

British Columbia  
Specifications And Guidelines for  
Geomatics

# Gridded DEM Specification

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Ministry of Sustainable Resource Management  
Province of British Columbia

## Table of Contents

- 1.0 Introduction
- 2.0 Mapping System
- 3.0 Data Source
- 4.0 Interpolation and Gridding
- 5.0 Accuracy
- 6.0 Water Bodies
- 7.0 File Structure
- 8.0 Header File Structure
- 8.1 Example of a header record
- 9.0 File Naming Convention
- 9.1 File Naming Example

### **1.0 Introduction**

This specification was developed to guide the consultant in creating a regular grid DEM data set for the Province of British Columbia. The grid spacing is 25 metres and is created from the 1:20,000 scale Terrain Resource Information Management (TRIM) Digital Elevation Model (DEM). When completed, this data set will fulfill many public and private sector DEM requirements.

### **2.0 Mapping System**

The gridded DEM files shall conform to the National Topographic System (NTS) for 1:250,000 scale. The 1:250,000 scale NTS quadrangles are each 1 degree of latitude by 2 degrees of longitude in size.

Data for each file will extend at least 250 metres past the range rectangle fully contained by the NTS mapsheet neat line. This implies the adjacent sheets will contain exact duplicate data in the overlapping areas.

All data is presented on the Universal Transverse Mercator Coordinate System based on the 1983 North American Datum. The vertical datum is mean sea level as established by the Geodetic Survey of Canada.

### 3.0 Data Source

The gridded DEM data set will be derived from the TRIM DEM utilizing all available data types including mass points and breaklines.

The DEM data types to be used are :

DEM Point	HA 90100 000
Indefinite DEM Point	HA 90100 110
Sharp Breakline	HA 90200 000
Round Breakline	HA 90200 110
Hypsographic Breakline	HA 90200 120
Hydrographic Breakline	HA 90200 130
Transportation Breakline	HA 90200 140

### 4.0 Interpolation and Gridding

All data will be interpolated using a linear interpolation process. Extrapolation processes will not be used except in ocean areas on the perimeter of the data set.

TRIM DEM data will be used to interpolate a grid at an even 25 metre spacing.

The eastings and northings will be gridded so they are evenly divisible by 25 metres. The eastings and northings of the *outside extents* of the data shall be evenly divisible by 100 metres. *Please note that this requirement, in conjunction with the 250 metre margin requirement, may mean the actual extents of the data will be greater than either requirement would otherwise demand.*

The elevation's/pixel's easting and northing position will be positioned on the *northwest* corner of the pixel, however the elevation value shall be calculated on the position of the *centre* of the pixel.

Breakline data shall be given **more** weight in the surface modelling process than DEM Points (mass points). Indefinite DEM Points shall be given **less** weight than DEM Points.

All elevations interpolated are to be stored to the nearest metre.

When merging the source 1:20,000 DEM files prior to re-gridding, the overlapping duplicate DEM data between the files will be deleted. This will prevent double or erroneously weighting of the elevation values during the interpolation process.

### 5.0 Accuracy

The accuracy of the interpolated DEM will conform to 1:20,000 TRIM data accuracy. Ninety percent of all points interpolated from the TRIM DEM shall be accurate to within 10 metres of their true elevation. This corresponds to the following:

Univariate:

LMAS - 1.64 10.00 metres (90.00%) probability

LSE - 1.00 6.10 metres (68.27%) probability

Rejection (blunder)

Univariate = 3.0 18.30 metres (99.73%) probability

## 6.0 Water Bodies

A uniform grid will be created across each entire 1:250,000 DEM file. Holes in the DEM grid will not be acceptable. Lakes and oceans will have DEM points interpolated across their surfaces at even 25 metre intervals. These elevations may have variations in the water body surface however they must meet the above accuracy specification.

## 7.0 File Structure

Elevations will be stored as pixels in signed 16 bit integer binary format. Negative values are considered to be valid elevations.

Elevations are to be stored in the file with the top left (northwest corner) pixel first, followed by the remaining elevation values of the row in sequential order. Rows of elevations/pixels are to be stored from the top to the bottom (southward) direction.

These files of elevation integers will not contain any header information. A separate file will accompany each DEM file containing the header and support information. This will allow for common GIS and image processing software to import the data. These support files can then be modified to accommodate individual software requirements.

No invalid values are allowed in the dataset, unless the boundaries of the Province are encountered. In this case, an invalid value will have an elevation value of **-9999 metres**.

## 8.0 Header File Structure

Each grid file will be accompanied by a header file which will contain the following information:

1. Gridded DEM data filename
2. Generation date of DEM file (yyyy/mm/dd)
3. Projection (always "UTM")
4. Datum (always "NAD83")
5. UTM zone number
6. easting of most westerly edge of the most westerly pixel in the dataset in metres (minimum easting of the dataset)
7. northing of most southerly edge of the most southerly pixel in the dataset in metres (minimum northing of the dataset)
8. easting of most easterly edge of the most easterly pixel in the dataset in metres (maximum easting of the dataset)
9. northing of most northerly edge of the most northerly pixel in the dataset in metres (maximum northing of the dataset)
10. easting of most westerly edge of the first pixel in the dataset in metres. The first pixel is the elevation value for the northwest corner of the DEM grid.

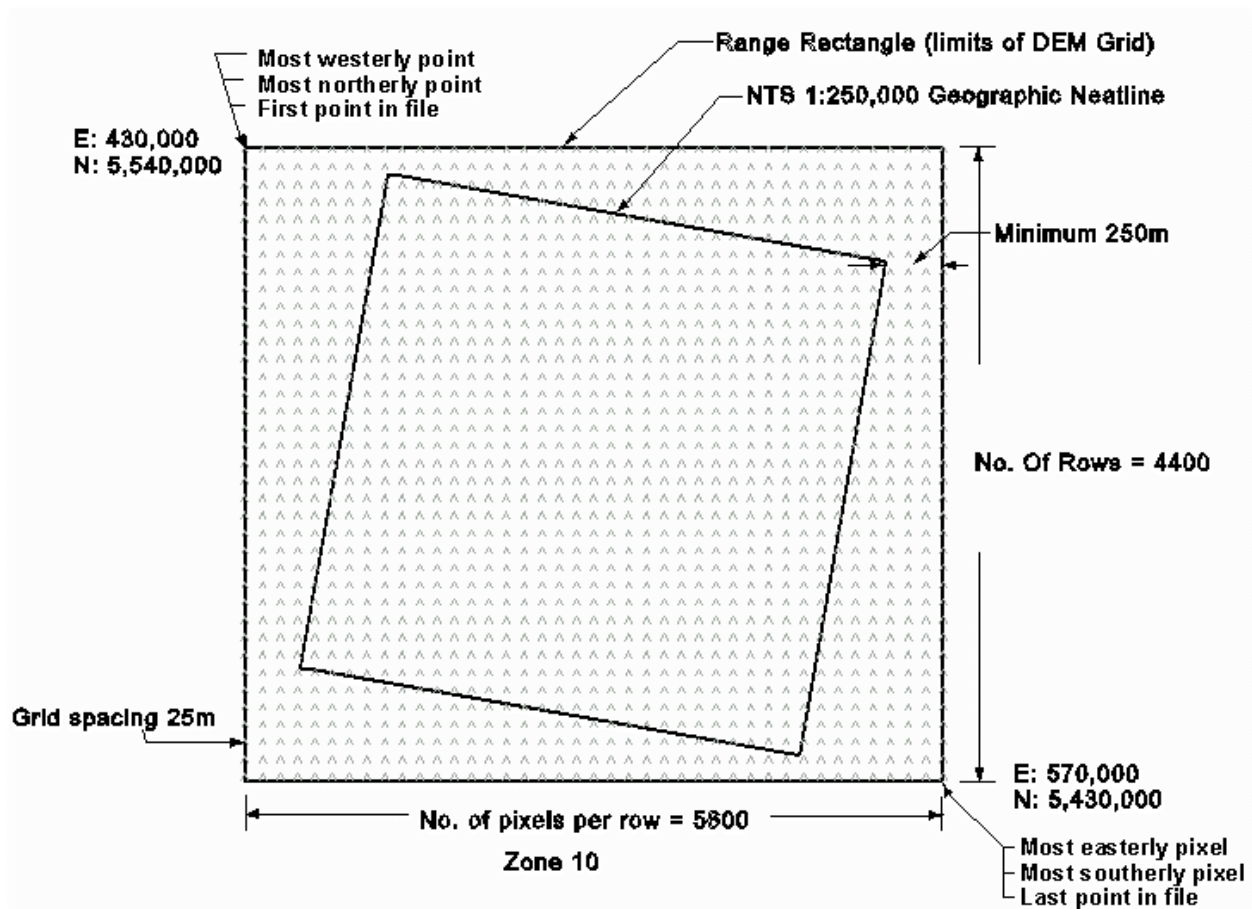
11. northing of most northerly edge of the first pixel in the dataset in metres. The first pixel is the elevation value for the northwest corner of the DEM grid.
12. grid spacing or pixel size in metres (always "25")
13. least/most significant bit indicator ("LSB" or "MSB")
14. number of pixels per row
15. number of rows

This file will be an ASCII, comma delimited file (often referred to as "CSV" or "Comma Separated Values").

### 8.1 Example of a header record

```
92g.grd,1996/03/23,UTM,NAD83,10,430000,5540000,570000,5540000,430000,5540000,
25,MSB,5600,4400
```

Diagram showing grid layout and header information



### 9.0 File Naming Convention

Each file will be named according to the NTS 1:250,000 naming convention and a three digit extension. All gridded DEM files will have the extension .GRD.

**9.1 File Naming Example:**

DEM file: 92g.grd