LANTMÄTERIET

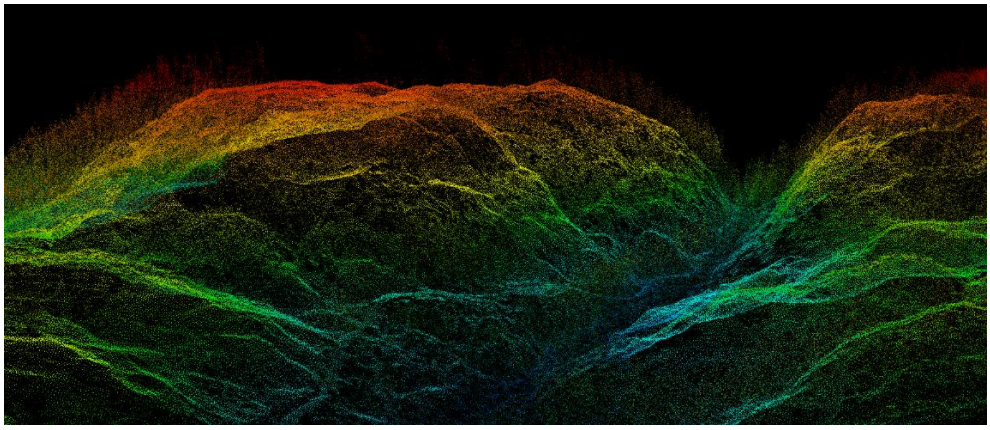
2022-04-05

**PRODUCT DESCRIPTION**

# Laser data Download, NH

DOCUMENT VERSION: 2.7

*Figure 1. Example laser data.*



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# 1 General description

*Laser data Download, NH* consists of a point cloud with classified points captured through airborne la-ser scanning of the terrain.

## 1.1 Contents

The product contains a point cloud with a point density 0,5-1 point/m2. Each point is classified as ground, water, bridge or unclassified.

The product is delivered with metadata that indicates the origin and status of the processing performed, in addition to a full set of metadata from the scanning, including flight lines.

## 1.2 Geographic coverage

Nationwide.

## 1.3 Delivery tiles

The smallest unit for delivery corresponds to a tile measuring 2.5 x 2.5 km geographically adjusted to the index system in SWEREF 99 TM.

## 1.4 Koordinatsystem

In plane: SWEREF 99 TM

In height: RH 2000

# 2 Quality description

See the pdf-file *Quality description of laser data*, which can be found alongside this product description at the website under Laserdata NH.

## 2.1 Data capture

Data capture for *Laser data Download, NH* began in 2009 and was completed in 2019. Laser data was captured through airborne laser scanning of the terrain.

Laser data Download, NH is provided in classification level 3 which includes classification of bridges, refined ground classification of dams and improved classification of ground and water.

Each laser point is classified in any of the following classes:

1 Unclassified, also includes any incorrect points
2 Point on ground
9 Point on water
11 Point on bridge

## 2.2 Maintenance

The point cloud is a snapshot without a plan for maintenance.

## 2.3 Metadata

### 2.3.1 DESCRIPTION OF IMAGE FILES

POINT DENSITY – LAST AND ONLY RETURN

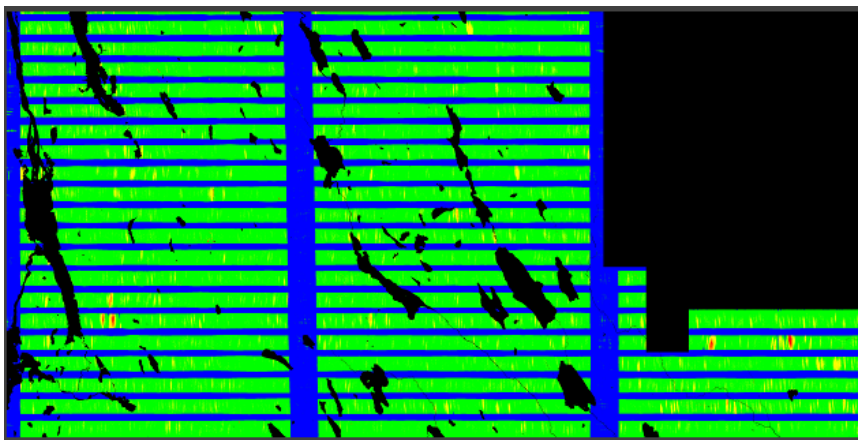
For each scanning area the point density of the laser point cloud is presented as an image file with a resolution of 10 metres. Only points from the last of several returns or the only return are shown, i.e. points that may represent the ground surface. The file is named, for example, 09P001_coverage.tif.

The point density is illustrated with colours as per the table below.

*Table 1. Point density and colour presentation in the image file Point density - last and only return.*

| Colour | Point density | Comment |
|---|---|---|
| Blue | > 1 point/$m^2$ | |
| Green | > 0.5 points/$m^2$ | |
| Yellow | > 0.25 points/$m^2$ | |
| Red | < 0.25 points/$m^2$ | |
| Black | 0 points/$m^2$ | Black colour in the image is either due to the water surfaces having been removed by masking or holes in the laser point cloud resulting from poor reflection. Seas and areas outside the national boundary that have not been scanned are also presented as black. |

*Figure 2. Example with point density, last and only return, for a scanning area.*



### POINT DENSITY – LASER POINTS CLASSIFIED AS GROUND

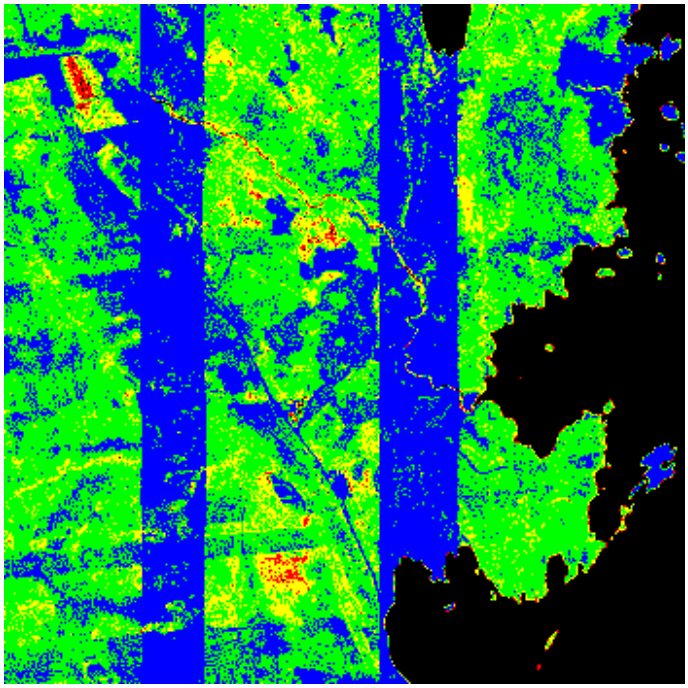
For each scanning area the average point density of laser points that have been classified as ground is presented as an image file with a resolution of 10 metres.

The point density is illustrated with colours as per the table below.

*Table 2. Point density and colour presentation in the image file Point density - laser points classified as ground.*

| Colour | Point density | Comment |
|---|---|---|
| Blue | > 0.5 points/$m^2$ | On open areas and on overlaps between flight lines there might be more points on ground than the minimum requirement of 0.5 points/m2. |
| Green | 0.25-0.5 points/$m^2$ | On average there is at least one point on ground within one area of 2 × 2 metres. |
| Yellow | 0.0625-0.25 points/$m^2$ | On average there is at least one point on ground within an area of 4 x 4 metres. The terrain model may have a diminished degree of detail in these areas. |
| Red | > 0.0625 points/$m^2$ | On average there is less than one point on ground within an area of 4 x 4 metres. This might be caused by dense forest or water. The terrain model may have a significantly diminished degree of detail in these areas. |
| Black | 0 points/$m^2$ | Black colour in the image is due to either the water surfaces having been removed by masking or holes in the laser point cloud. Holes in the laser point cloud are due to poor reflection or dense vegetation, which may cause a total loss of points on ground. Poor reflection occurs on, for example, water surfaces and newly laid asphalt. |

*Figure 3. Example with point density of ground for a scanning area.*



### 2.3.2 DESCRIPTION OF CONTENTS IN METADATA FILES

Every delivered laser data file is accompanied by two metadata files (GeoJSON). The metadata files contains geometry and attributes according to descriptions and examples below.

GeoJSON-schema for download.

*Table 3. Description and example of contents in metadata file, grouped by flight line.*

| Field | Description | Example |
|---|---|---|
| | Geometry, polygon<br>The approximate area of the flight line | |
| **id** | Identity of the flight line, Point Source ID | 1 |
| **insamlingsdatum** | Scanning date | 2018-03-01 |
| **flyghojd** | Planed flight altitude (metre) | 2200 |
| **flyghastighet** | Planed speed (knots) | 135 |
| **punkttathet** | Planed minimum point density inside a flight line (points/m2) | 0.6 |
| **skannerid** | Scanner ID | SN6114 |
| **skannerfabrikat** | Scanner manufacturer | Leica |
| **skannermodell** | Scanner model | ALS60 |
| **oppningsvinkel** | Field of view (degrees) | 40 |
| **pulsfrekvens** | Pulse frequency (Hertz) | 104100 |
| **skanningsfrekvens** | Scan frequency (Hertz) | 39 |
| **trjfil** | Trj-file | |

*Table 4. Description and example of contents in metadata file, grouped by tile.*

| Field | Description | Example |
|---|---|---|
| | Geometry, polygon<br>The approximate area of the tile | |
| **id** | Tile ID | 672_59_0050 |
| **klasstatistik** | Number of points for each class | klass 1: 115706<br>klass 2: 76985<br>klass 9: 2321521 |
| **klassifice-ringsniva** | Classification level | 3 |
| **kommentar** | Quality notes<br>*Indicates that deviations or problems of which the user should be aware have been detected during processing.* | Utbredd felaktig markklassning av tät låg vegetation |
| **senastAndrad** | Date of the most recent update | 2015-11-26 |

The following information, from the completed laser scanning, is available on the website under Laserdata Download, NH.

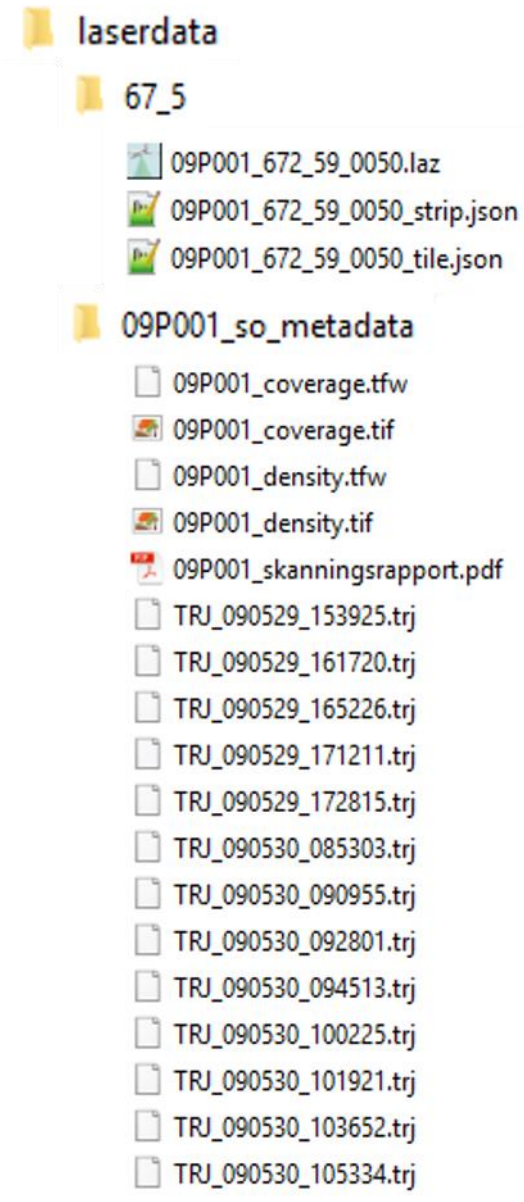
- Skanningsområden, shape-format (zip) - Scanning areas
- Skannade stråk (xls) - Scanning date and Point Source ID for flight lines
- Skannade stråk, shape-format (zip) - Position for the flight lines in scanning areas

# 3 Contents of the delivery

## 3.1 Folder structure at delivery

At delivery the LAZ files, including the metadata, is sorted into folders like the example below.

*Figure 4. Example of contents in a delivery.*



## 3.2 Delivery format

Laser data is supplied in LAS format, version 1.2, in point data record format 1. The LAS files are supplied compressed with Laszip (software to unzip these files is free to download on the internet).

## 3.3 File sets and contents

*Table 5. Description of files included in the delivery.*

| File name (example) | Description |
|---|---|
| 09P001_672_59_0050.las<br>(supplied compressed in .laz) | The file name includes the identity of the scanning area, the co-ordinates of the lower left corner of the tile and the file format. |
| 09P001_672_59_0050_strip.json | Metadata presenting attributes grouped by flight line, one file for each las-file. |
| 09P001_672_59_0050_tile.json | Metadata presenting attributes grouped by 2,5 kilometre tile, one file for each las-file. |
| 09P001_coverage.tif | A raster file presenting the point density of the laser point cloud, last and only return, for the entire scanning area. |
| 09P001_coverage.tfw | Geo-referencing file for the image file above. |
| 09P001_density.tif | A raster file for the entire scanning area presenting the point density of those laser points that have been classified as ground. |
| 09P001_density.tfw | Geo-referencing file for the image file above. |
| TRJ_090529_153925.trj | Trajectory data, one file for each flight line included in current scanning area. The file name may vary depending on the equipment used, but it will always end with the extension .trj. |
| 09P001_Skanningsrapport.pdf | The contractor´s report on collection. |
| leverans.json | Overview of tiles (2.5 x 2.5 km) included in the delivery, in GeoJSON-format. |