

Principles of Generalization and Project Structure Description

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During the development of Project 3.1, a GIS system was created with styling settings adapted for different scale levels.

For layers related to base data—the background (linear objects, land use polygons, and buildings)—styles were configured for three different scale levels:

- **Small scale** (less than 1:100,000),
- **Medium scale** (1:100,000 to 1:50,000),
- **Large scale** (greater than 1:50,000).

At **large scale**, all layers are displayed in their original form, including labels for street and river names, as well as highlighted tunnels.

At **medium scale**, alternative symbols are used, building visibility is disabled, certain road categories are hidden, and railway lines are generalized using the `v.clean` method from the GRASS library and the `dissolve` tool from the Processing Toolbox (simplifying geometry by removing branches and keeping only a single main track).

At **small scale**, only trunk and primary roads are displayed, processed in the same way as railways at the previous step. Additionally, the sea is visualized by setting a background color for the project. The only exception is building polygons, which are displayed only from a scale of **1:10,000**, as explained in more detail below.

Population Visualization of Apartment Buildings

Population data for apartment buildings is displayed at different scale levels:

- At **the largest scale** (from 1:10,000), apartment buildings are color-coded in shades of red, where a brighter color indicates a higher number of residents. Labels are also configured to display the population of each building.
- At **scales between 1:80,000 and 1:10,000**, aggregated points represent the total population of surrounding buildings. Two layers are used here:
 - A **detailed layer** (from 1:40,000 to 1:10,000),
 - A **less detailed layer** (from 1:80,000 to 1:40,000).These points were generated using the **DBSCAN Clustering** tool, followed by aggregation based on a methodology sourced from an external reference.
- At **scales smaller than 1:80,000**, a hexagonal grid is used, where labels display the total population of buildings within each hexagon. This approach was chosen over diagrams, as numerical representation appeared to be more intuitive and less visually cluttered.
- There are **two versions** of the hexagonal grid:
 - One for scales between 1:150,000 and 1:80,000,
 - Another for scales smaller than 1:150,000.

All layers in the project are grouped into categories (land use polygons, building polygons, aggregated population clusters, etc.).