ORDNANCE SURVEY GB

OS TERRAIN 5™ – TECHNICAL SPECIFICATION

OFFICIAL
Ver 2.0

Ordnance Survey

Version history

Version	Date	Description
1.2	03/2017	Minor updates.
2.0	04/2022	Original combined User Guide and Technical Specification document divided into separate Overview and Technical Specification documents. Minor formatting updates.

Purpose of this document

This document provides information about and insight into the OS Terrain 5 product and its potential applications. For information on the contents and structure of OS Terrain 5, please refer to the Overview.

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Contact details

OS website ‘Contact us’ page (https://www.ordnancesurvey.co.uk/contact-us).

Contents

1. Introduction

The purpose of the technical specification is to:

- Provide a brief description of the presentation of OS Terrain 5 in its supply formats.
- Provide licensed system suppliers with as much detail as necessary to enable OS Terrain 5 files to be easily understood and processed by application software.

1.1 Product overview

OS Terrain is the name given to Ordnance Survey's two height products. The two products provide detailed three-dimensional digital terrain models (DTMs) of Great Britain. A DTM primarily defines the ground surface, having removed all protruding features (such as buildings and trees) elevated above the bare earth. The main difference between the two products is their level of resolution.

- OS Terrain 5 is a mid-resolution DTM, designed to be interoperable with our large-scale data.
- OS Terrain 50 is a lower-resolution DTM product, designed for landscape visualisation and analysis over large areas. It is an Open Data product and, as such, it is free to view, download and use for commercial, educational, and personal purposes.

1.2 Available formats

OS Terrain 5 is published as both grid data and contour data in a variety of formats. Both data types are created from the same source data and are supplied as 5km-by-5km tiles. These tiles are identified by quoting the National Grid reference of the south-west corner of the area they cover.

- **OS Terrain 5 grid:** A grid of heighted points with regular 5m post spacing
- **OS Terrain 5 contours:** A contour dataset of 5m interval standard contour polylines. This includes mean high water and mean low water boundaries and spot heights.

OS Terrain 5 is available to download in the following formats:

- 5m grid in ASCII grid and GML 3.2.1 (simple features profile – level 0)
- 5m contours and spot heights in GML 3.2.1 (simple features profile – level 0)
- 5m contours and spot heights in Esri shapefile

2. Grid data

2.1 ASCII grid and GML

Ordnance Survey is committed to open data formats. The grid data is supplied as ASCII with GML, to enable their use in either format. The GML file does not contain any spatial height data as this data has been provided as an 'external data block', that is, the ASCII grid file. The GML file effectively provides metadata (such as location, grid spacing and the vertical reference system). It also contains spatial reference information in a software-independent form.

Currently, common software packages do not support it in this form, but the ASCII grid for OS Terrain 5 grid can be used alone.

ASCII grid is a generic, text-based DTM format that was originally developed by Esri, and it is sometimes referred to as ArcInfo ASCII grid or ArcGrid ASCII. This data can be read by most standard GIS software without additional translation.

2.1.1 Data structure

The term 'data structure' refers to the organisation and sequence of the records in the data file and not to the geographic topology of the data.

The data is specified as a raster grid, with the height values being calculated as a mean of the heights across the whole 5m pixel. To represent this in ASCII grid format, the z values are presented 2.5 m from the north-west corner of the tile (to provide the pixel-centre). The data is presented in rows reading from west to east creating a row of 1,000 values. The next row will begin 2.5m from the western edge 7.5m south of the northern tile edge (under the first value) and again progressing at 5m intervals to the east. Each tile contains 1,000 rows with each row comprising 1,000 pixels. The header provides the coordinates of the south-west corner (xllcorner and yllcorner) to ensure that a GIS places the data correctly.

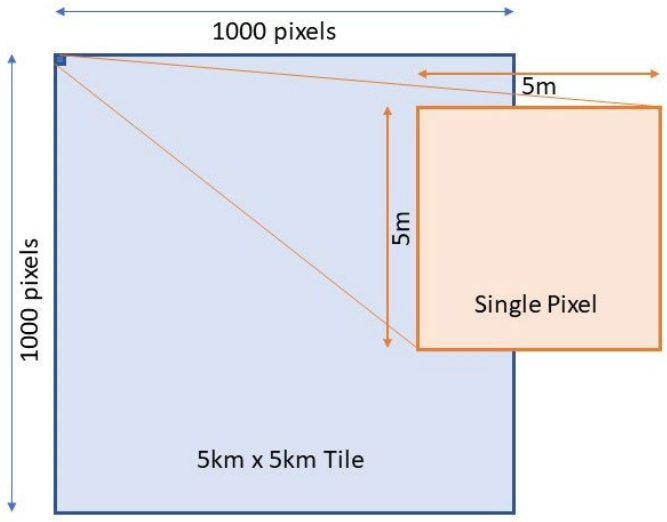

Figure 1: ASCII data as 5km x 5km tile raster grid of 5m x 5m pixels

The height values are presented in the standard ASCII grid format as a series of real values and are given to the nearest 0.01m.

The structure of the layers provided with the ASCII grid and GML download is outlined in the following table:

Layer name	Layer description
<tile name>.asc	Esri ASCII grid data.
<tile name>.gml	OGC file for the ASCII grid to enable the data to be loaded as GML format.
<tile name>.prj	File containing the spatial reference system in a format defined by Esri.
<tile name>.asc.aux.xml	A file that provides parameters to enable default styling in Esri applications. This ensures that the shading is consistent across the data but allows you to apply your own choice of colour ramp.
Metadata_<tile name>.xml	A metadata file for grid data, providing information on the flying date and so on.

2.1.2 Data header

The following is the data header found in the first six rows of the ASCII grid file:

```
ncols 1000
nrows 1000
xllcorner 295000 (example)
yllcorner 85000 (example)
cellsize 5
21.72 21.82 21.91 22.01 22.07 22.13 22.19 …
```

3. Contour data

3.1 GML

This section describes how OS Terrain 5 is defined in GML version 3.2.1. An understanding of XML and XML schema is required.

3.1.1 Overview

The OpenGIS GML encoding standard is an XML grammar for expressing geographic features. GML serves as a modelling language for geographic systems as well as an open interchange format for geographic transactions on the Internet. As with most XML-based grammars, there are two parts to the grammar: the schema that describes the document, and the instance document that contains the actual data. A GML document is described using a GML schema (http://www.opengeospatial.org/standards/gml/). This allows users and developers to describe generic geographic datasets that contain points, lines, and polygons.

The GML conforms to GML 3.2.1 simple features (level 0), which is a subset of the full GML specification, intended to make it easier for GIS vendors to provide a minimum level of support for GML.

3.1.2 GML schema

XML schemas are used to validate the format and content of the GML. The GML specification provides a set of schemas that define the GML feature constructs and geometric types. These are designed to be used as a basis for building application-specific schemas, which define the data content.

The OS Terrain 5 application schemas, which are referenced by the data, are available at https://www.ordnancesurvey.co.uk/xml/terrainschema/index.html

The user may need to be connected to the Internet to access these online schemas while working with OS Terrain 5 in GML unless their software supports local copies of the schema. Depending upon the software that is being used to read the data, the user has the following options:

- The software does not use the schema, and therefore does not need to be connected to the Internet.
- The software needs the schema but can reference it from a local copy if it is downloaded in advance.
- The software needs the schema and can only reference it from the online version, and therefore needs to be connected to the Internet.

3.1.3 Data structure

Layer name	Layer description
<tile name>.gml	GML data file.
Metadata_<tile name>.xml	A metadata file for contour data providing information on the flying date and so on.

3.1.4 Detailed GML model

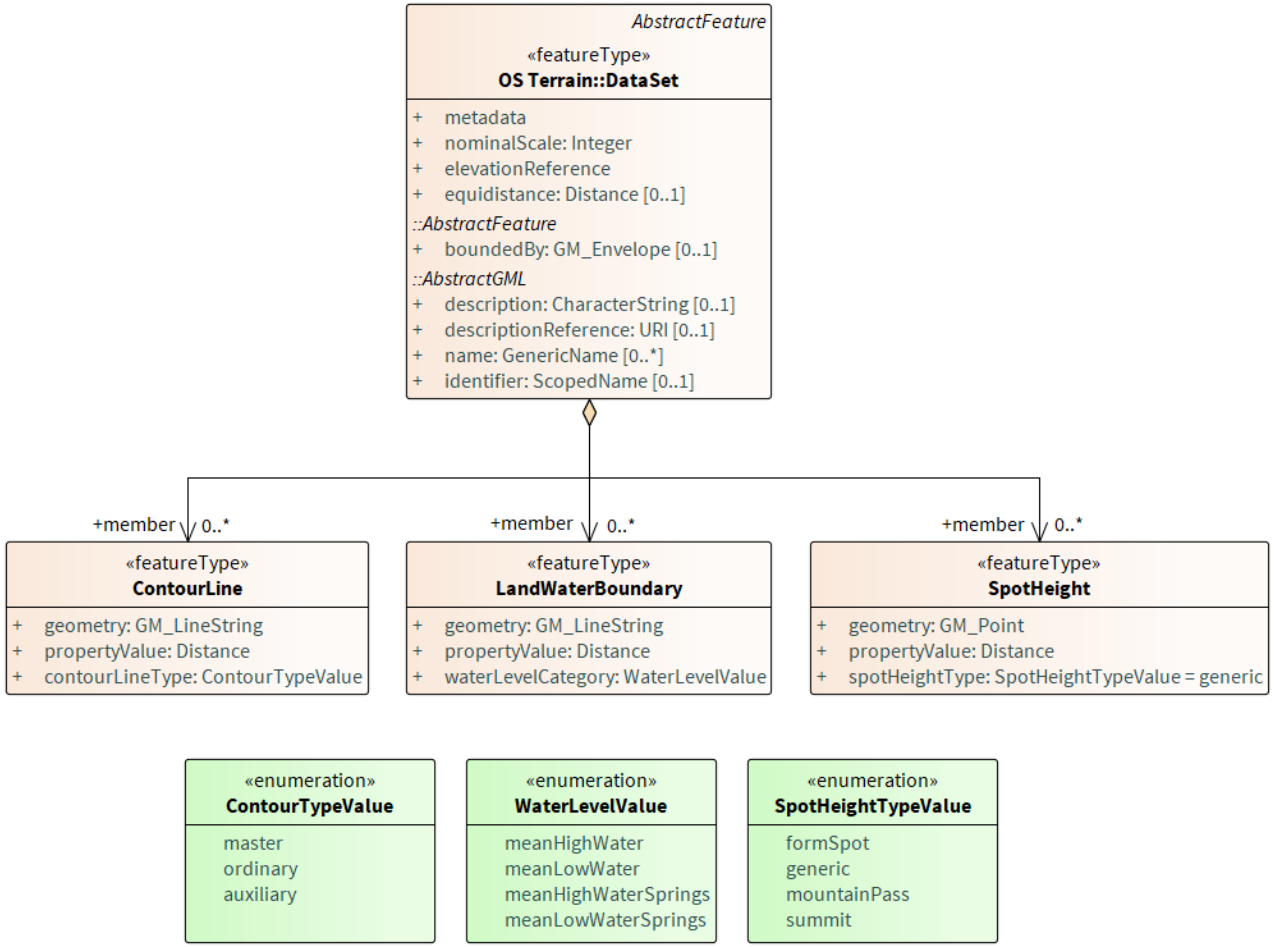

Figure 2: GML data model

3.1.5 Spot heights

The spot heights have been created by an automated process to select the highest mass point that is at least 1 metre above and within every closed contour. If the point is the same height as the contour, it will be removed. Some spot heights could be lower than the surrounding contour due to genuine depressions. The z value is rounded to one decimal place.

3.1.6 GML feature types

The feature types within the contours enable their representation as individual features to allow for easier interpretation; for example, the contours can be drawn as different colours to highlight the index contours, the high-water mark, and spot heights over a certain value. The contours and tidelines have been rounded to two decimal places.

The column names have been reformatted to facilitate compliance with Esri software.

Contour line feature type

Column name	Type	Description
+geometry	GM_LineString	The structure of the feature
+propertyValue	Distance	The length of the contour
+contourLineType	String	master ordinary auxiliary

Note: The ContourLine sub-type value names align with INSPIRE draft elevation specification. The terms 'master' and 'ordinary' represent the more traditionally recognised terms index and standard (contours) respectively.

SpotHeight feature type

Column name	Type	Description
+geometry	GM_Point	The structure of the feature.
+propertyValue	Distance	The z value (height above Newlyn, or other British height datum) of the feature.
+spotHeightType	String	formSpot generic mountainPass summit

Note: At launch only the sub-type value 'generic' has been used but the other values provide functionality to enrich the attribution if required in a later product release.

LandWaterBoundary feature type

Column name	Type	Description
+geometry	GM_LineString	The structure of the feature.
+propertyValue	Distance	The length of the boundary line.

Column name	Type	Description
+waterLevelCategory	String	meanHighWater meanLowWater meanHighWaterSprings meanLowWaterSprings

Note: At launch only the sub-type value 'generic' has been used but the other values provide functionality to enrich the attribution if required in a later product release.

Example of the ContourLine feature type

```
<os:member>
	<os:ContourLine gml:id="os.t5.sx98se.175">
		<os:geometry>
			<gml:LineString srsName="urn:ogc:def:crs:EPSG::27700"
gml:id="os.t5.sx98se.175.geom">
				<gml:posList>295487.08 80000 295481.21 80001.48 295480.55 80001.23
				295481.75 80000</gml:posList>
				</gml:LineString>
		</os:geometry>
		<os:propertyValue uom="m">15</os:propertyValue>
		<os:contourLineType>ordinary</os:contourLineType>
	</os:ContourLine>
</os:member>
```

SpotHeight feature type

```
<os:member
	<os:SpotHeight gml:id="os.t5.sx98se.0">
		<os:geometry>
			<gml:Point srsName="urn:ogc:def:crs:EPSG::27700" gml:id="os.t5.sx98se.0.geom">
				<gml:pos>299161.48 84990.56</gml:pos>
			</gml:Point>
		</os:geometry>
		<os:propertyValue uom="m">31.9</os:propertyValue>
		<os:spotHeightType>generic</os:spotHeightType>
	</os:SpotHeight>
</os:member>
```

Example of the LandWaterBoundary feature types

```
<os:member>
	<os:LandWaterBoundary gml:id="os.t5.sx98se.17">
		<os:geometry>
			<gml:LineString srsName="urn:ogc:def:crs:EPSG::27700" gml:id="os.t5.sx98se.17.geom">
				<gml:posList>297786.59 81469.64 297783.26 81469.75 297783.26
81466.75 297786.59 81469.64</gml:posList>
				</gml:LineString>
```

```
                </os:geometry>
                <os:propertyValue uom="m">1.62</os:propertyValue>
                <os:waterLevelCategory>meanHighWater</os:waterLevelCategory>
        </os:LandWaterBoundary>
</os:member>
```

3.1.7 Unique identifiers

GML 3.2 requires features and their geometries to have unique identifiers. For OS Terrain products, the feature identifiers have been structured as follows: os.t5.<tile name>.<sequential number>, where the second part abbreviates the product name. Geometry identifiers in the GML use the same form, but with a .geom suffix.

Therefore, for a given release of the product, every feature and geometry is guaranteed to have a unique identifier. The products will be updated by whole tile refresh and there are no plans to supply feature-based change only update. When a tile is updated, the sequential identifiers are regenerated.

3.1.8 Coordinate reference system

The coordinate reference system for geometries in the OS Terrain GML is expressed using an EPSG (European Petroleum Survey Group) code embedded in a uniform resource name (URN) (urn:ogc:def:crs:EPSG::27700). This is a more generic way of expressing the reference system, rather than osgb:BNG (British National Grid), used in previous Ordnance Survey products.

3.2 Esri shapefile

3.2.1 Overview

The Esri shapefiles consist of eight separate files for the point and line features.

Esri shapefiles are a simple, non-topological format for storing the geometric location and attribute information of geographic features. A shapefile is one of the spatial data formats that you can work with in ArcGIS.

The shapefile format defines the geometry and attributes of geographically referenced features in as many as five files with specific file extensions that should be stored in the same project workspace. The file extensions and their uses are as follows:

- .shp: The file that stores the feature geometry
- .shx: The file that stores the index of the feature geometry
- .dbf: The dBASE file that stores the attribute information of features. When a shapefile is added as a theme to a view, this file is displayed as a feature table.
- .sbn and .sbx: The files that store the spatial index of the features. These two files will only exist if you perform theme-on-theme selection, spatial joins or create an index on a theme's SHAPE field.
- .prj: The file that stores the projection information

3.2.2 Data structure

Layer name	Layer description
<tile name>_line.shp <tile name>_line.dbf <tile name>_line.shx <tile name>_line.prj	Esri shapefiles for contour and tideline data.
<tile name>_point.shp <tile name>_point.dbf <tile name>_point.shx <tile name>_point.prj	Esri shapefiles for spot height data.
Metadata_<tile name>.xml	A metadata file for contour data providing information on the flying date and so on.

3.2.3 Detailed shapefile model

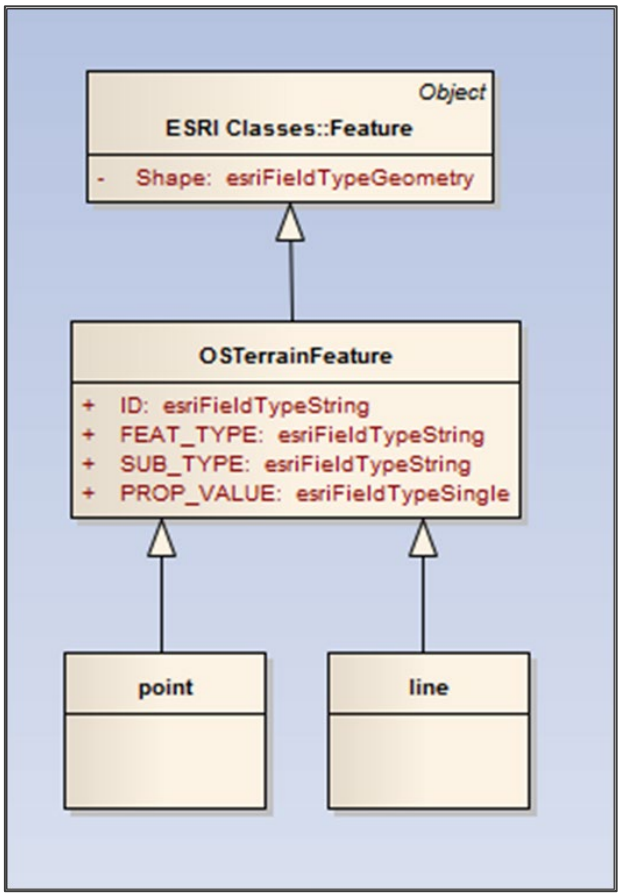

Figure 3: UML diagram of the Shapefile contour data model

4. Metadata

The XML metadata for the terrain products follows the GEMINI metadata standard, which Ordnance Survey has committed to for the UK Location Programme and INSPIRE. Ordnance Survey has provided metadata for national sets of products (www.ordnancesurvey.co.uk/oswebsite/xml/products).

OS Terrain 5 will also have metadata in this form, on a per-tile basis.

The XML metadata contains comments to clarify the meaning of the XML tags used in the file.

4.1 Product identification table

Name	Description	Examples
Product name	OS Terrain 5	gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:**collectiveTitle**/gco:CharacterString
Spatial representation	The structure of the data, either grid (DTM) or vector (contours).	gmd:MD_DataIdentification/gmd:spatialRepresentationType/gmd:**MD_SpatialRepresentationTypeCode**
Tile reference	5km National Grid tile reference.	gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:**title**/gco:CharacterString
Topic category	INSPIRE theme: elevation.	gmd:MD_DataIdentification/gmd:topicCategory/gmd:**MD_TopicCategoryCode**
Coordinate reference systems	The projected coordinate reference system – British National Grid – and the vertical reference system – Ordnance Datum Newlyn.	gmd:MD_ReferenceSystem/gmd:referenceSystemIdentifier/gmd:RS_Identifier/gmd:code/gmx:Anchor xlink:href="urn:ogc:def:crs:EPSG::27700"/**British National Grid** gmd:MD_ReferenceSystem/gmd:referenceSystemIdentifier/gmd:RS_Identifier/gmd:code/gmx:Anchor xlink:href="urn:ogc:def:crs:EPSG::5701"/**Ordnance Datum Newlyn**

4.2 Change history table

Name	Description	Examples
Flying date(s)	The date that the area was flown by Ordnance Survey for revision. To accommodate multiple flying dates within the tile, two values will be recorded: earliest flying date then latest flying date present. Both dates can be identical. For Profile content the Date Flown will be recorded as <null>.	gmd:MD_DataIdentification/gmd:extent/gmd:EX_Extent/gmd:temporalElement/gmd:EX_TemporalExtent /gmd:extent/gml:TimePeriod /gml:beginPosition /gml:endPosition
Processing date	The date the tile was created by Ordnance Survey, not the date of the real-world change or survey.	gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:date/gmd:CI_Date/gmd:date/gco:Date
Version number	An incrementing number to indicate the number of times the tile has been published.	gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:edition/gco:CharacterString
Reason for change	This provides information about the update of the data and whether it is creation (new) or a revision (modified / verified) which is described in the metadata by using lineage below.	gmd:MD_DataIdentification/gmd:citation/gmd:CI_Citation/gmd:date/gmd:CI_Date/gmd:dateType/gmd:CI_DateTypeCode
Lineage	Text to describe the status of the tile, either: 'created from new imagery', 'some parts revised from new imagery', 'new imagery examined and no change'.	gmd:DQ_DataQuality/gmd:lineage/gmd:LI_Lineage/gmd:statement/gco:CharacterString

4.3 Metadata viewing stylesheet

To make the XML easier to read, an XSLT viewing style sheet is provided (OSTerrainMetadataViewingStylesheet.xsl), which converts the XML to HTML for ease of viewing in a web browser. Some browsers and other software will read this automatically if the user is connected to the Internet, as its address is referenced in the metadata but it can also be located on the Ordnance Survey website: http://www.ordnancesurvey.co.uk/xml/stylesheet/OSTerrainMetadataViewingStylesheet.xsl.

4.3.1 Metadata XML file example

This is a section of the XML file in its native format with the location of the style sheet highlighted. It can be read like this when opened in an XML viewer or basic file reader.

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl"
href="http://www.ordnancesurvey.co.uk/xml/stylesheet/OSTerrainMetadataViewingStylesheet.xsl"?>

<gmd:MD_Metadata xmlns:gmd="http://www.isotc211.org/2005/gmd"
xmlns:gml="http://www.opengis.net/gml/3.2" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:gmx="http://www.isotc211.org/2005/gmx" xmlns:gco="http://www.isotc211.org/2005/gco"
xmlns:xlink="http://www.w3.org/1999/xlink" xsi:schemaLocation="http://www.isotc211.org/2005/gmx
http://eden.ign.fr/xsd/isotc211/isofull/20090316/gmx/gmx.xsd"><!-- Unique identifier, required if this
record is being used in a metadata management system -->
        <gmd:fileIdentifier>
                <gco:CharacterString>OSTerrain5.NT23NE</gco:CharacterString>
        </gmd:fileIdentifier>
        <gmd:contact gco:nilReason="missing"></gmd:contact>
        <gmd:dateStamp>
                <gco:DateTime>2013-01-08T03:22:25</gco:DateTime>
        </gmd:dateStamp><!-- Projected Coordinate Reference System -->
        <gmd:referenceSystemInfo>
                <gmd:MD_ReferenceSystem>
                        <gmd:referenceSystemIdentifier>
                                <gmd:RS_Identifier>
                                        <gmd:code>
                                                <gmx:Anchor
xlink:href="urn:ogc:def:crs:EPSG::27700">British National Grid</gmx:Anchor>
```

4.3.2 Example of the metadata XML file referencing the XSLT viewing stylesheet

This is the same section of the metadata file above when viewed directly by clicking on the file, utilising the style sheet.

OS Terrain Tile Metadata **Product identification:**	
Product name:	OS Terrain 5
Spatial representation:	Grid
Tile reference:	NT23NE
Topic category:	Elevation
Coordinate reference systems:	British National Grid

4.3.3 Esri grid styling – asc.aux.xml file

This XML file contains min, max, mean, and standard deviation height values for the product, in a format defined by Esri. The same values are supplied for every tile. These height statistics are provided to allow the user to apply colour ramps, such that adjacent tiles are styled consistently.

This feature can be disabled by moving the asc.aux.xml file from each downloaded zip file, or by adjusting the parameters of the minimum and maximum heights in a GIS if desired.

Annex A: Glossary

Glossary term	Definition
accuracy	The closeness of the results of observations, computations or estimates to the true values or the values accepted as being true. Accuracy relates to the exactness of the result and is the exactness of the operation by which the result is obtained.
American Standard Code for Information Interchange (ASCII)	A 7-bit code for encoding a standard character set.
area	A spatial extent defined by circumscribing lines that form a closed perimeter that does not intersect itself.
attribute	An attribute is a property of an entity, usually used to refer to a non-spatial qualification of a spatially referenced entity. For example, a name or descriptive code indicating what an entity represents or how it should be portrayed.
attribute code	An alphanumeric identifier for an attribute type.
boundary	Boundaries define the areas of the various national and local government authorities and some European authorities.
chain	A closed loop of links bounding a polygon.
code	An alphanumeric attribute code used in digital map data to describe each feature in terms either of the object surveyed or its representation on the map (or both).
coding	Allocation of a feature code to a feature being created from constituent construction data – points and/or segments; with optional linking to an existing feature of the same feature code.
contour	A line connecting points of equal elevation.
coordinate pair	A coordinate pair is an easting and a northing.
coordinates	Pairs of numbers expressing horizontal distances along original axes. Alternatively, triplets of numbers measuring horizontal and vertical distances. Row and column numbers of pixels from raw imagery are not considered coordinates for the purpose of the standard.
data format	A specification that defines the order in which data is stored or a description of the way data is held in a file or record.
data model	An abstraction of the real world that incorporates only those properties thought to be relevant to the application or applications at hand. The data model would normally define specific groups of entities and their attributes, and the relationship between these entities. A data model is independent of a computer system and its associated data structures. A map is one example of an analogue data model.

Glossary term	Definition
data structure	The defined logical arrangement of data as used by a system for data management; a representation of a data model in computer form.
eastings	See rectangular coordinates.
entity	Something about which data is stored in a databank or database. For example, boundary and name. The data may consist of relationships, attributes, positional and shape information and so on. Often synonymous with feature.
Extensible Markup Language (XML)	This is a markup language written in a textual data format designed to encode documents and data structures for transfer over the Internet. It was developed by the World Wide Web Consortium (W3C). XML schemas express shared vocabularies and allow machines to carry out rules made by people. They provide a means for defining the structure, content, and semantics of XML documents.
Extensible Stylesheet Language Transformations (XSLT)	This is a language for transforming XML documents into objects that can be presented in a format that is more easily read by the user, such as HTML for web pages or plain text.
feature	An item of detail within a map that can be a point and/or symbol, text, or line.
feature identifier	A unique code to identify an individual feature. A specified part of a record containing a unit of data, such as the date of digitising. The unit of data may be a data element or a data item.
feature record	The logical information, both spatial and attribute, describing a feature or entity.
geographical information system (GIS)	A system for capturing, storing, checking, integrating, analysing, and displaying data that is spatially referenced to the Earth. This is normally considered to involve a spatially referenced computer database and appropriate applications software.
Geography Markup Language (GML)	GML was developed by the Open Geospatial Consortium (OGC), a global organisation of developers and users that aims to maximise the benefit of geographic information. GML is a spatially enabled dialect of XML schema.
layer	A subset of digital map data selected on a basis other than position. For example, one layer might consist of all features relating to counties and another to wards. Also known as a level.
level	A level corresponds to a single type of administrative unit, for example, a ward or a district, and is conceptual in form. See also layer.
line	A series of connected coordinated points forming a simple feature with homogeneous attribution.
line feature	The spatial abstraction of an object in one dimension. Lines may intersect with other lines. They are defined as a series of two or more coordinate pairs and may be curved or straight. Curved lines consist of a series of very short straight-line segments. As an object abstraction, a line has no width.
line segment	A vector connecting two coordinated points.

Glossary term	Definition
link or edge	Links are the representation of line features. They are made up of one or more consecutive non-intersecting link segments with common attributes between two terminating nodes. Links have no connection with other links except at the start or end, via common (shared) terminating nodes (points). All links contain their terminating coordinates. Links may form the boundaries of polygons and may be shared between polygons.
map scale	The ratio between the extent of a feature on the map and its extent on the ground, normally expressed as a representative fraction, such as 1:1,250 or 1:10 000.
name	The proper name or label of an object (real world) or feature (object abstraction). The descriptive name might consist of one or more text strings or be an attribute of the object or object abstraction.
National Grid	A unique referencing system that can be applied to all Ordnance Survey maps of Great Britain (GB) at all scales. It is used by Ordnance Survey on all post-war mapping to provide an unambiguous spatial reference in Great Britain for any place or entity, whatever the map scale. The National Grid is defined by the OSGB36 spheroid.
Northings	See rectangular coordinates.
object	A collection of entities which form a higher-level entity within a specific data model.
object (real world)	A recognisable discrete part of the real world.
origin	The zero point in a system of rectangular coordinates.
point and line data	A form of vector data designed for map production in which all map features are designated as points, lines, or text. Point and line data does not carry the topological relationships between features.
polygon	Polygons are a representation of areas. A polygon is defined as a closed line or perimeter completely enclosing a contiguous space and is made up of one or more links. At least one node occurs on the perimeter of a polygon where the bounding link completes the enclosure of the area. There may be many nodes connecting the bounding links of a polygon. Links may be shared between polygons. Polygons may wholly contain other polygons or be contained within other polygons.
polygon boundary	The link(s) which enclose a polygon, projected into the horizontal plane. A chain.
record	A set of related data fields grouped for processing.
rectangular coordinates	Also known as X-Y coordinates and as eastings and northings. These are two-dimensional coordinates that measure the position of any point relative to an arbitrary origin on a plane surface (for example, a map projection).
resolution	A measure of the ability to detect quantities. High resolution implies a high degree of discrimination but has no implication as to accuracy. For example, in a collection of data in which the coordinates are rounded to the nearest metre, resolution is 1metre, but the accuracy may be ± 5metres or worse.

Glossary term	Definition
segment	A chord defined by two consecutive coordinates in a line string.
shapefile	This is a data format developed by Esri to describe features such as points, lines, and polygons to enable spatial analysis. A shapefile consists of several files designed to hold information essential for the transfer of this data between software products which are capable of reading shapefiles.
spatial data	Data that includes a reference to a two- or three-dimensional position in space as one of its attributes. It is used as a synonym for geometric data.
spot height	A point on the Earth's surface for which the height, above a reference datum, is known and which has been fixed by observation.
String	A set of items which can be arranged into a sequence according to a rule. A sequence of coordinate pairs or triplets making up a line or a link.
structured data	Data within which collections of features (of any type) form objects. Topographically structured data also contains topological information, defining the relationships between features and objects.
Topography	The study of the physical features of the Earth. A topographic map's principal purpose is to portray and identify the features of the Earth.
Topology	The study of the properties of a geometric figure that are not dependant on position, such as connectivity and relationships between lines, nodes, and polygons.
Vector	A straight line joining two data points.
vector data	Positional data in the form of coordinates of the ends of line segments, points, text positions and so on.