



What is QGIS?

- A GIS platform
- Desktop, Server-GIS and Mobile GIS
- 2D-GIS, with 2.5D Components (3D slowly under dev.)
- Platform independent (Linux, Mac, Windows, Android)
- Based on qt-Framework (C++ and Python)
- Plugin-System: Python and C++
- Integration with other FOSSGIS: GDAL/OGR, GRASS, R, Sextante, SAGA, OTB
- Support of a lot of GIS formats and databases
- Good integration with (OGC) web services



It's QGIS

- not QuantumGIS (old name)
- or Qgis
- or KuhGIS ;-)



QGIS Features

What can you do with QGIS?

- 1) Map symbolization
- 2) Map layout
- 3) Data acquisition, editing and CAD-tools (plugins)
- 4) Analysis (vector, raster, terrain modeling, statistics)
- 5) Modeling framework „PROCESSING“ (former SEXTANTE)
- 6) Extensible with Plugins



License

- GPL License (GNU General Public License, Open Source)
- Can be used without limitations
- Modifications are allowed
- If you sell a modified „QGIS“ you have to make the source code available to your customers

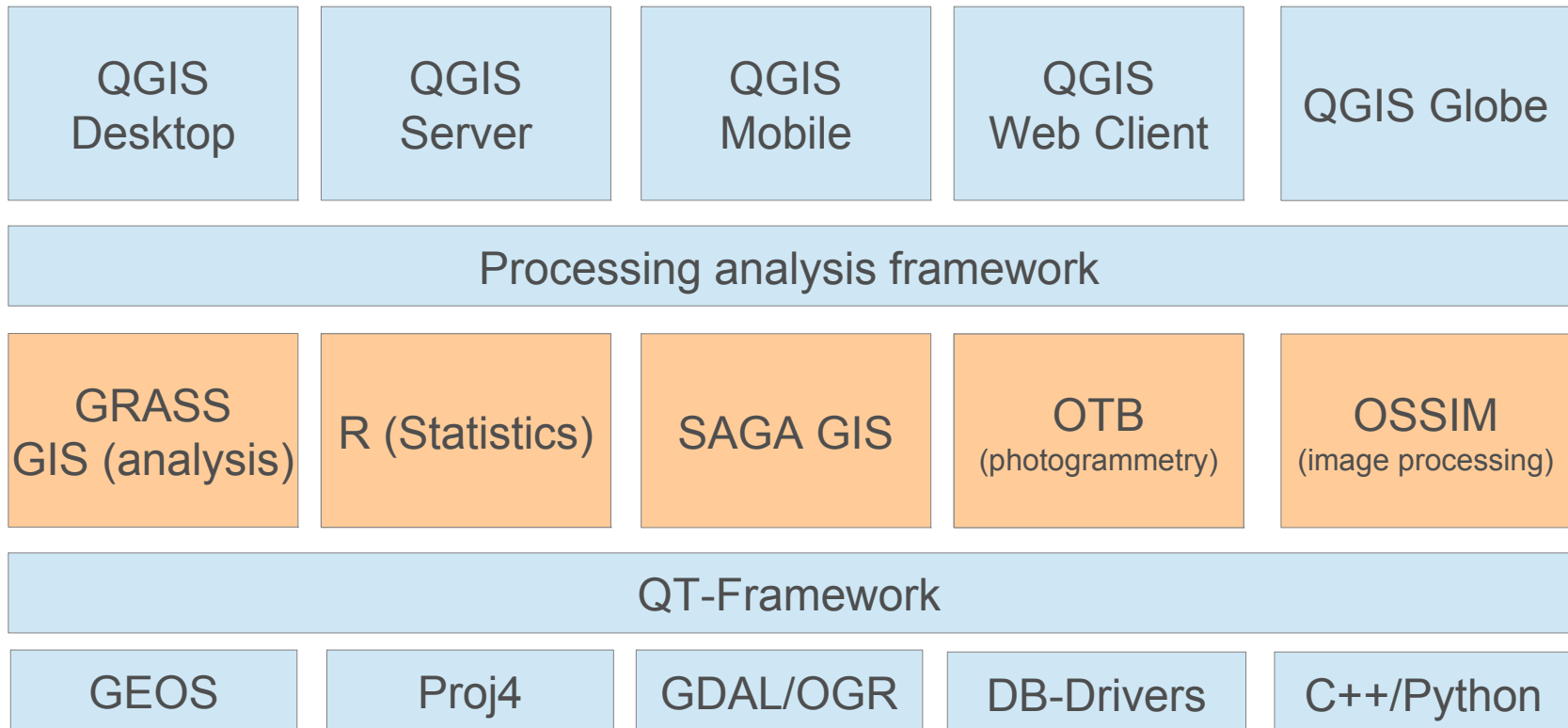


How is QGIS financed?

- Development contracts (in the core or with extensions)
- Service
- Support and Maintenance
- Cloud services
- Courses
- Paid software integration
- Sponsoring and donations from government agencies, companies and individuals
- QGIS user groups



Modular framework of QGIS/OSGeo





The FossGIS ecosystem

Libraries	Databases	GIS Server	Desktop-GIS	Web-GIS
GDAL/OGR (raster/vector drivers)	Postgis (Raster/Vektor/Netzwerke)	UMN Mapserv. (WMS, WFS, WPS, WCS)	QGIS	OpenLayers
FDO (vector/db drivers)	Spatialite (Raster/Vektor/Netzwerke)	Geoserver (WMS, WFS, WCS, WPS)	GRASS-GIS	Leaflet
GeoTools (raster/vector drivers)		QGIS Server (WMS, WFS, WCS)	gvSIG	Mapfish
JTS/GEOS (geometry engine)		RASDAMAN (Rasterserver)	uDIG	MapGuide
PROJ4 (projections)				QGIS Web-Client
MetaCRS (projections)				Liz-Map



Supported Raster Formats

- (Geo)TIFF
- JPEG
- GIF
- Erdas Imagine
- ECW (if SDK is installed)
- MisterSID (if SDK is installed)
- NetCDF (Klimadaten)
- ESRI ArcInfo Grid



Supported Vector formats

- ESRI Shapefile
- DXF
- SpatiaLite
- Mapinfo
- GML
- KML
- Interlis (Switzerland)



Supported databases and Spreadsheets

- PostgreSQL / Postgis
- SQLite / SpatiaLite
- Microsoft SQL Server
- Oracle
- Sybase
- ESRI File Geodatabase (if SDK is installed)
- ESRI Personal Geodatabase (read only)
- Excel, OpenOffice, txt/csv



Supported Web Services

- WMS (Web Map Service – symbolized maps)
- WMTS (Tile Service) – through the WMS-tab
- WFS (raw vector data)
- WCS (raw raster data)
- WPS (Web Processing Service - Plugin)
- CSW (Catalogue Service - Plugin)
- OpenLayers Plugin (Google Maps, Bing Maps, OpenStreetmap)



Some QGIS users and developers

Provinces

- Kanton Solothurn
- Kanton Glarus
- Kantone BS/BL
- Kanton Schaffhausen
- Kanton Neuenburg
- Kanton Schwyz (Landwirtschaft)
- Land Vorarlberg
- Provinz Toskana
- Provinz Trentino

Cities / Communities

- Uster
- Olten
- Morges
- Vevey
- Nyon
- Lausanne
- Dornbirn
- Jena
- Trento
- Montecchio (Vicenza)



Some QGIS users and developers

Universities and Organizations

- GVZ (Gebäudevers. Zürich)
- Österr. Hagelversicherung
- Univ. of Berne (CDE)
- HSR Rapperswil
- FH Yverdon
- IGN (NMA)
- ibW (forestry)
- ETH Zürich (Cartography)
- Univ. of Newcastle
- Univ. of Nottingham
- AIT (A)

Companies

- Alpgis (Thun)
- Sourcepole (Zurich)
- Wüst und Partner (Schweiz)
- KWO (Kraftwerke Oberhasli, CH)
- Asia Air Survey (Japan)
- Allianz Versicherung (Munich, DE)
- Norbit (Norden, DE)
- NextGIS (Moscow)
- Faunalia (Pisa, Lissabon, London)



Who develops QGIS?

- Foundation of the project 2002 in Alaska
- 2nd developer in Switzerland (Univ. of Zurich)
- Today an international developer team
- > 50 developers (30 regularly active)
- PSC (Project Steering Committee)
- A lot of development in Middle Europe

Follow Code on github:

<https://github.com/qgis/QGIS/commits/master>



Who develops QGIS? - the first two developers



Gary Sherman (Alaska)



Marco Hugentobler (Zürich)



Who develops QGIS? Dev. meeting 2012 in Essen





QGIS Developer Meetings

- Hannover (2009)
- Wien (2009)
- Moskau (2009)
- Pisa (2010)
- Breslau (2010)
- Lissabon (2011)
- Zürich (2011)
- Essen (2012)
- Valmiera/Lettland (2013)
- Brighton (2013)
- Vienna (2014)
- Essen (2014)





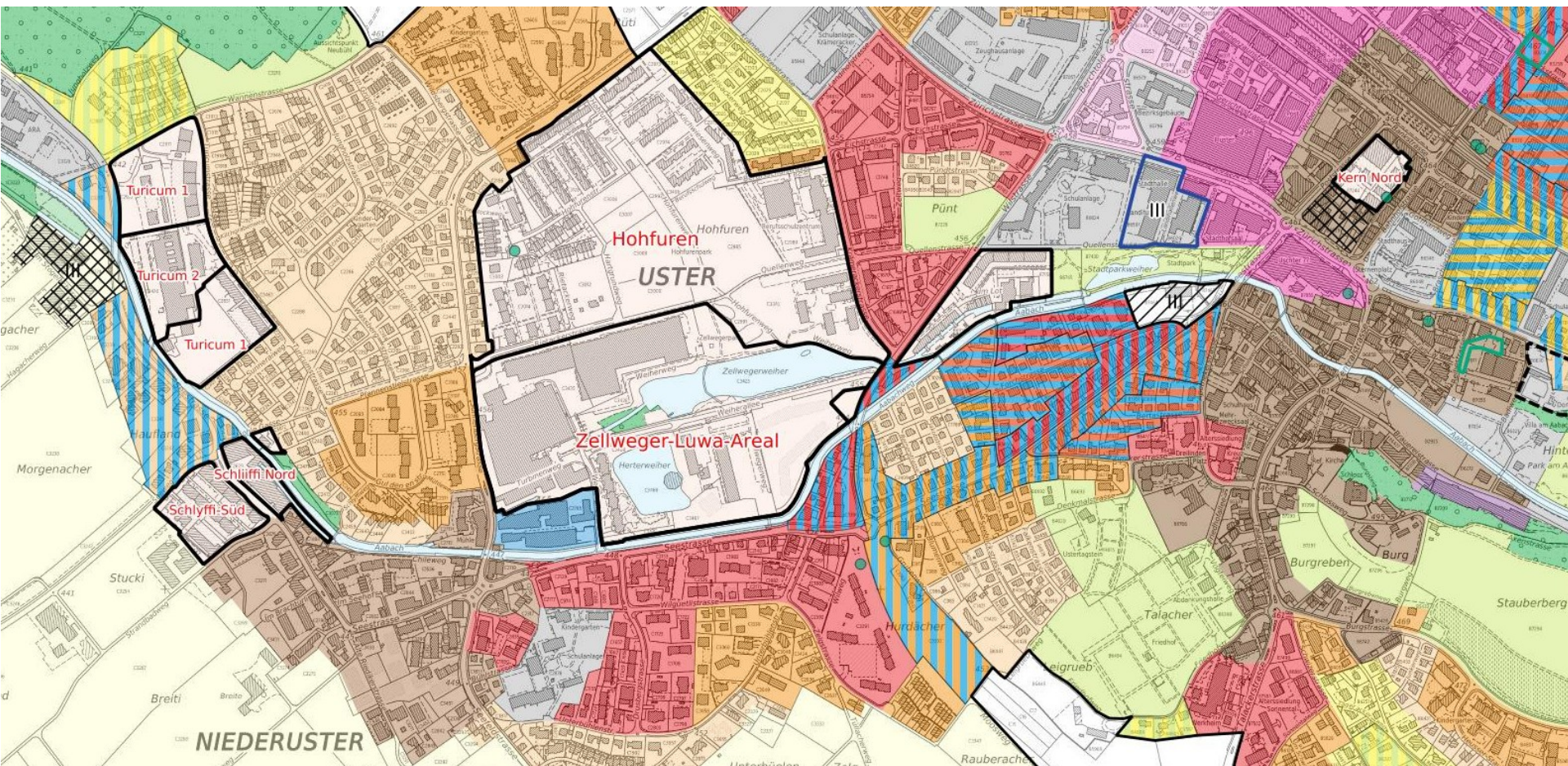
QGIS Local Usergroups

- QGIS-CH
- QGIS-UK
- QGIS-AUS
- QGIS-US
- (QGIS-DE)
- (QGIS-RO)





Map Symbolology





Map Symbolology: Renderers

- Single Symbol
- Categorized (with expression support; from QGIS 2.2)
- Graduated (with expression support; from QGIS 2.2)
- Rule-based
- Point displacement (in combination with the above renderers)

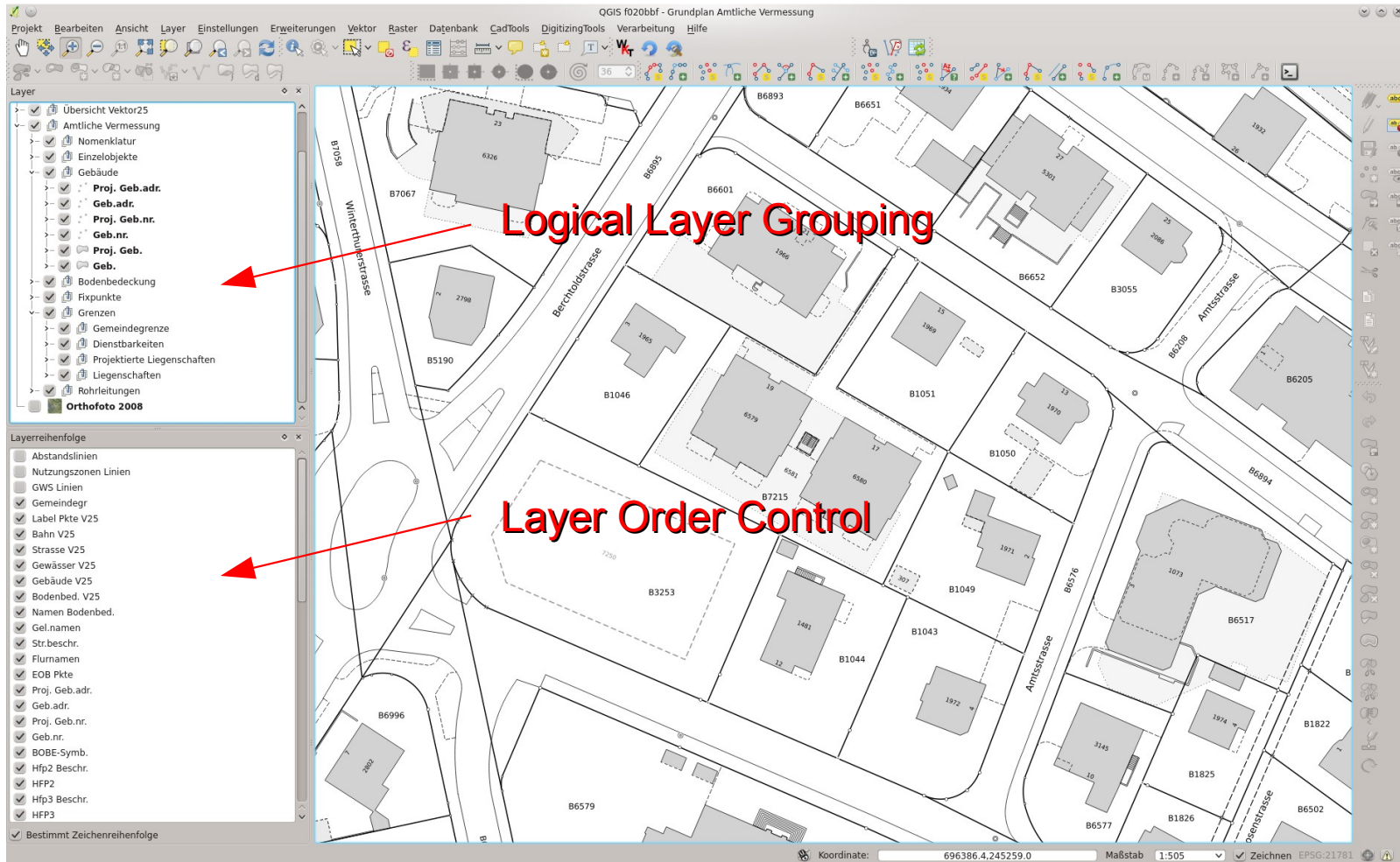


Map Symbolology: Categorizations

- Equal interval
- Quantiles (equal counts)
- Natural breaks (Jenks)
- Standard deviation
- Pretty breaks



Separation of Logical Grouping and Layer Order





Symbol Level Control

Stil

▼ Layerdarstellung

Layertransparenz: 0

Layermischmodi: Normal

Objektmischmodi: Normal

Einheits: Millimeter

Transparenz 0%

Breite: 1.50000

Farbe: [Pink Swatch]

Gespeicherte Stile

Symbollayer

- Line
 - Einfache Linie
 - Einfache Linie
 - Einfache Linie

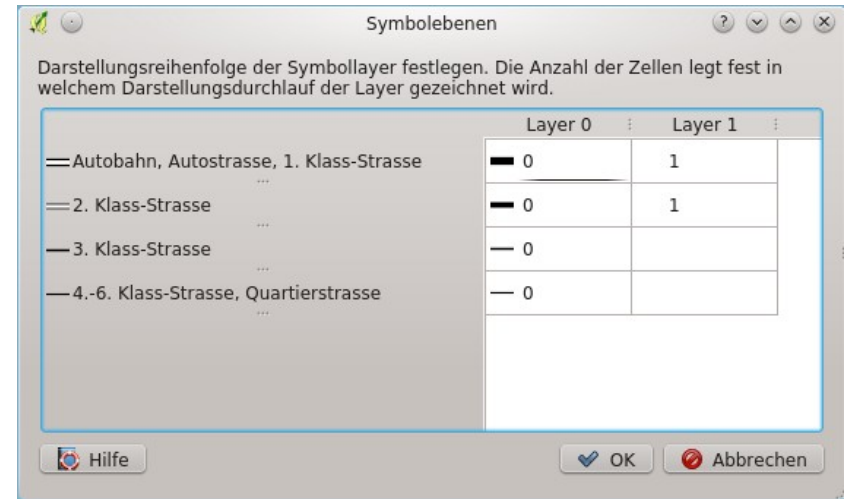
Abwasserhaltung öff. Kanal genau

Stilvorgaben wiederherstellen Als Vorgabe speichern Stil laden... Stil speichern

Hilfe OK Anwenden Abbrechen



Symbol Level Control





Units Support

- mm (not zoomable)
- map units (zoomable)
- units can be mixed: e.g. offset in map units and stroke-width in mm

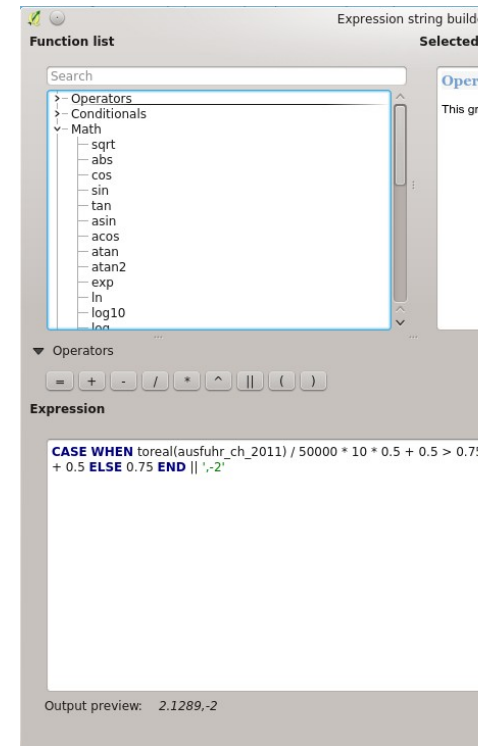


Expressions

- Operators
- Logic
- Math
- Strings
- Date
- Geometry and Spatial relations
- DB/Record
- Type conversion
- Color
- Python

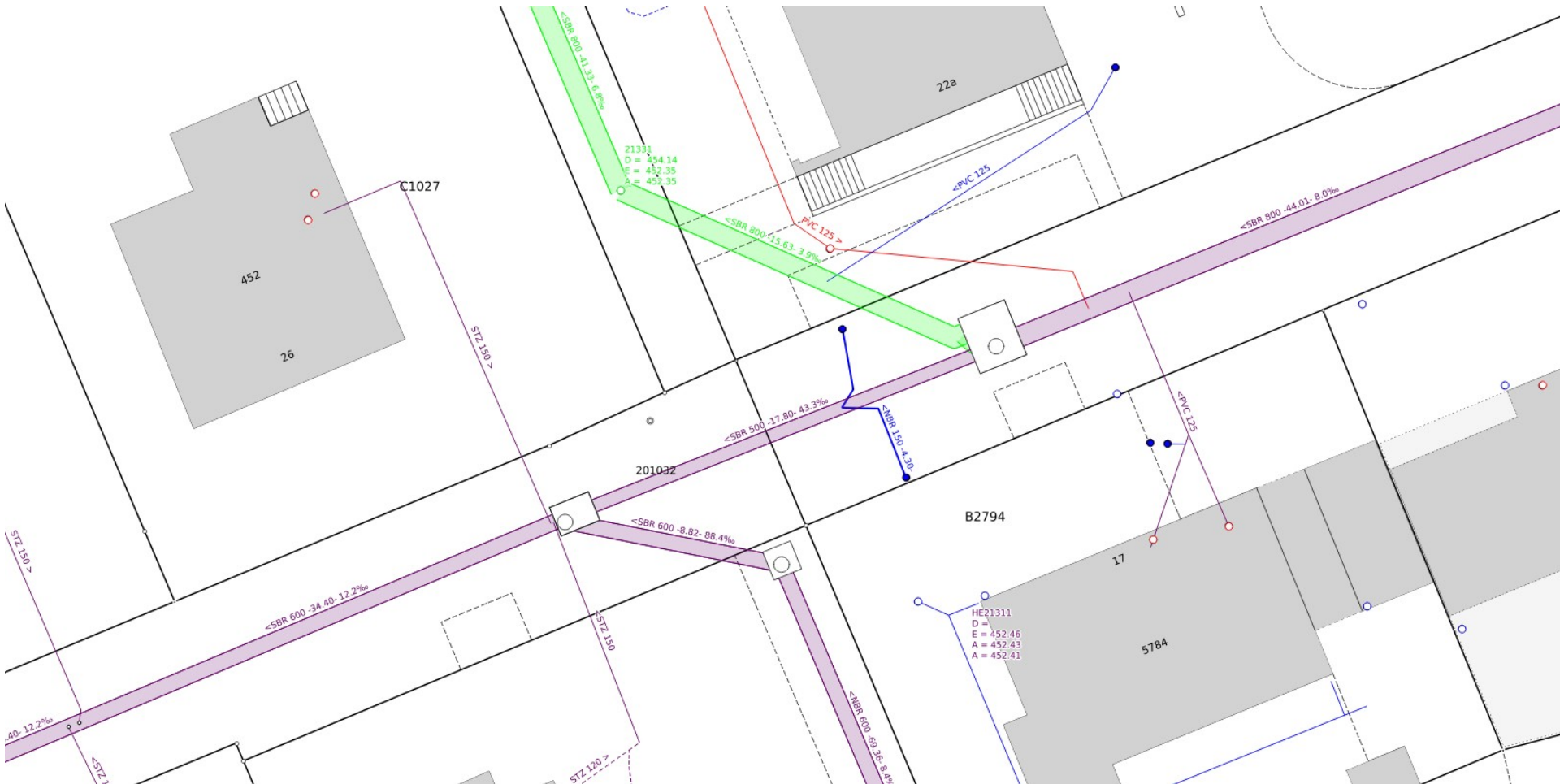
Can be used in

- Rules
- Data-defined symbology
- Labeling
- Field calculator
- Table filtering
- Table selection
- Print composer
- Serial printing



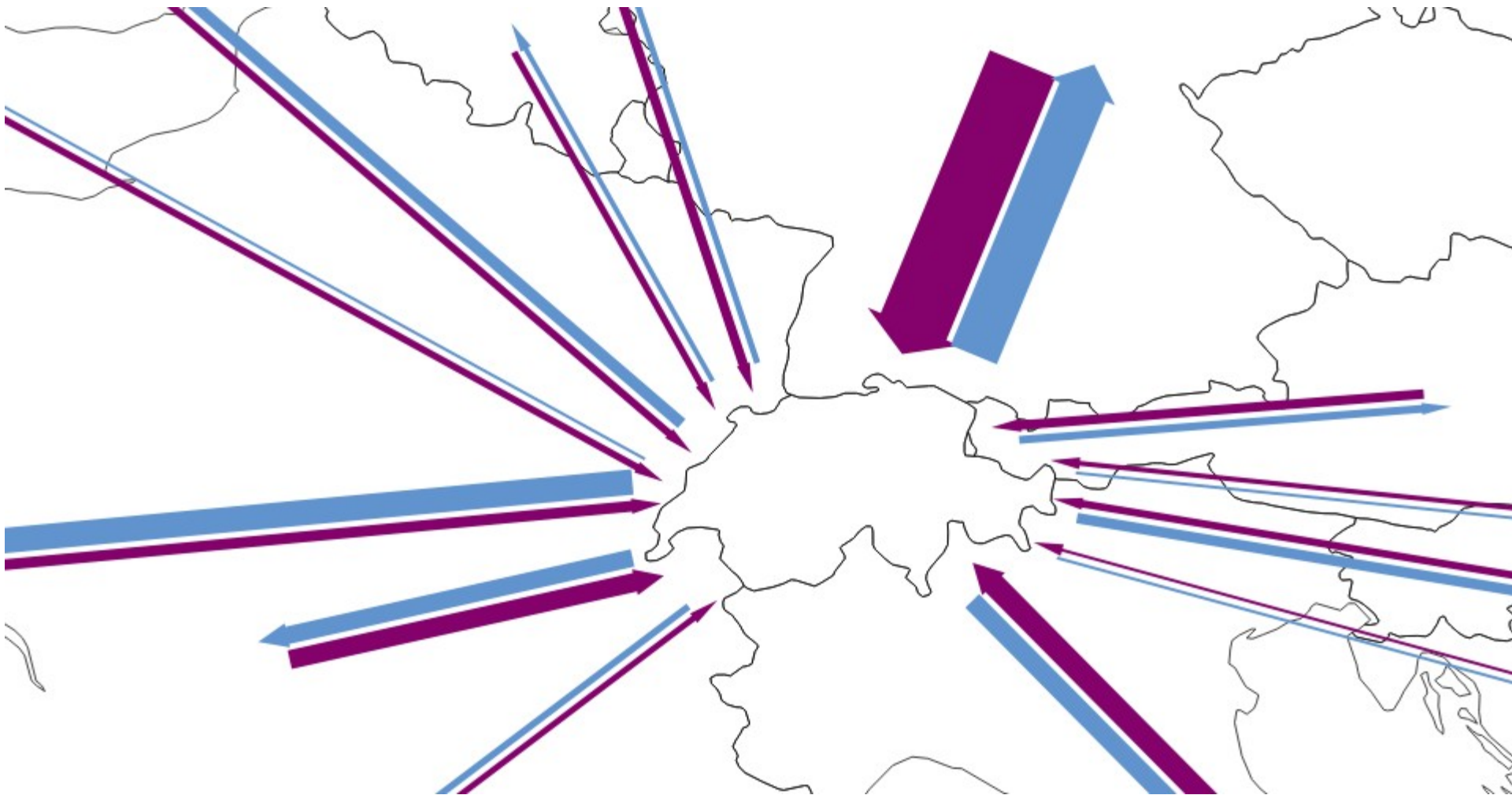


Example „mixed units“ and expressions





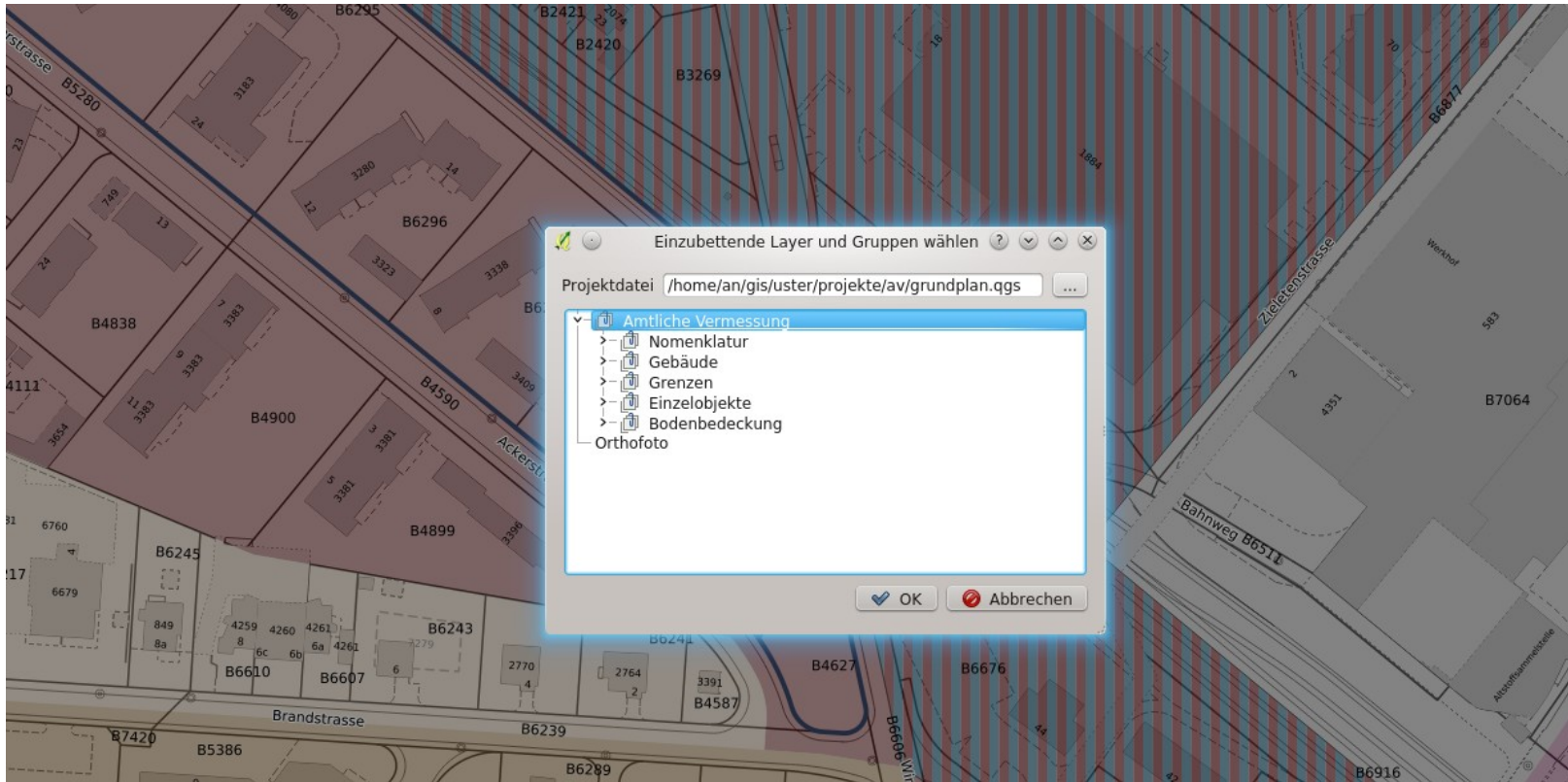
Sample „expression based symbology“





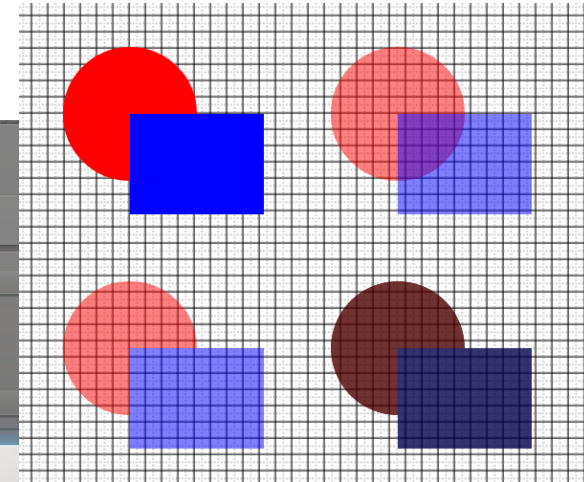
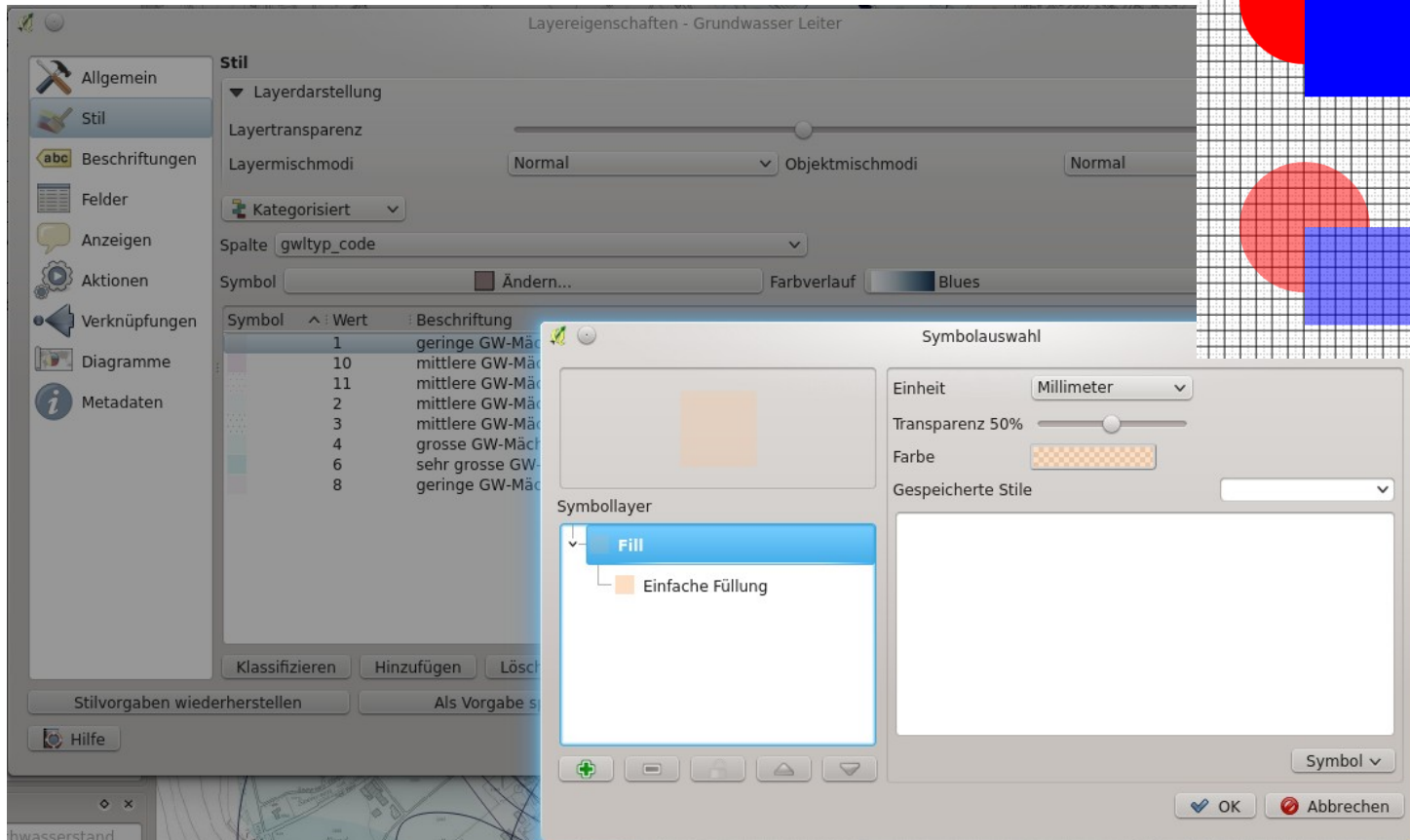
Embedded Groups and Layers for Re-Use

Symbology of Embedded Layers/Groups can't be changed



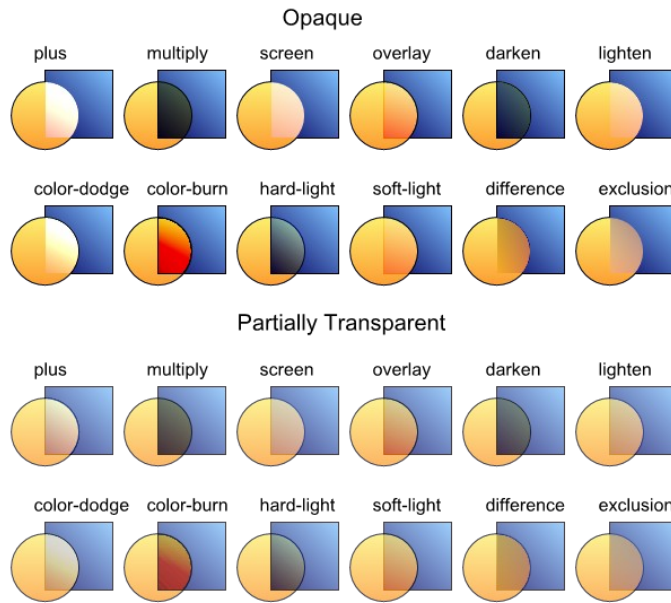


Layer vs Feature/Object Opacity

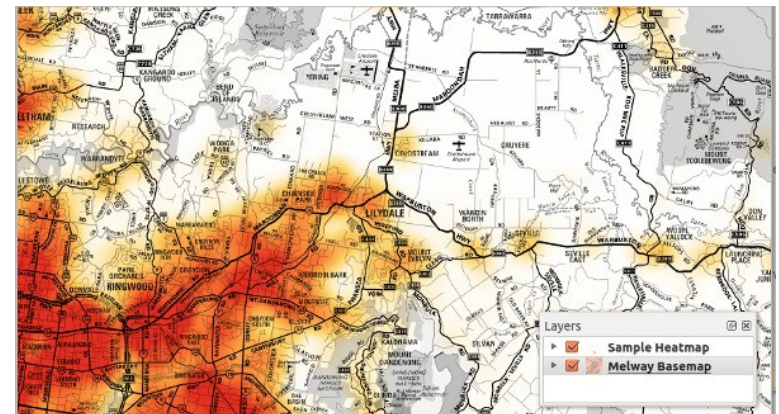
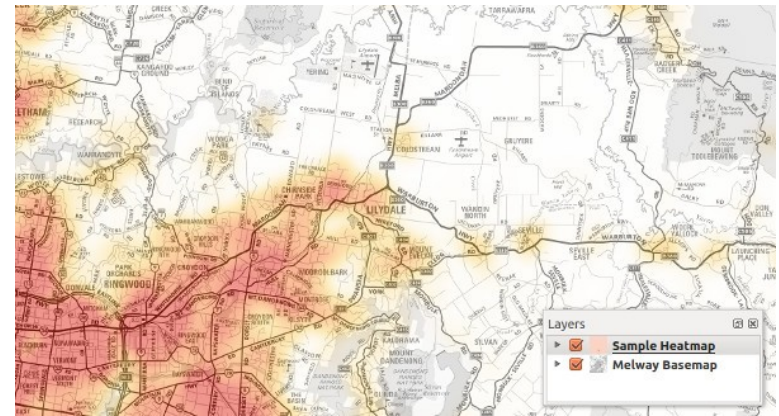




Blend Modes



Only Transparency



Blendmode Multiply

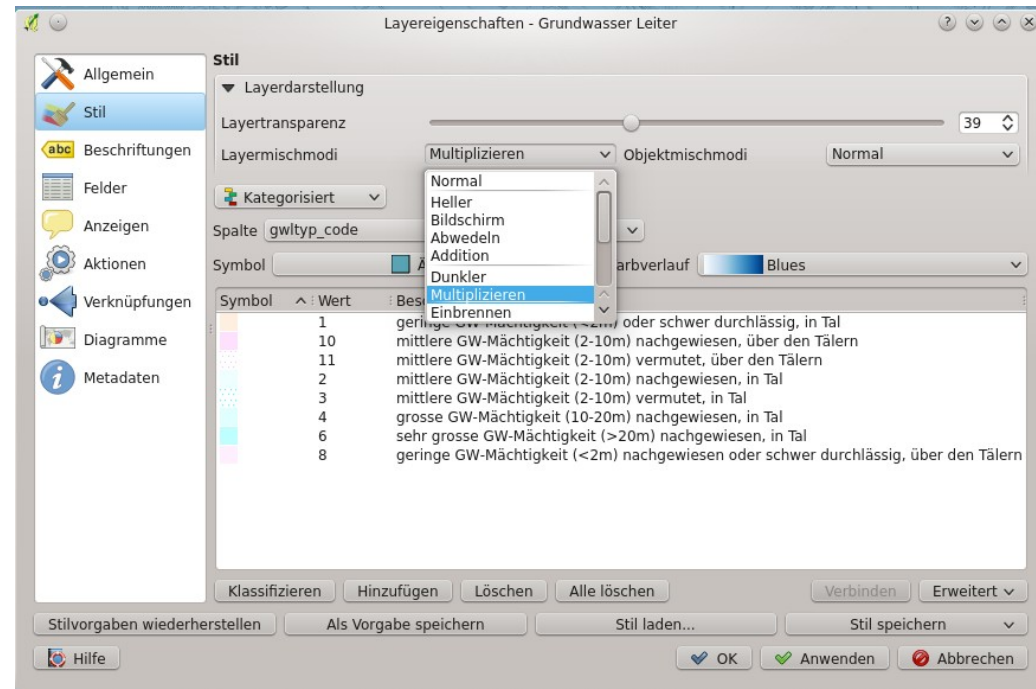
<http://nathanw.net/2013/05/02/svg-textures-in-qgis/>
<http://smathermather.wordpress.com/tag/quantum-gis/>
<http://anitagraser.com/2013/07/29/vintage-map-design-using-qgis/>
<http://nyalldawson.net/2013/03/coming-soon-in-qgis-2-0-blend-modes-for-layers/>



Blend Modes

Work on

- Features
 - Layers
 - Labels
 - Print composer elements
- Normal
 - Lighter
 - Screen
 - Dodge
 - Addition
 - Darker
 - Multiply
 - Burn
 - Overlay
 - Soft Light
 - Hard Light
 - Difference
 - Subtract



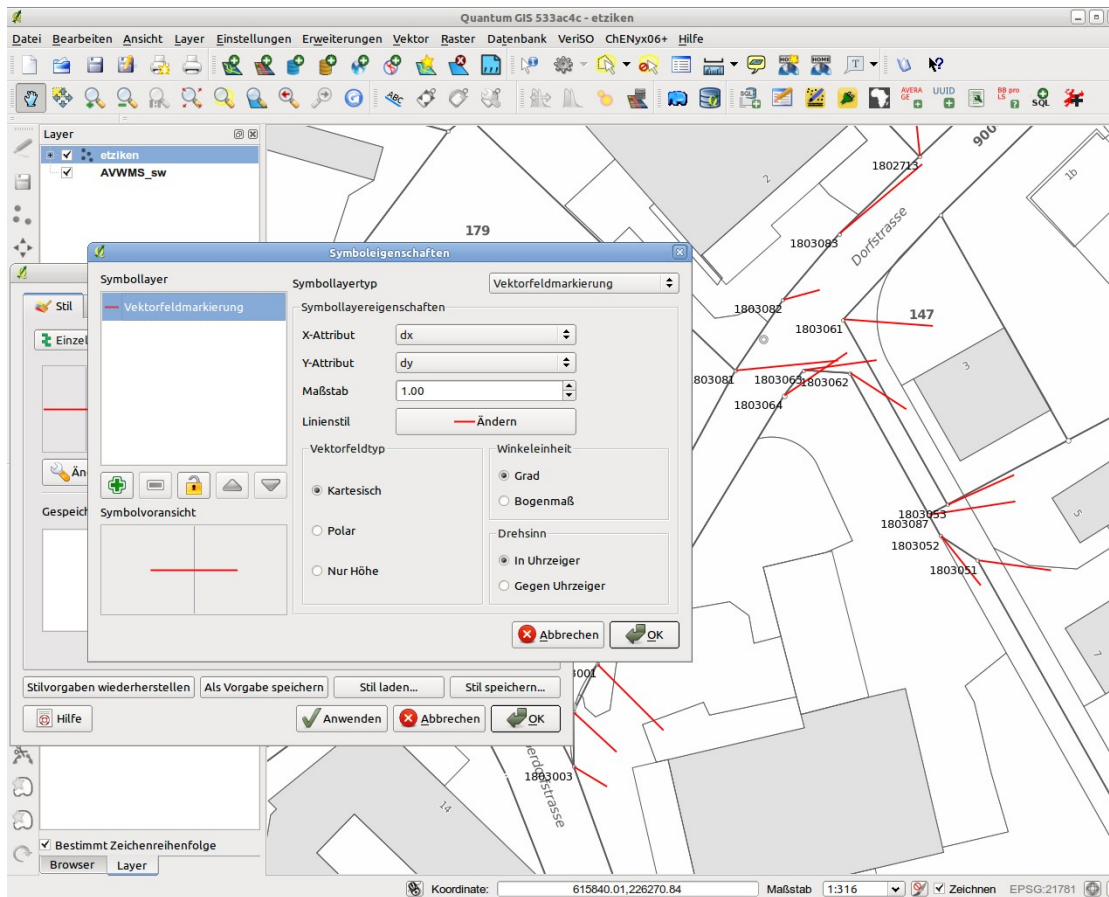


Point Symbology Options

- Simple Symbols
- Ellipse Symbols
- SVG Symbols – special mechanism for overriding graphical properties
- Font Symbols
- Vector field renderer (for distortions, wheather maps, etc.)
- Support for rotation, scaling, anchor points, offsets, etc.



Sample Vector Field Renderer



Div Einstellungen
zu Einheiten,
Polar/Kartesisch,
Drehrichtung

Kombinierbar mit
anderen
Klassierungen

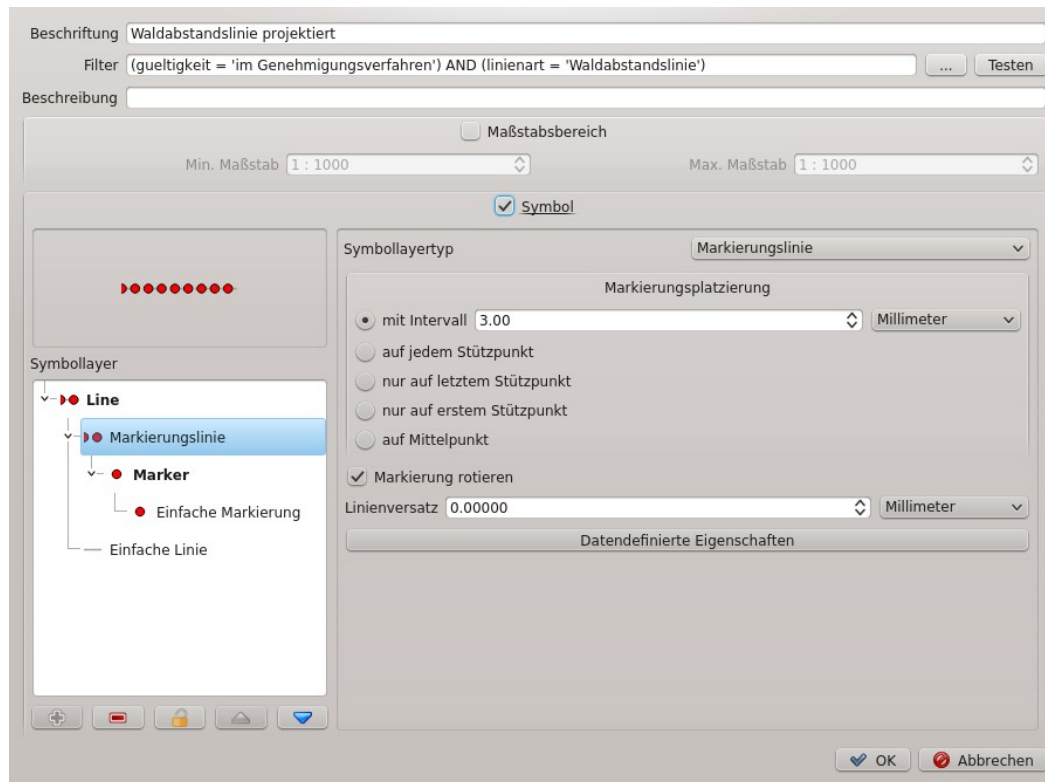


Line Symbology Options

- Simple Line
- Marker Line
- Any combinations of the two
- Individual offset per line possible
- Different line caps / line joins
- Custom dash-patterns



Marker Line



- Interval
- On every vertex
- Only on first vertex
- Only on last vertex
- On mid-point
- Automatic rotation
- Offsets
- Mixed Units

Supported types: Simple Marker, Ellipse Marker, Font and SVG Marker



Area Symbology Options

- Simple fill (color)
- SVG fill (vector-pattern)
- Line pattern (hashing)
- Point pattern (rastergrid)
- Centroid fill (one point at centroid)

Any combinations of the above and with line-styles



Labeling

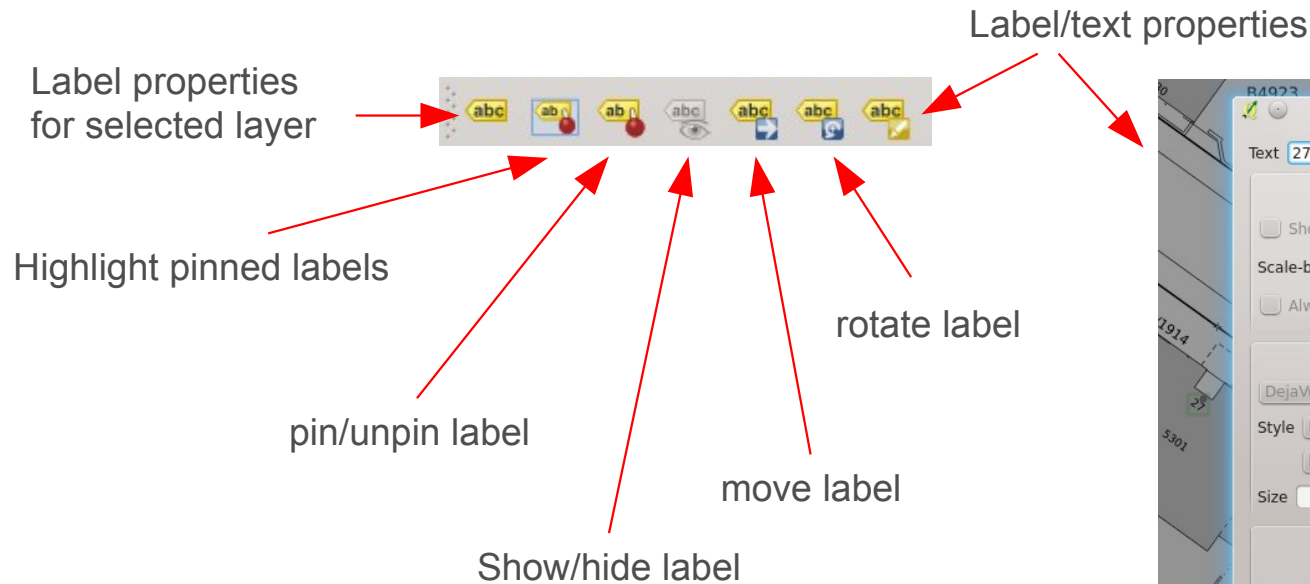


- Labeling allows to mix automatic labeling with manual labeling
- Labels can be pinned/unpinned (changing between automatic/manual labeling)
- Every text property can be stored/derived from attribute column or expression
- Different placement options and algorithms
- Different label backgrounds:
 - Simple shapes (rectangle, square, circle, ellipse)
 - Text buffer
 - SVG graphic
 - Shadow

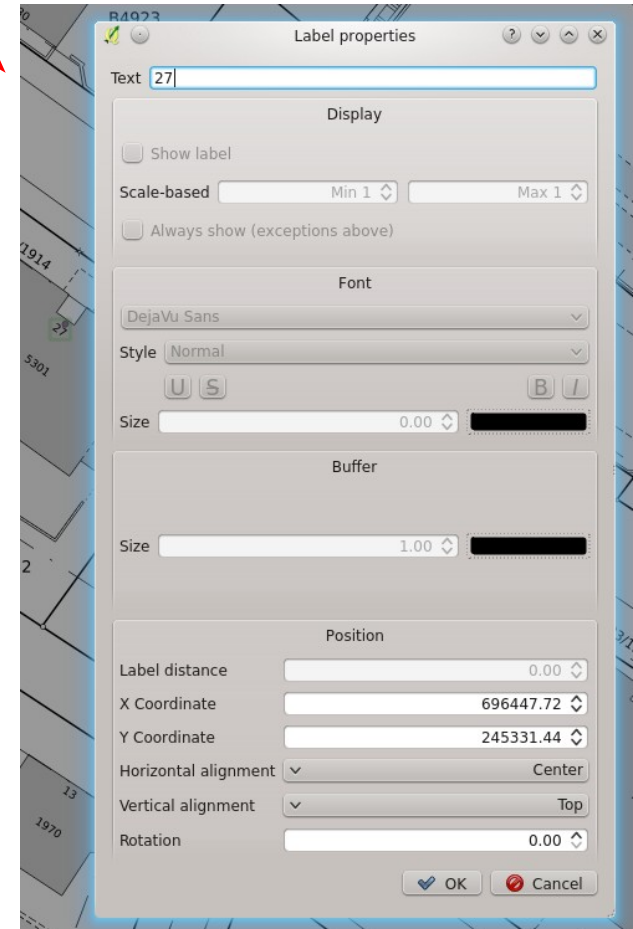




Manual Labeling



Only text properties that have an attribute column assigned can be changed – widgets of other properties are disabled





Map Layout

Menu and toolbars

Composer Edit View Layout Atlas Settings

A4-Hoch

Command history

Context sensitive Item properties

Layout Canvas

Properties of map sheet / composition

Command history

Composition Item properties Atlas generation

Item properties

Map

Main properties

Cache

Scale 1000

Map rotation 0.00 °

Draw map canvas items

Lock layers for map item

Extents

X min 696399.500

Y min 245391.923

X max 696588.500

Y max 245638.923

Set to map canvas extent

Controlled by atlas

Show grid

Overview

Position and size

Rotation

Frame

Background

Item ID

Rendering

x: -107.868 mm y: 0 mm page: 1 82.4% 1 item selected



Available layout elements

- Map frame
- Linked reference map
- Image/graphic (linkable with rotation of map-frame for north-arrows)
- Text label (supports expressions)
- Legend
- Scalebar
- Simple geometries (Circle/Ellipse, Rectangle, triangle, arrow)
- Table
- HTML Frame



Some Features of the map composition

- Element order
- Element alignment
- Snap to grid and guidelines
- Auto guides for placement relative to other elements
- Precise positioning and sizing with coordinates
- Lock/Unlock elements



„Atlas“ Serial Printing

Composer Edit View Layout Atlas Settings

100 80 60 40 20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320

Atlas Preview Controls

Katasterplan Parzelle H1056 1:387 Stadt Uster GIS-Kartographiezentrum Zollikerstrasse 78 8153 Uster uster.ch

Keine Garantie als Katasterplan. Alle Rechte an diesem Plan verbleiben bei der Gemeinde. Jede weitere Verwendung, insbesondere die Übertragung des Plansatzes in ein GIS-System oder die Reproduktion zur Veröffentlichung oder zu gewerblichen Zwecken ist untersagt und geistrechtlich geschützt. Gesetze sind an das Amt des Kantons Zürich zu richten. Keine Garantie für Richtigkeit. Weiterverbreitung ist erlaubt.

4. Stock: Urban Stadtvermessung Uster, Amtliche Vermessung und GIS-Kartographie Uster. <http://www.stadtuster.ch/karte>

Auftrag: 25.03.2016

H1719 2563 H1885 H1056 3851 1286 119 1285 Pfäferkerstrasse

x: 123.278 mm y: 0 mm page: 1 82.4% Atlas feature 3 of 576

Command history

- <empty>
- Item z-order changed
- Map scale changed
- Picture changed
- Map scale changed
- Item moved
- Label font changed
- Change item size
- Change item size
- Label text changed

Composition Item properties Atlas generation

Atlas generation

☒ Generate an atlas

Configuration

Coverage layer LS Fläche

☐ Hidden coverage layer

☒ Filter with "sektionsbezeichnung" = 'H'

Output

Output filename expression 'output_' || \$feature

☐ Single file export when possible

☒ Sort by gru_nummer

Atlas Settings



„Atlas“ Serial Printing Features

- Atlas Preview
- Output to PDF/Images
- Output to multi-page PDF
- Filter by expression
- Order by database column
- Labels/HTML Frames with Expression
- Style active feature differently from other features



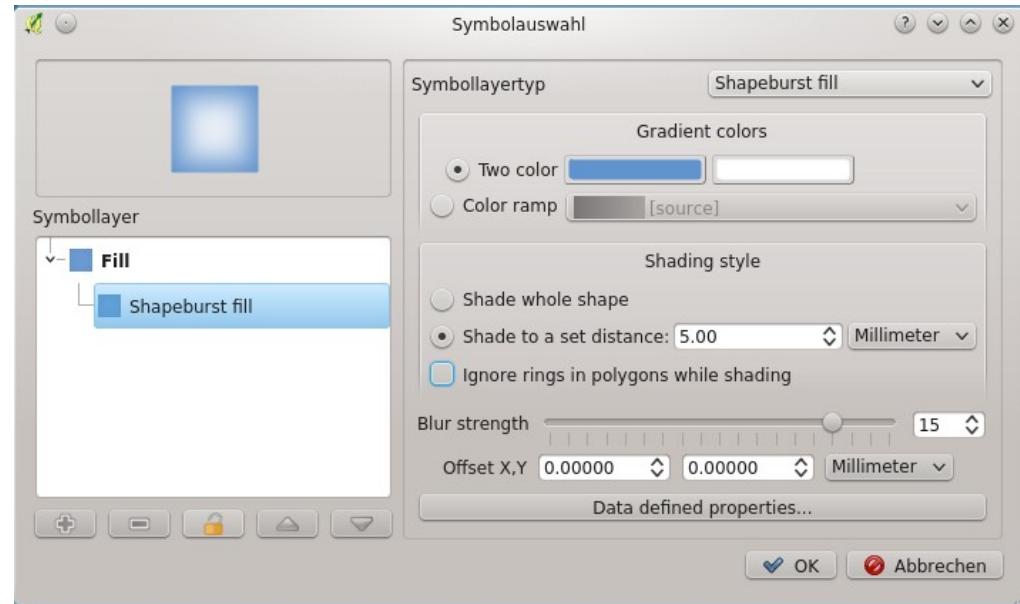
Future Projects – QGIS 2.4

- Multi-threaded renderer
- Symbology: shape-burst fill style
- Central symbol repository
- New widget system for forms
- Legend tree refactoring



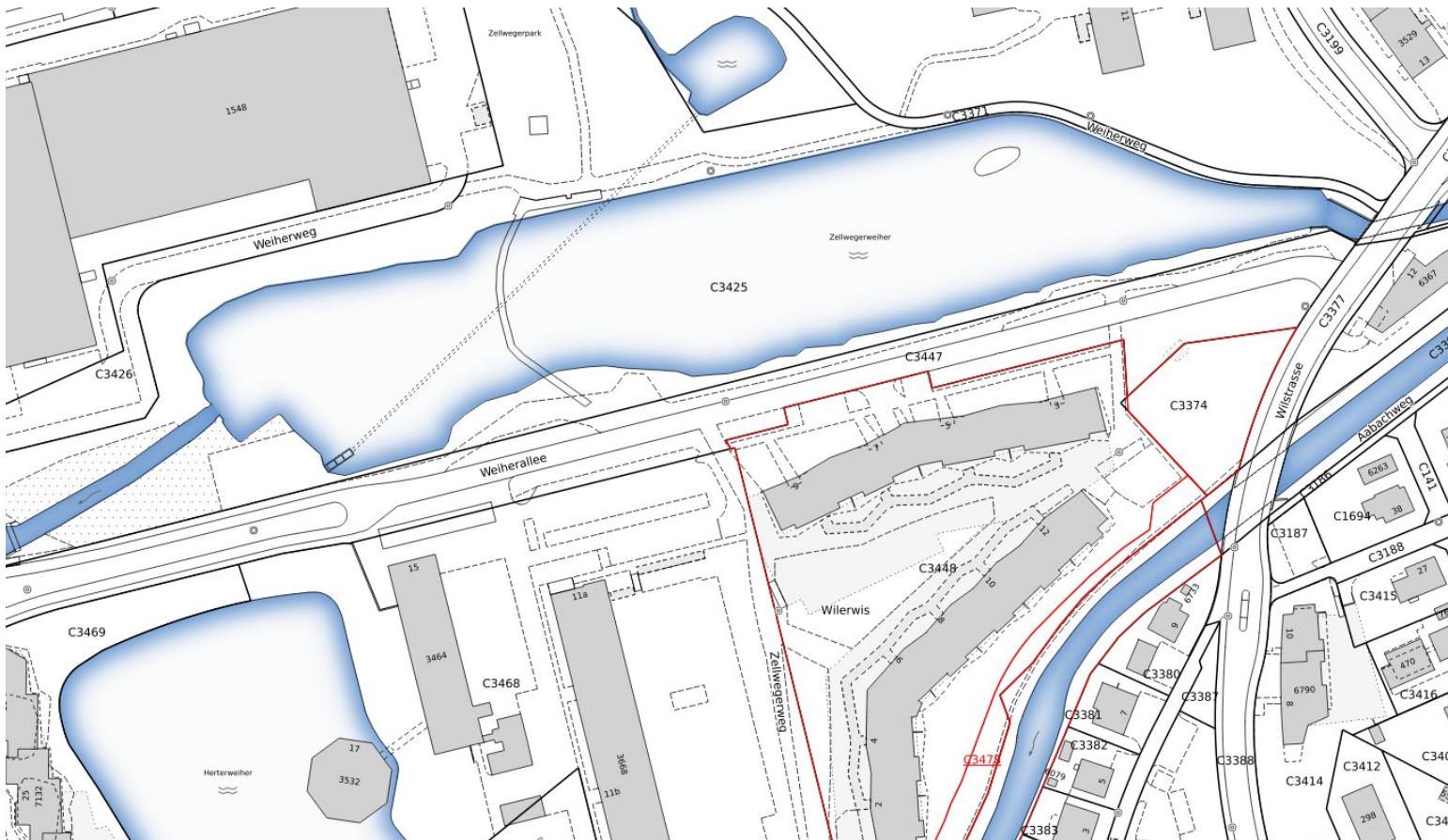
New Shape-Burst Fill Style

- Color ramp that follows shape
- Control of shade distance with unit support
- Control of blur effect
- Control handling of rings





New Shape-Burst Fill Style



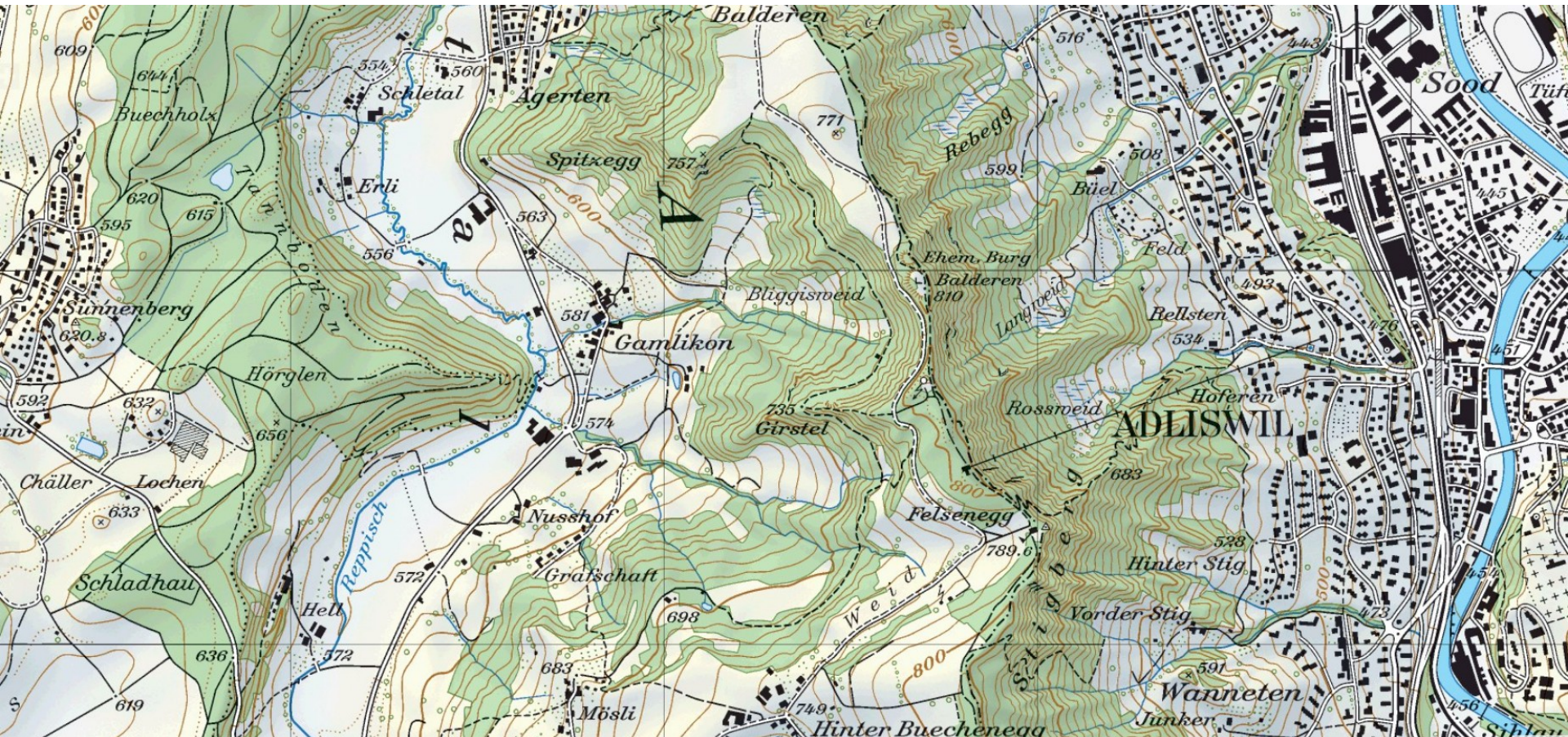


Future Projects

- Labeling: Better text/symbol-masking („Textfreistellung“/ „Symbolfreistellung“) with symbol levels as target
- SQL compiler for serverside filtering
- Geometry model enhancements: circular arcs, (splines or nurbs), Z-Values, M-Values



Text Masking Example – Goal to achieve



© Swisstopo 2014



Challenges: thematic mapping

- Diagrams: only pie-charts, bar charts, scalable symbols
- Heatmap plugin
- No flow maps
- No complex diagrams
- No „3d-style“ charts
- No „clustering“ mechanism
- No „dot-density“/„dot distribution“ maps
- No „Kleingeldmethode“
- Cartograms plugin needs to be ported



Links:

<http://www.qgis.org/>

<http://planet.qgis.org/>

<http://plugins.qgis.org/>

<http://www.qgis.org/api/>

<http://android.qgis.org/>

<https://github.com/qgis/Quantum-GIS>

<http://www.osgeo.org/>