

# Automatic orienteering map generation: Using Karttapullautin for Norwegian map data

Jan Kocbach

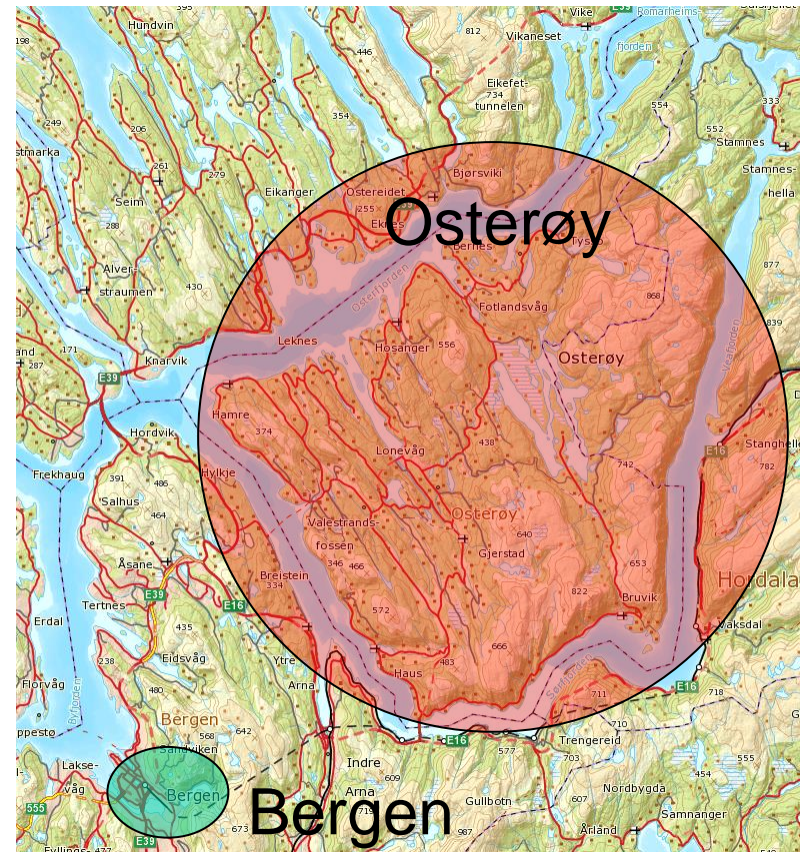
# Motivation (1)

- Identify areas for making new orienteering maps
  - Karttapullautin maps are good enough for realistic "test drive" of previously unmapped areas by different types of runners
  - Making a new map is costly – it is important to have a good decision basis for choice of new areas
- Make maps for o-technical training in terrains for which it is not economically viable to make a full orienteering map
  - Accessibility (no roads in the area, mountain top, island etc.)
  - Restrictions on organizing races

# Motivation (2)

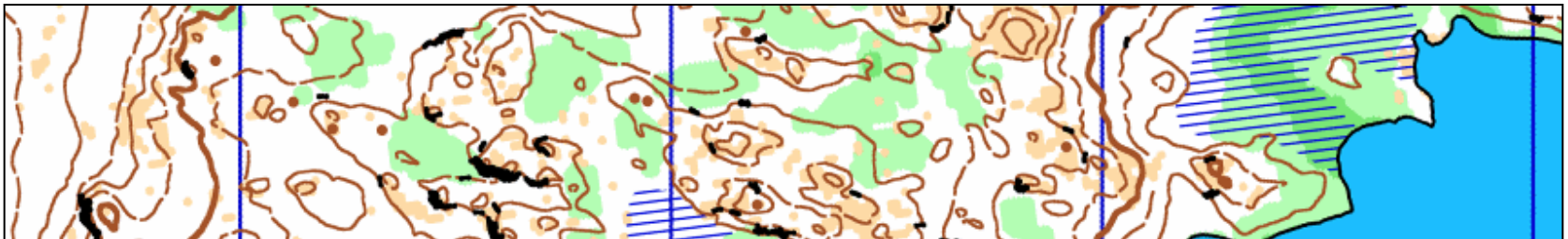
- Osterøy – island by Bergen
- Area 250 km<sup>2</sup>
- Very little orienteering activity
- One small orienteering map on the island today
- Close to a big city (Bergen)
- Trying to get LAS/FKB data to make Karttapullautin map over complete island to identify areas interesting for making real orienteering maps
- Also considering Sotra outside Bergen with similar status

*“We have a feeling that there might be some nice areas for orienteering here”*



# Karttapullautin

- Free\* program for automatic orienteering map generation ([download link](#))
- Processes LIDAR data with advanced algorithms
  - Contours – including algorithms for smoothing, for appropriate use of form lines, for detection of knolls, for removing small knolls etc.
  - Vegetation based on LIDAR data (various settings)
  - Cliffs based on LIDAR data (various settings)
- Add shape files to map (e.g. FKB-data)
  - Mapping from shape file symbols to symbols on the orienteering map can be defined by user (lakes, roads, paths etc.)



\*Kartapullautin is free for non commercial use or if used for nav sport mapping (orienteering, rogaining, adventure racing map making)



# Karttapullautin for Norwegian data

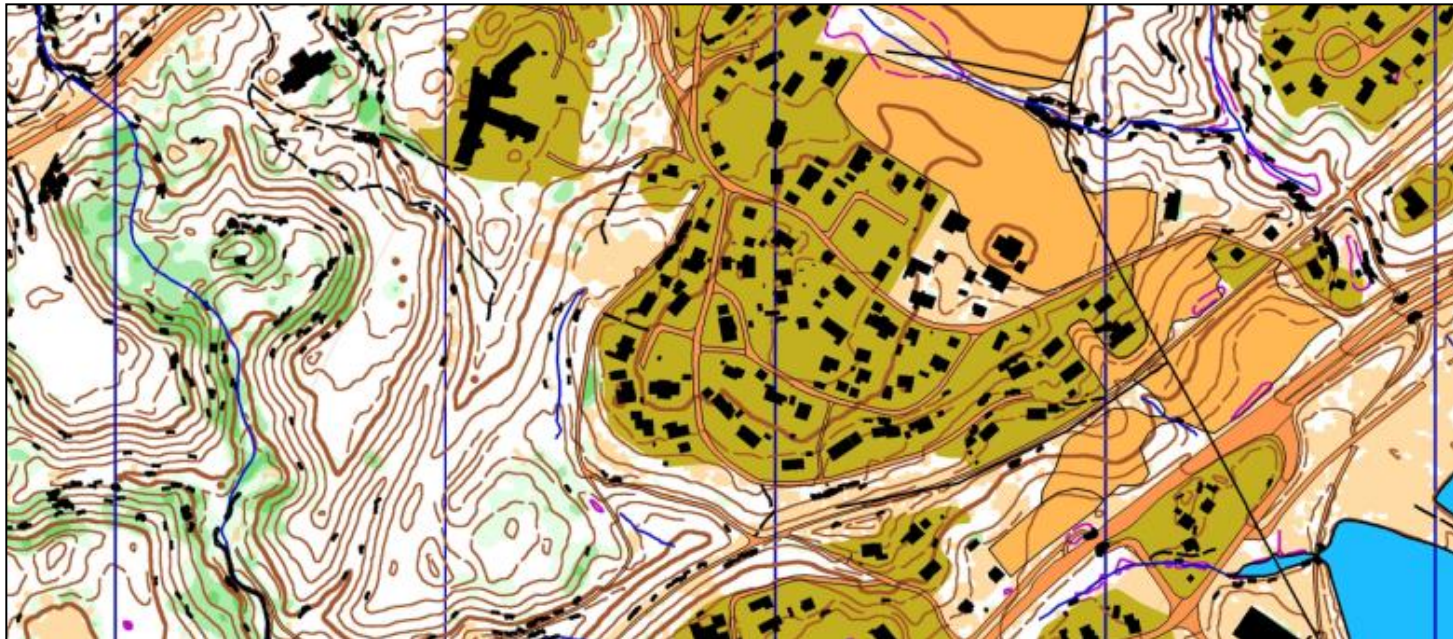
- Karttapullautin recently updated for easy import of FKB data (roads, lakes, paths, buildings etc.) into automatic workflow
- Step-by-step guidelines for Karttapullautin for Norwegian map data written ([available here](#))



Sample map on Holsnøy north of Bergen

# Example: Mosmoen (1)

- LIDAR + FKB-data made available through "Kartmøtet"
- Karttapullautin test run:
  - Work time to set up Karttapullautin: 10-15 minutes
  - Processing time: A few hours at night
  - Next morning: 600 dpi PNG-file + OCAD-files ready

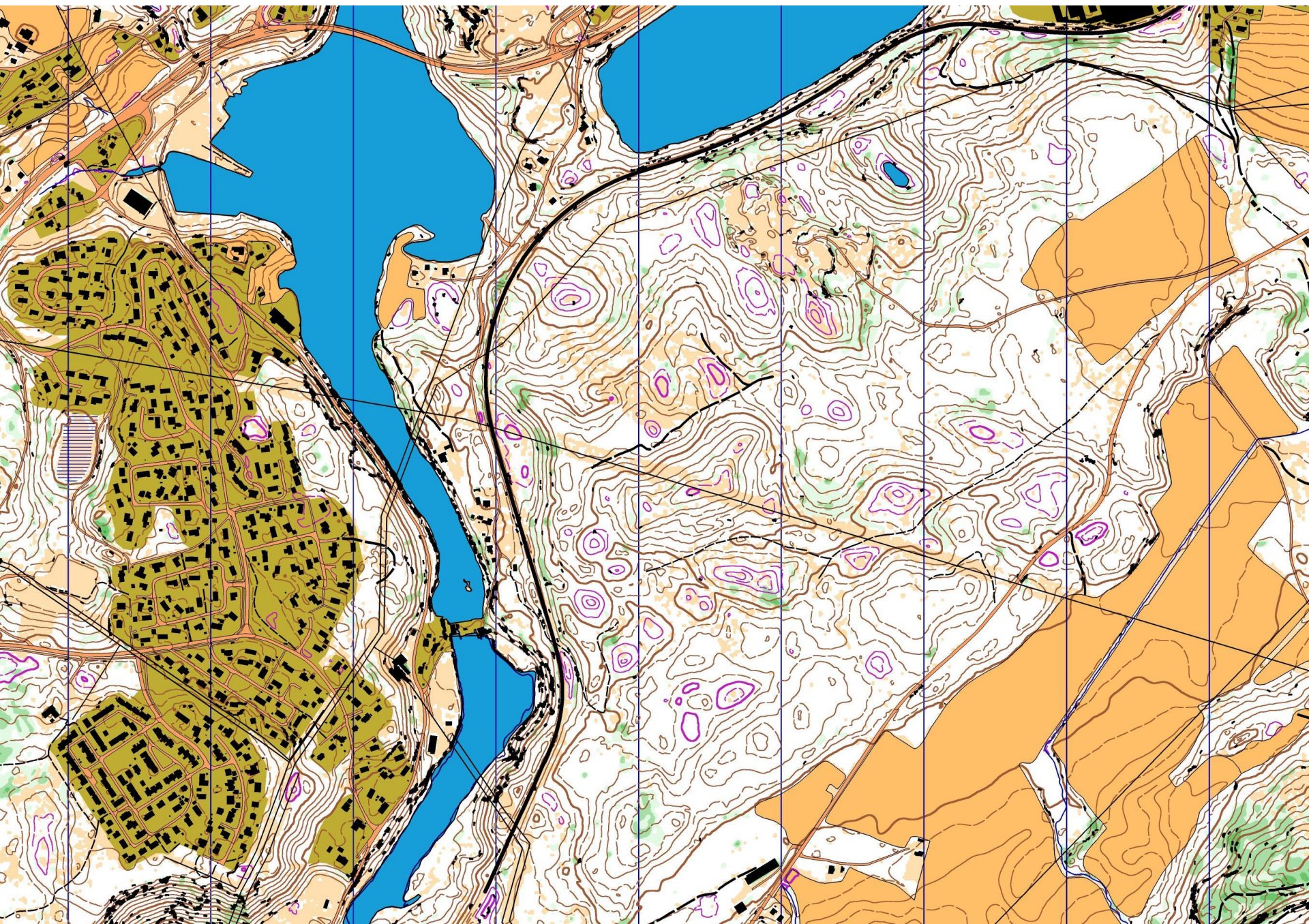


Sample map Mosmoen, Ringerike

# Example: Mosmoen (2)

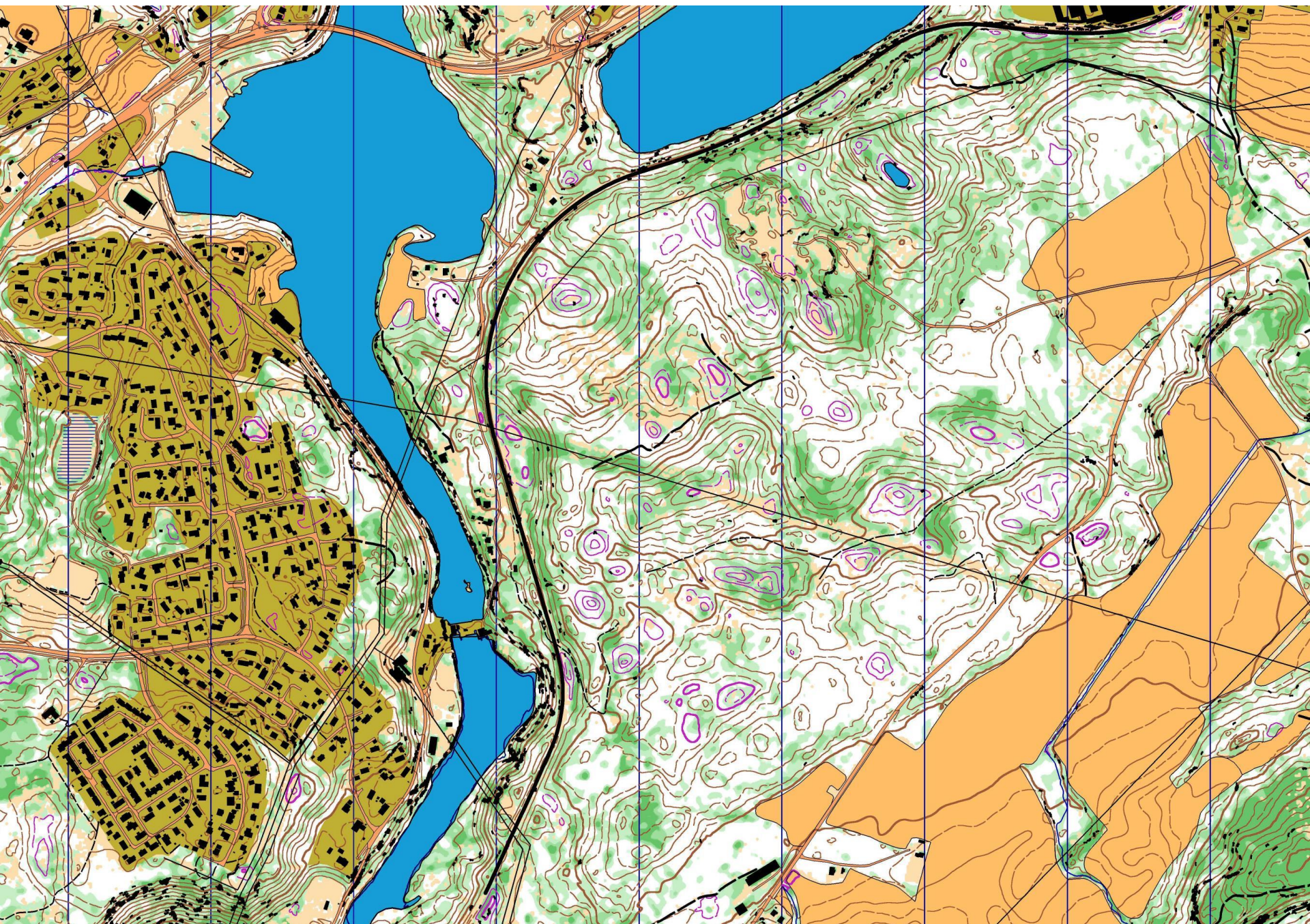
- Comments
  - Negative contours
    - Many negative contours in this area – tricky for Karttapullautin. Bottom of the depressions are drawn in pink color to distinguish from others
  - Settings for green areas
    - Improved results can be achieved if vegetation is optimized for the type of vegetation in the current area.
    - I asked Jarrko who made Karttapullautin to take a quick look, and he sent back an alternative, improved vegetation setting after 30 minutes
  - Railway and power lines were initially not included
    - A new iteration was made with a new FKB-data settings to include these
- See final result compared to the old orienteering map on the next slides
  - Note! Slight offset between Pullautin and old orienteering map is due to coordinate system of original map being NGO and conversion problem





**Karttapullautin “Out of the box” with default settings**





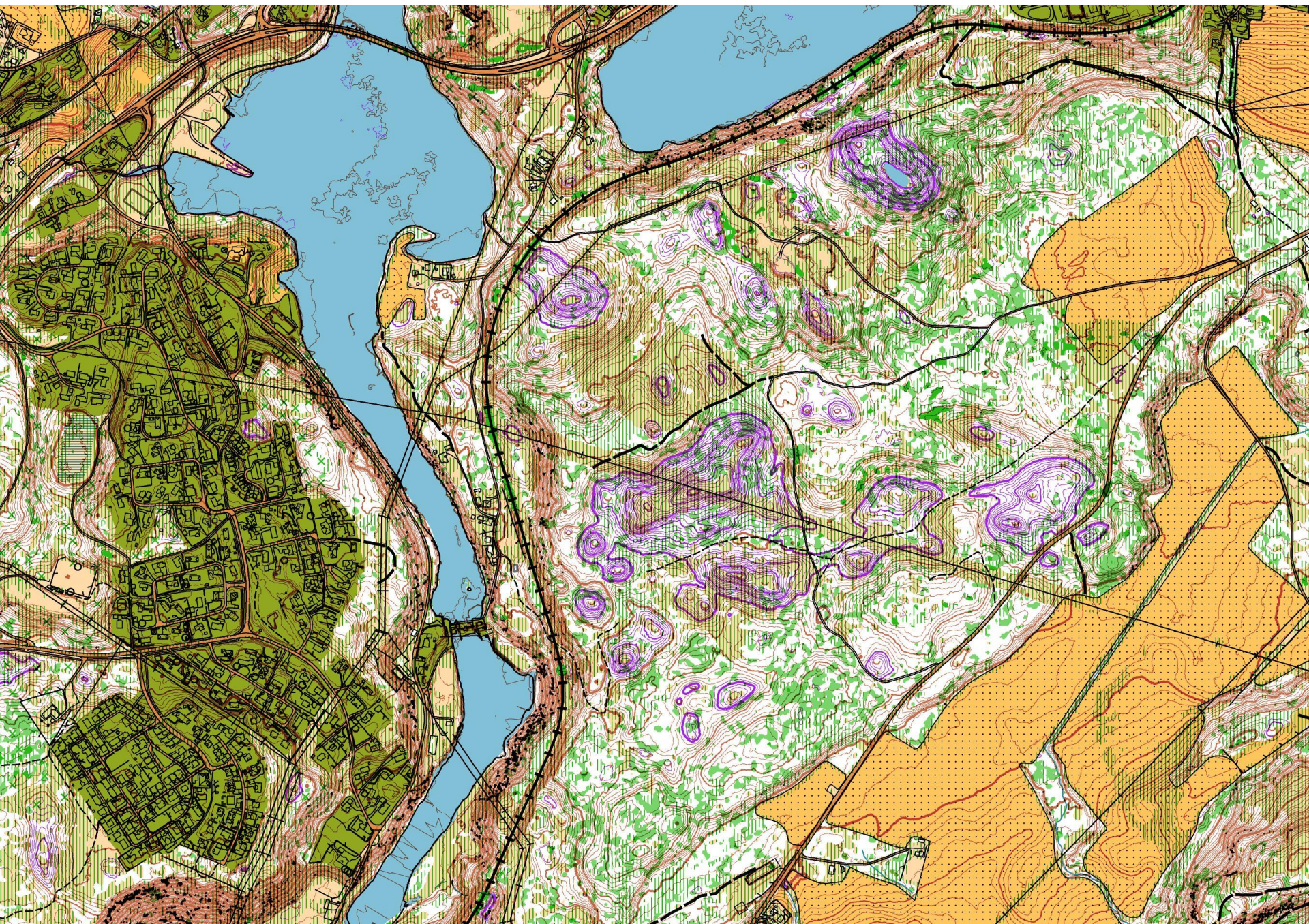
*Karttapullautin with modified vegetation settings (no full optimization, just quick improvement)*





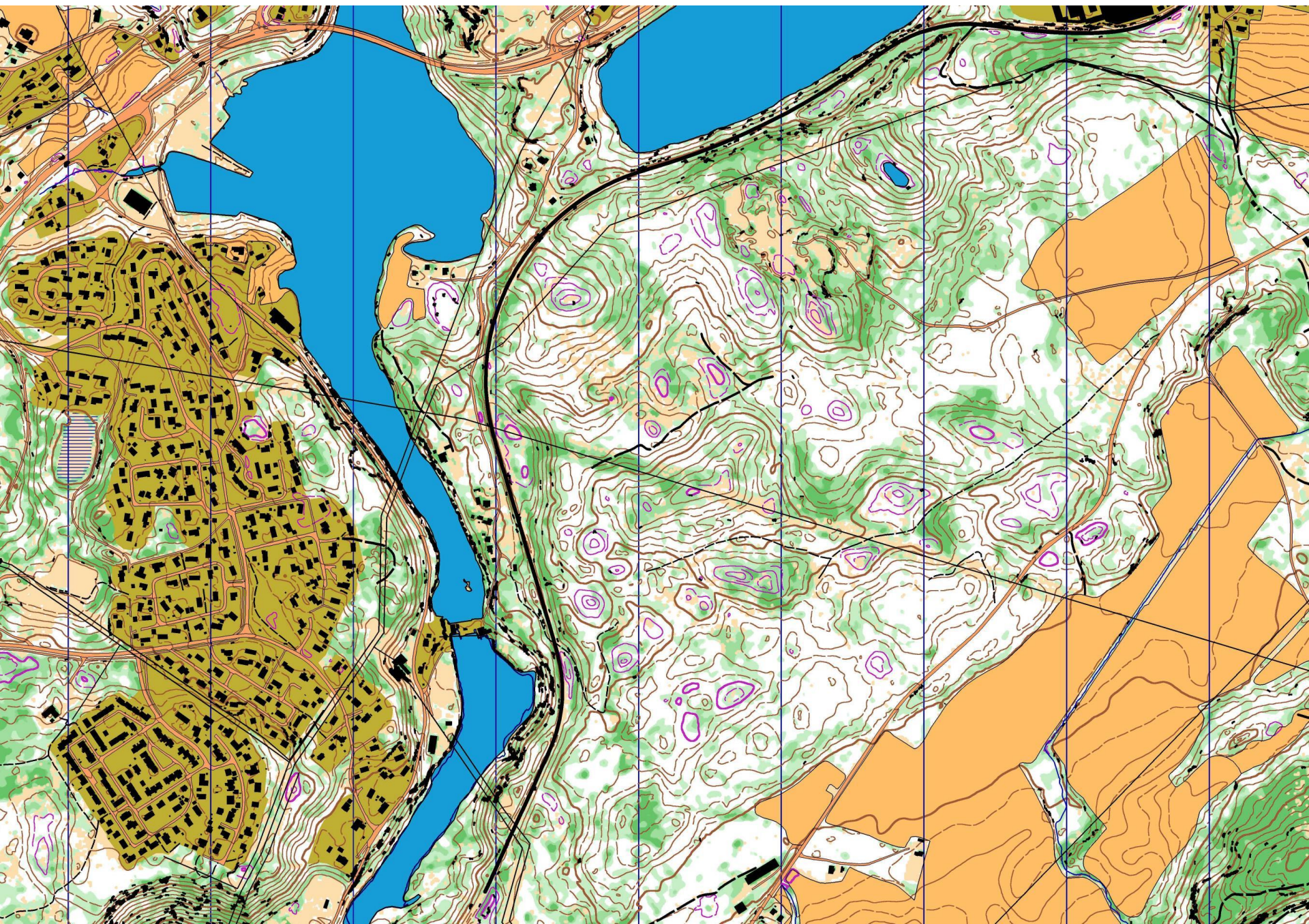
**Old orienteering map from the area. Go back and forth between slides to compare** (Slight offset due to coordinate system)





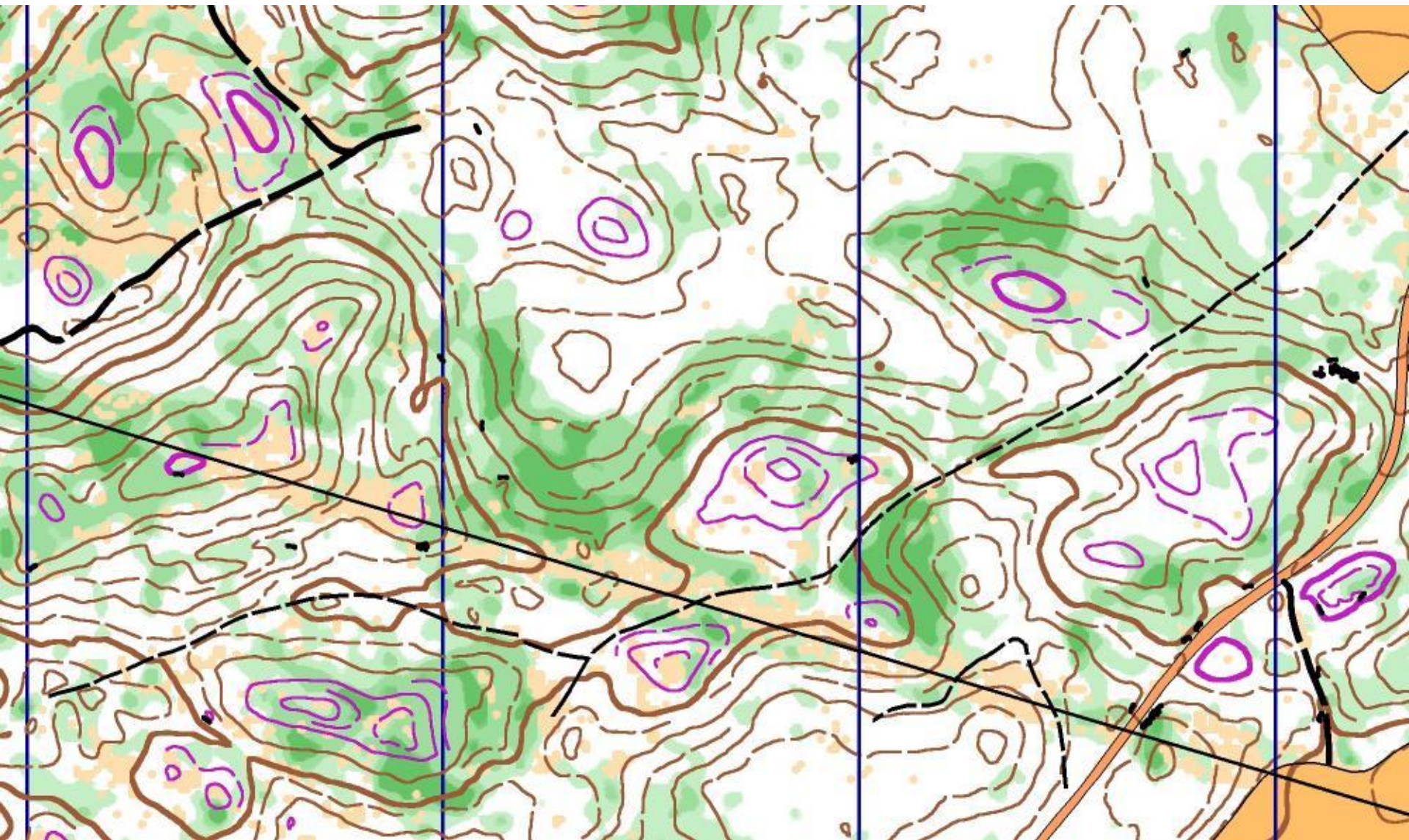
***Map for surveying from Terje Mathisen's tool . Go back and forth between slides to compare***



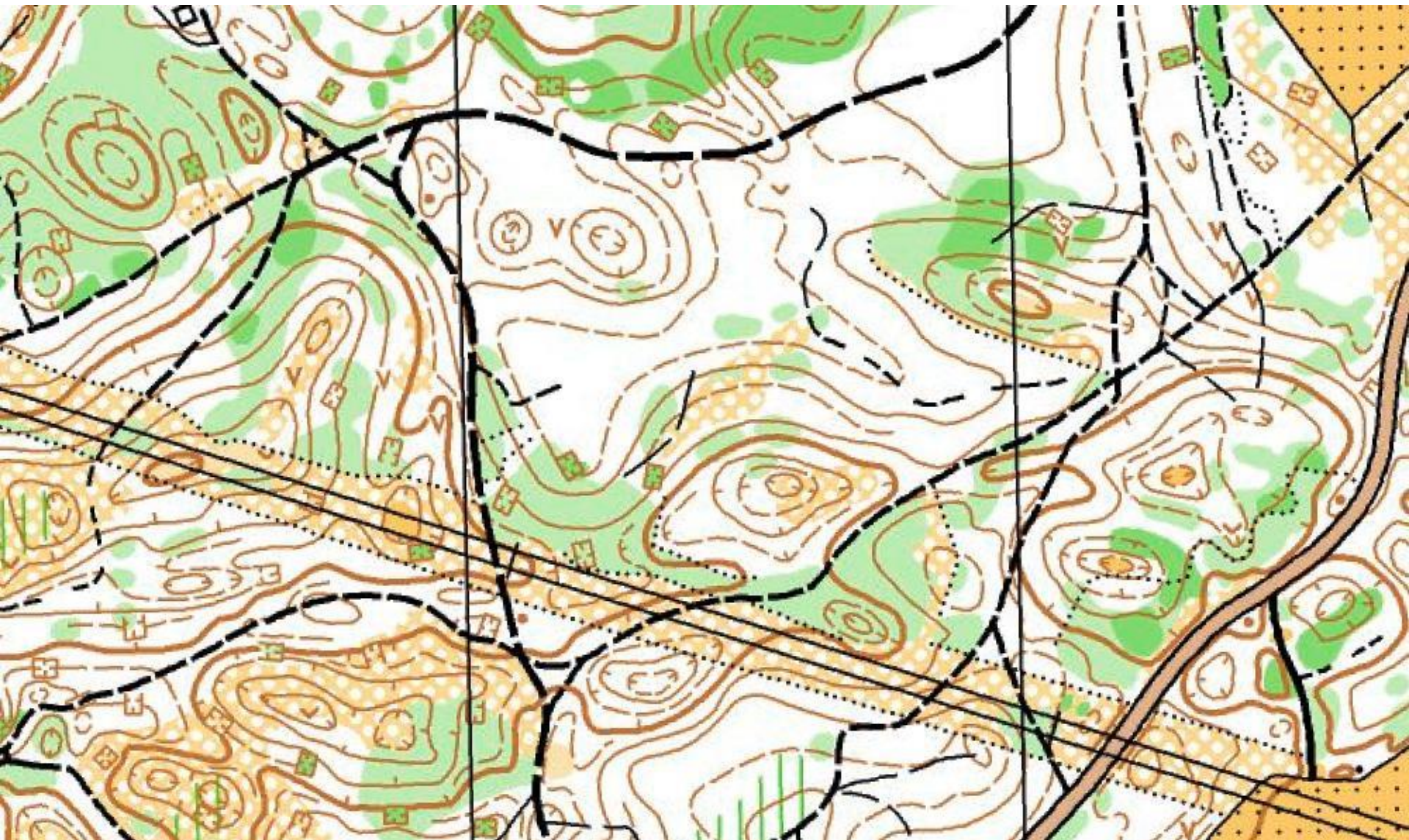


**Repeated for comparison:** Karttapullautin with modified vegetation settings (no full optimization, just quick improvement)



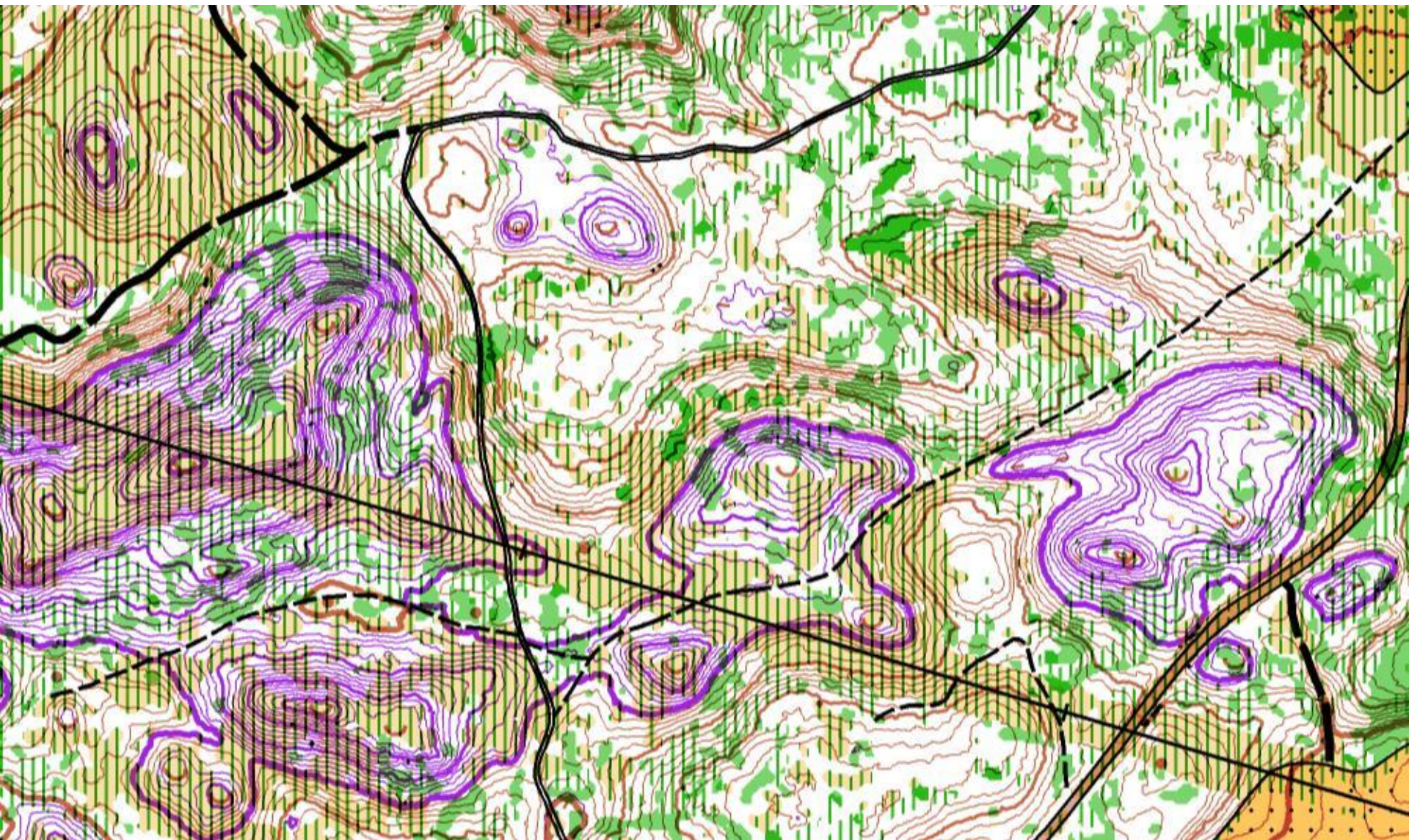






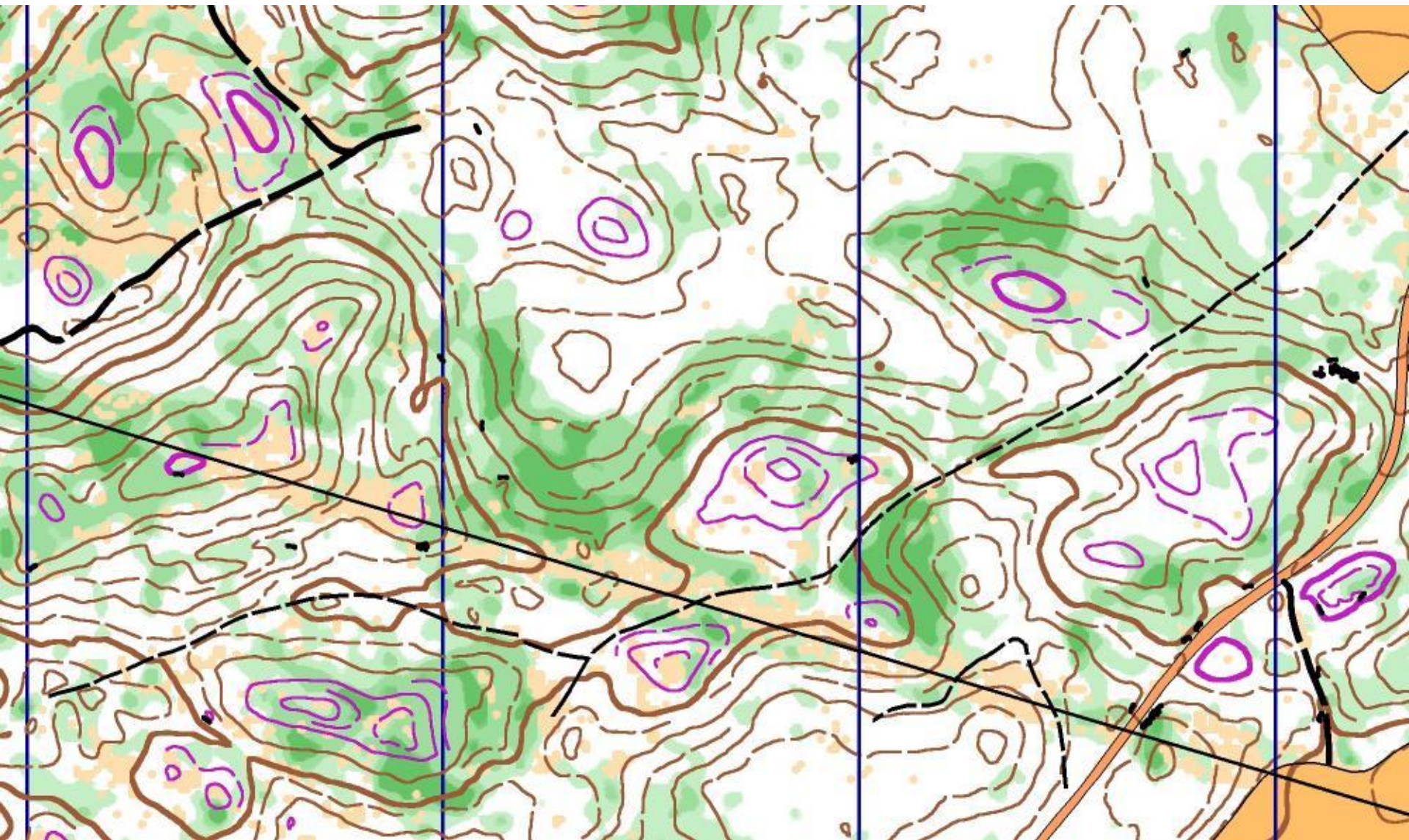
**Old orienteering map from the area. Go back and forth between slides to compare** (Slight offset due to coordinate system)





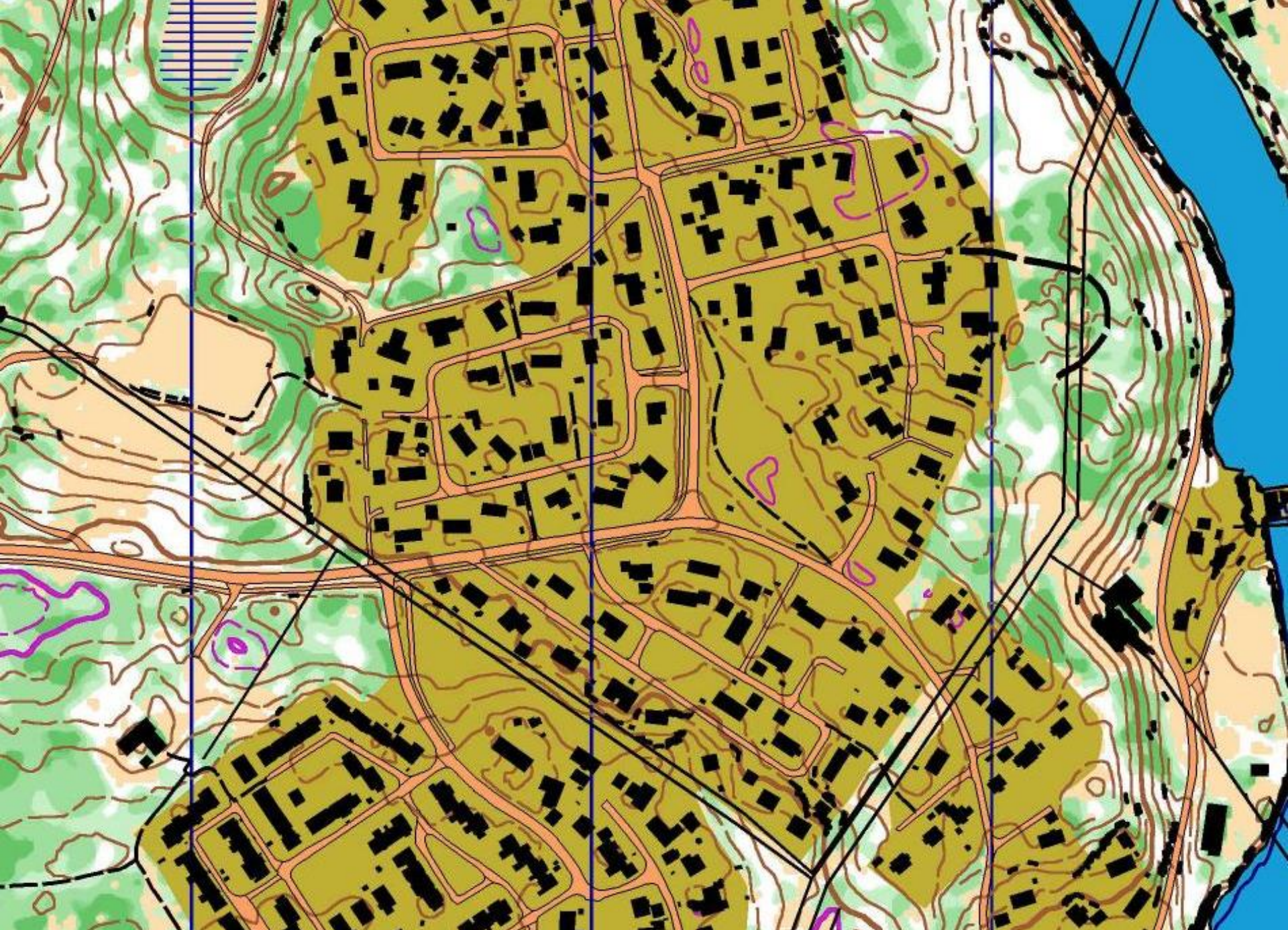
*Map for surveying from Terje Mathisen's tool . Go back and forth between slides to compare*





**Repeated for comparison:** Karttapullautin with modified vegetation settings (no full optimization, just quick improvement)





*Karttapullautin with modified vegetation settings (no full optimization, just quick improvement)*





*Old orienteering map from the area. Go back and forth between slides to compare (Slight offset due to coordinate system)*



# Conclusion

- This is a tricky case for Pullautin, but still results seem to be good enough for the planned use
- Possible to tweak the input settings to get improved results depending on use case
  - Note! By comparison with Terje's result I see that I miss some roads because I have taken the roads from AR5-data instead of the road layer. It is possible to take this from the road layer by uncommenting some lines in the FKB.txt file in Pullautin.