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# **QGEP Documentation**

***Release 0.5***

**The QGEP Project/OPENGIS.ch**

June 18, 2016



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QGEP is a wastewater management module for QGIS based on SIA 405 (Leitungskataster) and VSA-DSS (GEP) and developed closely to the QGIS application.

Această documentație poate fi descărcată în format PDF: QGEP.pdf .



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## Contents

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## 1.1 QGEP Installation Guide

This will guide you through the setup of required applications and services to get your system ready for running QGEP.

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**Note:** You also have the option of downloading a *Demo Virtual Machine* that has a working QGEP demo.

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### 1.1.1 Setup database server

If you expect to access the data from several different workstations, you can install the database on a network accessible server. If it is just a single desktop you are working on, this can be installed on the same machine.

#### Required Software

##### Server installation

- Install PostgreSQL (>=9.3)
  - [Windows download page](#)
- Install PostGIS (>=2.1)

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**Note:** In a single desktop environment (no network database server) you can setup your database to trust local connections.

This way, the database won't ask for a password if you're connecting from your local workstation while no password is written anywhere. You even can do with no database password at all.

This can be done by editing the database access configuration file `pg_hba.conf` and set the auth-options from `md5` to `trust`. A database service reload is required to activate changes.

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### 1.1.2 Database initialization

...database-initialization:

You can use `pgAdmin` to access and manage the database server.

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**Note:** By clicking the link you can learn how to *Install pgAdmin*

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## Process

In pgAdminIII

- Connect to the database server
- Create a new group role (preferably named *qgep*, but you are free to choose)
- Create a new login role (*qgepuser* for example) and make it a member of the *qgep* group

You can do this graphically or by simply opening a pgAdminIII *SQL query* window and type the following:

```
CREATE GROUP qgep;
CREATE ROLE qgepuser LOGIN;
GRANT qgep TO qgepuser;
```

- Create a new database (preferably named *qgep*, but you are free to choose)
  - Change to this database
- Create a new schema with the name *qgep*
- Open an *SQL query* Window and create the extensions (if they're not created yet)
  - CREATE EXTENSION hstore;
  - CREATE EXTENSION postgis;
- Download demo data
  - [https://github.com/QGEP/data/raw/demodata/qgep\\_demodata.backup](https://github.com/QGEP/data/raw/demodata/qgep_demodata.backup)
- Right click the *qgep* schema
  - Click *Restore*
  - Load your download of *qgep.backup*



- Restore Options #2: Activate *Clean before restore*



- Click *Restore*
- Click *Cancel*
- Right click the database and click *Refresh*
- Update privileges for the database
  - Right click the *qgep* schema
  - Properties -> Privileges Tab > Grant USAGE to group *qgep*. You can also do this as a query: GRANT USAGE ON SCHEMA *qgep* TO GROUP *qgep*;
  - Click *Grant Wizard...*
  - Selection, click *Check All*
  - Privileges
    - \* Group *qgep*
    - \* Choose *ALL*

### 1.1.3 Setări stație de lucru

#### Configurare baza de date

Pentru a-i spune stației de lucru (de pe care lucrezi) unde este baza de date instalată, va trebui să creezi niște fișiere pe aceasta. Această operațiune este necesară pe fiecare stație de lucru/laptop etc. de pe care se va rula QGIS/QGEP. Operațiunea nu este necesară pe server.

Aceste instrucțiuni depind de sistemul de operare.



## Windows

Creează un nou director acolo unde vrei să salvezi configurația. (De ex. un director pgconfig în directorul acasă). Acest director este descris în acest ghid de PGSYSCONFDIR.

Setează variabila de sistem PGSYSCONFDIR cu calea către PGSYSCONFDIR.

În acest director, vor fi două fișiere.

- pg\_service.conf
- pgpass (optional, dacă nu vrei să introduci parola de fiecare dată)

**Attention:** Pe Windows, fișierul pg\_service.conf trebuie salvat în format Unix pentru ca totul să funcționeze corect. O modalitate de a face aceasta este să se deschidă cu [Notepad++](#) și să se urmeze pașii Edit --> EOL Conversion --> UNIX Format --> File save .

## Linux

În linux, fișierele .pg\_service.conf și .pgpass se pot pune în folderul home (în mod normal /home/[numeutilizator])

### Toate sistemele

Introdu următoarele variabile în pg\_service.conf sau .pg\_service.conf. Variabilele introduse trebuie adaptate în funcție de topologia sistemului.

```
[pg_qgep]
host=localhost
port=5432
dbname=qgep
user=qgepuser
```

Pentru a salva și parola în sistem se poate folosi fișierul pgpass.

```
localhost:5432:*:qgepuser:password
```

**Note:** Dacă baza de date nu e instalată pe stația de lucru locală atunci trebuie înlocuit localhost cu adresa de rețea a bazei de date, oriunde găsiți aceasta referință.

## Instalare QGIS

- Minimum requirement 2.14
- We recommend using the latest master build (called qgis-dev on Windows) which often offers a better experience in combination with QGEP. For Windows installation, download the [OSGeo4W Installer](#) choose *advanced installation* and install qgis-dev.

## Instalare plugin QGEP

- Deschide QGIS
- Go to Plugins
  - Manage and Install Plugins
  - Settings
- \* Adaugă

- Nume: QGEP
- URL: <https://raw.githubusercontent.com/QGEP/repository/master/plugins.xml>
- \* Enable *Show also experimental plugins*
- Activează pluginul (a se vedea imaginea de mai jos)
- All - Toate
  - \* Caută *QGEP*
  - \* Bifează căsuța de lîngă

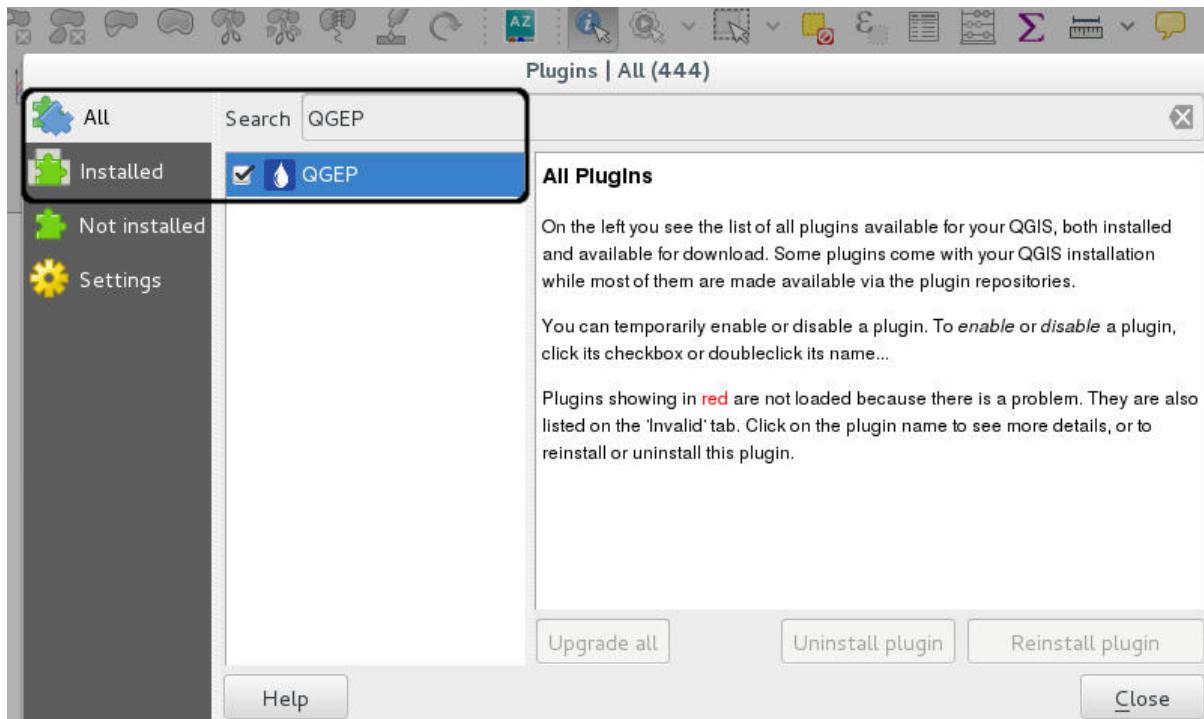


Fig. 1.1: Adaugă pluginul QGEP

### Instalează proiectul demo

- Descarcă <https://github.com/QGEP/data/archive/demodata.zip>
- Extrage fișierul
- Reîncarcă baza de date cu fișierul *qgep\_demodata.backup* cu pgAdminIII
- Deschide *project/qgep\_en.qgs* cu QGIS

## 1.2 QGEP User Guide

This represents a guide on how to collect data in QGEP (digitizing), edit existing data and use various tools like length profile, network following and plan plotting.

### 1.2.1 Digitizing in QGEP

This represents a guide on how to correctly collect and digitize data of sewer networks including building the topology.

## Data entry

There are basically two ways:

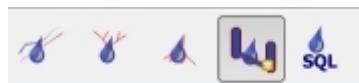
- Data entry by constructing or digitizing in the QGEP GIS itself
- Data entry in an external programm or software and then importing the position and/or technical data into QGEP e.g.:
  - coordinates from manholes from measurement
  - position and/or technical data from another GIS or CAD system
  - using data from the surveyor (e.g. property boundaries) as a basis for defining catchment borders
  - other

Data entry in QGEP needs some understanding of the underlaying data model [VSA-DSS](#), but is supported with some great data collecting wizards and forms that link the different tables correctly together. Especially the linking of manholes and reaches to a complete sewer network is highly automated and can be controlled with the network following tool.

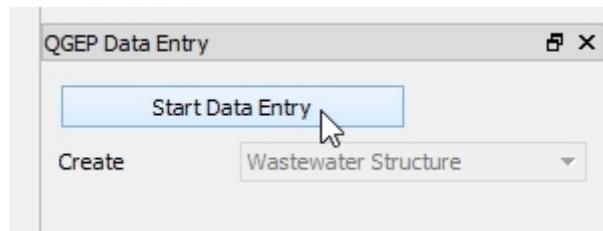
### General

When digitizing you start with the point elements (wastewater structures such as manholes, special structures). Then you can connect those with line elements (channels with reaches).

- To start with data entry select the QGEP button “wizzard”



- On the left side bottom the following window appears “QGEP Digitizing”. Click “Start Data entry”, so that you get into the edit mode

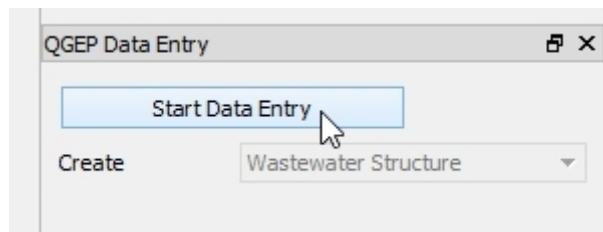


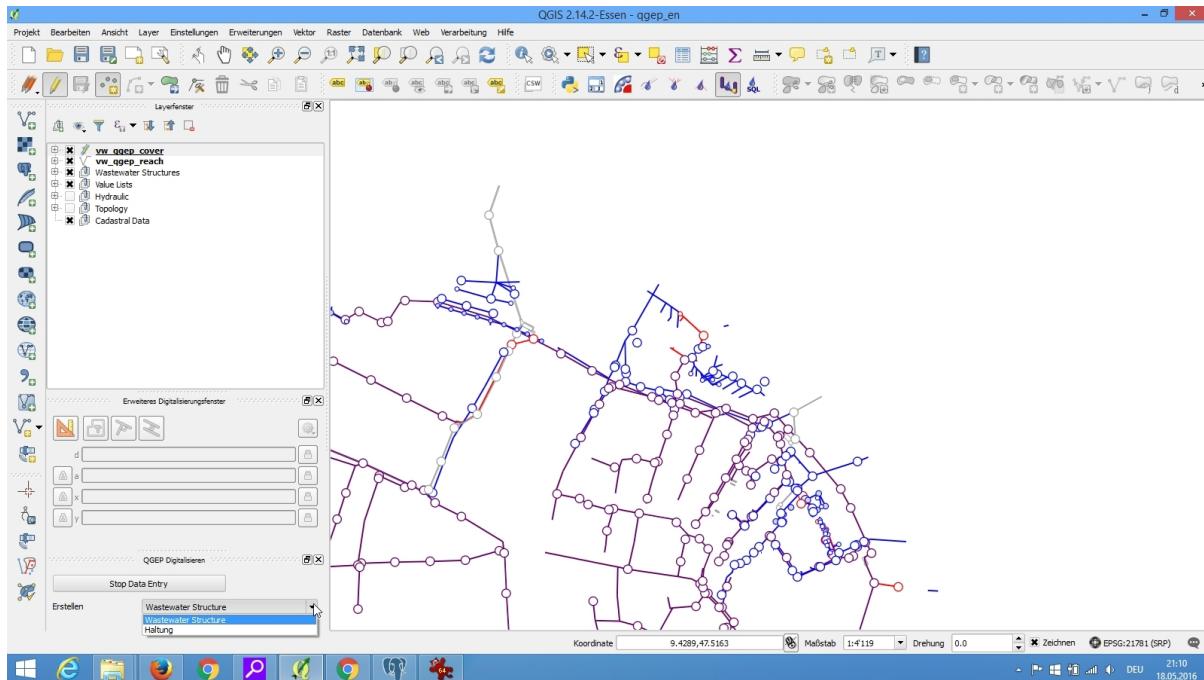
### Digitizing Waste water structures

#### General

QGEP has a wizard to correctly collect manholes and special structures.

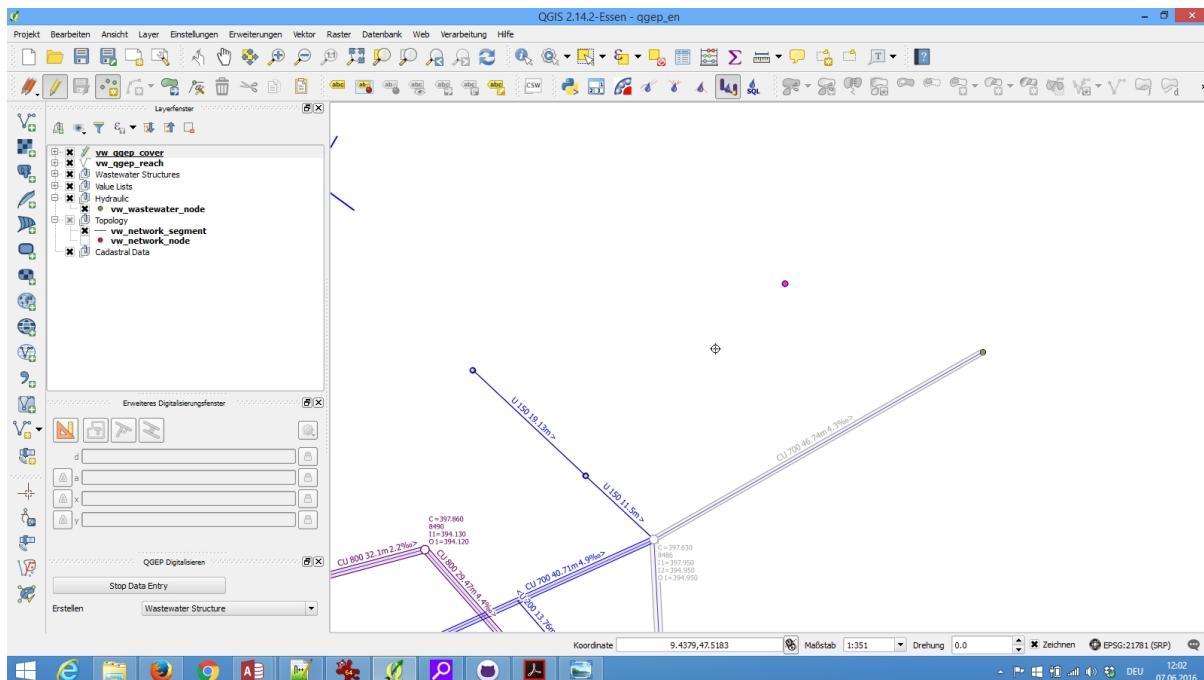
Select the “wizard” button, then click “start data entry” and choose “wastewater structure” in the pull down menu.





## Digitizing

Now the cursor changes to the digitizing symbol and you can select the location of the new point element.



Then the vw\_gep\_cover form opens and you can start adding data in the General tab:

Select the type you want [discharge\_point, infiltration\_installation, manhole, special\_structure]

Then add the identifier (this is the attribute that will be displayed on the map).

For manholes and special structures you then choose also the function [either in manhole\_function or special structure\_function] (will be automatically displayed or hidden in the future depending on ws\_type)

Add other attributes on this General Tab. Now you can click OK.





Save the information of this layer by stopping the data entry wizard



You can re-edit your point object selecting the edit mode and then click with the info cursor on the object you want to edit. If you do not select the edit mode, you can just look add the existing data.

For detailed information about editing see the edit chapter (editing-data).

## Further attributes and classes

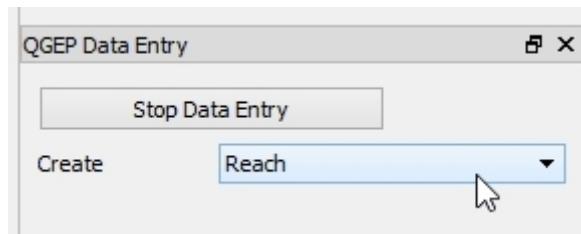
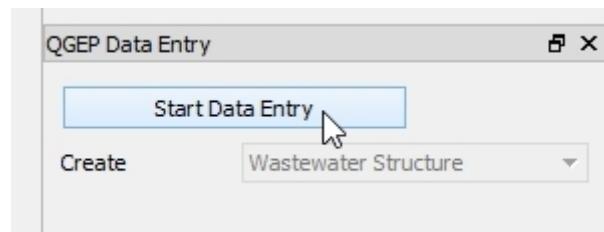
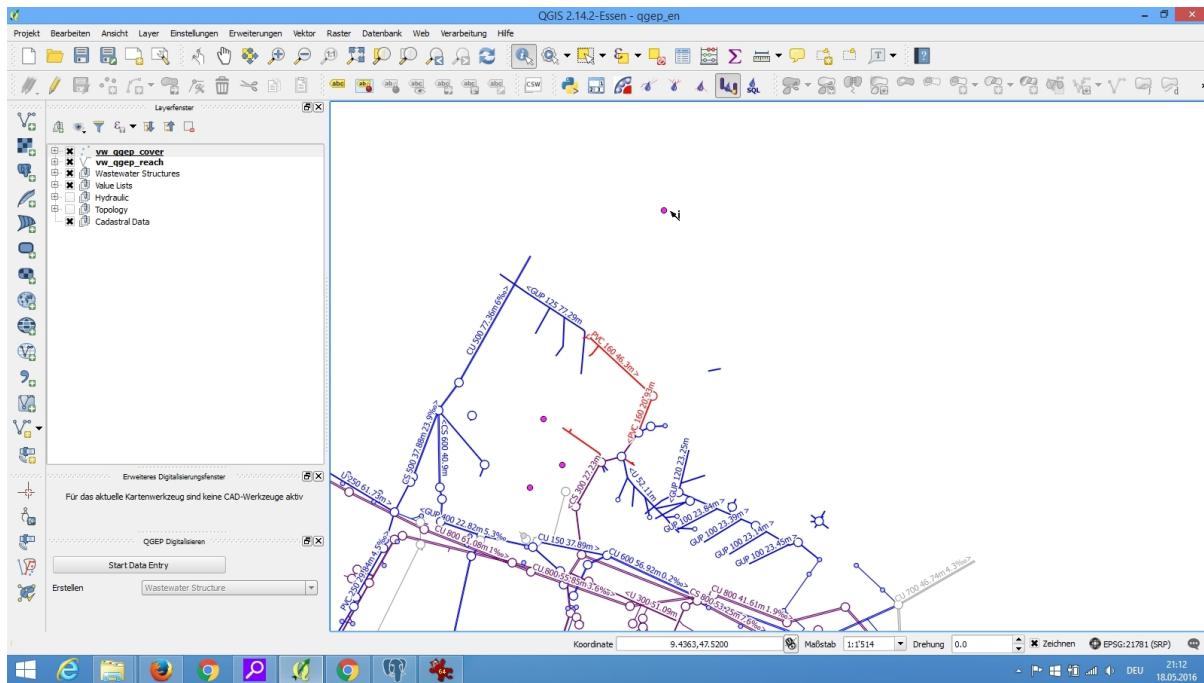
When a point object is digitized a series of steps take place in the background in the QGIS database: a) a new object in the class wastewater structure is added b) a new object in the respective subclass [discharge\_point, infiltration\_installation, manhole, special\_structure] is added and linked c) a new cover object is added and linked to the waste water structure d) a new wastewater node object is generated in wastewater network elements and its subclass wastewater nodes e) When you add additional objects such as structure parts (besides covers there are access aids, backflow prevention etc) then QGEP automatically generates the objects in the needed tables and subtables and sets the foreign keys to the waste water structure.

..(take more from GEPView-Howto 1.2. Chapter 4.1)

## Digitizing Waste channels

### General

QGEP has a wizard to correctly build channels and connect them to the manholes / special structures and build up the topology for waste water nodes and reaches.

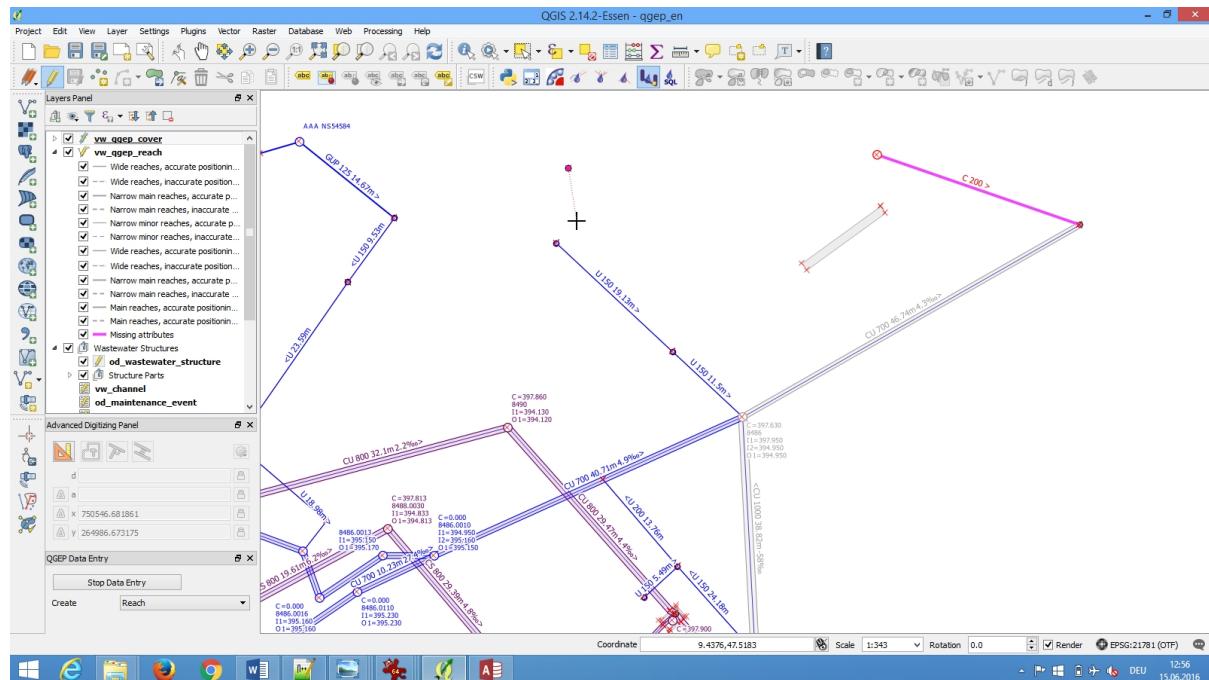


Important: Start digitizing in the direction of the flow - starting with the from node and finishing with the to node / manhole.

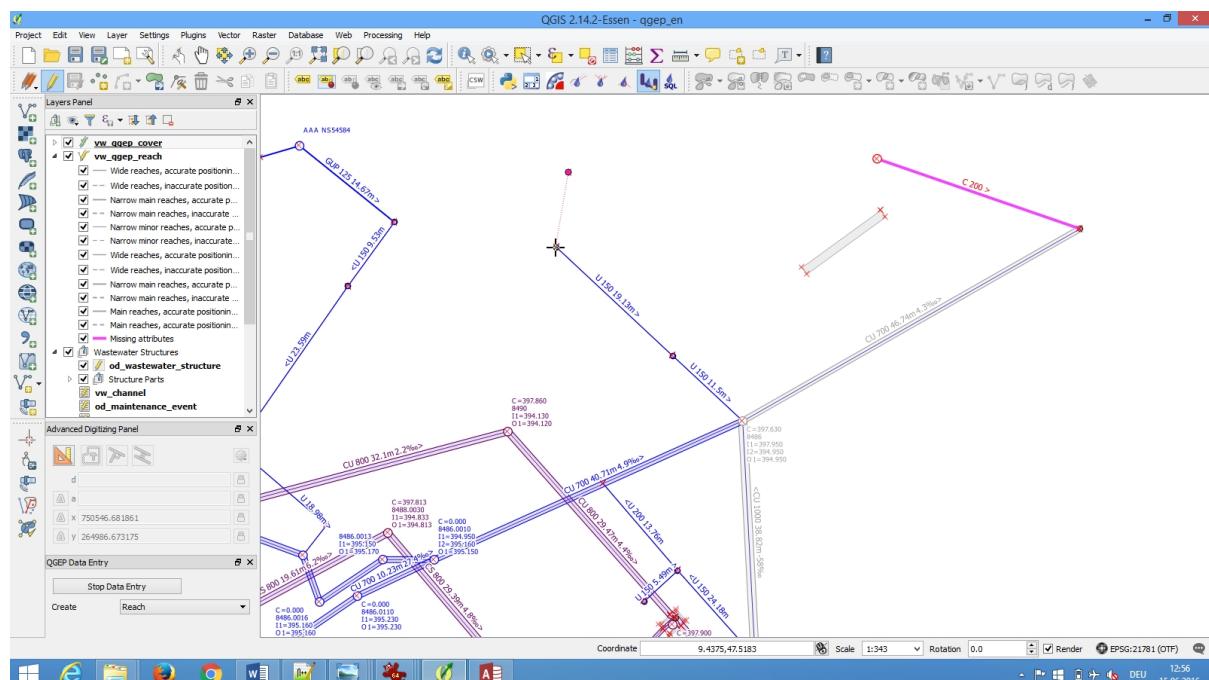
..There is no tool yet to change the flow direction (topology), so try to make it right from the beginning.

## Digitizing

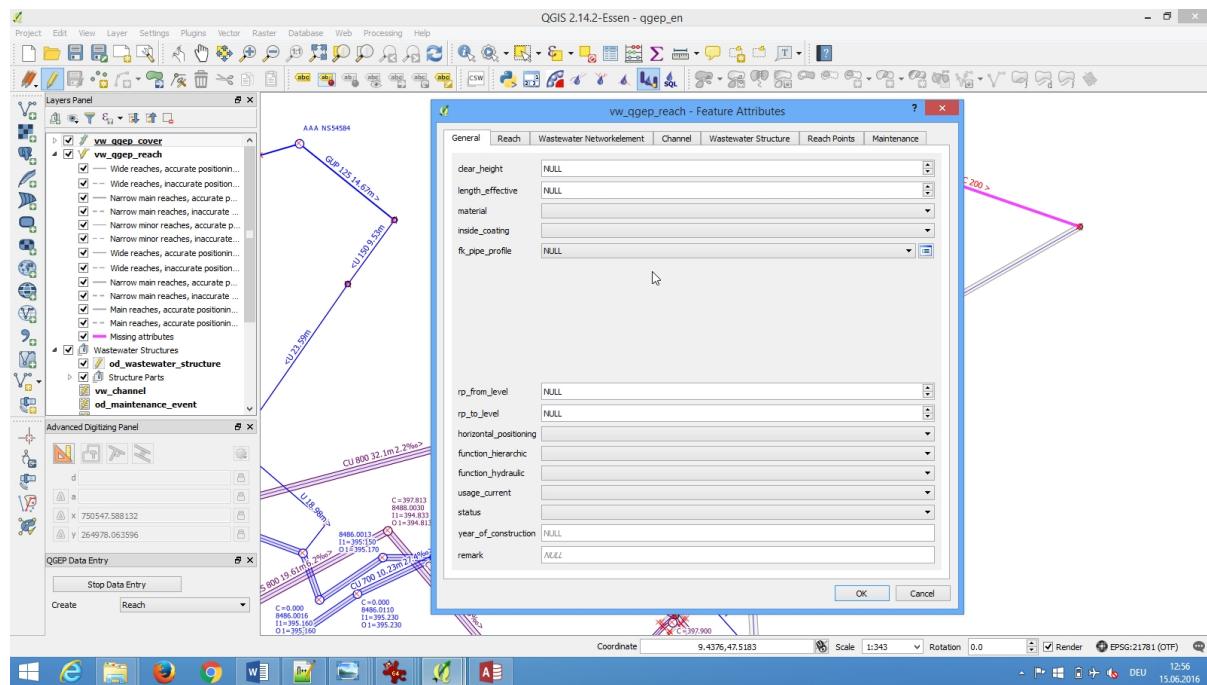
When digitizing the cursor will automatically snap to the nearest cover or reach. When clicking a line starts to draw.



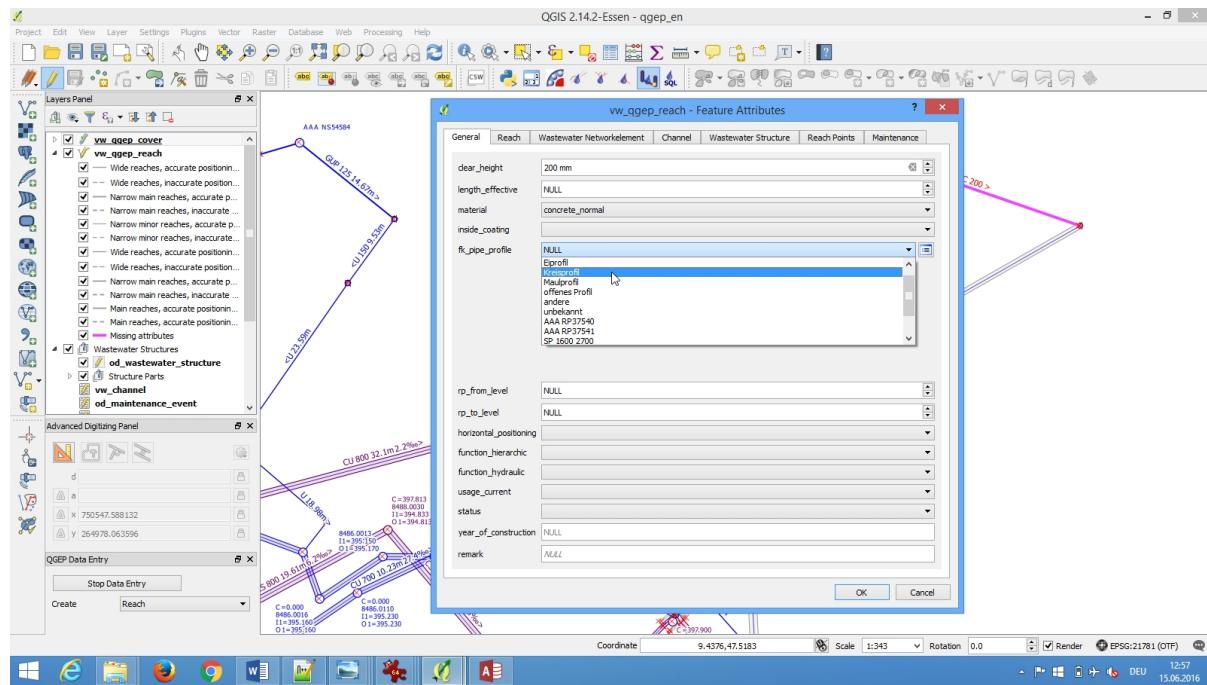
With further left clicks anywhere you can define intermediary points of the reach progression. Or you directly select another manhole to draw a straight channel.



With right click you finish digitizing and the reach form will appear.



Add the attributes on the general tab. For the profile type you will get a list of defined profiles. To edit those do so in the table pipe\_profile.

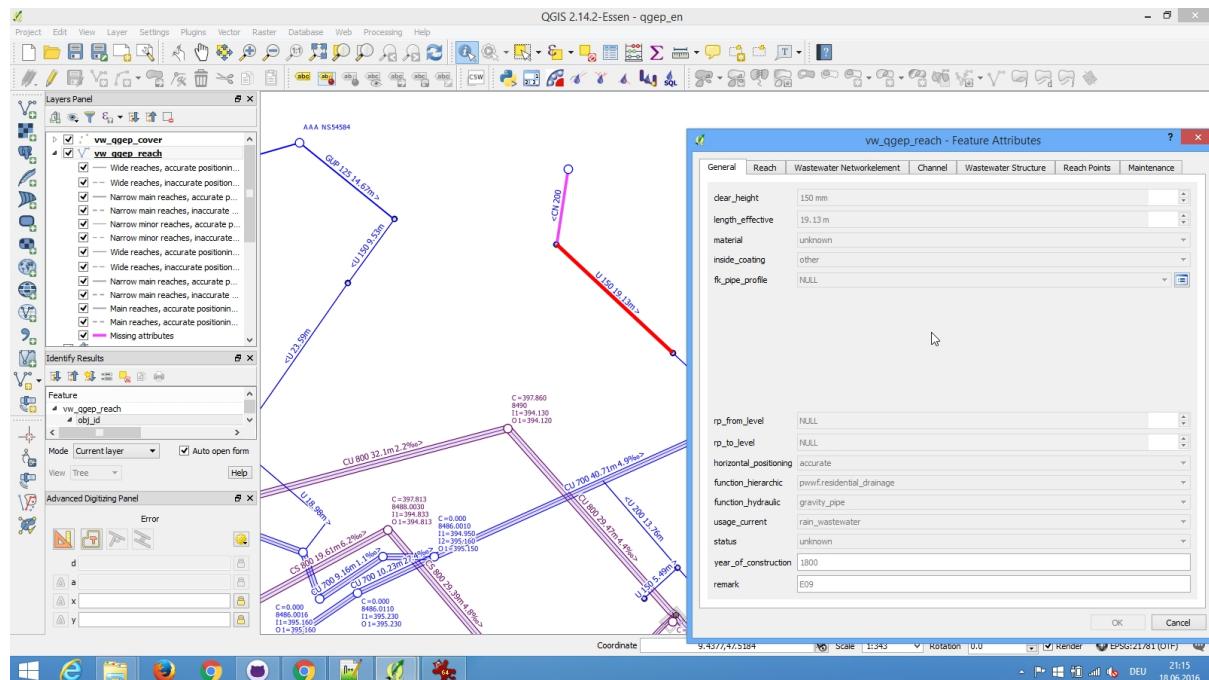
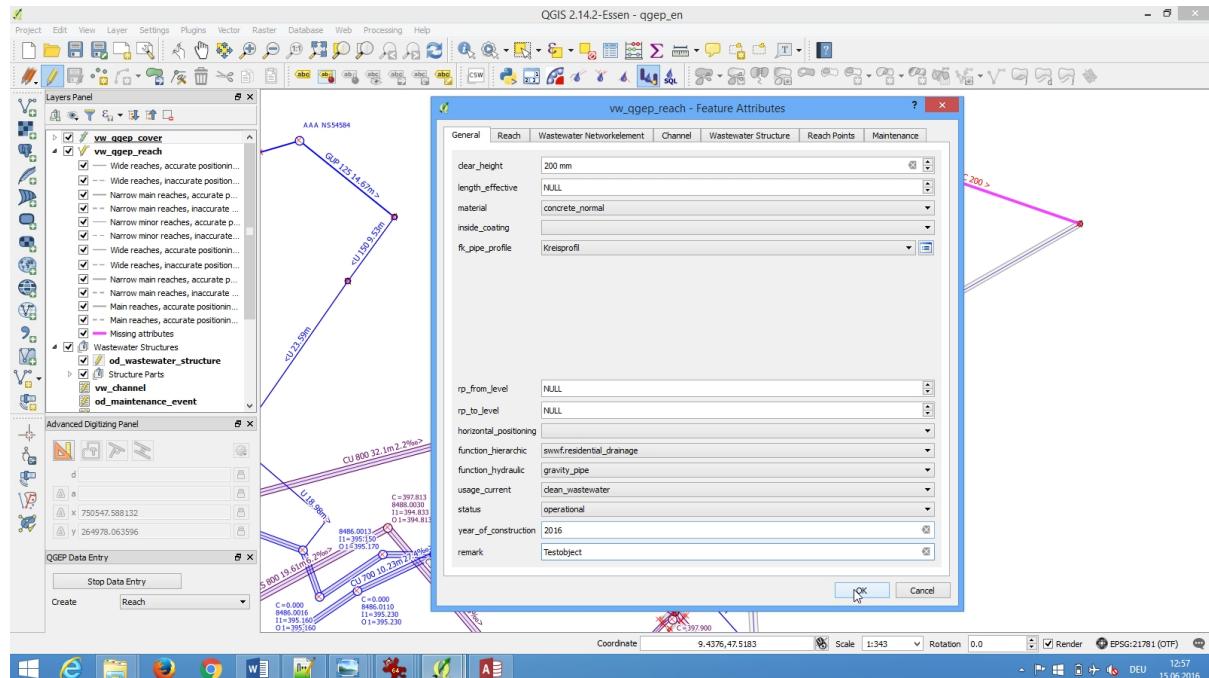


When finished, then click the OK button.

Save the information of this layer by stopping the data entry wizard

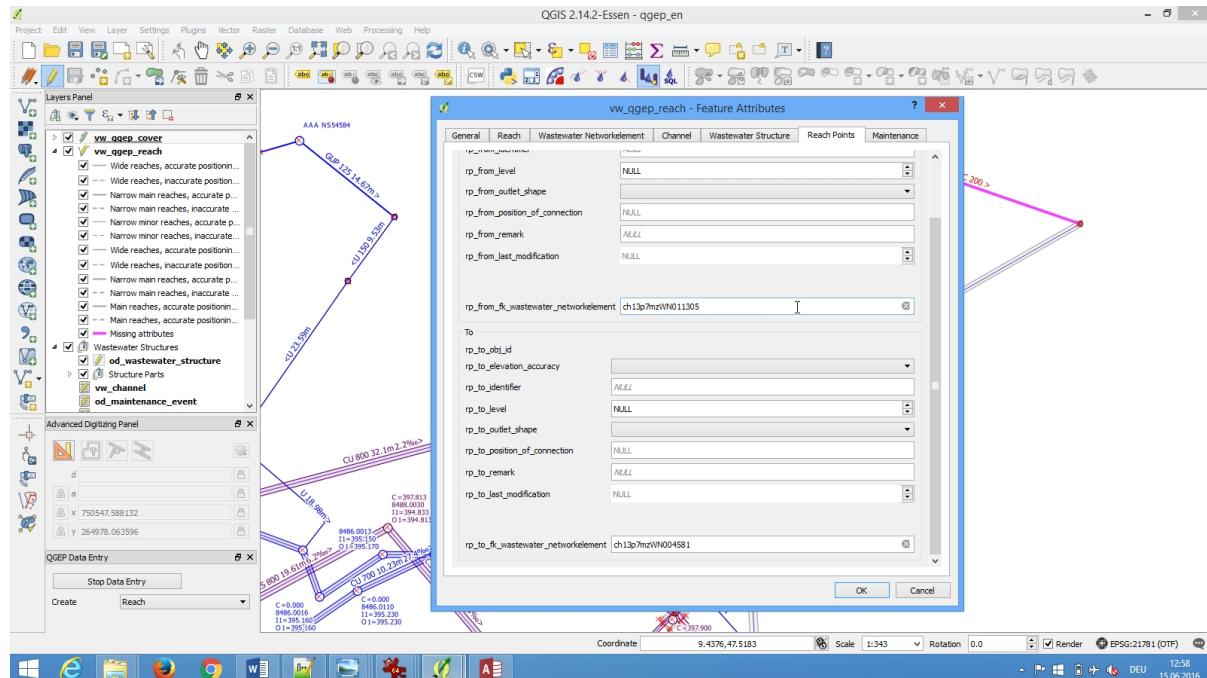
You can re-edit your point object selecting the edit mode and then click with the info cursor on the object you want to edit. If you do not select the edit mode, you can just look add the existing data.

For detailed information about editing see the edit chapter (editing-data).



## Further attributes and classes

When a line object is digitized a series of steps take place in the background in the QGIS database: a) an new object in the class wastewater structure is added b) a new object in the subclass channel is added and linked c) two new reach point objects are added and linked to the reach (rp\_from, rp\_to\_node)



4. a new reach object is generated in wastewater network elements and its subclass wastewater nodes

..\* Kanal/Haltung (Digitalisierrichtung, Schnappen) ..\* Weitere verknüpfte: Eigentümer, Rohrprofil, Hydraulische Geometrie, Hydraulische Einbauten ..\* evtl. Verknüpfungen erfassen ..(take more from GEPView-Howto 1.2. Chapter 4.2)

## Deleting objects

..TO DO: Explain how it works

### Title

### Subtitle

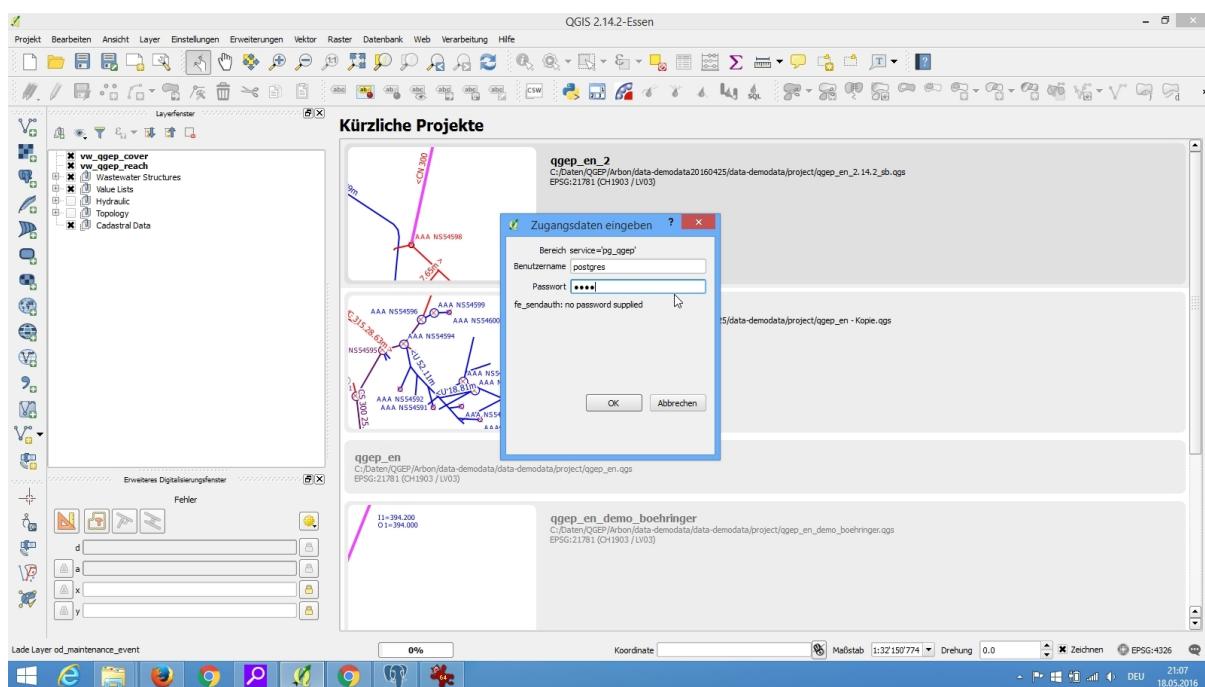
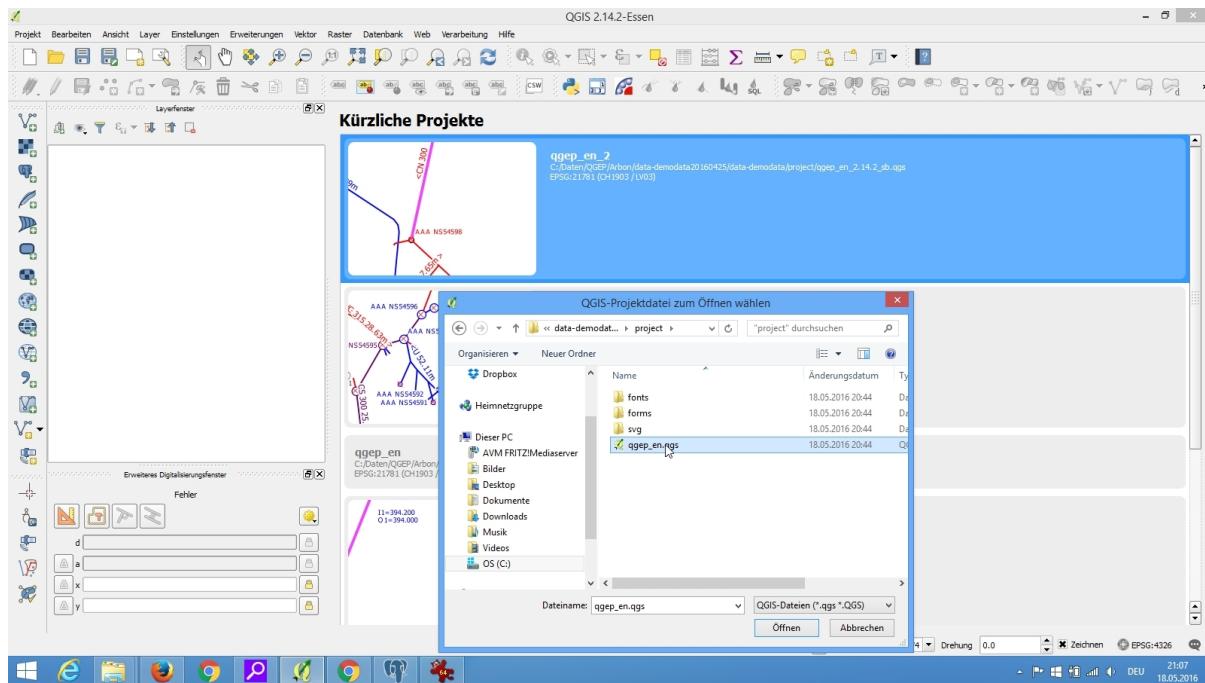
## 1.2.2 Editing of existing data

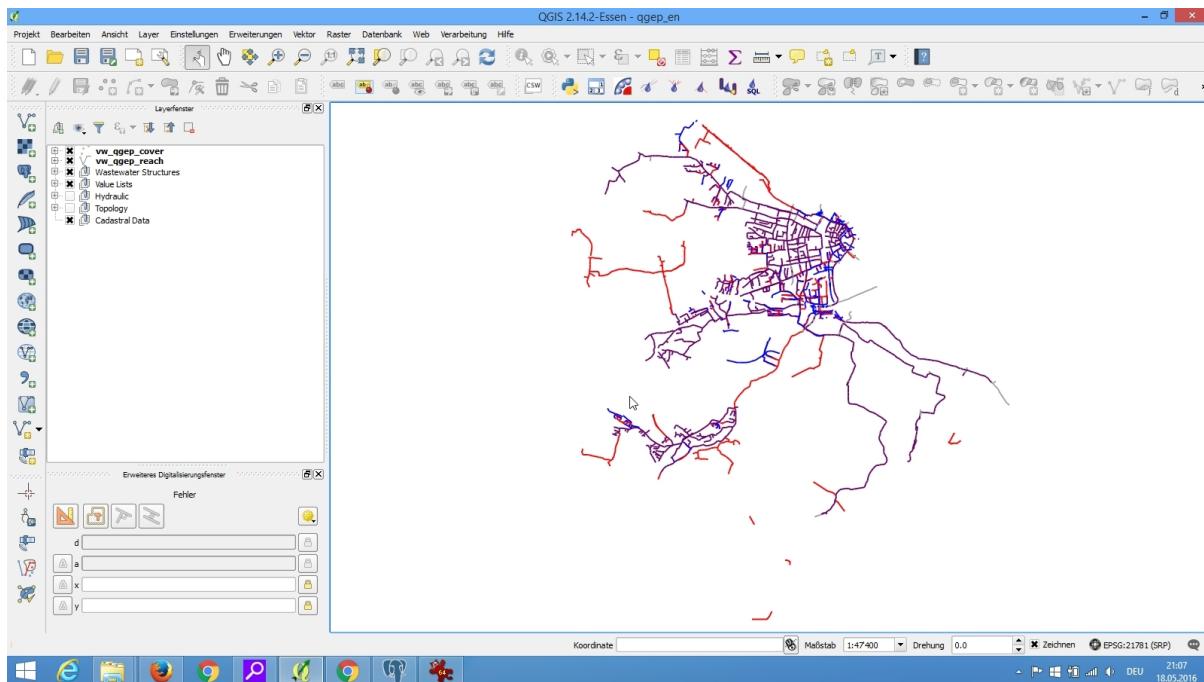
..\_editing-data:

This represents a guide on how to edit existing data in QGEP.

### Demo project

- Make sure you have imported the demo project with pgAdminIII (database-initialization)
- Open the demoproject with Menu Project/Open
- Login to the database





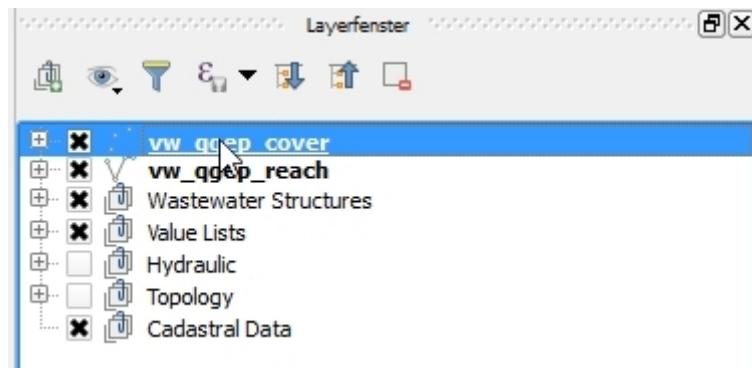
- You should now have the demoproject loaded
- The project consists of different layers. Depending on your task what to edit or add you choose the layer.

## Layers

- QGEP has different predefined layers:

### Layer vw\_qgep\_cover

- The layer `vw_qgep_cover` allows to edit all point elements. This are the wastewater structures such as manholes, special structures, discharge points and infiltration installation (not supported yet are `wwtp_structures`, which is also a wastewater structure), but not the channels.



### Layer vw\_qgep\_reach

- The layer `vw_qgep_reach` allows to edit all linear elements of the wastewater (channels).

## Layer Waste water structures

- TO DO Add description

## Layer Value lists

- TO DO Add description

## Layer Hydraulic

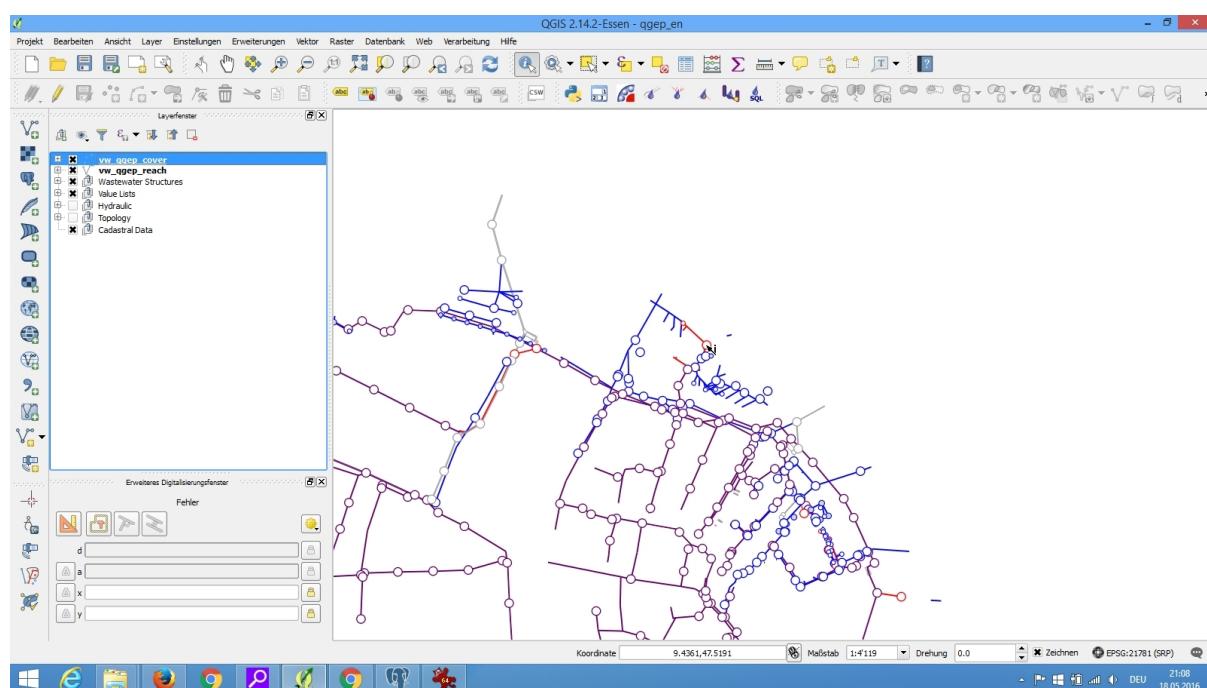
- TO DO Add description

## Layer Topology

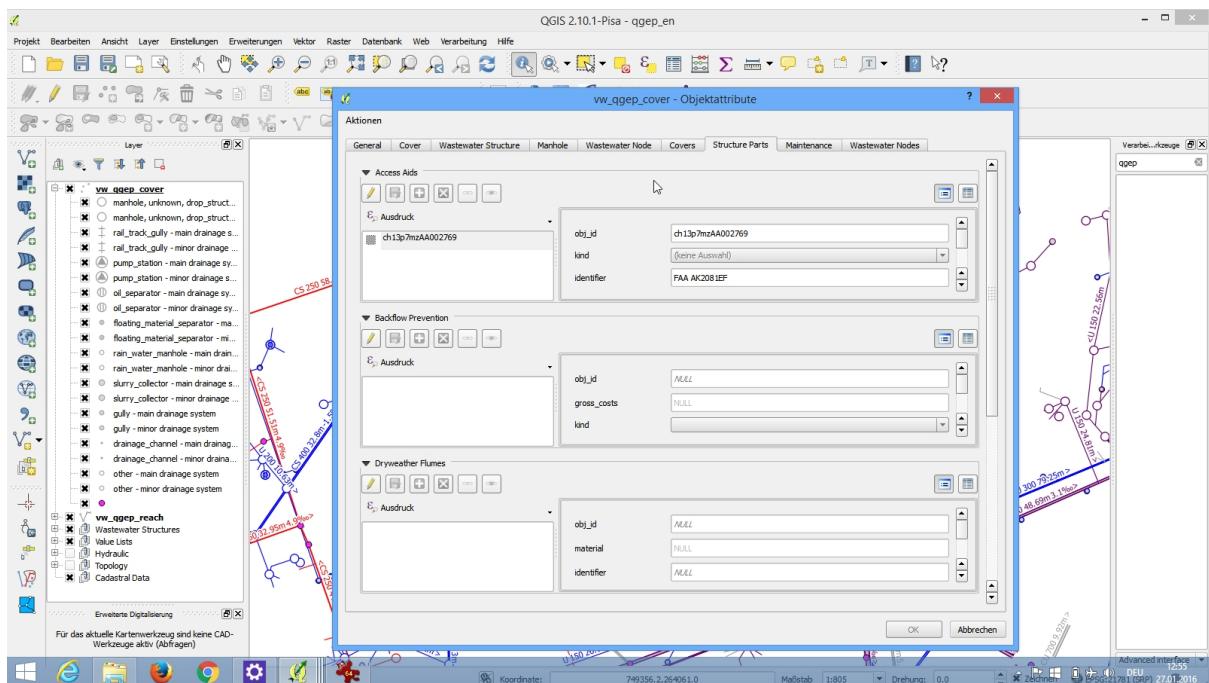
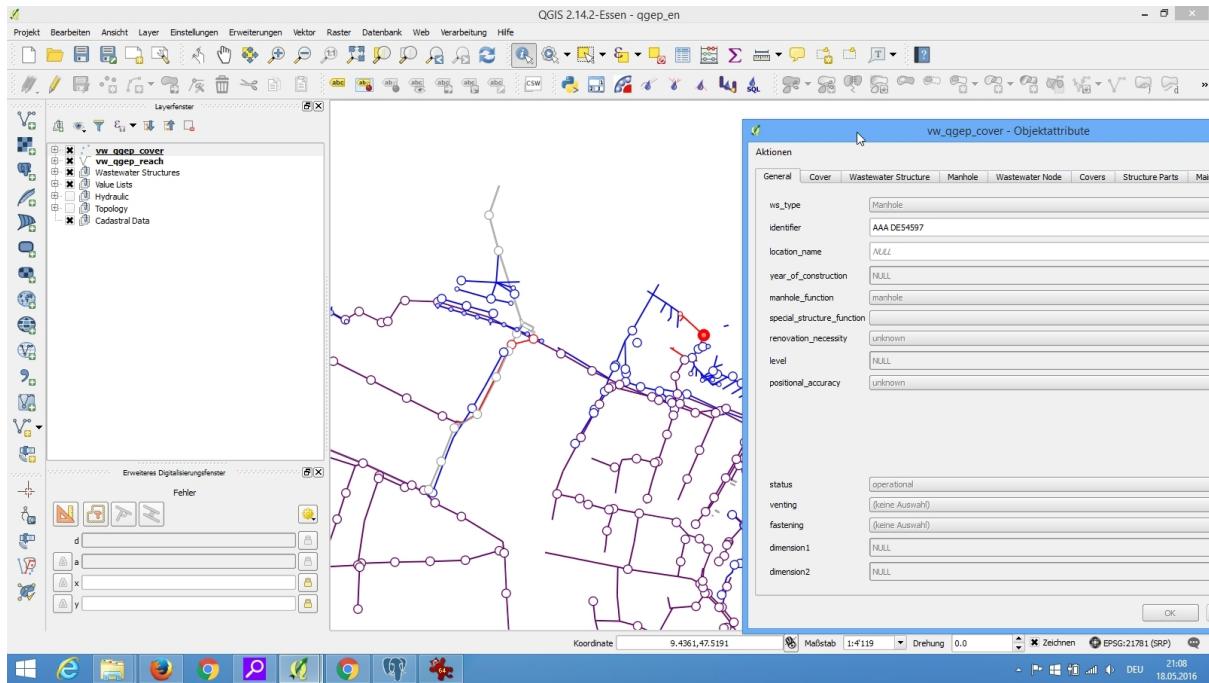
- TO DO Add description

## Changing attributes of point elements (manholes / special structures)

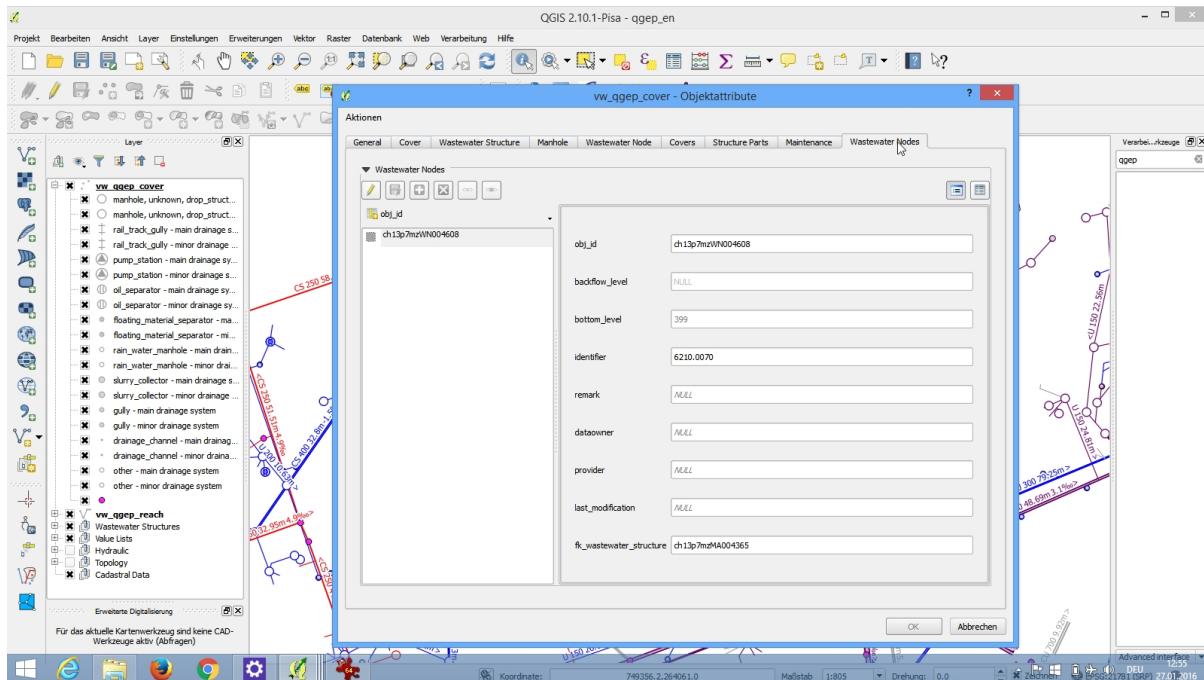
- To change an attribut first select the vw\_qgep\_cover layer and switch to the edit mode
- Then click on the info button and choose the element you want to edit by double-clicking



- The form of the vw\_qgep\_cover will open
- On the first tab you can change the most common attributes
- To change attributes of related tables such as the cover select that tab. Depending on the kind of wastewater structure you can edit additional attributs in the respective tab (special structure, manhole).
- The tab "covers" allows you to add additional covers.
- In "Structure parts" you can add also further parts such as acces aids, backflow prevention, dryweather flume etc.



- In “Wastewater nodes parts” you can edit or add all attributes of this class or add a second element



### Changing attributes of linear elements (channels)

- To change an attribut first select the vw\_qgep\_reach layer and switch to the edit mode
- Then click on the info button and choose the element you want to edit by double-clicking a channel
- The form of the vw\_qgep\_reach will open
- On the first tab you can change the most common attributes
- To change attributes of related tables such as reaches select that tab.

..TO DO: add image

#### ..\* TO DO:

- Changing relations (Verknüpfungen ändern)
- Change ws\_type (Subklasse eines Abwasserbauwerkes ändern (ObjektID ändert dann auch!))
- Split channels into different reaches (Kanäle unterteilen)

Link to the Homepage of the Swiss Waste Water Association - Datamodel VSA-DSS:

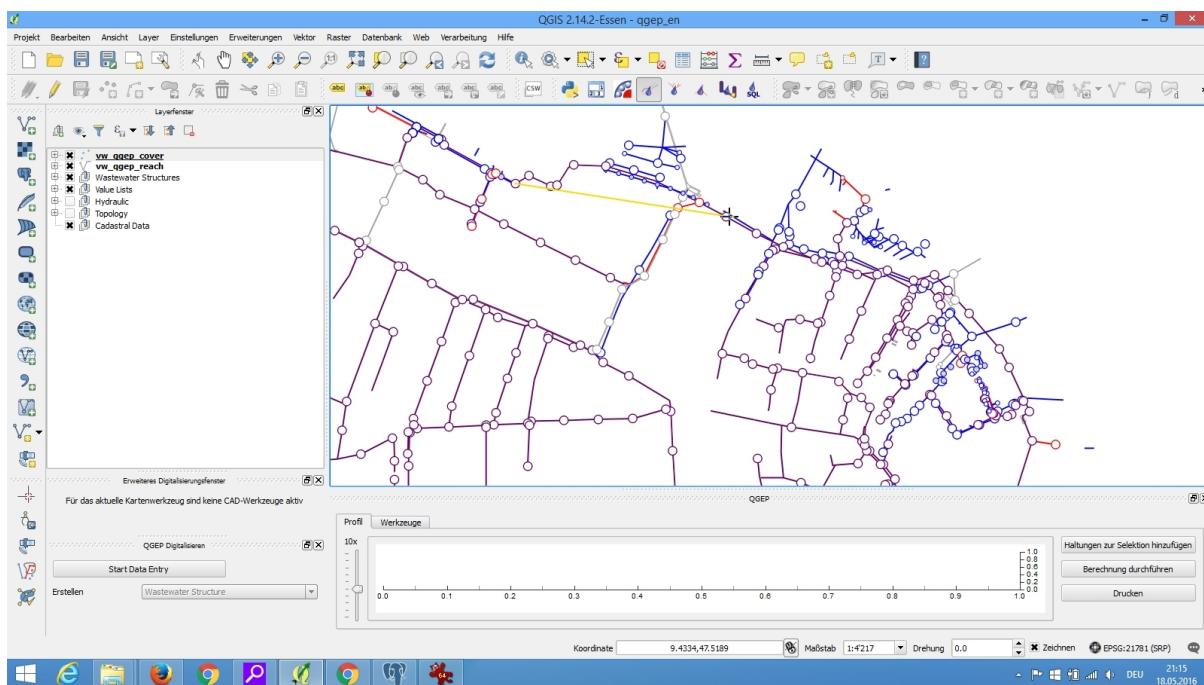
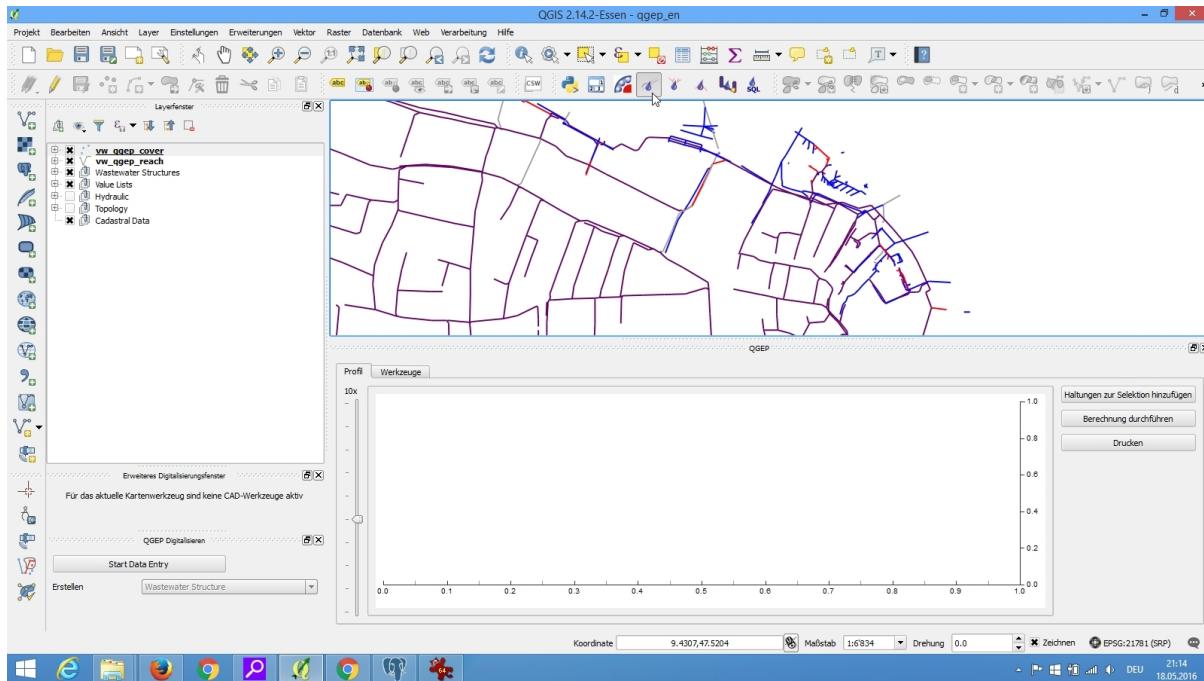
### 1.2.3 Length profiles

This represents a guide on how to choose a section and display a length profile.

QGEP has a unique function to display lenght profiles. Choose the lengt profile button to start.

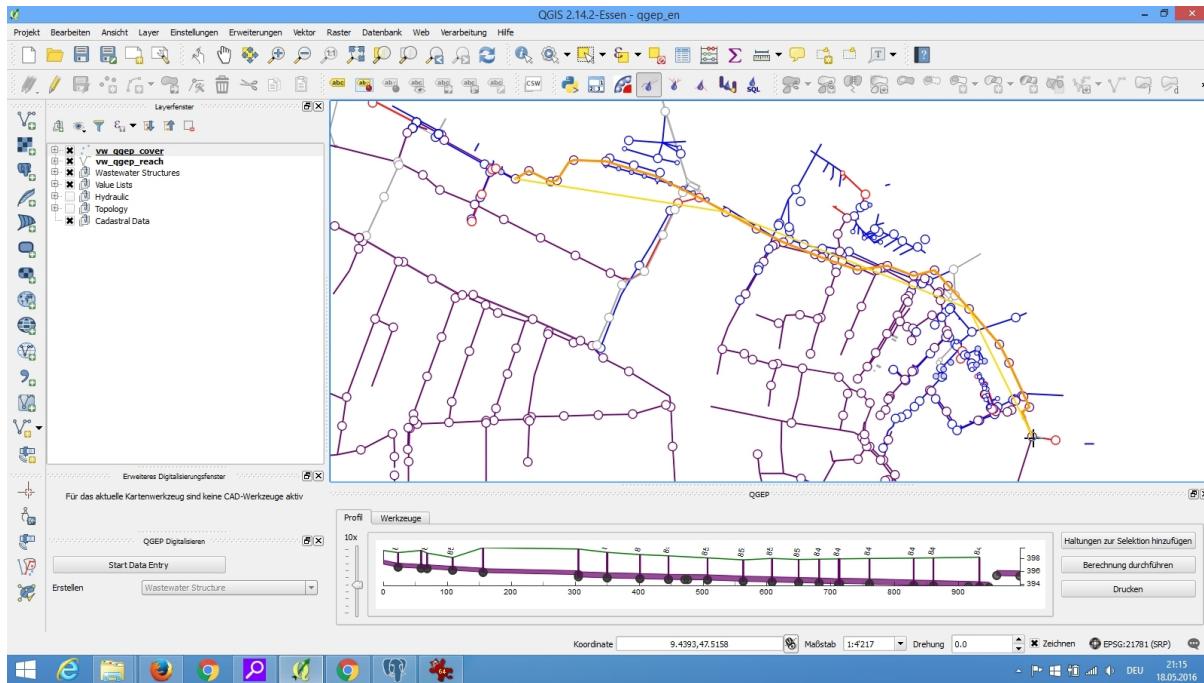


The lenth profile window opens

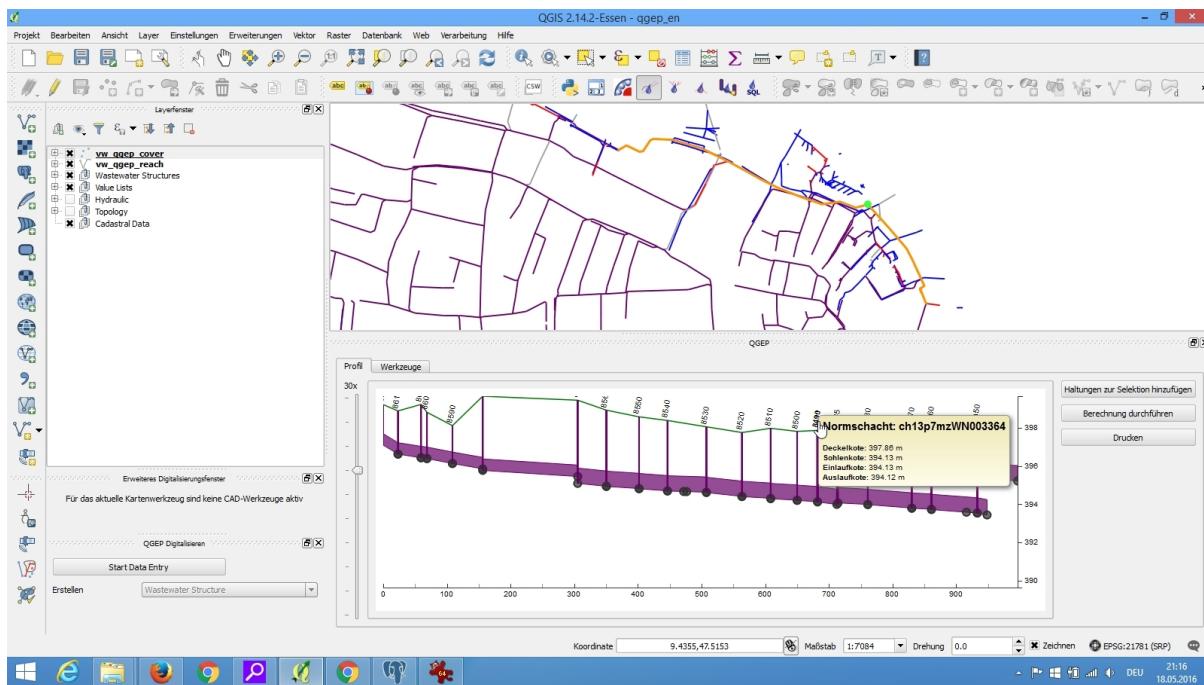


Select the vw\_qgep\_cover layer to select a start point.

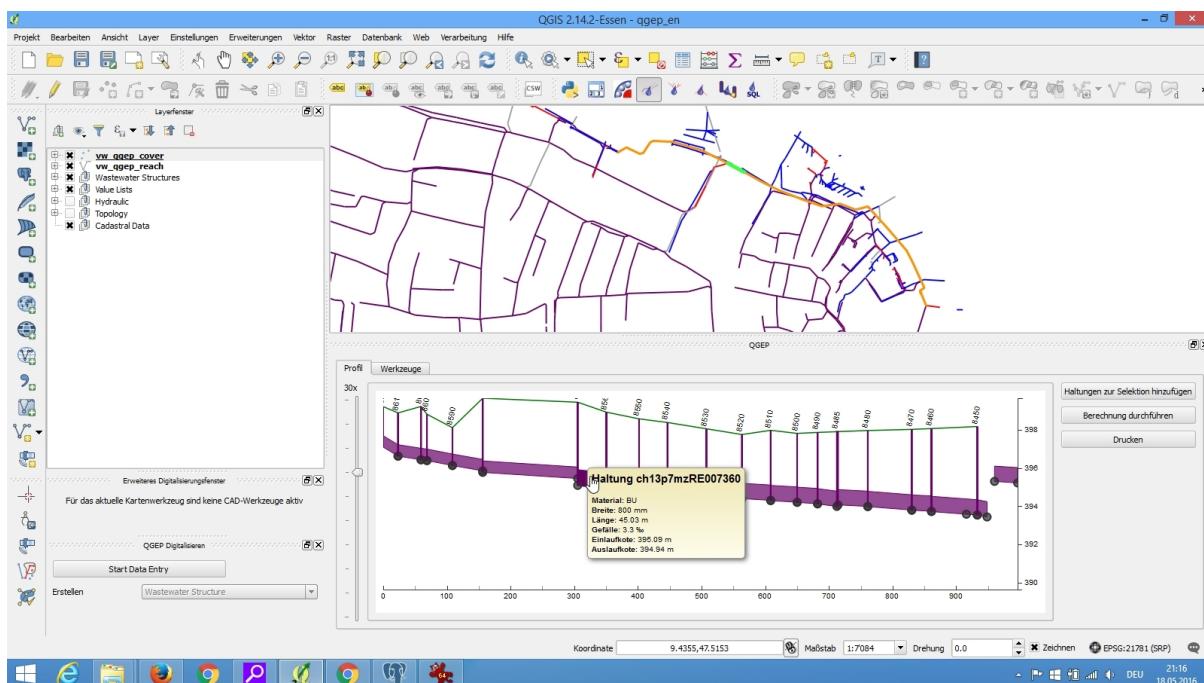
Then select a next manhole - it is not needed to be the direct next one. The tool automatically selects the manholes in between. You can repeat this several times. If there is no continuity you will get a warning. Right click to finish your selection.



In the profile window you now have the length profile. You can see detail info about manholes. When hovering, you can see with a green highlighting the manhole you currently touch.



The same is also implemented for reaches



## 1.2.4 Network following tools

This represents a guide on how to use the network following tools in QGEP.

TO DO: Explain how it works

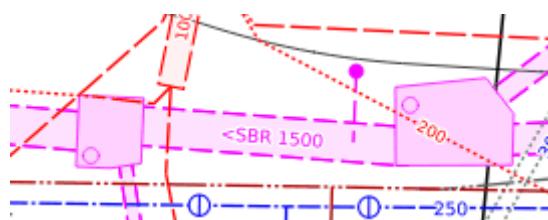
### Title

#### Subtitle

- List
  - Subpoint

Link: add [link](#)

Add some screen shots



## 1.2.5 Plan plotting

This represents a guide on how to do plan plotting in QGEP.

TO DO: Explain how it works

### General

- Titelblatt und Legende

- Rahmenpläne erstellen / verwalten / drucken

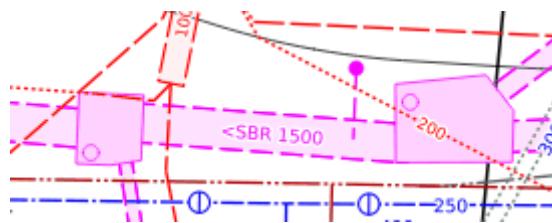
## Title

### Subtitle

- List
  - Subpoint

Link: add [link](#)

Add some screen shots



## 1.3 Admin Guide

This represents a guide on how to collect data in QGEP (digitizing), edit existing data and use various tools like length profile, network following and plan plotting.

### 1.3.1 pgAdmin

PgAdminIII is a Desktop tool that permits to access and manage the database server. This chapter represents a guide on how to do basic PostgreSQL management using pgAdmin.

#### Install pgAdmin

##### Windows

pgAdmin should be automatically installed if you used the EnterpriseDB installer.

##### Linux

**Debian/Ubuntu based distros** You can install pgAdmin by running the following command:

```
sudo apt-get install pgadmin3
```

**Fedora based distros** sudo yum install pgadmin3

**Suse based distros** sudo zypper install pgadmin3

---

**Note:** All the commands presented above assume that you are logged in as a user with sudo (admin) privileges. On certain systems it may be required to use the command su to become the *root* user and then issue the above command without the sudo prefix.

---

## Using Pgadmin

### SQL query

```
.. figure::: images/001_roles.jpeg
```

### Running SQL commands in PgAdminIII

---

#### Note:

- Clicking the highlighted icon at location 1 opens the SQL Window. The SQL icon is active only when you're connected to a database.
  - Clicking the icon at 2 runs the written SQL commands.
- 

### Database dump

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#### Note:

- Open pgAdminIII and connect to the database
  - Right click the Schema that you want to backup (in the tree structure below “Schemas”)
  - Enter the filename where the dump should be stored
  - Check the following options
- 

```
.. figure::: images/Screenshot-from-2015-01-22-102152.png
.. figure::: images/Screenshot-from-2015-01-22-102155.png
.. figure::: images/Screenshot-from-2015-01-22-102159.png
.. figure::: images/Screenshot-from-2015-01-22-102218.png
```

---

#### Note:

- After running the process, the exit code 0 indicates that everything went ok
- 

```
.. figure::: images/Screenshot-from-2015-01-22-102222.png
```

## 1.3.2 Demo Virtual Machine

This represents a guide on how to download and install a virtual machine (VM) that has a working QGEP installation with a preinstalled demo dataset.

### About

The VM is based on Debian Jessie with Cinnamon Desktop.

Installed software:

- PostgreSQL 9.4.4 with Postgis 2.1.7
- QGIS Master 2.11

Settings that are changed from a default software install:

- `pg_hba.conf` has **trust** for local connections
- QGIS is setup with multithreaded rendering enabled
- QGIS is setup with postgres server side expression compiler enabled

---

**Note:** The users `web` and `root` have the password `qgis`

---

**Note:** If you decide to use the VM in production, it is recommended to:

- change the passwords
  - regenerate the ssh keys by running in a terminal `sudo rm /etc/ssh/ssh_host_*` && `sudo dpkg-reconfigure openssh-server`
- 

### Install

#### Download

Download the vm from [here](#)

---

**Note:** The size of the VM is around 2GB compressed and around 7GB uncompressed.

---

#### Extract

The virtual disk is archived using XZ compression.

To extract the archive:

- **Windows:** you can use [7-Zip](#) to extract the archive.
- **Linux:** cd to the download directory and run `xz -d qgisplatform.vdi.xz`

You can run the VM as you would do with any VirtualBox VM.

---

**Note:** As the VM is based on Linux it is fairly simple to convert the image to a raw disk and put it on a USB stick (minimum 8GB) or a faster storage. This would enable you to run the app without the virtualization penalty and enjoy the full speed of your hardware.

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### QGIS Server

The VM has working installations of [QGIS Server](#) and [QGIS Web Client \(QWC\)](#).

#### Access the Web Services

The Apache server is setup to respond to requests pointing to the `http://qgisplatform.demo`. Accessing the above link with the Internet Browser of the VM will take you to the starting page of QWC depicted in the above image.

If you want to access the web services outside the VM, you need to edit the `hosts` file on your machine and point `qgisplatform.demo` to the IP of the VM.

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**Note:** If you've setup the VM with the network adapter in NAT mode only the VM host will be able to access the services. If you want all the devices on your LAN to do it, you need to setup the network adapter in bridge mode.

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### 1.3.3 Data import

This represents a guide on how to import data into QGEP.

- INTERLIS

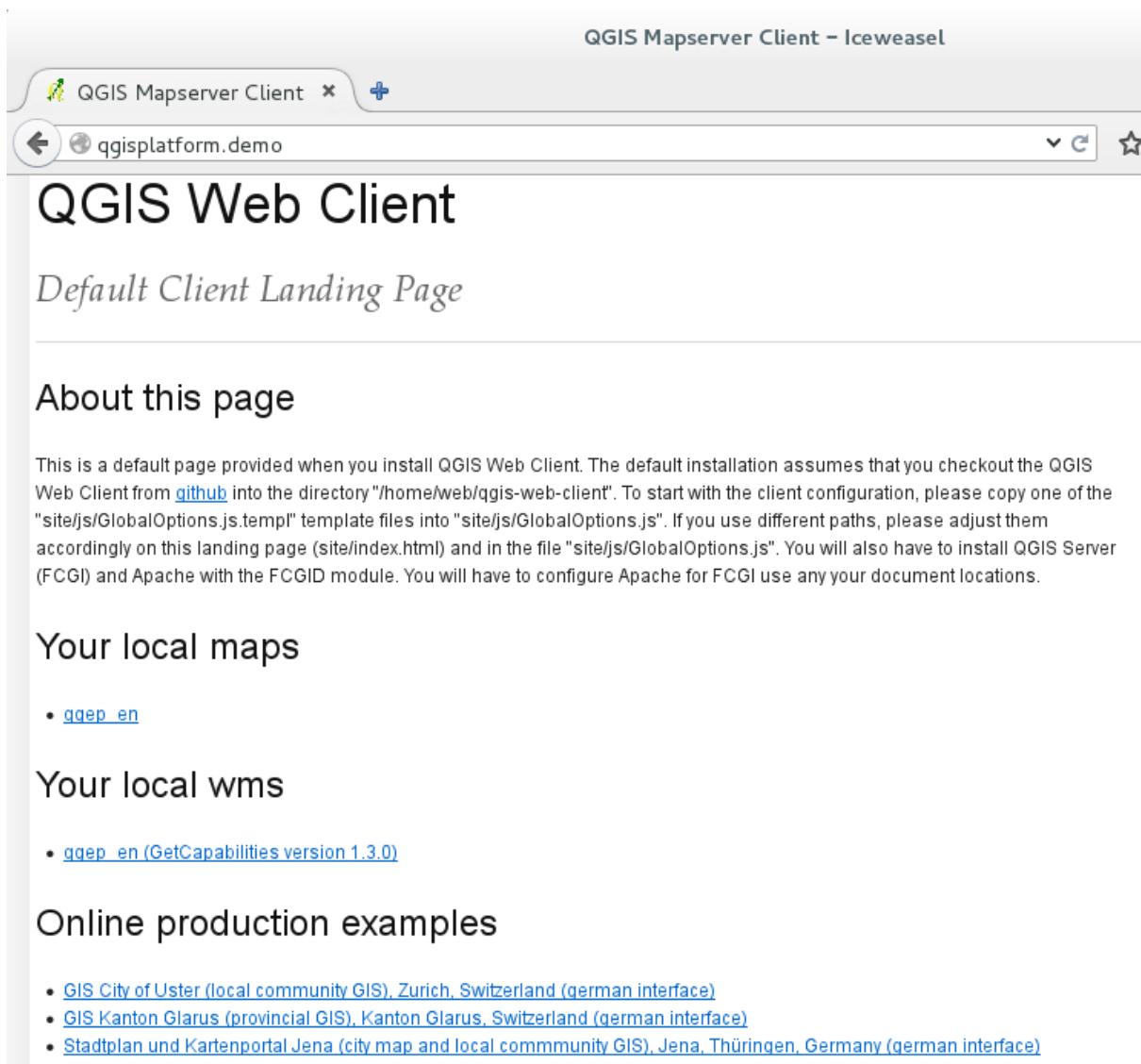


Fig. 1.2: QGIS Web client starting page

- dxf
- Shape
- Text
- MOUSE / MikeUrban
- other

TO DO: Explain how it works

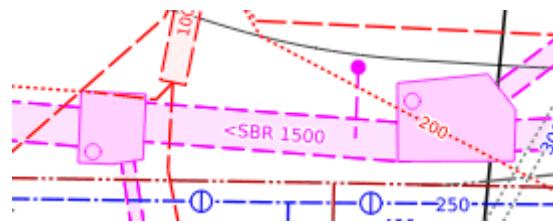
## Title

### Subtitle

- List
  - Subpoint

Link: add [link](#)

Add some screen shots



## 1.3.4 Data export

This represents a guide on how to export data from QGEP.

TO DO: Explain how it works

- INTERLIS
- dxf
- Shape
- MOUSE / MikeUrban
- other

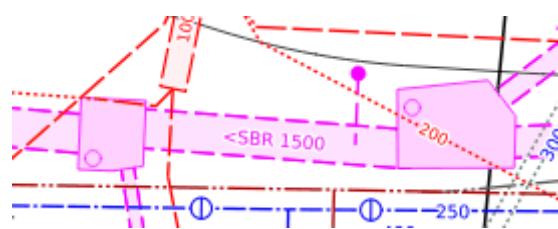
## Title

### Subtitle

- List
  - Subpoint

Link: add [link](#)

Add some screen shots





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