DGIWG 116-3-4

Elevation Surface Model (ESM) Encoding rules - Part 4: NSIF

Document type:	Standard
Document date:	19 November 2020
Edition:	1.1.1
Supersedes:	This document supersedes DGIWG 116-3-4 Ed. 1.1.0, Elevation Surface Model (ESM) Encoding rules – Part 4: NSIF (NATO Secondary Image Format), 18 May 2017.
Responsible Party:	Defence Geospatial Information Working Group
Audience:	This document is approved for public release and is available on the DGIWG website, http://www.dgiwg.org/
Abstract:	This document defines the ESM Encoding Rules on the basis of STANAG 4545 (NSIF) and the ESM UML model and metadata (DGIWG 116-1). It is to be used in conjunction with ESM Encoding Rules – Core (DGIWG 116-3-1).
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i. Submitting organizations

Nation	Parent organization
France (Lead Nation)	Institut Géographique National (IGN)
Czech Republic	Military Geographic and Hydrometeorologic Office (MGHM)
Denmark	Danish Geospatial Agency (SDFE)
Sweden	Military Geographic Service
Turkey	General Command of Mapping
United States	National Geospatial-Intelligence Agency (NGA)

ii. Revision history

Date	Release	Primary clauses modified	Description
1/03/2016	1.1 (draft1)	All	Submitted by NGA
8/08/2016	1.1 (draft2)		Incorporation in multi-part ESM Encoding Rules (DGIWG 116-3) as Part 4
18/10/2016	1.1 (draft3)		DGIWG TP October 2016 review Addition of JPEG2000 lossless capability for IC field + Addition of annex A
18/05/2017	1.1		Resolution of comments from DEU and FRA, at DGIWG TP May 2017
2/10/2020	1.1.1		Update of normative references (Section 3) and throughout the document

Foreword

An important area of consideration for the use of Elevation Surface Model data is the encoding format. Most data exchange standards are defined in terms of their encoding format. Often, information about the structure of the format itself dominates, and the information elements that describe the underlying nature of the data are a secondary consideration. In many instances, the information elements pertinent to understanding the nature of the data are not included with the data to be exchanged, relegating users of the data to depend on *a priori* knowledge that may, or may not be externally documented.

The standardization approach taken for the ESM is in line with the more modern approach of separating the information carrier (encoding format specification) design from the content description (ESM abstract content model) design. This approach potentially allows for several different encodings to represent the information content of the data to be exchanged in a form consistent with the underlying content model. Note, however, that popular formats used to carry elevation data in the past are not robust enough in their defined structures to fully carry all aspects of the ESM content model. The ESM Encoding Annexes within this implementation profile identify the relationship of the specific encoding format information elements with the corresponding ESM content model elements, thus identifying the degree to which the ESM content model can be expressed using a particular data format. Since the information elements of each format can be traced to the underlying ESM content model, consistency of information content exchange using these formats is greatly enhanced.

Introduction

This document specifies how the Elevation Surface Model (ESM) shall use the NSIF/NITF encoding standard to convey the elevation values assigned to regularly spaced grid points (under the Rectified Grid coverage model) or irregularly spaced grid points (under the Point coverage model) on the basis of the NATO STANAG 4545 (NSIF), equivalent to US NITF 2.1.

This document specifies the high-level requirements and encoding rules that shall be used for the exchange of elevation surface data when opting to use the NSIF and NITF file format structures. It constitutes a description of the bounds and constraints for the use of NSIF and NITF within the design objectives of the Elevation Surface Model (ESM). It is to be used in conjunction with ESM Encoding rules – Part 1: Core (DGIWG 116-3-1) for the general encoding rules for ESM data and associated metadata, as well as associated ESM GML document (if applicable). The main body of this document addresses the general approach for using NSIF/NITF within the context of the ESM. Appendix A outlines the internal NSIF/NITF data structures and defines the rules for representing the ESM content model using the syntax, structure and coding scheme available within the NSIF/NITF format. While Appendix A defines the rules for expressing the ESM content model in NSIF/NITF form, Appendix B defines the inverse encoding rules for extracting and interpreting content from NSIF/NITF form into the ESM content model. Appendix C is the abstract test suite for measuring conformance with the ESM content model when representing elevation surface data using NSIF/NITF. Users of this annex will develop an application-specific implementation profile(s) to capture the detailed design for using the ESM within the context of the intended deployment of ESM-enabled data, services and capabilities.

Note: This document contains no mapping with RectifiedGridcoverage (as of OGC GML Coverage - GMLCOV schema), which differ with the other encodings (GeoTIFF and GMLJP2); the main reason being that there is no NSIF/NITF GMLCOV extension.

1 Scope

This document specifies how the Elevation Surface Model (ESM) shall be formatted when using the NSIF and NITF tags to convey the elevation values assigned to grid points. Since the popular use of NSIF/NITF does not support the full representation of the metadata content model specified for ESM, the XML metadata files are to be used as part of the transmittal of ESM data contained in NSIF/NITF files.

NSIF/NITF is an image file format used for storing and interchanging raster images. For ESM, the elevation values can be carried as an array much like an image through use of the Elevation Grid Coverage class. It is a portable format, not specific to or favoring any particular operating systems, file systems, compilers, or processors. It is also extensible and designed to evolve as new needs arise.

The individual NSIF/NITF value file population strategy shall be defined with a means to associate each NSIF/NITF file with:

- An ESM Transmittal;
- An ESM Data Set;
- An ESM Elevation Collection, to include tile association, when tiling is used;
- The type of data contained within the value file (i.e. grid or point coverage);
- The surfaces represented by the data in the value file

It is to be used in conjunction with ESM Encoding rules – Part 1: Core (DGIWG 116-3-1) for the general encoding rules for ESM data and associated metadata, as well as associated ESM GML document (if applicable).

This document does not contain any ESM Coverage encoding specification (GML description).

2 Conformance

Any data claiming conformance with this profile shall pass all requirements described in Annex A.

3 Normative References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of these profiles.

International Standards

1. DGIWG 116-1: Elevation Surface Model, Edition 1.1, 17 September 2020 [ESM]
2. DGIWG 114: DGIWG Metadata Foundation, 2.0.0, 12 July 2017 [DMF]
3. DGIWG 116-3-1: DGIWG ESM Encoding Rules – Part 1: Core, Edition 1.1.1, 2 October 2020 [ESM_ER_Core]
4. STANAG 4545, NATO Secondary Image Format Edition 2, version 1.0.1, May 2013
5. Allied Engineering Document Publication AEDP-4, NATO Secondary Imagery Format (NSIF) STANAG 4545 (Ed. 2) Implementation Guide, May 2013
6. Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF) Volume 1, Tagged Record Extensions, Version 5.0 Appendix C, PIAE 3.0/CN2, 5 March 2020
7. ISO 639-2:1998 Codes for the representation of names and languages

National Standards

8. MIL-STD-2500C w/CHANGE 2, National Imagery Transmission Format Version 2.1, 2 January 2019

4 Terms and definitions, and abbreviated terms

4.1 Terms and definitions

Generally, the terms and definitions of the base standard DGIWG 116-1 (ESM) and DGIWG 116-3-1 (ESM Encoding Rules – Part 1: Core) apply to this profile. Some abbreviated terms are repeated in this document, for the sake of readability

4.2 Abbreviated terms

ASCII	American Standard Code for Information Interchange
CRS	Coordinate Reference System
DEM	Digital Elevation Model
DES	Data Extension Segment
DMF	DGIWG Metadata Foundation
ESM	Elevation Surface Model
HRE	High Resolution Elevation (cf. High Resolution Elevation Products - NGA.IP.0002_1.1)
IEEE	Institute of Electrical & Electronic Engineers
ISO	International Organization for Standardization
NITF	National Imagery Transmission Format (USA MIL-STD-2500C – NITF2.1)
NSIF	NATO Secondary Image Format
PIAPRD	Profile for Imagery Access Product (TRE)
TRE	Tagged Record Extension
XML	eXtensible Markup Language

5 Applicability and use

This ESM Encoding Rules for NSIF is applicable to any ESM elevation data encoded in NSIF/NITF, claiming compliance to ESM.

6 NSIF / NITF rules for ESM elevation data

In general, the elevation value records for ESM data delivered in NSIF/NITF format will conform to the standard NSIF and NITF formats as defined in the NSIF and NITF specifications. The following clauses constrain the implementation of NSIF/NITF for use with the ESM implementation profile.

6.1 NSIF/NITF Data Representation

Each NSIF/NITF file shall contain:

- File Header
- Extended Header Data to include the PIAPRD Tagged Record Extension (TRE)
- Image Subheader for DEM Height Data
- DEM Height Data
- Accuracy summary statistics
- Additional (optional) error propagation data may be included

Table 1: NSIF/NITF File Components Requirements

Component	**NSIF/NITF Header**	**Image Segment Subheader & data**	**XML DES**	**Shapefile DES**	**Comments**
File Header	Required				{1}
PIAPRD TRE	Required				{1}
Elevation Data		Required			{1}
Error Data		Optional			
XML Metadata			Required		{1}
Accuracy Summary Statistics			Required		{4 to 12}
Shapefile Data				Optional	{Multiple sets may be included.}
Error Propagation Data to be included in XML DES metadata (Optional, but recommended)					
Region Definition by Polygons – Method 1			{1 to N}		Two alternate methods are provided to define regions. They are mutually exclusive.
Region Definition per Post – Method 2		{1}	{1} *		

Component	NSIF/NITF Header	Image Segment Subheader & data	XML DES	Shapefile DES	Comments
Accuracy Summary Statistics per Region			{(4 to 12)N}		Summary statistics may optionally be defined for each region.
Systematic Error per Region			{1 to N}		Always included
Cross Region Systematic Error			{N/2 (N-1)}		Included for 2 or more regions.
Relative Error Covariance by Region			{2 to 2N}		Always included. Relative error requires 2 covariance matrices per region (U and V directions)
Random Error Covariance – Method 1					Two alternate methods are provided to define random error covariance terms. They are mutually exclusive.
Random Error Covariance per Region			{1 to N}		
Random Error Scale Factor per Post		{1}	{1} *		
Random Error Covariance – Method 2					
Random Error Variance Terms per Post		{1}	{1} *		
Random Error Cross Correlation Terms per Post		{1}	{1} *		

* Error components stored in NSIF/NITF image segments are always also referenced in the XML metadata.

NOTE: Item in brackets refers to number of instances in the file. "N" refers to the number of the regions defined.

Optionally the NSIF/NITF file may contain Error data associated with the elevation data. These include Error propagation region point-by-point values, Error propagation random error point-by-point scale factor values, Error propagation random error point-by-point covariance values, and Error propagation random error point-by-point correlation coefficient values. For each of these data types the NSIF/NITF file will contain:

- Image Subheader for Error Data type
- Error Data

One image segment containing the elevation data is always present in an HRE NITF file. When error propagation metadata is included, the NSIF/NITF file may contain 1, 2, or 3

additional image segments. One of these image segments may contain region definitions per post, dependent on the method used to define the regions. Additionally, when error propagation data is included, image segments (one or two) will be used to capture the random error per post. If the scale factor method is used for the random errors, this will consist of one image segment. Alternatively, the random errors could be expressed with one image segment for random error variance terms and a second segment for the cross-correlation terms. So, a complete NSIF/NITF file will contain from one to four image segments.

The detailed specifics of the encapsulation of this Error data into NSIF/NITF are referenced in Annex B.

The following diagram (Figure 1) provides an overview of the NSIF/NITF structure of an ESM based product in block format.

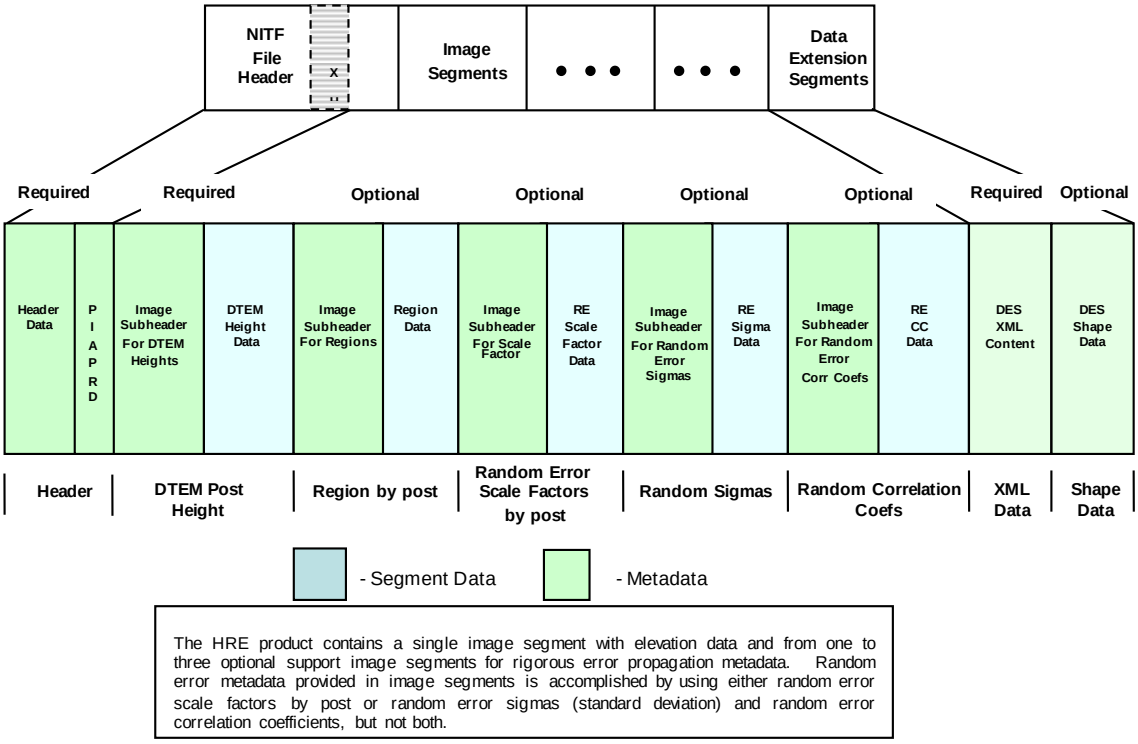


Figure 1: NSIF/NITF structure of an ESM based product (block format)

6.2 Valid Elevation values

The vertical unit of measure for NSIF/NITF elevation points shall be in meters. The unit of measure code 'M' shall be specified in the Band Subcategory (ISUBCAT01) field in the NSIF/ NITF Image Subheader. Valid elevation point values exist in geographic areas where the elevation point value can be accurately determined. For grid points with valid elevations, the data type shall be specified in the Pixel Value Type (PVTYPE) field in the NSIF/NITF Image Subheader. All numeric values are encoded in Most Significant Byte (MSB) first order known as the "big endian" convention.

- Valid elevation values for may be a signed 16 bit integer value. The PVTYPE value shall be SI (Signed Integer) designating that the data values are encoded

using 2's complement representation. The SI type indicates the data bits shall appear in the file in order of significance, beginning with the MSB and ending with the LSB.
- Valid elevation values may also be a 32 bit floating point value. The PVTYPE value shall be R (for Real). The data values shall be represented according to IEEE 32-bit floating point representation (IEEE-754).

6.3 Security Classification

NISF/NITF provides capability to store security classification information in the following NSIF/NITF header fields; FSCLAS, FSCLSY, FSCODE, FSCTLH, FSREL, FSDCTP, FSDCDT, FSDCXM, FSDG, FSDGT, FSCLTX, FSCATP, FSCAUT, FSCRSN, FSSRDT, FSCTLN, and Image sub-header and DES sub-header. Security classification information will also be included in the XML metadata file.

6.4 Void and Suspect Areas

Null (No-Data) values are used for geographic areas when the elevation point values cannot be accurately determined due to various factors. Reasons for Null Values may be because of image cloud cover, shadows or obscuration due to topographic conditions. The Null value, when used, shall be specified in the NITF Image Data Mask Table, Pad Output Pixel Code (TPXCD) field in the NSIF/NITF Image Subheader for Elevation Data.

- Null values for NSIF/NITF 16 bit data will be a signed 16 bit integer value encoded as hexadecimal 0x8001, decimal -32767.
- Null values for signed 32 bit data will be 32 bit integer value -32767 encoded as hexadecimal 0xFFFF8001, or "Not a number" (NaN) encoded as hexadecimal 0xFFFFFFFF in IEEE-754.

6.5 Accuracy

NSIF/NITF provides capability to store accuracy information within the NSIF/NITFformat. Storage of Accuracy summary statistics, and regional statistics may be stored in the NSIF/NITF header. Additional (optional) per post accuracy information may also be stored as additional image segments in the NSIF/NITF data. Summary accuracy values are also to be included in the XML metadata file.

6.6 Units of Measure

The vertical unit of measure for NSIF/NITF elevation points shall be in meters. The unit of measure code 'M' shall be specified in the Band Subcategory (ISUBCAT01) field in the NSIF/ NITF Image Subheader.

6.7 Date and Time

Date, time and producer information is stored in the NSIF/NITF PIAPRD TRE, and also in the file header, image sub-header and XML metadata. The data date will typically reflect the collection time of the elevation data source.

6.8 Coordinate Reference Systems and Datums

Horizontal Reference Datum

The Horizontal reference datum for NSIF/NITF data shall be the World Geodetic System - WGS-84 and the specific epoch shall be identified in metadata.

Vertical Reference Datum

The baseline vertical reference datum for all NSIF/NITF data will be ellipsoid height as defined by WGS-84. Data may optionally be output referenced to the current Earth Gravitational Model (EGM) implementation of WGS-84. NSIF/NITF header information will be will be populated to indicate the vertical reference system. (See Annex A).

6.9 Collection and Maintenance Constraints

ESM XML metadata files will be used to carry this type of information when needed.

6.10 Tiling of NSIF/NITF within ESM

The ESM allows for value records within an elevation collection or a fundamental dataset to be organized into tiles. The three primary motivations for organizing value records into a tiling scheme are: 1) The nature and description of the value records within the collection or dataset is different, thus requiring different metadata descriptions; 2) The physical size of the value data is so large that it warrants subdivision for ease of data management; and 3) The sampling density varies within the coverage of the gridded dataset. ESM tiling must be described in detail in the XML metadata and does not correspond to internal NSIF/NITF format tiling.

NSIF/NITF supports an internal format tiling structure called blocking. This should not be confused with an ESM defined “tile” as defined above. The concept of blocked images extends the image model for NSIF/NITF to support the representation of an image in terms of an orderly set of subimages (or subarrays) called blocks. For large images (e.g., those having more horizontal and vertical pixel values than typical display devices), the performance of an imagery implementation can be potentially improved by “blocking” the image; that is, ordering the pixel values in the NITF file as a series of concatenated pixel arrays.

6.11 Sub-groups

For the case when elevation value points are to be assigned a subgroup, the ESM specification states that the values record for each point shall carry an attribute that identifies the subgroup to which it belongs. The NSIF/NITF structure is not conducive to associating attributes with each elevation posting, but does allow such data to be represented as separate image segment(s) within a file. Sub-grouping identification is accomplished using the associated XML metadata DES.

6.12 Mapping with ESM / DMF metadata

The table provided in Annex C provides the mapping requirements between ESM metadata (based on DMF) and corresponding element in NISF/NITF elevation data file.

In addition to the elements specified in these tables, the RSFMT metadata element (fileDecompressionTechnique) must indicate which compression is implemented (if applicable).

Annex A
ESM NSIF/NITF encoding rules - Abstract test suites
(normative)

This Annex provides abstract test suites for ESM NSIF Encoding Rules build upon the DGIWG ESM and the NATO STANAG 4545 (NSIF), for data encoded in conformance with the rules specified in this document.

Note: Requirements in Section 6 are to be identified by the use of 'shall' (as they are not identified by a number).

A.1 Conformance of elevation data with NSIF/NITF

Purpose: An ESM NSIF/NITF data file shall conform to NSIF/NITF standards

Method: Inspect ESM NSIF/NITF data file against the requirements referenced below.

Reference: Requirements and tables in Section 6.1 + Annex B.

A.2 Correct encoding of CRS and UoM

Purpose: An ESM NSIF/NITF data file shall include correct definition of Horizontal and Vertical datum, as well as UoM for elevation data.

Method: Inspect ESM NSIF/NITF data file against the 2 requirements referenced below.

Reference: Requirements in 6.6 (UoM) and 6.8 (CRS).

A.3 Correct encoding of Security classification and Intellectual property rights information

Purpose: An ESM NSIF/NITF data file shall provide (when relevant) Security classification and Intellectual property rights information as specified.

Method: Inspect ESM NSIF/NITF data file against the requirements referenced below.

Reference: Requirements in 6.3.

A.4 Correct encoding of Void areas

Purpose: An ESM NSIF/NITF data file shall provide (when relevant) Void areas definition as specified.

Method: Inspect ESM NSIF/NITF data file against the requirement referenced below.

Reference: Requirement in 6.4.

A.5 Consistency between information provided by metadata and values in NSIF/NITF descriptive fields

Purpose: ESM metadata (based on DMF) and corresponding element in NISF/NITF elevation data file shall be consistent.

Method: Check the consistency between ESM metadata and ESM NSIF/NITF descriptive fields against the requirement referenced below.

Reference: Mapping provided in Annex C.

Annex B
NITF/NSIF File Format
(normative)

B.1 Introduction

B.1.1 Overview

This annex specifies the requirements for formatting within a NATO Secondary Image Format (NSIF)/National Imagery Transmission Format (NITF) file. This includes the NSIF/NITF File Header format, the NSIF/NITF Image Segment format for containing elevation data and related error propagation data, and the NSIF/NITF Data Extension Segment (DES) format for metadata describing the dataset. (See Figure B-1).

B.1.2 Metadata Overview

Metadata embedded within the NSIF/NITF file provides information about the organization, content, and structure of the NSIF/NITF file, and information about the elevation data, to include data about the sensor that captured the elevations, support information about the elevations, and a host of other values. The main purpose of this annex is to describe the NSIF/NITF file formatting required for specifying elevation data. This includes specifying NSIF/NITF header, sub-header, and Data Extension Segment (DES) field values, and the elevation data, error propagation data, and metadata (XML-formatted) contained within the NSIF/NITF file structure. For convenience, this document contains excerpts and tables from standards documents so that referencing these documents can be kept to a minimum. For implementation of this profile, all documentation should be reviewed for accuracies before proceeding.

B.1.3 Coordinate System

B.1.3.1 Ground Space

Ground space coordinates expressed in the NSIF/NITF Image Segments and Data Extension Segments are referenced to the World Geodetic System 1984 (WGS-84) coordinate system. NSIF/ NITF coordinate references are expressed in decimal degrees as a bounding polygon. However, the Image Geographic Location field (IGEOLO) in the NSIF/NITF image subheader indicates only the approximate geographic location of the image to only 3 decimal places, or 1-meter level for UTM projected data. The reliability of the IGEOLO becomes less effect the more accurate the elevation product, because of this lack of precision.

IGEOLO coordinates are therefore not intended for analytical purposes and are only intended to support general user appreciation for the image location for such things as file cataloguing and discovery, as used in libraries and repositories not capable of reading metadata stored in the XML_DATA_CONTENT DES. The subheader for this DES (see Table 10) includes a field (DESSHLPG) that also provides an approximate reference, although to greater precision. For positioning the data and for analytical purposes, the associated XML metadata (included in the DES) should be used, and specifically the ‘Resource extents’ and ‘Coordinate reference system – horizontal’ elements found in Annex B.

B.1.3.2 Image Space

Image (elevation post) space coordinates are defined in the NSIF/NITF row and column coordinates indexing system. When the row/column coordinate system is positioned such that the origin (0,0) of the array is at the upper left, the integer or integral image space coordinates associated with a single cell are assigned to the upper left corner of the cell. The corresponding geospatial coordinates are associated with the center of the cell (e.g. cell index 0.5,0.5 for the origin cell) , for the purposes of this specification. This reflects the value is point case (vice the value is area case) applicable to elevation postings. Note, for general NFIS/NITFS the IGEOLO location point of the geographic information is not directed in the standards. Hence, some applications could interpret the values stored in the IGEOLO to a point on the pixel other than the center point and adding to inaccuracies for the image location when using IGEOLO data.

B.2 Terms and Definitions

B.2.1 NSIF/NITF References

NSIF/NITF field format definitions were extracted from the NSIF/NITF Version 2.1 (MIL-STD-2500C 1 May 2006). The Compendium of Controlled Extensions for the National Imagery Transmission Format Volume 1 (STDI-0002-1) Tagged Record Extensions defines the PIAPRD Tagged Record Extension (TRE) used with ELEVATION DATA data. Volume 2 (STDI-0002-2) Data Extension Segments defines both the XML_DATA_CONTENT Data Extension Segment (DES) and the CSSHPA Data Extension Segment (DES) optionally used with elevation data.

B.2.2 Field Format Definitions

Basic Character Set (BCS)

A subset of the Extended Character Set (ECS). The most significant bit of the BCS character is set to 0. The range of valid BCS characters code is limited to 0x20 to 0x7E plus line feed (0x0A), form feed (0x0C), and carriage return (0x0D).

Basic Character Set-Alphanumeric (BCS-A)

A subset of the Basic Character Set. The range of allowable characters consists of space through tilde (codes 0x20 through 0x7E); and line feed, form feed, and carriage return (0x0A, 0x0C, and 0x0D).

Basic Character Set-Numeric (BCS-N)

A subset of the Basic Character Set-Alphanumeric. The range of allowable characters consists of minus through the number “9”, BCS codes 0x2D through 0x39, and plus, code 0x2B.

BCS Space BCS code 0x20.

Extended Character Set (ECS)

A set of 1-byte encoded characters. Valid ECS character codes range from 0x20 to 0x7E, and 0xA0 to 0xFF, as well as Line Feed (0x0A), Form Feed (0x0C) and Carriage Return (0x0D). As an interim measure, because of inconsistencies between standards, it is strongly advised that character codes ranging from 0xA0 to 0xFF should never be used. Therefore, the use of ECS characters should be restricted to its BCS Subset.

Field structure and default values. The NSIF/NITF uses byte counts to delimit header fields, as opposed to special end-of-field characters or codes or direct addressing. These counts are provided in the tables detailing the NSIF/NITF header and subheader field specifications. All data in fields designated "BCS-A" shall be left justified and padded to the right boundary with BCS spaces. All data in numeric fields (BCS-Numeric (BCS-N)) shall be right justified and padded to the left boundary with leading zeros. Where a BCS-N field allows a plus sign (code 0x2B) or a minus sign (code 0x2D), it is the left most character of the integer value. The standard default value shall be spaces for alphanumeric fields and zero for numeric fields. For a few fields, a specific default may be indicated in the field description. In this case, the field description shall take precedence. All header and subheader fields contained in a NSIF/NITF file shall contain either meaningful data (that is, data in accordance with the restrictions specified for the contents of the field in this document) or the specified default value.

B.2.3 Field Type Definitions

Required (R)

Designates a NSIF/NITF header or subheader field that must be present and filled with valid data.

Conditional (C)

A state applied to a NSIF/NITF header or subheader data field whose existence and content is dependent on the existence and/or content of another field.

<R> or <C>

BCS Spaces allowed for entire field when no specific default value is specified.

[PSG]

PSG designates a NSIF/NITF header or subheader field for which 'production-specific guidance' for population of the field will be provided by the elevation data production sponsoring activity.

B.3 High Resolution Elevation Product Format

B.3.1 High Resolution Elevation Product Format Overview

Elevation data is a product consisting of elevation data and associated metadata.

B.3.2 NSIF/NITF File Contents

The following diagram (Figure B-1) provides an overview of the NSIF/NITF structure of an elevation data product in block format. Subsequent sections provide further clarification of the format including NSIF/NITF TRE(s).

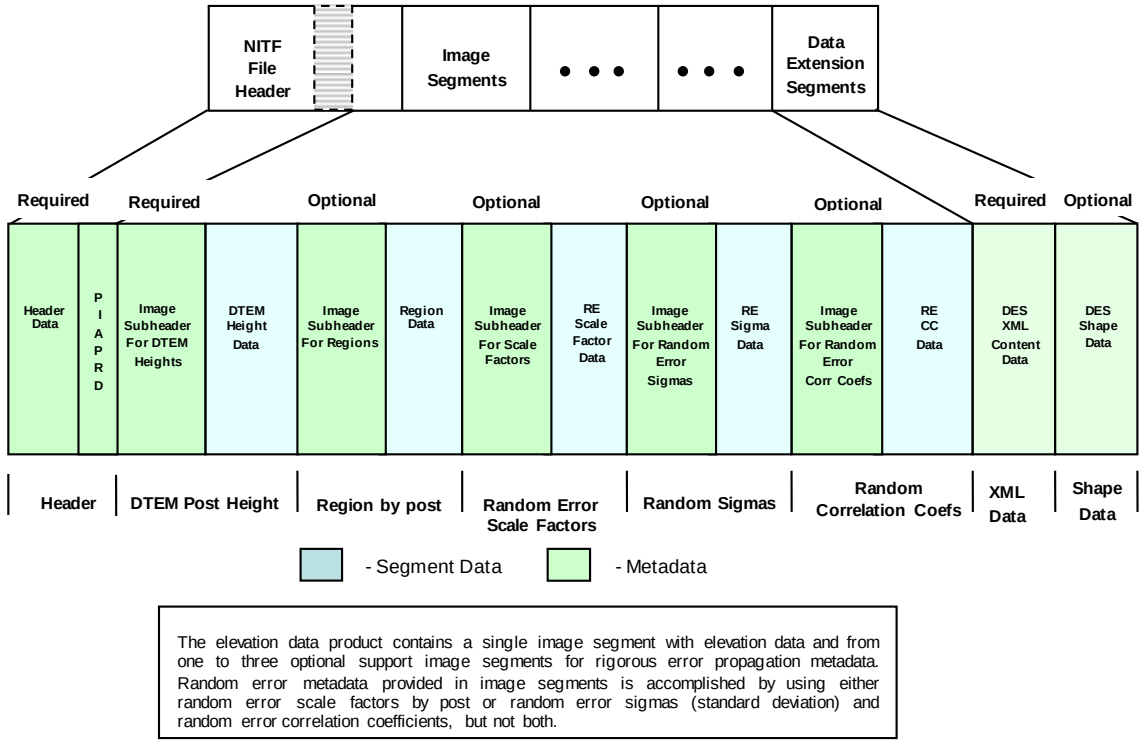
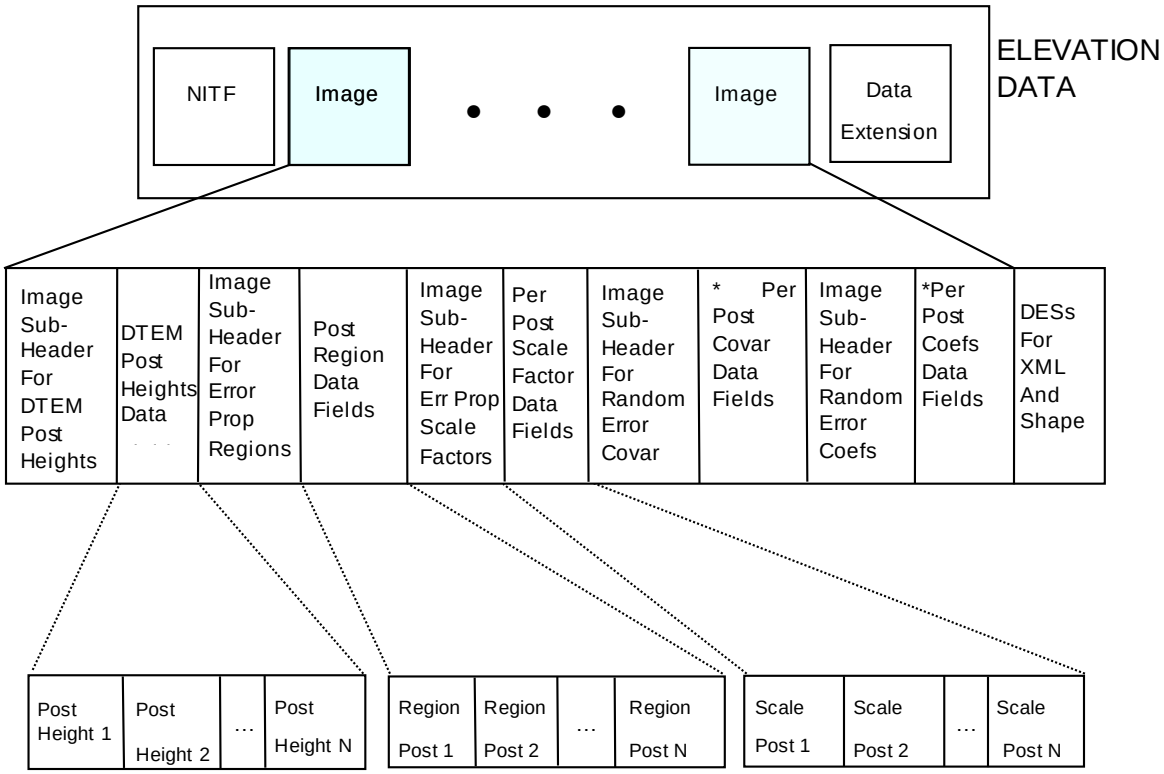


Figure 2: Diagram showing NSIF/NITF File Format

B.3.3 DTEM Post Height and Optional Error Propagation Image Segment Layout

Figure 3 describes the storage layout of the DTEM Post Heights and optional rigorous error propagation image segments associated with DTEM posts. These values (when present) will be stored as separate image segments (DTEM Post Heights, Error propagation region post-by-post values, Error propagation random error post-by-post scale factor values, Error propagation random error post-by-post covariance values, and Error propagation random error post-by-post correlation coefficient values). Additional required metadata is supplied in the NSIF/NITF XML_DATA_CONTENT DES.



NOTE: Asterisk (*) indicates the additional optional two image segments needed to specify the post-by-post random error covariance matrix elements. These are each 3-band image segments. One image segment consists of the elevation data diagonal term standard deviations, stored as 4-byte real numbers So, a given band within a segment contains values representing a specific location within the covariance matrix, for example the σ_x location. The other two bands permit storage for σ_y and σ_z. The second image segment of the set consists of the three off-diagonal correlation coefficients, stored as 1-byte integers. A given band then represents a specific off-diagonal term, σ_{xy}, σ_{xz}, or σ_{yz}.

Figure 3: Diagram indicating potential image segment components for the elevation data product

B.4 NSIF/NITF File Header Layout

B.4.1 Header Format

Table 2 shows how the NSIF/NITF File Header shall be populated during the creation of the product. The table provides details for populating header fields and places elevation data specific constraints for use of NSIF/NITF (e.g. tighter value range constraints and obligations than allowed in the NSIF/NITF standard). In some instances, the desired field value is not known until a data production order or plan is in place. Those fields for which Production Specific Guidance (PSG) is anticipated are designated with the letters 'PSG'.

Table 2: NSIF/NITF File Header Format for NSIF/NITF 2.1 images

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
FHDR	File Profile Name The valid value for this field is NITF.	4	BCS-A NSIF/NITF	R	*Data written in NSIF/ NITF format.*
FVER	File Version The valid value for this field is 02.10.	5	BCS-A 02.10	R	*Data written in NSIF/NITF version 02.10 format.*
CLEVEL	Complexity Level The complexity level required to interpret fully all components of the file.	2	BCS-A 03 to 09	R	*Primarily related to the number of DTEM posts. This is based on a value derived from* Table 9 in MIL-STD-2500C.
STYPE	Standard Type Standard type or capability. BF01 indicates that this file is formatted using ISO/IEC IS 12087-5.	4	BCS-A BF01	R	*NITF version 02.10 is intended to be registered as a profile of ISO/IEC 12087-5.*
OSTAID	Originating Station ID Identification code or name of the originating organization, system, station, or product.	10	BCS-A	R	*Organization responsible for producing the final data file.*
FDT	File Date & Time The date and time (UTC) of the file's origination.	14	BCS-N *CCYYMMDDhhmmss*	R	*Date and time of the creation of the elevation data file.* *Format*: *CCYYMMDDhhmmss*
FTITLE	File Title This field contains the title of the file.	80	ECS-A *Elevation Data ErrtvvDDMMSShDDDMMSSe_cxx.hrf*	R [PSG]	*"Elevation Data ErrtvvDDMMSShDDDMMSSe_cxx.hrf"* .

Field	Name	Size	Value Range	Type	Comments
FSCLAS	File Security Classification This value contains a valid value representing the classification level of the entire file.	1	ECS-A T, S, C, R, or U	R [PSG]	*For fields FSCLAS through FSCTLN, consult Production Specific Guidance (PSG) for applicable security field population values.*
FSCLSY	File Security Classification System This field shall contain valid values indicating the national or multinational security system used to classify the file.	2	ECS-A	<R> [PSG]	*Refer to current NATO security classification guidelines for proper information*
FSCODE	File Codewords This field shall contain a valid indicator of the security compartments associated with the file	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCTLH	File Control and Handling This field shall contain valid additional security control and/or handling instructions (caveats) associated with the file.	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSREL	File Releasing Instructions This field shall contain a valid list of country and/or multilateral entity codes to which countries and/or multilateral entities the file is authorized for release.	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSDCTP	File Declassification Type This field shall contain a valid indicator of the type of security declassification or downgrading instructions which apply to the file.	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSDCDT	File Declassification Date This field shall contain a date on which a file is to be declassified if the value in the File Declassification Type is DD.	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSDCXM	File Declassification Exemption This field shall indicate the reason the file is exempt from automatic declassification if the value in File Declassification Type is X.	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
FSDG	File Downgrade This field shall contain the classification level to which a file is to be downgraded if the value in the File Declassification Type is GD or GE.	1	ECS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSDGDT	File Downgrade Date This field shall indicate the date on which a file is to be downgraded if the File Declassification Type is GD.	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCLTX	File Classification Text This field shall be used to provide additional information about file classification to include identification of a declassification or downgrading event if the values in the File Declassification Type are DE or GE.	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCATP	File Classification Authority Type This field shall indicate the type of authority used to classify the file.	1	ECS-A O, D, M	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCAUT	File Classification Authority This field shall identify the classification authority for the file dependent upon the value in File Classification Authority Type.	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCRSN	File Classification Reason This field shall contain values indicating the reason for classifying the file.	1	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSSRDT	File Security Source Date This field shall indicate the date of the source used to derive the classification of the file.	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCTLN	File Security Control Number This field shall contain a valid security control number associated with the file.	15	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
FSCOP	File Copy Number This field shall contain the copy number of the file.	5	BCS-N 00000	R	*If the field is all zeros, this shall imply that there is no tracking of the number of copies.*
FSCPYS	File Number of Copies This field shall contain the total number of copies of the file.	5	BCS-N 00000	R	*If the field is all zeros, this shall imply that there is no tracking of the number of copies.*

Field	Name	Size	Value Range	Type	Comments
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	Default 0 = Not Encrypted
FBKGC	File Background Color This field shall contain the three color components of the file background in the order Red, Green, Blue.	3	Unsigned Binary Integer *0x00, 0x00, and 0x00*	R	*This field contains unsigned binary integer values with a range of 0x00, 0x00, and 0x00 (Black) to 0xFF, 0xFF, 0xFF (White).*
ONAME	Originator's Name This field shall contain a valid name for the operator who originated the file.	24	ECS-A	R [PSG]	*Lists the organization responsible for creating the final data product and shall be followed by BCS spaces to reach size.*
OPHONE	Originator's Phone Number This field shall contain a valid phone number for the operator who originated the file.	18	ECS-A	R [PSG]	*Originator's phone number followed by BCS spaces to fill size.*
FL	File Length This field shall contain the length in bytes of the entire file including all headers, subheaders, and data.	12	BCS-N 000000000388 to 999999999998	R	*BCS-N positive integer* *Calculated length of entire file in bytes, including all headers, subheaders and data.*
HL	NITF File Header Length This field shall contain a valid length in bytes of the NITF file header.	6	BCS-N 000388 to 999998	R	*BCS-N positive integer. Length of NITF file header in bytes*
NUMI	Number of Image Segments Indicates the number of image segments in the NITF file.	3	BCS-N 001 to 004	R	Table 1 in MIL-STD-2500C.
LISH001	Length of 1st Image Subheader This field shall contain a valid length in bytes for the image subheader.	6	BCS-N 000439 to 999998	R	*Length of the DTEM Post Height image subheader*
LI001	Length of 1st Image This field shall contain a valid length in bytes of the image data.	10	BCS-N 0000000001 to 9999999998	R	*Length of the DTEM Post Heights image segment*
LISHn	Length of nth Image Subheader	6	BCS-N 000439 to 999998	C	*Length of the Rigorous Error Propagation Region Definition image subheader, if present.*
LIn	Length of nth Image	10	BCS-N 0000000001 to 9999999998	C	*Length of the Rigorous Error Propagation Region Definition image segment, if present.*
LISHn	Length of nth Image Subheader	6	BCS-N 000439 to 999998	C	*Length of the Rigorous Error Propagation Scale Factor Definition image subheader, if present.*

Field	Name	Size	Value Range	Type	Comments
LIn	Length of n^{th} Image	10	BCS-N 0000000001 to 9999999998	C	*Length of the Rigorous Error Propagation Scale Factor Definition image segment, if present.*
LISHn	Length of n^{th} Image Subheader	6	BCS-N 000439 to 999998	C	*Length of the Rigorous Error Propagation Random Error Covariance Definition image subheader, if present.*
LIn	Length of n^{th} Image	10	BCS-N 0000000001 to 9999999998	C	*Length of the Rigorous Error Propagation Random Error Covariance Definition image segment, if present.*
LISHn	Length of n^{th} Image Subheader	6	BCS-N 000439 to 999998	C	*Length of the Rigorous Error Propagation Random Error Correlation Coefficient Definition image subheader, if present.*
LIn	Length of n^{th} Image	10	BCS-N 0000000001 to 9999999998	C	*Length of the Rigorous Error Propagation Random Error Correlation Coefficient Definition image segment, if present.*
NUMS	Number of Graphics This field shall contain the number of separate graphic segments included in the file.	3	BCS-N 000-999 Default value is 000	R [PSG]	*This shall be "000" unless graphics are added. Inclusion of Graphics is optional.*
LSSHn	Length of n^{th} Graphic Subheader This field shall contain a valid length in bytes for the n^{th} graphic subheader, where n is the number of the graphic segment counting from the first graphic (n=001) in the order of the graphic segments' appearance in the file.	4	BCS-N 0258 to 9998	C	*Inclusion of Graphics is optional.*
LSn	Length of the n^{th} Graphic This field shall contain a valid length in bytes of the n^{th} graphic, where n is the number of the graphic segment counting from the first graphic (n=001) in the order of the graphic segments' appearance in the file.	6	BCS-N 000001 to 999998	C	*Inclusion of Graphics is optional.*
NUMX	Reserved for Future Use This field is reserved for future use.	3	BCS-N 000	R	*This field shall be filled with BCS zeros (0x30)*

Field	Name	Size	Value Range	Type	Comments
NUMT	Number of Text Files This field shall contain the number of separate text segment(s) included in the file.	3	BCS-N 000-999 Default value is 000	R [PSG]	*This shall be "000" unless text segments are added. Inclusion of text segments is optional.*
LTSHn	Length of the n^{th} text subheader This field shall contain a valid length in bytes for the n^{th} text subheader, where n is the number of the text segment, counting from the first text segment (n=001) in the order of the text segments' appearance in the file.	4	BCS-N 0282 to 9998	C	*Inclusion of text segments is optional.*
LTn	Length of the n^{th} Text file This field shall contain a valid length in bytes of the n^{th} text segment, where n is the number of the text segment, counting from the first text segment (n=001) in the order of the text segments' appearances in the file.	5	BCS-N 00001 to 99998	C	*Inclusion of text segments is optional.*
NUMDES	Number of Data Extension Segments This field shall contain the number of separate data extension segments included in the file.	3	BCS-N 001 to 010	R [PSG]	*An elevation data NITF file will always have at least one DES to contain XML-formatted metadata. The file may also include DES(s) with Shapefiles.*
LDSH001	Length of the 1^{st}Data Extension Segment Subheader This field shall contain a valid length in bytes for the 1^{st} data extension segment subheader.	4	BCS-N 0200 to 9998	R	*Length in bytes of the XML_DATA_CONTENT DES subheader.*
LD001	Length of 1^{st} Data Extension Segment Data This field shall contain a valid length in bytes of the data in the 1^{th} data extension segment.	9	BCS-N 000000001 to 999999998	R	*Length in bytes of the data in the XML_DATA_CONTENT DES.*

Field	Name	Size	Value Range	Type	Comments
LDSHn	Length of the n^{th} Data Extension Segment Subheader This field shall contain a valid length in bytes for the n^{th} data extension segment subheader, where n is the number of the data extension segment *counting from the first data extension segment (n=001) in order of the data extension segment's appearance in the file.*	4	BCS-N 0200 to 9998	C	*Length in bytes of the CSSHPA DES subheader, if present.*
LDn	Length of n^{th} Data Extension Segment Data This field shall contain a valid length in bytes of the data in the n^{th} data extension segment, where n is the number of the data extension segment counting from the first data extension segment (n=001) in order of the data extension segment's appearance in the file.	9	BCS-N 000000001 to 999999998	C	*Length in bytes of the data in the CSSHPA DES, if present.*
NUMRES	Number of Reserved Extension Segments This field shall contain the number of separate reserved extension segments included in the file.	3	BCS-N 000	R	*"000" There are no reserved extension segments included in the file.*
UDHDL	User Defined Header Data Length A value of BCS zeros shall represent that no tagged record extensions are included in the UDHD.	5	BCS-N 00000	R	*There are no TREs included in the User Defined Header.*
XHDL	Extended Header Data Length This field shall contain a valid length in bytes for all the TREs in the extended header data portion of NITF file. The field shall contain the sum of the length of all the tagged record extensions appearing in the XHD field plus 3 bytes (length of XHDLOFL).	5	BCS-N	R	*The only TRE to appear in the Extended Header Data is the PIAPRD TRE.*

Field	Name	Size	Value Range	Type	Comments
XHDLOFL	Extended Header Data Overflow This field shall contain BCS zeros (0x30) if the tagged record extensions in XHD do not overflow into a DES, or shall contain the sequence number of the DES into which they do overflow.	3	BCS-N 000	C	*A TRE overflow condition does not exist for elevation data.*
XHD	Extended Header Data This field shall contain controlled tagged record extensions. The length of this field shall be the length specified by the field XHDL minus 3 bytes. Controlled tagged record extensions shall appear one after the other with no intervening bytes.	†[1]	PIAPRD TRE	C	*The PIAPRD TRE is placed in this field.*

†[1] - As Specified in XHDL minus 3 bytes

B.4.2 PIAPRD TRE Format

Profile for Imagery Access Product Support Extension TRE

Support information about elevation data product processing including date/time, software type, and software version will be stored in the PIAPRD TRE. In addition, this TRE will hold information about additional image sections within the product. These sections include unique identifiers (IDs) for the DTEM Post Height segment, and if present, Rigorous Error Propagation Region definition, Rigorous Error Propagation random error Scale Factor definition, Rigorous error Propagation random error Covariance data, and Rigorous Error Propagation random error Correlation Coefficient data image segments. These IDs are used to associate the DTEM Post Heights, with any of the Rigorous Error Propagation image segments that may be included.

Table 3: PIAPRD TRE Format

(Type "R"=Required, "C" = Conditional, "<>" = BCS Spaces Allowed for Entire Field)

Field	Name	Size	Value Range	Type	Comments
CETAG	Unique Extension Identifier	6	BCS-A PIAPRD	R	
CEL	Length of Entire Tagged Record	5	BCS-N 00201-63759	R	
ACCESSID	Access ID	64	BCS-A	<R>	*Default – BCS Spaces*
FMCONTROL	FM Control Number	32	BCS-A	<R>	*Default – BCS Spaces*
SUBDET	Subjective Detail	1	BCS-A	<R>	*Default – BCS Space* P - Poor, F - Fair, G - Good, E – Excellent

Field	Name	Size	Value Range	Type	Comments
PRODCODE	Product Code	2	BCS-A	<R>	*Default – BCS Spaces*
PRODUCERSE	Producer Supplement	6	BCS-A	<R>	*Default – BCS Spaces*
PRODIDNO	Product ID Number	20	BCS-A	<R>	*Default – BCS Spaces*
PRODSNME	Product Short Name Identifies the abbreviated name of a product stored in the archive.	10	BCS-A *Elevation data*	R	*"Elevation"*
PRODUCERCD	Producer Code	2	BCS-A	<R>	*Default – BCS Spaces*
PRODCERTIME	Producer Time Identifies the date or the date and time that the product was created or last modified, expressed in ZULU time.	14	BCS-A CCYYMMDDHHMMSS (ZULU)	R	Date or date and time of the version number reported in the file title (FTITLE) field in the file header
MAPID	Map ID	40	BCS-A	<R>	*Default – BCS Spaces*
SECTITLEREP	SECTITLE Repetitions	2	BCS-N 00	R	*"00" – Indicating zero repeating SECTITLE values*
REQORGREP	REQORG Repetitions	2	BCS-N 00	R	*"00" – Indicating zero repeating REQORG values*
KEYWORDREP	KEYWORD Repetitions	2	BCS-N 00	R	*"00" No keywords are used.*
ASSRPTREP	ASSPRT Repetitions	2	BCS-N 00	R	*"00" – Indicating zero repeating ASSRPT values*
ATEXTREP	ATEXT Repetitions Identifies the number of times the ATEXTREP field repeats per extension instance.	2	BCS-N 01 - 05	R	*For elevation data , this is the number of Image Segments contained within the elevation data (Typically 01 to 05). This number is used to determine how many ATEXT fields will follow. These ATEXT fields represent unique Segment IDs contained in the IID2 (NSIF/NITF 2.10) fields of the image segments.*

Field	Name	Size	Value Range	Type	Comments
ATEXTnn	Associated Text nn Provides the nnth text block further describing the imagery product. The number of ATEXTs between the previous field and this is represented in the ATEXTREP field.	255	BCS-A *ELLyyyymmdd*	R	*This is used as an internal identification number mechanism.* *The format for the DTEM Post Heights, identification tags is:* *ELLyyyymmdd*
	Where: ○ *E – required portion of keyword for E DTEM segment* ○ *LL – the two character elevation data product designator (e.g. EGP, LL will be "GP").* ○ *yyyymmdd format, where yyyy is the year, mm is the month, and dd is the day of the month* *The format for any rigorous error image segments included will follow the same format pattern, with the first three letters changed to one of the following, identification tags:* ○ *REG – required portion of keyword for rigorous error regions segment* ○ *RSF – required portion of keyword for rigorous error random error scale factor segment* ○ *COV – required portion of keyword for rigorous error propagation random error covariance segment* ○ *COR – required portion of keyword for rigorous error propagation random error correlation coefficient segment* *NOTE:* *The exploitation system will be able to match these segments by comparing these values.*				

B.5 Elevation data Post Height

B.5.1 Elevation data Post Height

The first, and possibly only, image segment in the elevation data NSIF/NITF product contains the elevation data post heights. This image segment is comprised of Image subheader information and DTEM post height data. Metadata associated with the DTEM data is contained in the XML_DATA_CONTENT DES.

B.5.2 Image Subheader

This section describes the fields and contents within the IM subheader. For the DTEM Post Heights, this IM subheader will contain the values designated in Table B-3.

Table 4: Elevation data Post Height Image Subheader Format

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
IM	File Part Type This field shall contain the characters "IM" to identify the subheader as an image subheader.	2	BCS-A IM	R	*"IM"*

Field	Name	Size	Value Range	Type	Comments
IID1	Image ID1 This field shall contain a valid alphanumeric identification code associated with the image.	10	BCS-A Elevation	R	*"Elevation"* *Short name that identifies the DTEM Post Height segment.*
IDATIM	Image Date & Time This field shall contain the time (UTC) of the image acquisition.	14	BCS-N *CCYYMMDDhhmmss*	R	*Date/Time that best reflects the currency of the elevation postings. Typically the date/time the sensor acquired the data from which the elevation postings were derived.*
TGTID	Target ID This field shall contain the identification of the primary target.	17	BCS-A (17 space characters)	<R>	17 BCS spaces (0x20)
IID2	Image IID2 This field contains the identification of additional information about the image.	80	ECS-A *ELLyyyymmdd*	R	*Unique identifier for the DTEM Post Height Segment. This MUST match the corresponding value found in the PIAPRD TRE field ATEXT of the file header.*
ISCLAS	Image Security Classification	1	ECS-A	R [PSG]	*For fields ISCLAS through ISCTLN, consult Production Specific Guidance (PSG) for applicable NATO security field population values.*
ISCLSY	Image Security Classification System	2	ECS-A Note: this field may contain two space characters when the FSCLAS value is 'U'.	<R> [PSG]	*Refer to current NATO security guidelines for general description of these fields. Consult current security guidelines at the time of production to determine proper markings.*
ISCODE	Image Codewords	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLH	Image Control and Handling	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISREL	Image Releasing Instructions	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISDCTP	Image Declassification Type	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCDT	Image Declassification Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCXM	Image Declassification Exemption	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDG	Image Downgrade	1	BCS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDGDT	Image Downgrade Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCLTX	Image Downgrade Text	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCATP	Image Classification Authority Type	1	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCAUT	Image Classification Authority	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRSN	Image Classification Reason	1	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRDT	Image Security Source Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLN	Image Security Control Number	15	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	*"0"* *Elevation data is not encrypted.*

Field	Name	Size	Value Range	Type	Comments
ISORCE	Image Source This field shall contain a description of the source of the image.	42	ECS-A	<R> [PSG]	*The general type of the collection source of the data; such as LIDAR, IFSAR, SAR, or EO for sensor-based sources.* **When classified, the description shall be preceded by the classification, including codewords.*
NROWS	Number of Significant Rows in Image This field shall contain the total number of rows of significant pixels in the in the image.	8	BCS-N 00000001 to 99999999	R	*Number of rows in the DTEM.*
NCOLS	Number of Significant Columns in Image This field shall contain the total number of columns of significant pixels in the image.	8	BCS-N 00000001 to 99999999	R	*Number of columns in the DTEM.*
PVTYPE	Pixel Value Type This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image.	3	BCS-A R, SI	R	*"R" – indicating 'real' for the ELL case.* *"SI" – indicating 'signed integer' for the geographic case.*
IREP	Image Representation This field shall contain a valid indicator of the processing required in order to display an image.	8	BCS-A NODISPLY	R	*"NODISPLY"* *Indicating data not intended for display.*
ICAT	Image Category This field shall contain a valid indicator of the specific category of image, raster or grid data.	8	BCS-A DTEM	R	*"DTEM"- indicating Matrix Data (elevation). The value 'DTEM' shall be followed by 4 BCS spaces (0x20).*
ABPP	Actual Bits-Per-Pixel Per Band This field contains the number of significant bits for the value in each band of each pixel without compression.	2	BCS-N 16, 32	R	*16 when Signed Integer* *32 when Real*
PJUST	Pixel Justification When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified or right justified.	1	BCS-A R	R	*"R" – indicating Right Justified*

Field	Name	Size	Value Range	Type	Comments
ICORDS	Image Coordinate System This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO).	1	BCS-A D N S	R	*"D"- indicating decimal degrees.* *N/S indicating UTM*
IGEOLO	Image Geographic Location This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field.	60	BCS-N *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *Or UTM corner locations for UTM referenced data*	R	*Coordinates of the footprint of the DTEM.* *Format:* *"±dd.ddd±ddd.ddd"* *(repeating a total of four times)* *Or UTM coordinates for UTM referenced data* *Note: the coordinates provided here are approximate and intended to support discovery and cataloguing of the dataset and not intended for analytical purposes. For data positioning and analysis, refer to the polygon extents provided in the XML DATA CONTENT DES*
NICOM	Number of Image Comments This field shall contain the number of image comment fields to follow .	1	BCS-N 0	R	*"0" – indicating no optional comment fields.*
IC	Image Compression This field contains a valid code indicating the form of compression used in representing the image data.	2	BCS-A NC, NM, C8, M8	R [PSG]	*"NC" – indicating Not Compressed.* *"NM" – indicating use of a pixel mask table.* *C8 – compressed JPEG2000 (jc2 format)* *M8 – compressed JPEG2000 with masking (jc2 format)*
COMRAT	If the value of IC is C8 or M8, this field shall contain a value representing the nominal compression rate (numbers of bits-per-pixel-per-band) of the compressed image. See the BIIF Profile for JPEG 2000 (BPJ2K) for guidance in populating this field.	4	BCS-A Nxxx	C	*Required when IC = C8 or M8 (numerically lossless JPEG2000)*

Field	Name	Size	Value Range	Type	Comments
NBANDS	Number of Bands This field shall contain the number of data bands within the specified image.	1	BCS-A 1	R	*"1" – indicating one band (DTEM Post Height)*
IREPBAND1	1st Band Representation This field contains a valid indicator of the interpretation of the 1st band.	2	BCS-A (2 space characters)	<C>	*Default – BCS Spaces*
ISUBCAT1	1st Band Significance for Image Category This field provides the significance of the 1st band of the image.	6	BCS-A M	<R>	*"M" Terrain elevation values are in meters.*
IFC1	1st Band Image Filter Condition This field shall contain the value N (to represent none).	1	BCS-A N	R	*"N" – indicating no band filter condition*
IMFLT1	1st Band Standard Image Filter Code Reserved for future use.	3	BCS-A (3 space characters)	<R>	*Default – BCS Spaces*
NLUTS1	Number of Look-up Tables for the 1st Band This field shall contain the number of LUTs associated with the nth band of the image.	1	BCS-A 0	<R>	*"0" – indicating the number of lookup tables*
ISYNC	Image Sync Code This field shall contain BCS zero (0x30)	1	BCS-N 0	R	*"0" – no sync code*
IMODE	Image Mode This field shall contain an indicator of whether the image bands are stored sequentially, or band interleaved by block, or band interleaved by pixel, or band interleaved by row.	1	BCS-A B	R	*"B" – indicating data is stored band interleaved by block.*
NBPR	Number of Blocks per Row This field shall contain the number of image blocks in a row of blocks in the horizontal direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per row*
NBPC	Number of Blocks per Column This field shall contain the number of image blocks in a column of blocks in the vertical direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per column*

Field	Name	Size	Value Range	Type	Comments
NPPBH	Number of Pixels per Block Horizontal This field shall contain the number of pixels horizontally for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of rows of the DTEM. Use 'large block' option (value = '0000') when number of rows is greater than 8192 and designates that the number of pixels vertically is specified by the value in NROWS.*
NPPBV	Number of Pixels per Block Vertical This field shall contain the number of pixels vertically for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of columns of the DTEM. Use 'large block' option (value = '0000') when number of columns is greater than 8192 and designates that the number of pixels vertically is specified by the value in NCOLS.*
NBPP	Number of Bits per Pixel per Band This field shall contain the number of storage bits used for the value from each component of a pixel value.	2	BCS-N 16, 32	R	*16 when Signed Integer* *32 when Real*
IDLVL	Display Level This field shall contain a valid value that indicates the graphic display level of the image relative to the other displayed file components.	3	BCS-N 001	R	*"001" – for the IM with the DTEM data.*
IALVL	Attachment Level This field shall contain a valid value that indicates the attachment level of the image.	3	BCS-N 000	R	*"000" – for the IM with the DTEM data.*
ILOC	Image Location This field shall contain the location of the first pixel of the first line of the image.	10	BCS-N 0000000000	R	*"0000000000"*
IMAG	Image Magnification This field shall contain the magnification factor of the image relative to the original source.	4	BCS-A 1.0	R	*"1.0 " indicating the original product (not sub-sampled)*
UDIDL	User defined image data length A value of BCS zeros (0x30) shall denote that no TREs are included in the UDID field.	5	BCS-N 00000	R	*"00000" No TREs are included.*

Field	Name	Size	Value Range	Type	Comments
IXSHDL	Extended subheader data length A value of BCS zeros (0x30) shall denote that no TREs are included in the IXSHD field.	5	BCS-N 00000	R	*"00000" No TREs are included.*

B.5.3 Image Data Mask

An image data mask structure follows the image subheader when the Image Compression Field value is "NM" or "M8". The image data mask identifies those data blocks containing one or more instances of a specified data value that requires special interpretation. The numerical value of the special data value is specified by the NITF Image Data Mask Table, Pad Output Pixel Code (TPXCD) field. The designated special value can be located anywhere inside the significant image pixels defined by NROWS and NCOLS, and therefore impact the interpretation of the data. For elevation data, the image data mask designates the "no-data value" used to indicate that a valid value is missing.

The structure of the image data mask is shown in Table B-4. When applicable, the image data mask is used with the elevation data Post Height image subheader, the Random Error Scale Factors by Post image subheader, the Random Error Covariance by Post image subheader, and the Random Error Correlation Coefficients by Post image subheader.

Table 5: Image Data Mask Table

Field	Name	Size	Value Range	Type	Comments
IMDATOFF	Blocked Image Data Offset. This field is included if the IC value contains M. It identifies the offset from the beginning of the Image Data Mask to the first byte of the blocked image data.	4	Unsigned binary integer 0 to 2^{32-1} 0x0000000F or 0x00000010 or 0x00000012 and 4 bytes per each block in image segment	C	Unsigned binary integer: *The offsets (decimal) are: 8 (PVTYPE INT), 8 or 16 (PVTYPE SI), or 18 (PVTYPE R), plus 4 bytes per each block in image segment.*
BMRLNTH	Block Mask Record Length. This field is included if the IC value contains M. It identifies the length of each Block Mask Record (BMRnBNDm) in bytes.	2	Unsigned binary integer 0x0000	C	*0x0000 denotes that no Block Mask Records are recorded.*

Field	Name	Size	Value Range	Type	Comments
TMRLNTH	Pad Pixel Mask Record Length. This field is included if the IC value contains M. It identifies the length of each Pad Pixel Mask Record in bytes. When present, the length of each Pad Pixel Mask Record is 4 bytes. The total length of the Pad Pixel Mask Records is equal to TMRLN	2	Unsigned binary integer; 0x0004	C	*0x0004 denotes that Pad Pixel Mask Records (4 bytes each) are present.*
TPXCDLNTH	Pad Output Pixel Code Length. This field is included if the IC value contains M. It identifies the length in bits of the Pad Output Pixel Code.	2	Unsigned binary integer 0x0008 0x0010 0x0020	C	*Length must be as specified in NBPP for the applicable image segment.* *Allowed NBPP values (decimal) include:* *08, 16, and 32.*
TPXCD	Pad Output Pixel Code. This field is included if the IC value contains M and TPXCDLNTH is not zeros (0x0000). It contains the output pixel code that represents a pad pixel in the image. This value is unique within the image, and allows the user to identify pad pixels. The pad output pixel code length is determined by TPXCDLNTH.	1 or 2 or 4	For PVTYPE=SI and NBPP=08: 0x81 For PVTYPE=SI and NBPP=16: 0x8001 For PVTYPE=R and NBPP=32: 0xFFFFFFFF	C	*The SIZE (in bytes) of the field is determined by the NBPP value:* *1 when NBPP=08* *2 when NBPP=16* *4 when NBPP=32* *The designated 'no-data' values (decimal) are:* *8-bit INT: 0* *8-bit SI: -127* *16-bit SI: -32767* *32-bit R: not defined*
TMRnBNDm	Pad Pixel n, Band m. This field shall contain the nth Pad Pixel Mask Record for band m. It is recorded/transmitted only if the TMRLNTH field does not contain zeros (0x0000). The field shall contain an offset in bytes from the beginning of the Blocked Image Data to the first byte of block n of the image data of band m if block n contains pad pixels, or the default value 0xFFFFFFFF to indicate that this block does not contain pad pixels.	4	Unsigned binary integer 0xnnnnnnnn	C	*For IMODEs B and P:* *Increment n only; m is always 1.*

B.6 Rigorous Error Propagation

B.6.1 Rigorous Error Propagation Regions

This image segment is comprised of the standard NSIF/NITF 2.1 Image Subheader information and rigorous error propagation post-by-post region definition data. This is an

optional image segment, since the regions may also be defined by specifying polygon boundaries in the XML_DATA_CONTENT DES. The DES specifies which of these two methods of defining the regions is being used. Regions (a minimum of one) are always defined for error propagation metadata since this is how the systematic error covariance data is specified. In addition, the regions can be used in defining the random error nominal covariance terms.

B.6.2 Image Subheader

This section describes the fields and contents within the IM subheader. For the rigorous error propagation region definition, this IM subheader will contain the values designated in Table 6. Metadata associated with the rigorous error propagation region data is contained in the XML_DATA_CONTENT DES.

Table 6: Error Propagation Regions Image Subheader Format

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
IM	File Part Type This field shall contain the characters "IM" to identify the subheader as an image subheader.	2	BCS-A IM	R	*"IM"* .
IID1	Image ID1 This field shall contain a valid alphanumeric identification code associated with the image	10	BCS-A *EP_REGIONS*	R	*Short name that identifies the error propagation regions segment –* *"EP_REGIONS"*
IDATIM	Image Date & Time This field shall contain the time (UTC) of the image acquisition.	14	BCS-N *DDHHMMSSZMONYY*	R	*Date/Time that this image segment was created*
TGTID	Target ID This field shall contain the identification of the primary target.	17	BCS-A (17 space characters)	<R>	*Default – BCS Spaces*
IID2	Image IID2 This field contains the identification of additional information about the image.	80	ECS-A *REGLLyyyymmdd*	R	*Unique identifier for the rigorous error propagation Regions definition Segment. This MUST match the corresponding value found in the PIAPRD TRE field ATEXT of the file header.*
ISCLAS	Image Security Classification This field shall contain a valid value representing the classification level of the image. Valid values are T, S, C, R, and U.	1	ECS-A	R [PSG]	*For fields ISCLAS through ISCTLN, consult Production Specific Guidance (PSG) for applicable NATO security field population values.*

Field	Name	Size	Value Range	Type	Comments
ISCLSY	Image Security Classification System This field shall contain valid values indicating the national or multinational security system used to classify the image. Country Codes per FIPS 10-4 shall be used to indicate national security systems; codes found in DIAM 65-19 shall be used to indicate multinational security systems.	2	ECS-A Note: this field may contain two space characters when the FSCLAS value is 'U'.	<R> [PSG]	*Refer to current NATO documentation for general description of these fields. Consult current security guidelines at the time of production to determine proper markings.*
ISCODE	Image Codewords	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLH	Image Control and Handling	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISREL	Image Releasing Instructions	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCTP	Image Declassification Type	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCDT	Image Declassification Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCXM	Image Declassification Exemption	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDG	Image Downgrade	1	ECS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDGDT	Image Downgrade Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISCLTX	Image Downgrade Text	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCATP	Image Classification Authority Type	1	ECS-A O, D, M	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCAUT	Image Classification Authority	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRSN	Image Classification Reason	1	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRDT	Image Security Source Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLN	Image Security Control Number	15	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	*"0"* *Not encrypted.*
ISORCE	Image Source This field shall contain a description of the source of the image.	42	BCS-A	<R> [PSG]	*The source of the matrix data.* **When classified, the description shall be preceded by the classification, including codewords.*
NROWS	Number of Significant Rows in Image This field shall contain the total number of rows of significant pixels in the in the image.	8	BCS-N 00000001 to 99999999	R	*Number of rows in the region data. This will match exactly the number or rows specified in the associated DTEM.*
NCOLS	Number of Significant Columns in Image This field shall contain the total number of columns of significant pixels in the image.	8	BCS-N 00000001 to 99999999	R	*Number of columns in the region data. This will match exactly the number or columns specified in the associated DTEM.*

Field	Name	Size	Value Range	Type	Comments
PVTYPE	Pixel Value Type This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image.	3	BCS-A INT	R	*"INT" – indicating integer*
IREP	Image Representation This field shall contain a valid indicator of the processing required in order to display an image.	8	BCS-A NODISPLY	R	*"NODISPLY"* *Indicating data not intended for display.*
ICAT	Image Category This field shall contain a valid indicator of the specific category of image, raster or grid data.	8	BCS-A MATR	R	*"MATR"- indicating Matrix Data*
ABPP	Actual Bits-Per-Pixel Per Band This field contains the number of significant bits for the value in each band of each pixel without compression.	2	BCS-N 08	R	*08 (region numbers are integers)*
PJUST	Pixel Justification When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified or right justified.	1	BCS-A R	R	*"R" – indicating Right Justified*
ICORDS	Image Coordinate System This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO)	1	BCS-A D N S	R	*"D"- indicating decimal degrees.* *N/S for UTM coordinates*
IGEOLO	Image Geographic Location This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field.	60	BCS-N *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *Or UTM corner locations for UTM referenced data*	R	*Coordinates of the footprint of the region data. This will match the corresponding footprint of the Elevation data DTEM Post Heights Segment.* *Format:* *"±dd.ddd±ddd.ddd"* *Or UTM coordinates for UTM referenced data* *(repeating a total of four times)*

Field	Name	Size	Value Range	Type	Comments
NICOM	Number of Image Comments This field shall contain the number of image comment fields to follow.	1	BCS-N 0	R	*"0" (no comment fields)*
IC	Image Compression This field contains a valid code indicating the form of compression used in representing the image data.	2	BCS-A NC, NM, C8, M8	R	*"NC" – indicating Not Compressed* *C8 – compressed JPEG2000 (jc2 format)* *M8 – compressed JPEG2000 with masking (jc2 format)*
COMRAT	If the value of IC is C8 or M8, this field shall contain a value representing the nominal compression rate (numbers of bits-per-pixel-per-band) of the compressed image. See the BIIF Profile for JPEG 2000 (BPJ2K) for guidance in populating this field.	4	BCS-A Nxxx	C	*Required when IC = C8 or M8 (numerically lossless JPEG2000)*
NBANDS	Number of Bands This field shall contain the number of data bands within the specified image.	1	BCS-A 1	R	*"1" – indicating one band (Post-by-Post region identifier)*
IREPBAND1	1st Band Representation This field contains a valid indicator of the interpretation of the nnth band.	2	BCS-A (2 space characters)	<C>	*Default – BCS Spaces*
ISUBCAT1	1st Band Significance for Image Category This field provides the significance of the nnth band of the image.	6	BCS-A (6 space characters)	<R>	*Fill with BCS spaces*
IFC1	1st Band Image Filter Condition This field shall contain the value N (to represent none).	1	BCS-A N	R	*"N" – indicating no band filter condition*
IMFLT1	1st Band Standard Image Filter Code Reserved for future use.	3	BCS-A (3 space characters)	<R>	*Default – BCS Spaces*
NLUTS1	Number of Look-up Tables for the 1st Band This field shall contain the number of LUTs associated with the nth band of the image.	1	BCS-A 0	<R>	*"0" – indicating the number of lookup tables*
ISYNC	Image Sync Code This field shall contain BCS zero (0x30)	1	BCS-N 0	R	*"0" – no sync code*

Field	Name	Size	Value Range	Type	Comments
IMODE	Image Mode This field shall contain an indicator of whether the image bands are stored sequentially, or band interleaved by block, or band interleaved by pixel, or band interleaved by row.	1	BCS-A B	R	*"B" – indicating data is stored band interleaved by block.*
NBPR	Number of Blocks per Row This field shall contain the number of image blocks in a row of blocks in the horizontal direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per row*
NBPC	Number of Blocks per Column This field shall contain the number of image blocks in a column of blocks in the vertical direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per column*
NPPBH	Number of Pixels per Block Horizontal This field shall contain the number of pixels horizontally for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of rows of the DTEM. Use 'large block' option (value = '0000') when number of rows is greater than 8192 and designates that the number of pixels vertically is specified by the value in NROWS.*
NPPBV	Number of Pixels per Block Vertical This field shall contain the number of pixels vertically for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of columns of the DTEM. Use 'large block' option (value = '0000') when number of columns is greater than 8192 and designates that the number of pixels vertically is specified by the value in NCOLS.*
NBPP	Number of Bits per Pixel per Band This field shall contain the number of storage bits used for the value from each component of a pixel value.	2	BCS-N 08	R	*"08" – Number of bits per pixel per band*
IDLVL	Display Level This field shall contain a valid value that indicates the graphic display level of the image relative to the other displayed file components.	3	BCS-N 002	R	*"002"*

Field	Name	Size	Value Range	Type	Comments
IALVL	Attachment Level This field shall contain a valid value that indicates the attachment level of the image.	3	BCS-N 001	R	*"001" – indicating that the region data segment (002) is attached to the elevation data DTEM Post Height segment (001)*
ILOC	Image Location This field shall contain the location of the first pixel of the first line of the image.	10	BCS-N 0000000000	R	*"0000000000"*
IMAG	Image Magnification This field shall contain the magnification factor of the image relative to the original source.	4	BCS-A 1.0	R	*"1.0 " indicating the original product, not sub-sampled*
UDIDL	User defined image data length	5	BCS-N 00000	R	*"00000" No TREs are included.*
IXSHDL	Extended subheader data length	5	BCS-N 00000	R	*"00000" No TREs are included.*

B.7 Rigorous Error Propagation Random Error Scale Factors By Post

B.7.1 Random Error Scale Factors By Post

This image segment is comprised of the standard NITF 2.1 Image Subheader information and random error scale factors by post data. These scale factors are used in conjunction with region by region nominal random error covariance matrices defined in the XML_DATA_CONTENT DES.

B.7.2 Image Subheader

This section describes the fields and contents within the IM subheader. For the random error scale factors by post data, this IM subheader will contain the values designated in Table B-6. Metadata associated with the random error scale factors by post data is contained in the XML_DATA_CONTENT DES.

Table 7: Random Error Post Scale Factors Image Subheader

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
IM	File Part Type This field shall contain the characters "IM" to identify the subheader as an image subheader.	2	BCS-A IM	R	*"IM"*
IID1	Image ID1 This field shall contain a valid alphanumeric identification code associated with the image	10	BCS-A RE_POST_SF	R	*Short name that identifies this segment – "RE_POST_SF*

Field	Name	Size	Value Range	Type	Comments
IDATIM	Image Date & Time This field shall contain the time (UTC) of the image acquisition.	14	BCS-N *DDHHMMSSZMONYY*	R	*Date/Time that the random error scale factor data was created*
TGTID	Target ID This field shall contain the identification of the primary target.	17	BCS-A (17 space characters)	<R>	*Default – BCS Spaces*
IID2	Image IID2 This field contains the identification of additional information about the image.	80	ECS-A RSFLLyyyymmdd	<R>	*Unique identifier for the Random Error Scale factors Segment. This MUST match the corresponding value found in the PIAPRD TRE field ATEXT of the file header.*
ISCLAS	Image Security Classification	1	ECS-A	R [PSG]	*For fields ISCLAS through ISCTLN, consult Production Specific Guidance (PSG) for applicable NATO security field population values.*
ISCLSY	Image Security Classification System	2	ECS-A Note: this field may contain tw o space characters when the FSCLAS value is 'U'.	<R> [PSG]	*Refer to current NATO documentation for general description of these fields. Consult current security guidelines at the time of production to determine proper markings.*
ISCODE	Image Codew ords	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLH	Image Control and Handling	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISREL	Image Releasing Instructions	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCTP	Image Declassification Type	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCDT	Image Declassification Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISDCXM	Image Declassification Exemption	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDG	Image Downgrade	1	ECS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDGDT	Image Downgrade Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCLTX	Image Downgrade Text	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCATP	Image Classification Authority Type	1	ECS-A O, D, M	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCAUT	Image Classification Authority	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRSN	Image Classification Reason	1	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRDT	Image Security Source Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLN	Image Security Control Number	15	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	*"0"* *Not encrypted.*
ISORCE	Image Source This field shall contain a description of the source of the image.	42	BCS-A	<R> [PSG]	*The source of the matrix data.* **When classified, the description shall be preceded by the classification, including codewords.*

Field	Name	Size	Value Range	Type	Comments
NROWS	Number of Significant Rows in Image This field shall contain the total number of rows of significant pixels in the in the image.	8	BCS-N *00000001 to 99999999.*	R	*Number of rows in the random error scale factor data. This will match exactly the number or rows specified in the associated DTEM.*
NCOLS	Number of Significant Columns in Image This field shall contain the total number of columns of significant pixels in the image.	8	BCS-N *00000001 to 99999999*	R	*Number of columns in the random error scale factor data. This will match exactly the number or columns specified in the associated DTEM.*
PVTYPE	Pixel Value Type This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image.	3	BCS-A R	R	*"R" – indicating real*
IREP	Image Representation This field shall contain a valid indicator of the processing required in order to display an image.	8	BCS-A NODISPLY	R	*"NODISPLY"* *Indicating data not intended for display.*
ICAT	Image Category This field shall contain a valid indicator of the specific category of image, raster or grid data.	8	BCS-A MATR	R	*"MATR"- indicating Matrix Data*
ABPP	Actual Bits-Per-Pixel Per Band This field contains the number of significant bits for the value in each band of each pixel without compression.	2	BCS-N 32	R	*32 (scale factors are real numbers)*
PJUST	Pixel Justification When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified or right justified.	1	BCS-A R	R	*"R" – indicating Right Justified*
ICORDS	Image Coordinate System This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO)	1	BCS-A D N S	R	*"D"- indicating decimal degrees.* *"N/S" for UTM coordinates*

Field	Name	Size	Value Range	Type	Comments
IGEOLO	Image Geographic Location This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field.	60	BCS-N ±*dd.ddd*±*ddd.ddd* ±*dd.ddd*±*ddd.ddd* ±*dd.ddd*±*ddd.ddd* ±*dd.ddd*±*ddd.ddd* *Or UTM corner coordinates for UTM referenced data*	R	*Coordinates of the footprint of the random error scale factor data. This will match the corresponding footprint of the DTEM Post Heights, IM Segments.* *Format:* *"*±*dd.ddd*±*ddd.ddd* *Or UTM coordinates for UTM referenced data"* *(repeating a total of four times)*
NICOM	Number of Image Comments This field shall contain the number of image comment fields to follow.	1	BCS-N 0	R	*"0" (no comment fields)*
IC	Image Compression This field contains a valid code indicating the form of compression used in representing the image data.	2	BCS-A NC, NM	R [PSG]	*"NC" – indicating Not Compressed* *"NM" – indicating use of a pixel mask table.*
NBANDS	Number of Bands This field shall contain the number of data bands within the specified image.	1	BCS-A 1	R	*"1" – indicating one band (random error scale factor data)*
IREPBAND1	1st Band Representation This field contains a valid indicator of the interpretation of the nnth band.	2	BCS-A (2 space characters)	<C>	*Default – BCS Spaces*
ISUBCAT1	1st Band Significance for Image Category This field provides the significance of the nnth band of the image.	6	BCS-A (6 space characters)	<R>	*Fill with BCS spaces*
IFC1	1st Band Image Filter Condition This field shall contain the value N (to represent none).	1	BCS-A N	R	*"N" – indicating no band filter condition*
IMFLT1	1st Band Standard Image Filter Code Reserved for future use.	3	BCS-A (3 space characters)	<R>	*Default – BCS Spaces*
NLUTS1	Number of Look-up Tables for the 1st Band This field shall contain the number of LUTs associated with the nth band of the image.	1	BCS-A 0	<R>	*"0" – indicating the number of lookup tables*

Field	Name	Size	Value Range	Type	Comments
ISYNC	Image Sync Code This field shall contain BCS zero (0x30)	1	BCS-N 0	R	*"0" – no sync code*
IMODE	Image Mode This field shall contain an indicator of whether the image bands are stored sequentially, or band interleaved by block, or band interleaved by pixel, or band interleaved by row.	1	BCS-A B	R	*"B" – indicating data is stored band interleaved by block.*
NBPR	Number of Blocks per Row This field shall contain the number of image blocks in a row of blocks in the horizontal direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per row*
NBPC	Number of Blocks per Column This field shall contain the number of image blocks in a column of blocks in the vertical direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per column*
NPPBH	Number of Pixels per Block Horizontal This field shall contain the number of pixels horizontally for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of rows of the DTEM. Use 'large block' option (value = '0000') when number of rows is greater than 8192 and designates that the number of pixels vertically is specified by the value in NROWS.*
NPPBV	Number of Pixels per Block Vertical This field shall contain the number of pixels vertically for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of columns of the DTEM. Use 'large block' option (value = '0000') when number of columns is greater than 8192 and designates that the number of pixels vertically is specified by the value in NCOLS.*
NBPP	Number of Bits per Pixel per Band This field shall contain the number of storage bits used for the value from each component of a pixel value.	2	BCS-N 32	R	*"32" – Number of bits per pixel per band*

Field	Name	Size	Value Range	Type	Comments
IDLVL	Display Level This field shall contain a valid value that indicates the graphic display level of the image relative to the other displayed file components.	3	BCS-N 003	R	*"003"*
IALVL	Attachment Level This field shall contain a valid value that indicates the attachment level of the image.	3	BCS-N 001	R	*"001" – indicating that the scale factor segment (003) is attached to the DTEM Post segment (001)*
ILOC	Image Location This field shall contain the location of the first pixel of the first line of the image.	10	BCS-N 0000000000	R	*"0000000000"*
IMAG	Image Magnification This field shall contain the magnification factor of the image relative to the original source.	4	BCS-A 1.0	R	*"1.0 " indicating the original product, not sub-sampled*
UDIDL	User defined image data length	5	BCS-N 00000	R	*"00000" No TREs are included.*
IXSHDL	Extended subheader data length	5	BCS-N 00000	R	*"00000" No TREs are included.*

B.8 Rigorous Error Propagation Random Error Covariance By Post

B.8.1 Random Error Covariance By Post

This image segment is comprised of the standard NSIF/NITF 2.10 image subheader information and the random error covariance by post data. The random error covariance data are input as standard deviation terms that when squared, make up the diagonal terms of the random error covariance matrices. The presence of this image segment is defined in the accompanying XML_DATA_CONTENT DES. When this image segment is being used to specify a per-post random error covariance matrix, the random error covariance by post image segment is always accompanied by a random error correlation coefficients by post image segment (Section 9). Dividing the random error covariance matrix terms between two image segments permits different levels of precision to be specified for each in an attempt to minimize file size.

B.8.2 Image Subheader

This section describes the fields and contents within the IM subheader. For the random error covariance by post data, this IM subheader will contain the values designated in Table B-7. Metadata associated with the random error covariance by post data is contained in the XML_DATA_CONTENT DES.

Table 8: Random Error Covariance Image Subheader

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
IM	File Part Type This field shall contain the characters "IM" to identify the subheader as an image subheader.	2	BCS-A IM	R	*"IM"*
IID1	Image ID1 This field shall contain a valid alphanumeric identification code associated with the image	10	BCS-A COVARIANCE	R	*Short name that identifies this segment – "COVARIANCE"*
IDATIM	Image Date & Time This field shall contain the time (UTC) of the image acquisition.	14	BCS-N *DDHHMMSSZMONYY*	R	*Date/Time that the random error covariance data was created*
TGTID	Target ID This field shall contain the identification of the primary target.	17	BCS-A (17 space characters)	<R>	*Default – BCS Spaces*
IID2	Image IID2 This field contains the identification of additional information about the image.	80	ECS-A COVLLyyyymmdd	<R>	*Unique identifier for the Random Error Covariance Segment. This MUST match the corresponding value found in the PIAPRD TRE field ATEXT of the file header.*
ISCLAS	Image Security Classification	1	ECS-A	R [PSG]	*For fields ISCLAS through ISCTLN, consult Production Specific Guidance (PSG) for applicable NATO security field population values.*
ISCLSY	Image Security Classification System	2	ECS-A Note: this field may contain two space characters when the FSCLAS value is 'U'.	<R> [PSG]	*Refer to current NATO documentation for general description of these fields. Consult current security guidelines at the time of production to determine proper markings.*
ISCODE	Image Codewords	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLH	Image Control and Handling	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISREL	Image Releasing Instructions	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCTP	Image Declassification Type	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCDT	Image Declassification Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCXM	Image Declassification Exemption	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDG	Image Downgrade	1	ECS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDGDT	Image Downgrade Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCLTX	Image Downgrade Text	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCATP	Image Classification Authority Type	1	ECS-A O, D, M	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCAUT	Image Classification Authority	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRSN	Image Classification Reason	1	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRDT	Image Security Source Date	8	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISCTLN	Image Security Control Number	15	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	*"0"* *Not encrypted.*
ISORCE	Image Source This field shall contain a description of the source of the image.	42	BCS-A	<R> [PSG]	*The source of the matrix data.* **When classified, the description shall be preceded by the classification, including codewords.*
NROWS	Number of Significant Rows in Image This field shall contain the total number of rows of significant pixels in the in the image.	8	BCS-N 00000001 to 99999999	R	*Number of rows in the random error covariance data. This will match exactly the number or rows specified in the associated DTEM.*
NCOLS	Number of Significant Columns in Image This field shall contain the total number of columns of significant pixels in the image.	8	BCS-N 00000001 to 99999999	R	*Number of columns in the random error covariance data. This will match exactly the number or columns specified in the associated DTEM.*
PVTYPE	Pixel Value Type This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image.	3	BCS-A R	R	*"R" – indicating real*
IREP	Image Representation This field shall contain a valid indicator of the processing required in order to display an image.	8	BCS-A NODISPLY	R	*"NODISPLY"* *Indicating data not intended for display.*
ICAT	Image Category This field shall contain a valid indicator of the specific category of image, raster or grid data.	8	BCS-A MATR	R	*"MATR"- indicating Matrix Data*
ABPP	Actual Bits-Per-Pixel Per Band This field contains the number of significant bits for the value in each band of each pixel without compression.	2	BCS-N 32	R	*32 (random error covariances are a real number)*

Field	Name	Size	Value Range	Type	Comments
PJUST	Pixel Justification When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified or right justified.	1	BCS-A R	R	*"R" – indicating Right Justified*
ICORDS	Image Coordinate System This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO)	1	BCS-A D N S	R	*"D"- indicating decimal degrees.* *"N/S" for UTM coordinates*
IGEOLO	Image Geographic Location This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field.	60	BCS-N *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *Or UTM corner coordinates for UTM referenced data*	R	*Coordinates of the footprint of the random error covariance data. This will match the corresponding footprint of the DTEM Post Heights, IM Segments.* *Format:* *"±dd.ddd±ddd.ddd"* *Or UTM for UTM referenced data* *(repeating a total of four times)*
NICOM	Number of Image Comments This field shall contain the number of image comment fields to follow.	1	BCS-N 0	R	*"0" (no comment fields)*
IC	Image Compression This field contains a valid code indicating the form of compression used in representing the image data.	2	BCS-A NC, NM	R [PSG]	*"NC" – indicating Not Compressed* *"NM" – indicating use of a pixel mask table.*
NBANDS	Number of Bands This field shall contain the number of data bands within the specified image.	1	BCS-A 3	R	*"3" – indicating three bands (random error covariance data)*
IREPBANDn	n^{th} Band Representation This field contains a valid indicator of the interpretation of the n^{th} band.	2	BCS-A (2 space characters)	<C>	*Default – BCS Spaces*
ISUBCATn	n^{th} Band Significance for Image Category This field provides the significance of the n^{th} band of the image.	6	BCS-A (6 space characters)	<R>	*Fill with BCS spaces*

Field	Name	Size	Value Range	Type	Comments
IFCn	n^{th} Band Image Filter Condition This field shall contain the value N (to represent none).	1	BCS-A N	R	*"N" – indicating no band filter condition*
IMFLTn	n^{th} Band Standard Image Filter Code Reserved for future use.	3	BCS-A (3 space characters)	<R>	*Default – BCS Spaces*
NLUTSn	Number of Look-up Tables for the n^{th} Band This field shall contain the number of LUTs associated with the nth band of the image.	1	BCS-A 0	<R>	*"0" – indicating the number of lookup tables*
ISYNC	Image Sync Code This field shall contain BCS zero (0x30)	1	BCS-N 0	R	*"0" – no sync code*
IMODE	Image Mode This field shall contain an indicator of whether the image bands are stored sequentially, or band interleaved by block, or band interleaved by pixel, or band interleaved by row.	1	BCS-A P	R	*"P" – indicating data is stored band interleaved by pixel.*
NBPR	Number of Blocks per Row This field shall contain the number of image blocks in a row of blocks in the horizontal direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per row*
NBPC	Number of Blocks per Column This field shall contain the number of image blocks in a column of blocks in the vertical direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per column*
NPPBH	Number of Pixels per Block Horizontal This field shall contain the number of pixels horizontally for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of rows of the DTEM. Use 'large block' option (value = '0000') when number of rows is greater than 8192 and designates that the number of pixels vertically is specified by the value in NROWS.*

Field	Name	Size	Value Range	Type	Comments
NPPBV	Number of Pixels per Block Vertical This field shall contain the number of pixels vertically for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of columns of the DTEM. Use 'large block' option (value = '0000') when number of columns is greater than 8192 and designates that the number of pixels vertically is specified by the value in NCOLS.*
NBPP	Number of Bits per Pixel per Band This field shall contain the number of storage bits used for the value from each component of a pixel value.	2	BCS-N 32	R	*"32" – Number of bits per pixel per band*
IDLVL	Display Level This field shall contain a valid value that indicates the graphic display level of the image relative to the other displayed file components.	3	BCS-N 004	R	*"004"*
IALVL	Attachment Level This field shall contain a valid value that indicates the attachment level of the image.	3	BCS-N 001	R	*"001" – indicating that the random error covariance segment (004) is attached to the DTEM Post segment (001)*
ILOC	Image Location This field shall contain the location of the first pixel of the first line of the image.	10	BCS-N 0000000000	R	*"0000000000"*
IMAG	Image Magnification This field shall contain the magnification factor of the image relative to the original source.	4	BCS-A 1.0	R	*"1.0 " indicating the original product and not sub-sampled*
UDIDL	User defined image data length	5	BCS-N 00000	R	*"00000" No TREs are included.*
IXSHDL	Extended subheader data length	5	BCS-N 00000	R	*"00000" No TREs are included.*

B.9 Rigorous Error Propagation Random Error Correlation Coefficients By Post

B.9.1 Random Error Correlation Coefficients By Post

This image segment is comprised of the standard NSIF/ITF 2.10 Image Subheader information and random error correlation coefficients by post data. The random error correlation coefficient data (when multiplied by the corresponding diagonal term standard deviations) make up the off-diagonal terms of the random error covariance matrices. The presence of this image segment is defined in the accompanying

XML_DATA_CONTENT DES. When this image segment is being used to specify a per-post random error covariance matrix, the random error correlation coefficients by post image segment is always accompanied with a random error covariance by post image segment (Section 8). Dividing the random error covariance matrix terms between two image segments permits different levels of precision to be specified for each in an attempt to minimize file size.

B.9.2 Image Subheader

This section describes the fields and contents within the IM subheader. For the random error correlation coefficients by post data, this IM subheader will contain the values designated in Table B-8.

Table 9: Random Error Correlation Coefficient Image Subheader

(Type "R"=Required, "C" = Conditional, "<>" BCS Spaces allowed for entire field)

Field	Name	Size	Value Range	Type	Comments
IM	File Part Type This field shall contain the characters "IM" to identify the subheader as an image subheader.	2	BCS-A IM	R	*"IM"*
IID1	Image ID1 This field shall contain a valid alphanumeric identification code associated with the image	10	BCS-A COREL_COEF	R	*Short name that identifies this segment – "COREL_COEF"*
IDATIM	Image Date & Time This field shall contain the time (UTC) of the image acquisition.	14	BCS-N *DDHHMMSSZMONYY*	R	*Date/Time that the random error correlation coefficient data was created*
TGTID	Target ID This field shall contain the identification of the primary target.	17	BCS-A (17 space characters)	<R>	*Default – BCS Spaces*
IID2	Image IID2 This field contains the identification of additional information about the image.	80	ECS-A CORLLyyyymmdd	<R>	*Unique identifier for the Random Error Correlation Coefficient Segment. This MUST match the corresponding value found in the PIAPRD TRE field ATEXT of the file header.*
ISCLAS	Image Security Classification	1	ECS-A	R [PSG]	*For fields ISCLAS through ISCTLN, consult Production Specific Guidance (PSG) for applicable NATO security field population values.*

Field	Name	Size	Value Range	Type	Comments
ISCLSY	Image Security Classification System	2	ECS-A Note: this field may contain two space characters when the FSCLAS value is 'U'.	<R> [PSG]	*Refer to current NATO documentation for general description of these fields. Consult current security guidelines at the time of production to determine proper markings.*
ISCODE	Image Codewords	11	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLH	Image Control and Handling	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISREL	Image Releasing Instructions	20	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCTP	Image Declassification Type	2	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCDT	Image Declassification Date	8	ECS-A *CCYYMMDD*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDCXM	Image Declassification Exemption	4	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDG	Image Downgrade	1	ECS-A S, C, R	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISDGDT	Image Downgrade Date	8	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCLTX	Image Downgrade Text	43	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCATP	Image Classification Authority Type	1	ECS-A O, D, M	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*

Field	Name	Size	Value Range	Type	Comments
ISCAUT	Image Classification Authority	40	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRSN	Image Classification Reason	1	ECS-A	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCRDT	Image Security Source Date	8	ECS-A *CCYYMMDD.*	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ISCTLN	Image Security Control Number	15	ECS-A A through H	<R> [PSG]	*Consult current security guidelines at the time of production to determine proper markings.*
ENCRYP	Encryption This field shall contain the value BCS zero (0x30).	1	BCS-N 0	R	*"0"* *Not encrypted.*
ISORCE	Image Source This field shall contain a description of the source of the image.	42	BCS-A	<R> [PSG]	*The source of the matrix data.* **When classified, the description shall be preceded by the classification, including codewords.*
NROWS	Number of Significant Rows in Image This field shall contain the total number of rows of significant pixels in the in the image.	8	BCS-N 00000001 to 99999999	R	*Number of rows in the random error correlation coefficient data. This will match exactly the number or rows specified in the associated DTEM.*
NCOLS	Number of Significant Columns in Image This field shall contain the total number of columns of significant pixels in the image.	8	BCS-N 00000001 to 99999999	R	*Number of columns in the random error correlation coefficient data. This will match exactly the number or columns specified in the associated DTEM.*
PVTYPE	Pixel Value Type This field shall contain an indicator of the type of computer representation used for the value for each pixel for each band in the image.	3	BCS-A SI	R	*"SI" – indicating signed integers. The integer values are within the range of -100 to 100 and represent percentage from -100% to 100%.*

Field	Name	Size	Value Range	Type	Comments
IREP	Image Representation This field shall contain a valid indicator of the processing required in order to display an image.	8	BCS-A NODISPLY	R	*"NODISPLY"* *Indicating data not intended for display.*
ICAT	Image Category This field shall contain a valid indicator of the specific category of image, raster or grid data.	8	BCS-A MATR	R	*"*MATR*"- indicating Matrix Data*
ABPP	Actual Bits-Per-Pixel Per Band This field contains the number of significant bits for the value in each band of each pixel without compression.	2	BCS-N 8	R	*8 (random error correlation coefficients are SI numbers)*
PJUST	Pixel Justification When ABPP is not equal to NBPP, this field indicates whether the significant bits are left justified or right justified.	1	BCS-A R	R	*"R" – indicating Right Justified*
ICORDS	Image Coordinate System This field shall contain a valid code indicating the type of coordinate system used for providing an approximate location of the image in the Image Geographic Location field (IGEOLO)	1	BCS-A D N S	<R>R	*"D" – indicating decimal degrees.* *"N/S" for UTM coordinates*
IGEOLO	Image Geographic Location This field shall contain an approximate geographic location, in terms of corner locations, of the image in the coordinate system specified in the ICORDS field.	60	BCS-N *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *±dd.ddd±ddd.ddd* *Or UTM corner coordinates for UTM referenced data*	R	*Coordinates of the footprint of the random error correlation coefficient data. This will match the corresponding footprint of the DTEM Post Heights, IM Segments.* *Format:* *"±dd.ddd±ddd.ddd"* *Or UTM coordinates for UTM referenced data* *(repeating a total of four times)*
NICOM	Number of Image Comments This field shall contain the number of image comment fields to follow.	1	BCS-N 0	R	*"0" (no comment fields)*

Field	Name	Size	Value Range	Type	Comments
IC	Image Compression This field contains a valid code indicating the form of compression used in representing the image data.	2	BCS-A NC, NM	R [PSG]	*"NC" – indicating Not Compressed* *"NM" – indicating use of a pixel mask table.*
NBANDS	Number of Bands This field shall contain the number of data bands within the specified image.	1	BCS-A 3	R	*"3" – indicating three bands (random error correlation coefficient data)*
IREPBANDn	n^{th} Band Representation This field contains a valid indicator of the interpretation of the n^{th} band.	2	BCS-A (2 space characters)	<C>	*Default – BCS Spaces*
ISUBCATn	n^{th} Band Significance for Image Category This field provides the significance of the n^{th} band of the image.	6	BCS-A (6 space characters)	<R>	*Fill with BCS spaces*
IFCn	n^{th} Band Image Filter Condition This field shall contain the value N (to represent none).	1	BCS-A N	R	*"N" – indicating no band filter condition*
IMFLTn	^{nth} Band Standard Image Filter Code Reserved for future use.	3	BCS-A (3 space characters)	<R>	*Default – BCS Spaces*
NLUTSn	Number of Look-up Tables for the n^{th} Band This field shall contain the number of LUTs associated with the nth band of the image.	1	BCS-A 0	<R>	*"0" – indicating the number of lookup tables*
ISYNC	Image Sync Code This field shall contain BCS zero (0x30)	1	BCS-N 0	R	*"0" – no sync code*
IMODE	Image Mode This field shall contain an indicator of whether the image bands are stored sequentially, or band interleaved by block, or band interleaved by pixel, or band interleaved by row.	1	BCS-A P	R	*"P" – indicating data is stored band interleaved by pixel.*
NBPR	Number of Blocks per Row This field shall contain the number of image blocks in a row of blocks in the horizontal direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per row*

Field	Name	Size	Value Range	Type	Comments
NBPC	Number of Blocks per Column This field shall contain the number of image blocks in a column of blocks in the vertical direction.	4	BCS-N 0001 to 9999	R	*Indicates one or more blocks per column*
NPPBH	Number of Pixels per Block Horizontal This field shall contain the number of pixels horizontally for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of rows of the DTEM. Use 'large block' option (value = '0000') when number of rows is greater than 8192 and designates that the number of pixels vertically is specified by the value in NROWS.*
NPPBV	Number of Pixels per Block Vertical This field shall contain the number of pixels vertically for each block.	4	BCS-N 0001-8192 Or 0000 When count>8192	R	*Number of columns of the DTEM. Use 'large block' option (value = '0000') when number of columns is greater than 8192 and designates that the number of pixels vertically is specified by the value in NCOLS.*
NBPP	Number of Bits per Pixel per Band This field shall contain the number of storage bits used for the value from each component of a pixel value.	2	BCS-N 08	R	*"8" – Number of bits per pixel per band*
IDLVL	Display Level This field shall contain a valid value that indicates the graphic display level of the image relative to the other displayed file components.	3	BCS-N 005	R	*"005"*
IALVL	Attachment Level This field shall contain a valid value that indicates the attachment level of the image.	3	BCS-N 004	R	*"004" – indicating that the random error correlation coefficient segment (004) is attached to the random error covariance segment (002)*
ILOC	Image Location This field shall contain the location of the first pixel of the first line of the image.	10	BCS-N 0000000000	R	*"0000000000"*

Field	Name	Size	Value Range	Type	Comments
IMAG	Image Magnification This field shall contain the magnification factor of the image relative to the original source.	4	BCS-A 1.0	R	*"1.0 " indicating the original product, not sub-sampled*
UDIDL	User defined image data length	5	BCS-N 00000	R	*"00000" No TREs are included.*
IXSHDL	Extended subheader data length	5	BCS-N 00000	R	*"00000" No TREs are included.*

B.10 Additional Elevation data Metadata

B.10.1 XML_Data_Content Data Extension Segment (DES)

Additional Metadata associated with the DTEM data is contained in the XML_DATA_CONTENT DES. A single XML_DATA_CONTENT DES shall be included in every NSIF/NITF-formatted elevation data file. This data extension segment is comprised of subheader information and XML-formatted metadata.

B.10.2 DES Subheader

The DES shall include a DES subheader (compliant with guidance found in Table A, and current NATO guidance) and user-defined data. For the elevation data Metadata, this DES subheader will contain the values designated in Table B-9. This table does not include the security classification fields (Fields DECLAS through DESCTLN), but these fields are required (DECLAS at a minimum) and are detailed in MIL-STD-2500C. Implementers should follow current NATO security guidance found for security fields DESCLAS to DESSCTLN.

Table 10: XML_Data_Content DES Subheader

R = Required, A = Alphanumeric, N = Numeric, <> = Designated Default Value Allowed

Field	Name/Description	Size	Value Range	Type
DE	File Part Type. This field shall contain the characters DE to identify the subheader as a data extension.	2	BCS-A DE	R
DESID	Unique DES type identifier. This field shall contain XML_DATA_CONTENT	25	BCS-A XML_DATA_CONTENT	R
DESVER	Version of the data definition. This field shall contain the alphanumeric version number of the use of the Tag. The version number is assigned as part of the registration process.	2	BCS-N positive integer 01	R
DECLAS through DESCTLN	Security classification fields are defined in MIL-STD-2500C. Implementers should follow security guidance found in MIL-STD-2500C Tables A-3, A-5, A-6, A-7 and A-8 for security fields DESCLAS to DESCTLN.	167	*For fields DECLAS through DESCTLN, consult Production Specific Guidance (PSG) for applicable security field population values.*	R [PSG]

Field	Name/Description	Size	Value Range	Type
DESSHL	DES User-defined Subheader Length This field shall contain the number of bytes in the field DESSHF. The field, DESSHF (DES User-defined Subheader Field), is comprised of the sub-fields DESCRC through DESSHABS specified below	4	BCS-N positive integer 0773	R
DESCRC	Cyclic Redundancy Check. This field contains the calculated CRC value for the content of the DESDATA field. A value of 99999 shall be used when CRC is not calculated.	5	BCS-N positive integer 999999	R
DESSHFT	XML File Type. Data in this field shall be representative of the XML File Type	8	BCS-A XML	R
DESSHDT	Date and Time. This field shall contain the time (UTC) (Zulu) of the XML file's origination in the format: YYYY-MM-DDThh:mm:ssZ, where YYYY is the year (0000-9999), MM is the month (01 to 12), DD is the day (01 to 31), T is the separator between date and time, hh is the hour (00 to 23), mm is the minute (00 to 59), and ss is the second (00 to 59). Z is the UTC time zone designator to express the time of day. The precision for recording the date and time is dictated by the user application and the field size constraint. Examples: 2007-04-12T11:45:20Z 2007-04-12T11:45Z 2007-04-12	20	BCS-A YYYY-MM-DDThh:mm:ssZ	R
DESSHRP	Responsible Party – Organization Identifier. Identification of the organization responsible for the content of the DES.	40	BCS-A National Geospatial-Intelligence Agency	R
DESSHSI	Specification Identifier. Name of the specification used for the XML data content.	60	BCS-A Implementation Profile for Elevation data Products	R
DESSHSV	Specification Version. Version or edition of the specification.	10	BCS-A 1.1	R
DESSHSD	Specification Date. Version or edition date for the specification.	20	BCS-A 2014-06-12	R
DESSHTN	Target Namespace. Identification of the *target namespace*, if any, designated within the XML data content. Example: http://www.w3.org/2001/XMLSchema	120	BCS-A http://www.isotc211.org/2005/gmd	R
When the content of the DES is applicable to a geographic location, at least one of the three Location elements (Polygon, Point, Identifier) shall be recorded.				

Field	Name/Description	Size	Value Range	Type
DESSHLPG	Location – Polygon. Five-point boundary enclosing the area applicable to the DES, expressed as the closed set of coordinates of the polygon (last point replicates first point). NOTE: The coordinates in this field are always provided as decimal degrees on WGS-84, even for elevation data products, which are projected to UTM. Recorded as paired latitude and longitude values in decimal degrees with no separator. Each latitude and longitude value includes an explicit 'plus' or 'minus sign'.	125	BCS-A Five pairs of longitude and latitude values. -90 to +90 latitude -180 to +360 longitude ±*dd.ddddddd*±*ddd.ddddddd* ±*dd.ddddddd*±*ddd.ddddddd* ±*dd.ddddddd*±*ddd.ddddddd* ±*dd.ddddddd*±*ddd.ddddddd* ±*dd.ddddddd*±*ddd.ddddddd*	R
DESSHLPT	Location – Point. Single geographic point applicable to the DES. NOTE: This is only an approximate reference so specifying the coordinate reference system is unnecessary. Recorded as paired latitude and longitude values in decimal degrees. The precision for recording the values in the subheader is dictated by the field size constraint.	25	BCS-A -90 to +90 latitude -180 to +360 longitude ±*dd.ddddddd*±*ddd.ddddddd* Default is ECS spaces (0x20) *Elevation data shall default to all spaces.*	<R>
DESSHLI	Location – Identifier. Identifier used to represent a geographic area. An alphanumeric value identifying an instance in the designated namespace. When this field is recorded with other than the default value, the Location Identifier Namespace URI shall also be recorded. Examples: US USA	20	BCS-A Default is ECS spaces (0x20) *Elevation data shall default to all spaces.*	<R>
DESSHLIN	Location Identifier Namespace URI. URI for the Namespace where the Location Identifier is described. Example: http://metadata.dod.mil/mdr/ns/GPAS/codelist/fips10-4/digraph http://metadata.dod.mil/mdr/ns/GPAS/codelist/iso3166-1/trigraph	120	BCS-A Default is ECS spaces (0x20) *Elevation data shall default to all spaces.*	<R>
DESSHABS	Abstract. Brief narrative summary of the content of the DES.	200	BCS-A Elevation (E) Data consisting of a fixed resolution grid of elevation values at [m] post spacing representing a geospatial surface. *Where [m] is the applicable post spacing.* Default is ECS spaces (0x20)	<R> [PSG]

Field	Name/Description	Size	Value Range	Type
DESDATA	User-defined data field. This field shall contain the XML data. The length of this field shall not cause any other NITF field length limits to be exceeded, but is otherwise fully user-defined.	**	Metadata formatted in XML conforming to ISO/TS 19139:2007 with content as described in Annex B	R

B.11 Elevation Data SHAPE Data

B.11.1 CSSHPA Data Extension Segment (DES)

The Shapefile DES (CSSHPA) is a general wrapper structure for an ESRI Shapefile. Inclusion of the CSSHPA DES is optional; see production specific guidance for when to include one or more instances of this DES. This data extension segment is comprised of subheader information and the three files that together constitute a Shapefile.

B.11.2 DES Subheader

The DES shall include a DES subheader (compliant with current NATO documentation/guidance) and user-defined data.

1. This table does not include the /security/classification fields: Fields DECLAS through DESCTLN are required and are detailed in current NATO guidance and implementers should follow security guidance found in current NATO

2. User-defined data shall consist of an ESRI Shapefile complying with the ESRI Shapefile Technical Description.

3. Nodes of shapes described in a Shapefile DES shall be expressed as latitude and longitude coordinates referenced to the WGS-84 datum only. It is acceptable to use the WGS-84 datum for Shapefiles even if the elevation or error data files are expressed in a different datum. Shapes within a Shapefile shall be composed of a minimum of three nodes (four is preferable).

4. The datasets may contain multiple instances of the CSSHPA DES, as described below. The SHAPE_USE field of the user-defined DES subheader fields distinguishes the instances.

When accompanying elevation data, shapefiles encapsulated in the DES would typically be used to define water bodies, void areas, alternate source fill, known anomalous data or regions for error/accuracy information.

The following table defines the format of CSSHPA DES as used for elevation data.

Table 11: CSSHPA Data Extension Segment

R = Required, A = Alphanumeric, N = Numeric, <> = Designated Default Value Allowed

Field	Name/Description	Size	Value Range	Type
DE	File Part Type. This field shall contain the characters "DE" to identify the subheader as a data extension.	2	BCS-A DE	R
DESID	Unique DES type identifier. This field shall contain the value "CSSHPA".	25	BCS-A CSSHPA	R
DESVER	Version of the data definition. This field shall contain the alphanumeric version number of the use of the tag. The version number is assigned as part of the registration process.	2	BCS-N positive integer 01	R
DECLAS through DESCTLN	Security classification fields are defined in MIL-STD-2500C. Implementers should follow security guidance found in MIL-STD-2500C Tables A-3, A-5, A-6, A-7 and A-8 for security fields DESCLAS to DESCTLN.	167	*For fields DECLAS through DESCTLN, consult Production Specific Guidance (PSG) for applicable security field population values.*	R [PSG]
DESSHL	DES User-defined Subheader Length. This field shall contain the number of bytes in the field DESSHF.	4	BCS-N positive integer 0062	R
The following eight sub-fields constitute the DESSHF user-defined fields for this DES.				
SHAPE_USE	Shapefile Use. This field shall contain a value descriptive of the purpose for the Shapefile. Typical values include: WATER_BODY_SHAPE VOID_SHAPE ALTERNATE_FILL_SHAPE ANOMALOUS_SHAPE ERROR_REGION_SHAPE LAND_COVER_CLASS VERTICAL_OBSTRUCTION SURFACE_TYPE GROUND_CONTROL_POINT ….	25	BCS-A	R [PSG]
SHAPE_CLASS	Shapefile Class. Type of shapes contained within this Shapefile. E.g. POLYGON	10	BCS-A	R
SHAPE1_NAME	*Shapefile1 Name. Name of first file in the Shapefile. One of three allowed values: SHP, SHX, or DBF.*	*3*	*BCS-A* *SHP* *SHX* *DBF*	*R*
SHAPE1_START	Shapefile1 Start Location. Start location in bytes of the first file, expressed as an offset in the DES User-Defined Data.	6	BCS-N positive integer Generated by DES content provider.	R
SHAPE2_NAME	Shapefile2 Name. Name of second file in the Shapefile. One of three allowed values: SHP, SHX, or DBF.	3	BCS-A SHP SHX DBF	R

Field	Name/Description	Size	Value Range	Type
SHAPE2_START	Shapefile2 Start Location. Start location in bytes of the second file, expressed as an offset in the DES User-Defined Data.	6	BCS-N positive integer Generated by DES content provider.	R
SHAPE3_NAME	Shapefile3 Name. Name of third file in the Shapefile. One of three allowed values: SHP, SHX, or DBF.	3	BCS-A SHP SHX DBF	R
SHAPE3_START	Shapefile3 Start Location. Start location in bytes of the third file, expressed as an offset in the DES User-Defined Data.	6	BCS-N positive integer Generated by DES content provider.	R
DESDATA	User-defined data field. The user-defined data field shall consist of the three files which together comprise the description of an ESRI Shapefile (described in the ESRI Shapefile Technical Description). **The length of this field shall not cause any other NITF field length limits to be exceeded.	**	User defined extension with no intervening octets.	R

Annex C
ESM Metadata Requirements
(normative)

The purpose of following Table 12 is to provide a mapping between ESM metadata fields that correspond to similar fields that are required in NSIF/NITF. When there is no direct correspondence between NSIF/NITF requirements to a required ESM field the statement: “no applicable NSIF/NITF field” is indicated in red text. When there is a corresponding NSIF/NITF field/value the NSIF/NITF value is indicated in blue text. This Annex does not specify the ESM metadata field value if there is no corresponding NSIF/NITF field. For complete ESM XML metadata requirements/values see corresponding Implementation Profile documentation.

Table 12: Mapping between ESM metadata and NSIF/NITF elevation data structures

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
1	**Metadata file identifier** MDSID (Core)	unique identifier for this metadata file	**M**	1	String Note: DMF strongly recommends a unique identifier (e.g. UUID or URI) or a locator (e.g. URL). The NSIF/NITF filename and the XML metadata filename shall match
2	**Parent metadata file identifier** MDPTSID (Common)	file identifier of the metadata to which this metadata is a subset (child)	**C / if parent metadata file exists**	1	String No applicable NSIF/NITF field
3	**Metadata language** MDDLOC (Core) + language	language used for documenting metadata	M	1	Locale language = 'eng' No applicable NSIF/NITF field
4	**Metadata character set** MDDLOC (Core) + encoding	full name of the character coding standard used for the metadata	M	1	Locale encoding = 'utf8' No applicable NSIF/NITF field
5	**Metadata Translation** MDTLOC (Common)	locale in which some metadata elements may be translated	O	N	Locale No applicable NSIF/NITF field
6	**Metadata date stamp** MDDATE (Core)	date that the metadata was created	M	1	Date NSIF/NITF = FDT
7	**Metadata point of contact** MDRPTY (Core)	identification of, and means of communication with, person(s) and organizations associated with the dataset	M	N	Responsible Party NSIF/NITF = ONAME/OSTAID

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
8	**Metadata standard name** MDSTD (Core) + title	name of the metadata standard (including profile name) used	M	1	'urn:dgiwg:metadata:dmf'
9	**Metadata standard version** MDSTD (Core) + version	version (profile) of the metadata standard used	M	1	'1.0'
10	**Metadata security constraint level** MDSCST (Common) + level	name of the handling restrictions on the metadata	**C / based on requirement of security constraint system**	1	Security Constraint Level No applicable NSIF/NITF field
11	**Metadata security constraint system** MDSCST (Common) + system	national or international system used to classify the metadata	**C / based on presence of security constraint level**	1	Security Constraint System No applicable NSIF/NITF field
12	**Metadata releasability** MDREL (NATO)	establishes a body to which the metadata can be released	O	N	Releasability Codelist, NATO Body Codelist, or String (a 3-character country code from STANAG 1059 when available). No applicable NSIF/NITF field
13	**Metadata legal constraint** MDLCST (Common)	provides a means to express a set of legal constraints applicable to the metadata	**C / legal constraints exist**	N	Legal Constraint No applicable NSIF/NITF field
14	**Metadata maintenance frequency** MDMFRQ (Common)	information on the frequency with which changes and additions are made to the metadata after the initial metadata is completed	O	1	Frequency Codelist No applicable NSIF/NITF field

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
15	**Dataset title** RSTITLE (Core)	name by which the cited resource is known	M	1	Free Text NSIF/NITF = FH:FTITLE
16	**Dataset alternate title** RSALT (Common)	short name, informal name, or name in another language by which the dataset is known	O	1	Free Text NSIF/NITF = PRODSNME
17	**Abstract describing the dataset** RSABSTR (Core)	brief narrative summary of the content of the resource(s)	M	1	Free Text No applicable NSIF/NITF field
18	**Collection Tiling Scheme** GPHICS (Common)	reference to a graphic that provides a description of the collection's tiling scheme	**C / if RSTYPE=series and tiling scheme is defined**	1	GPHICS.name (file name) and GPHICS.description (= 'TilingScheme') No applicable NSIF/NITF field
19	**Dataset purpose** RSPURP (Core)	A summary of the intentions with which the resource was developed	O	1	Free Text No applicable NSIF/NITF field
20	**Metadata type code** RSTYPE (Core)	scope to which the metadata applies	M	1	Resource Type Codelist Value = 'dataset', or 'series' for a collection No applicable NSIF/NITF field
21	**Metadata type name** RSTYPN (Core)	name of the hierarchy level for which the metadata is provided	**C / RSTYPE = series**	1	Free Text No applicable NSIF/NITF field
22	**Dataset edition** RSED (Core)	version identifier of the resource	O	1	String NSIF/NITF = FVER

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
23	**Dataset edition date** RSEDDAT (Core)	reference date of this edition of the resource	O	1	Date NSIF/NITF = FDT
24	**Dataset identifier** RSID (Core)	value uniquely identifying an object within a namespace	**M**	N	Identifier No applicable NSIF/NITF field
25	**Collection Name** RSSERI (Core)	Identifier of the collection, when the dataset is a member of a collection	**C / when dataset is a member of a collection**	1	String No applicable NSIF/NITF field
26	**Tile Identifier** RSSHNA (Core)	Identifier of the Tile, when the dataset is a member of a tiled collection	**C / when dataset is a member of a tiled collection**	1	String No applicable NSIF/NITF field
27	**Keywords** RSKWDS (Core) + keyword	commonly used word(s) or formalized word(s) or phrase(s) used to describe the subject.	**M**	N	Controlled Vocabulary Enumerations No applicable NSIF/NITF field
28	**Spatial resolution of the dataset** RSGSD (Core)	factor which provides a general understanding of the density of spatial data in the dataset	**M**	1	Distance Note: This distance may be approximate, as it is aimed at providing a general understanding only on the ESM dataset. NSIF/NITF = CLEVEL
29	**Dataset language** RSLOC (Core) + language	languages(s) used within the dataset	M	N	Locale Language No applicable NSIF/NITF field
30	**Dataset character set** RSLOC (Core) + encoding	full name of the character coding standard used for the dataset	M	N	Locale Encoding No applicable NSIF/NITF field

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
31	**Spatial representation type** RSRPTP (Core)	method used to spatially represent geographic information	**M**	1	Spatial Representation type Codelist No applicable NSIF/NITF field
32	**Dataset type** DGITYP (Core)	information about the type of geospatial information provided by the dataset	O	1	Geospatial Information Type Codelist No applicable NSIF/NITF field
33	**Dataset georeferencing level** RSGFLV (Core)	level of georeferencing of the dataset	O	1	Georeferencing Level Codelist No applicable NSIF/NITF field
34	**Dataset level** RSDTLVL (Core)	method of categorizing resolution bands of digital geographic data by equivalence to paper map scales	O	1	Data Level Codelist No applicable NSIF/NITF field
35	**Dataset topic category** RSTOPIC (Core)	main theme(s) of the dataset	M	**1**	Topic Category Enumeration 'elevation'
36	**Dataset theme** RSTHEME (Core)	provides more precise thematic information enabling discovery of the dataset	O	N	Thematic Codelist No applicable NSIF/NITF field
37	**Dataset environment description** RSENVD (Data)	information on producer's processing environment, including items such as the software, the computer operating system, file name, and the dataset size.	O	1	Free text No applicable NSIF/NITF field
38	**Value type** GRCINF (Data) + contentType	type of information represented by the cell value	**M**	1	Coverage Content Type CodeList No applicable NSIF/NITF field

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
39	**Surface type** GRCINF (Data) + range	description of the attribute described by the measurement value	**M**	1	Range No applicable NSIF/NITF field
40	**Special Cell** GRCINF (Data) +specialCell	cell playing a specific role (e.g. no data) in the coverage. When the content type of the coverage is a thematic classification, each thematic class is represented by a special cell.	O	N	Special Cell Values No applicable NSIF/NITF field
41	**Geographic location of the dataset (by coordinates)** RSEXT/boundingBox(Core)	geographic position of the dataset	**C / for unprojected data**	N	Bounding Box Note: RSEXT may be repeated NSIF/NITF = IGEOLO
42	**Dataset positional extent** RSEXT/boundingPolygon (Core)	the boundary enclosing the dataset, given as a set of (x,y) WGS84 coordinates of a polygon, with the last point replicating the first	**C / for UTM projected data**	1	Polygon Note: RSEXT may be repeated NSIF/NITF = IGEOLO
43	**Dataset temporal extent** RSEXT/temporalExtent (Core)	date and time for the content of the dataset (collection date and time)	O	1	Temporal Extent NSIF/NITF = FDT
44	**Dataset vertical extent** RSEXT/vertcalExtent/minz and maxz (Core)	vertical domain of the dataset expressed using WGS84 ellipsoid	**M**	1	Integer No applicable NSIF/NITF field
45	**Coordinate reference system – horizontal** RSRSYS (Core)	identifier used for reference systems	**M**	1	String, Anchor or Identifier No applicable NSIF/NITF field

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
46	**Coordinate reference system – temporal** RSRSYS (Core)	identifier used for reference systems	**C / for high-resolution datasets**	1	String, Anchor or Identifier No applicable NSIF/NITF field
47	**Dataset status** RSSTAT (Common)	Information about the status of the dataset	O	1	Status Codelist No applicable NSIF/NITF field
48	**Dataset reference date** RSDATE (Core)	reference date for the cited resource	M	N	Reference Date NSIF/NITF = FDT
49	**Dataset originator** RSRPTY:originator (Core)	party that created the dataset	**M**	1	ResponsibleParty (role = originator) NSIF/NITF = ONAME/OSTA ID
50	**Dataset point of contact** RSRPTY:pointOfContact (Core)	party that can be contacted for inquiries regarding or acquisition of the dataset	**M**	N	ResponsibleParty (role = pointOfContact) No applicable NSIF/NITF field
51	**Maintenance frequency** RSMTNC (Common) + maintenanceFrequency	frequency with which changes and additions are made to the resource after the initial resource is completed	**M**	1	Maintenance Information No applicable NSIF/NITF field
52	**Dataset classification** RSSCST (Core) + level	name of the handling restrictions on the resource	**C / based on requirement of classification system**	1	Security Constraint level NSIF/NITF = FSCLAS
53	**Dataset classification system** RSSCST (Core) + system	national or international system used to classify the dataset	**M**	1	Security Constraint System NSIF/NITF = FSCLSY

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
54	**Dataset releasability** RSREL (NATO)	provides a means to express a set of releasability information applicable to the dataset	O	N	Releasability NSIF/NITF = FSREL
55	**Dataset use constraints** RSUSE (Core)	provides a means to express general use limitations (limitations not implied by security or legal constraints) of the dataset	O	N	Free Text No applicable NSIF/NITF field
56	**Dataset legal constraints** RSLCST (Core)	restrictions and legal prerequisites for accessing and using the resource	**C / legal access/use constraints exist?**	N	Legal Constraint No applicable NSIF/NITF field
57	**Dataset lineage** RSLING (Core)	information about the source, the method of data capture, and any information on the transformation, conversion, or resampling that has been applied to the data, if available	M	1	Free Text No applicable NSIF/NITF field
58	**Dataset quality report** RSRQR or RSUQR (Data)	Information related to the result of a quality evaluation of the dataset	**M**	N	Regulated Quality Element or Unregulated Quality Element (see E.5 for definition and minimum requirement) No applicable NSIF/NITF field
59	**Dataset source** RSSRC (Data)	information about the source data used in creating the dataset	O	N	Source NSIF/NITF = ISORCE
60	**Method used to estimate values** RSPRST (Data)	information about the method used to estimate elevation values	**C / dataset includes estimated values**	1	Process Step No applicable NSIF/NITF field
61	**Dataset intended usage** RSSPUS (Common)	brief description of ways in which the resource(s) is/are currently or has been used	O	N	Usage No applicable NSIF/NITF field

	Name DMF ID (Requirement Class)	Definition	Obligation	Max Occur	Value Domain
62	**Dataset distribution format** RSDFMT (Core)	name of the data distribution format(s) and version of the format (date, number, etc.)	M	**1**	Format NSIF/NITF = FH:FHDR
63	**Online resource** RSONLLC (Core)	information about on-line sources from which the dataset, specification or community profile name and extended metadata elements can be obtained	**M**	N	Online Location No applicable NSIF/NITF field
64	**Dataset distribution unit** RSUD (Data)	a description of the unit (tiles, layers, geographic areas, etc.) in which the data is available	O	1	Free Text No applicable NSIF/NITF field
65	**Dataset transfer size** RSTS (Data)	estimated size of a unit in the specified transfer format, expressed in megabytes. The transfer size is > 0.0	O	1	Float No applicable NSIF/NITF field
66	**Dataset offline distribution** RSOFDM (Data)	information about offline media through which the dataset can be obtained	O	1	Medium No applicable NSIF/NITF field
67	**Instrument identification** (DMF ID is to be determined)	unique identification of the instrument	**M**	**1**	MD_Identifier <<DataType>> No applicable NSIF/NITF field
68	**Instrument type** (DMF ID is to be determined)	name of the type of instrument	**M**	**1**	Free Text No applicable NSIF/NITF field