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Automated Drain Area Creation for Municipal Hydraulic Simulations

8. May 2018

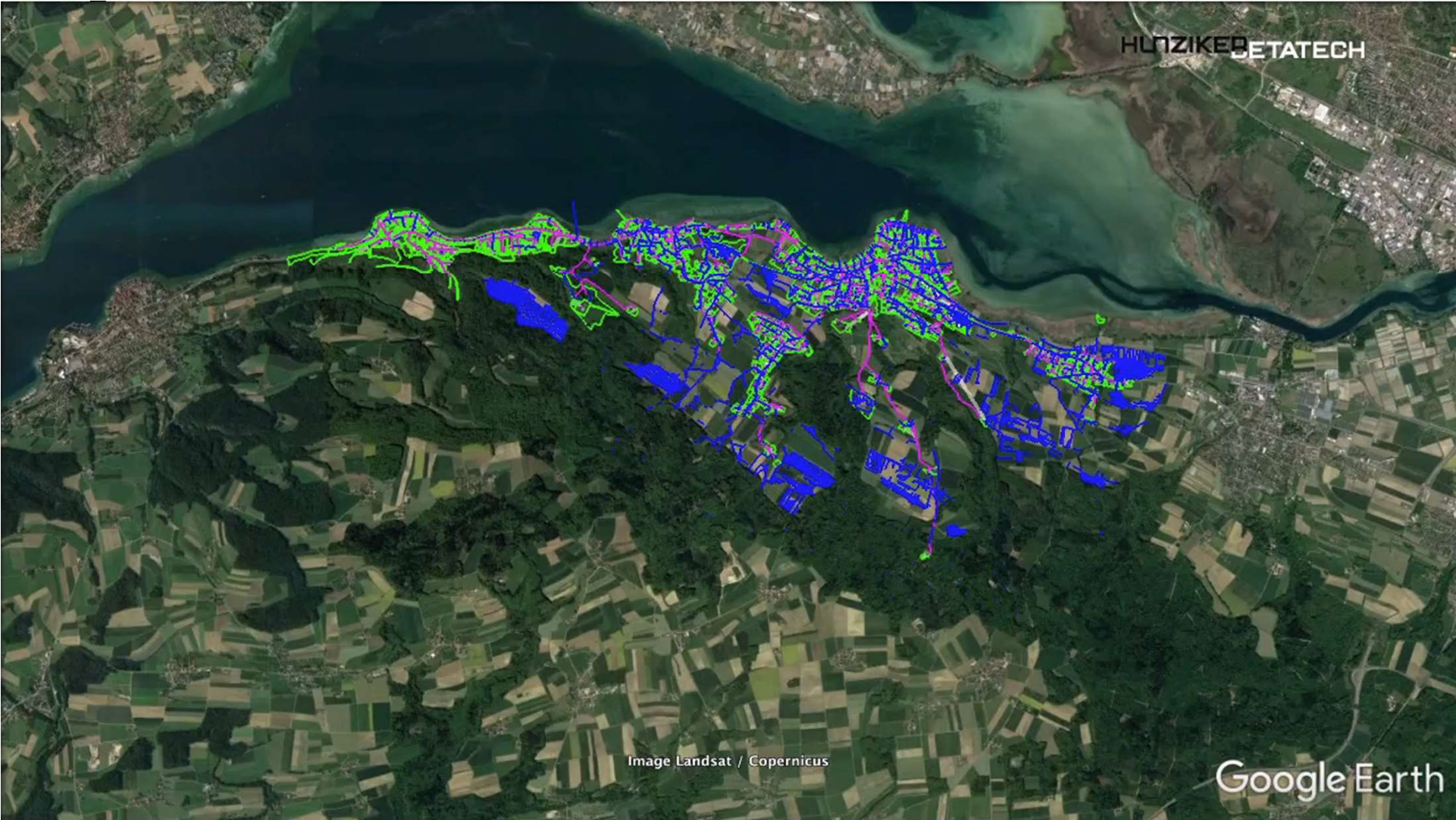
GeoPython Conference 2018

Robin Dainton



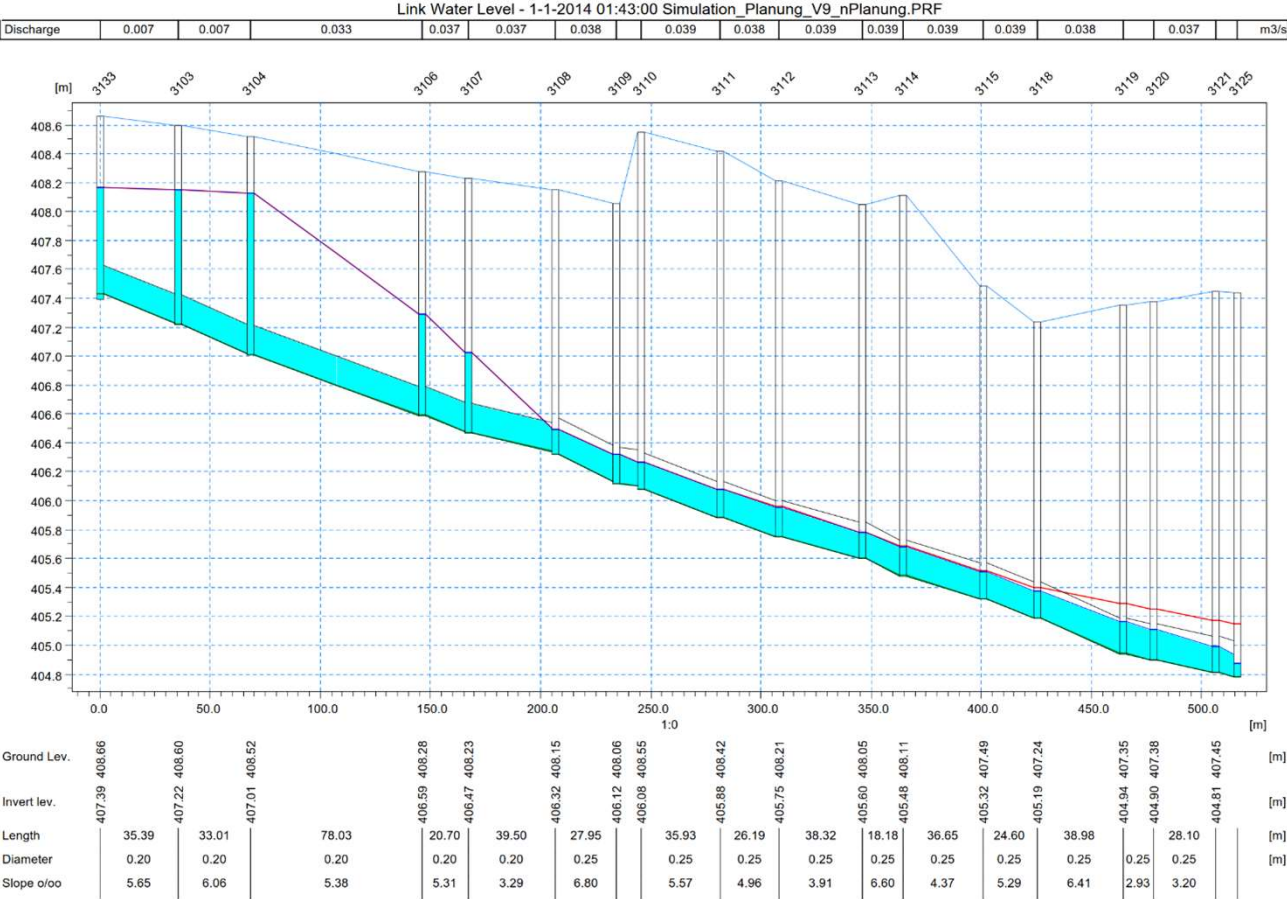
Presentation Structure

- Drain Area Planning
- Input Data and Official Models
- System Design
- Workflow Examples and Techniques
- Summary



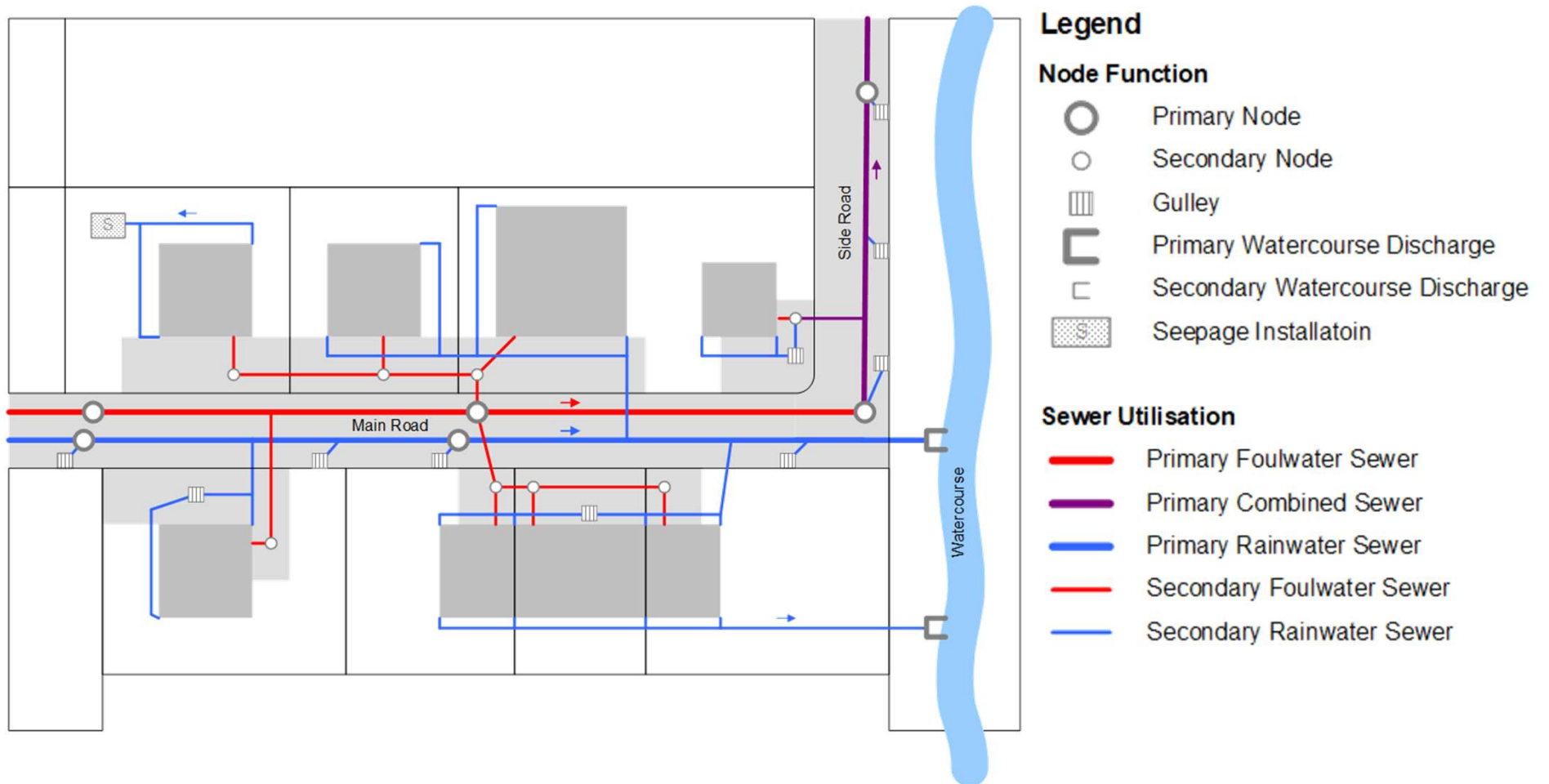


Drain Area Planning



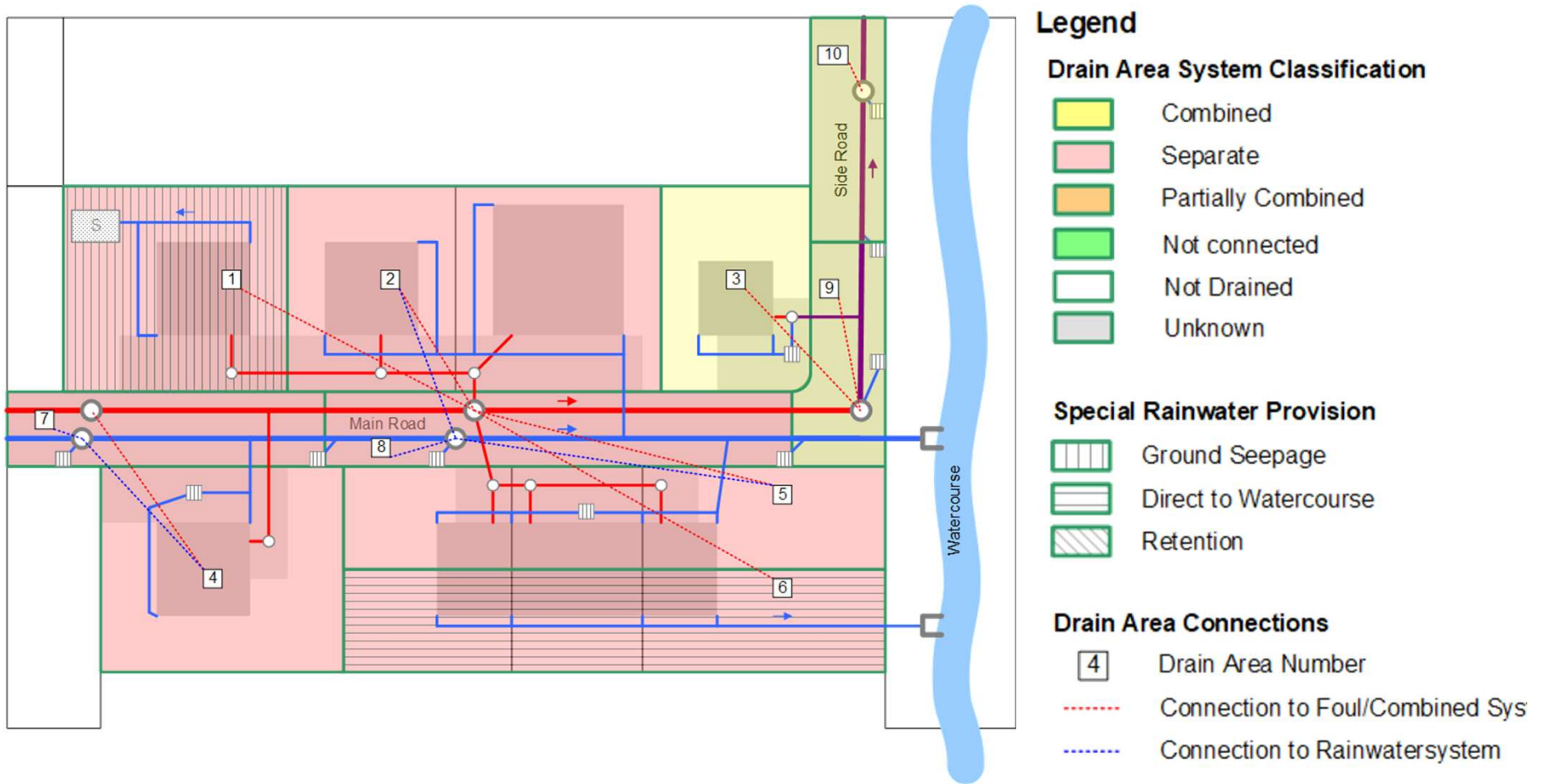


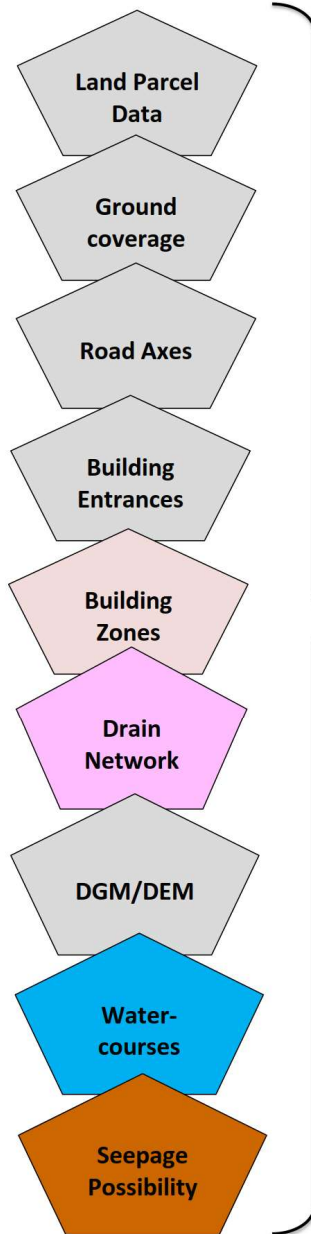
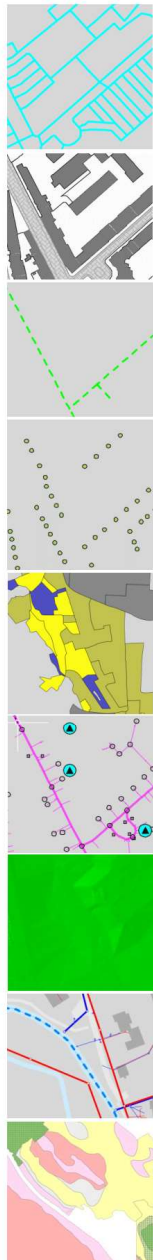
Network Data



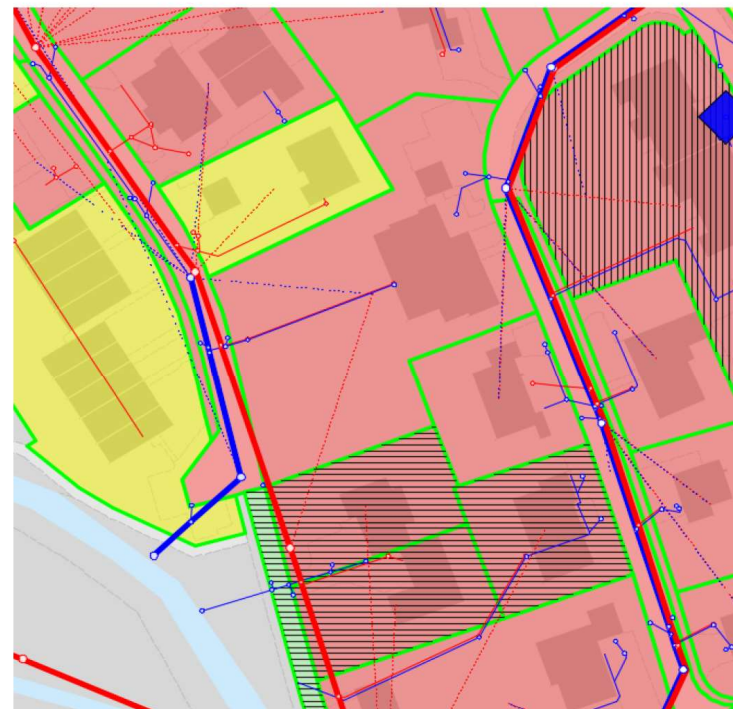


Drain Area Model



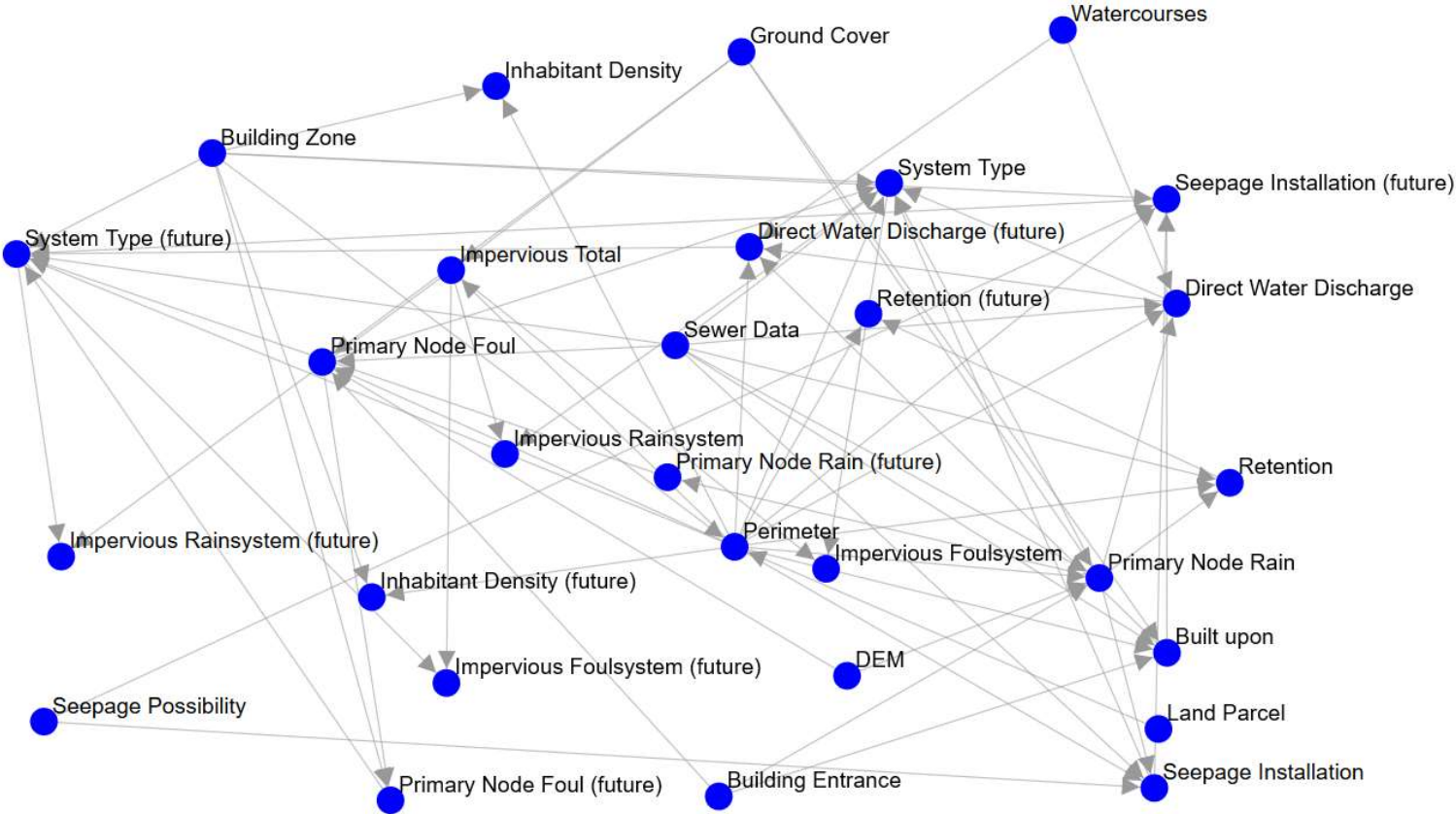


Drain Area Model





Influence Diagram





Topological Sorting

```

from toposort import toposort

# Create dependency graph
dependencies = dict()
dependencies['Perimeter'] = {'Land Parcel', 'Building Zone'}
dependencies['Built upon'] = {'Perimeter', 'Ground Cover', 'Building Entrance', 'Sewer Data'}
dependencies['Impervious Total'] = {'Perimeter', 'Ground Cover'}
dependencies['Primary Node Foul'] = {'Perimeter', 'DEM', 'Building Entrance', 'Ground Cover'}
# Etc...

# Topological Sort
execution_order = list(toposort(dependencies))

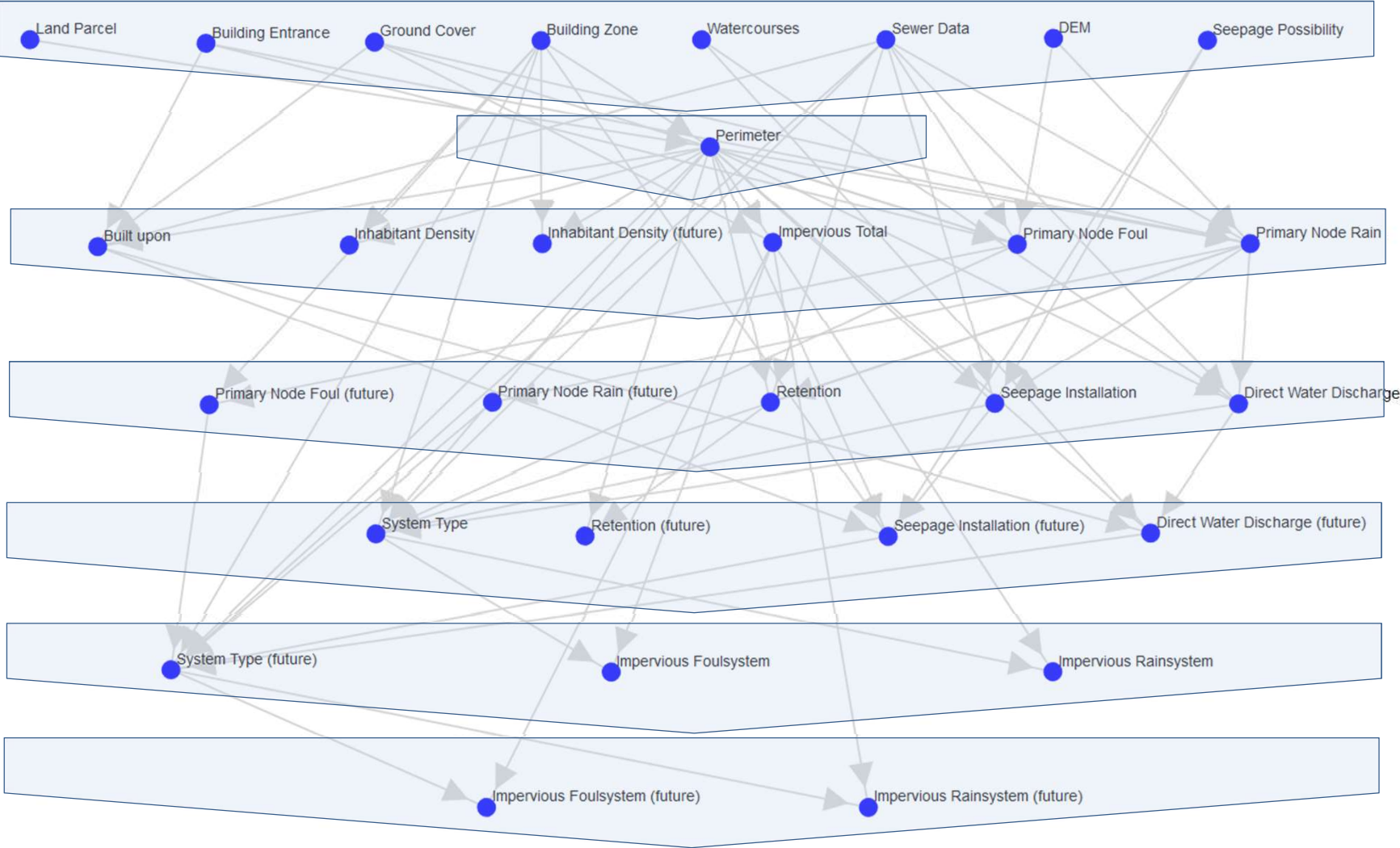
print('Execution Order:\n %s\n\n' % execution_order)

""" Output:
Execution Order:
[{'Land Parcel', 'Sewer Data', 'Seepage Installation', 'Built upon', 'Watercourses', 'Build
{'Perimeter'}},
{'Inhabitant Density (future)', 'Primary Node Foul', 'Impervious Total', 'Primary Node Rain'
{'Primary Node Foul (future)', 'Retention', 'Seepage', 'Primary Node Rain (future)', 'Direct
{'Retention (future)', 'System Type', 'Seepage (future)', 'Direct Water Discharge (future)'}
{'Impervious Rainsystem', 'Impervious Foulssystem', 'System Type (future)'},
{'Impervious Foulssystem (future)', 'Befestigungsgrad_Rain (future)'}]

```

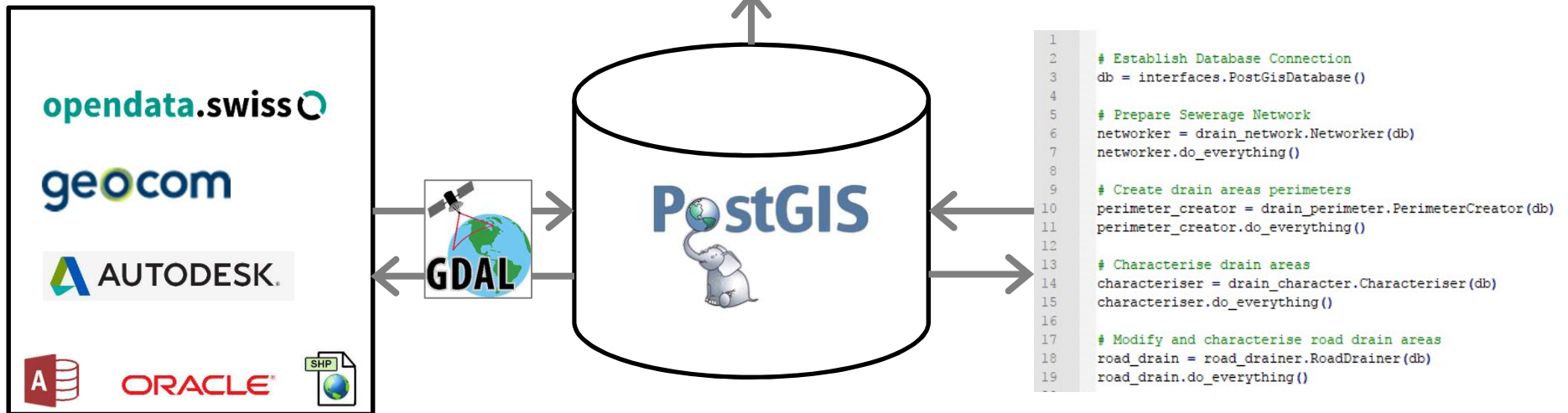
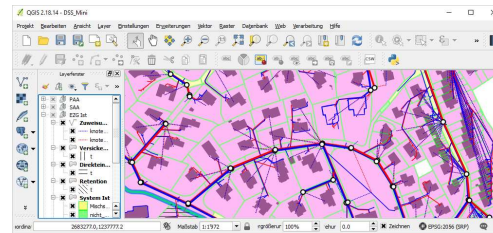


Workflow



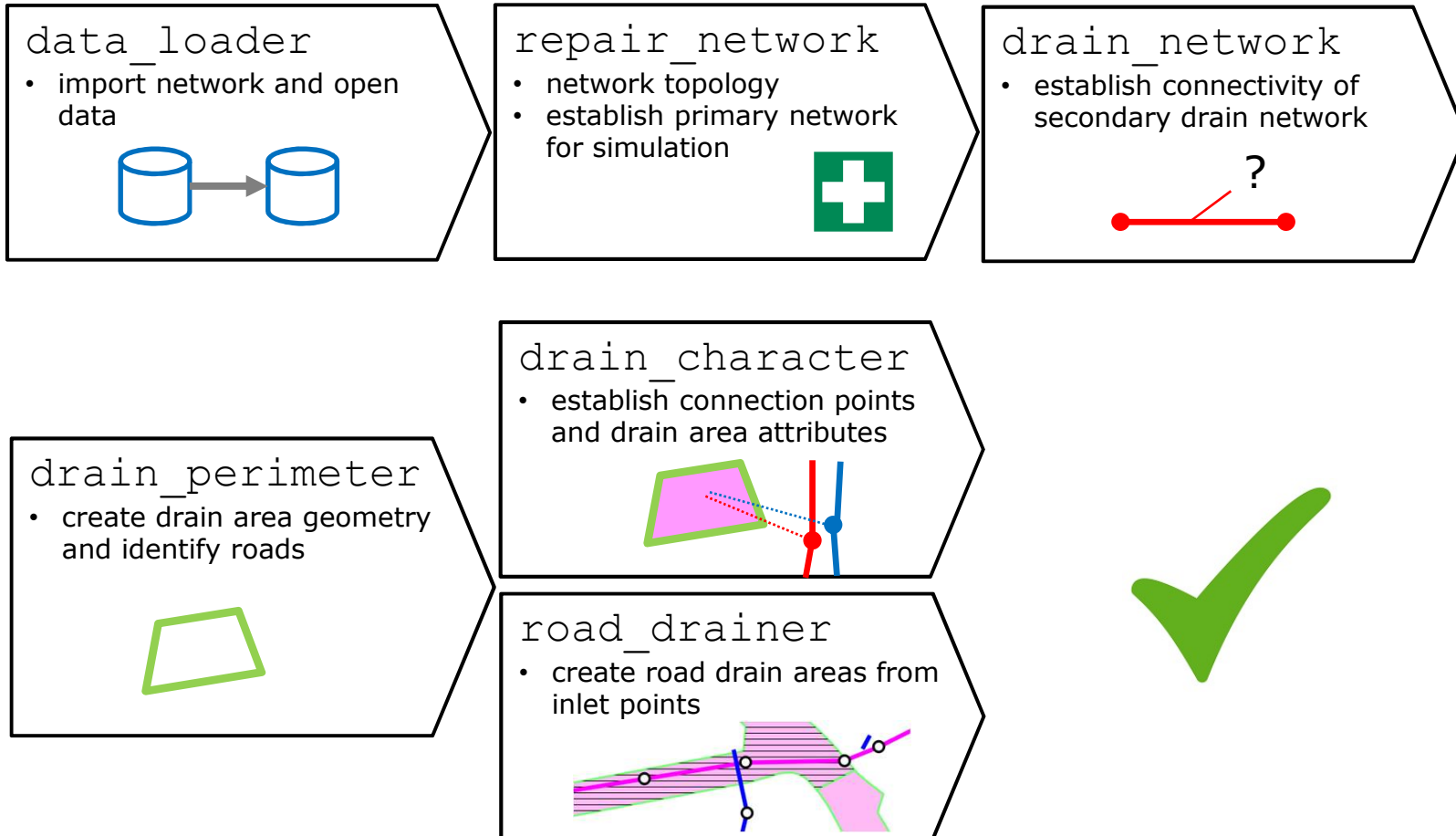


System Architecture





Python Modules



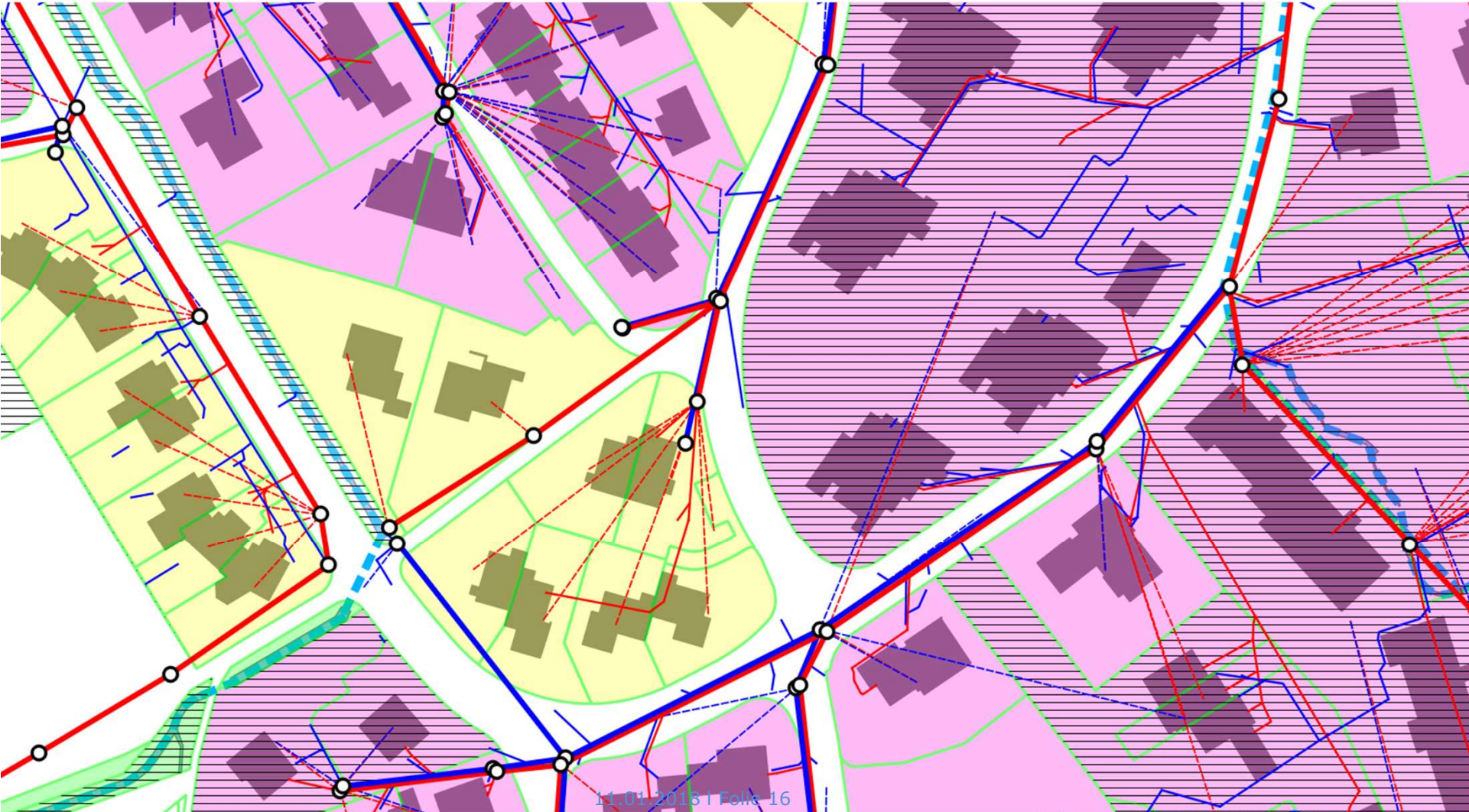


Perimeter



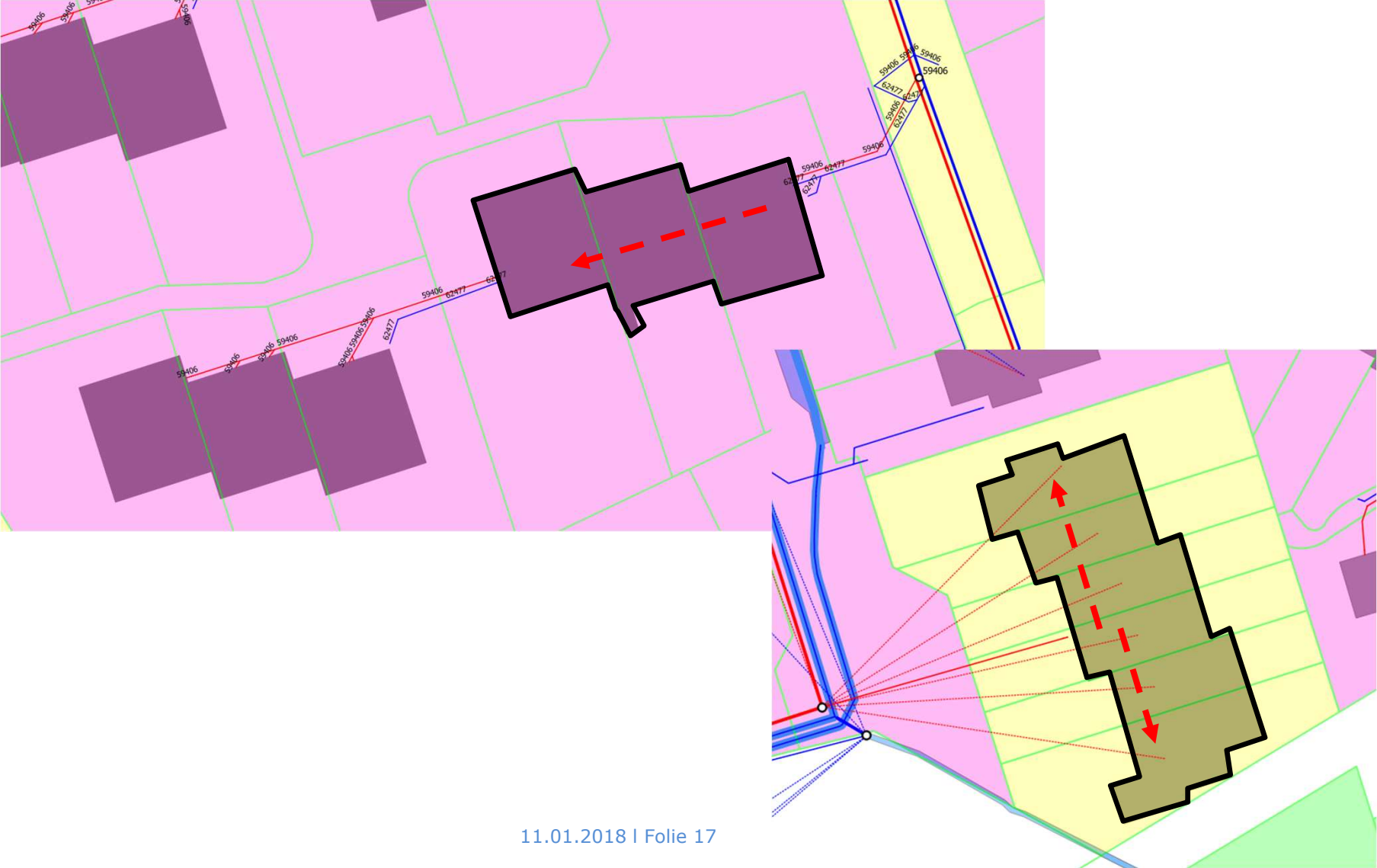


Drain Area Characterisation



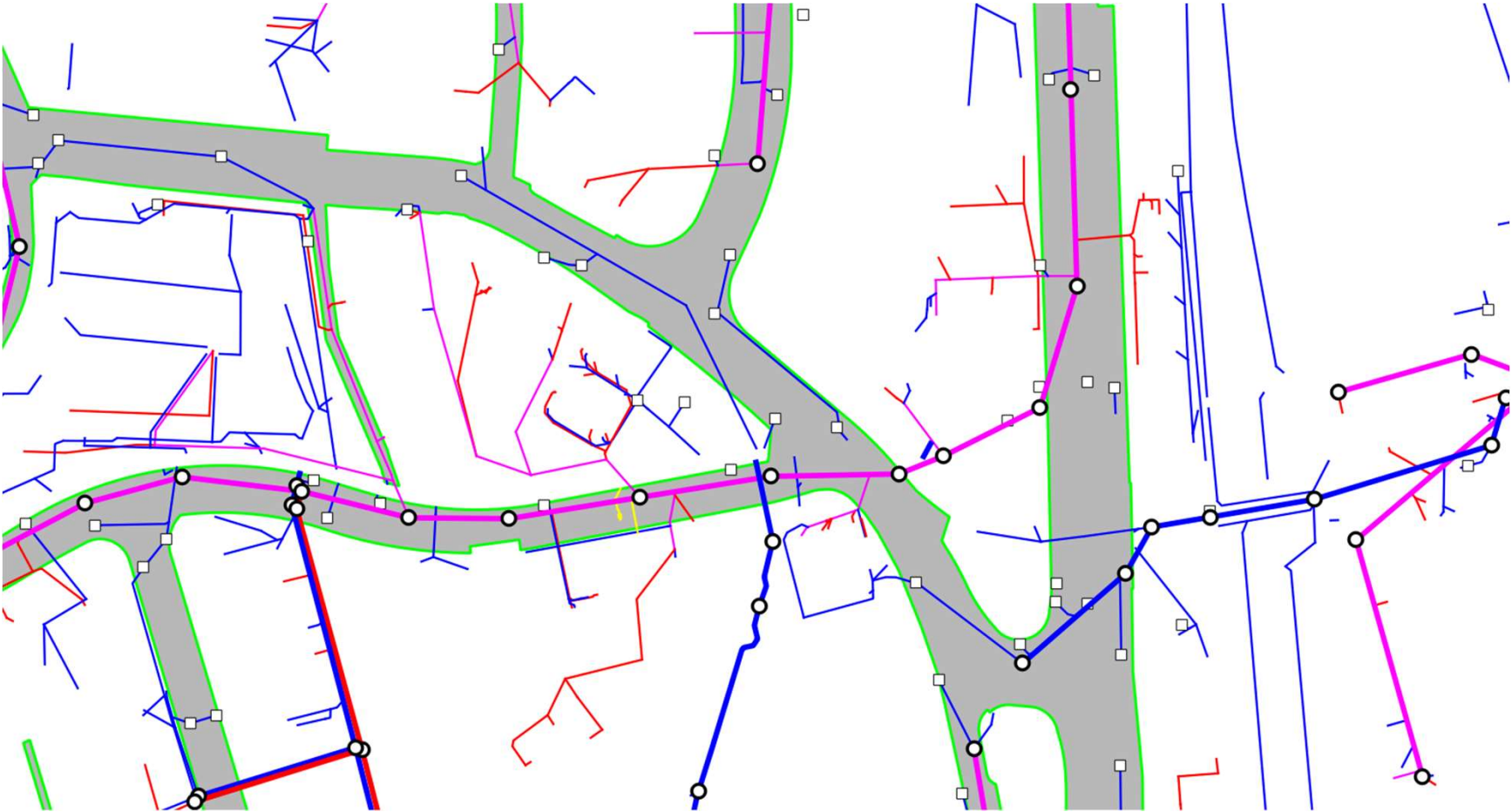


Use of Building Geometry





Roads



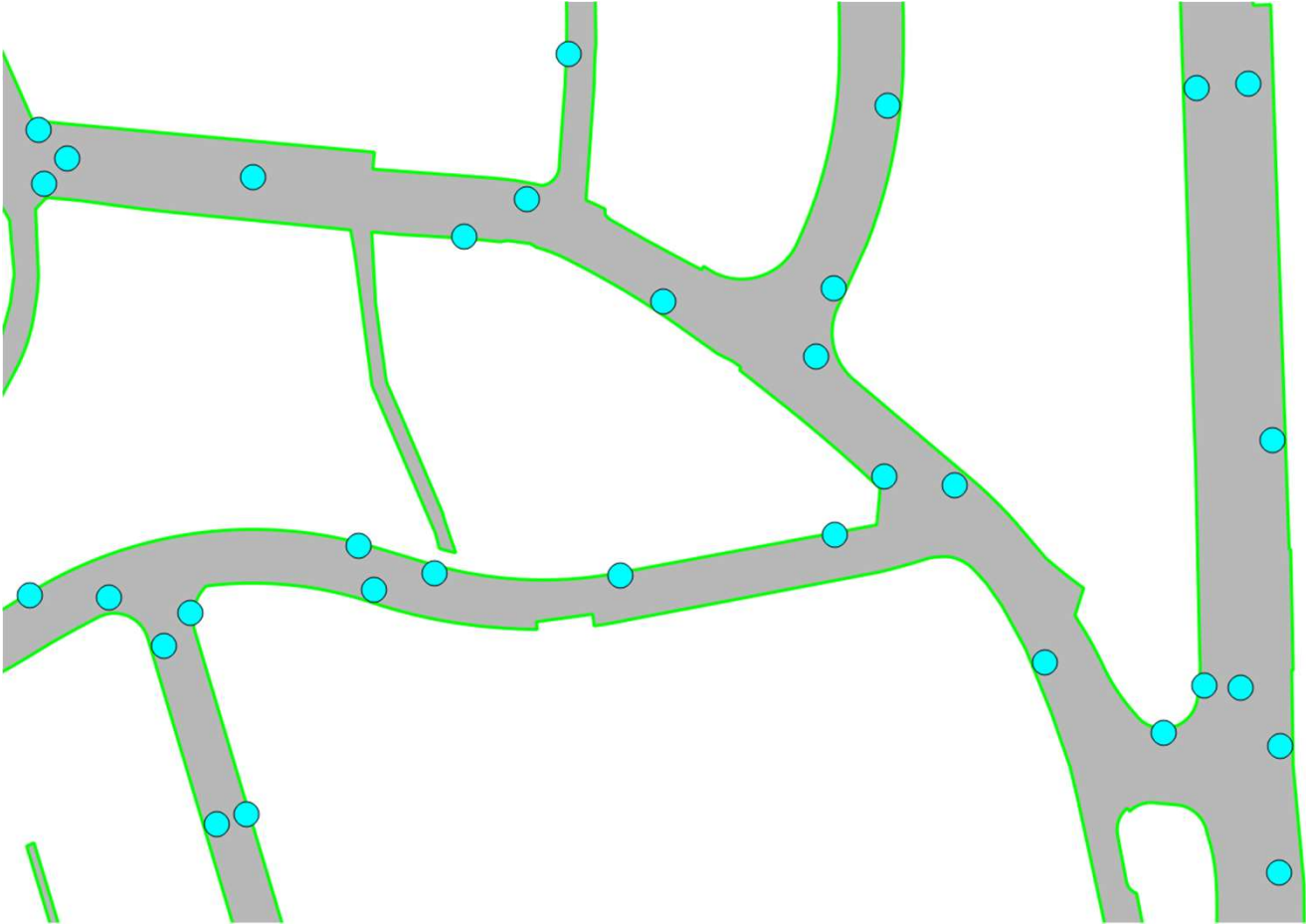


Roads



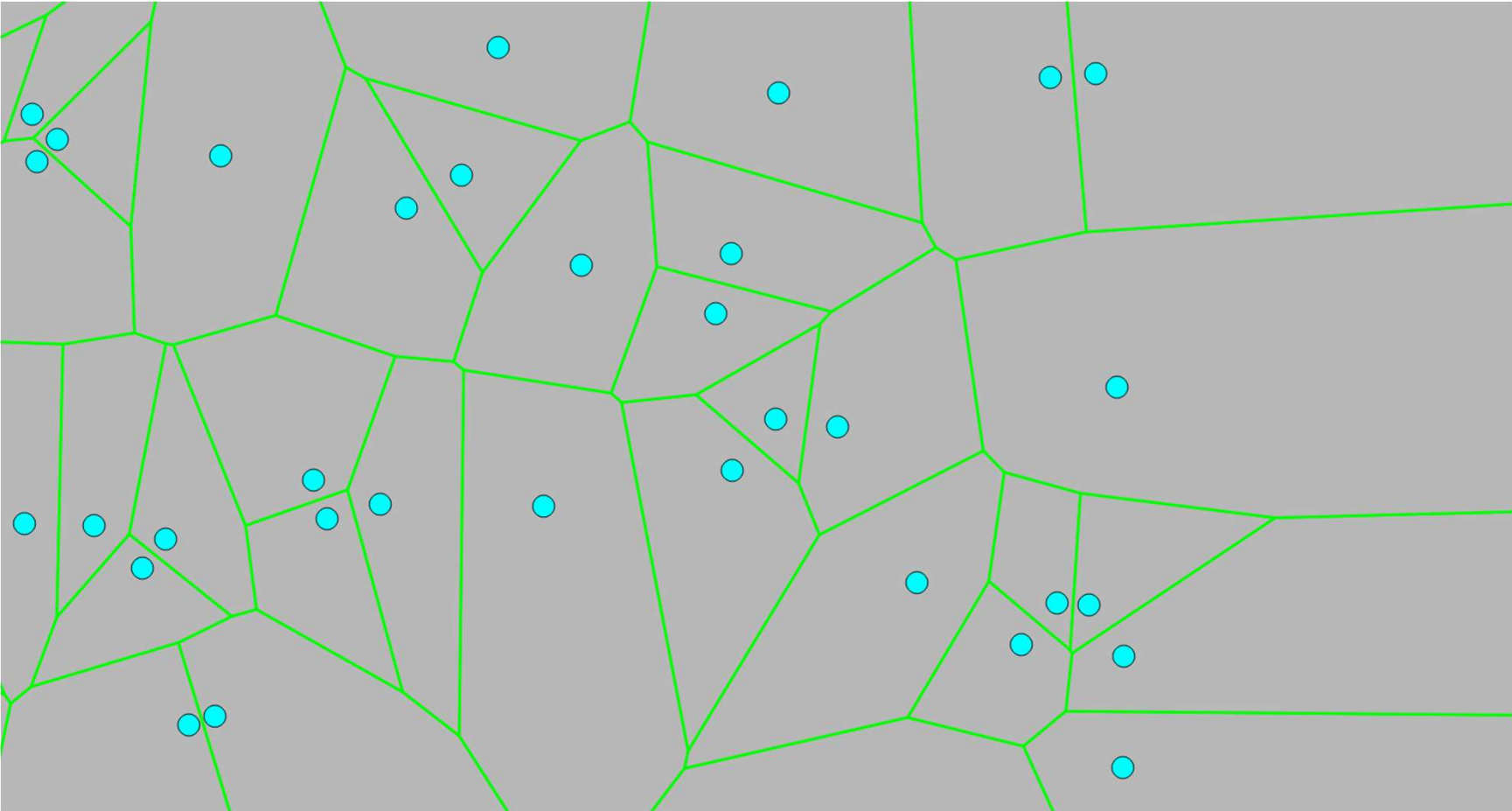


Roads



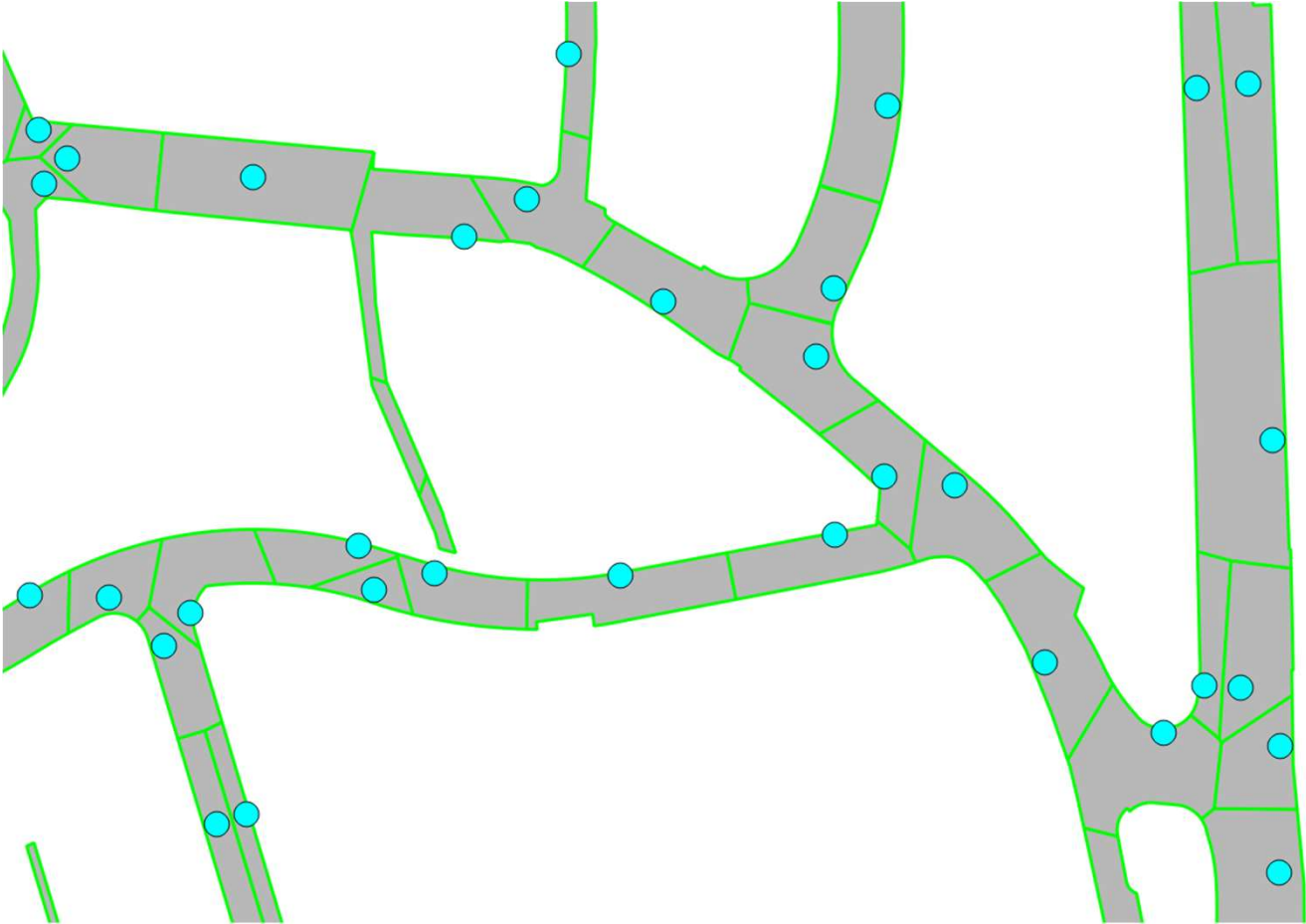


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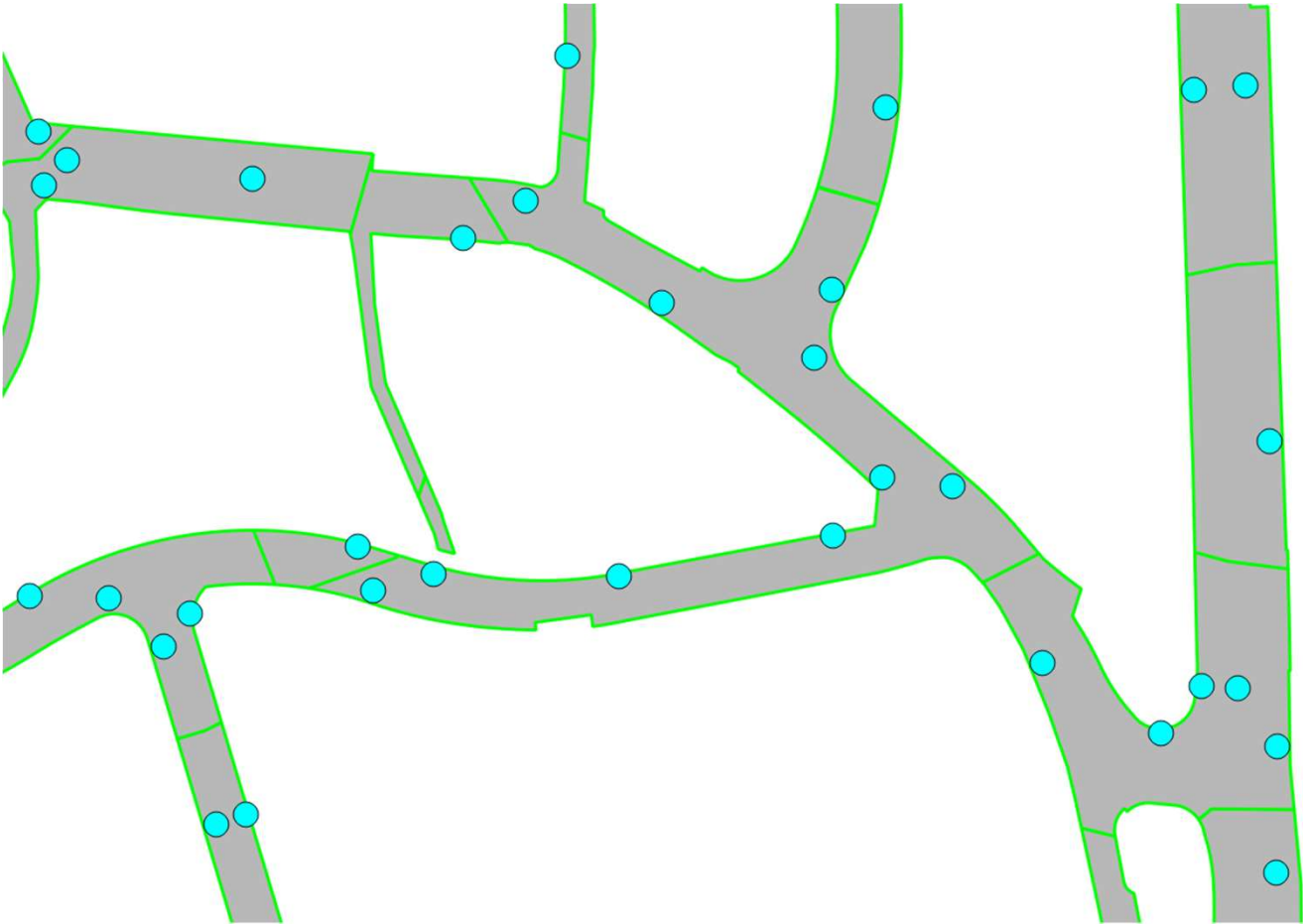


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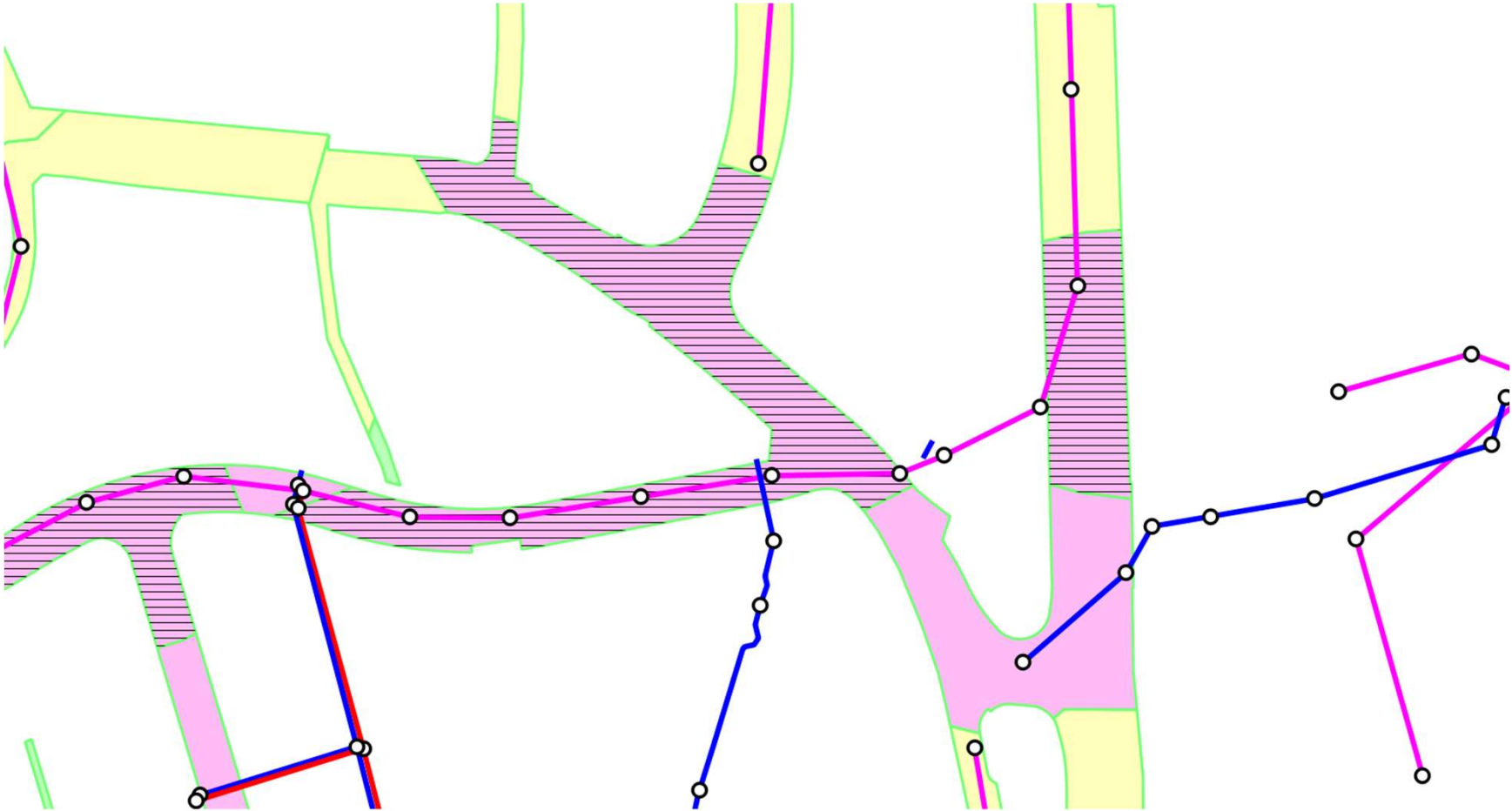


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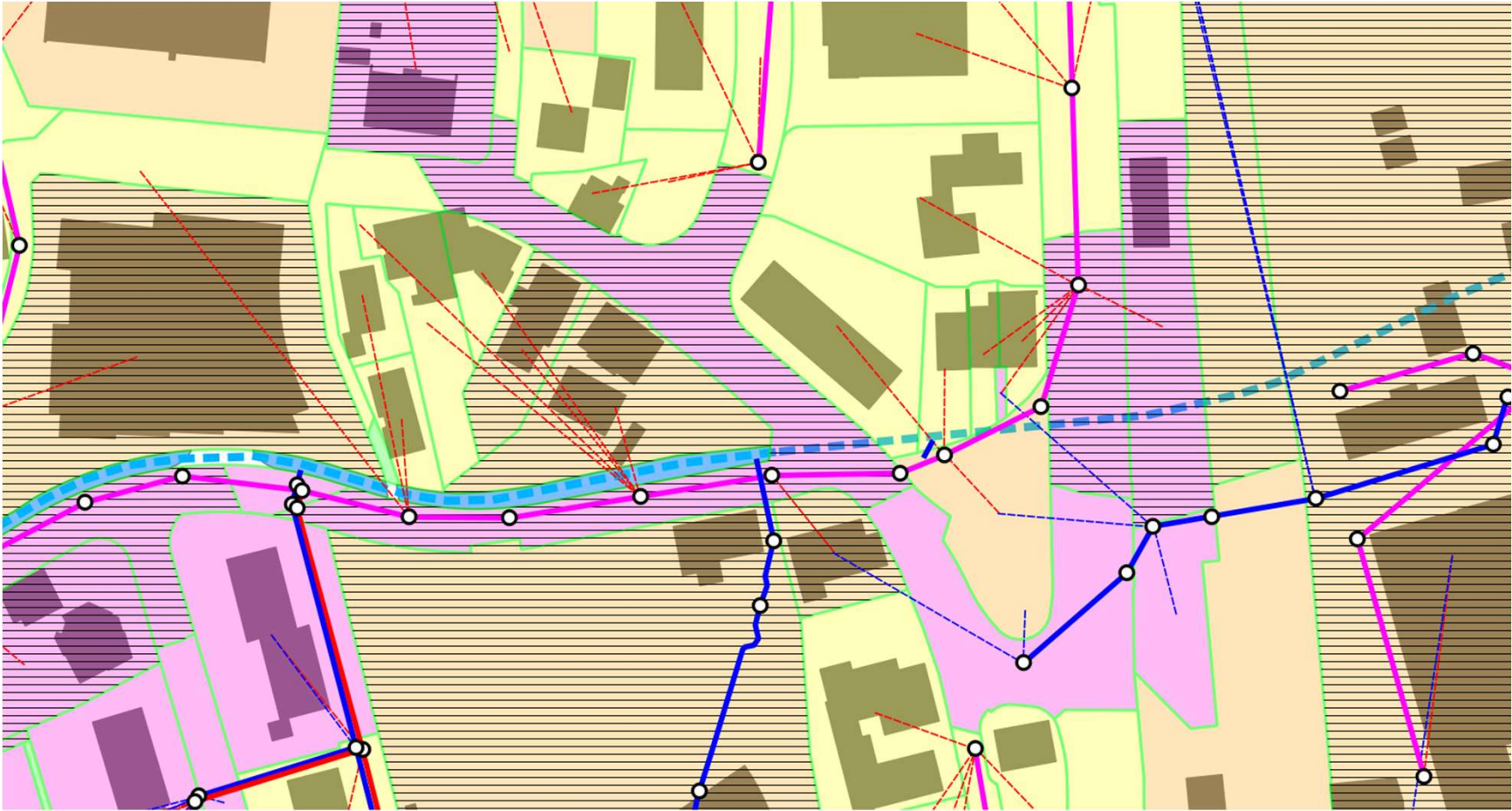


Roads





Roads





Use and Documentation

```

1  import ...
2
3  # Start timer for Info
4  start_time = time.time()
5
6  # Establish Database Connection
7  db = interfaces.PostGisDatabase()
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9  # Drain Network Modification
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```

DrainAreaPlan 1.0

Search docs

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Interfaces Module

Module to obtain and save data from different sources and formats.

`class interfaces.OgrDataImporter(srid=2050)`

Object to carry out data import/export, mapping and conversions

Parameter: `srid (int)` - EPSG Spatial Reference System number (integer), Defaults to LV95, CH1903+

`ogr_gdb(odbc_dns_name, geom=True)`

Provide OGR connection string for OGR import from Geonis Database Format.

Parameter:

- `odbc_dns_name (str)` - ODBC DNS Name for source file
- `geom (bool)` - If True, geometry tables will be copied, if False all tables will be copied with no geometry

Rückgabe: Tuple (OGR format name, OGR connection string)

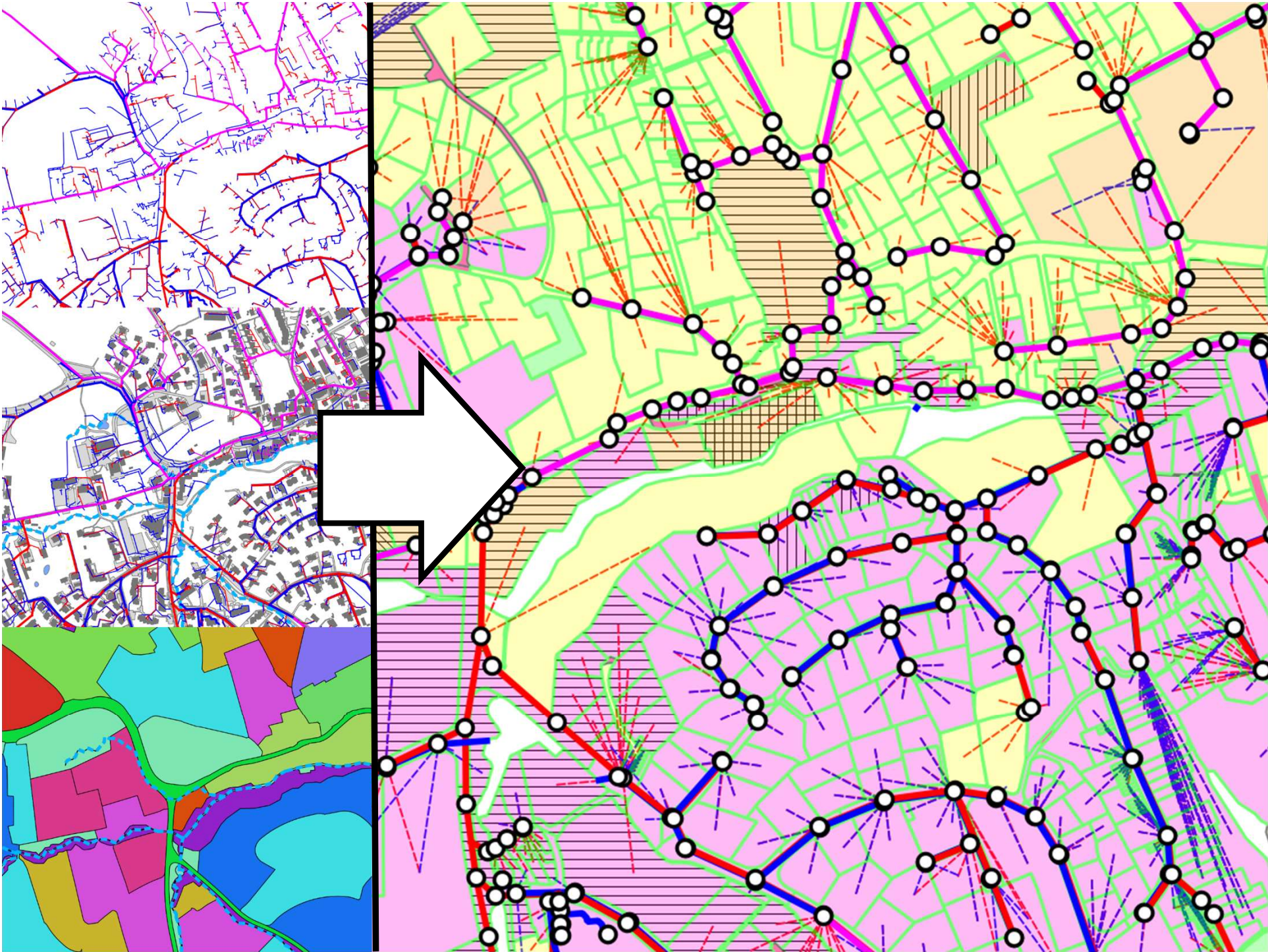
Rückgabotyp: tuple

`ogr_gemeinde_info(gemeinde, source=None)`

Get spatial and gemeinde number information from a geojson file (defaults to gemeindegrenzen.geojson).

Parameter:

- `gemeinde (str)` - Gemeinde name
- `source (str)` - Filepath for geojson source file





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