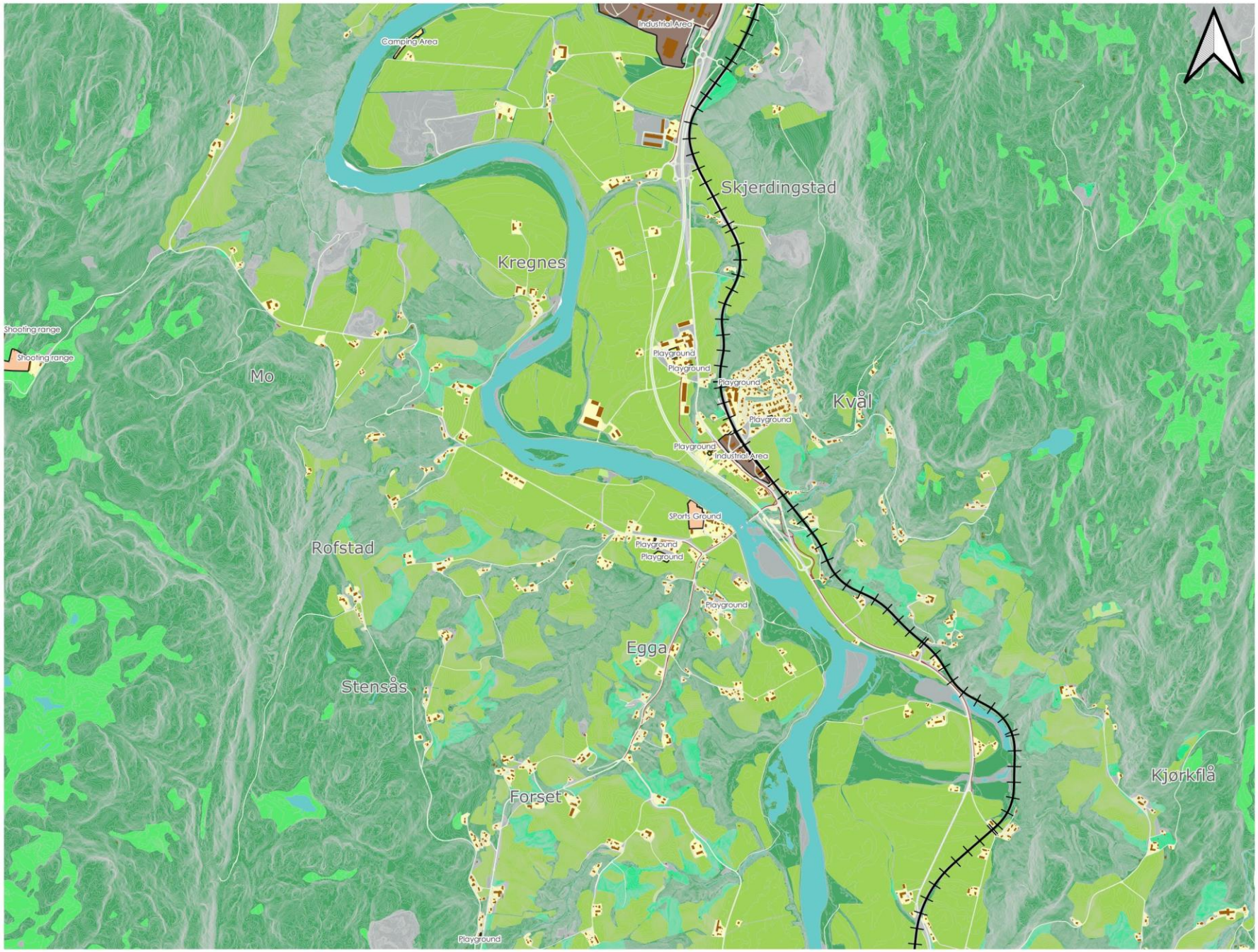
AAR4847 – Assignment

Candidate no: 10007

1. Topographic Map

01 | Topographic Map

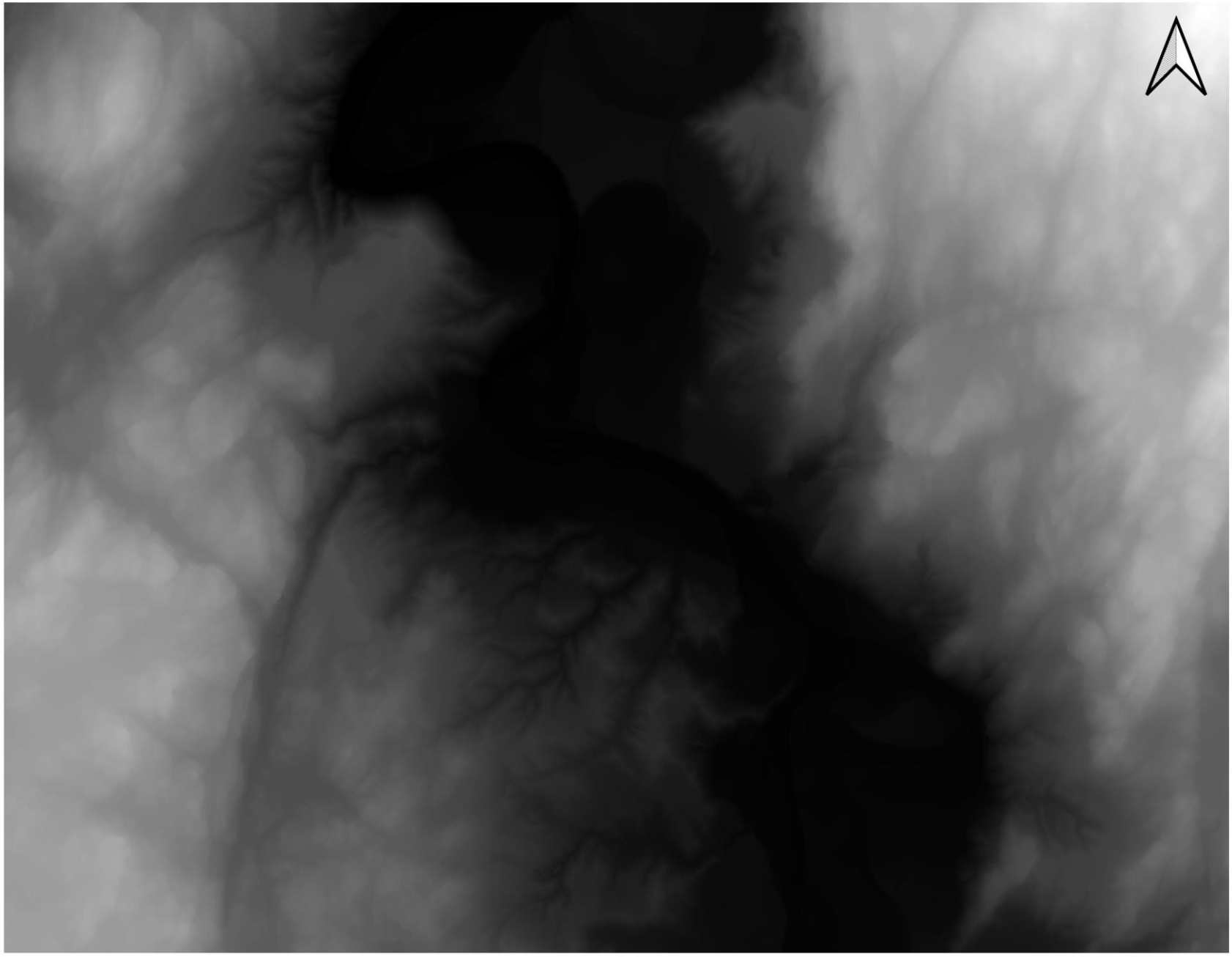


Steps and Description

- Topographic map was prepared using the distributed geodatabase.
- Geodatabase was converted into a GeoPackage file.
- Building, Roads, Railway, Water, Land resources polygon along with contour line layer were used for the map.
- The text displayed on the map include the names of the places (obtained using WMS) and location of selected land use, such as playground, industrial areas, Shooting Range etc (using Land Use layer from distributed geodatabase)
- Symbology, attribute table, filter and layout manager were the tools used to prepare the map.

2. TIN and Elevation Raster Models

02 | TIN Elevation Model



TIN Elevation Model prepared with Contour Lines

Legend

Interpolated Raster

593.67396

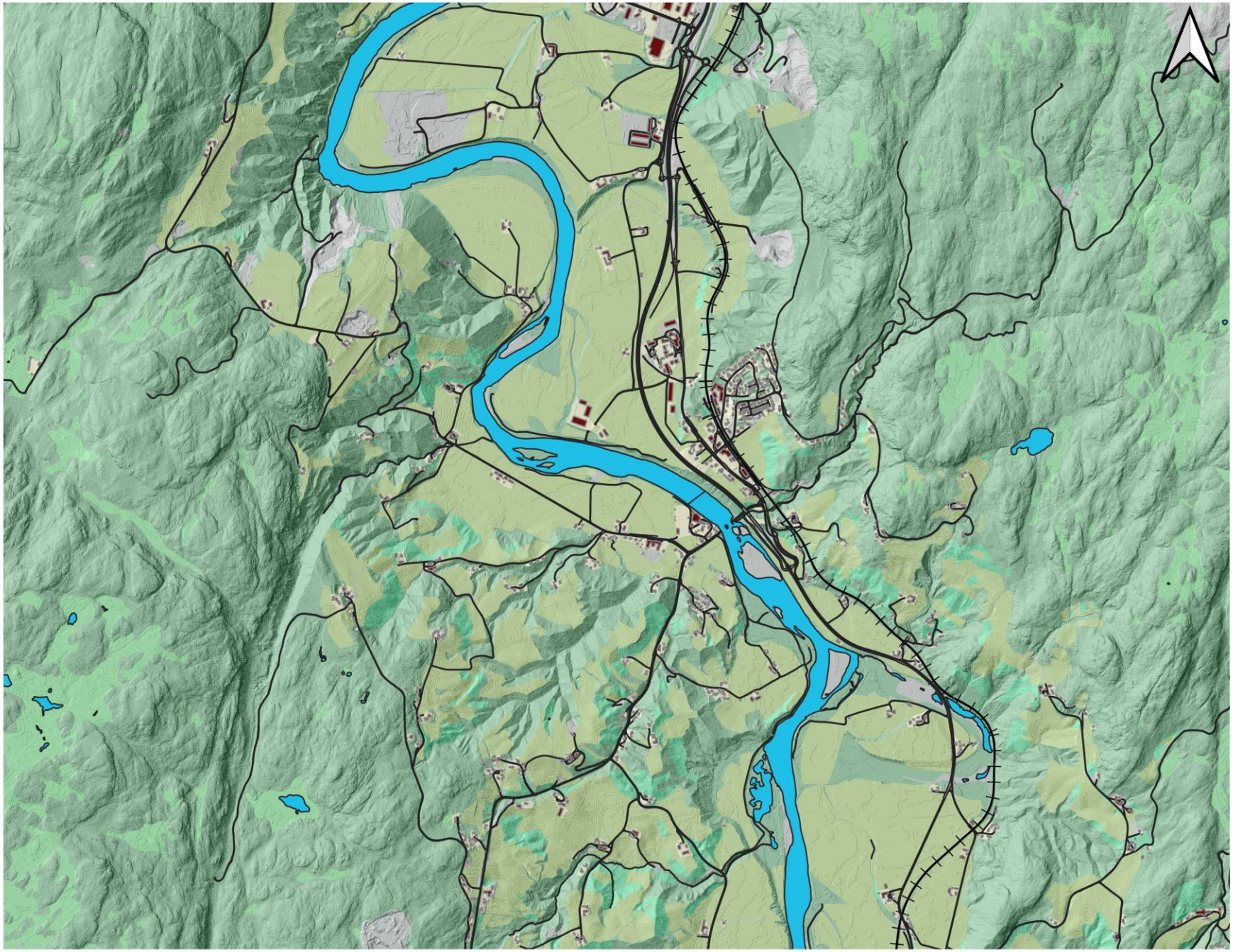
7

0 500 1,000 m

Steps and Description

- A TIN elevation model was prepared using contour lines
- First, contour lines were filtered for ‘Høydekurve’ field.
- TIN Interpolation tool was used to create the model. The linear interpolation method was used.
- The tool prepared an Interpolated Raster and triangulation line model.
- The Interpolated Raster was compared with the given Digital Terrain Model to check for any errors.

02 | Hillshade Map



Hillsahde map based on elevation raster, with buildings, water, roads and land resources

Legend

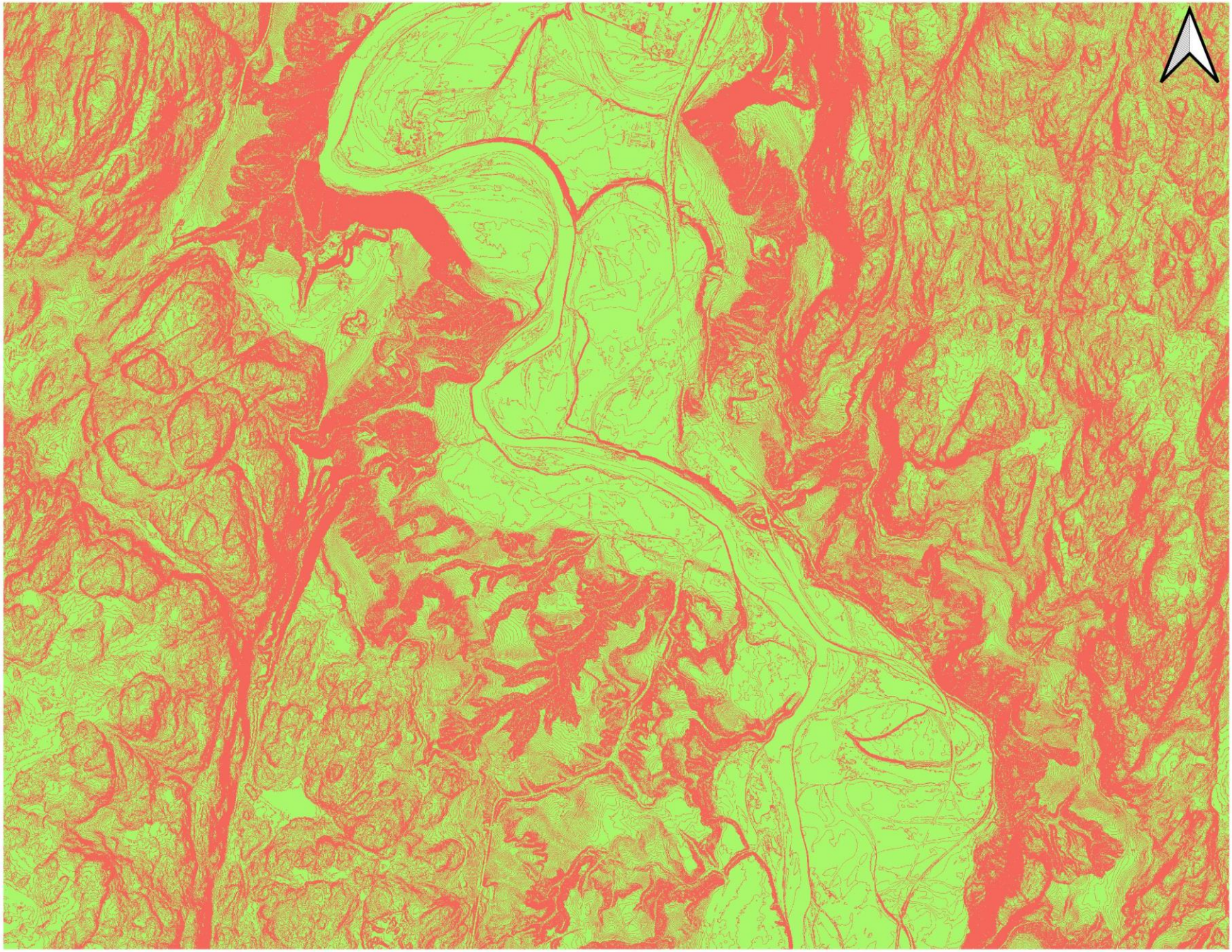
- Buildings
- Water
- Roads
- railway_line

Land Resources

- Built-up Area
- Transportation
- Fully Cultivated Soil
- Surface Cultivated Soil
- Infield Grazing
- Forest
- Open Solid Land
- Swamp
- Fresh Water

0 500 1,000 m

02 | Slope Map



Slope map with Red color showing areas with slope > 14 degrees (should be avoided for building) and green as areas that could be preffered.

Legend

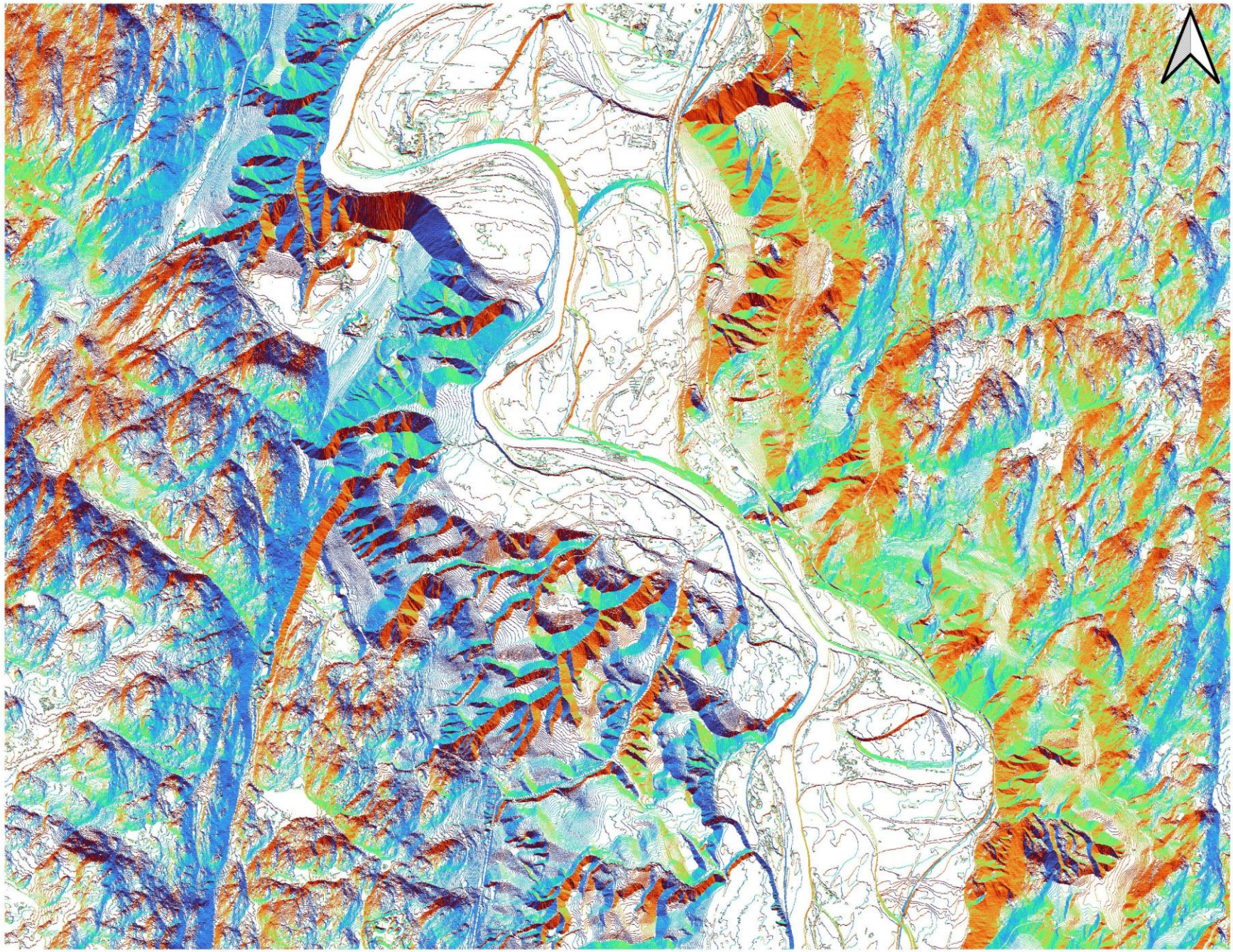
SLOPE

<= 14.0000

> 14.0000

0 500 1,000 m

02 | Aspect Map



Steps and Description

- DTM model was used for raster terrain analysis
- Hillshade, Slope and Aspect tools were used to prepare three maps.
- The first map shows the Hillshade, with water, buildings, roads, railways and land resource layers.
- The slope map highlights the areas between the ones with slopes greater than or less than 14 degrees
- The aspect map uses symbology to display the direction of the slope.

02 | Shadow Areas

Shadow Areas for 21/02/2023 at 11:00 AM produced using Hillshade (Terrain Shading)

Legend

Hillshade
(Terrain Shading)

0.9

0

0 500 1,000 m

02 | Shadow Areas

Shadow Areas for 07/04/2023 at 02:00 PM produced using Hillshade (Terrain Shading)

Legend

Hillshade (terrain_shading)

0.9

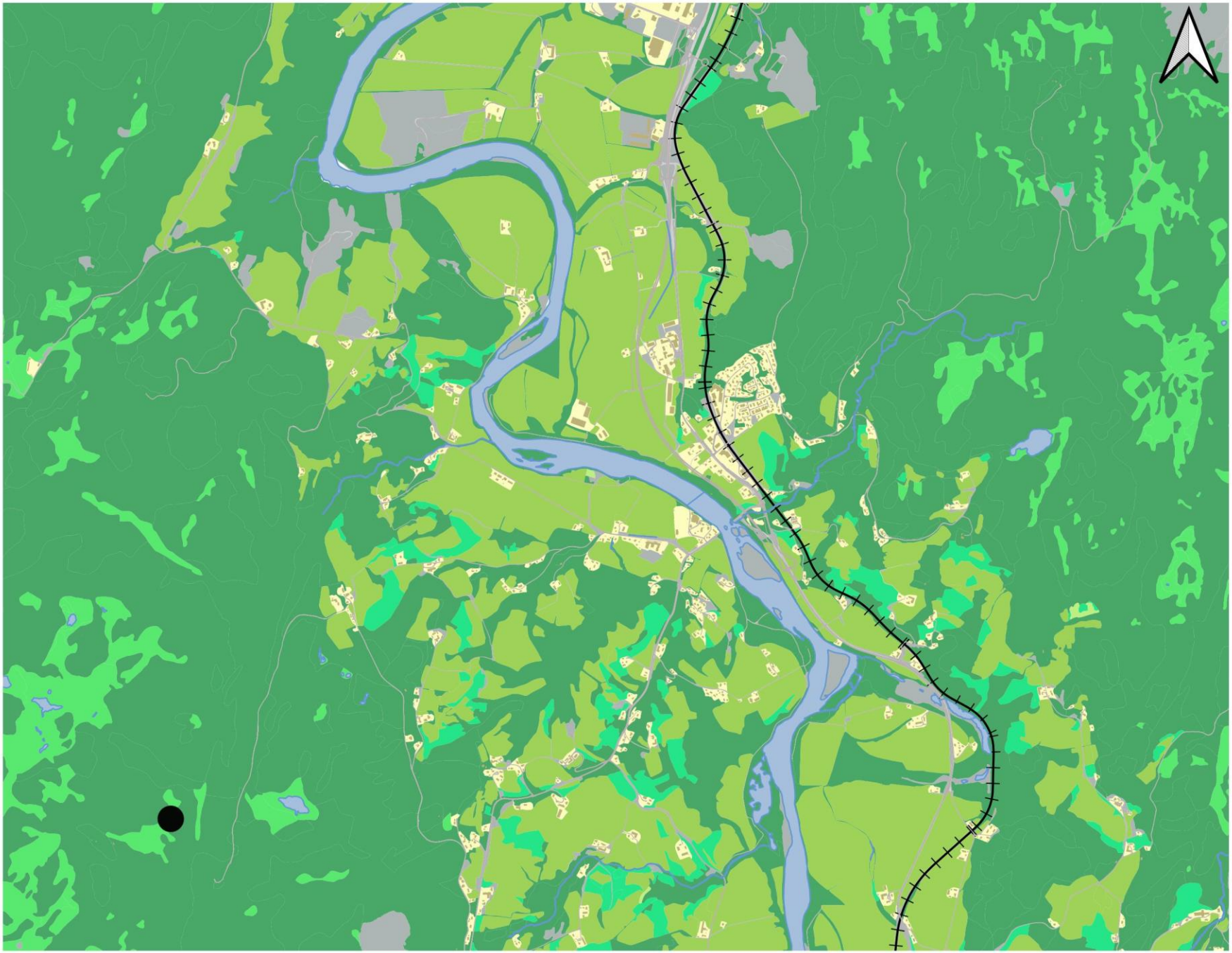
0

0 500 1,000 m

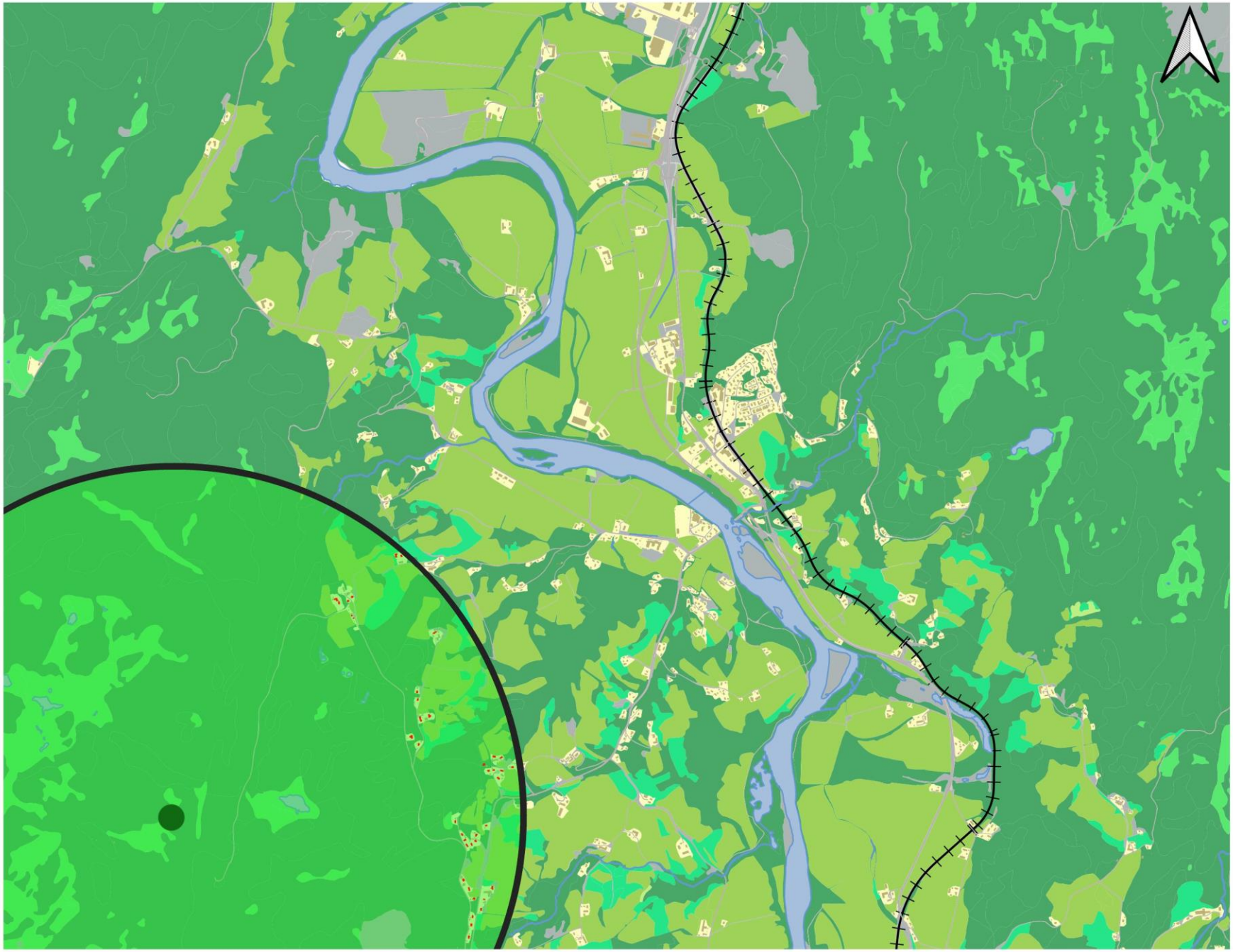
Steps and Description

- For the date 21-Feb-2023 11:00 AM and 7th April 2023 02:00 PM, azimuth and elevation angles were calculated.
- 21-Feb-2023 11:00 AM – Azimuth – 14.07 degrees; Elevation – 156.97 degrees
- 7th April 2023 02:00 PM– Azimuth – 30.82 degrees; Elevation – 208.83 degrees
- Hillsahde (Terrain shading) tool was used to prepare the shadow map.

02 | Windmill Tower Location



02 | Windmill Visibility



Windmill visibility with a tower height of 101m, Observer height of 2m and Maximum distance for visibility 2000m.

47 Buildings with residents have a view to the windmill tower.

Legend

- Water
- Road
- Railway
- Buildings
- Windmill Tower

Windmill Visibility

- Visible
- Residential Buildings with view to the tower

0 500 1,000 m

Steps and Description

- The windmill with the height of 101m was assigned based on DOB.
- The observers standpoint elevation was 2m, and maximum distance from observer to compute visibility was 2000m.
- Viewshed tool was used to compute the visibility.
- After the viewshed was prepared it was converted into the vector form for further analysis.
- The table join was used to identify buildings with residents.
- Then to identify which residential buildings have a view of the windmill tower, Select by Location tool was used and ‘are within’ check box was select.
- A total of 47 residential buildings were found to have a view of the windmill tower.

3. Georeferencing of Aerial Photo

03 | Aerial Photo

The map shows the aerial photo of the area with Water, Roads, Building and Railway features. The aerial photo was aligned using the Georefrencing tool.

03 | 3D View - Aerial Photo

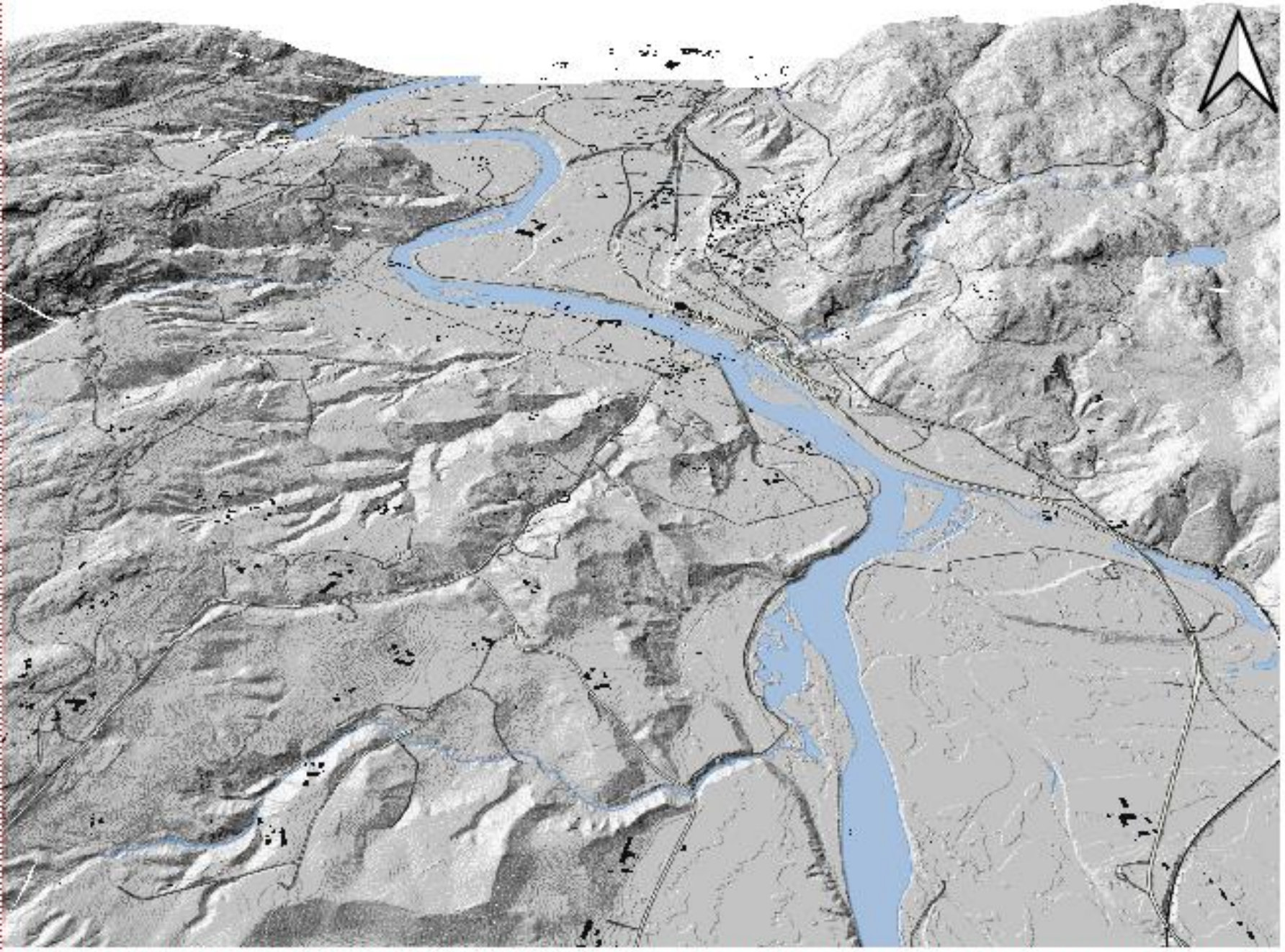
3D View map with Aerial Photo draped over Digital Elevation Model.

Legend

- Water
- Road
- Railway
- Buildings

0 500 1,000 m

03 | 3D View - Hillshade



3D View map with Hillsahde draped over Digital Elevation Model.

Legend

- Water
- Road
- Railway
- Buildings

0 500 1,000 m

Steps and Description

- Aerial Photo aligned using Georeferencing tool, Polynomial 1 transformation was chosen and three control points were selected.

- 3D map viewer was used to obtain 3D perspectives, first with Hillshade draped on DTM and then Aerial Photo draped over the DTM.

4. Table Join and Spatial Analysis

04 | Number of inhabitants

The map shows the number of residents in each buuldings with the help of graduated colors sysmbology.

Legend

Number of inhabitants

- 1 - 3
- 3 - 5
- 5 - 7
- 7 - 10
- 10 - 12

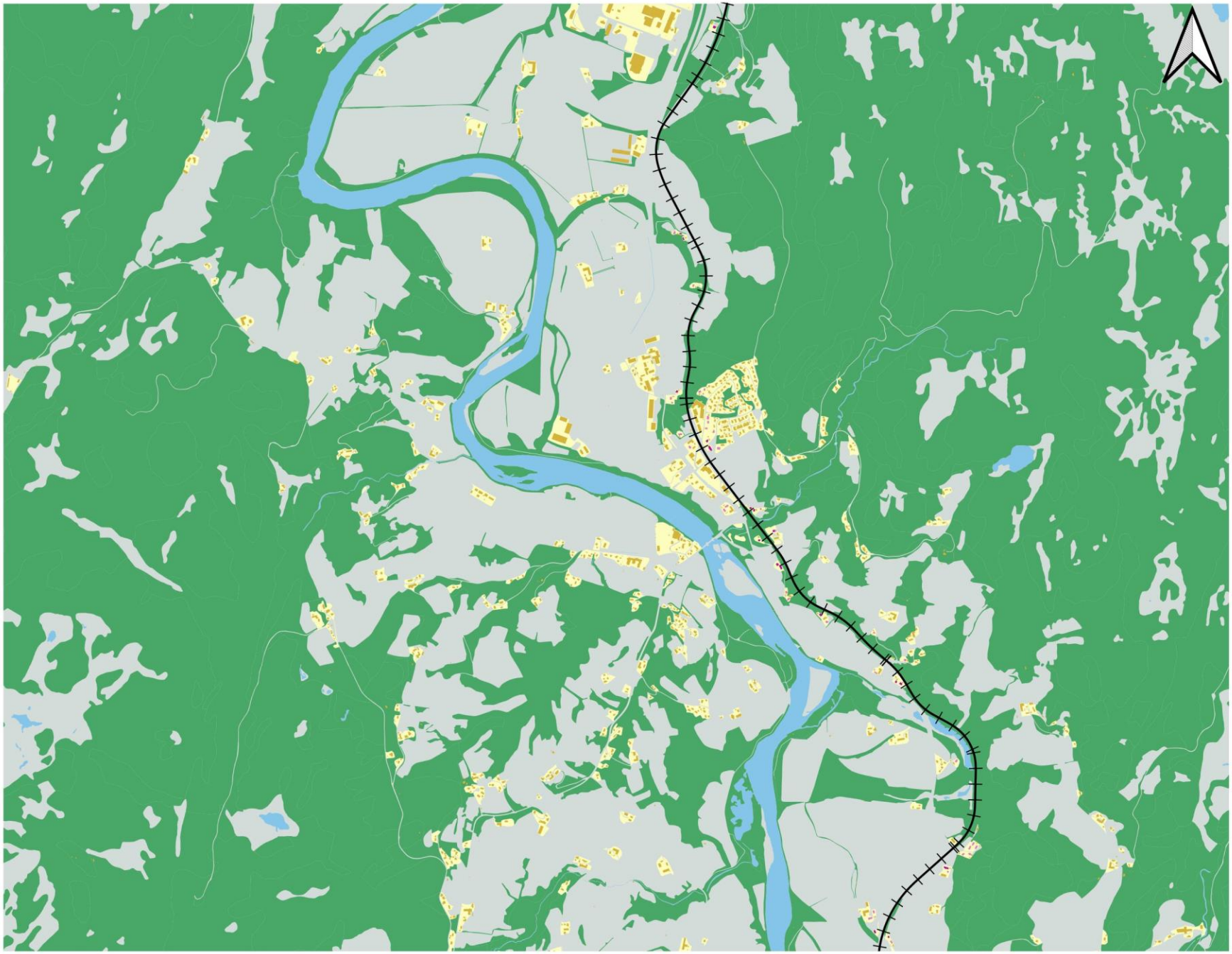
- Built-up Area
- Forest
- Fresh Water
- Railway_line

0 500 1,000 m

Steps and Description

- Bygningsnummer was used as the unique ID to join the table with residents data to building polygon layer.
- Buildings without residents were filtered out.
- Graduated Symbology to show houses with more residents.

04 | Buildings with residents, closer to the Railway Line



Located within 100m of the railway line
Buildings = 52
Residents = 326

Located within 500m of the railway line
Buildings = 18
Residents = 95

Legend

- Buildings with residents, 50m from the railway line
- Buildings with residents, 100m from the railway line
- Other Buildings
- Railway_line

and_resources_pol

- Built-up Area
- Forest
- Fresh Water

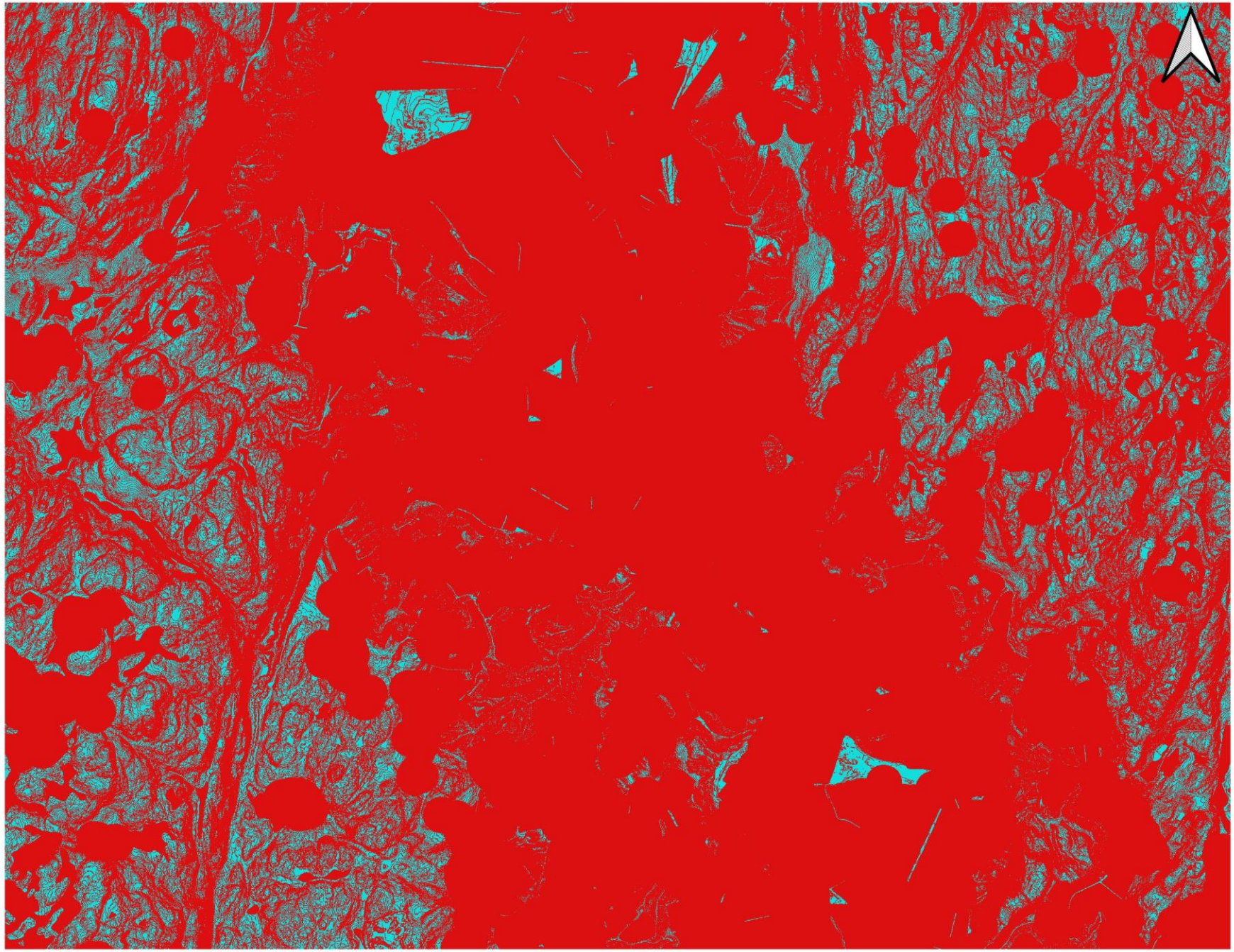
0 500 1,000 m

Steps and Description

- Select within distance tool was used to identify residential buildings within 50 and 100m from the railway line.
- Basic Statistics for fields was used to calculate the total number of such buildings and total number of residents.
- For buildings within 50m – No. of Buildings - 18, Total number of residents - 95
- For buildings within 100m – No. of Buildings – 52, Total number of residents – 326 sum

5. Binary Suitability Analysis

05 | Binary Suitability Map for a new factory



The suitability criteria includes -

Slope < 8 degrees

100m away from fresh water

50m away from the railway line

100m away from schools and residential buildings

Not bult on fully cultivated soil, infield grazing and transportation area

Legend

Suitability

Unsuitable

Suitable

0 500 1,000 m

Steps and Description

- Binary suitability map for development of a factory was prepared using this criteria –
- The slope should be less than 8. The slope map was prepared and then reclassified using Reclassify by table tool, with raster cells with values less than 8 as 1 and those greater than 8 as 0.
- Land Resource 21,12,23 were avoided for building, and reclassify by table was used to give them the value of 0 and others as 1.
- Other criteria included avoiding building 100m from fresh water, 50m from railway line and 100m from residential and school buildings.
    - First, the water and building layers were filtered for the desired values. Then buffer tool was used to create the required buffer around the layers.
    - The vector buffers were then rasterized with DTM as extent.
    - The buffers were then reclassified such that the buffer areas receive a value of 0, and rest of the area within DTM extent receives the value 1.
- Finally Raster calculator was used to identify areas that are suitable for the factory.
- Additionally, r.reclass.area tool was used to identify plots greater than 50 hectare. The analysis showed no plots passing this suitability criteria.