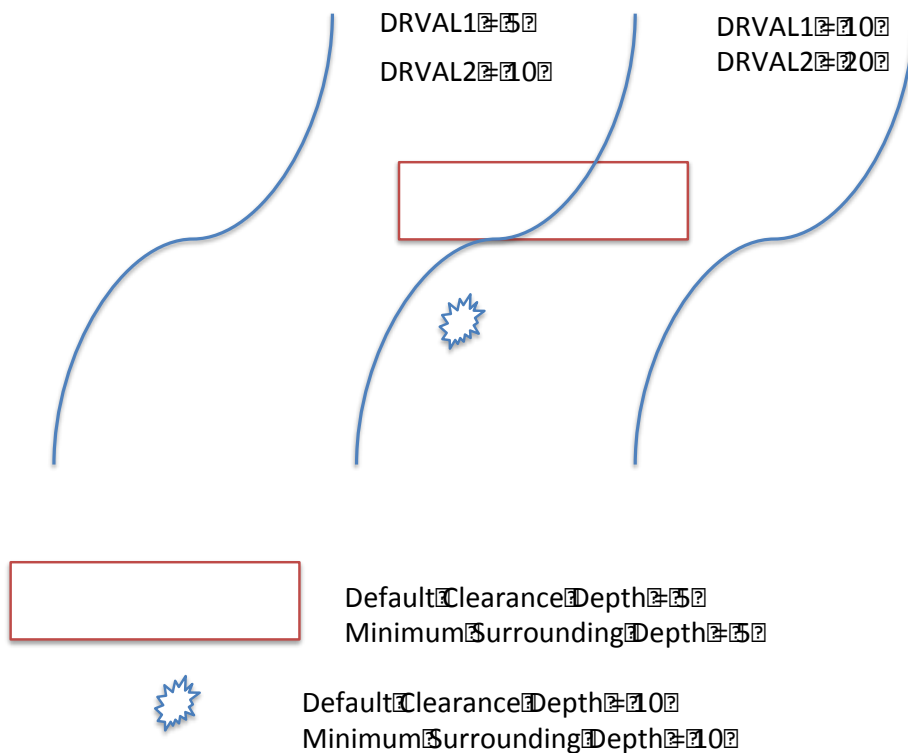
The current definition of the default clearance depth in the DCEG is the following:
- The depth value determined for an underwater hazard of unknown depth, based on the depth of the surrounding area.

When the Value of Sounding is unknown the Default Clearance Depth can be used to identify a known safe clearance value. If it is known that the object lies within the range of the surrounding depth then Default Clearance Depth can be set to the minimum depth of all the surrounding depth/dredged areas. If the object is shoaler than the surrounding water then other context or known information can be used or else the Default Clearance would need to be set to a safe value such as -1. If a producing agency has knowledge that a wreck within a channel is at least deeper than 30metres then setting the Default Clearance to 30metres would prevent the wreck from being shown as an isolated danger when the ships own Safety Contour is set to 20 metres.

In addition, to the above definition the value that could be used would be the DRVAL1 of the shoalest depth area as shown in the graphic below:

Using the DRVAL1 of the Shoalest Depth Area

DRVAL1 = 5
DRVAL2 = 10

DRVAL1 = 10
DRVAL2 = 20

Default Clearance Depth = 5
Minimum Surrounding Depth = 5

Default Clearance Depth = 10
Minimum Surrounding Depth = 10

In the diagram above the Default Clearance Depth could be sensible providing the object is known to be within the range of the surrounding depth.

It is the "minimum surrounding depth" as currently defined in the DCEG baseline where the problem lies. As defined in the DCEG the minimum surrounding depth states:

- The depth value determined for seabed around an underwater hazard of unknown depth, based on the depth of the surrounding area

For items that are fully contained within a depth area the logic makes sense to take the DRVAL1 of the surrounding depth area. However, for features crossing multiple depth areas this logic does not hold up. For example, if one uses the shoalest surrounding minimum depth and the feature is partially in shallow water and partially in navigable water it will not get flagged as an isolated danger and the portion in the navigable water it will not be highlighted using the isolated danger portrayal. Essentially, while trying to err on the side of safety, the logic will inadvertently create potentially dangerous situations.

The issue is that the logic being used actually deviates from the existing UDWHAZ CSP which is as follows:
- If the VALSOU or the default clearance is shoaler than the safety contour and any of the DRVAL1's surrounding the object are deeper than the safety contour then it is an isolated danger.

The logic is using the surrounding depth to determine if any water around the object is navigable, if the water around the object is not navigable then there is no need to flag the isolated danger.

The recommendation is to change the name of 'Minimum surrounding depth' to 'Surrounding depth' and to populate it using the deepest minimum depth(DRVAL1) of the surrounding water. So in the diagram above would be amended as shown below:

Where the area object would have:
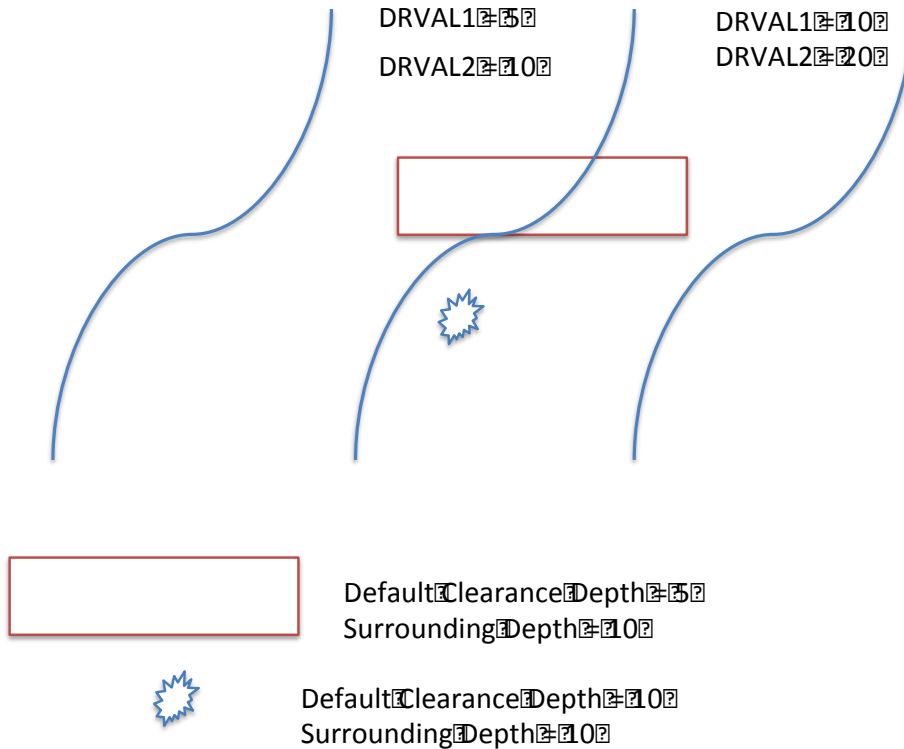Default clearance depth = 5
Surrounding depth = 10

And the point feature:
Default clearance depth = 10
Surrounding depth = 10

Using the DRVAL1 of the Deepest Surrounding Depth Area

DRVAL1 = 5
DRVAL2 = 10

DRVAL1 = 10
DRVAL2 = 20

Default Clearance Depth = 5
Surrounding Depth = 10

Default Clearance Depth = 10
Surrounding Depth = 10

Isolated Dangers in Shallow water
There is also another situation where a Mariner setting is available to allow the mariner to flag objects as isolated dangers even if they are not in 'Navigable' water but that lie in water that is deeper than the zero metre contour. Similar to the situation above if the area object spans the zero metre contour then the underlying depths could have minimum depth values of -1 and 5. In that case the deepest of the surrounding minimum depths value 5 would be applied to the Surrounding depth and the isolated danger logic would flag the object as an isolated danger.

Recommendations
It is recommended to change the name of 'Minimum surrounding depth' to 'Surrounding depth' or perhaps 'Navigable surrounding depth' and amend the logic for calculating the surrounding depth attribute to use the DRVAL1 of the deepest depth area that the feature is surrounded by or touches.

Action Required of TSMAD DCEG
The TSMAD DCEG is invited to:

      a.   agree to amend the logic for the surrounding depth

      b.   report to TSMAD28 of this change