

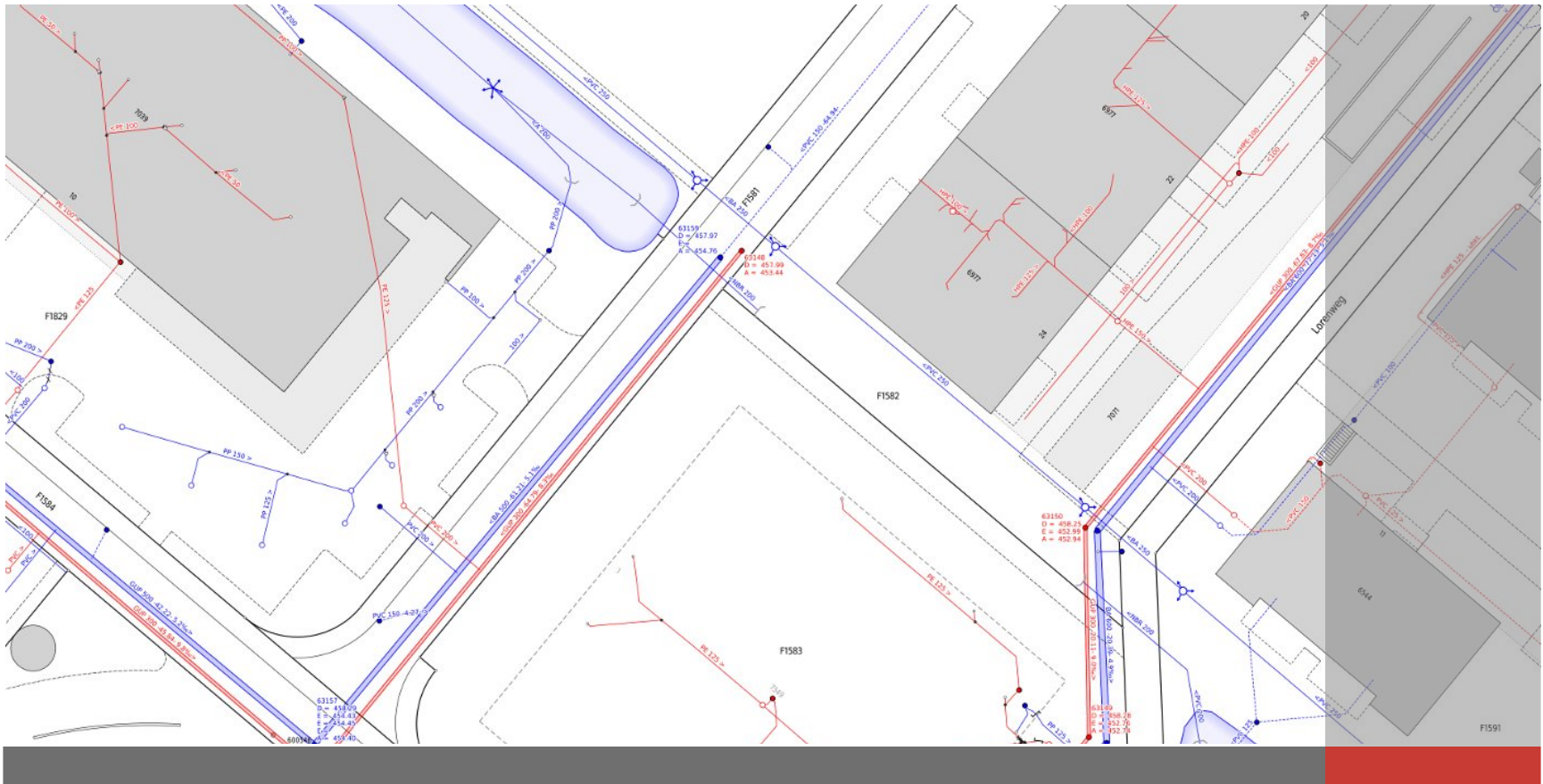


Project QGEP

a QGIS/Postgis based waste-water management application

Swiss QGIS User Meeting Berne 2015

Stefan Burckhardt (Sjib Consulting) and Andreas Neumann (Stadt Uster)





Agenda

- I. Why QGEP?
- II. Data model
- III. Financing, Participation
- IV. Project state
- V. Selected problems in QGIS core solved during the projects QGEP and qWat



Why developing a new application?

- Get the software we want (direct influence on future development)
- Replace existing solution based on ArcView 3x (which isn't maintained anymore)
- Existing commercial solutions do not fully and correctly implement national data models (e.g. VSA-DSS model)
- Most commercial solutions only implement the core part of the waste-water network documentation and not the extensions
- Cost sharing between members
- Know how pooling among members
- Sometimes faster development than commercial software



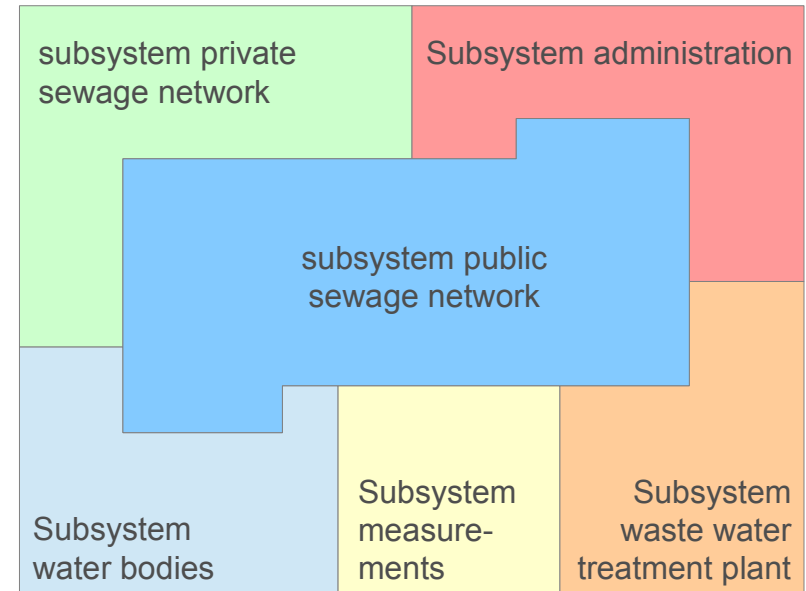
Project partners

- Holinger (Thun) AG, former Spring Ingenieure (Thun)
- Fischer Ingenieure AG (Arbon)
- Stefan Burckhardt, Software, Informations-Management, Beratung (SJiB) (Zurich)
- City of Uster
- SIGE (service intercommunal de gestion, region Lake Geneva)
- OpenGIS.ch (Thun), QGIS developers
- Sourcepole (Zurich), QGIS developers
- Additional communities (Vevey, Morges)



Data model

- Based on SIA Geo405 and DSS model of the VSA (Swiss engineering and waste-water associations)
- Database objects in english
- Value lists and comments are translated to german and french. Other languages can be added.
- StandardOID primary keys with prefix and counter allows to have human-readable ids that are unique across different organizations:
e.g.: "**ch11h8mw**MA010898"



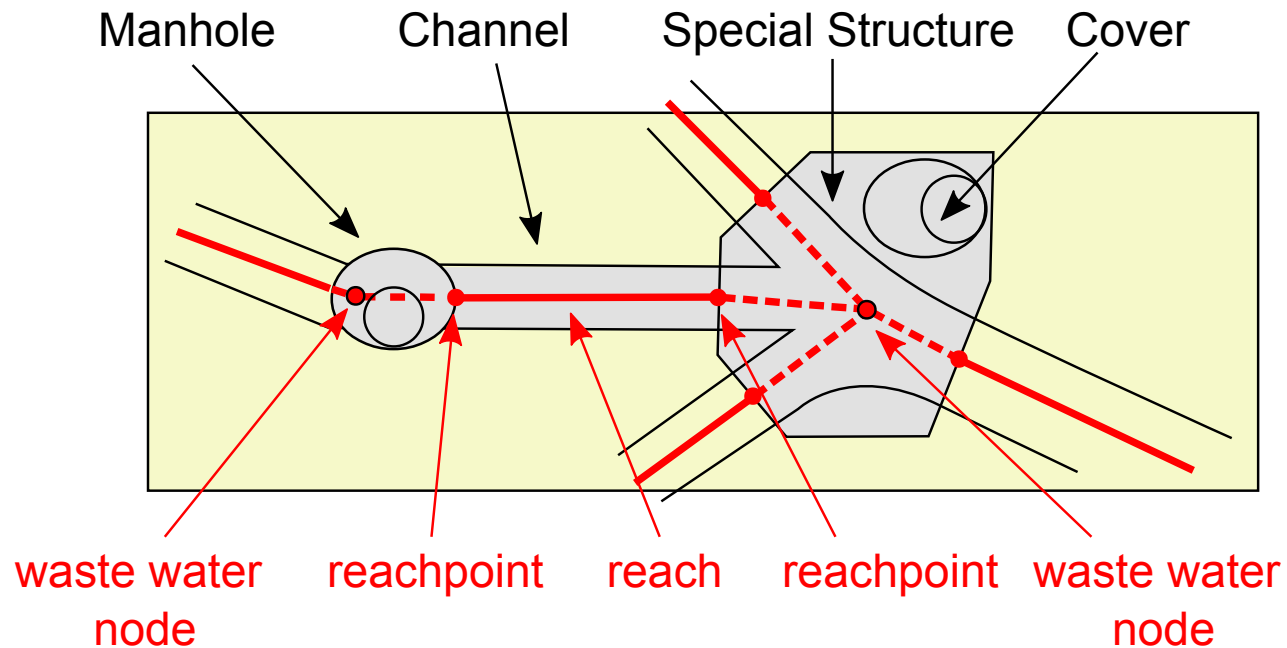
Source: VSA

Full data model: <https://github.com/QGEP/QGEP/tree/master/datamodel>



Data model - Terms

Structural entities

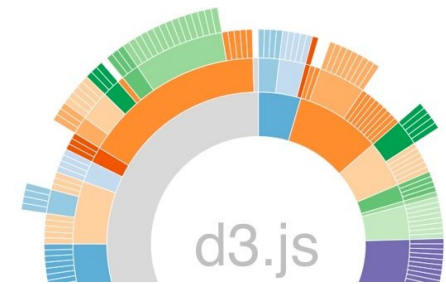


Source: VSA

hydraulic entities

Technical framework

- Database: PostgreSQL/Postgis
- Desktop-GIS: QGIS
- Network following: NetworkX (Python)
- New generic functions in QGIS Core (C++)
- Python Plugins
- Qt GUI-Bibliothek
- Webkit with d3.js for visualization (eg. for profile functionality)
- Import/Export through GDAL and Processing





Financing

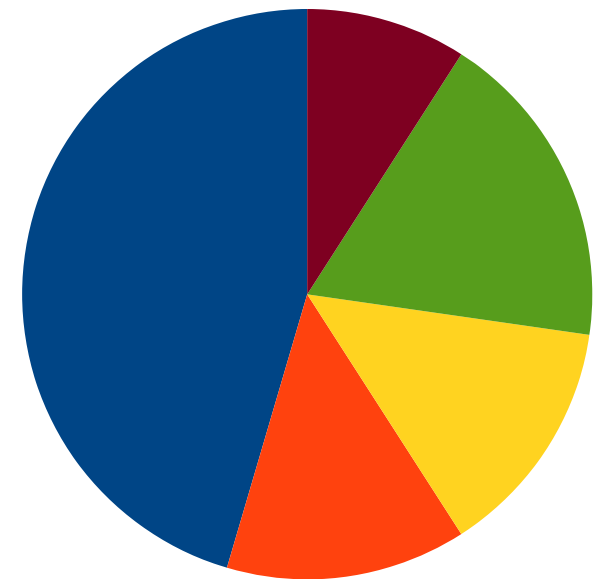
- Cost sharing (Crowdfunding among members)
- Established as sub-group of Swiss QGIS user group in 2014
- Local governments and companies are invited to join the efforts
- Annual fee of CHF 3'000.- to keep the development going
- Additional financing of some members at the beginning
- Approximate initial costs of the project: 250'000.- CHF





Financing: 110 k CHF already invested

- CHF 50'000 invested into **QGIS core** to make it suitable for large projects like qWat and QGEP (SIGE, Uster, Morges, Vevey, QGIS user group, etc.)
- CHF 15'000 invested into **data model work** (SQL generation for PostgreSQL, translations, ER model documentation, etc.)
- CHF 15'000 invested directly in **QGEP** development through QGEP membership fees (forms, Python Scripts, scripts for translation, etc.)
- CHF 20'000 invested indirectly through regular **project management** meetings by project members
- CHF 10'000 invested in Uster internship of Matthias Kuhn around **QGEP** (network following, profile function)



- QGIS core
- Data model
- QGEP directly
- Project meetings/coordination
- Uster internship around QGEP



Project adoption

- **Migrations and pilot projects** in Arbon and SIGE (Vevey) now
- Migration in Uster in Q3/Q4 2015
- Other communities in 2016 (Morges ?, Pully ?)

- If you are interested in the project we can visit your organization from September 2015 on for an **onsite demo of our tool** and discuss your organizations requirements and migration issues



Project status, part I (already or partially finished)

- Data model (english) – based on VSA-DSS 2014
- Generation of Postgis Views, Rules, Triggers and functions (mostly finished, with ongoing improvements)
- Symbolization and labelling rules and DB triggers
- QGIS project with localization in English, German, French and Italian (already usable for pilot projects, ongoing improvements)
- Editing functionality in QGIS (with Python plugin and Postgis rules/functions)
- Network following (up- and downstream)
- Interactive profile generation
- Many improvements in QGIS core during the project



Project status, part II (still to be implemented)

- Integrate new QGIS core transaction mechanism with project to allow smoother editing
- Better mass updates of attribute data directly from forms (QGIS core)
- Import and export interfaces (INTERLIS 1 + 2)
- Aggregation and statistics functions
- More analysis tools
- Forms for extension Stammkarte of VSA-DSS and VSA-KEK (Kanalfernsehaufnahmen und –schäden (TV-inspection and sewer channel damages)). Data model already at hand.

See milestones at <http://www.qgis.ch/en/projects/qgep-waste-water-module/current-development>



Forms: Manhole General (most important attributes)

vw_qgep_cover - Feature Attributes

Actions

General Cover Wastewater Structure Manhole Wastewater Node Covers Access Aid Backflow Prevention Dryw < >

ws_type	Manhole
identifier	AAA DE49229
location_name	NULL
year_of_construction	NULL
function	manhole
function	
renovation_necessity	unknown
level	NULL
positional_accuracy	5349
dataowner	NULL
status	other.calculation_alternative
venting	(no selection)
fastening	(no selection)
dimension1	NULL
dimension2	NULL

Cancel OK











Forms: Manhole Covers

vw_qgep_cover - Feature Attributes

General Cover Wastewater Structure Manhole Wastewater Node **Covers** Structure Parts Maintenance

▼ Covers

Expression

ch11h8mwCO001963

obj_id	ch11h8mwCO001963
brand	NULL
cover_shape	NULL
depth	NULL
diameter	0
fastening	NULL
level	398.999
material	NULL
positional_accuracy	5349
sludge_bucket	NULL
venting	NULL
identifier	6008.0370

Cancel OK



Forms: Manhole Structure Parts

vw_qgep_cover - Feature Attributes

General Cover Wastewater Structure Manhole Wastewater Node Covers **Structure Parts** Maintenance

▼ Access Aids

✎ 📄 + ✕ 🔗 🔗

⌘ Expression

ch11h8mwAA001327

obj_id	ch11h8mwAA001327
kind	NULL
identifier	FAA AK1990EF
remark	NULL
renovation_demand	NULL
last_modification	NULL
dataowner	NULL
provider	NULL
fk_wastewater_structure	ch11h8mwMA010178

▶ Backflow Prevention

▶ Dryweather Flumes

▶ Benching

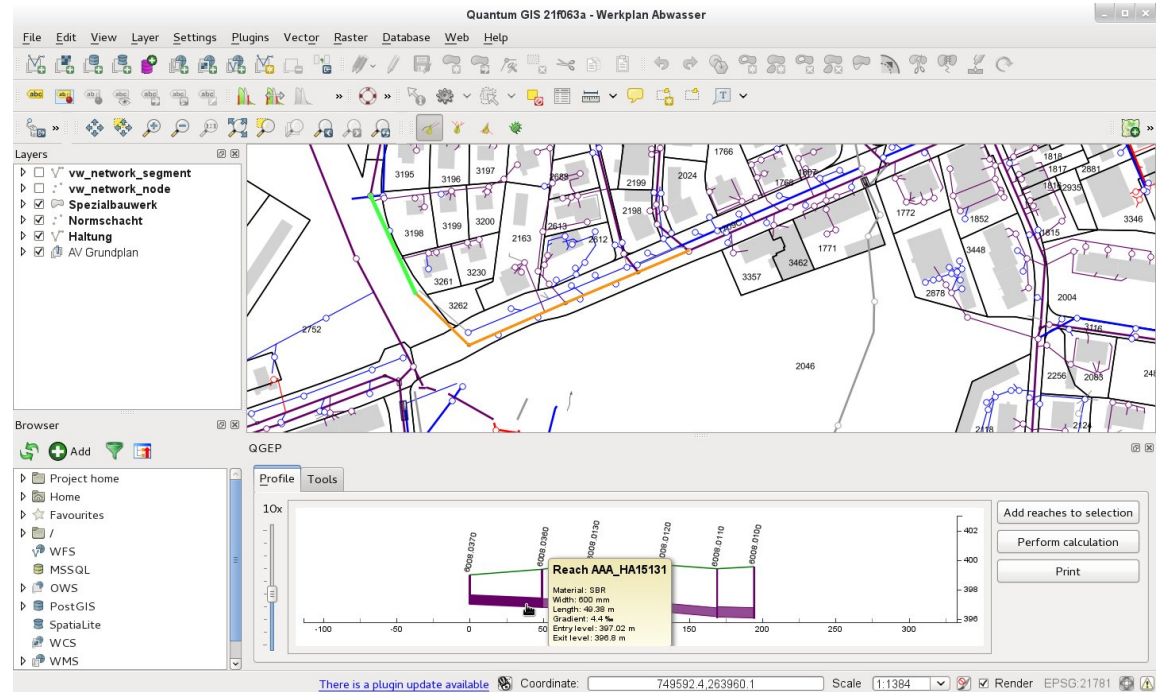
▶ Dryweather Downspouts

Cancel OK



Network following and profile view

- Network following
 - upstream
 - downstream
 - between 2 nodes
- Interactive profile view
- Linked between profile and map
- Attribute display in Tooltips





Challenge: multilanguage support

- A requirement in Switzerland
- Many places that need translation:
 - Forms
 - Value lists
 - Layer tree
 - Labels
 - Print templates
 - Plugin
- Many of them require different approaches
 - Different sources for translation:
database and manual → ts files
 - *.qlf layer files with dependencies loaded and translated on-the-fly



Forms Localizations

vw_qgep_cover - Objektattribute

Aktionen

General Cover Wastewater Structure Manhole Wastewater Node Covers Access Aid Backflow Prevention Dryw < >

General Cover Wastewater Structure

ws_type Manhole

Bezeichnung AAA DE49501

Standortname NULL

Baujahr NULL

Funktion Einlaufschacht

Funktion

Sanierungsbedarf unbekannt

Kote NULL

Lagegenauigkeit 5349

dataowner NULL

Status weitere.Berechnungsvariante

Entlueftung (keine Auswahl)

Verschluss (keine Auswahl)

Dimension1 NULL

Dimension2 NULL

Abbrechen OK

Cancel OK

ws_type Manhole

designer AAA D

lieu_dit NULL

annee_de_construction NULL

fonction chamb

fonction

necessite_assainir inconn

cote NULL

determination_planimetrique 5349

dataowner NULL

etat autre.y

aeration (pas d

fermeture (pas d

dimension1 NULL

dimension2 NULL

ws_type Manhole

identifier AAA DE49229

location_name NULL

year_of_construction NULL

function manhole

function

renovation_necessity unknown

level NULL

positional_accuracy 5349

dataowner NULL

status other.calculati

venting (no selection)

fastening (no selection)

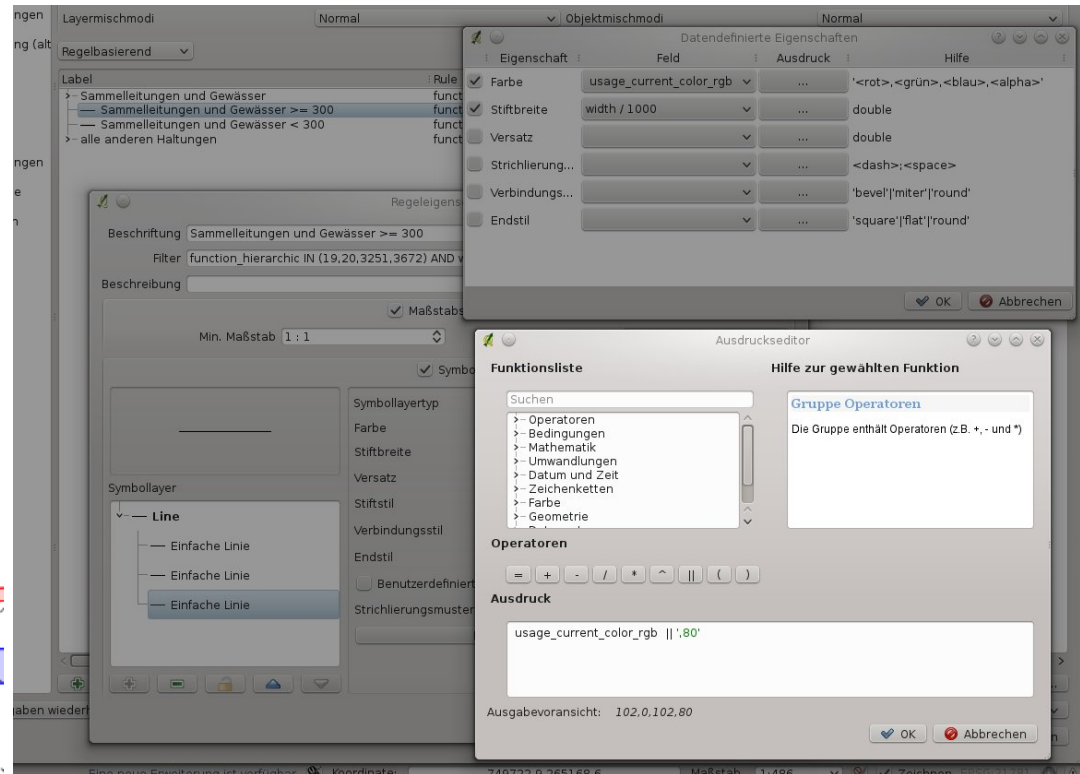
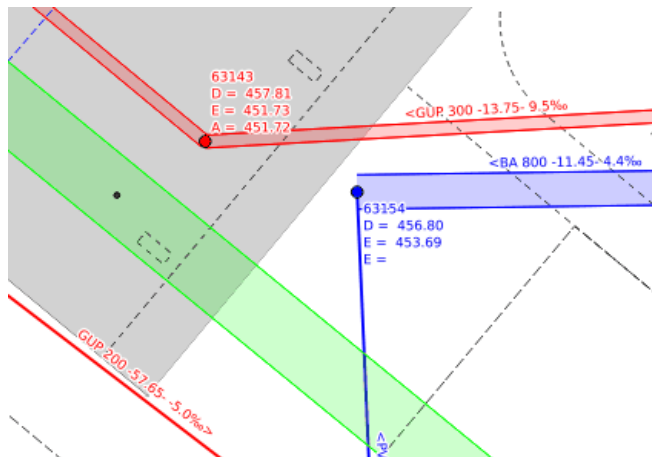
dimension1 NULL

dimension2 NULL



QGIS-Improvements in core – data defined symbology

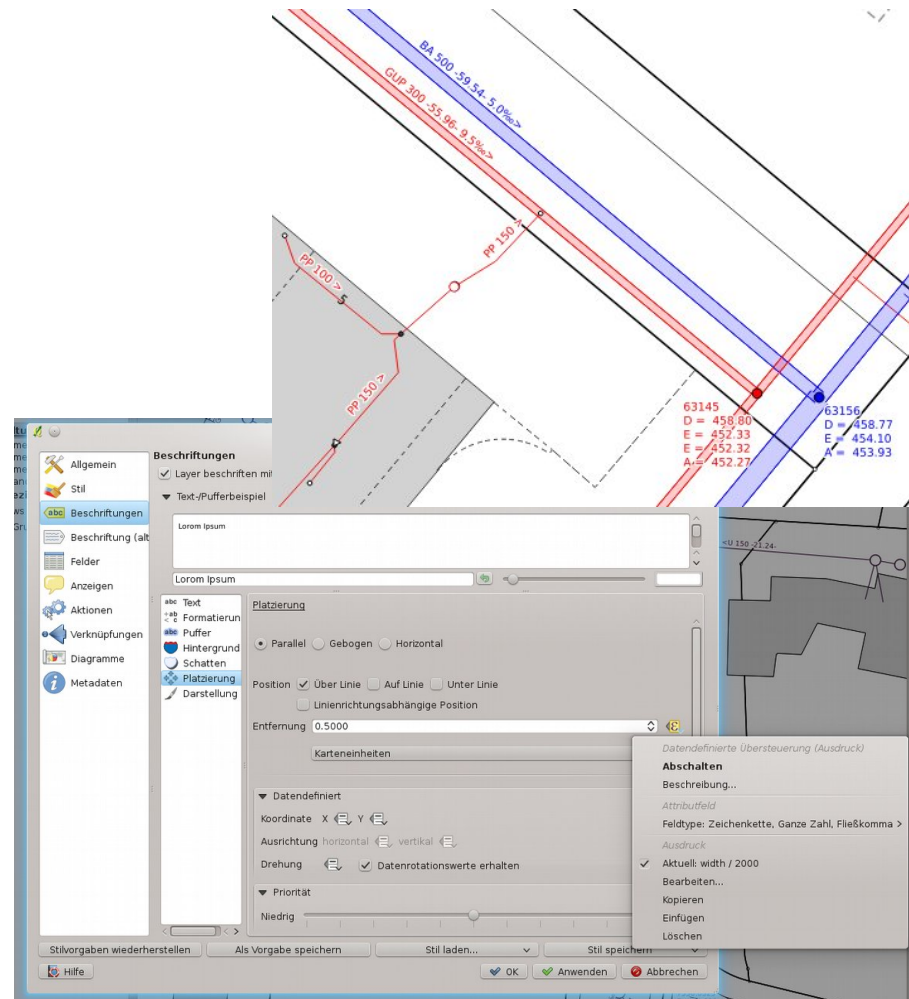
- Since QGIS 2.0
- On symbol level
- With expressions (calculations)
- Mix of units (mm and map units)





QGIS-Improvements in core – automated labeling

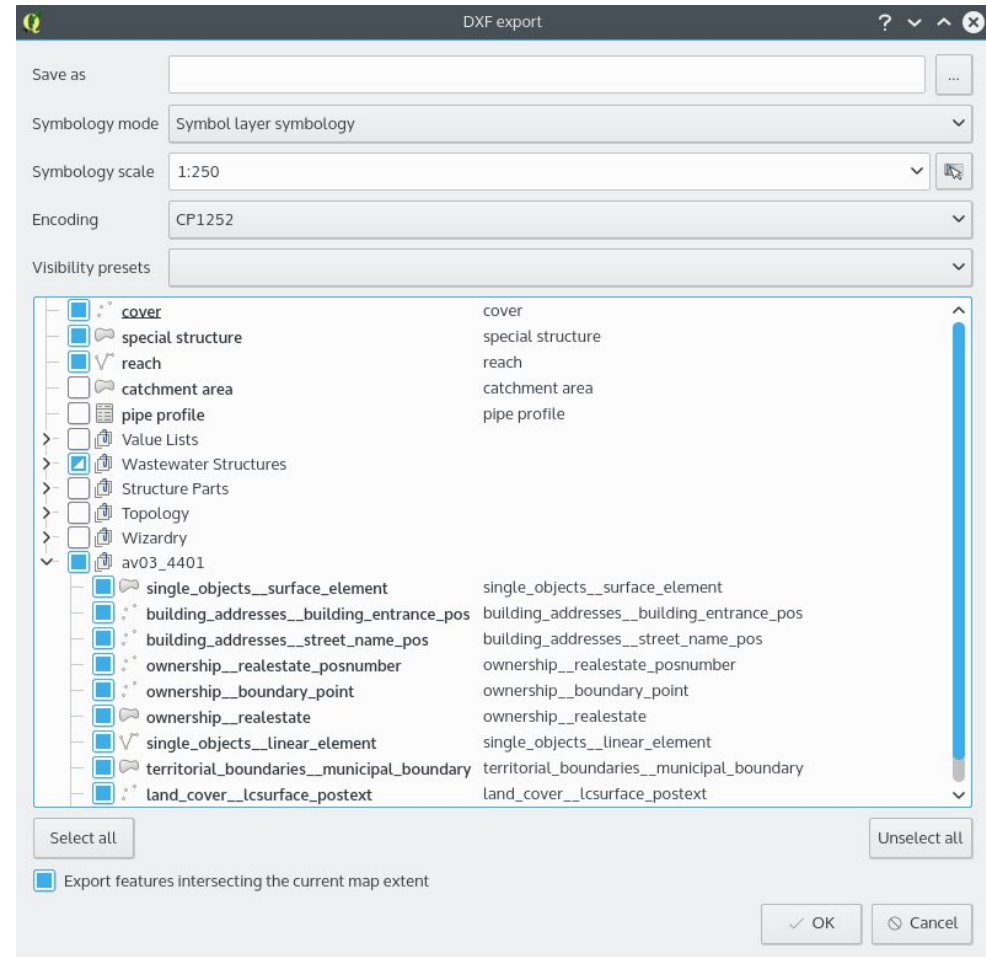
- Direction arrow (since QGIS 1.7/1.8)
- Multiline labeling (since QGIS 1.7/1.8)
- Expressions for data-defined labeling (since QGIS 2.0)
- Label backgrounds: buffers, simple shapes, SVG (since QGIS 2.0)
- Suppress labeling of short lines (based on rendered line length in mm)





QGIS-Improvements in core – DXF export

- Support of multilevel strokes
- Scale-based rules/filters
- Automatically converts SVG symbols to DXF blocks
- DXF layer names taken either from QGIS layer name or from layer attribute
- Encoding
- Visibility presets





QGIS-Improvements in core – database relations I

- since QGIS 2.2
- Relations Manager

Project Properties | Relations

	Name	Referencing Layer	Referencing Field	Referenced Layer	Referenced Field	Id
1	Access Aids	Einstiegshilfe	fk_wastewater_structure	Normschacht	obj_id	access_aid-m...
2	Catchment Ar...	Einzugsgebiet	fk_wastewater_netwerkeleme...	Abwasserknoten		
3	Catchment Ar...	Einzugsgebiet	fk_wastewater_netwerkeleme...	Abwasserknoten		
4	Catchment Ar...	Einzugsgebiet	fk_wastewater_netwerkeleme...	Abwasserknoten		
5	Catchment Ar...	Einzugsgebiet	fk_wastewater_netwerkeleme...	Abwasserknoten		
6	Covers	Deckel	fk_wastewater_structure	Normschacht		
7	Covers	Deckel	fk_wastewater_structure	Normschacht		
8	Reaches	Haltung	fk_pipe_profile	Rohrprofil		
9	Reaches	Haltung	fk_wastewater_structure	Kanal		
10	Special Struct...	vw_wizard_cover_specia...	fk_owner	Organisation		
11	Reaches	vw_wizard_reach_channel	fk_owner	Organisation		
12	Profiles	vw_wizard_reach_channel	fk_pipe_profile	Rohrprofil		
13	Reach Points	vw_wizard_reach_channel	rp_from_fk_wastewater_netw...	Abwassernetzelement		
14	Reach Points	vw_wizard_reach_channel	rp_to_fk_wastewater_networ...	Abwassernetzelement		
15	Manholes	vw_wizard_cover_manh...	fk_owner	Organisation		

Add relation

Name: Catchment Netwerkelement Rain Water Current

Referencing Layer (Child): Einzugsgebiet

Referencing Field: fk_wastewater_netwerkelement_rw_current

Referenced Layer (Parent): Abwassernetzelement

Referenced Field: obj_id

Id: [Generated automatically]

Buttons: OK, Cancel

Buttons: Add Relation, Remove Relation

Buttons: Help, OK, Apply, Cancel



QGIS-Improvements in core – database relations II

- Link / Unlink references
- Create and delete linked objects
- Nested forms for 1:n relations

The screenshot shows the 'Feature Attributes' dialog for a 'manhole' object. The 'Access Aids' section is expanded, showing a list of access aids and a detailed form for the selected one (obj_id: ch11h8mwAA004551).

obj_id	Value
ch11h8mwAA004551	ch11h8mwAA004551
%#vw_access_aid#kind#name#%	ladder
%#vw_access_aid#identifier#name#%	AAA EF5233
%#vw_access_aid#remark#name#%	NULL
%#vw_access_aid#renovation_demand#name#%	138
%#vw_access_aid#last_modification#name#%	NULL
%#vw_access_aid#dataowner#name#%	NULL
%#vw_access_aid#provider#name#%	NULL
%#vw_access_aid#fk_wastewater_structure#name#%	ch11h8mwMA001058



Thank you for your attention!

Links:

<http://www.qgis.ch/en/projects/qgеп-waste-water-module/>
(QGEP project information)

<https://github.com/QGEP/QGEP/>
(github project page)

<http://www.qgis.org/>
(QGIS project)

<http://www.postgis.net/>
(Postgis project)

<http://www.vsa.ch/fachbereiche-cc/siedlungsentwaesserung/vsa-dss/>
(DSS data model of the VSA)

<http://networkx.github.com/>
(network following in Python)

<http://d3js.org/>
(d3 visualization framework)