National Historic Seascape Characterisation (NHSC): Technical Advice Document

Prepared by LUC
July 2017

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Author(s):	**Diana Manson, Katie Stenson** LUC, 12th Floor, Colston Tower, Bristol, BS1 4XE diana.manson@landuse.co.uk
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1   Introduction

1.1   This Technical Advice Document is a guidance note relevant to Historic England (HE) needs in respect of the NHSC database: its amendment for future updating; its storage and options for its data supply with particular consideration to the database size and any tools and rules beyond those normal to GIS.

1.2   This guide is designed primarily for an internal audience at Historic England.

2   National HSC Data Format and Structure

2.1   The consolidated National HSC database and related files include the following:

- ESRI file geodatabase

- ESRI MXD

- ESRI layer files and style file

- National perspective texts in pdf format

- Documentation: Technical Advice Document (this document), User Guide, National HSC Consolidation project report, Symbology Style Sheet, metadata

2.2   Each of these components is described in this document.

ESRI Geodatabase

2.3   The geodatabase is an ESRI .gdb. It contains feature classes and tables.

2.4   The geodatabase contains the following domains with coded terms:

- CNF

- LCTN

- PRD

- BDTY

- SBTY

- TY

2.5   The full list of coded terms are in line with those in the HSC Method Statement and HSC Theasurus. The geodatabase contains the following table with a full list of coded terms: HSC_DOMAIN_TERMS

Feature classes

2.6   A feature classed named National_HSC contains all of the national HSC data, the format of which is shown in **Table 2.1**. Fields with coded terms and compulsory fields are indicated, and indexed fields are marked with an asterisk (*).

2.7   The National_HSC feature class is indexed to speed up searching and filtering of the data. The indices are on the following fields:

- OBJECTID (default index)

- CC_SBTY

- SSRFC_SBTY

- WTRCL_SBTY

- SFLR_SBTY

- SBFLR_SBTY

Table 2.1 Field properties in the National_HSC feature class

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
Shape	Shape	Shape of data (i.e. polygon), automatically generated and updated by database.	Automated	Geometry	0		Yes (automated)
OBJECTID*	OBJECTID	ID automatically generated and updated by database.	Automated	Integer	10		Yes (automated)
NAME	Name	Name of area or topographic identifier, local or popular name.	Manual	String	254		Yes
CC_SBTY*	Coastal and Conflated Sub-Character Type	Sub-character type (present, dominant; local level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254	Yes	Yes
CC_TY	Coastal and Conflated Character Type	Character type (present, dominant; regional level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254	Yes	Yes
CC_BDTY	Coastal and Conflated Broad Character Type	Broad Character Type (present, dominant; national strategic level). Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254	Yes	Yes
SSRFC_SBTY*	Sea Surface Sub-Character Type	Present and dominant historic character of the sea-surface (recorded at sub-character, character and broad character levels).	Manual	String	254	Yes	Yes (for gridded data)
SSRFC_TY	Sea Surface Character Type		Manual	String	254	Yes	Yes (for gridded data)
SSRFC_BDTY	Sea Surface Broad Character Type		Manual	String	254	Yes	Yes (for gridded data)
WTRCL_SBTY*	Water Column Sub-Character Type	Present and dominant historic character of the water column (recorded at sub-character, character and broad character levels).	Manual	String	254	Yes	Yes (for gridded data)
WTRCL_TY	Water Column Character Type		Manual	String	254	Yes	Yes (for gridded data)

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
WTRCL_BDTY	Water Column Broad Character Type		Manual	String	254	Yes	Yes (for gridded data)
SFLR_SBTY*	Sea Floor Sub-Character Type	Present and dominant historic character of the sea-floor (recorded at sub-character, character and broad character levels.	Manual	String	254	Yes	Yes (for gridded data)
SFLR_TY	Sea Floor Character Type		Manual	String	254	Yes	Yes (for gridded data)
SFLR_BDTY	Sea Floor Broad Character Type		Manual	String	254	Yes	Yes (for gridded data)
SBFLR_SBTY*	Sub-Sea Floor Sub-Character Type	Present and dominant historic character of the sub-sea floor (recorded at sub-character, character and broad character levels).	Manual	String	254	Yes	Yes (for gridded data)
SBFLR_TY	Sub-Sea Floor Character Type		Manual	String	254	Yes	Yes (for gridded data)
SBFLR_BDTY	Sub-Sea Floor Broad Character Type		Manual	String	254	Yes	Yes (for gridded data)
STUDY_AREA	Study Area	Identifies which project area the data originated from.	Manual	String	254		
DATA_TYPE	Data Type	Identifies if data is 'Gridded' sea data or 'Not gridded' land data.	Manual	String	254		Yes
CC_PRD	Coastal and Conflated Period	Benchmark period of origin of the area represented in the polygon or cell. Recorded for present historic character. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254	Yes	Yes
CC_SRC	Coastal and Conflated Source	Sources used to identify present and previous historic character. Attribute values to record supplier, date, precise GIS file name. To include reference to the scale of original data used. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254		Yes

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
CC_CNF	Coastal and Conflated Confidence	Degree of certainty/confidence of HSC interpretation of present historic character. Landward (above MHW) this will relate to coastal land HSC, whereas seaward it will relate to the 'conflated' HSC as derived from the marine levels.	Manual	String	254	Yes	Yes
CC_NTS	Coastal and Conflated Notes	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		
CC_N_LINK	Coastal and Conflated National Link	URL hyperlink to Character Type texts and multi-media. Landward (above MHW) this will record coastal land HSC, whereas seaward it will record the 'conflated' HSC as derived from the marine levels.	Manual	String	254		Yes
SSRFC_PRD	Sea Surface Period	Benchmark period of origin of the area represented in the polygon. Recorded for present historic character levels and previous historic character.	Manual	String	254	Yes	Yes (for gridded data)
SSRFC_SRC	Sea Surface Source	Sources used to identify historic character. Attribute values to record supplier, date and precise GIS file name. To include reference to the scale of original data used.	Manual	String	254		Yes (for gridded data)
SSRFC_CNF	Sea Surface Confidence	Degree of certainty/confidence of HSC interpretation of present historic character.	Manual	String	254	Yes	Yes (for gridded data)
SSRFC_NTS	Sea Surface Notes	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		Yes (for gridded data)
SSRFC_N_LINK	Sea Surface National Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		Yes (for gridded data)
WTRCL_PRD	Water Column Period	Benchmark period of origin of the area represented in the polygon cell.	Manual	String	254	Yes	Yes (for gridded data)
WTRCL_SRC	Water Column Source	Sources used to identify historic character. Attribute values to record supplier, date, precise GIS filename. To include reference to the scale of original data used.	Manual	String	254		Yes (for gridded data)
WTRCL_CNF	Water Column Confidence	Degree of certainty/confidence of HSC interpretation of present historic character.	Manual	String	254	Yes	Yes (for gridd

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
							ed data)
WTRCL_NTS	Water Column Notes	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		Yes (for gridded data)
WTRCL_N_LINK	Water Column National Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		Yes (for gridded data)
SFLR_PRD	Sea Floor Period	Benchmark period of origin of the area represented in the polygon cell.	Manual	String	254	Yes	Yes (for gridded data)
SFLR_SRC	Sea Floor Source	Sources used to identify historic character. Attribute values to record supplier, date, precise GIS filename. To include reference to the scale of original data used.	Manual	String	254		Yes (for gridded data)
SFLR_CNF	Sea Floor Confidence	Degree of certainty/confidence of HSC interpretation of present historic character.	Manual	String	254	Yes	Yes (for gridded data)
SFLR_NTS	Sea Floor Notes	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		Yes (for gridded data)
SFLR_N_LINK	Sea Floor National Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		Yes (for gridded data)
SBFLR_PRD	Sub-Sea Floor Period	Benchmark period of origin of the area represented in the polygon cell.	Manual	String	254	Yes	Yes (for gridded data)
SBFLR_SRC	Sub-Sea Floor Source	Sources used to identify historic character. Attribute values to record supplier, date, precise GIS filename. To include reference to the scale of original data used.	Manual	String	254		Yes (for gridded data)
SBFLR_CNF	Sub-Sea Floor Confidence	Degree of certainty/confidence of HSC interpretation of present historic character.	Manual	String	254	Yes	Yes (for gridded data)
SBFLR_NTS	Sub-Sea Floor Notes	Further background information on history of the polygon. Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		Yes (for gridded data)

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
SBFLR_N_LINK	Sub-Sea Floor National Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		Yes (for gridded data)
PRVS_SBTY1	Previous Sub-Character Type 1	Previous historic character for which evidence is available. Recorded for multiple time-slices on basis of source dataset.	Manual	String	254	Yes	
PRVS_SBTY2	Previous Sub-Character Type 2		Manual	String	254	Yes	
PRVS_SBTY3	Previous Sub-Character Type 3		Manual	String	254	Yes	
PRVS_SBTY4	Previous Sub-Character Type 4		Manual	String	254	Yes	
PRVS_SBTY5	Previous Sub-Character Type 5		Manual	String	254	Yes	
PRVS_PRD1	Previous Period 1	Benchmark period of origin of the area represented in the polygon. Recorded for present historic character levels and previous historic character.	Manual	String	254	Yes	
PRVS_PRD2	Previous Period 2		Manual	String	254	Yes	
PRVS_PRD3	Previous Period 3		Manual	String	254	Yes	
PRVS_PRD4	Previous Period 4		Manual	String	254	Yes	
PRVS_PRD5	Previous Period 5		Manual	String	254	Yes	
PRVS_SRC1	Previous Source 1	Sources used to identify historic character. Attribute values to record supplier, date, precise GIS filename. To include reference to the scale of original data used.	Manual	String	254		
PRVS_SRC2	Previous Source 2		Manual	String	254		
PRVS_SRC3	Previous Source 3		Manual	String	254		
PRVS_SRC4	Previous Source 4		Manual	String	254		
PRVS_SRC5	Previous Source 5		Manual	String	254		
PRVS_CNF1	Previous Confidence 1	Degree of certainty/confidence of HSC interpretation of present historic character.	Manual	String	254	Yes	
PRVS_CNF2	Previous Confidence 2		Manual	String	254	Yes	
PRVS_CNF3	Previous Confidence 3		Manual	String	254	Yes	
PRVS_CNF4	Previous Confidence 4		Manual	String	254	Yes	
PRVS_CNF5	Previous Confidence 5		Manual	String	254	Yes	
PRVS_NTS1	Previous Notes 1	Further background information on history of the polygon.	Manual	String	254		

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
PRVS_NTS2	Previous Notes 2	Expansion on information recorded at broad character and sub-character levels.	Manual	String	254		
PRVS_NTS3	Previous Notes 3		Manual	String	254		
PRVS_NTS4	Previous Notes 4		Manual	String	254		
PRVS_NTS5	Previous Notes 5		Manual	String	254		
PRVS_LINK1	Previous Link 1	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		
PRVS_LINK2	Previous Link 2		Manual	String	254		
PRVS_LINK3	Previous Link 3		Manual	String	254		
PRVS_LINK4	Previous Link 4		Manual	String	254		
PRVS_LINK5	Previous Link 5		Manual	String	254		
CA1	Character Area 1	Unique Character Area.	Manual	String	254		
CA2	Character Area 2		Manual	String	254		
LCTN	Location	General location (eg. Offshore marine, inshore marine, estuary, coast etc).	Manual	String	254	Yes	Yes
CELL_SZ	Cell Size	Size of grid used for gridded sea data (eg. 250m etc), un-gridded land data should have the value 0..	Manual	Double	19		Yes
CRT_DT	Creation Date	Date of dataset /polygon creation/completion.	Manual	String	254		Yes
CRTR	Creator	Name of the person/organisation who compiled the HSC.	Manual	String	254		Yes
HSC_LINK_ID	Link Table ID	ID for link to hyperlink summary table.	Manual	Double	19		Yes
CC_R_LINK	Coastal and Conflated Regional Link	URL hyperlink to Character Type texts and multi-media. Landward (above MHW) this will record coastal land HSC, whereas seaward it will record the 'conflated' HSC as derived from the marine levels.	Manual	String	254		
SSRFC_R_LINK	Sea Surface Regional Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		
WTRCL_R_LINK	Water Column Regional Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		
SFLR_R_LINK	Sea Floor Regional Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		
SBFLR_R_LINK	Sub-Sea Floor Regional Link	URL hyperlink to Character Type texts and multi-media.	Manual	String	254		

Field name	Field alias	Description and guidance, terminology	Population method	Data type	Field length	Coded term?	Compulsory field?
Shape_ Length	Shape Length	Polygon length in metres automatically generated and updated by database.	Automated	Double	19		Yes (automated)
Shape_ Area	Shape Area	Polygon area in metres squared, automatically generated and updated by database.	Automated	Double	19		Yes (automated)

2.8 There are seven feature classes in the geodatabase containing grids recreated from the HSC data in each of the project areas:

- A_Grid
- C_Grid
- D_Grid
- E_Grid
- G_Grid
- H_Grid
- I_Grid

2.9 Due to project area B having grid squares that were not exactly 250 m x 250 m and not exactly square, it was not possible to regenerate the grid for project B. It was also not possible to regenerate a grid for project area F.

2.10 There are also 10 feature classes containing demonstration data in a grid format for the entire NHSC dataset. A 250 m x 250 m grid and a 500 m x 500 m grid were produced for Character Sub-Type at each marine level. These feature classes are called:

- CC_SBTY_250m_Grid: A 250 m x 250 m grid of all SBTY data
- CC_SBTY_500m_Grid: A 500 m x 500 m grid of all SBTY data
- SSRFC_SBTY_250m_Grid: A 250 m x 250 m grid of all SBTY data
- SSRFC _SBTY_500m_Grid: A 500 m x 500 m grid of all SBTY data
- WTRCL_SBTY_250m_Grid: A 250 m x 250 m grid of all SBTY data
- WTRCL_SBTY_500m_Grid: A 500 m x 500 m grid of all SBTY data
- SFLR_SBTY_250m_Grid: A 250 m x 250 m grid of all SBTY data
- SFLR_SBTY_500m_Grid: A 500 m x 500 m grid of all SBTY data
- SBFLR_SBTY_250m_Grid: A 250 m x 250 m grid of all SBTY data
- SBFLR_SBTY_500m_Grid: A 500 m x 500 m grid of all SBTY data

2.11 To generate these layers, the whole NHSC data set was converted to raster data then back to vector data in order to produce a gridded data set for the entire project as a demonstration. The grid was produced as a 250 m x 250 m grid and a 500 m x 500 m grid.

Tables

2.12 There are four tables in the geodatabase:

- HSC_LINK_TABLE: Relate table for CC, SSRFC, WTRCL, SFLR and SBFLR hyperlinks

- HSC_LINK_TABLE_PRVS: Relate table for PRVS_SBTY1, PRVS_SBTY2, PRVS_SBTY3, PRVS_SBTY4 and PRVS_SBTY5 hyperlinks

- HSC_CHARACTER_TERMS: Table containing all HSC character terms

- HSC_DOMAIN_TERMS: Table containing all terms used in the geodatabase domains

2.13   HSC_LINK_TABLE and HSC_LINK_TABLE_PRVS contain links to the national texts and are required in the MXD for use of hyperlinks to the National Character Texts.

2.14   HSC_CHARACTER_TERMS and HSC_DOMAIN_TERMS are for reference for users of the NHSC database

Metadata

2.15   Metadata is provided in a spreadsheet conforming to the UK GEMINI standards v2.2, an xml version is also provided as a .xml in INSPIRE format.

MXD

2.16   The MXD is a map document named Consolidated_National_HSC. It is a document compatible with ESRI ArcMap 10.4.1 and will not be compatible with earlier versions of ArcMap.

2.17   The MXD contains:

- The National_HSC feature class displayed at each marine level and at Broad Character Type, Character Type and Character Sub-Type (see Figure 2.1).

- HSC_LINK_TABLE and HSC_LINK_TABLE_PRVS as related tables, allowing for use of hyperlinks to the National Perspective texts.

- The phrase 'Do not use for navigation' in the layout view.

- OS Open Raster and ESRI aerial imagery base maps.

Figure 2.1 NHSC MXD layout view
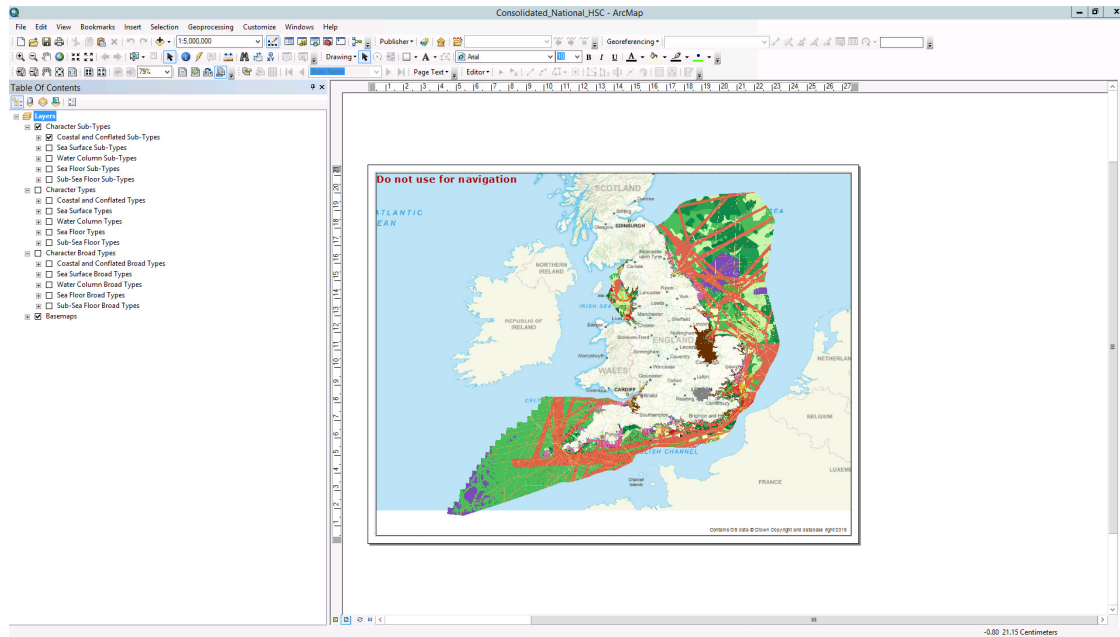
Layer files and style file

2.18   Three layer files in .lyr format contain the HSC symbology:

- HSC_Palette_BDTY

- HSC_Palette_Grouped_SBTY

- HSC_Palette_Grouped_TY

2.19   Each layer file contains a set of fill symbol colours for Character Sub-Types, Types and Broad Types in the HSC Thesaurus. All fill symbol colours are grouped by Broad Character Type, for example all character types and sub-types falling under the 'Communications' Broad Type have fill symbol colours in different shades of orange.

2.20   The style file is called HSC_Style_File and contains all symbology from the three layer files described above.

National Perspective texts

2.21   The national texts are in PDF format and were provided by Historic England.

Regional Perspective texts

2.22   Regional Perspective texts are not yet available but placeholders have been left in the National_HSC feature class to accommodate these texts in the future.

File structure

2.23   The National HSC is provided with the folder structure shown in

2.24   **Table** 2.2. In order for the MXD to function correctly, the file structure, naming and location of the files should be kept in this format. Moving or renaming files will result in broken links in the project file (MXD).

Table 2.2 Folder structure of the NHSC

Folder	Files contained
Data	NHSC Geodatabase
Documentation	User Guide
	Technical Advice Document
	Consolidation Project Report
	Two symbology style sheets
	Metadata
LayerFiles	3 layer files
	1 style file
MXD	MXD
NationalTexts	28 National Perspective texts

3   Maintenance

Geodatabase: feature classes

3.1   Updates to data should be made in line with the latest available version of the National HSC Method Statement.

Editing geometry

3.2   The National HSC data set has been dissolved in order to provide more efficient data handling. There are many multi-part polygons in the data set, if the data required editing, it may be necessary to 'explode' the multi-part polygons to single polygons in order to ensure edits are applied only where intended (and not over the wider data set).

3.3   Geometry of the data should be maintained when data is updated. Geometry problems lead to inefficient handling and errors when running tools. Geometry issues can include null geometry, self-intersections, unclosed rings, bad envelopes.

3.4   Topology of the data should also be maintained during data updates, this includes no overlapping data. There should be no gaps in the gridded sea data, and gaps should only exist in the land data where the land has no maritime character.

3.5   Grids for each of the individual project areas have been provided. These grids could be used to cut gridded data back to the original 250 m x 250 m grid squares if required during future database editing work. The grids were all retro-fitted to match the data sets and are not the original grids used to complete the projects. It is therefore recommended that these grids are not used to cut the entire data set, but used at a more local scale to make small changes in the gridded data. For project areas B and F, where there is no available full grid, cuts to the data can be made off existing data axes from surrounding grid squares.

Editing attribute table

3.6   Compulsory fields must be completed if new records are added to the attribute table, compulsory fields are indicated in **Table 2.1**.

3.7   Where there are fixed terms for fields, such as LCTN, the exact terminology should be used including use of correct case, spelling and characters. Refer to the National HSC User Guide for fixed terminology. Coded domains have been included in the geodatabase in order to control use of fixed terms. The coded domains are linked to the relevant fields and are available as drop down menus. For those coded domains relating to the HSC Character Type terminology and hierarchy, their values will also need to be updated to match the content of the latest version of the HSC Thesaurus.

3.8   Any updates to the LINK fields should be completed in the following structure in order to maintain functioning links to the National Perspective texts: ..\NationalTexts**[TY]**.pdf

3.9   If records are split or added, it will be necessary to assign unique IDs to these new records.

Geodatabase: tables

3.10   Any changes to the NHSC database would necessitate the generation of a new HSC_LINK_TABLE and HSC_LINK_TABLE_PRVS table. In addition, the introduction of the Regional Perspective texts would require a new table to be generated to accommodate these texts.

3.11   In order to generate a link tables, the ArcMap Summarize tool was used on the HSC_LINK_ID field in the National_HSC attribute table to generate a table for each marine level. An additional field

(Level) was added to each table to hold the name of the marine level, the tables were merged and saved into the geodatabase.

3.12   The structure of the link tables is shown in **Table 3.1**. Note that the HSC_LINK_TABLE_PRVS do not have a TY and BDTY field as this data is not stored in the NHSC database for previous SBTY

Table 3.1 Link table fields

Field name	Field alias
OBJECTID	OBJECTID
HSC_LINK_ID	Link Table ID
NAME	Name
SBTY	Sub-Character Type
TY	Character Type
BDTY	Broad Character Type
PRD	Period
SRC	Source
CNF	Confidence
NTS	Notes
LINK	Link
Level	Level

Metadata

3.13   Metadata is provided in spreadsheet format (UK GEMINI v.2.2) and .xml format (INSPIRE) and can be directly modified using suitable software such as Microsoft Excel and ArcCatalogue.

MXD

3.14   Any future alterations to the MXD must retain the text 'Not to be used for navigation'.

Layer files and style file

3.15   The layer files can be edited in ArcMap. The layer file must be applied to a data set, then in Layer Properties new values can be added manually (see **Figure 3.1**). Values can be removed and the symbology can be altered. Once additions have been made, a new layer file can be exported and the existing version can be superseded.

3.16   The style file can be edited using the Style Manager in ArcMap. Fill symbols can be added, removed or edited.

Figure 3.1 Adding new values to a layer file
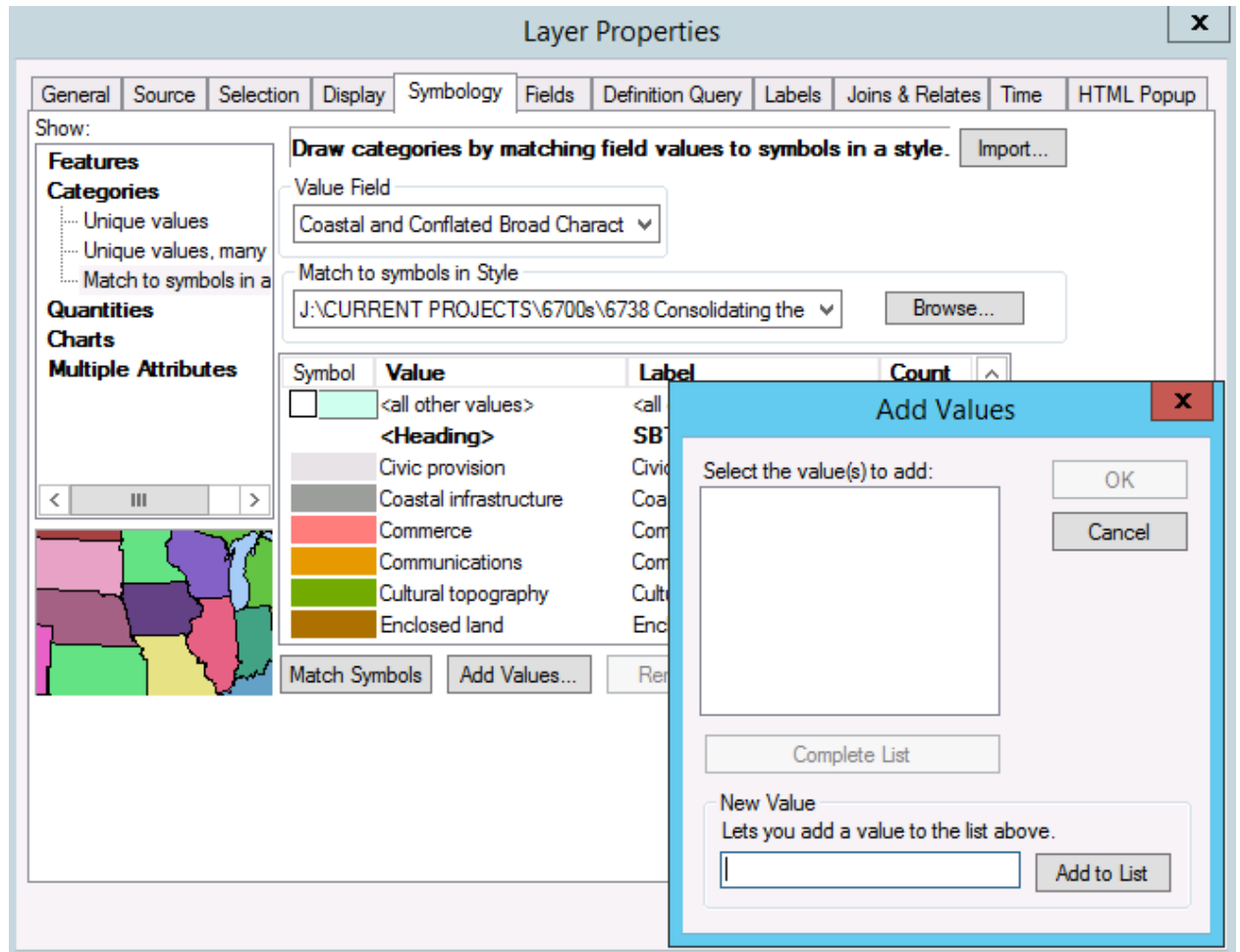
National Perspective texts

3.17   The National Perspective texts can be edited or replaced as required, however the file name and location needs to remain the same in order for the hyperlinks in the national HSC dataset to work correctly. If the PDF names and locations require changing, the link table will need to be updated to maintain functioning hyperlinks.

4 Compatibility

4.1 The NHSC database has been delivered in a format suitable for use in ESRI software. The core NHSC database is compatible with, or could be converted to data types suitable for other GIS software, however the map document (project MXD), hyperlinks and symbology files would need to be reconstructed for use in other software.