

Mariusz Krukar



for newbies & viewing

Tutorial for absolute beginners

Cambridge & Krosno 2022

Introduction

I am introducing the very basic QGIS tutorial, which is mostly dedicated for people, who are planning to use this software just only for viewing, reading, and exporting the GIS content, which has been already prepared by anyone else. QGIS is widely used tool, which includes a vast number of issues for explanations. Most of tutorials look rather like books, which stresses the wealth of features offered by QGIS. This short guide should help you understand what QGIS is and how can it help you to read any content properly and apply it in other ways. By knowing how to surf between various GIS layers you will be able to understand the QGIS better. The level of knowledge presented in the following document covers pretty much the entry level of QGIS knowledge. The whole guide is based on 3.12 version. Some options and solutions have been omitted due to community to which this tutorial is dedicated. I tried to omit advanced features and keep this document as much succinct as possible.

Blue text – important things to know

Red text – very important things

Italic dark blue – QGIS things

Italic dark blue bold – important QGIS things

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1. Installation of QGIS

Installation can be done by visiting the website <https://qgis.org/> where you can always find the most up to date QGIS version.



Pic. 1 QGIS Main website with download options.

Under the “Download button” you can see two latest versions of the software. The top one is usually “*The reachest features*”, the second one is “*Most stable*” as it exists for a longer time, which allows contributors to remove some unforeseen bugs. After clicking “**Download Now**” and selecting the version we want to (as well as the directory), we must **wait until the QGIS installer is downloaded on our drive**. Its **weight is about 1GB**, so it might take longer than usually expected. At the end we should see the QGIS installed by appearance on the list of our **Windows Start** menu.

If you are unhappy with the newest QGIS versions provided, due for whatever reason i.e., **slowing down your computer**, you can always

try with older versions, which are available on this website:

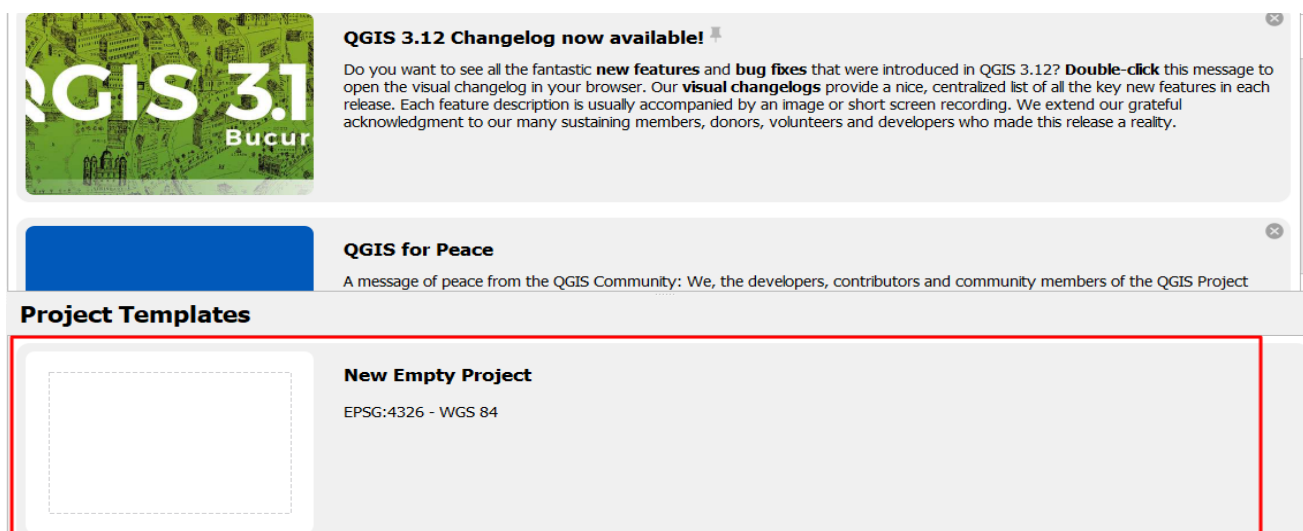
<https://gisenglish.geojamal.com/2018/08/download-old-qgis-software-and-all.html>

However, it’s not advisable back further than version 3.0, because of a **serious upgrade**, which took place at that moment. In turn a lot of plugins have been incorporated in the QGIS toolbox, therefore they aren’t compatible anymore as separate units.

If you are interested in further releases, which are planning in the foreseeable future, you can check this list out:

<https://qgis.org/en/site/getinvolved/development/roadmap.html>

2. Choosing the project

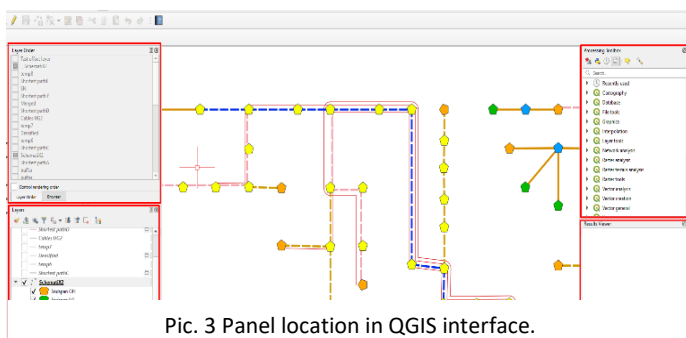


Pic. 2 Selecting (creating) the new project in QGIS.

At the very beginning of your adventure with QGIS you will have to **select the project**. It's not a big deal, especially that the tool leads you intuitively to the proper bar (Pic. 2).

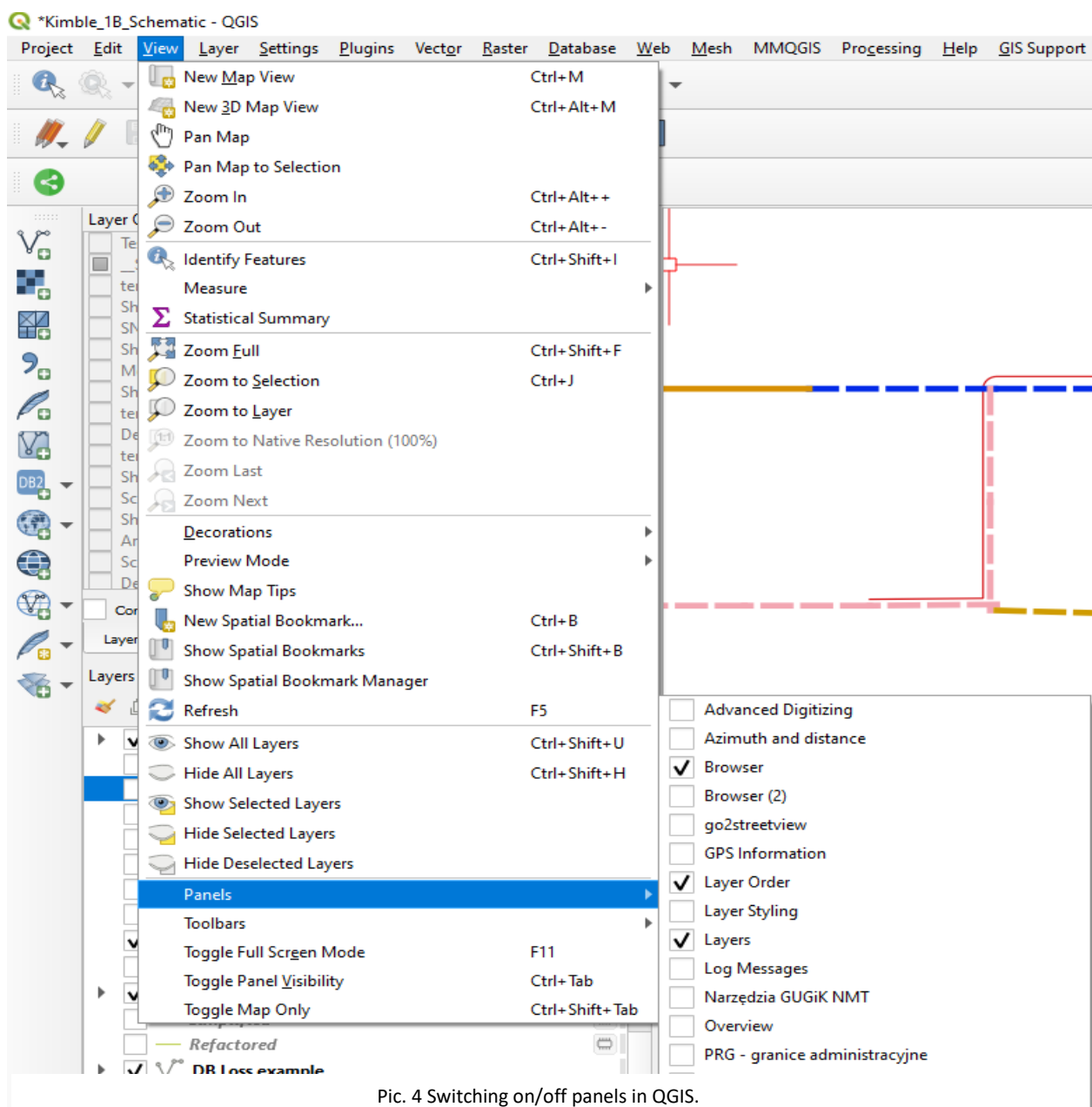
3. Getting around with QGIS interface

A. Panels

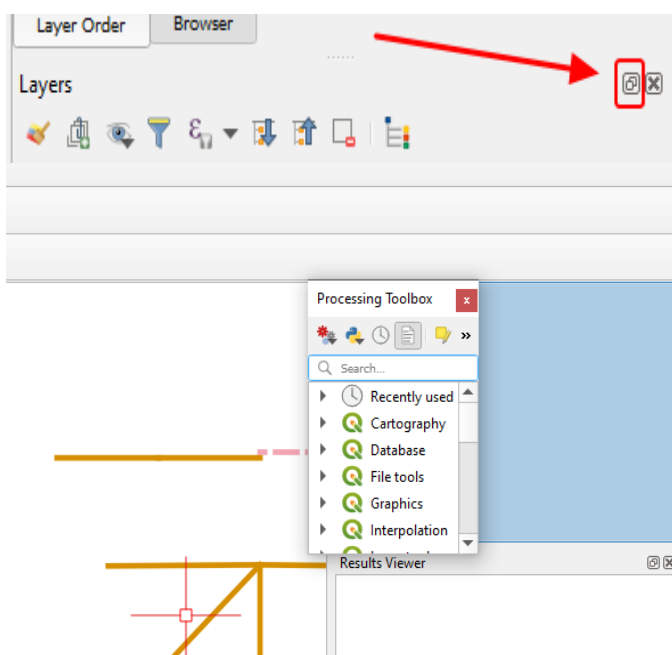


Pic. 3 Panel location in QGIS interface.

Panels in QGIS are located **on the left**, and **right-hand side**. Like you see below, there are example panels available, which can be changed (switched on/off) at the same basis as toolbars described below. We should go **View -> Panels** (Pic. 4) or right-click anywhere in the main toolbar area. Each panel box has the characteristic cross "X", to close it down.



Pic. 4 Switching on/off panels in QGIS.



Pic. 5,6 Moving out the panel box from its default position.

Next to it on the left we can find the double-box which unfreezes our panel box from its placement in QGIS.

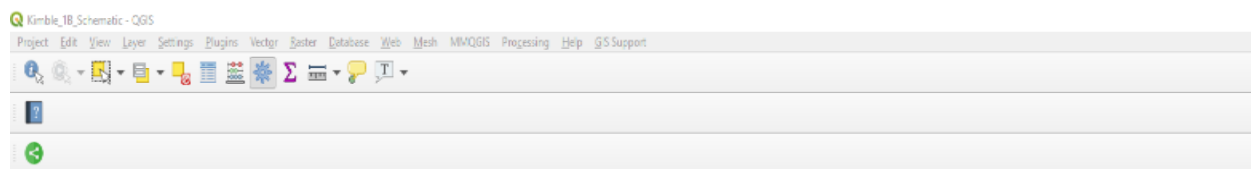
In fact, when you move it just slightly, the QGIS will still keep the blue space reserved for this box to come back. Moving it further across the map canvas, this area disappears, and it's filled out by other panels optionally. The panel window can be moved by **holding the header** next to the "X" symbol.

The most important panels from the browser's point of view can be: "Layers", "Layer Order" and "Browser". The last two appear in the one panel as separate tabs. In the further chapters the usage of them is fully explained.

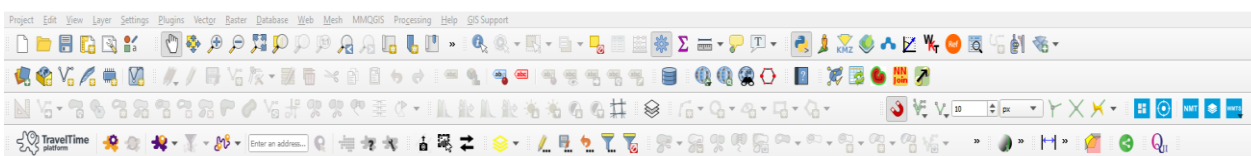
B. Toolbar

In default your major QGIS panel looks poor, like you can see below. There are just basic options available, which number tend to increment as we install some new plugins.

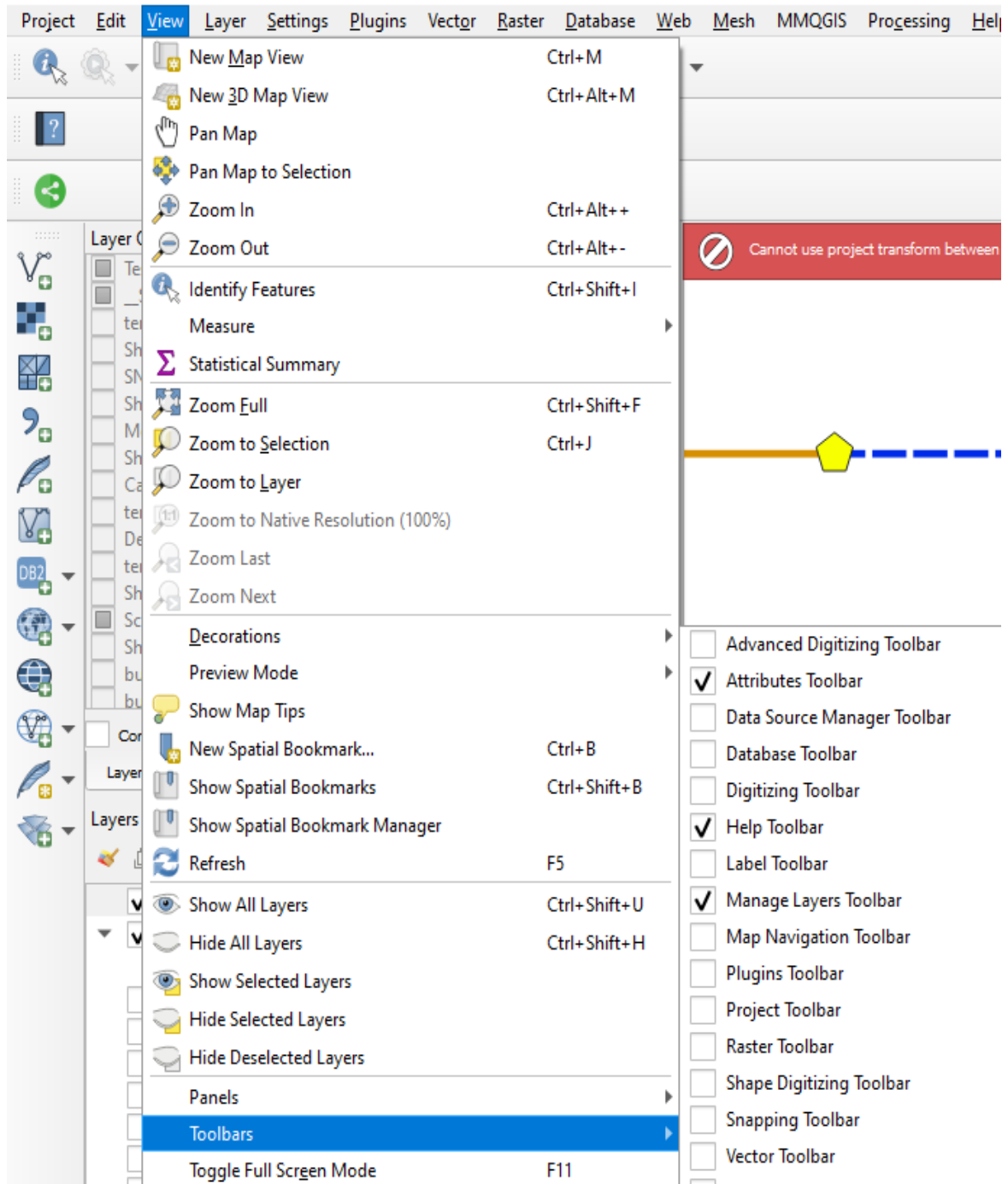
In fact, there is an option, which allows a user to manage with various toolbars quickly depending on the situation. It's just a simple way of how we can do it.



Pic. 7 The default toolbar in QGIS or pretty much like this.



Pic. 8 This is how the main toolbars looks like when all toolbars are active (including toolbars of plugins installed).



Pic. 9 Switching on/off toolbars in QGIS.

In your main panel select **View -> Toolbars** and tick on which one you want to use for your project. I guess for viewing you won't need them that much. The **most important for you** might be **"Help Toolbar"**, **"Manage Layers Toolbar"**, **"Multiple selection"** etc.

C. Status bar

It's a bar placed **at the very bottom of QGIS interface**. We have some options there, which include mostly the **view-based features** to be discussed further in this document.



Pic. 10 The status bar in QGIS interface

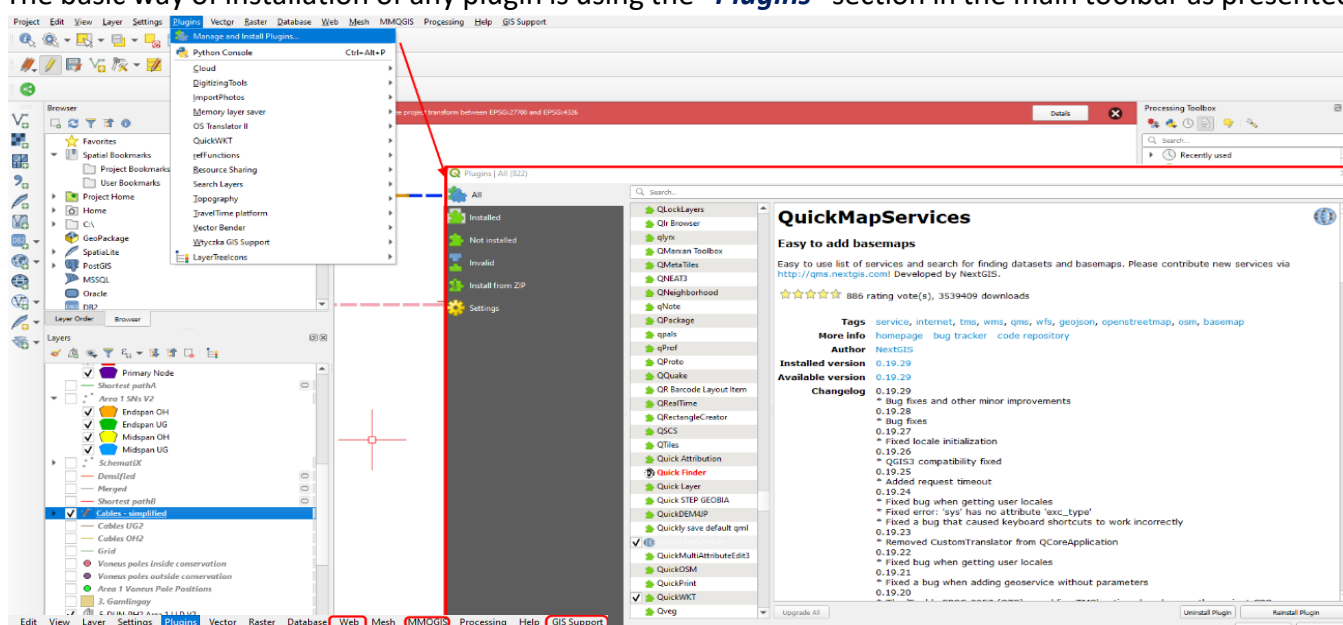
D. Main view (map canvas)

Admittedly this is the rest of our interface, the biggest section, in which our QGIS work is visible.

4. Plugins installation

QGIS has a lot of tools in its core, where most of them were former plugins functional in the 2x versions. This is the section, which keeps this software vital. Every new version brings some new functionalities in the core toolbox. We cannot forget that some plugins are updated or created even more often than scheduled QGIS upgrade. There are over 800 plugins available in QGIS dedicated for various type of work. From the browser's point of view just a little of them can be utilised in a day-to-day basis, but it will be vital to know how to manage and install them successfully.

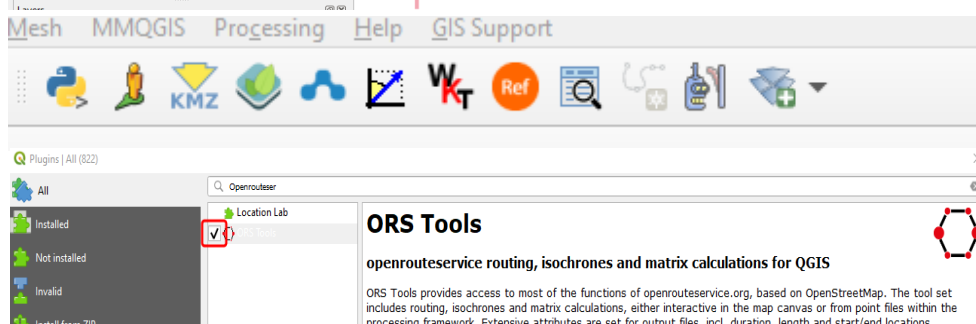
The basic way of installation of any plugin is using the "Plugins" section in the main toolbar as presented



Pic. 11, 12 Installation and browsing plugins in QGIS.

in the images above. Installation is straightforward itself because you just need to hit "Install plugin". If the plugin has been already installed earlier in your QGIS software, the button changed to "Reinstall plugin". Another thing is the appearance of any plugin installed. We need to make sure, that access to it is easy. Usually on instant way any plugin creates its additional

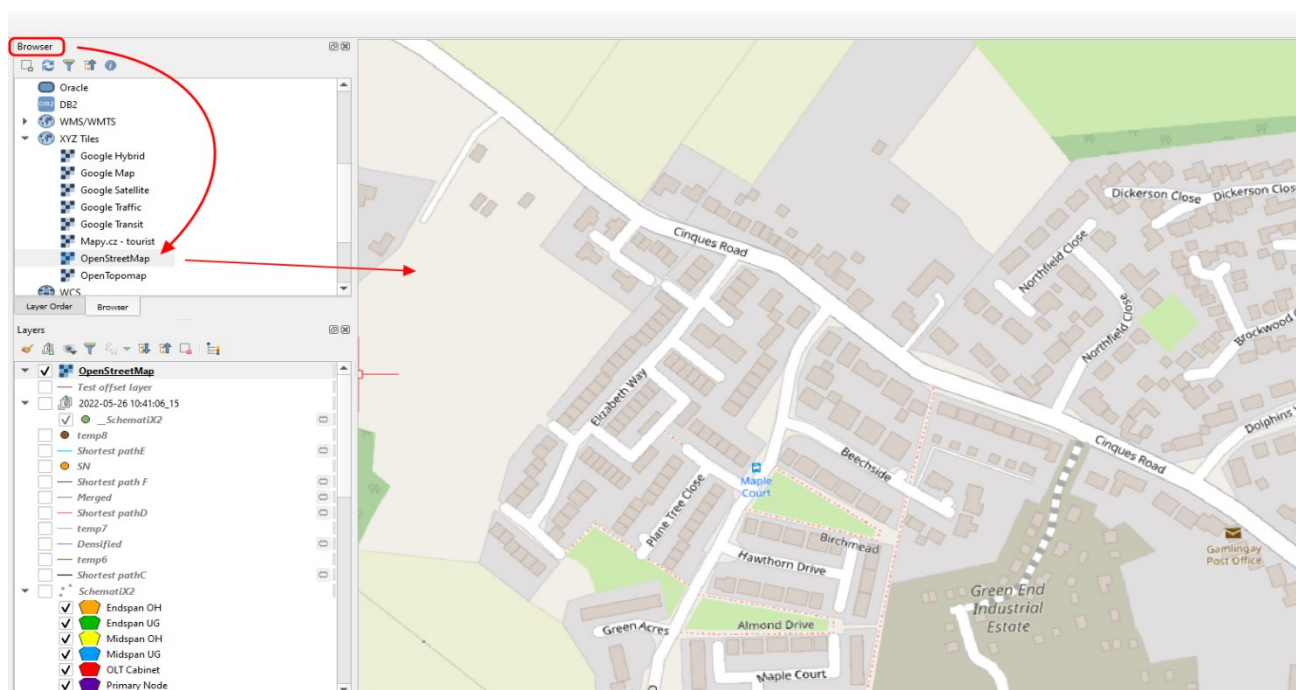
options available both in the main toolbar (like MMQGIS) or in the "Plugins" and "Web" dropdown menu. Moreover, they can be found as additional panels or toolbars described earlier (Pic. 2, 3). One of the toolbars is called



Pic. 13 The way of how we can switch on/off the plugin in QGIS.

simply **“Plugins toolbar”** which includes some signatures of installed plugins (Pic. 13). Another option is **adding plugins to QGIS externally**, by downloading them and unzipping. This option can be found in the pic. 9 (**Install from ZIP**), although it’s not necessary just for browsing purposes. Each plugin can be simply switched off without uninstallation. It’s just unticking the box next to the plugin name/logo as shown above.

5. Basic map



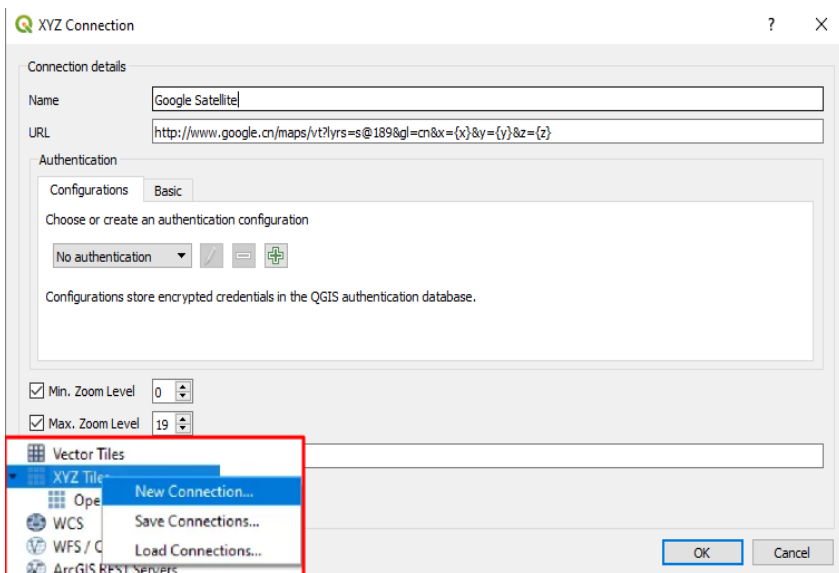
Pic. 14 Launching the base map canvas in QGIS.

There are 2 ways of how we can **load the map tiles** into QGIS. I usually use the solution shown above. In your **“Browser”** panel there is a section called **XYZ tiles**, from where you can **pick up the map you want to**. Regrettably the default settings don’t offer any choice at all. You can only run the **OpenStreetMap** canvas by double clicking, drag & drop or selecting **“Add layer to the project”** after right-click. However, if you would like to have the list expanded as shown in the image above, you can use some links below:

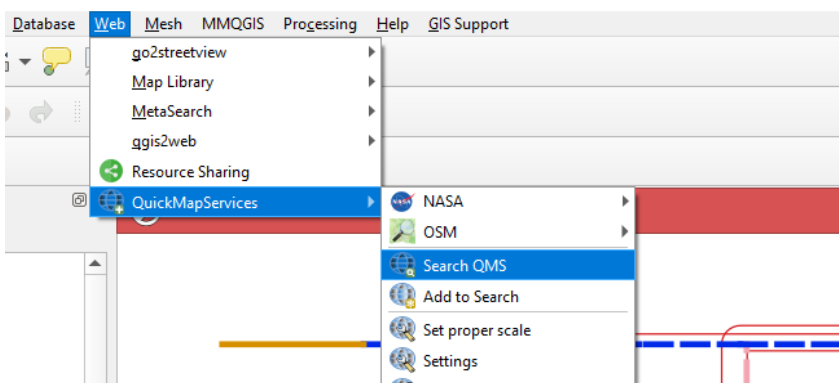
Map canvas	URL
Google Roadmap	http://mt0.google.com/vt/lyrs=m&hl=en&x={x}&y={y}&z={z}
Google Hybrid	http://mt0.google.com/vt/lyrs=y&hl=en&x={x}&y={y}&z={z}
Mapy.cz	https://mapserver.mapy.cz/turist-m/{z}-{x}-{y}
OpenTopoMap	https://tile.opentopomap.org/{z}/{x}/{y}.png
Google Satellite	https://www.google.cn/maps/vt?lyrs=s@189&gl=cn&x={x}&y={y}&z={z}

Tab. 1 Examples of XYZ (map) tiles, which can be linked to QGIS.

These links represent **direct connection to the custom map tiles** offered by their major provider (**Google Maps**, **OpenStreetMap** and so on). We must **connect the XYZ layer** with one of them like shown below:



Pic.15 Connecting XYZ map tiles to QGIS.



Pic.16 Launching the QuickMapServices plugin in QGIS.

Another way seems to be easier for the QGIS novices and more beneficial in terms of the range of map canvas provided. This is the **QuickMapServices (QMS)** plugin, which can be installed from the plugins panel presented earlier (Pic. 16).

There is also another method, which would allow user to load the map tiles quite smoothly. There is the **Tile+ plugin**, although its installation requires unzipping, therefore surely it won't be the first port of call for someone completely new to QGIS.

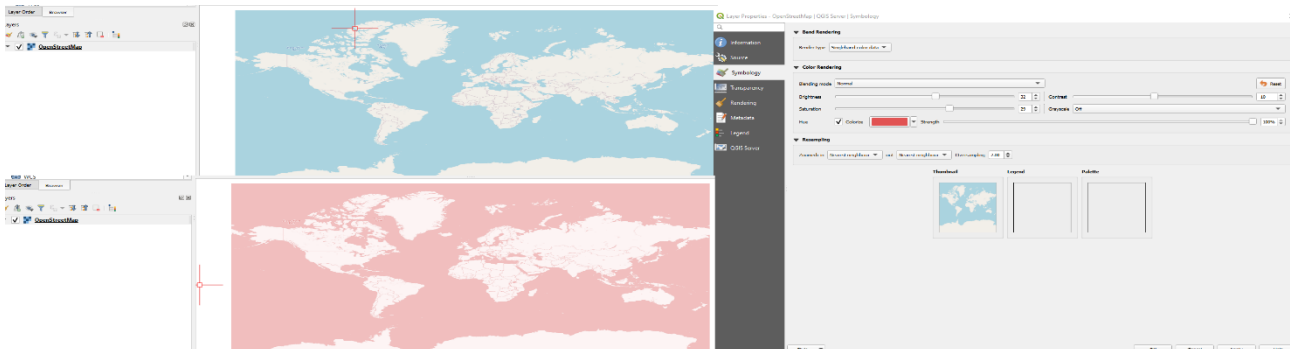
I assume, that loading your map canvas came without any problems. Your map appears in a major part of QGIS interface and all of us are happy. However, it's beneficial at this stage to explain some things. Firstly, it's vital to know some **hot keys**, which make a nice shortcut for our work.

By using the mouse, you can **zoom in and out**. It happens so quickly. In order to have the zoom level changes under control we can **keep the Ctrl when scrolling our mouse**. The full specificity of hot keys used for browsing the main map is listed in the table below (Tab. 2).

Hot Key	Action
Mouse scroll	Zoom in/out of our map - quickly
Ctrl + mouse scroll	Controlled zoom/in of our map
Ctrl + Shift + F / PgDn	Zoom map to full extend

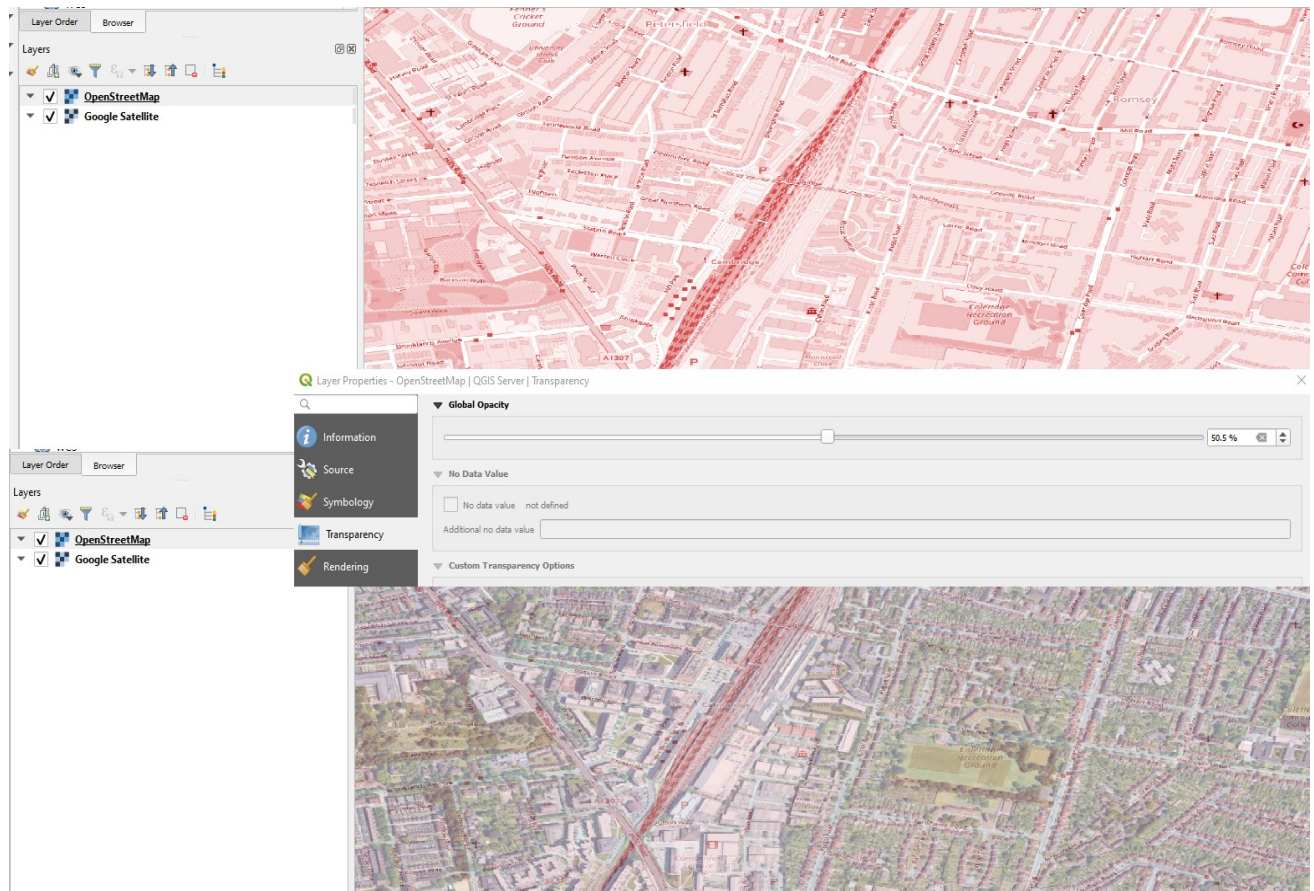
Tab. 2 Hot keys for general QGIS map canvas

Much more about shortcuts will be discussed in the next chapter. The map canvas has other curious options like wide-understood customizing. We can **fetch the random map tile** to our project or even more than 1. They are in fact quite heavy but can be useful simultaneously when needed.



Pic. 18 Customizing map coloration

Every individual setting applied here **goes straight to print layout or export map as the image**, which is further discussed in this document. Apart from the coloration important is the map transparency, which



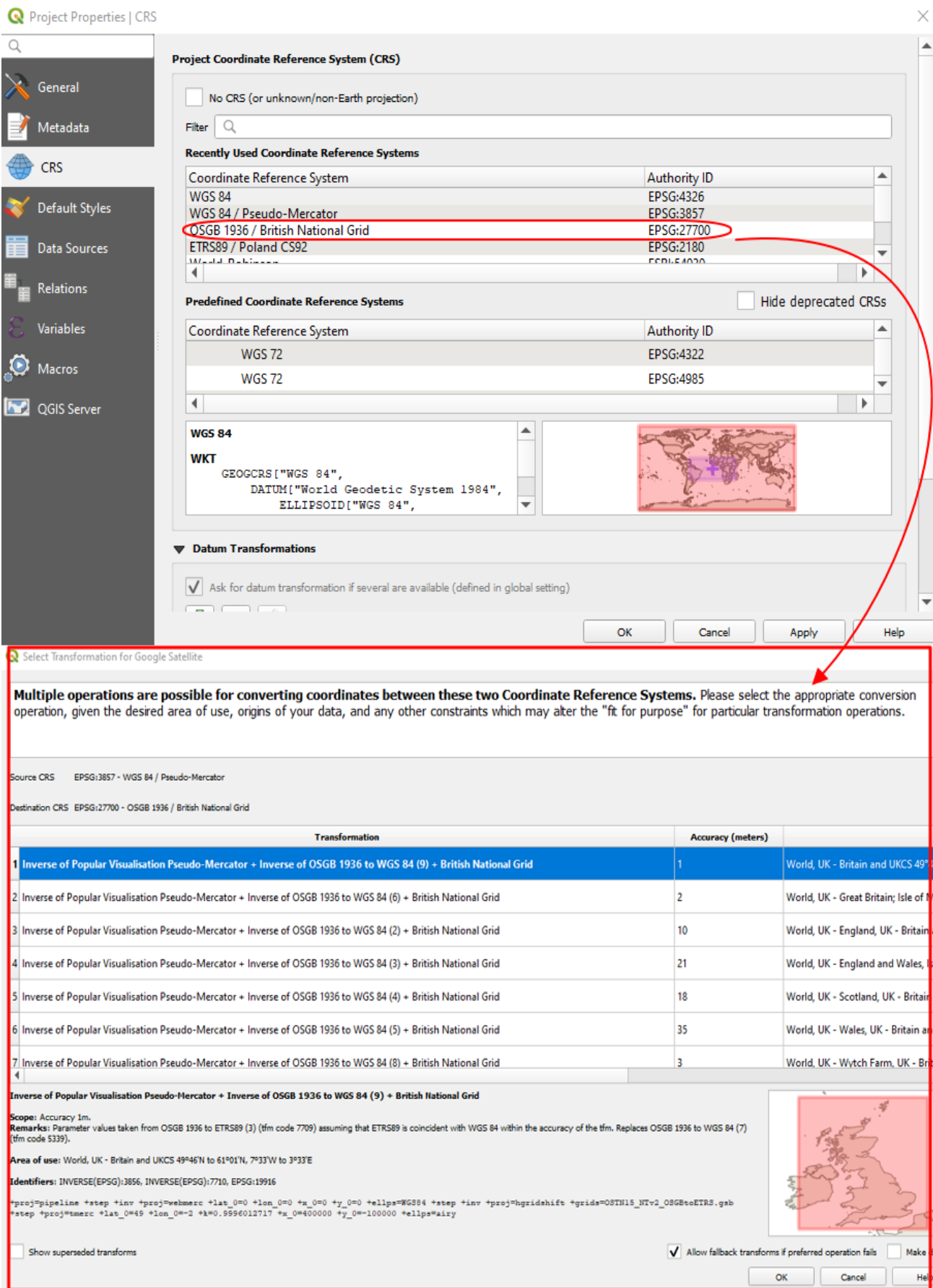
Pic. 19 Setting up map canvas transparency

might be useful especially for overlays i.e., with satellite imagery (Pic. 19).

6. Coordinate Reference System (CRS)

Coordinate Reference System (CRS) is used for the **projection of our map**. As you probably were at the very beginning, the map loaded into QGIS has some default projection. Obviously, it must change to fit your project requirements. The **default CRS projections** are *EPSG:3857-WGS84/ Pseudo-Mercator* and *EPSG:4326 – WGS 84*. The **default configuration**, which allows maps and layers to work properly is the *EPSG:4326* as the project CRS and *EPSG:3857* for the map canvas CRS.

There is a lot of CRSes available, which are **dedicated locally**. For example, in the case of Great Britain, most used is *EPSG:27700 – OSGB 1936 / British National Grid*. Changing the default project CRS to the CRS we want to use in our work requires conversion of coordinates between two CRSes, which is done automatically by QGIS application. We must remember that proper CRS defines the **individual coordinate system** visible in the status bar, about which I write you later. Another consequence of use the specific CRS is the **compatibility with displayed maps and layers**. If, for instance we use the *EPSG:27700 – OSGB 1936 / British National Grid* we shouldn't expect to have OpenStreetMap layer displayed correctly, since it's based on *WGS84*. When CRS system of the map will be different than the CRS of our layer, the vector layer will be placed "at the beginning" of the used coordinate system, which for *WGS84* means Lat 0 Lon 0 (Guinea Bay) and for *British National Grid* accordingly X 0 Y 0 (westernmost part of English Channel southwest of Isles of Scilly).

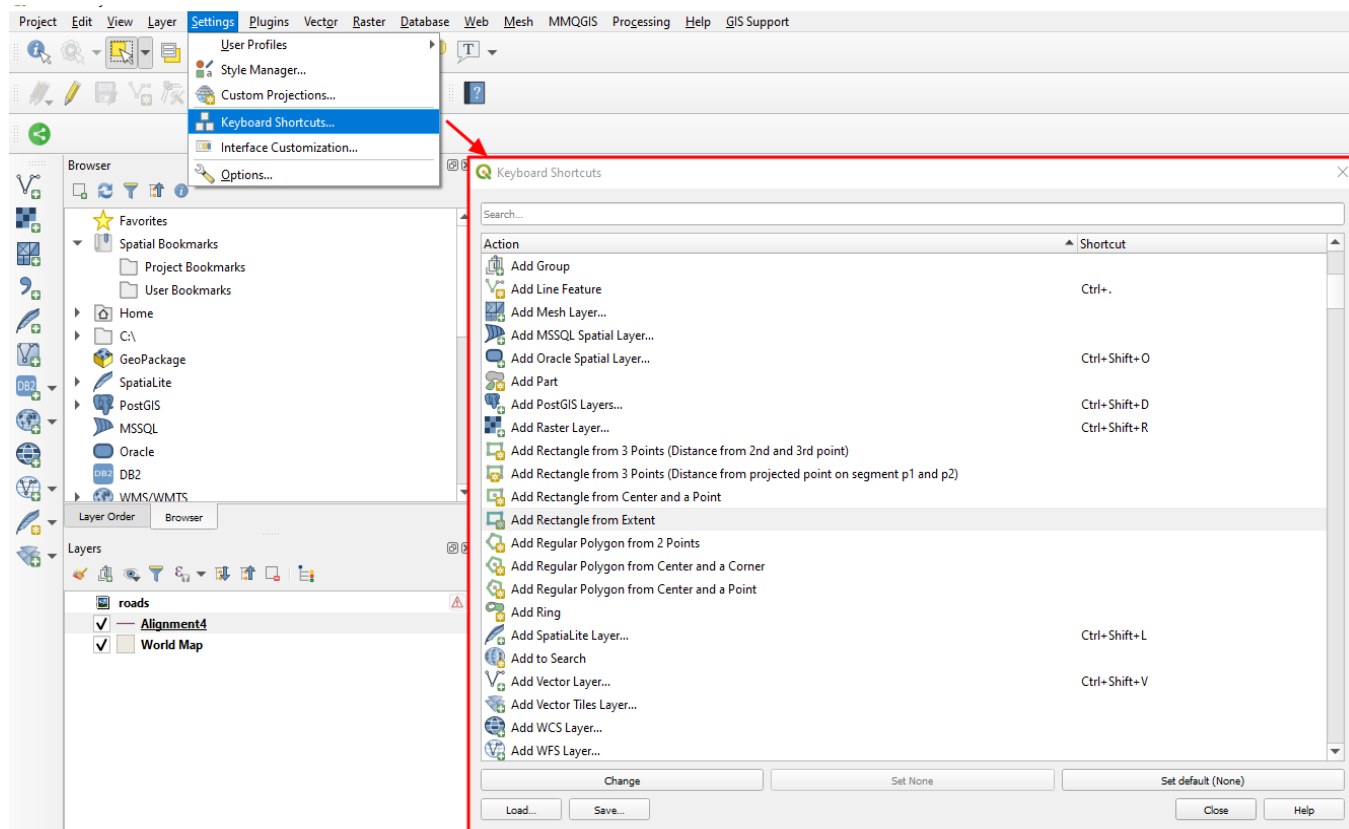


Pic. 20 An example of conversion between two CRS systems.

The same applies for all layers you want to include in your project. Their CRS **must correspond to project CRS** if we want to have them working properly.

7. QGIS Hot keys

The matter discussed a bit earlier refers to the **keyboard shortcuts**, which can be used in QGIS. There are a few sets as default so far, although every user can adjust them to the individual demand.

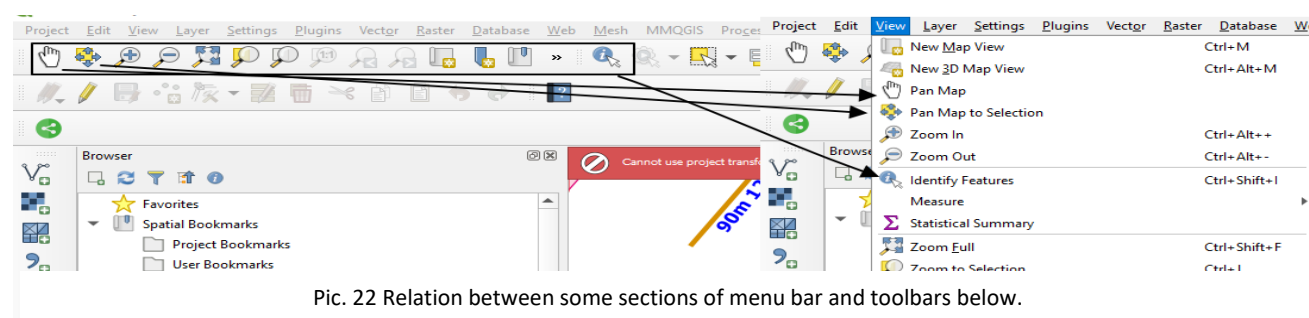


Pic. 21 Keyboard shortcuts settings in QGIS.

You can find them by clicking **Settings -> Keyboard shortcuts** in the main panel. Next find the one you wish to use frequently and hit the **“Change”** button. Next the button will turn into **“Input:”** waiting for your keyboard turn. Once you hit some key it will appear instantly on your right. When some shortcut has been already assigned you should see the alert asking you about the reassigning. Often keyboard shortcuts are visible just next to some option like **Save Edits (Ctrl+S)** and so on.

8. Menu Bar

Menu bar is located **at the very top of our QGIS interface**. Right above toolbars discussed earlier. Menu bar in other words is a **list of tasks**, which can be applied to typical work in QGIS. This section is expandable by additional options, which come out right after some plugin's installation. For entry



Pic. 22 Relation between some sections of menu bar and toolbars below.

level in QGIS it's good to remember that some sections of menu bar are replicated as separate toolbars beneath. It's good to know it, because you can avoid a frill expands of the sections and use the proper icons straight away, which I am going to explain in the next section. The graphical example is shown above (Pic. 22).

9. Toolbars

Let's go through the status bar now. We have them a few in a default option, which should require attention for new QGIS users.

A. Project toolbar



Pic. 23 Project Toolbar with all options

The project toolbar looks as follows (Pic. 23). We have effectively 6 options there, although not all will be used by the new user of QGIS. Let's see which one might be important:

1 – New Project – creates the new project.

2 – Open Project – opens already existing project saved in

our directory.

3 – Save Project – saves our project. Remember, that **saving the project in QGIS does not guarantee saving layers we are working on!** By saving project we are **freezing our current level of work** with regards to layer appearance, layer orders, grouping, etc. If you have forgotten to save edits in your particular layer, they won't be restored!

4 – Create a new print layout – nice shortcut for creating print layout, which usage is to be discussed later in this publication.

5 – Show layout manager – opens a **list of already existing print layouts** if they exist at all. I assume, that you will have nothing there as you are beginning your adventure with QGIS.

6 – Style Manager – it's a quite advance option, which is tailored for organizing style items. You can read more about it here:

https://docs.qgis.org/3.22/en/docs/user_manual/style_library/style_manager.html

B. Map Navigation Toolbar



Pic. 24 Map Navigation Toolbar with all options

Map Navigation Toolbar is usually the adjacent toolbar on the right of the previous one. There is a dozen or so useful options, which act as the handy shortcuts in our managing with the main map canvas. Let's explain them all:

1 – Pan Map – it's like a **"hand" cursor**, which basically switches off all other options applied (like editing, creating vertices and so on) and allows a user to pan and dragging the map canvas wherever he wants to.

2 – Pan map to selection – centres our map where the selection has been made. It works for any layer and multiple selections too. The zoom level is based on the selection range. Selection will be explained later in this guide.

3 – Zoom in

4 – Zoom out – both Zoom in and zoom out can be superseded by mouse scrolling (alternatively mouse scrolling + Ctrl) as explained in the chapter 5.

5 – Zoom full – this option pans map to our whole project. It means, that the zoom is based on the range of [the most robust layer](#). In turn our whole work is visible in one go.

6 – Zoom to selection – close-up view at the items, which have been already selected.

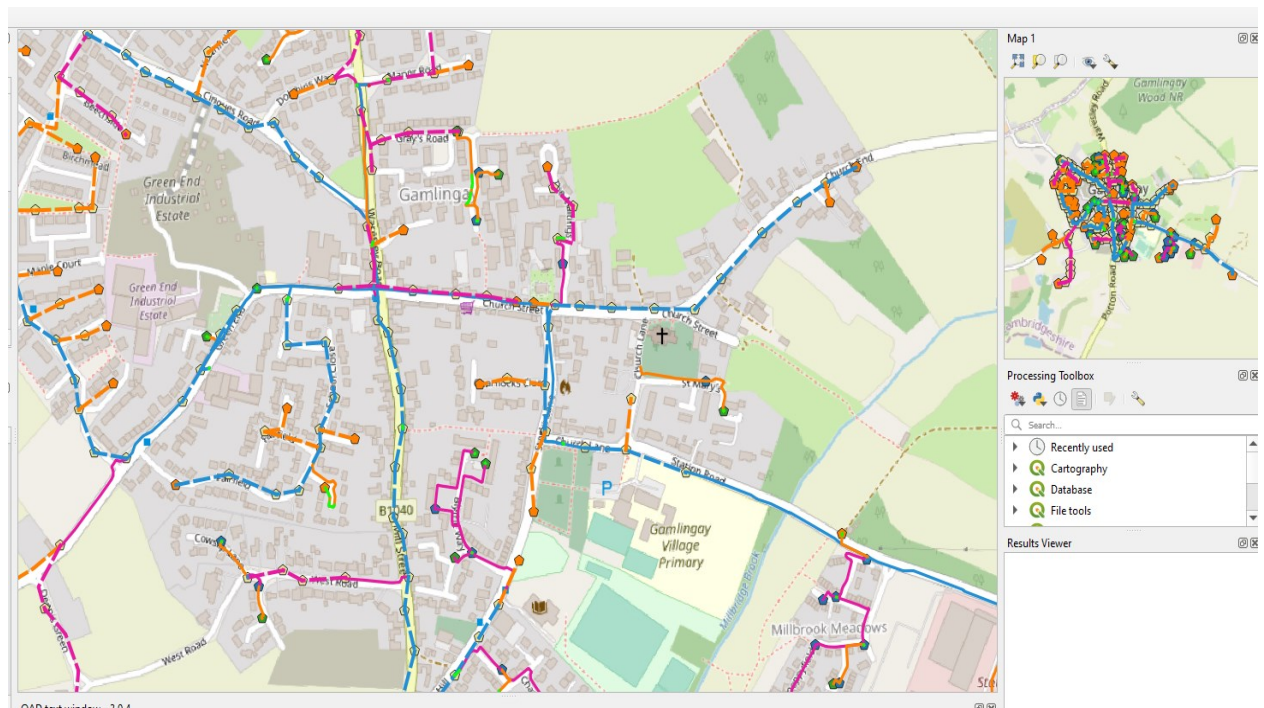
7 – Zoom to layer – setting up the map view, which covers the view of a whole layer already in use. It applies to every layer selected in the **“Layers”** panel, which is highlighted in blue.

8 – Zoom to native resolution – it works just for map canvas (XYZ) tiles and acts like the zoom-out option.

9 – Zoom last – brings a user to the last zoom level.

10 – Zoom next – moving a user to the further zoom level (after Zoom last have been applied).

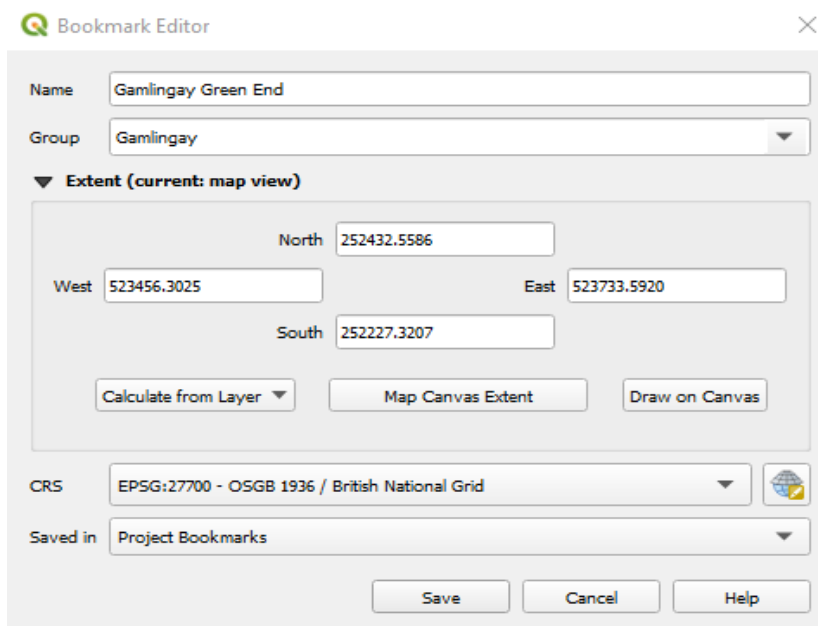
11 – New map view – very handy option, which creates the new map view. In this case we have



Pic. 25 An overview map as an example of new map view added to our main QGIS interface.

a possibility to [work with multiple map canvas](#), which I am going to explain you a bit later. The new map view can be placed in one of the side bars and act like the overview map for our project. We can see there how our cursor moves and where we certainly are, which is beneficial for a close-up view (Pic. 25).

12 – New spatial bookmark – the option, which can **save our current zoom level at the specified area**



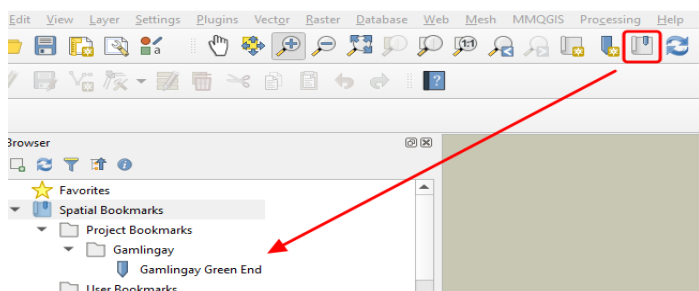
Pic. 26 An example of spatial bookmark.

and **help us to back to this view instantly later**. By opening the dialog window, we can decide what the spatial bookmark should look like. We can define the bookmark by the following criteria:

- *current map view*
- *map canvas extend*,

Last thing is saving our map in the bookmarks catalogue.

13 – Show spatial bookmarks – if you have any, they will **appear in the Browser panel**. Basically, this button does nothing apart of expanding the folder tree in your **“Browser”** panel where all the spatial bookmarks are located (Pic. 27).



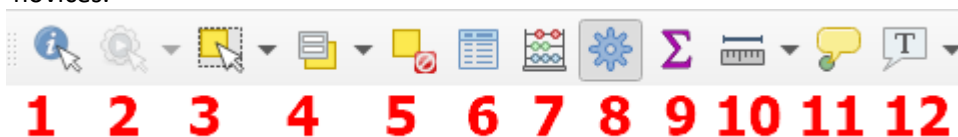
Pic. 27 The location of spatial bookmarks.

14 – Refresh – updates our current map view

C. Attributes toolbar

This is another useful toolbar, which should come as the default is concentrated on the layer content, which user can manipulate on the map. We can find there some options, which are treated separately in this tutorial, therefore I will skip them by now. Another set of features won't rather be used by QGIS

novices.



Pic. 28 Attributes Toolbar with all options

This toolbar offers 12 functions, which are:

1 – Identify features – **the quickest way** of getting some information about the layer items, objects,

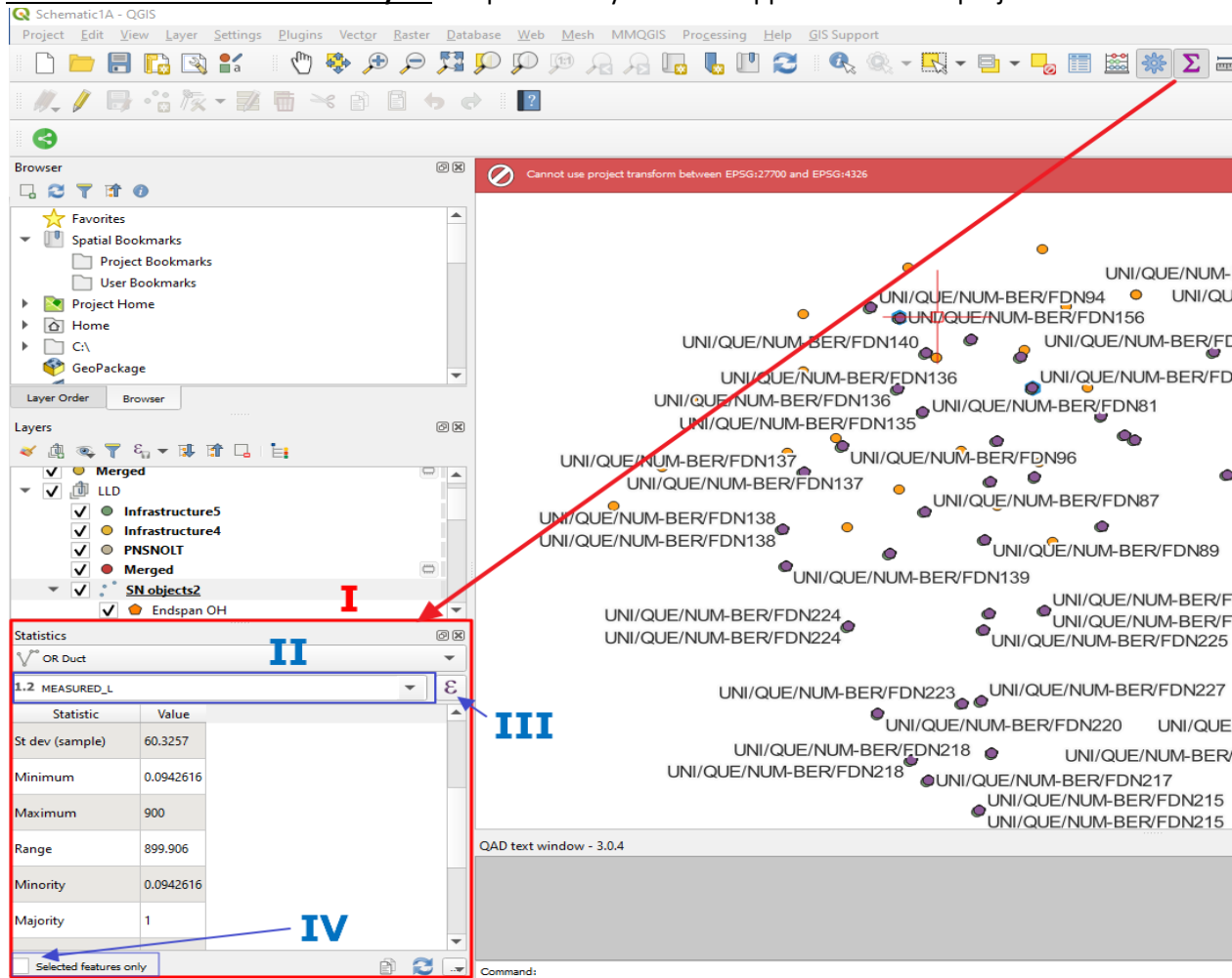
etc.

2 – Actions – used only when some actions are assigned to our layer. It's for advanced users of QGIS.

3 – Selecting features – four options included while select by polygon, select by freehand or radius. To be discussed later

4 – Select features by value – again, another four options available, which are going to be discussed later (select features by expression, select features by value, select all features, invert selection).

5 – Deselect features from all layers – wipes out any selection applied across the project.



Pic. 29 QGIS Statistical summary in action.

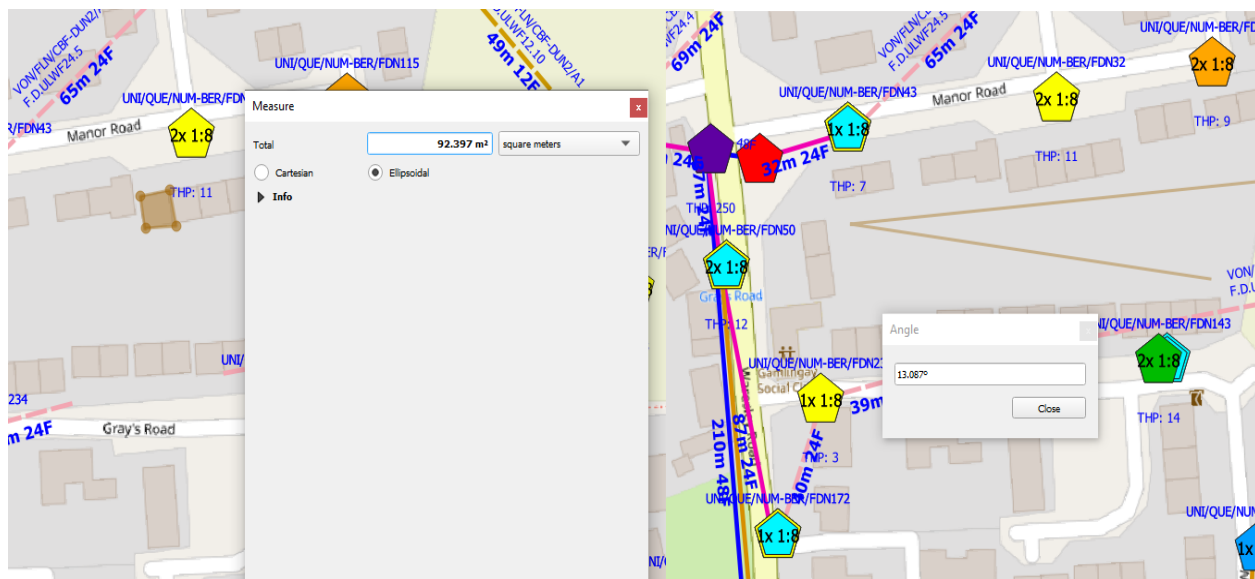
6 – Open Attribute Table – the quickest way to get to our data content in QGIS

7 – Open Field Calculator – another option rather for advanced users, which allows us to provide some changes in data attribute table by using specific formulae.

8 – Toolbox – opens the **Processing Toolbox** as the panel (usually) on the right. Another function for advanced QGIS users.

9 – Show statistical summary – quite useful option, especially for summarizing some distances, total number of items within our layer. By clicking this icon, user has the Statistic panel available (usually) on the left. The image above shows the **statistical summary** in action. It's our interest to select the proper value **(II)**, which statistics are needed. We can also use some expression for it **(III)** but probably not at the novice stage. If we want to get the statistical data just for selected features remember to tick the box in the bottom left corner **(IV)**. The statistics are basic like shown in the image above (Pic. 29).

10 – Measure line/area/angle – such a fantastic set of three features, which allow user making detailed measurements in QGIS. In fact, it's just manual way, which can be quickly replaced by appropriate formulae in data attribute table for all layers at once, but I doubt it's an exercise for newbies. Therefore, this method can be used. Remember, that **measurement results are based on the CRS system!** If your



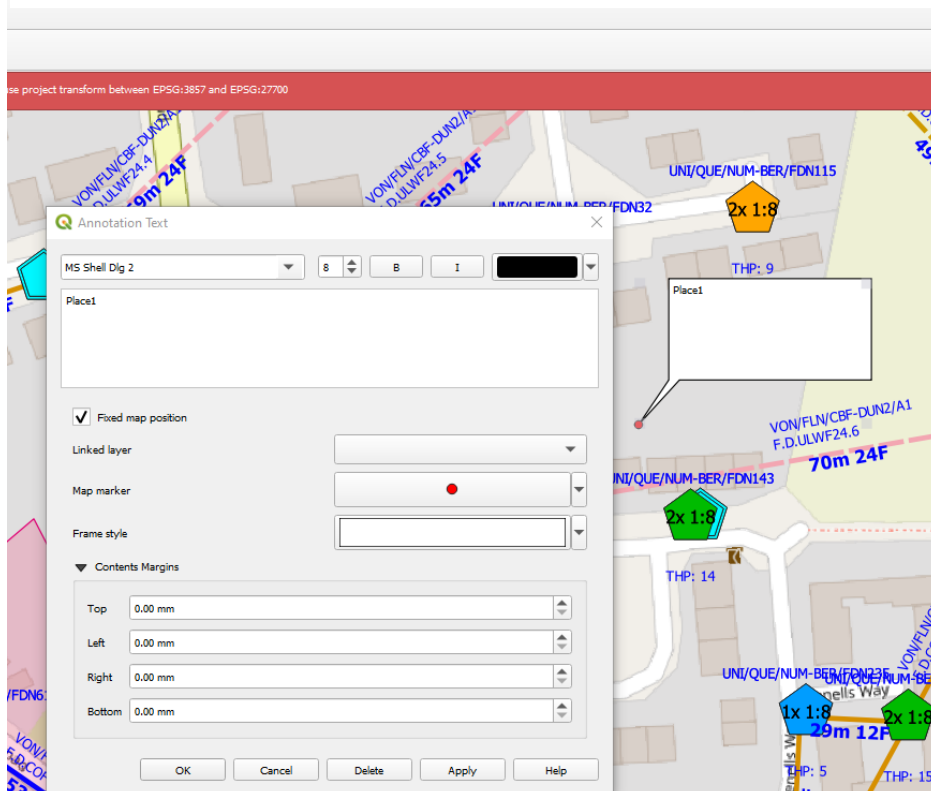
Pic. 30 Measuring area (left) and angle (right) in QGIS.

layer CRS it's not compatible with your project CRS (see Chapter 6) you will receive a rubbish. When doing measurement, the *“Measure”* or *“Angle”* window will always appear. For two-desktop workers it might be located far away from the QGIS window, but you can drag it closer when necessary. Important is, that the **measurement tool cannot be switched off by clicking on it again**. If you want to get rid of it, you must select the *“Pan map”* option from the Map Navigation Toolbar (Pic. 24).

11 – Show map tips – the option requires some **HTML & CSS skills** for customizing and styling the box we want to display. We can use these boxes for showing some links to objects, etc.

12 – Text annotation – a good way to show some comments, information in the **specific place on our map**.

Pic. 31 Text annotation in QGIS.



map. Apart from text annotation, we can also use form annotations, html annotations, SVG annotations and others. Some features might not work correctly, so the Annotation Manager plugin installation is necessary

D. Digitizing Toolbar

It's not necessarily toolbar just for QGIS viewers, although it's good to know some options from it.



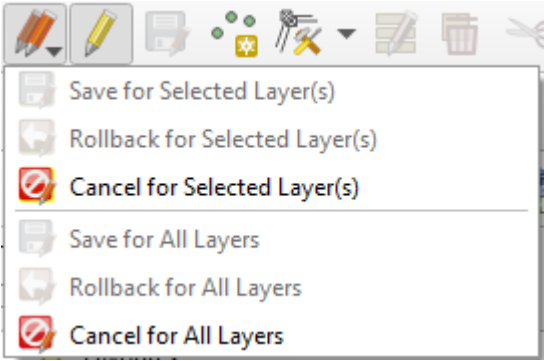
Pic. 32 Digitizing toolbar in QGIS.

The digitizing toolbar includes options as follows:
1 – Current edits – useful section, where user can do the saving for all & selected

layers at once, make a rollback for all & selected layers if something went wrong and cancel for all & selected layers (Pic. 33).

2 – Toggle editing – the most important feature of Digitizing Toolbar, where every user can start making some changes when necessary. It includes both playing with the attribute table, creating new objects in the attribute layer, and editing them.

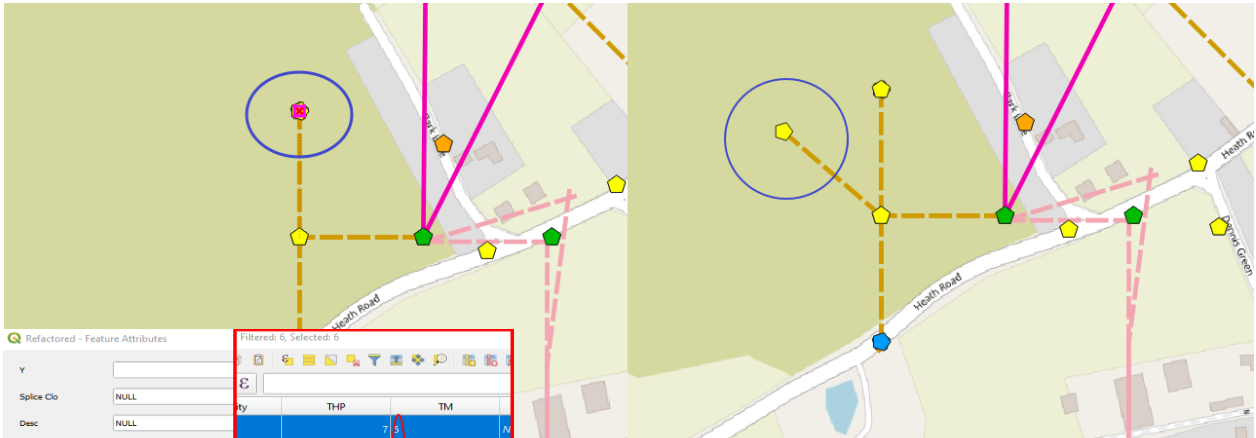
3 – Save layer edits. When inactive it means, that nothing has changed since we started editing. This is important step, which **must be done for all layers before we close the QGIS down.** In the situation, when our software is running slow, tends to freeze or even crashes, clicking on this option must be somewhat a knee-jerk task.



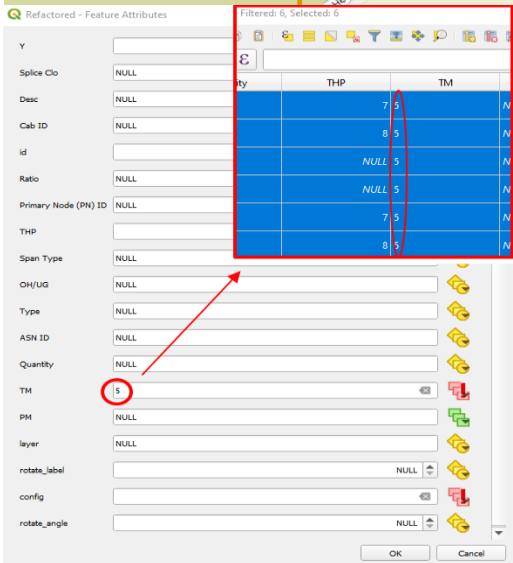
Pic. 33 QGIS – current edits

4 - Add feature – depending on the geometry of our layer we will see here Add Point/Line/Polygon features. They are marked by specific signatures. The point layer is given in the example considered (Pic. 32).

5 - Vertex tool – in order to make some slight changes in our layer we can move the vertices, add them or remove. The Vertex tool can work either for just our current layer or for all layers at once.



Pic. 34 Vertex tool – an example of moving one vertex.



Pic.35 Modifying some attributes for selected layers at once and confirmation with data attribute table.

6. Modify the attributes of all selected features simultaneously – this is something, which can be used **instead of the field calculator.** Since there some formula is required here even novice can handle with some changes, which apply for the whole lot. Rather than making some changes in attribute table, we can simply **provide the given value** (the same in fact) for all currently selected features or even for a whole column

when everything in our layer is selected (Pic. 35). We have 3 types of symbology there appearing on the right. The green boxes in the row mean, that all the inputs across the whole column have

the same value. Yellow signature with circle, box and lozenge informs us, that some of values are different. The last one – red highlights, that changes haven't been saved (applied) so far.

7 – Delete selected – when the item is not needed anymore, we can delete it. In practise usually the quickest option is hit the Del button instead.

8 – Cut features - Selected features are cut to clipboard

9 – Copy features – Selected features are copied to clipboard

10 – Paste features – Selected previously features are pasted where we want.

11 – Undo

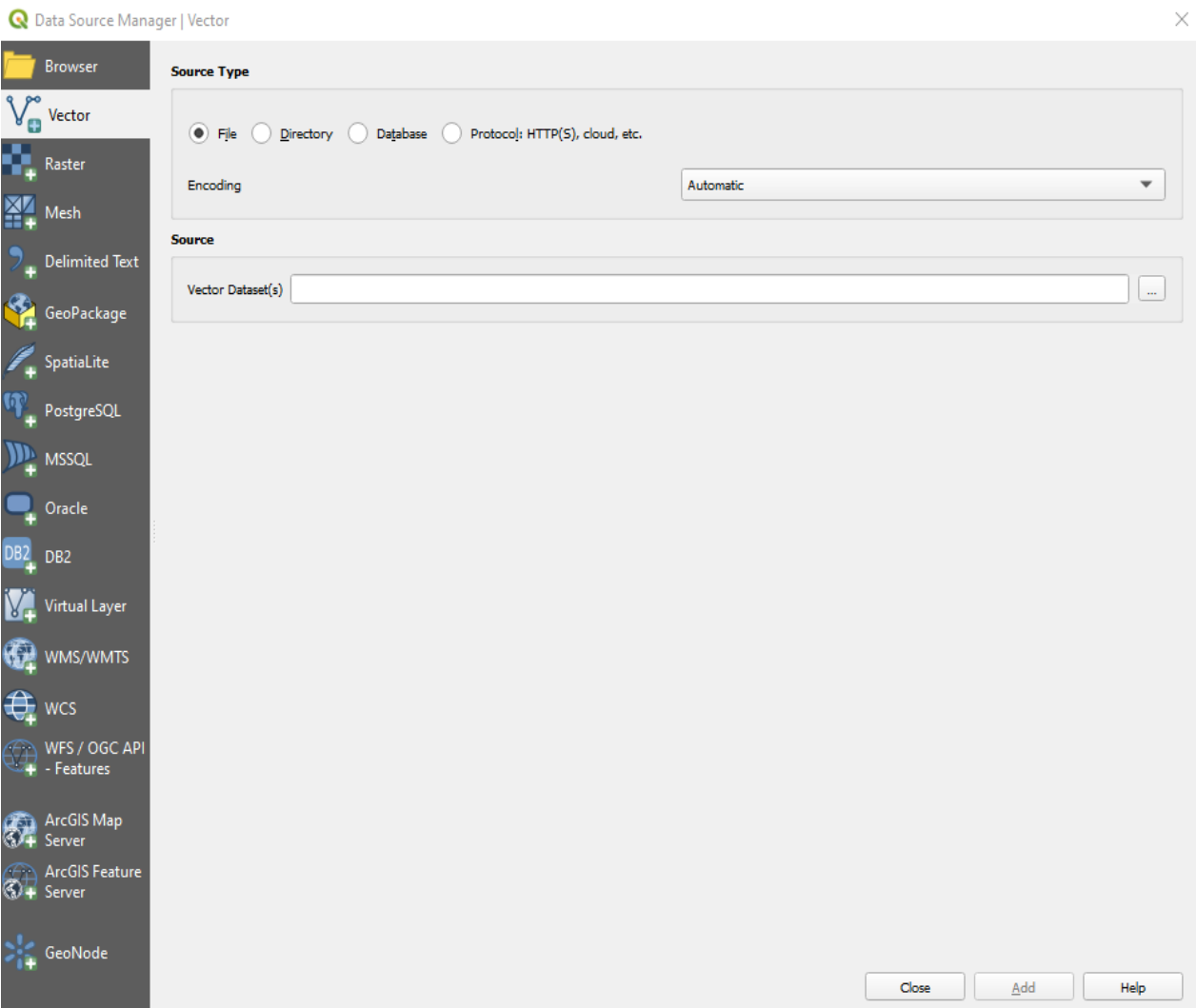
12 – Redo

E. Layer management toolbar



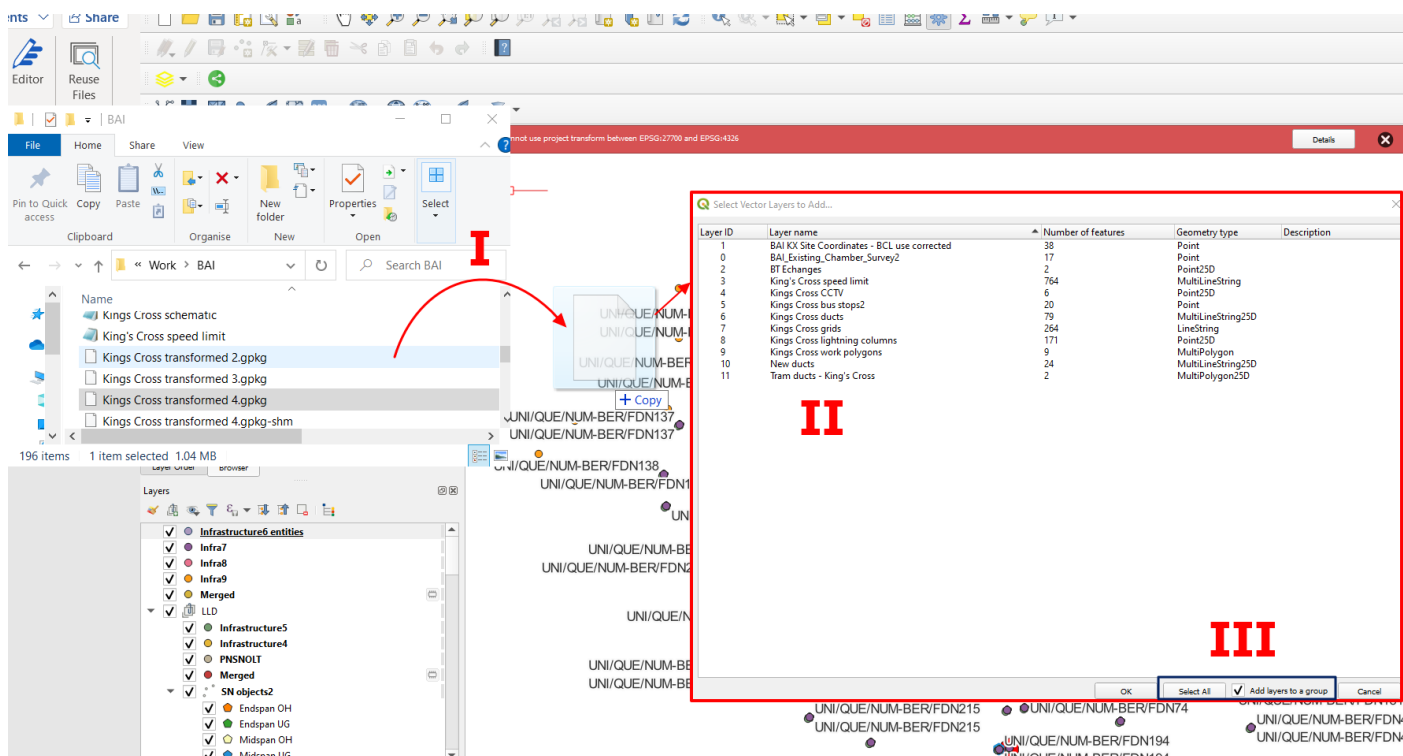
Pic. 36 Layer management toolbar in QGIS.

Layer management toolbar includes 12 options of adding new layer. The same options are available in the main panel in the **“Layer”** section as well as **Data Source Manager** (Pic. 37).



Pic. 37 Adding new layer by Data Source Manager in QGIS.

However, there are some options missing. Maybe adding PostgreSQL is not an issue for QGIS newbies, but the Geopackage for sure! There is another option, which would allow us to add any kind of layer apart from options listed in these 2 cases. It's just a simple drag & drop the file from the folder to QGIS (Pic. 38).

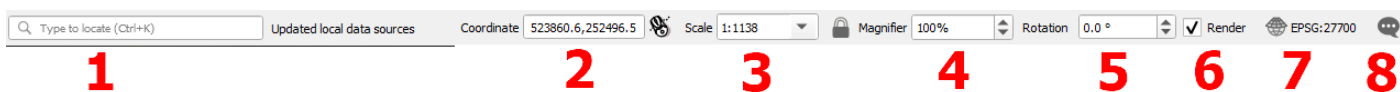


Pic. 38 Adding new layer to QGIS by drag & drop the file from the folder. This is the quickest way of how we can load geopackage (.gpkg) file in QGIS.

Drag & drop is easy thing. However, we must remember some issues here. First of all, the layer can be added when you can see the *"+Copy"* above your QGIS map (I). Secondly, the tool will ask you about loading the components of the file (layer) we want to add. When dealing with Geopackage file we have usually *several or even more layer within*. It's highly likely, that we will see the window like above (II) though. Moreover, we need to select some of them or all of them by using *"Select All"* button (III). Optionally they can be grouped (III), which is helpful especially in the case when we already have other layers in our panel.

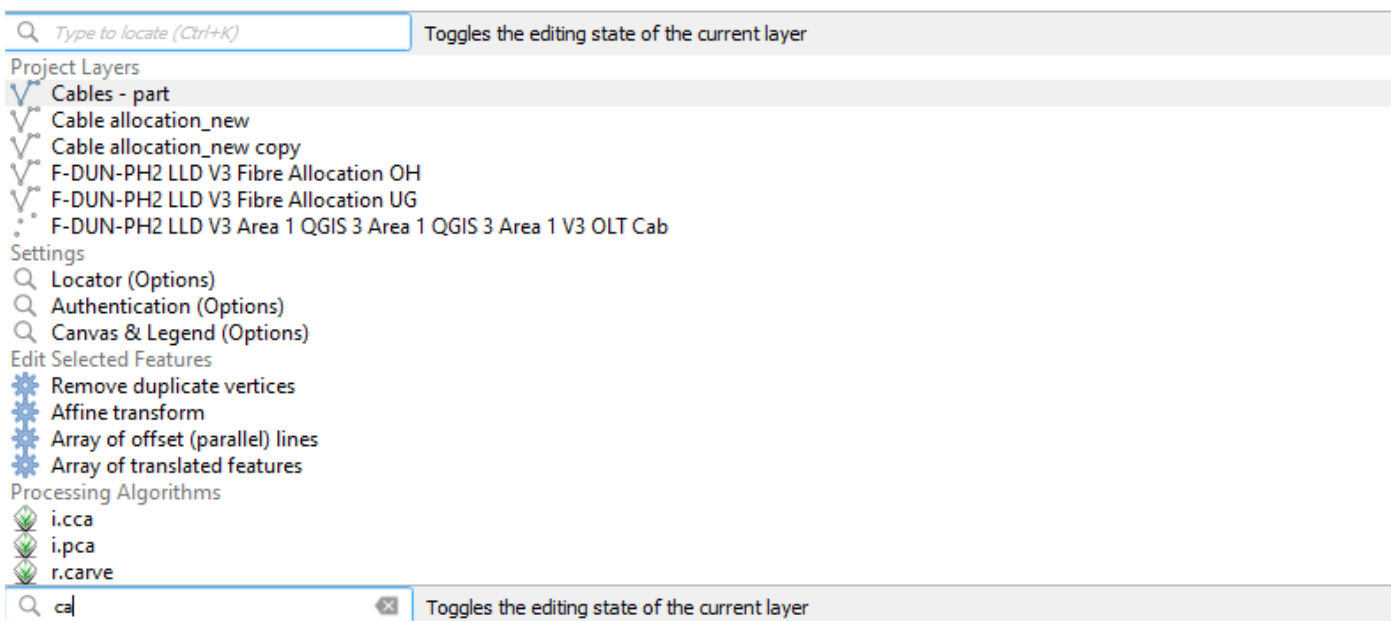
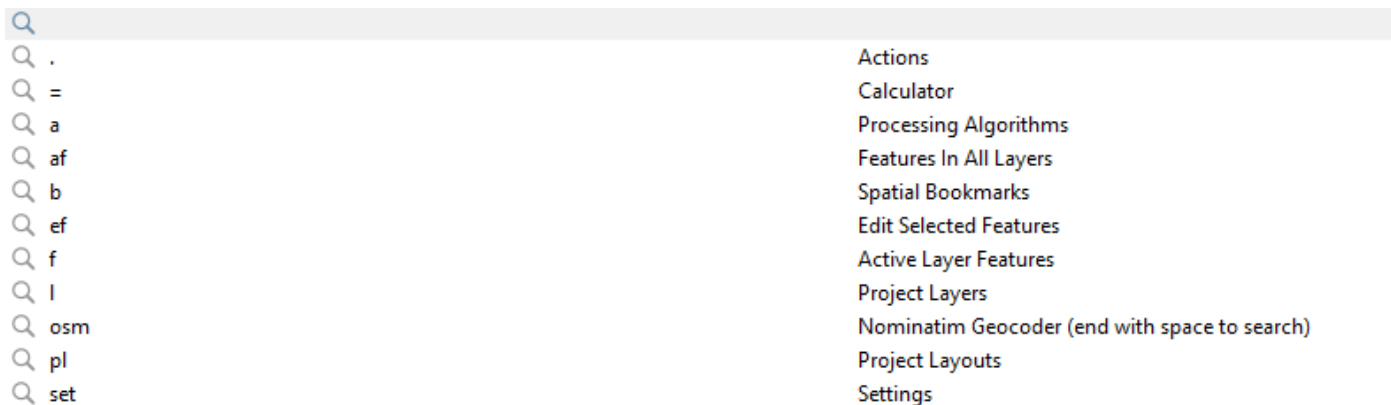
F. Status Bar

Status bar in QGIS is located **at the bottom of the interface**. Sometimes called information bar includes a few boxes in which you can find out information about the projection and navigation of the map. This bar also stores icons about any log messages (potential errors) and plugins awaiting updating.



Pic. 39 Status bar options in QGIS.

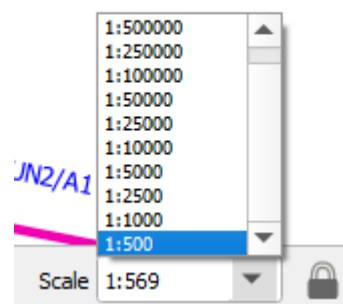
Our status bar has basically 8 options: **1 – Search function** – you can go *quickly to processing tools or layers*. It works analogically to the processing toolbox, although apart from just processing algorithms you can find the layers currently loaded to the project.



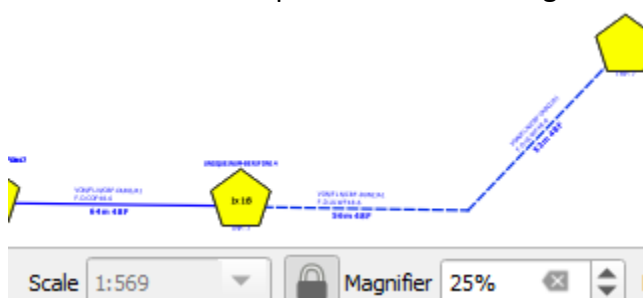
Pic. 40 Search function in use (next page).

2 – Coordinate box – informs us **what are the coordinates of our current cursor location**. They are CRS-based, so remember this. Instead of mouse position (signature on the right) we can toggle the coordinates of current map extends.

3 – Scale – the most important thing here is, that the scale value changes x2 when zoom in/out. If, for example your scale map is 1:2200, after scrolling your mouse or using the Zoom in option (Chapter 9.B.3) you will have the view at scale 1:1100. In the other side, when zoomed out, your scale will be 1:4400. Obviously, it's not a fixed issue. You can always **set up the scale** you want by using the smallish dropdown on the right or just typing your own value in the box. Very important is the **padlock** on the right-hand side, which allows you to **freeze the scale** and prevent it from changes when zoom in/out.



Pic. 41 Scale bar in use.

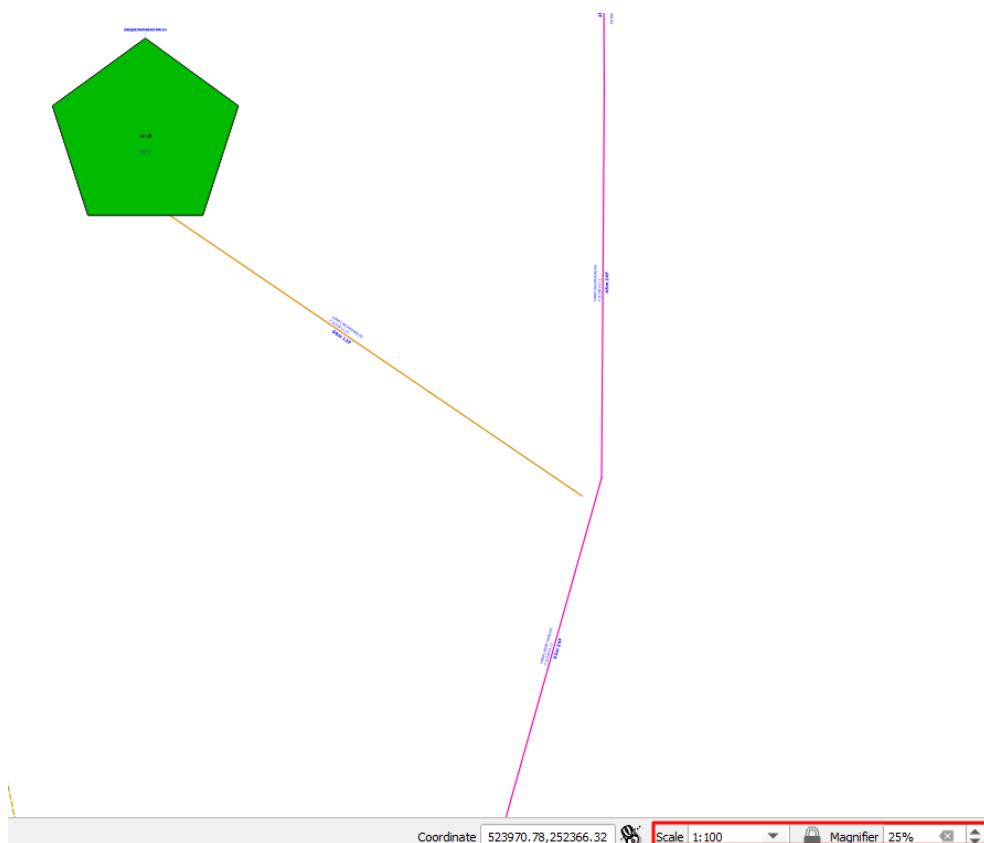


Pic. 42 The role of magnifier in QGIS.

When our scale is frozen, the only way of how we can zoom in/out is the **Magnifier**.

4 – Magnifier - Its role is different, because unlike the scale which brings us detail, the magnifier does just **visual enlargement or diminution of the view**. As you can spot in the image on the left, the view at scale of 1:569 has

been just reduced from 100% to 25% and finally it's the same view, just smaller than initially. Another tricky thing is the relation between Magnifier and Scale. Once the 25% is still in use, even when scale is unlocked, the view of the map will be reduced accordingly (Pic. 42).



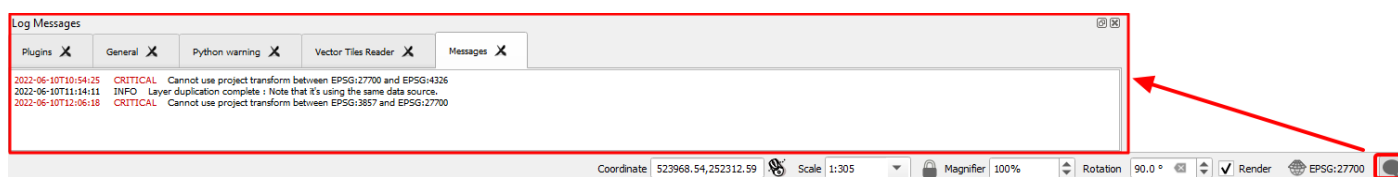
Pic. 43 Relation between the scale and magnifier in QGIS.

5 – Rotation – by setting an angle you can make your map rotated. As a result, just labels keep the “normal” view. Everything apart of it is a subject for rotation (**layers + map canvas**).

6 – Render – very useful option for users, who work on large projects requiring long loading when zooming in/out. The primary downside of this option is a **lack of precision** when we want to edit vertices, add new object, etc. By switching “**Render**” off, QGIS is not able to recognize the proper place where we want to make some changes, albeit for viewers only it can be a minor issue.

7 – Project CRS – information about current CRS and the shortcut for our project CRS settings at once.

8 – Log Messages – the pop-up window including all information & errors since we started working on our project. As shown below, they are gathered in some sections.

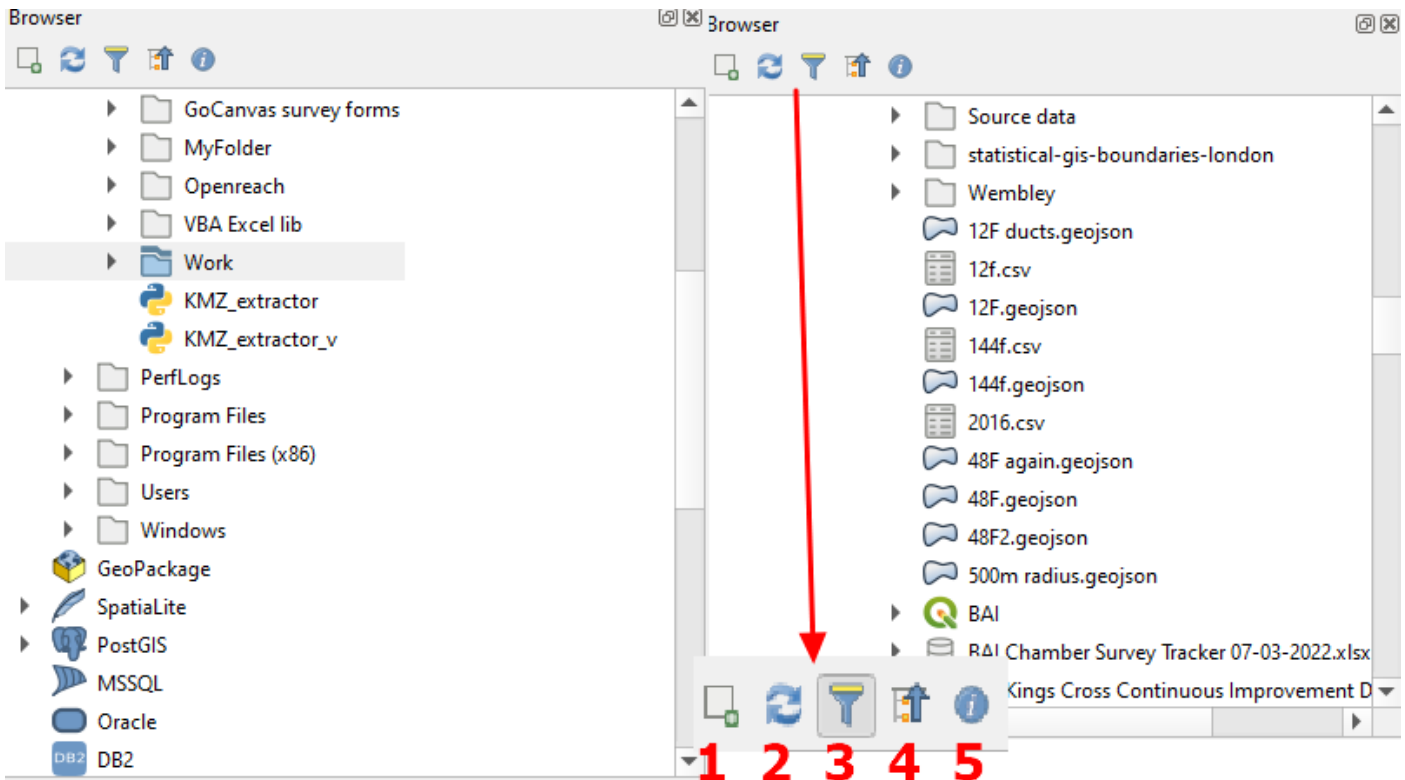


Pic. 44 Log Messages in QGIS, which are categorized.

G. Browser panel

The Browser panel acts like the **folder tree in our QGIS**. We have the **quick access** to bookmarks, recently saved layers and other QGIS projects. So, far only adding the new map canvas by using XYZ tiles was discussed (Chapter 6).

The Browser panel **act as the directory**, which can be compared to some dialog window opened by Windows when we want to load files with some specific extension. It does look pretty much the same here. The directory is presented as a nice folder tree with all files considered as potential vector/raster or other types of layers for our QGIS project. It's also the place from which we can drag & drop in the QGIS. Moreover, you can open the folder directly from here.



Pic. 45 The Browser panel in QGIS

The Browser panel handles a few options listed in the image, which can act as a nice shortcut for newbies.

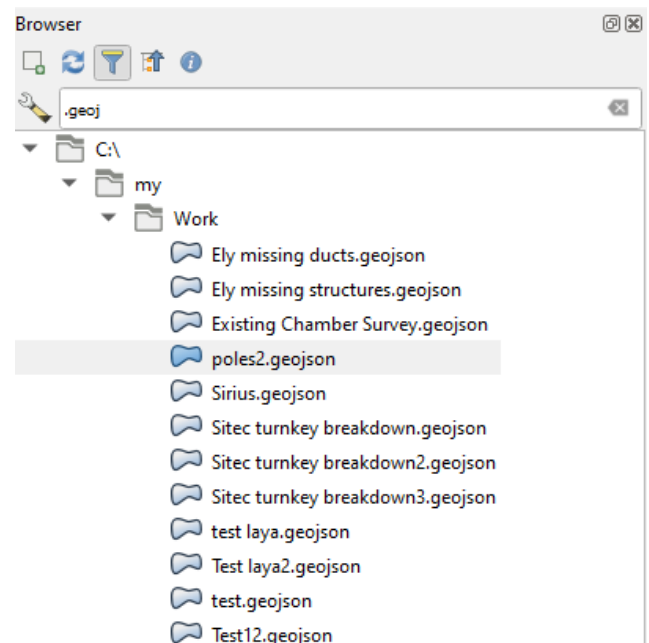
1 – Add selected layers – when the [file extension is compatible with the layer type](#), then it can be added to QGIS straight from this panel. As told before, the same can be done by [dragging & dropping the file into the main map canvas](#).

2 – Refresh – simply updates the view of our directory

3 – Filter browser – a nice option, which works likewise the search tool in Windows. We can find our file quickly by its name or extension. Our folder tree must be expanded correctly here (Pic. 46).

4 – Collapse All – it closes all folders and basically retrieves the default view of the folder tree.

5 – Enable/disable properties widget – the way for insight into the details of our file. We can [get the information](#) such as the geometry type, coordinates extent, number of features or units.



Pic. 46 Finding some files in QGIS browser panel.

10. Working with layers panel

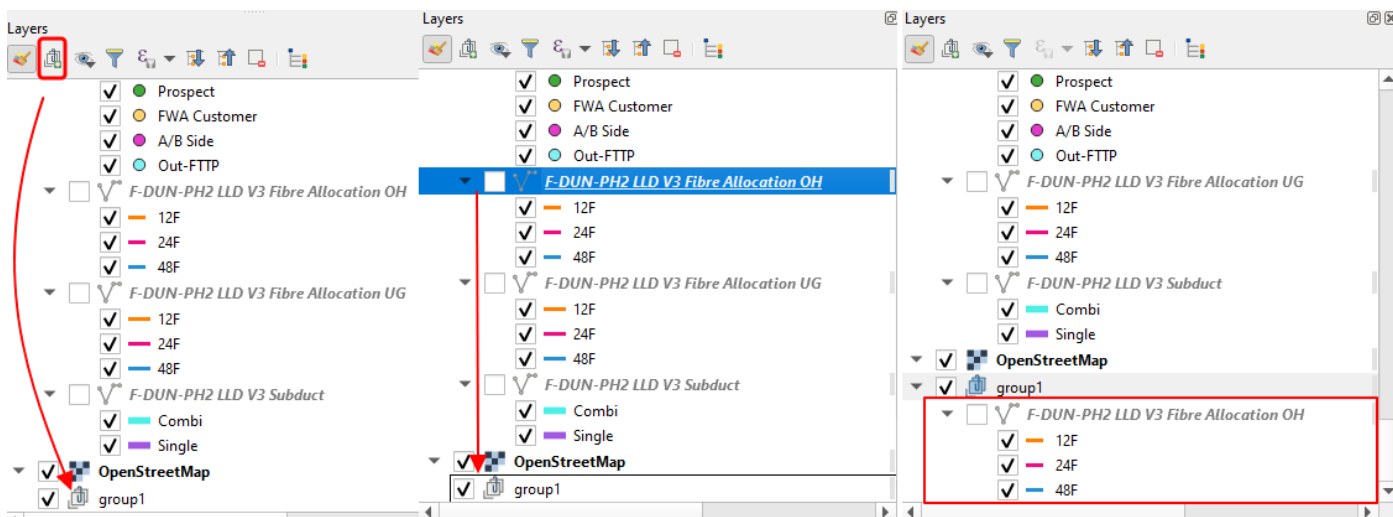


Pic. 47 Options in the QGIS Layers panel main bar.

Apart from the clear list of layers we have additional options, which allows us to manage with all layers smoothly.

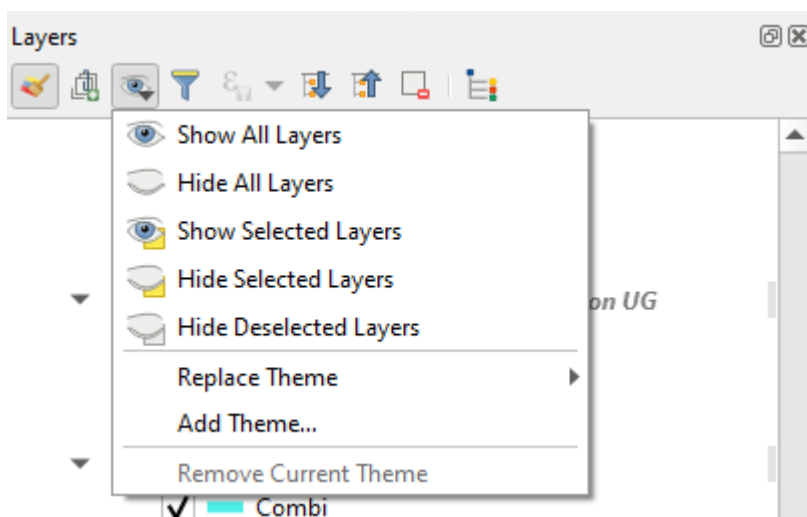
1 – Open the layer styling panel – it opens a new panel, usually above the Layers panel. In this panel you can look at styling used for the given layer (to be selected by dropdown) and make some changes, when necessary, at the same basis as styling is defined in QGIS. Some bits of this matter will be discussed later in this tutorial.

2 – Add Group – the handy option, which allows you to **congregate some layers** as per various topics/usage, etc.



Pic. 48 Creating layer group in QGIS.

3 – Layer visibility dropdown – includes several additional options, which help us to **manage with layer visibility**. The options listed below are mostly show/hide everything in one go, which is very handy. Another



Pic. 49 Show/Hide layers options

The Layers panel is the most important for any user because it gives us an instant access to any layer included in our QGIS project. The Layers panel is the place where a user can see **all the layers used in the project**, count total amount their items straight away or access the data instantly.

Another thing is the **map theme**, which can be customized and saved. This is a **nice shortcut mostly for printing our map**. First – map theme is otherworldly the group of layers saved as the map. So, if you have grouped your layers earlier, now you can see them as the map theme. The **“Replace Theme”** option can be used for changing the current map with other one saved earlier.

4 – Filter legend my map content – interesting option for “slimming down” your legend when zoom in. It will include

just these layers or categorized items, which are [visible in the current map zoom level](#).

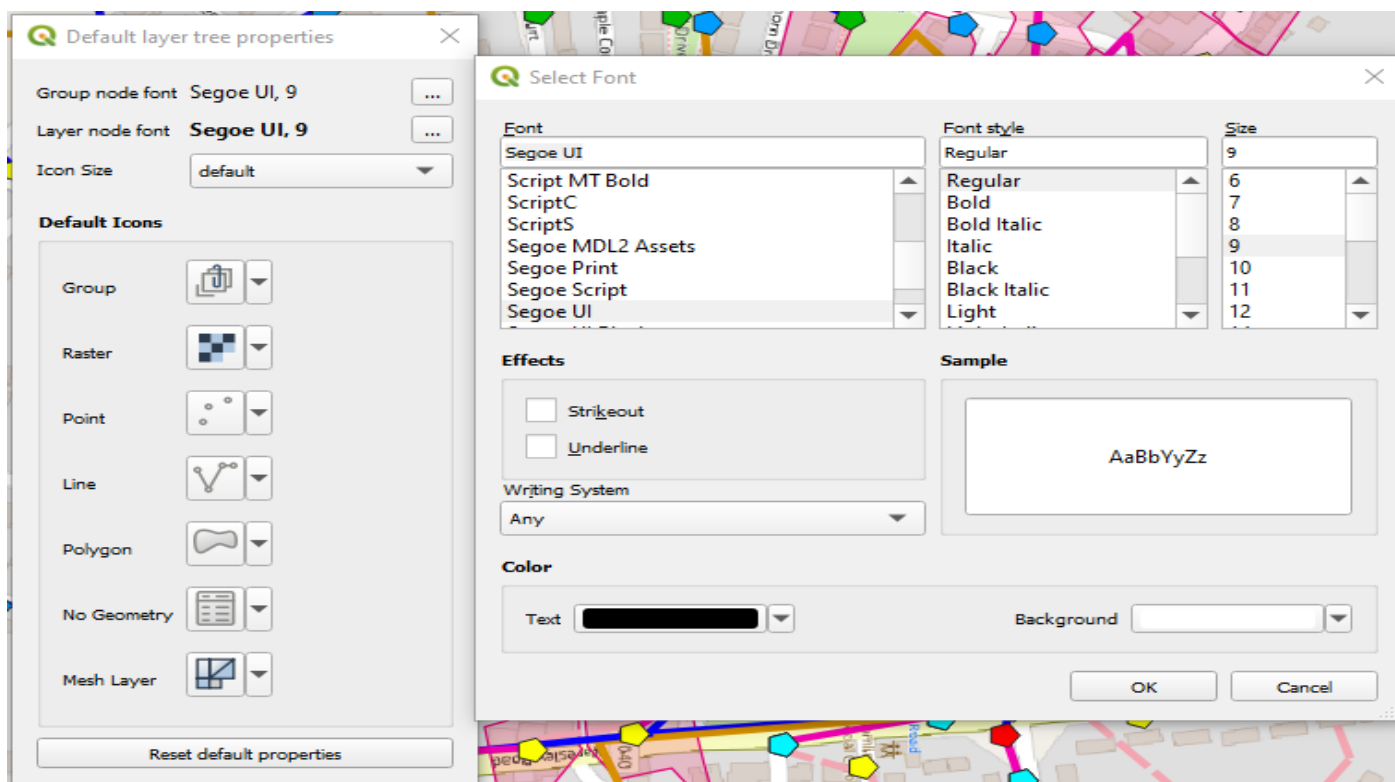
5 – Filter legend by expression – applies to one layer only. We can filter the legend categories by expression, although it doesn't seem to be task for QGIS newbies.

6 – Expand all – expands all the layers which have categorized items.

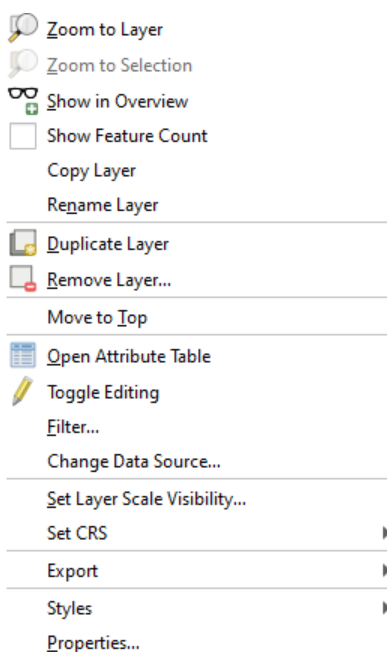
7 – Collapse all – Collapses all the layers which have categorized items.

8 – Remove layer group – **removes layer group with all layers inside**. Make sure, that you are doing this step wisely and you thought over everything before! You can still add these layers again to QGIS, but it will be wasting of time.

9 – Manage default tree properties – can be useful when you are unhappy with default font and icons.



Pic. 51 (bottom-left) Right-clicking list of options offered by the Layers panel for each layer.

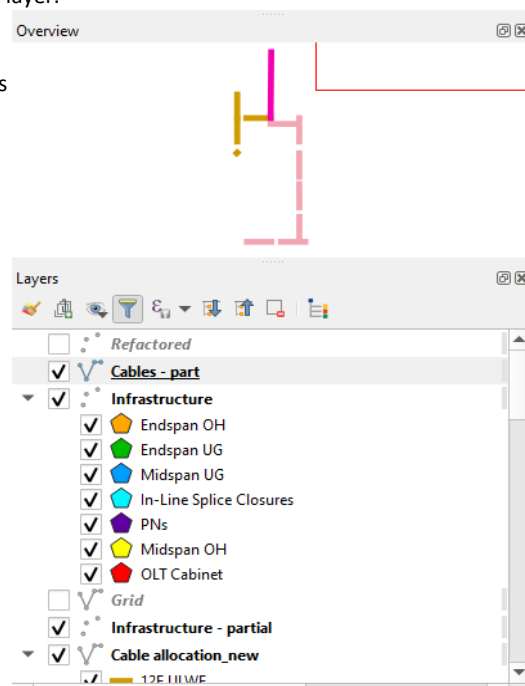


Pic. 50 (top) Layer in Overview panel.

Pic. 52 (bottom-right) Show/Hide layers options

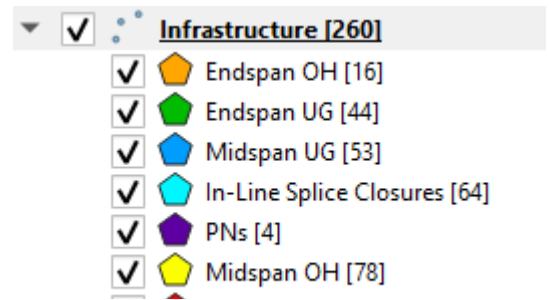
The Layer panel features many other options available for any layer by right-clicking (Pic. 52).

- **Zoom to Layer** – zooms user **directly to the layer**. It works especially for layers **restricted to some small area**. Zoom level is adjusted to it. If our layer covers i.e., the whole town, there is no need to use this feature.
- **Zoom to Selection** – needed especially when **we have some bits selected and we don't know**



where they are. It works at the same basis as the previous one. It's a very handy feature.

- **Show in Overview** – the option useful just for another – the Overview panel, which should be toggled separately. As long as the binoculars icon remains active, we can see the layer active in the Overview panel. The zoom level in Overview panel is also subject of changes depending on the size of our layer or area covered by all the layers which have been toggled as shown in Overview (Pic. 50).
- **Show feature count** – very useful option, which calculates instantly all the items belonging to the particular layer even when categorized (Pic. 51)



Pic. 53 Categorized layer legend with the “Show features count” option applied.

- **Copy Layer** – the same option as presented earlier (Chapter 9, D, Pic. 32). We can copy our layer.

Handle Unavailable Layers

Layer name	Type	Provider	Auth config	Datasource
5 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940051_2.tif
6 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940051_3.tif
7 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940051.tif
8 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_1.tif
9 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_2.tif
10 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_3.tif
11 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_4.tif
12 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_5.tif
13 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_6.tif
14 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052_7.tif
15 OS_MasterMap_725...	raster	none		../Kimble 2/OS Maps/OS_MasterMap_725856_940052.tif
16 Transformed	vector	ogr		../Users/mariuszk/AppData/Local/Temp/

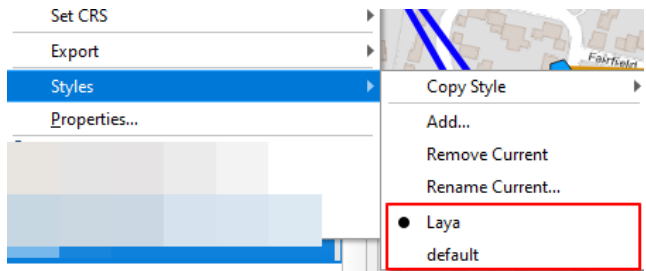
Pic. 54 The “Handle Unavailable Layers” window

- simply show our layer as doubled. When your layer is heavy, give your computer a while for rendering it.

- **Remove layer** – removes layer from our QGIS project making it lighter and faster at once. It doesn't remove group, just layer thereby loading it again into QGIS won't be a big issue.
- **Move to Top** – very handy shortcut in the situation when our layer falls somewhere in the bottom and it's not visible properly (or even hidden at all by i.e., the map tiles). By clicking this option, we are emphasizing the visibility of the given layer, because it's placed at the very beginning of the Layers list and not hidden anymore. In the other hand this layer overlaps all others lying underneath it.
- **Move out of the group** – the option visible just for grouped layers. When user doesn't want to have this layer assigned to the group, he can simply move it out. Both Move to the Top as well as Move Out of the Group work in manual way by dragging and dropping, but when our project is large it might take a while to, therefore far better is using these shortcuts provided.
- **Open Attribute table** – opens the details of our data, which will be discussed almost straight after this chapter.
- **Toggle editing** – The same as discussed earlier (Chapter 9, D, Pic.32) we can make our layer editable.
- **Filter** – not necessarily an attribute for QGIS novices. We can basically filter the visibility of our layer items by expression (query builder).
- **Change data source** – it's relevant in the case when our QGIS project have been moved somewhere or in the other hand some layers has changed their directory. As a result, QGIS cannot find them after

loading the project. It's often shown as the information window **“Handle Unavailable Layers”** (Pic. 54) where we can find the **new layer location on our own**. In fact, QGIS can help us with it when the layer by **Auto-Find option**, but better is do it manually. The best option is **saving our layer as relative path** instead of absolute.

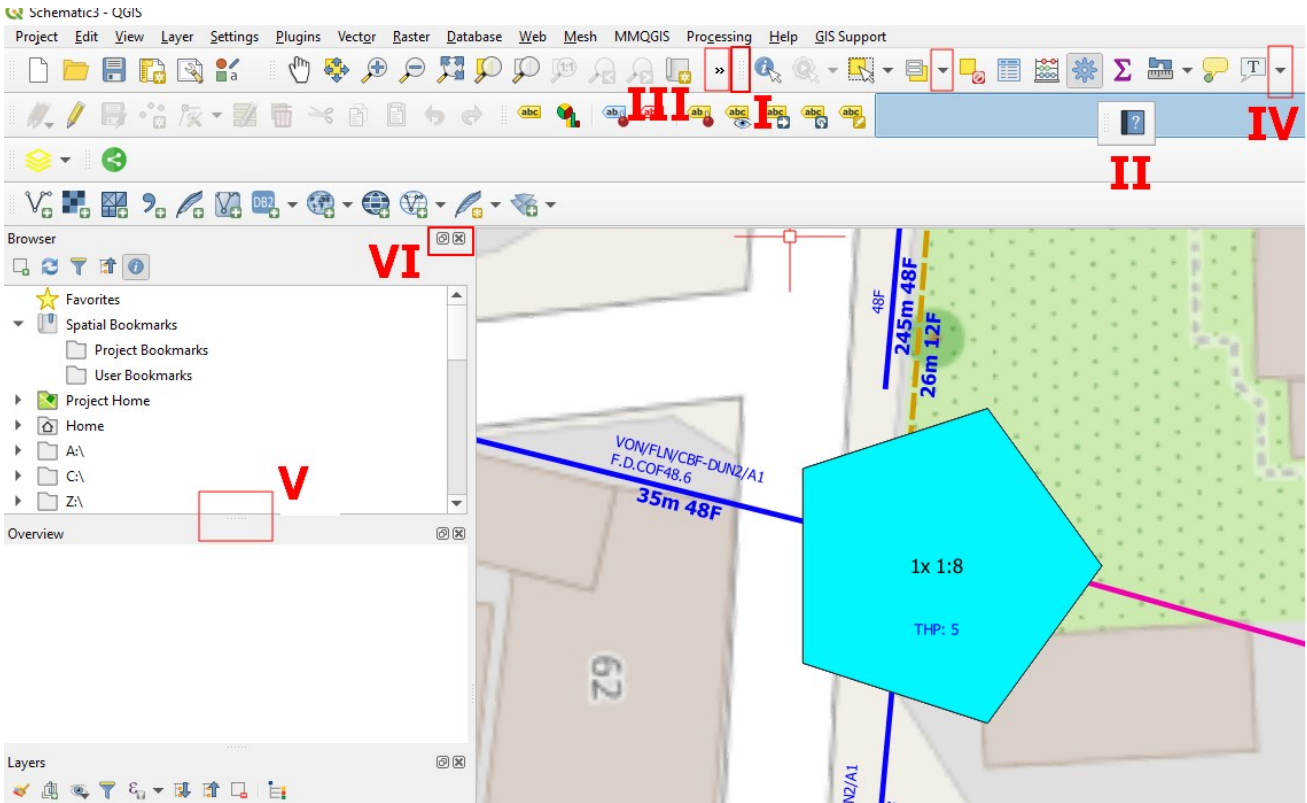
- **Set Layer scale visibility** – a nice shortcut, where we can **define the range of scale** in which our layer will be rendered. In practise it's the **zoom threshold** above which the layer will become invisible. It works in the case when our project is congested and most of stuff tends to merge when zooming out.
- **Set CRS** – another shortcut, which help us to get quickly to the coordinate system options for our layer. Discussed in the Chapter 6.
- **Export** – a way of which we can export our layer to desired format. To be discussed later.
- **Styles** – the option which allows us to **copy the style** of given layer or paste the style from another layer, which is similar. We can also add a new style here or change its name. All the styles made by us will appear on the Styles section after expanding (Pic. 55).
- **Properties** – an instant access to layer properties, to be discussed later in this text.




Pic. 55 List of current styles available for our layer.

11. Interface – summary

At the end of explaining how the QGIS main interface works it's essential to raise information about remaining some bits, which can help us with the general navigation skills.



Pic. 56 List of current styles available for our layer.

The screenshot above (Pic. 56) shows elements, which knowledge is helpful in the day-to-day work with the program. They help us navigate a specific piece of the  interface smoothly.

I – the vertical row of dots – after hovering our cursor changes into cross enabling us to move the panel in different place in our major toolbar (II).

II – The section of main toolbar “prepared” for the toolbar “deposition” – it’s ready for dropping the toolbar we want there.

Layer Properties - Cable allocation_new | Information

Information from provider

Name: Cable allocation_new
 Path: C:\my\Work\Voneus IIC\Schematics\Kimble III\Cable_allocation_new.geojson
 Source: C:\my\Work\Voneus IIC\Schematics\Kimble III\Cable_allocation_new.geojson[layername=Cable_allocation_new]
 Storage: GeoJSON
 Comment:
 Encoding: UTF-8
 Geometry: Line (MultiLineString)
 CRS: EPSG:27700 - OSGB 1936 / British National Grid - Projected
 Extent: 522984.0984963175142184.251569.0572842473338824 - 525022.0941310997586697.252862.6366959591105115
 Unit: meters
 Feature count: 194

Identification

Identifier:
 Parent Identifier:
 Title:
 Type: dataset
 Language:
 Abstract:
 Categories:
 Keywords:

Extent

CRS: - Projected
 Spatial Extent:
 X Minimum: 0
 Y Minimum: 0
 X Maximum: 0
 Y Maximum: 0

Temporal Extent:
 Start:
 End:

Access

Fees:
 Licenses:
 Rights:
 Constraints:

Fields

Count: 19

Field	Type	Length	Precision	Comment
fid	Integer	0	0	
id	Real	0	0	
Cable Size	String	0	0	
Length (m)	Real	0	0	
Cable ID	String	0	0	
New Build/	String	0	0	
TM	String	0	0	
PM	String	0	0	
layer	String	0	0	
Order	String	0	0	
1_Cable Size	String	100	0	
1_Length (m)	Real	0	0	
1_Cable ID	String	254	0	
2_Cable Size	String	100	0	
2_Length (m)	Real	0	0	
2_Cable ID	String	254	0	
auxiliary_storage_labeling_positionx	Real	0	0	
auxiliary_storage_labeling_positiony	Real	0	0	
auxiliary_storage_labeling_labelrotation	Real	0	0	

Contacts

ID	Name	Position	Organization	Role	Email	Voice	Fax	Addresses
1								

Links

No links yet.

History

No history yet.

Pic. 57 The list of layer properties in QGIS with Information panel displayed.

III – the “>>” symbol - means, that the given toolbar hasn’t been expanded enough and some of options are simply hidden. The toolbar can be expanded by using the symbol I.

IV – the upside-down triangle - which states that the given option is expandable and includes at least 2-3 other ways of solution.

V – the horizontal row of dots “.....” - Plays an analogue role to symbol I. Here we can expand or reduce the dimensions of the given panel. It’s useful especially when we want to see all layers included in our project.

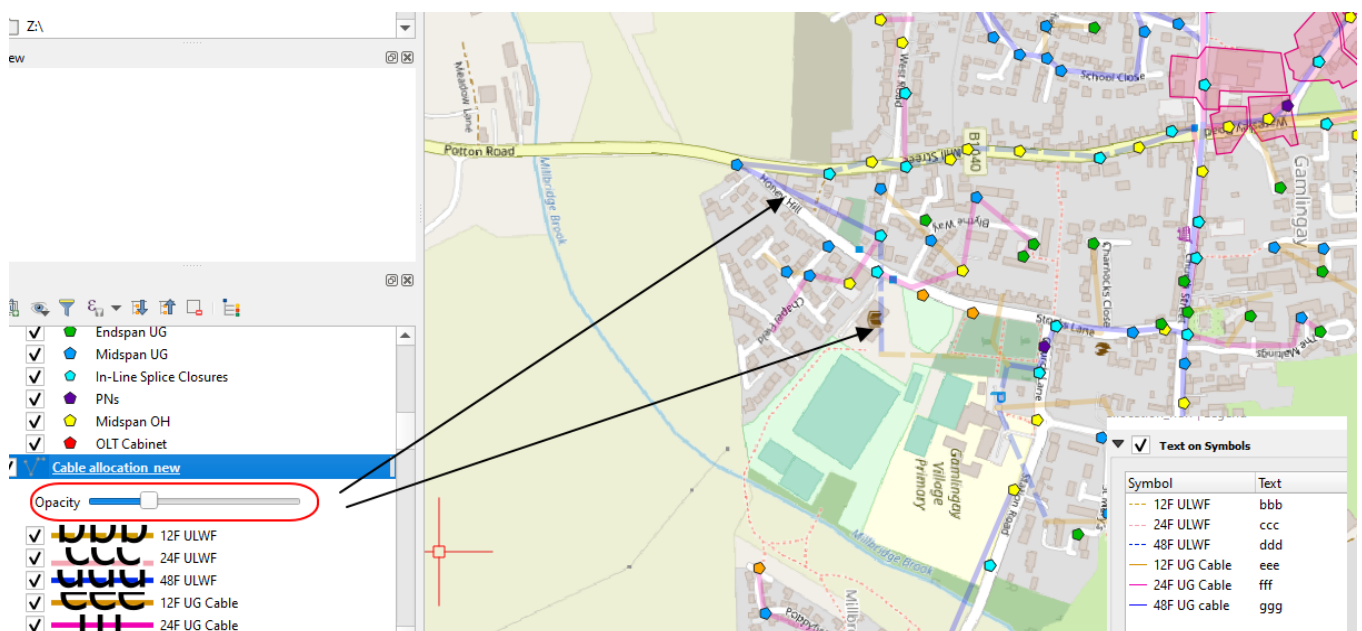
VI – The symbols described in chapter 3.A. - applying to the single panel. One of them shuts down the panel an adjacent one pops the panel out of the sidebar like described earlier.

12. Checking layer properties

This is the last option considered after the right-click on the layer. In fact, it’s a bunch of many other options, in which we can

make a lot of alterations to our layer. Some of them will be discussed here, although most of options don’t seem to be easy for QGIS newbies. Basically we can start from the very beginning of the list (Pic. 57) and briefly discuss all of them:

- **Information** – the whole panel you can see above (Pic. 57), which includes a few sections informing us about the layer origination and its content. It's worth to look at the following things:
 - > **Path** – inform us about the **location of our layer**.
 - > **CRS** – current **coordinate system** of our layer.
 - > **Storage** – in other words the file extension in which our layer is stored.
 - > **Geometry** – what type of geometry has our layer.
 - > **Feature count** – **total number of features** included in our layer.
 Other information is listed in the image above.
- **Source** – it basically refers to the **coordinate reference system**. There is an option for feature filter there, but it's the advance feature.
- **Symbology** – the place where we can **style our layer**. It will be discussed later.
- **Labels** – providing **text labels to our features**. It will be also discussed later.
- **Masks** – the option for stroke outlines around the layer items. It works at the same basis as the masks around labels discussed later.
- **Diagrams** – very nice option for users, who must prepare the **proportional symbol maps**. The creation is based on the expressions, therefore might be difficult for newbies.
- **3D View** – nice option for **3-dimensional visualizing of our layer**, although recommended rather for gaming computers with a good graphic card.
- **Fields** – an **insight on the data attribute columns**, where we can find especially their type (Boolean, string, double, etc). If some fields have been joined from other layer, they are also visible here.
- **Attributes form** – the **detailed options for any attribute column** and the way of how we can input the data. We can automatize some inputs here.
- **Joins** – the tool joining the **correspondent attribute tables from another layer**
- **Auxiliary Storage** – visible only when **labels have been rotated from the label panel**. They include information where the certain rotation circumstances are stored.
- **Actions** – the list of actions assigned to our layer.
- **Display** – here is the place for creating the map tip by using **basic HTML code**. The map tip will be displayed when clicking anywhere on our map.
- **Rendering** – for newbies the most important can be the **“Scale dependant visibility”** discussed earlier (Chapter 11) which defines the layer scale visibility range.
- **Variables** – the list of all variables available at the layer's level. It's just mostly for information purpose.

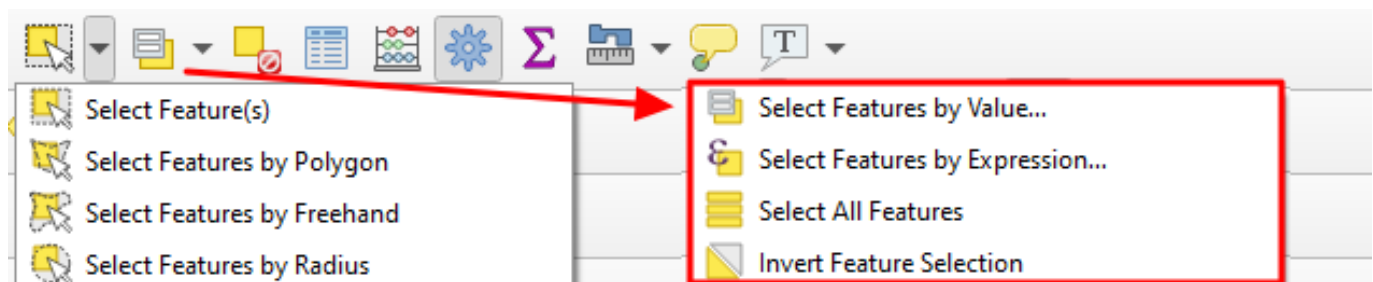


Pic. 58 The legend properties for one of the layers in QGIS project.

- Metadata – the section, where we can provide additional information about our layer like copyright, etc.
- Dependencies – this tab allows you to declare [data dependencies between layers](#). It means, that we can select the layer, which may alter externally the data in other layer and other way around. This is rather for advanced QGIS users.
- Legend properties – the box, in which user can [adjust the visibility of our layer](#) by adding some description on your symbol (flexible font and size) or set the degree of layer opacity as shown above.
- QGIS Server – it's option rather for advanced users. You can provide your own WMS connection based on the file you are using as the layer.
- Digitizing – here we can ensure about the validity of our layer. The option allows us to check the quality of digitized properties.

13. Selecting layers & items

Layer section is important thing in QGIS, because we can [distinguish the items from the layer](#). The selection also allows us to [extract the piece of data](#), about which it will be explained later. The selection options are in the attribute toolbar (Chapter 9 B, Pic. 28). We have several options of the selection (Pic. 59).



Pic. 59 Selecting options in QGIS.

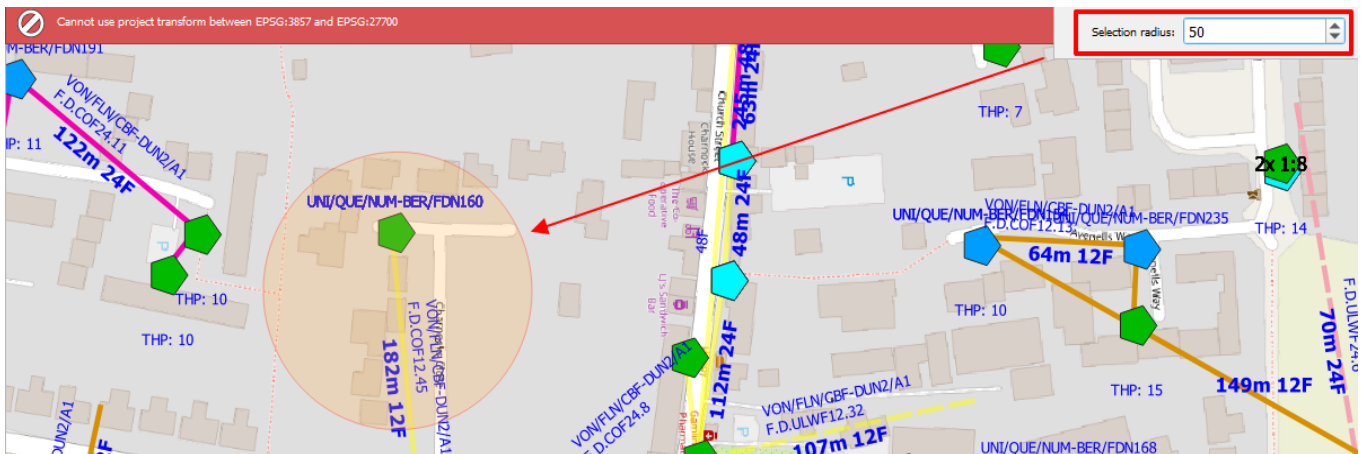
- Select Feature(s) – we are [selecting any feature by clicking](#). We can select them more by [holding the Ctrl button](#). Another way is [holding mouse and dragging the cursor](#), which eventually makes the selection box. Everything within as well as crossing this box is to be selected.



Pic. 60 Selecting features by polygon in QGIS. Selection polygon on the left and selected features on the right.

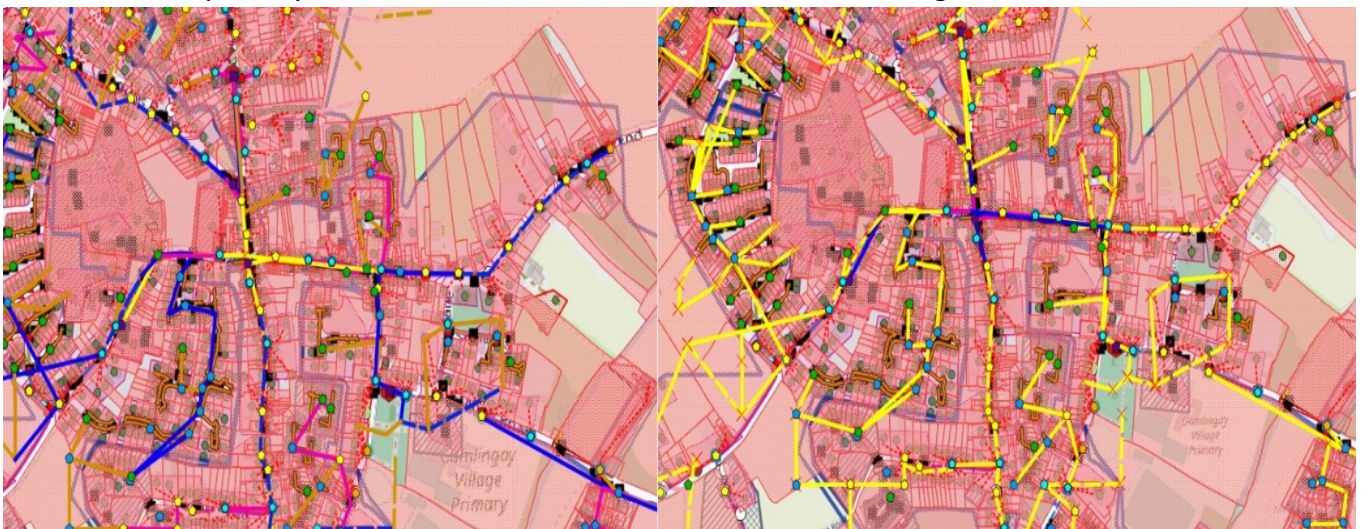
- Select Features by Polygon – an analogous option to the previous one, but instead of the box, we can [select our items by polygon](#) (Pic. 60). Likewise, previously, everything falling inside or crossing the polygon will be selected.

- Select features by freehand – similar to the two previous options. It's enough just to click somewhere in the map and **as you move your cursor, the freehand polygon is created automatically**.
- Select Features by Radius – as you **set your cursor somewhere on the map** and see the purple cross (X) now you can click and see how your circular selection increases (Pic. 61). On the right there is information about **the radius value**, which is displayed in meters (despite lack of unit provided). You can set it manually either. If you are unsure the measurement unit, there is a plugin **Select by Radius Plus**, which will take care of it for you.



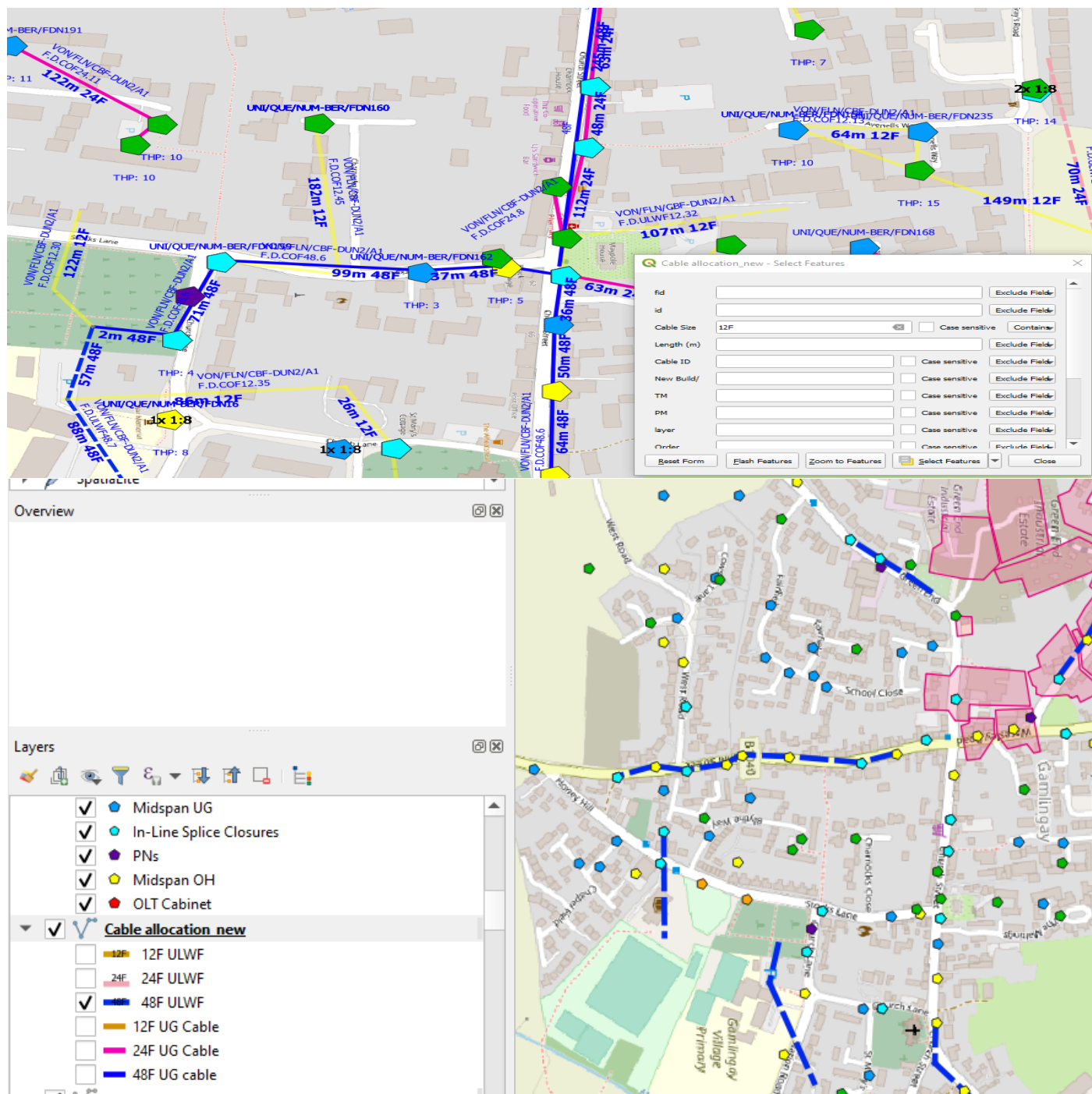
Pic. 61 Selecting features by radius in QGIS.

- Select features by value – this is a cool option of selection, which can be based on **value or more than one values**. We've got here all the attribute table inputs, which can be used. Moreover, this option allows us to zoom to selected features or add something more to our current selection.
- Select feature by expression – an analogous option to the previous one, but requires some knowledge about QGIS expressions, which aren't covered in this text, dedicated just for viewers/newbies.
- Select all features – selects **everything which belongs to our current layer**.
- Invert feature selection – can be really handy when we just need **two group of selections**. This option simply reverts the selection of the items. If for instance, we have all the items selected with the given value like shown in the image above (Pic. 62). Invert selection will deselect them and select all remaining items in the current layer instead.
- Deselect all – the rightmost option in the panel, which switches off the selection completely. Nothing is selected since then. Alternatively, you can use the Invert feature selection in the case when all the features in your layer are selected. The effect will be the same though.



Pic. 62 Invert feature selection in QGIS.

There are also other methods of the layer selection. Instead of using the **“Select feature by value”** we can switch off some legend categories from the Layer panel and use the **“Select all features”** in some cases (Pic. 63).



Pic. 63 (Up) Selecting features by value.

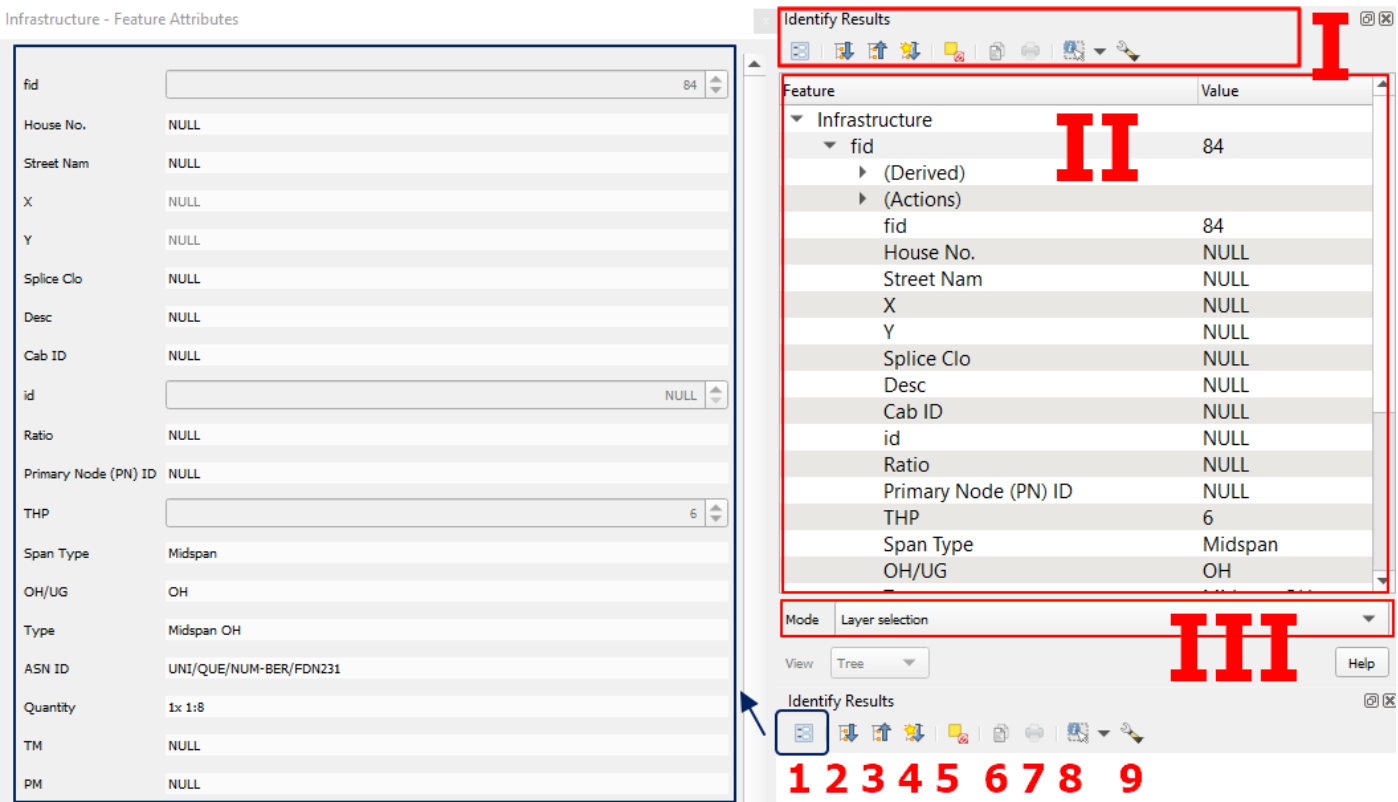
Pic. 64 (Down) Switching on/off categorized items from the layers panel.

In the Layers panel, where we have the list of layers, each layer with more than 1 style applied (mostly rule-based or categorized) **has its own legend** retrieved from the symbology. **Each of categories can be switched on/off**, although all the are visible in default. The image above shows the situation, where just one of categories is selected. Thereby just this category can be selected in the case like this. Imagine, that our categorized criteria have been based on the same value as shown in the earlier image (Pic. 63), the **result of selection will be exactly the same!** Bear in mind, that since the selection of all items has been applied, it will be assigned for another category too when switched on. Anyhow this is the case, where the specific selection, based on the style category can be done.

More advanced selection method applies to [choosing items, which falls inside the other layer](#). It's not in fact the thing, which the QGIS newbies should be familiar with, although it's good to know for the future reference, that the option such as this exists. We should use **Vector -> Research Tools -> Select by location** and define both the layer which items we want to select and the layer, which these items potentially overlap. Apart from the **Select by location** we can use the **Random Selection** and select just sample of the given layer like 10 items or so. Another – **Random Selection** within subsets does the same but with respect of the particular attribute table value provided. In general, both methods are just rather out of interests, because the selection such as this is mostly senseless.


14. Inspecting items

Another thing, which is like selection of the layer items is the inspection. The inspection seems to be [far more beneficial than selection](#) because it provides **all the details about our layer items**. Unlike the normal selection, where you have just highlighted features by the other colour, inspection gives you the possibility of providing and changing data inputs in attribute table. You cannot do it from the selection panel because you must visit the data attribute table. The Identify Results tool [emerges as the separate panel, usually on the right sidebar](#). The Identify results option is wealth with features, which are shown in the image below and described accordingly (Pic. 65).



Pic. 65 Identify Results in QGIS – available options (I), the interface (II), mode selection (III) and feature attributes.

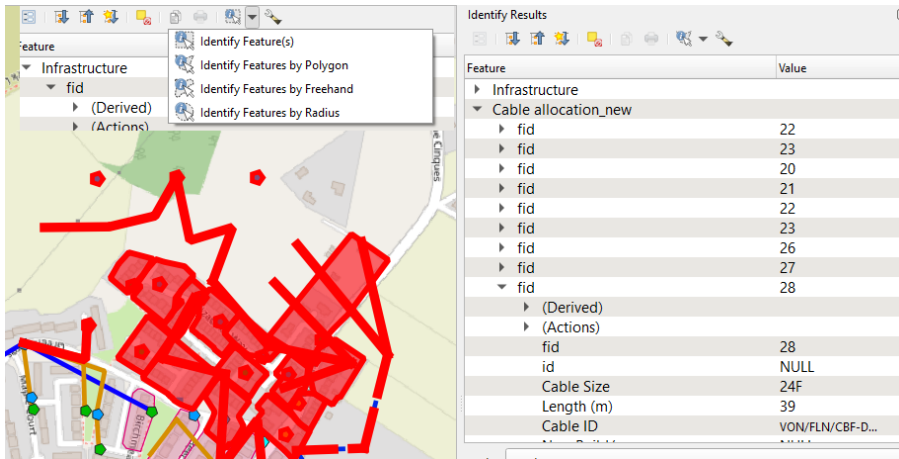
1 – View feature form – shown in the image above (Pic. 65). This is the section, where you can **edit the values of feature attributes**. Obviously, it's available only when your layer is **toggle in editing mode**. Otherwise, you will see greyed inputs like above.

2 – Expand Tree – expands all sections preceded by the symbol , although it's not necessary using it, because in default we have all information from attribute table, which we need.

3 – Collapse Tree – it's rather not recommended, because we will have everything hidden.

4 – Expand New Results as Default – it determines whether the next identified feature’s information should be collapsed or expanded. It’s better to [keep this option switched off](#) as we don’t need the full sections (*Derived, Actions*) expanded all the time, just pure data from the attribute table.

5 – Clear results – erase everything leaving an empty dialog window.



Pic. 66 Identifying features by polygon.

an example of identification of multiple features by polygon. Worth attention is the **Feature panel**, which now includes all types of layers and items selected. Each single item comes as “fid” and its expandable at the same manner as the single one.

9 – Identify Settings – it’s just one option there - *Auto-open form for single feature results*, which opens instantly the *Feature Attributes form* when clicked on just one single feature of our layer. Can be useful in the case when user wants to edit something quickly. The Feature attribute is launched on account of Identify Panel which is not.

Next area of concern is the **feature panel** (Pic. 65, II), where all relevant information is shown. Basically the “*Derived*” and “*Actions*” section is not needed to know. We just need to know all the inputs from “fid” to the bottom, which correspond to our **data attribute table** (being more precise to Feature Attributes section).

Mode (Selection Mode) (Pic. 65, III) – it’s important because it defines of how we can select the layer. Usually, we have more than 1 layer in the place of clicking. The following options here are defining the way of how the items must be selected:

- **Current layer** – it works **just for active** (not necessarily editable) layer in QGIS (Pic. 67).

6 – Copy selected features to clipboard – copies whole identify content to clipboard.

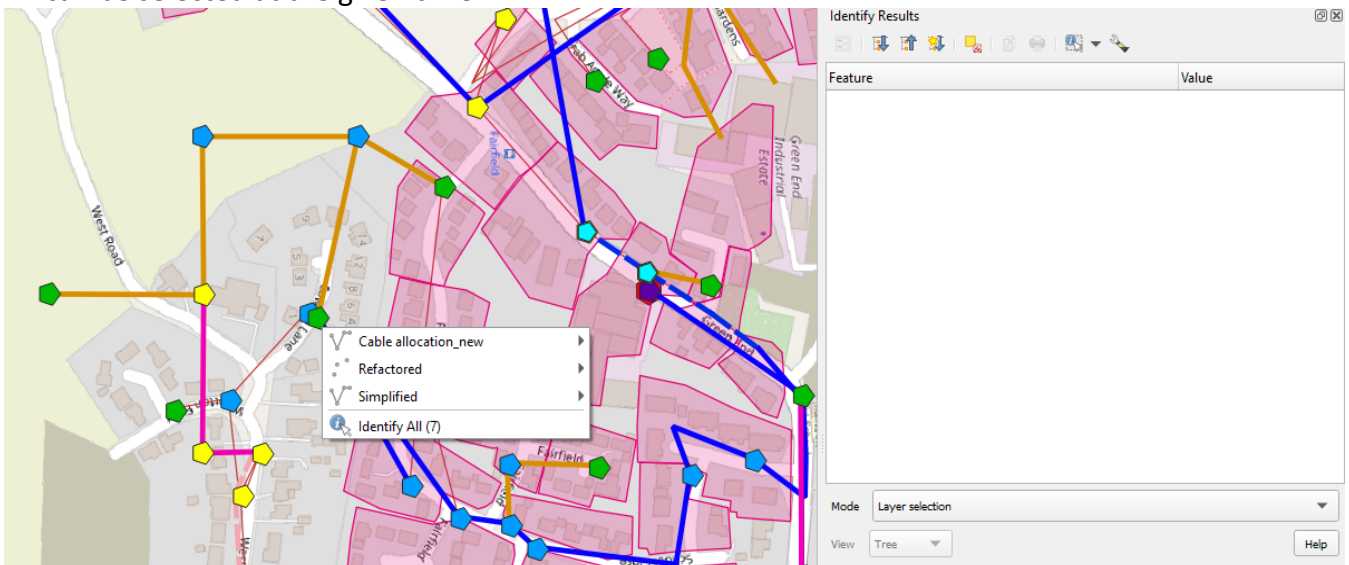
7 – Print selected HTML Response – this option is for advance QGIS users, remains mostly inactive in our cases.

8 – Identify features by area or single click – we have the same options as by the [selection features](#). We can do the identification by *single click/box, polygon, freehand* or *radius*. The image next to shows

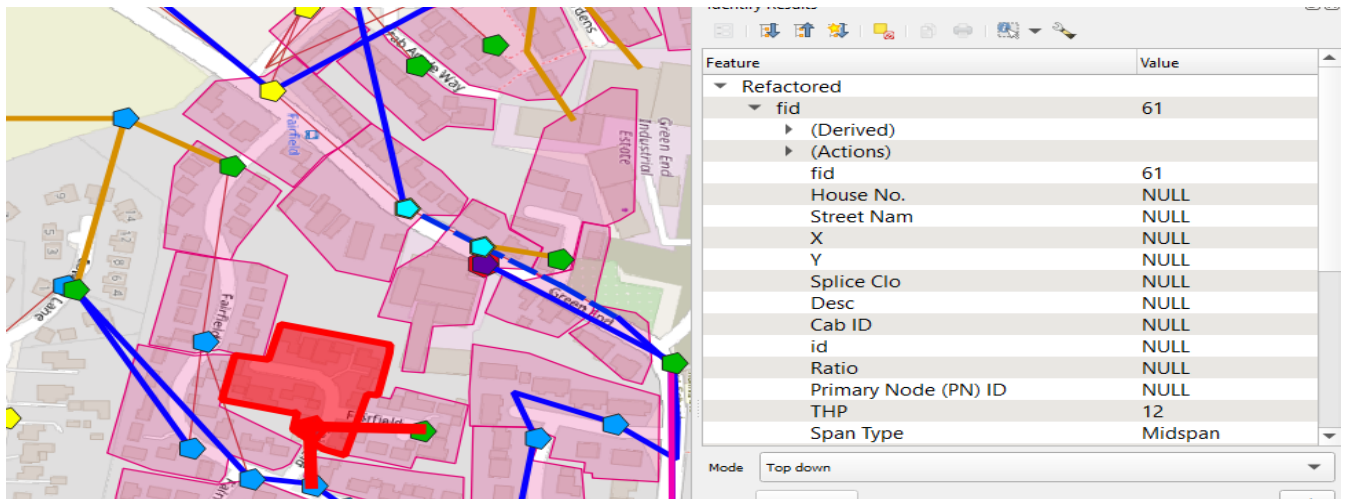


Pic. 67 Identifying features of current layer in QGIS.

- Top down, stop at first – user can select all layers **regardless their position**, although only one layer can be selected at the given time.

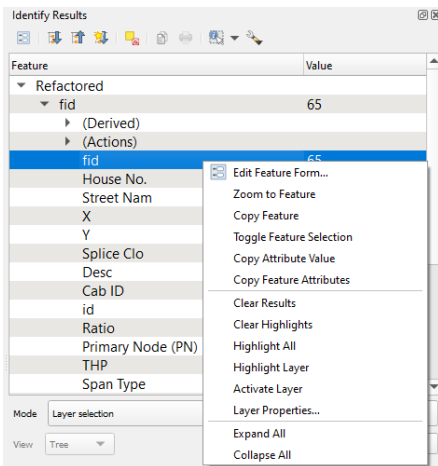


Pic. 68 Identifying features by “Layer selection” mode in QGIS. You have the choice of the following layers available at the location where you clicked.



Pic. 69 Identifying features by “Top down” mode in QGIS. All the layers are selected when clicking at certain location.

- Top down – all the layers are selected **from the bottom to the top** when clicking at the certain location (Pic. 68).
- Layer selection – the panel gives you an opportunity to **choose which layer do you want to inspect when clicking at some location**. Personally, I would recommend this option as the best (Pic. 69). The same effect you can have regardless of the mode when you right-click on your selected location.

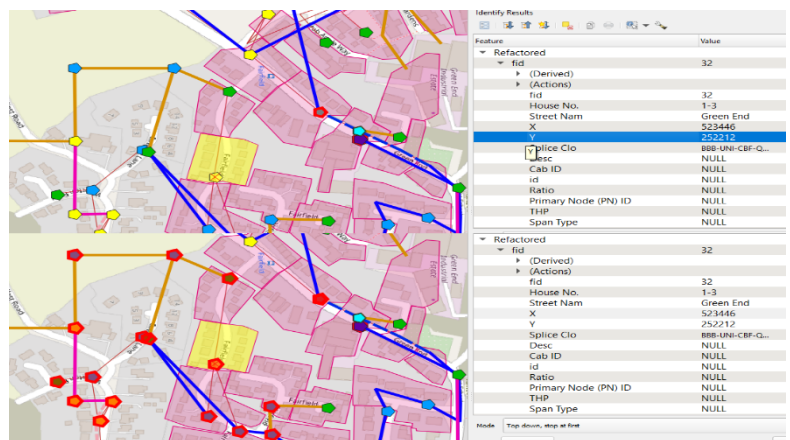


Pic. 70 Identifying features in QGIS – mouse right-click options.

There is also another set of options for Identify Results in QGIS available **after right-click**. Some of them repeats, but some of them are completely new (Pic. 69). Following the list of options, we have:

- > **Edit Feature Form...** – as discussed above, user can provide some **new inputs into the attribute table** via this form.
- > **Zoom to feature** – QGIS takes us **directly to the place** where this selected feature (or group of features) is located.
- > **Copy Feature** – option for copying an item, the same as discussed earlier (Chapter 9, D, 9).
- > **Toggle Feature Selection** – selects the current feature under investigation.
- > **Copy Attribute Value** – the same option like in the main panel, simply another way of how we can copy the attribute value to the clipboard

- > **Clear Results** – erases everything leaving **blank panel**
- > **Clear Highlights** – deselects the features selected just for identification. If we used the **“Toggle Feature Selection”** the typical selection remains in place.
- > **Highlight All** – works just in the case when we selected **more than 1 element for inspection**. Obviously, we can read just one per time, therefore just this one will be highlighted within area of our selection.
- By choosing the **“Highlight All”** option we can see all of them active again within the area of our selection (Pic. 71).
- > **Highlight Layer** – it works similarly to the previous option, although instead of all elements in the selected area, **just the items of one layer are highlighted**.
- > **Activate Layer** – this option **activates and toggles editing mode** for the layer concerned.
- > **Layer Properties** – **opens pop-up window with all layer properties** as discussed in the chapter 14.
- > **Expand All** – the same as discussed in the main panel
- > **Collapse All** – as per discussed above

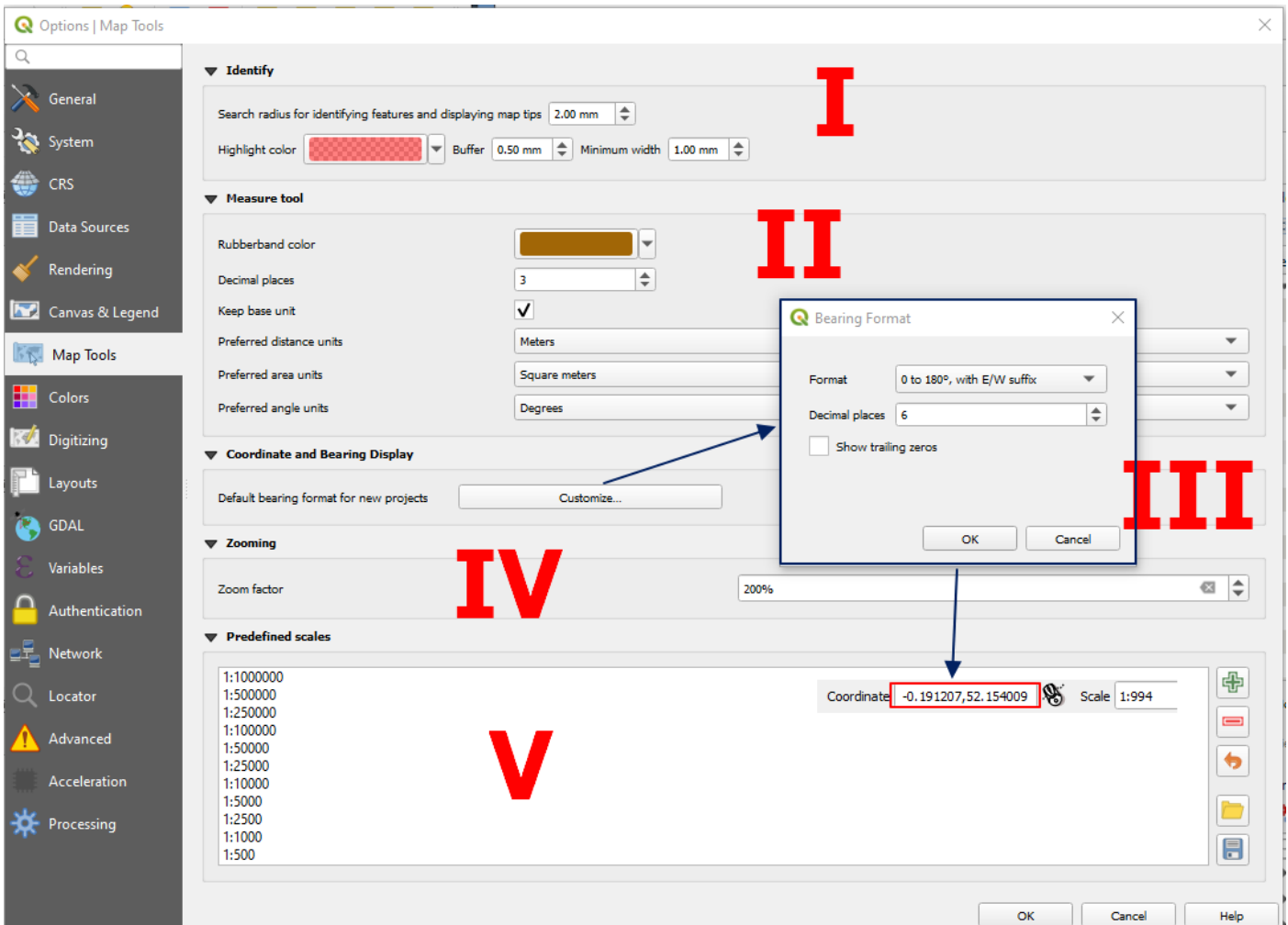


Pic. 71 Using “Highlight All” option in the QGIS Identify Results panel.

(Pic. 71).

15. Important settings

Some tools described here so far give the possibility of changes some settings, which are mostly concentrated in the following place: **QGIS main bar -> Settings -> Options**. In the QGIS novice's point of view important are especially **Map Tools (QGIS main bar -> Settings -> Options -> Map Tools)**.



Pic. 72 The "Map tools" settings in QGIS.

We have the following options here:

I – Identify – options for changing the behaviour of Identify Results.
 -> Search radius identifying features and displaying map tips – as default set to 2mm, which means that we must click almost always on the layer. However, if you change it to 20mm instead for example, then the buffer between clicking on the map and highlighted layer for identifying will be much thicker.
 -> Highlight colour – can be changed, as default comes semi-transparent red. Everything is changeable here along with the Buffer thickness and its minimum width.

II – Measure Tool – as you can see above (Pic. 72) the subject of changes are colour, decimal places, and preferred units. Nothing to explain here really.

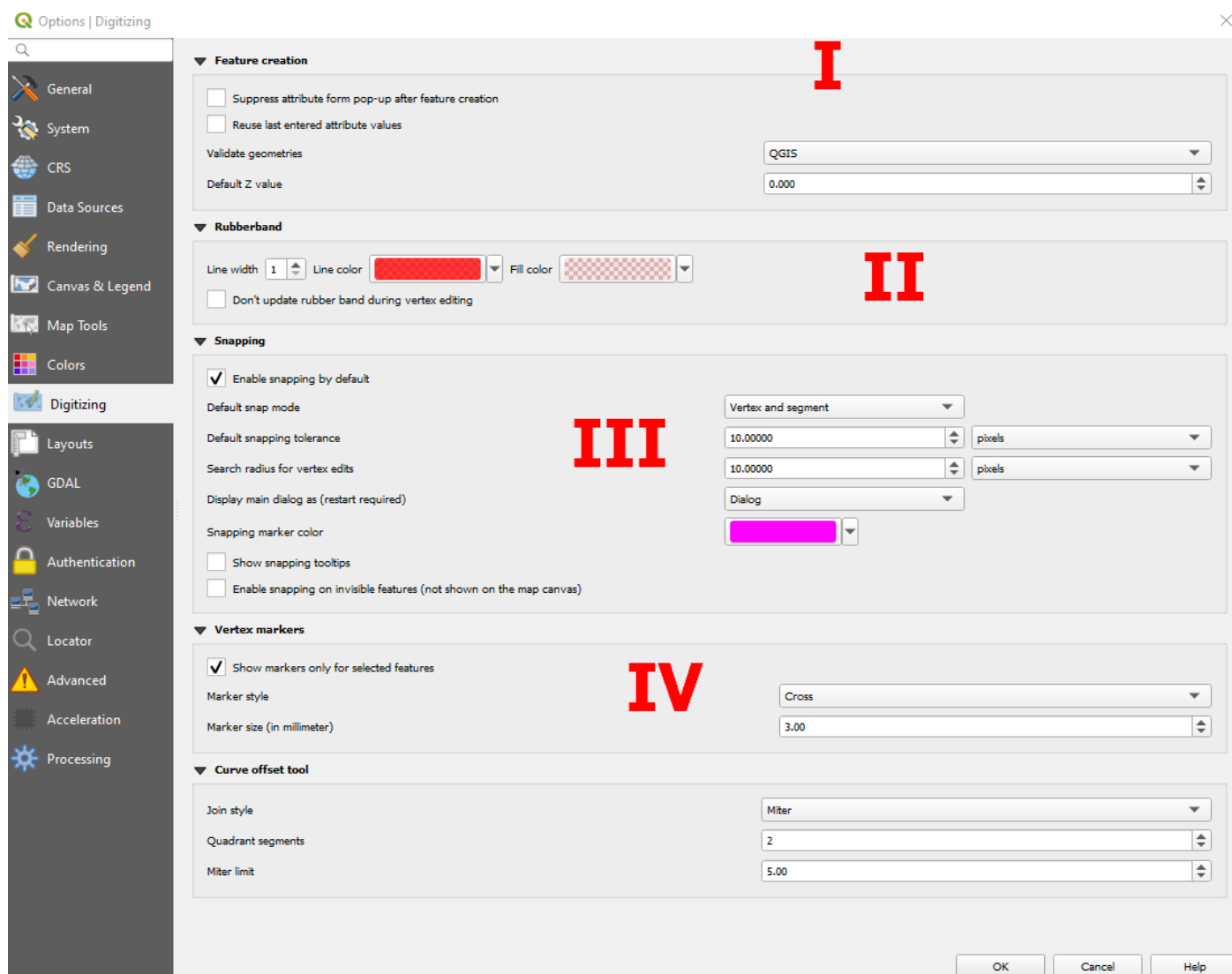
III – Coordinate and Bearing Display – defines the way of displaying the mouse coordinates in the status bar when panning the map canvas. It works just for WGS 84.

IV – Zooming – as default set as 200%, which can be changed. The 2x zoom level have been already discussed in chapter 10, Pic. 39, 4.

V – Predefined scales – good option, when working on **non-standard maps**, to which the common scales like 1:10000, 1:5000 don't fit. We can set up our own scale, on which your map will be operated.

Other options aren't important that much for QGIS newbies. Below are some issues, which it's good to know even at the getting started stage with QGIS:

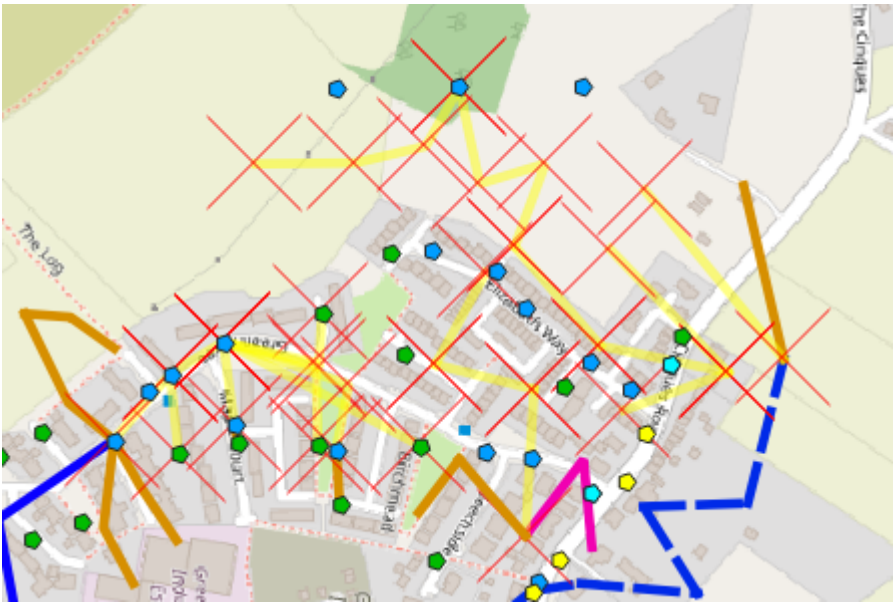
QGIS main panel -> Settings -> Options -> Digitizing (Pic. 73).



Pic. 73 The "Digitizing tools" settings in QGIS.



Pic. 74 The "Rubberband" customization in QGIS.



Pic. 75 The Vertex markers with size of 10px instead of 3px set as default.

There are other options useful for newbies:

I – Feature creation – everything, which is set as default should remain in place.

II – Rubberband – the options for new layer creations. You have the right to change the line width, line colour and fill colour (Pic. 74), which basically can be beneficial in the case when you are struggling to see the new layer draft in your QGIS project because of i.e., map canvas coloration.

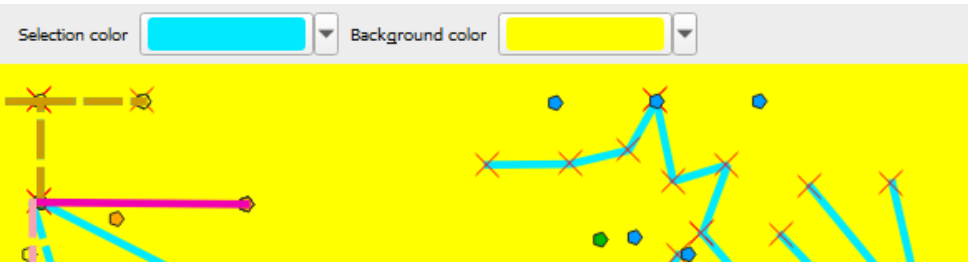
III – Snapping – very handy tool. You must make sure, that “Enabling snapping by default” is turned on.

Moreover, you can change the colour of your snapping marker, which appears pink as default. Important is also the *snapping tolerance*, which defines the “distance” at which the tool starts to snap your vertex to the nearest existing point or line. As default it’s reasonable 10 pixels, but it’s subject to change by user. Other options are not necessary for use when you start your adventure with QGIS.

IV – Vertex markers – they appear just for selected features (at least as default option) and personally I would leave it as it is. Marker style is set as *Cross*, whereas you can choose also semi-transparent circle, whatever works better for you. Marker size is also subject of changes (Pic. 75). The last option *Curve Offset Tool* should also remain as it is.

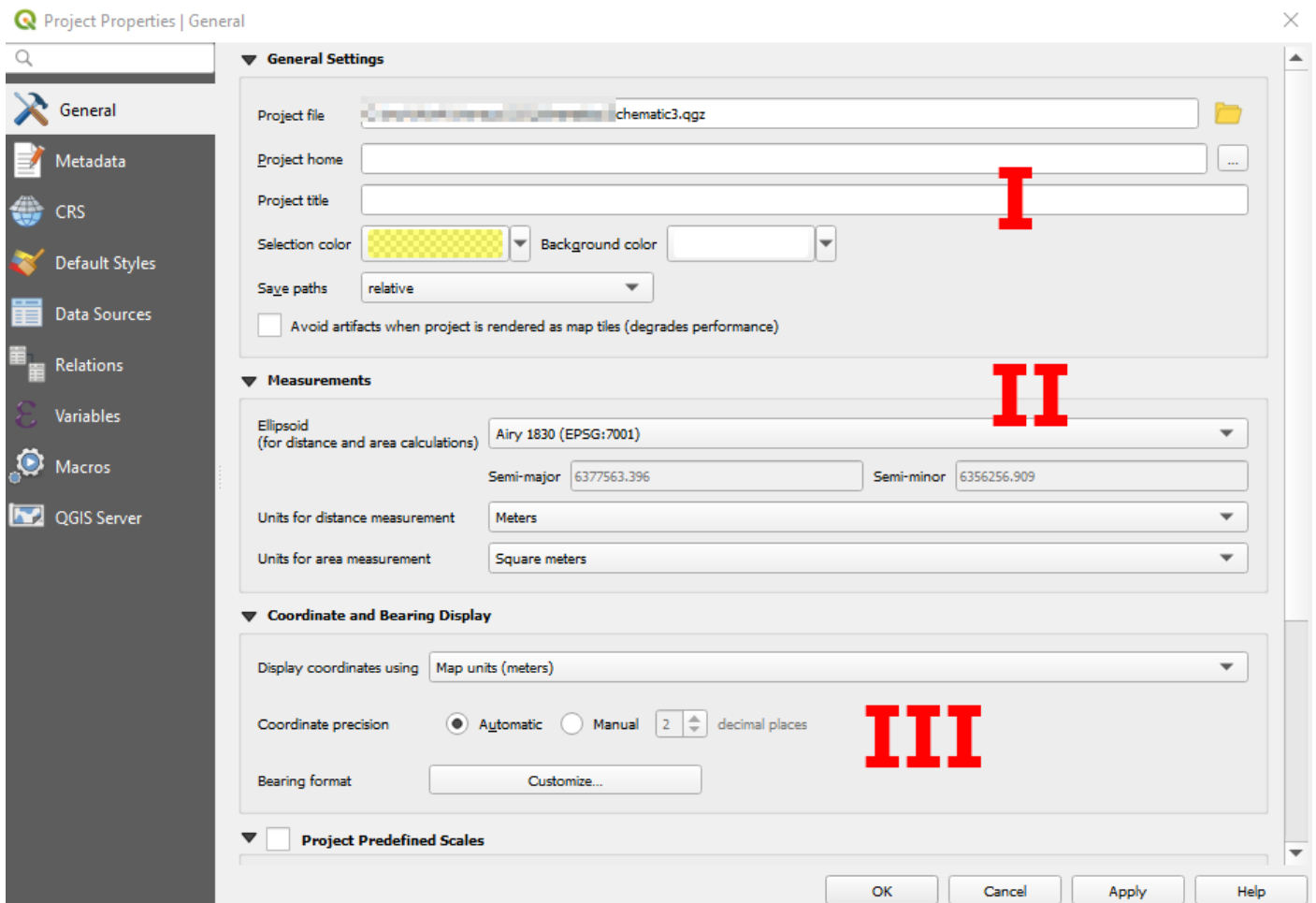
Project -> Properties -> General -> General settings – we have some important bits here, which might require attention from the very first day our work with QGIS (Pic. 76).

I General settings – the most important for the QGIS novice’s point of view because we have the project file path here as well as Saving path or selection & background colour (Pic. 73). Since the background colour



Pic. 76 The selection and background colour settings in the QGIS Project properties.

is not important that much, the selection colour of course! Especially, when both colours are exportable along with the map to image, which will be discussed later.



Pic. 77 Important settings in Project Properties -> General section

II Measurements – should remain as default. However, the most intriguing option here is **“Ellipsoid (for distance and area calculations)”**, which is set to **EPSG:7001** as default. Remember, that measurements based on this ellipsoid are doable just for not projected layers. If you already set the CRS for your layer, **all the measurements will be based on your CRS system defined**. All the option should rather remain the same.

III – Coordinate and Bearing Display – everything should remain as default here.

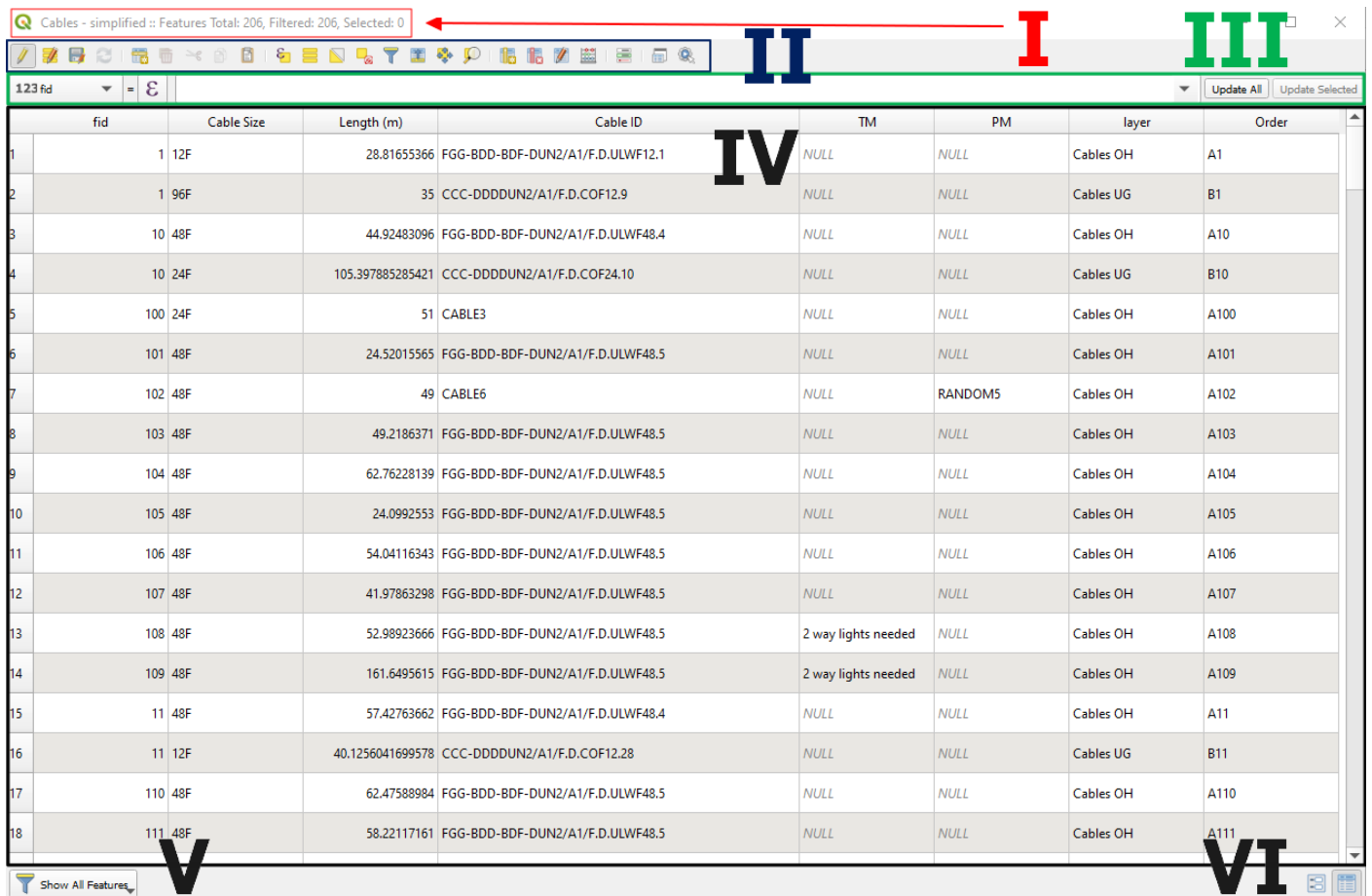
IV – Project Predefined Scales – as discussed above, here is also the place, where we can **predefine the non-standard map scale for our project**.

The last option once we move our slider down is **“Generate Project Translation File”**, which won’t be useful for users working in English environment.

16. Working with data attribute table

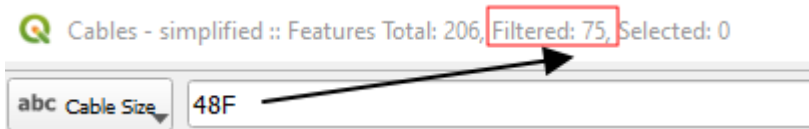
Data attribute table is a **pivot thing in QGIS**. This is the **core element of each layer**, which **stores all the database**. Every user must remember that layer its’ not just the geometry visible on the map. Layer is also a database on which most of our QGIS operations are based. We can use the various styling, labelling, selections, which are based on the attribute data. **Each formulation requires some data to stick to**, therefore having something apart just from the geometry is a mandatory! The new user to QGIS should know how to play with the random attribute data, how to make the correct selection, how to read the number of values

and how to extract this data outside. The image below shows the **visual components of data attribute table window**, which should be clearly understandable for anyone who started learning QGIS recently.



Pic. 78 The components of data attribute table.

I – Total features count – another way of counting **how many items is included in our layer**. It's not as quick method as described earlier (Chapter 10, Pic. 53), but better for use when some **random features are selected**. Every time when our attribute table dock is opened in the top left corner, we can see how many features we have in total, how many of them have been filtered (Pic. 79). Admittedly, this way can be achieved also when using categorized or



Pic. 79 Filtering data in attribute table dock.

rule-based styling and next displaying the **“Show feature count”** in the layer category as shown above (Chapter 10, Pic. 53), although in other situation this approach will be beneficial. Another value corresponds to the selected items. When you select any items within the given layer both in your QGIS map or in the attribute table, then the number of selected features will appear in the **top-left attribute table dock calculation**.

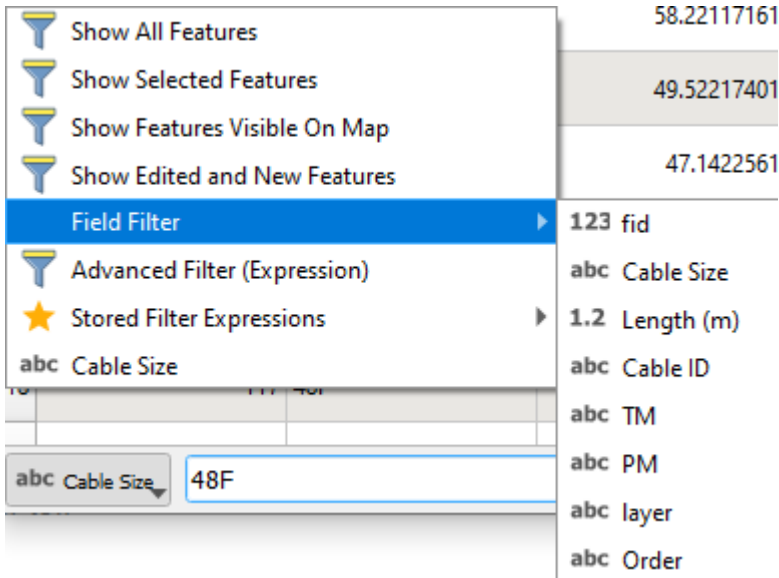
II – Data attribute table toolbar – a bunch of useful options, which will be discussed later here.

III – Formula bar – analogue input to Microsoft Excel where you can **provide the formula (expression)** and execute it in data attribute table (the layer you are working on). At the end of this bar, you have two options. By clicking the first one, the provided expression will update everything in our layer regardless the selection or filtering applied. The second option will update just selected records.

IV – Data attribute table – the most important content of the whole dock, where we have all information about every single item included in our layer. Depending on the amount of data we can have this content

wealth or poor. If you have more than shown in the image above (Pic. 78), you should see the horizontal slider at the bottom of this table.

V – Display options – as default we have the “*Show All Features*” toggled a user can see everything, what belongs to the given layer. In fact, it’s not the only option here and I believe there is something more, which the QGIS newcomer can play with (Pic. 76).

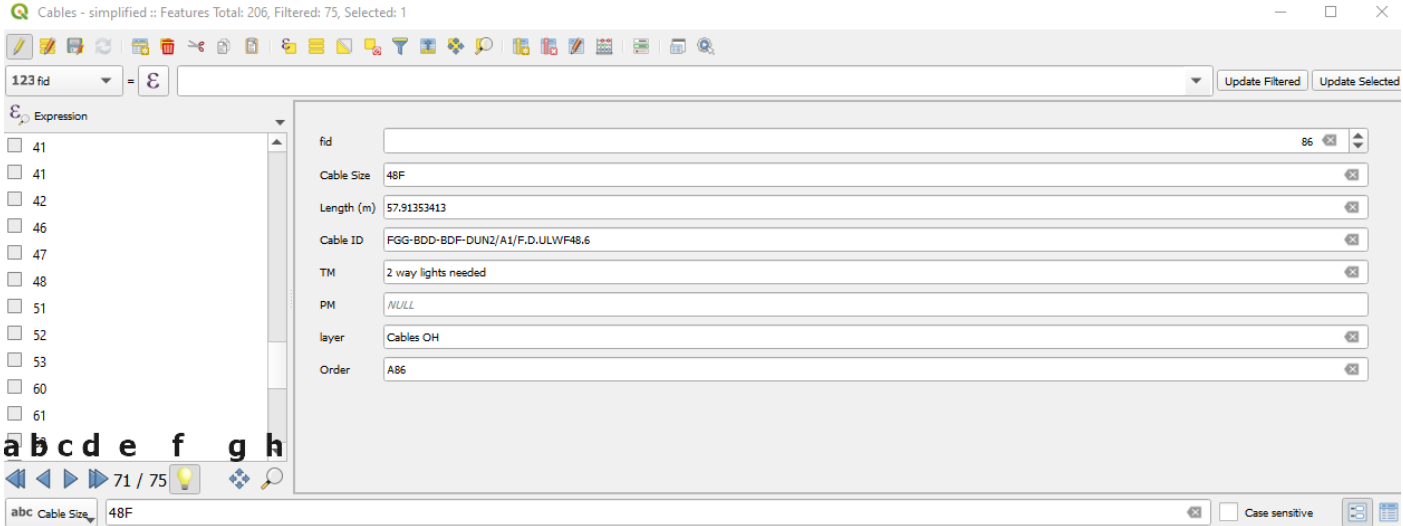


Other options are listed in the image on the left (Pic. 79).
 -> Show Selected Features – displays only the stuff, which **has been selected both on map and in the attribute table**. Remember, that everything which has been selected on the map will be selected in data attribute table as well. It works the same way for an opposite direction and vice versa!
 -> Show Features Visible on Map – cool option, which **displays only the stuff visible on the map at current zoom level**. It works analogically to the **Box selection**, where even a piece of item falling inside is enough to be selected.
 -> Show Edited and New Features – displays only the features, which **have been changed or added recently**. It’s a good approach in

Pic. 80 Filtering data in attribute table dock.

the situation when we want to **double check what has happened with the layer items during our work process**. The option is valid just **when the layer is editable**. Its pivot role is making sure, that everything is alright before we switch off the editing mode and save changes!
 -> Field filter – **classifying the features by certain field (column)**, although the accurate value is required here.
 -> Advanced Filter (Expression) – option for more advanced QGIS users.
 -> Stored Filter Expressions – in the case when we have applied some expressions recently, they will appear in this option, facilitating us using them in the future without typing them again.
 -> Current criterion – displays on which conditions we are making current selection.

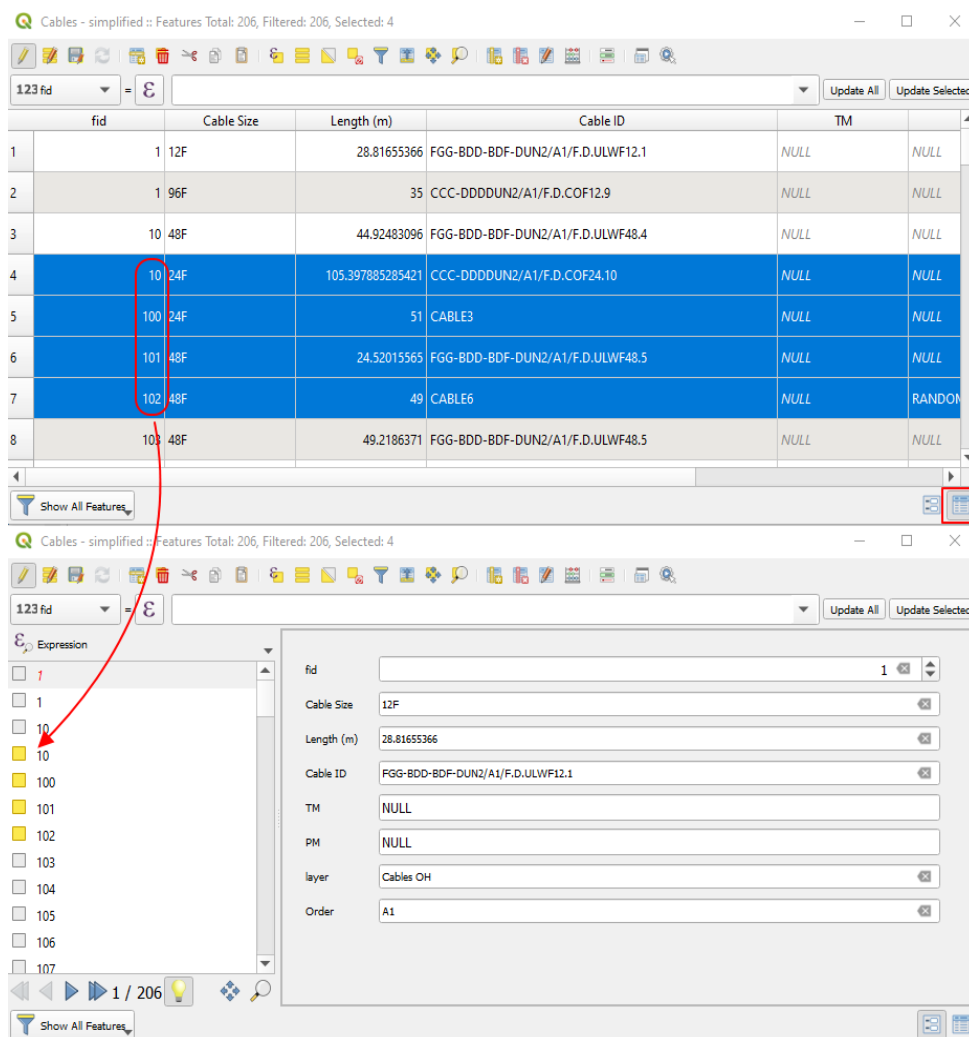
VI – Switching Mode – we can toggle between the form view and table view. In the form view we have slightly different layout, which includes a few more options to manage the layer features.



Pic. 81 Data attribute table – the form view.

Basically, the form view features the similar layout to the identify (Chapter 14, Pic. 65), although it's more wealth with other features. Unlike the feature attributes in the Identify Results panel we are looking at many more items. Therefore, we can toggle between them by using the **left sidebar**. At the bottom of this sidebar, you can find a few symbols, which correspond to the following:

- a – move to the very first item (very top of the list),
- b – move to the previous,
- c – move to the next,
- d – move to the last (very bottom of the table),
- e – order of the item (currently active 71st out of 75 included in the layer),



Pic. 82 Data attribute table – visibility of selected features compared between

- f – highlight current feature on the map – by having it active we can take a look where the feature is located (selected on the map),
- g – automatically pan to current feature – when highlighted on the map, user might not know its certain location, therefore clicking this icon QGIS will place the map area where the feature is located,
- h – automatically zoom to the current feature – panning the map might be not enough, when the zoom level is inappropriate. Clicking this icon QGIS will both pan and zoom to the location of the item at once.

Important is to understand of how the feature selection works in the form view. They are highlighted in yellow (Pic. 82).

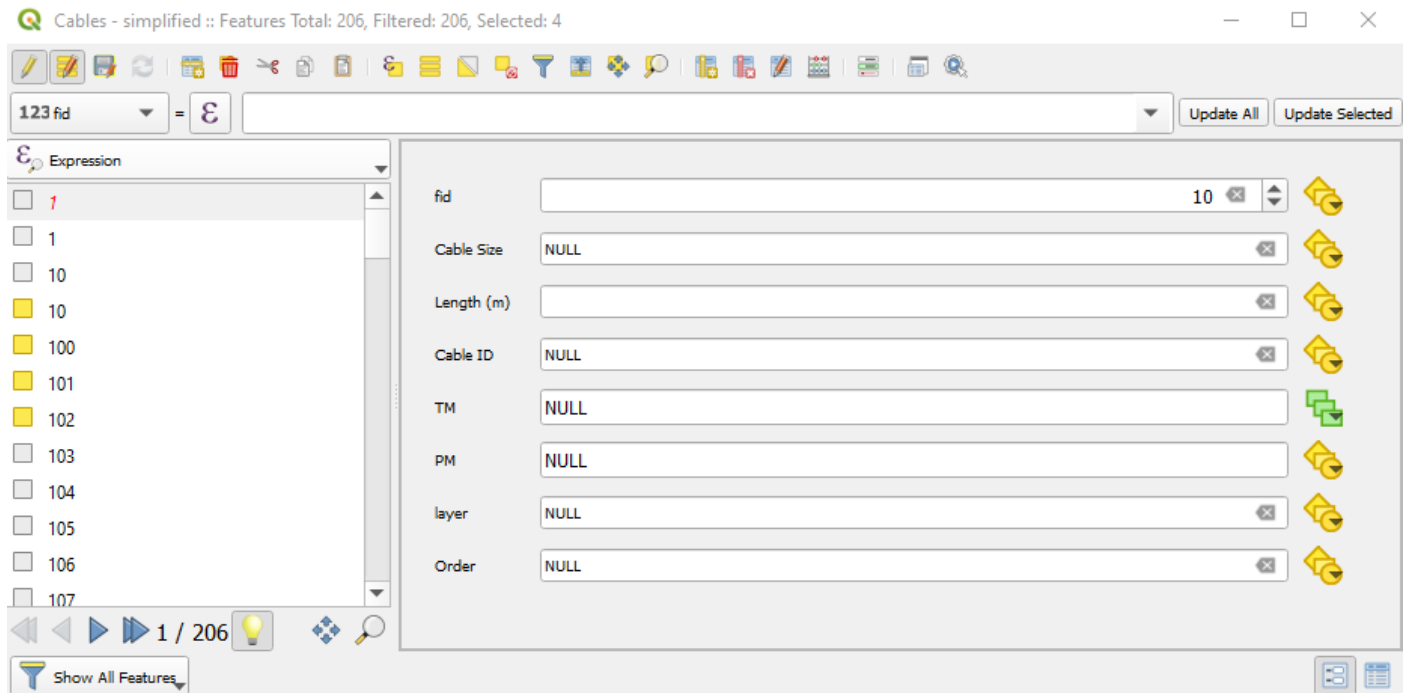
The most important is the attribute toolbar, which is located at the top (Pic. 78, II, Pic. 83).



Pic. 83 Data attribute table – toolbar.

1 – Toggle editing mode – the same as discussed earlier (Chapter 9 D Pic. 32, 2). Once toggled we have the attribute table content editable and most of other options active. It works at the same basis as in the case of layers. By toggling the editing mode off QGIS will ask us about saving the current changes.

2 – Toggle multi-edit mode – works for many features. Basic workplace here is the form view instead of table view (Pic. 84). When something is selected, it appears as yellow box on the left, which corresponds to highlighted blue line in the table view as discussed above.



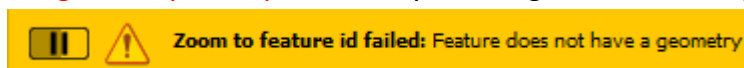
Pic. 84 Multi-edit mode in QGIS attribute table.

As you can see, the symbology is the same as discussed previously (Chapter 9, D, Pic. 35). **Green shapes** mean, that the value provided is the same for all selected features. **Yellow shapes** forewarn us, that the values vary across the selected features. The **red signatures** state as alert, that some changes have been made and not saved. Users must bear it in mind before making some edits. Anyway, this option can be treated as a nice shortcut especially for new QGIS users, who **aren't familiar with the expressions**. Indeed, the multi-edit mode can be somewhat replaced by using the appropriate expressions across the data attribute table, but not in the case when we are getting around with QGIS software. Not to mention, that by using this editing mode we can still provide some expressions for all selected features at once since the “formula bar” remains in the same place where it is in table view.

3 – Save edits – the same function as discussed, several times before. When edits are saved this way, the switching off editing mode won't run the pop-up save changes alert.

4 – Reload the table – simple refreshing the attribute table content.

5 – Add feature – **completely new feature is added to our attribute table**. Don't expect it on the map because the **geometry is not provided**. By zooming to the feature, you should expect an error saying, that our “*feature has no geometry*” (Pic. 85). The problem such as this can be fixed by using the “**Add Part**” option in the **Advanced Digitizing Toolbar**.



Pic. 85 Error appearing after adding new feature directly in attribute table.

6 – Delete selected features – by clicking this option we are removing everything, which was selected previously.

7 – Cut selected rows to clipboard – cuts selected rows to clipboard as the name of this option says.

8 – Copy selected rows to clipboard

9 – Paste features from clipboard

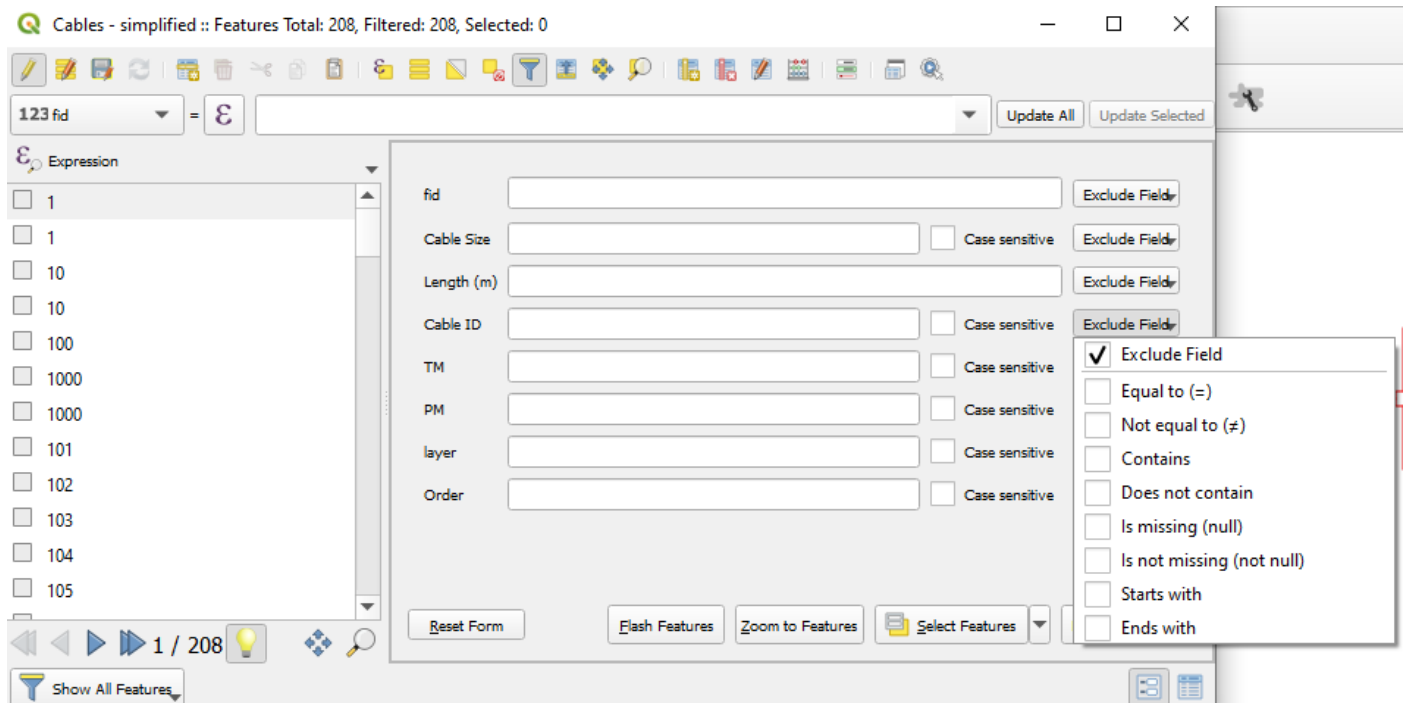
10 – Select feature by expression – not for QGIS newbies.

11 – Select All – selects all the items belonging to our layer.

12 – Invert Selection – overturn the previous selection of features.

13 – Deselect All – removes selection from the attribute table.

14 – Select/Filter features using form – pretty much analogous approach to [selection features by expression](#). In this case instead of expressions we have a nice alternative for someone, who is not savvy enough to. Thereby anyone, who starts using QGIS can play with it (Pic. 86).



Pic. 86 Select/filter features using form in QGIS data attribute table.

Each column has its own options to choose, which you can see above. As default **“Exclude Field”** is toggled, but we can provide our own value, which appears across the attributes and define the proper condition to it. Each condition can be the **“Case sensitive”**, which means that our records are differentiated between capital and lower-case letters. It’s worth to look at the other options beneath (Pic. 87).



Pic. 87 Select/filter features using form in QGIS data attribute table – other options.

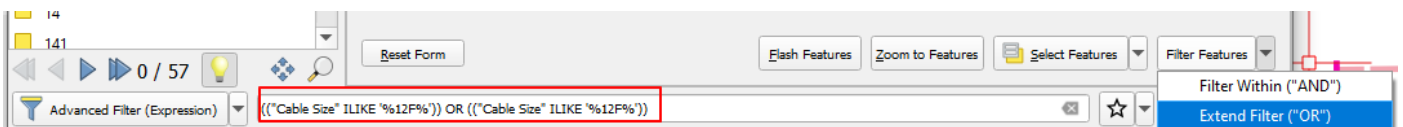
-> **Reset form** – clears all conditions applied.

-> **Flash Features** – just [brief blazing of the layer content](#), which has been filtered.

-> **Zoom to features** – the same as discussed earlier, when clicked QGIS will redirect us to the given object or group of objects selected.

-> **Select Features** – as you can see it’s not only one option there (Pic. 87), because we can [add them to current existing selection](#), remove them from the existing selection or filter current selection. The last option it’s just reducing the number of selected features by adding an additional condition. We might as well use the **“Select Features”** instead.

-> **Filter Features** -> by two options, within and outside. By using one of them the QGIS we are building an expression automatically and use it via **Advanced Filter** (Pic. 88).



Pic. 88 Filtering features in attribute table with autocreation of expressions.

The most important thing is, that you can do nothing with it, just select one of these 2 options. The expression will appear automatically.

15 – Move selection to the top – takes our records to the very beginning of our table. When switched on every other selected feature will be brought at the very beginning of our layer instantly.

16 – Pan map to the selected rows – centres our map canvas to the selected layer items, which act as rows in data attribute table.

17 – Zoom map to the selected rows – adjusts zoom level to selected features and pans it automatically as well.

18 – New Field – not necessarily for QGIS newbies, but here we can [append our data attribute table by creating a new column \(field\)](#). The column for all the features will be empty (NULL) as default.

19 – Delete field – when we are sure, that the given column is not needed anymore, we can delete it.

20 – Organize columns – we can change their order. It's just temporary thing, which doesn't work all the time. After saving our layer to some formats the order might be forgotten, therefore better is refactor our attribute fields.

21 – Open Field calculator – it's an option for advanced users. Basically, we can shape our layer content by executing some formulas.

22 – Conditional formatting – also option for more advanced QGIS users, because it requires using formulas.

23 – Dock attribute table – a nice option allowing user to have both map canvas and attribute table in one working panel (Pic. 89).

Cables - simplified :: Features Total: 208, Filtered: 56, Selected: 1

fid	Cable Size	Length (m)	Cable ID
7	14 12F	40.77614642	FGG-BDD-BDF-DUN2/A1/F.D.ULWF12.21
8	16 12F	50.10101727	FGG-BDD-BDF-DUN2/A1/F.D.ULWF12.22
9	17 12F	119.6290916	CCC-DDDDUN2/A1/F.D.COF12.8

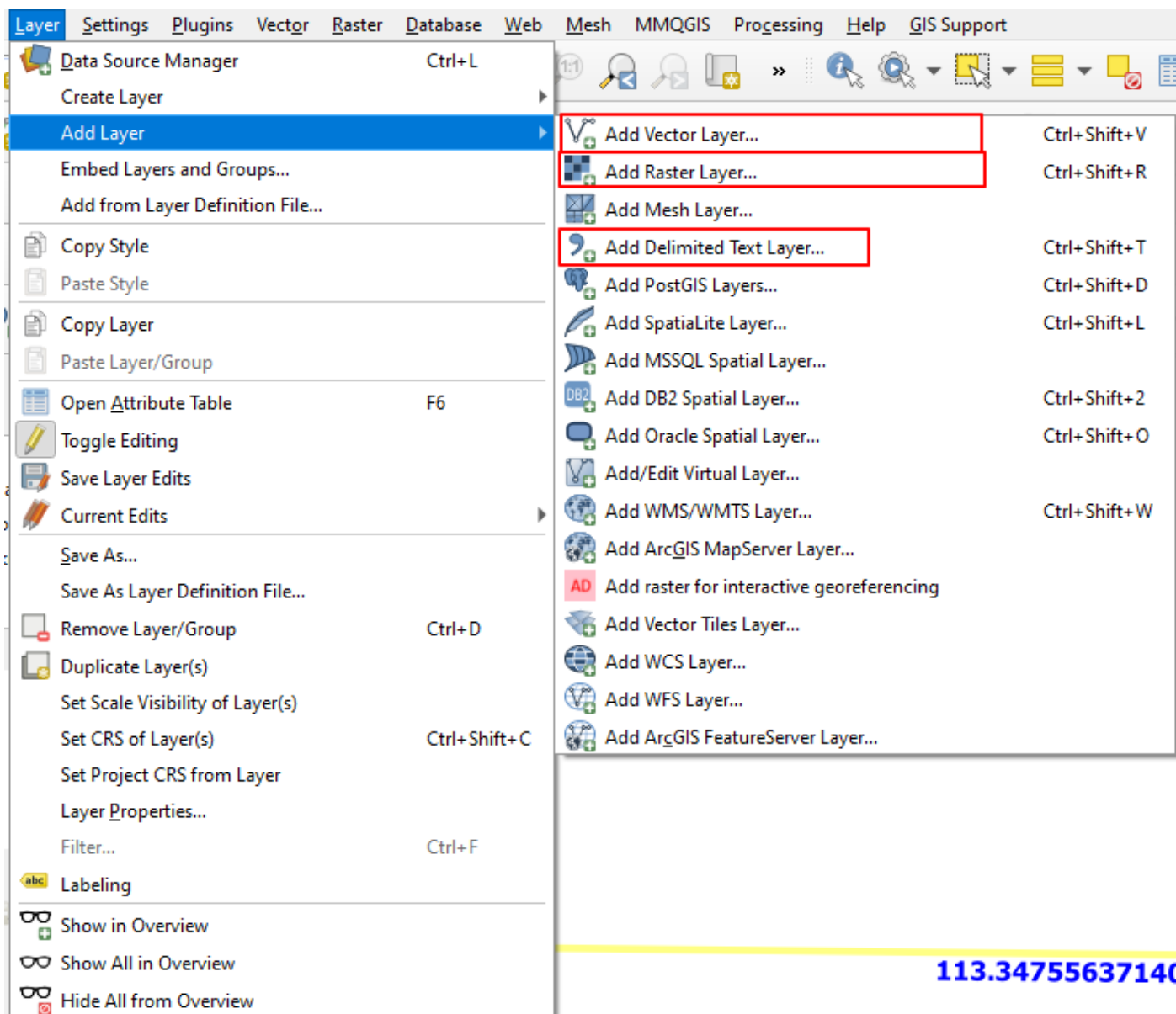
Advanced Filter (Expression) `((("Cable Size" ILIKE '%12F%')) OR ((("Cable Size" ILIKE '%12F%'))`

Pic. 89 Filtering features in attribute table with autocreation of expressions.

We can easily [undock this attribute table dialog](#) by clicking the double-box just next to the escape “cross” sign on the top right (the same as discussed in the Chapter 3A, Pic. 3). **25 – Actions** – again, something for advanced users, who can assign actions to the specific features in data attribute table.

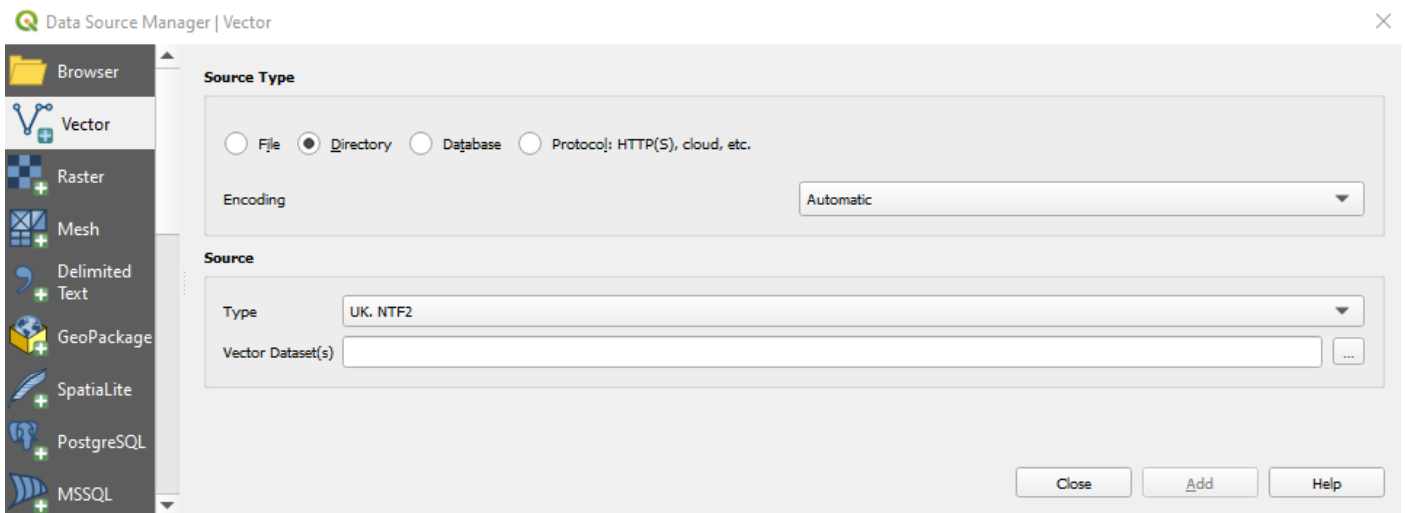
Import (adding) layer

Often happens, that the set of layers is not enough for our project. In other situation you have just files, which must be displayed in QGIS in order i.e., printing the output map. In this chapter you will learn how to add various types of layers to QGIS on different ways. One way is going to the main QGIS toolbar and select **Layer -> Add Layer** and choosing the relevant option (Pic. 90).



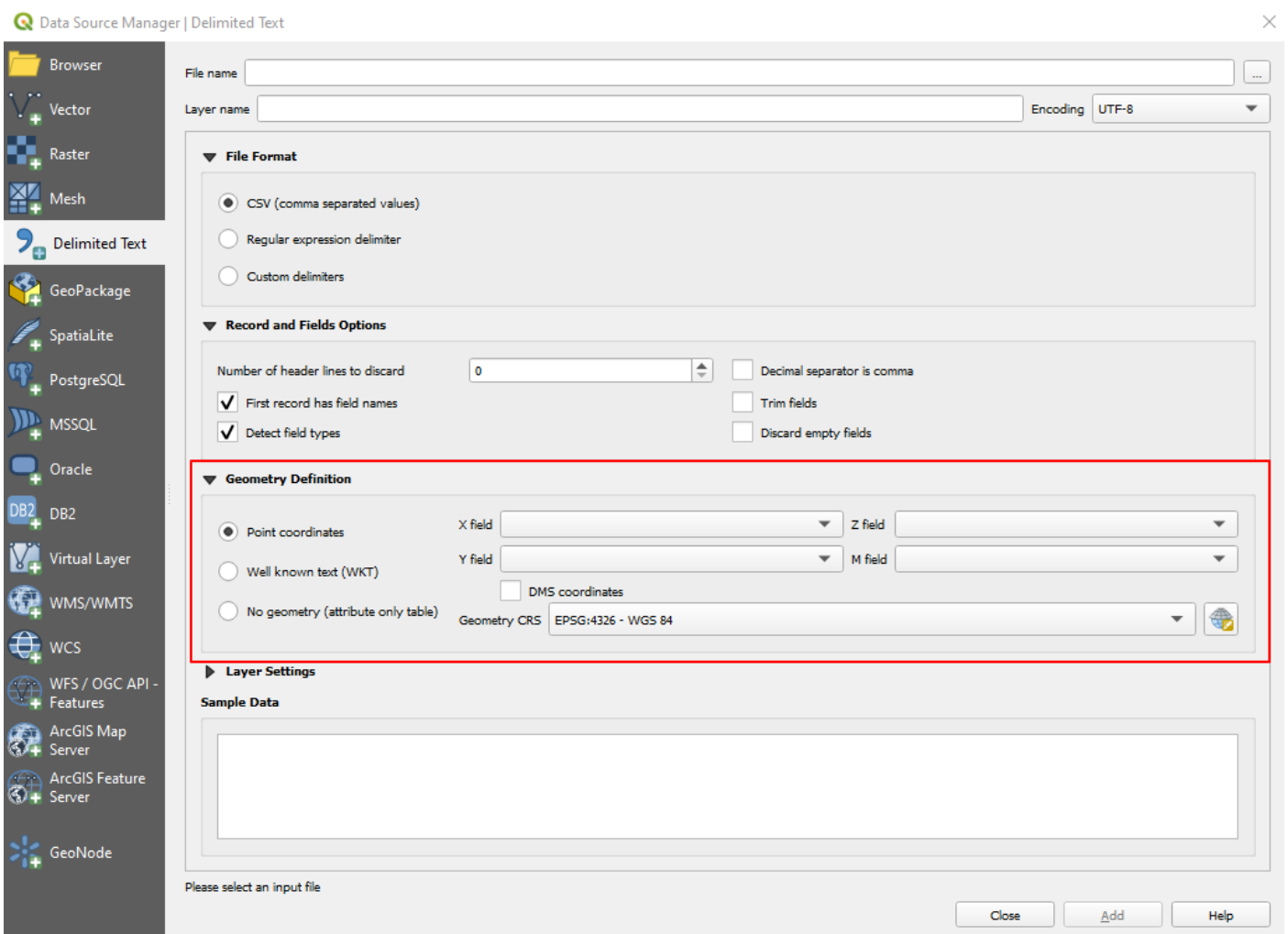
Pic. 90 Adding layers to QGIS. For novices just 3 types of layers can be under consideration.

User can add vector layer – it's just [selecting the proper file from your directory](#), which extension can be: *.shp (Shapefile)* *.geojson*, *.kml (Keyhole Markup Language)* *.gml (Geography Markup Language)* *.dxf* and others. Another intriguing option here is [adding a whole directory instead of file](#). It won't be useful that much, but I guess it's good to know (Pic. 91).



Pic. 91 Adding whole directory to QGIS.

Another type of layer, which surely can be added by anyone to QGIS is the **raster layer**. Unlike vector layer, which represents the spatial distribution of editable features, raster layer comes usually as the **georeferenced image**. This image can be the file with following extensions: **.pdf** (only raster version, because there is also vector **.pdf** versions), **.png** (previously georeferenced with separate **.pgw** file coming along with) and **.geotiff** (commonly used raster format in GIS environment).

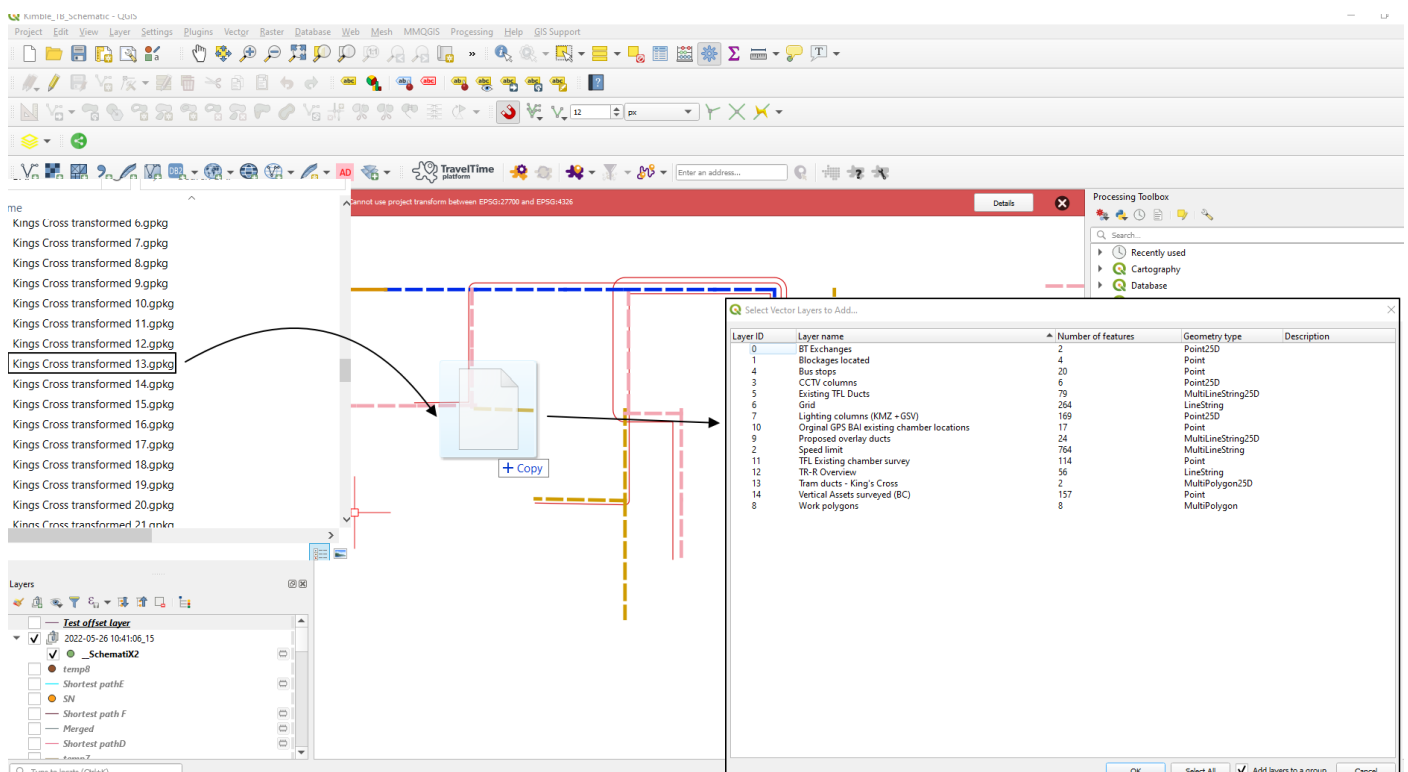


Pic. 92 Adding comma delimited layer to QGIS with the most important section highlighted.

The trickiest type of layer to add by new QGIS user is the **comma separated** type of layer. The image above (Pic. 92) shows the Delimited text options and highlights the most important section to look at. Namely it's

the **Geometry Definition**, which determines the **placement of our features on the map**. If we want to have our comma delimited values displayed on the map, our **.csv** file must be equipped with **at least one column representing geometry**. In the case like this we are talking about the **Well-known text (WKT) geometry**, which should be gained by previous export layer to the **.csv** format from QGIS or other GIS software. Since the **.csv** file is uploaded from external sources **it must contain two columns with geometry** as pointed out in the highlighted box above (Pic. 92). These are **Point coordinates**, which **need to be defined in X and Y fields**. It's enough for making our point layer visible on the map. Our X corresponds to **Latitude** and Y to **Longitude** – this is an interpretation of cartesian coordinate system. The **Z-field** is the 3rd dimension of our layer and will be used for defining altitude when playing with 3D layers. The M-field states for measurement dimensions. When your **.csv** file contains just one column, you must use the **“File format” -> Custom delimiters** and select **tab** or **comma** or others in order to **split your data between at least 2 columns**. If we want to have our coordinates valid, we should define the geometry CRS properly, which initially comes as our project CRS. Another thing is Record and Field Options section right above. Amidst several options there, two of them are the most important. The first one is **“First record and field names”** and must be always included, when we are transferring the **.csv** file with column names. It will help QGIS to **identify which columns are related to the coordinates**. The **“Detect field types”** also cannot be ignored. QGIS can **classify our comma separated data to appropriate type of fields** (Integer, String, etc).

Another way of adding the new layer to QGIS seems to be much quicker, because we don't need to “visit” the aforementioned options dedicated for adding layer. In fact, the second way is the most beneficial for the **.gpkg (Geopackage)** files, which aren't listed in the traditional **“Add layer”** section. The way of including these files in QGIS is very straightforward (Pic. 93), because we are dragging our file from the directory and dropping it to the QGIS map canvas. The same as discussed earlier (Chapter 8 E, Pic. 38).



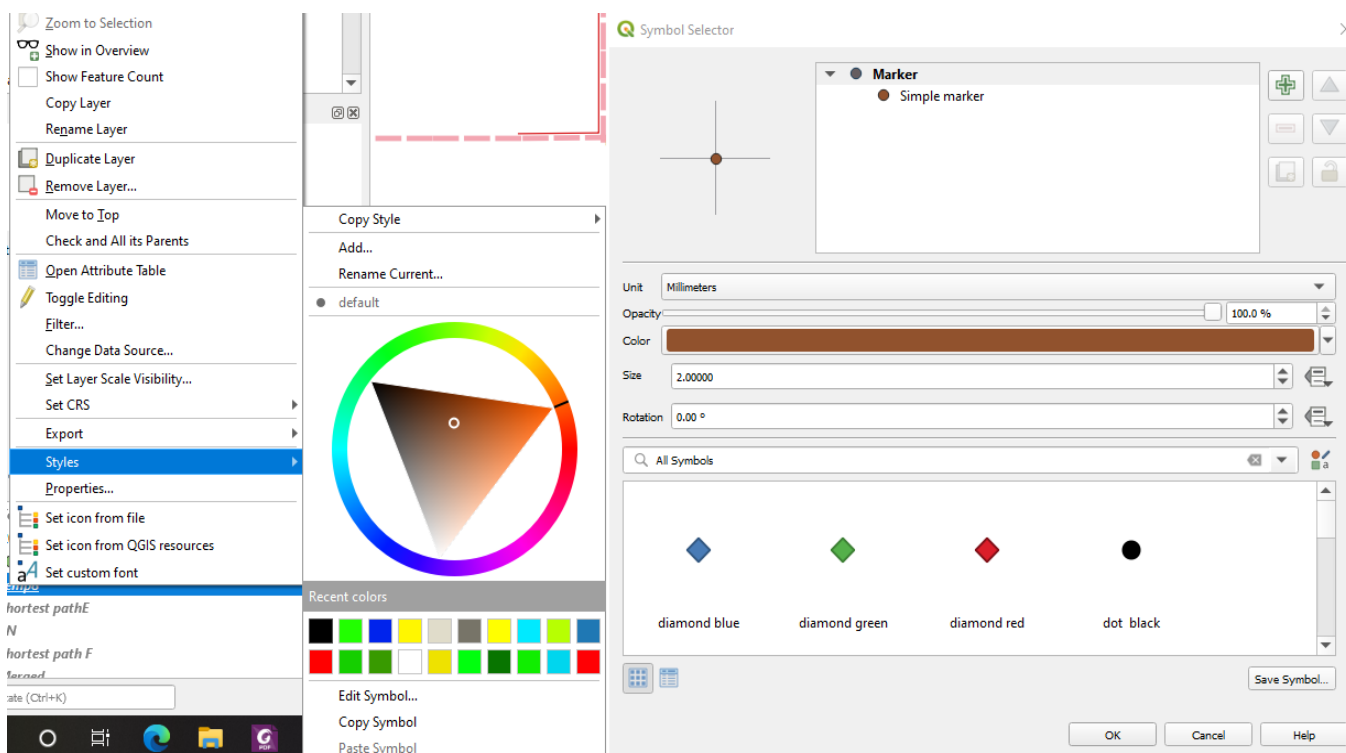
Pic. 93 Adding new layer (file) to QGIS by drag & drop. Needed mostly for the Geopackage file (**.gpkg**).

This method **doesn't work for comma-separated values** because the determination of coordinates is necessary in this case. After drag & drop the **.csv** file to our QGIS we will have just pure attribute table without any geometry plotted on the map even when the file contains column with geometry.

17. Styling layer

Since you are a viewer, I guess you won't deal with styling that much, especially when you load the Geopackage file. The Geopackage file includes **both vector layers and their styling**, which is very convenient for everyone. However sometimes we must **load style separately to our layer**. Before I get to this point it will be good to explain of how you can change the styling of the given object and how to transfer the styles between the similar layers within the current QGIS project.

A. Quick Style edit – this is myself-called option available after right-click on the layer. This is **Right-click -> Styles**. Unfortunately, the option is somewhat misleading for users, because at first thing you could guess, that is the exact place for customizing your layer. Unfortunately, it's not. It's just a basic style

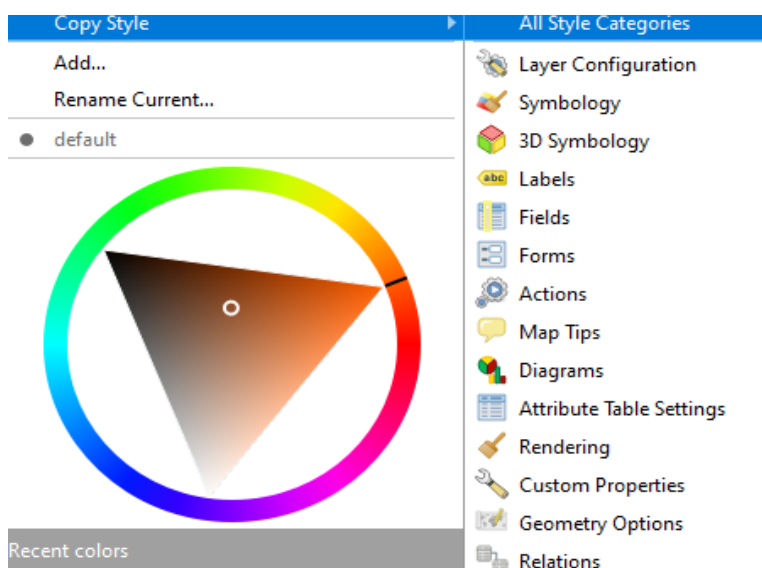


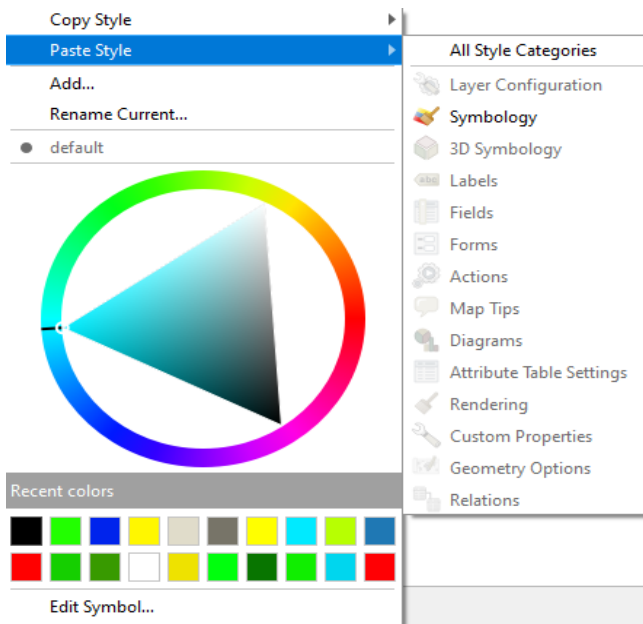
Pic. 94 Basic styling option in the Styles section after right-click on our layer.

adjustment available solely for single-styled layers (Pic. 94). The user can just **play with coloration and basic symbology**. If you are not planning to expand the styling criteria, then it's fine. If you wish to use more advanced styling, then this section won't be good at all. This particular matter will be described later. Let's have a look at other options available here.

B. Transfer styling criteria between layers within the current QGIS project - So far just **"Edit Symbol"** has been discussed. This symbol can be copied and pasted to

Pic. 95 The "Copy Style" options in QGIS.



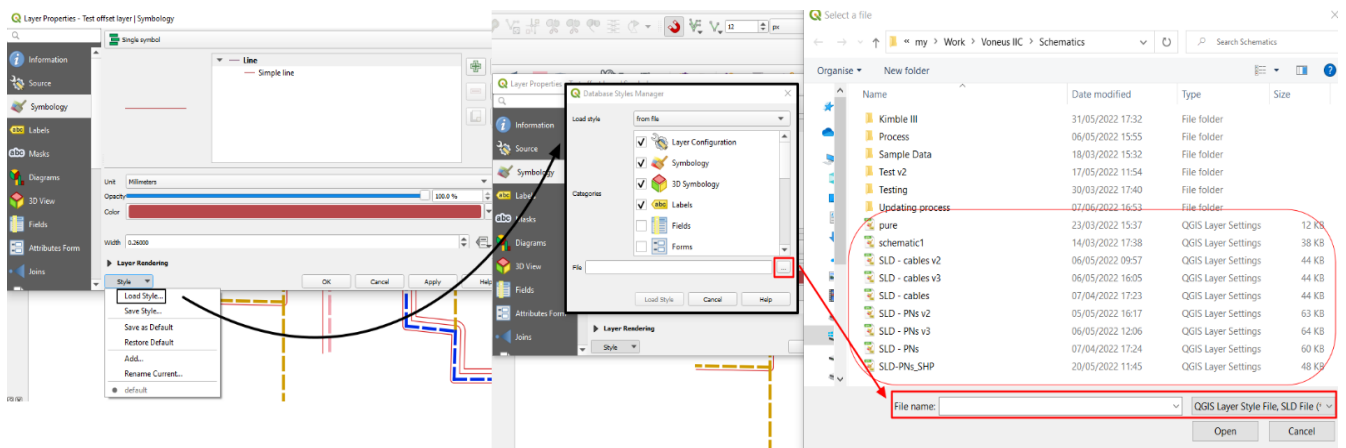


Pic. 96 The “Paste Style” options in QGIS.

another layer **with the same geometry**. This is surely **the simplest and quickest style transfer** between the layers, assuming that their geometry is the same. Since our styling is more advanced than discussed earlier, we should use the very top option, which is **“Copy Style”** (Pic. 95). Obviously, the quickest option here is copying **“All style categories”**, which basically include not only the styling but also some attribute table settings, potential expressions saved in the various properties (as seen in the list above). However, if we need just particular setting from this layer to be transferred, we can just select one of them. Next just this particular option will be available for pasting in another layer concerned (Pic. 96). It’s still applicable for layers with the same geometry.

C. Transferring styling criteria between external files (or QGIS projects) – another

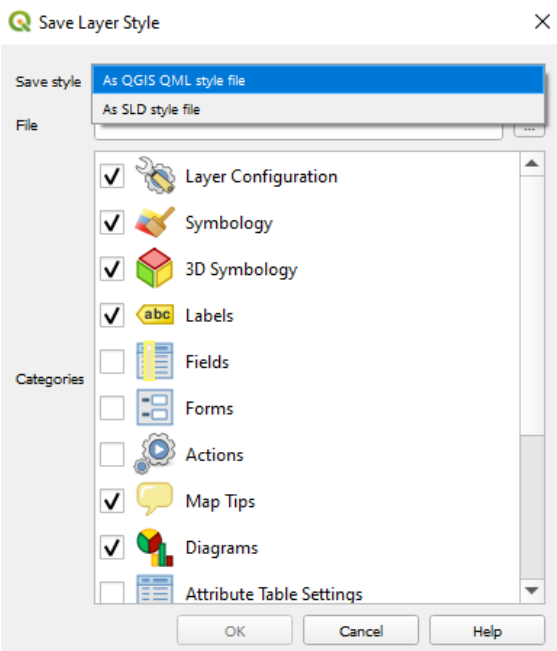
way of getting ready styling features for layer we are working on, although it requires a bit more hassle. Again, we have two ways of doing it, where one of them is slower and another one faster. Let’s consider the “slower” one.



Pic. 97 Loading style from external file in QGIS.

Right-click on the layer -> Properties -> Symbology is the proper place for styling the same as **Right-click on the layer -> Properties -> Labels** (to be discussed later), next for masks and so forth as shown in the image above (Pic. 97). The common denominator of all these sections is the small **“Style”** button located in the bottom left. This is a dropdown including some options, from which we are picking up the very first one – **“Load Style”**. Once we select the **“Load Style”** we can load the external file from the directory. This file was surely saved previously by using the next option in the dropdown **“Save Style”** (Pic. 98) Other option for saving our style file is **right-click on our layer -> Properties -> Export -> Save as QGIS Layer Style file** (only **.qml** extension). By saving our style to the separate file we can **access it from any other QGIS project**. However, this access must be done by **proper loading this file**. The way of how we can do it is also shown in the image above (Pic. 97). By using the **“File”** section at the bottom, we can click the **“...”** button which will **pop-up the local directory for us**. It’s always the recently used path. Now, we can select the QGIS style file (**.qml**) and use it in our layer. At this moment it’s good to stress, that there are **2 types of QGIS style files**, which we can save. The first one (**.qml**) represents fully the symbology, and can be used with preserving all the renderers provided like **rule-based styling**, categorized styling,

etc. Therefore, in my point of view is better to use this style. The second one (.sld) doesn't include the whole Symbology content, because this type of file converts the categorized and graduated styles to rule-based. The difference between these 2 styles is serious and can be seen in this example: <https://gis.stackexchange.com/questions/254480/qml-style-differs-from-the-same-sld-style-saved-in-qgis>

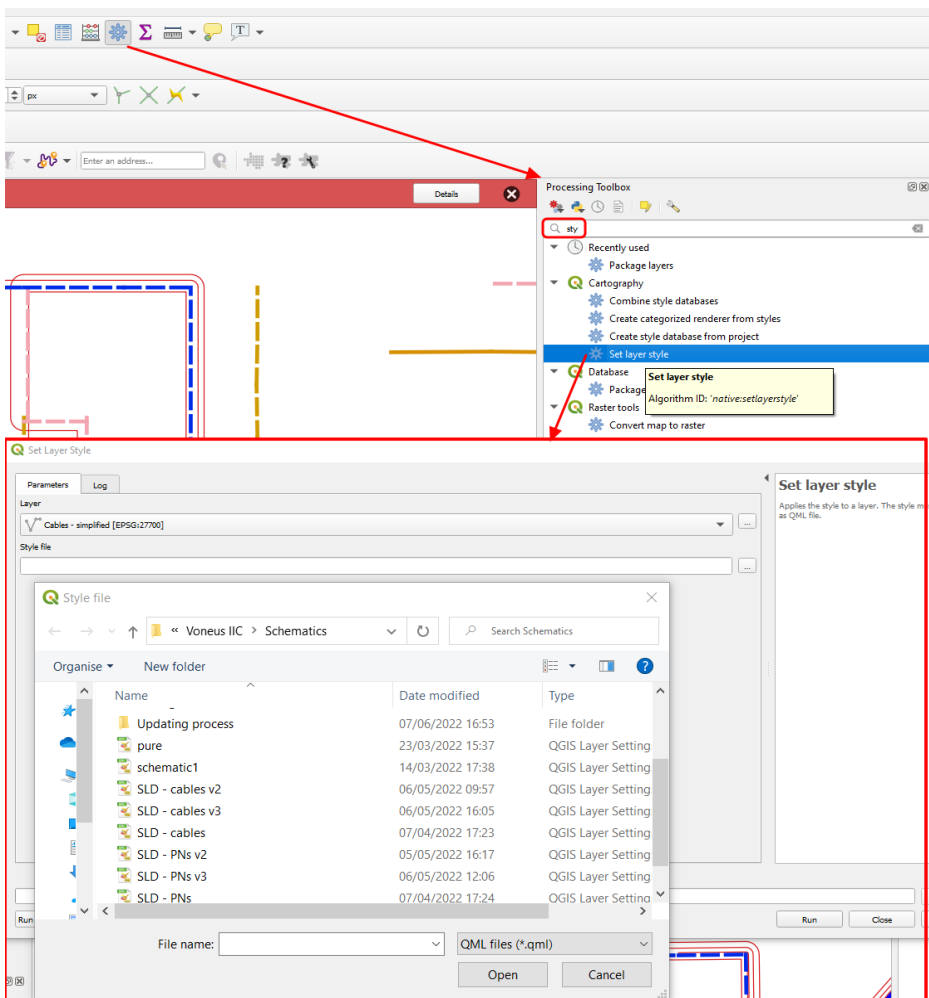


Pic. 98 Saving style to the file in QGIS.

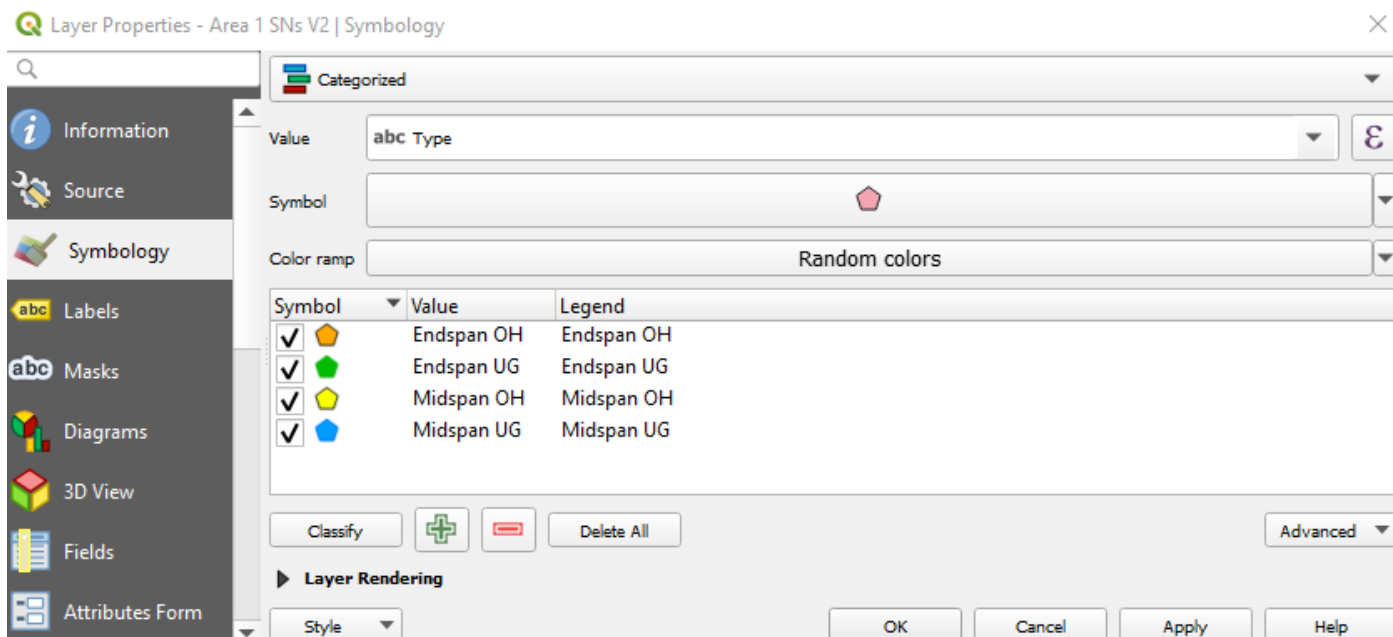
On the left the second option **“Save Style”** is presented. You have just 2 options of saving your style file, which was discussed earlier. Important is another table listing all style sections applicable to the layer. The ticked ones are currently available for saving. Of course, you can select more of them or disable the existing ones. Anyhow everything selected will be included in your styling file and applicable for other layer in completely different QGIS project as long as the layer matches the geometry. This way saves all the styling detail starting from the colouration or symbology and finishing on labelling and some advanced expressions applied. In the other hand, the expressions will be valid **just only in the case when the attribute table content matches properly the formulae applied**. If not, the user won't be able to execute the styling formula from imported file. As you apply more styling criteria, the further usage might be more restricted. Obviously, it's still a quick way of applying the style because user can always alter some bits later. The saved style can be next imported by using more elegant

method, which appears to be also the quickest. We need to use the **Toolbox**, which usually is located on the **right sidebar**. In the search bar at the top, just beneath the toolbar we can define what we want. Even if we **start typing something**, the list of tools start adjusting to our query. Type then until you see the **“Set layer style”** option (Pic. 99) and double-click on it. This rule works for each other tool available in this box. The **“Set layer style”** is nothing else like attaching the external style file discussed earlier in this chapter.

D. Advanced styling of the layer features - it's possible by using the **Symbology** and **Labels** sections. It's fair enough for someone, who begins its adventure with QGIS. Also, not



Pic. 99 Loading style file via **“Set layer style”** option.



Pic. 100 Categorized layer style in QGIS.

all ways of styling will be discussed here. I think at this stage it's enough to know about the following ways of styling features:

- > No symbols – simply erases any styling applied for the layer making its invisible.
- > Single symbol – as discussed earlier, a whole layer has the same colour and symbol applied regardless various parameters (feature values)

Symbol	Value	Legend
✓	Endspan OH	Endspan OH
✓	Endspan UG	Startspan UG
✓	Midspan OH	Midspan OH
✓	Midspan UG	Midspan UG

Pic. 101 Change name of Legend in categorized styling in QGIS.

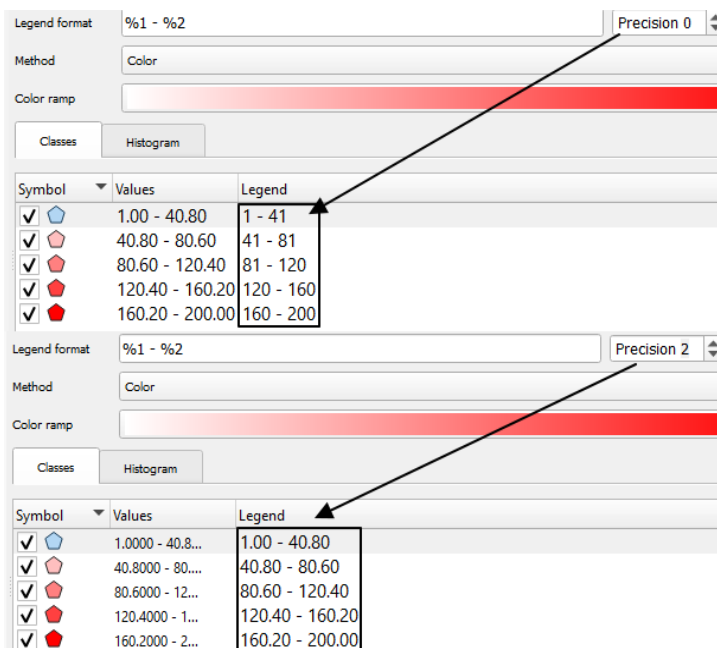
-> Categorized – the **certain value acts like category**. By choosing this type of styling we must **select the attribute table value** and next click the **“Classify”** button underneath (Pic. 100). This way of styling is still simple. We can change the colours by using some predefined gradients instead of **“Random colors”**. The **Legend input** also can be changed by **double-click and providing your own**

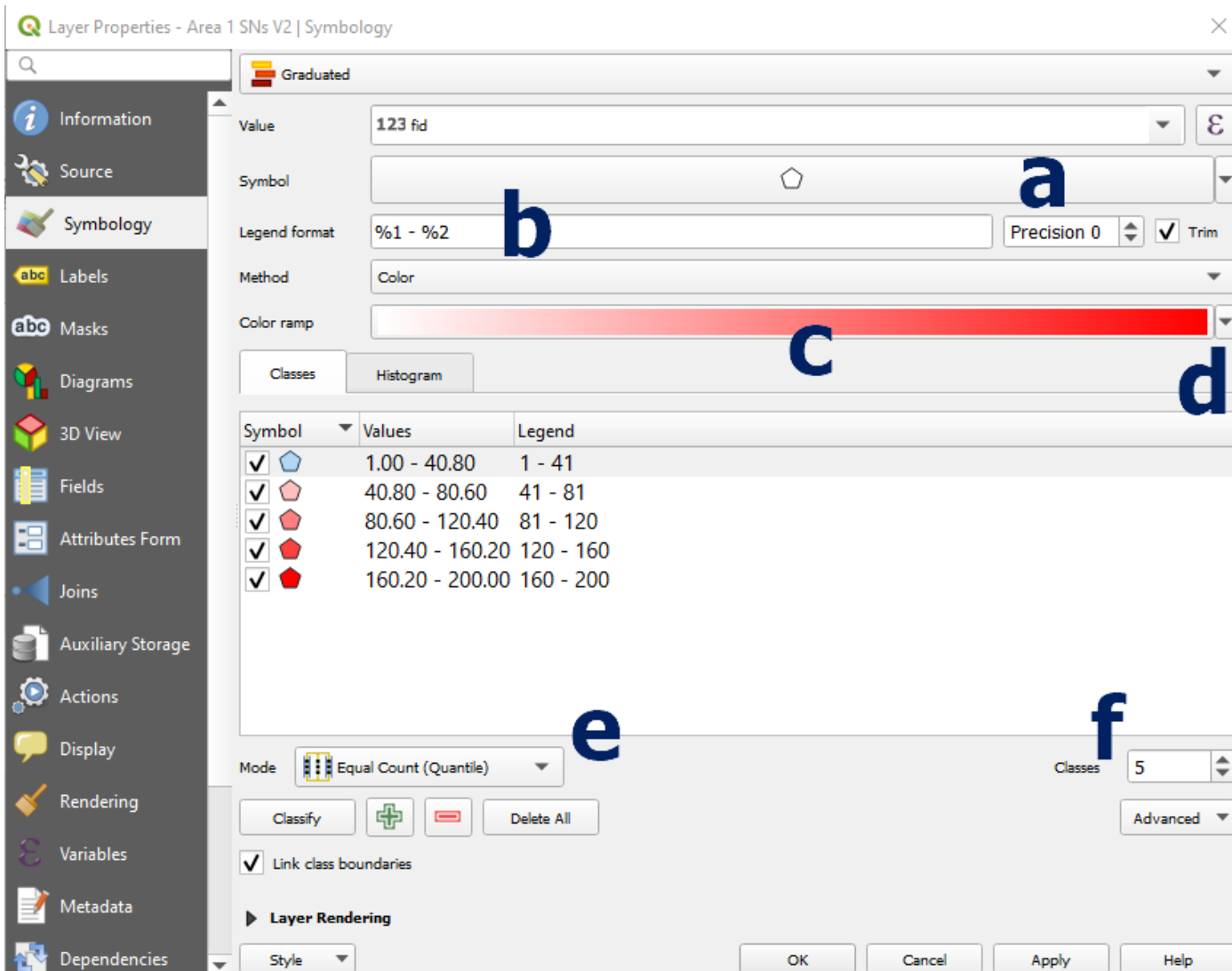
name when cursor is visible. Since the colour ramp selection is not always necessary, the change names of categories in our legend of course it is! Furthermore the Legend section strictly correspond to what we can see in the layer panel.

-> Graduated – the most advance styling method to be discussed – we have a wide choice of colour ramps, although for the entry level important is to operate between four highlighted below (Pic. 103).

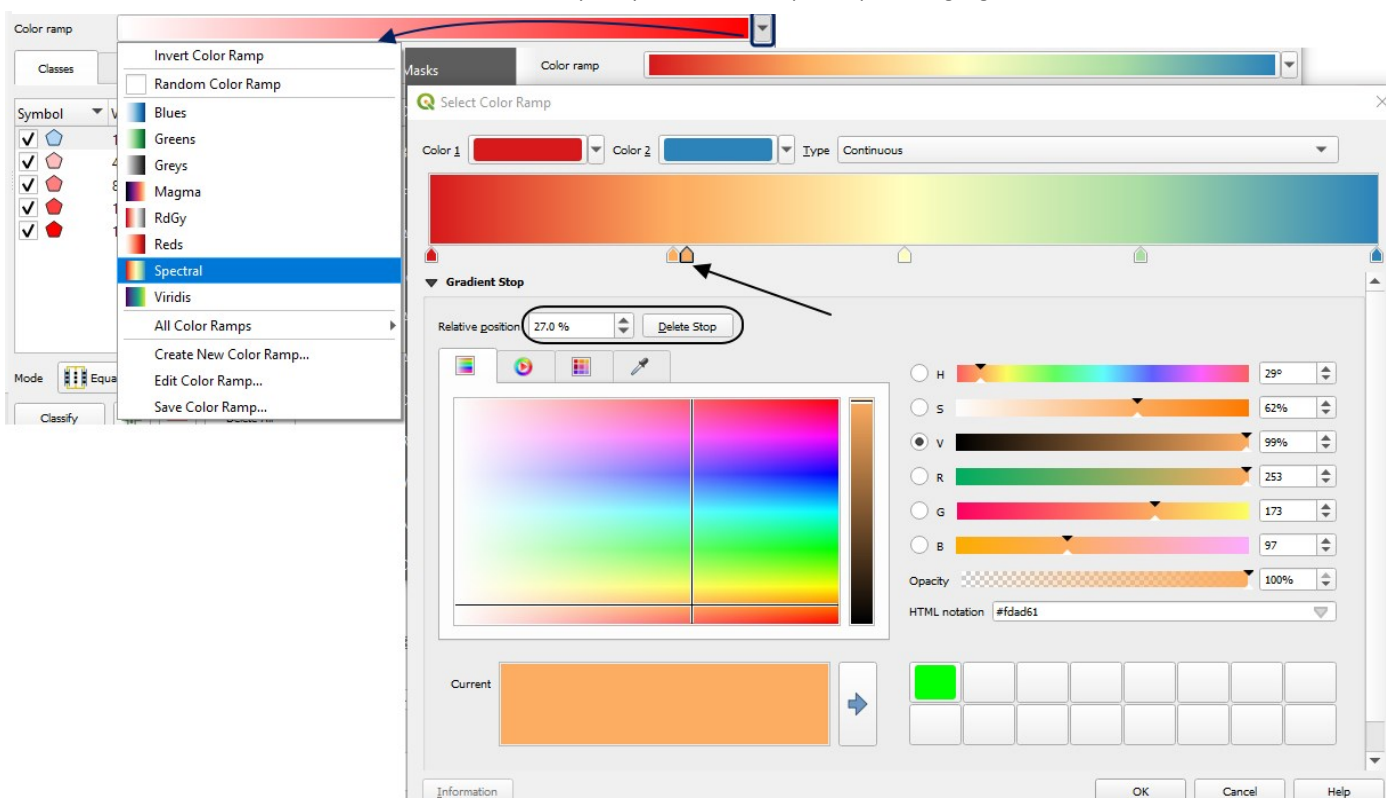
a – Legend format & Precision – legend format should remain in place, because it **determines the range** from the lowest (%1) to the highest (%2) value in the given section. Precision regulates the **number of decimals**. Full number in legend means Precision set to 0. However, we can always play with it (Pic. 102).

Pic. 102 Changing legend precision in graduated styling.



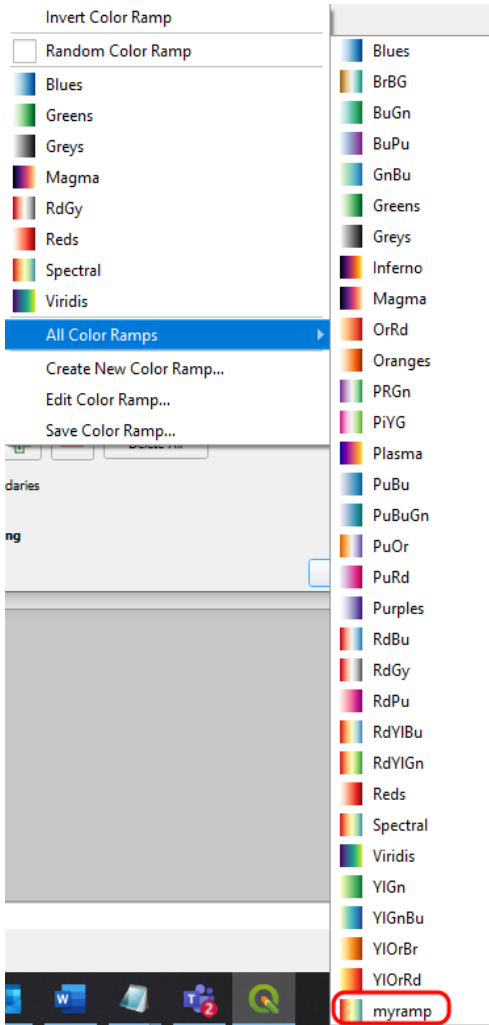


Pic. 103 Graduated layer style in QGIS with pivot options highlighted.



Pic. 104 Colour ramp settings.

b – Method – we can choose between the colour and size. Above you can see the colour ramp applied. It's



Pic. 105 Colour ramp advanced selection with custom ramp saved.

just a **simple colour ramp** comprised with just 2 colours, which work as huge gradient between two extreme values in our selection. This colour ramp can be changed by selecting the dropdown *c*, which is available also for categorized styling, but in my opinion is not necessary that much there.

c, d – Color ramp selection – includes tens of others and more advanced colour ramps for using in your graduated styling (expand **“All Color ramps”**) section. The selection opens additional options worth our attention (Pic. 105).

First of all, the multi-coloured ramp doesn't mean fixed displacement of colours. Each ramp is equipped with **“Stops”**, that can be **moved or deleted**. The relative position is expressed in the percentage of a whole ramp strip visible just above. The default colour ramp comes in continuous coloration, which means, that all the hues penetrate each other subtly. We can also select the **“Discrete”** option instead and our colours will change abruptly. Not to mention, that the coloration of this ramp is **just proposal!** You can do what you want with colours, change them, make stops as much as you can and wherever you want to. Finally, you can save your ramp and append the final list of colour ramps (Pic. 105).

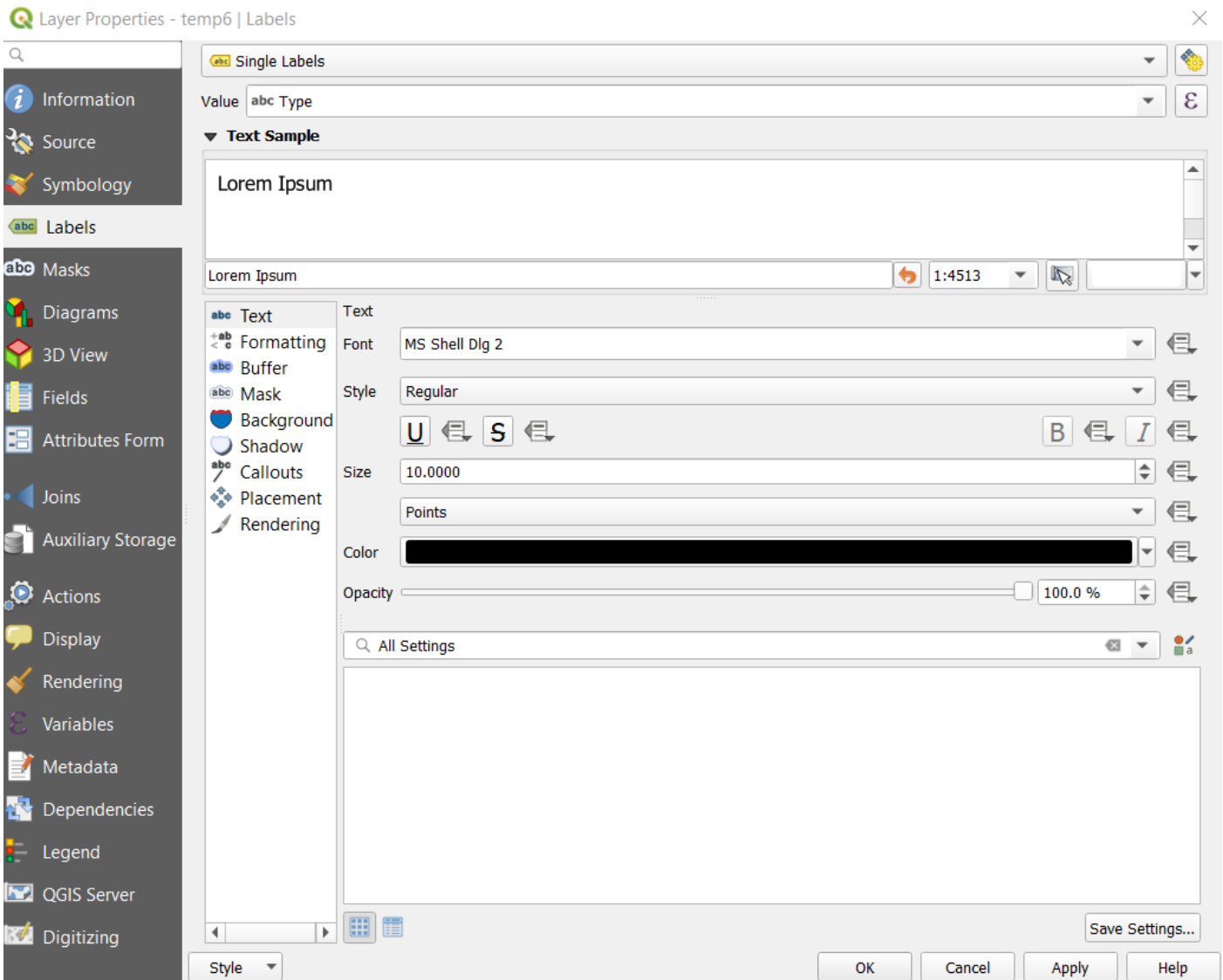
By saving the colour ramp you will be asked about assigning it to **one of the 4 groups** available (*Colorful, Grayscale, Showcase, Topology*) making it easier to locate later. Other options here allow you to edit some existing colour ramp or create some colour ramp from scratch.

e – Mode – the way of **how the graduate classes must be calculated**. There are a few options in which the whole range of our values can be split (Pic. 106). As default, the **“Equal Count (Quantile)”** is set, but we can choose also between: *Equal Interval, Logarithmic Scale, Natural Breaks (Jenks), Pretty Breaks* and *Standard Deviation*. ***f – Classes*** – specifying the **total number of classes of our graduation**. The default value is 5.

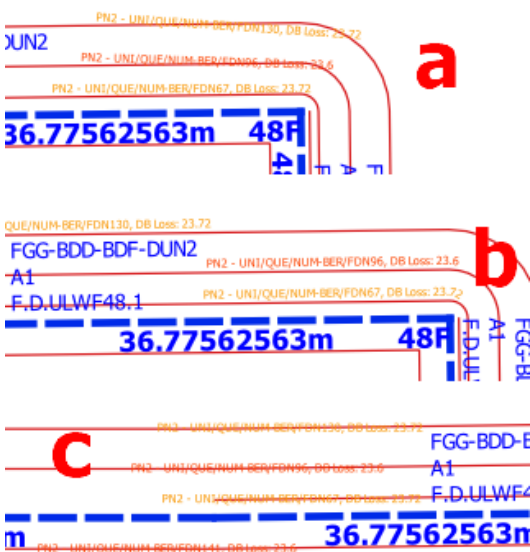
Symbol	Values	Legend
<input checked="" type="checkbox"/>	1.000 - 3.162	1 - 10 ^{0.5}
<input checked="" type="checkbox"/>	3.162 - 10.000	10 ^{0.5} - 10 ¹
<input checked="" type="checkbox"/>	10.000 - 31.623	10 ¹ - 10 ^{1.5}
<input checked="" type="checkbox"/>	31.623 - 100.000	10 ^{1.5} - 10 ²
<input checked="" type="checkbox"/>	100.000 - 316.228	10 ² - 10 ^{2.5}
<input checked="" type="checkbox"/>	316.228 - 1000.000	10 ^{2.5} - 10 ³

Mode: Logarithmic scale

Pic. 106 Making classes by “Logarithmic scale”.



Pic. 107 The **Label** styling options in QGIS.

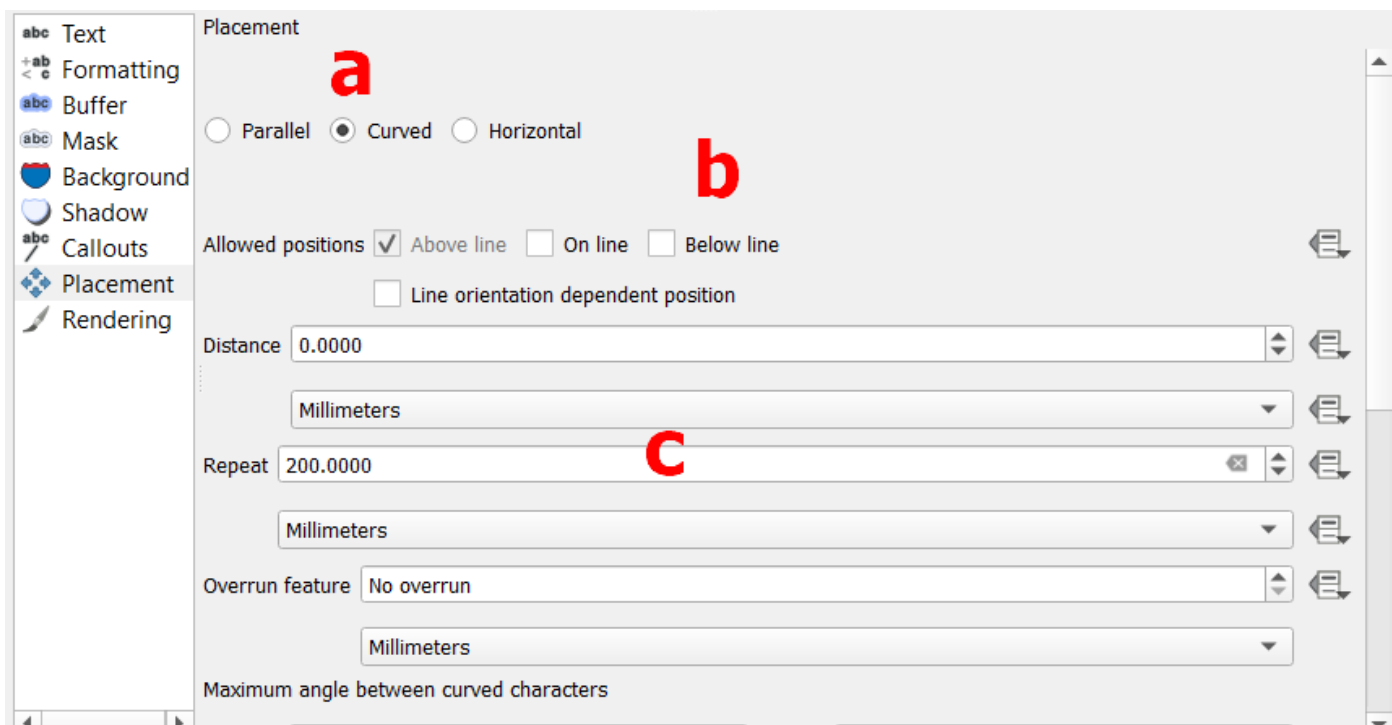


Pic. 108 Basic label placement options in action: a) parallel, b) curved, c) horizontal.

E. Labelling features – apart from styling important is **defining the labels**, which show a visual description of our layer. It's the description expressed by the most important keywords like name, length and so forth. The default setting is **"No labels"**, but admittedly there is just one option for QGIS newcomer to use – **Single Labels**. **For rule-based labelling the expression is required**. In general labelling includes several sections where we can **customize our text**. At the beginning of your adventure with QGIS you just need to know the very basic one, where the font can be customized (Pic. 107). The **"Text Sample"** window shows how our label will look like. Below is the **Text** box, where you can change the font and set the text size as default in **Points**, but they can be changed to **Millimetres, Pixels, Meters at Scale, Inches** and **Map Units**. **The most important are Map Units**, which visually correspond to used map scale (Pic. 110). **Colour** and **opacity** also are basic settings, which can be applied to our layer.

The options available in the left sidebar apply to more advanced text customization. We will focus on some options offered by **Placement** and **Rendering** section. -> **Placement** – in general this section defines **how the given label will be placed against the shape** of our

feature. We can [choose its correct position](#) by positioning the label above or below the item, right or left of the item, overlay item with label and so forth. There is a multitude of combinations to play with, although now when you start using QGIS we can highlight just the most important ones (Pic. 108). The image below shows a piece of Placement section, with some important settings:

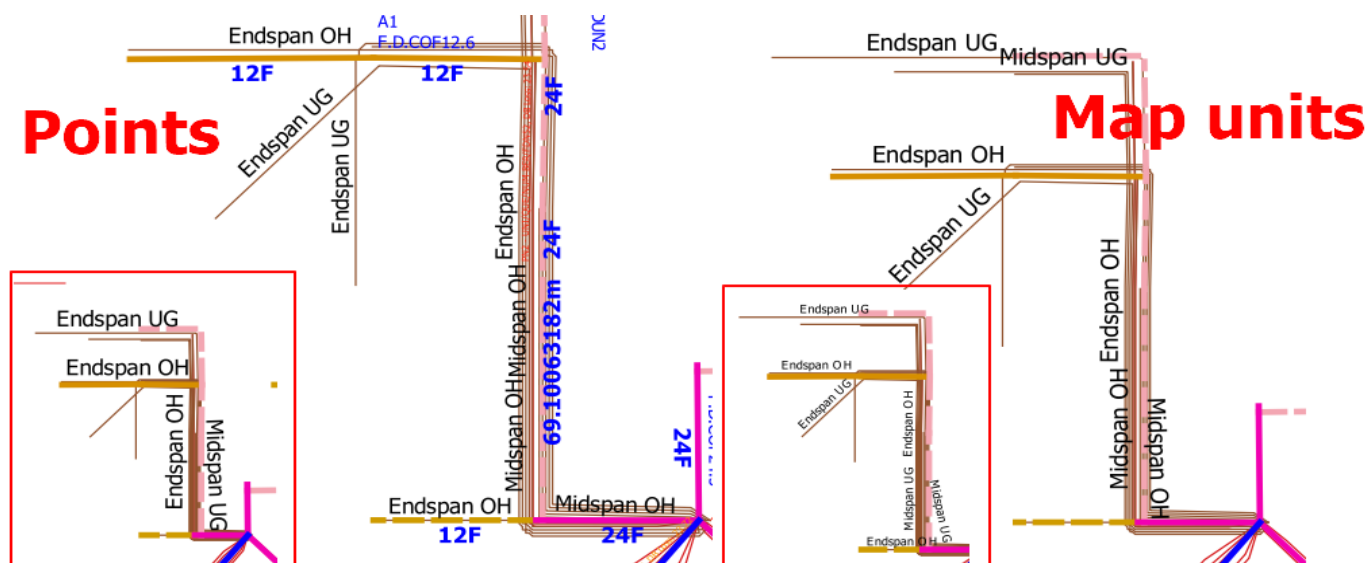


Pic. 109 Basic label placement options with the most important highlighted.

a – Placement - The very first label defines the **position of text against the feature** (Pic. 108), in which the best is *Curved*, where the text firmly sticks to the shape of the item. When *Parallel* is used, the text is less “plastic” and can be placed diagonally when the feature “makes a turn” on the map. *Horizontal* basically falls right above the item.

b – Allowed Positions – as default are “Above line”, but we can set our text online, blow line or depending on its position.

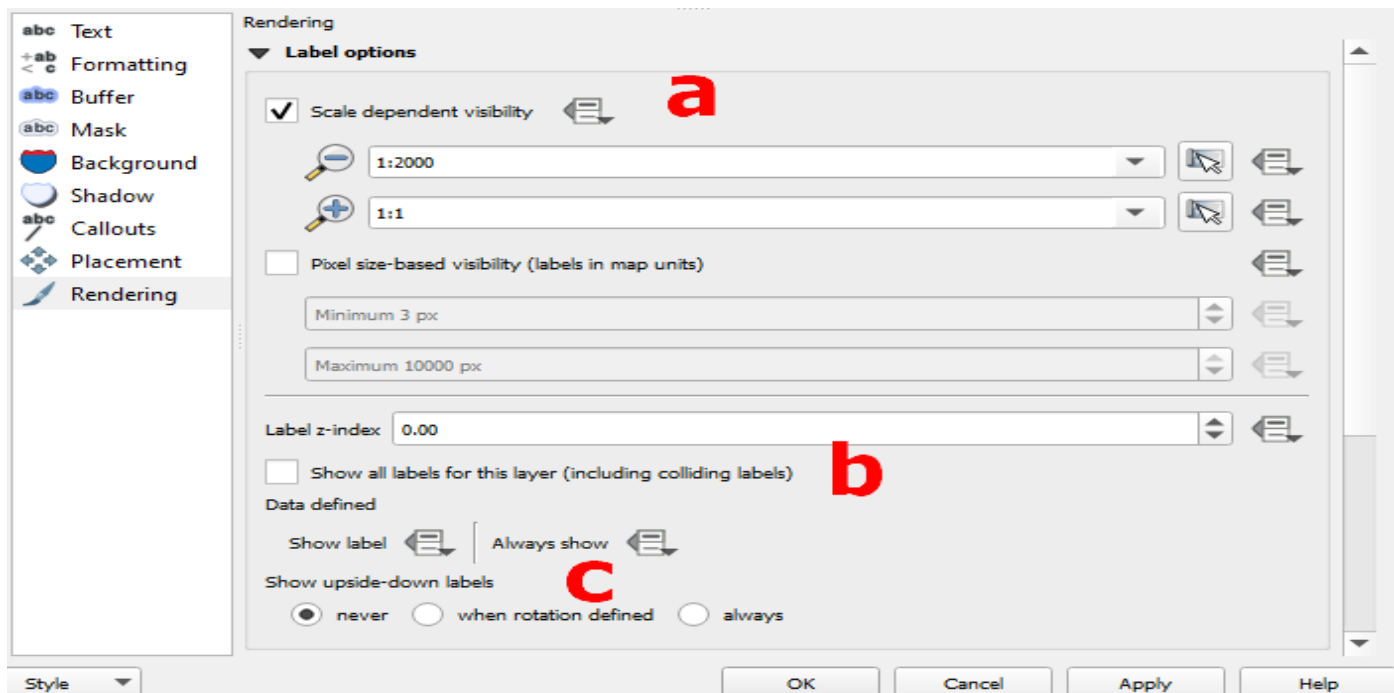
c – Repeat – means how often our label will be repeated across the feature line. By default, it comes as “No



Pic. 110 The size of font against the map scale at different units applied.

repeat” which means, that the label will appear only once regardless the length of the line. By setting it as i.e., 300.0000 Meters at scale we should expect three labels along our 1km line separated by 300m.

-> **Rendering** – the section which in general “is responsible” for showing the labels on our map (Pic. 106).



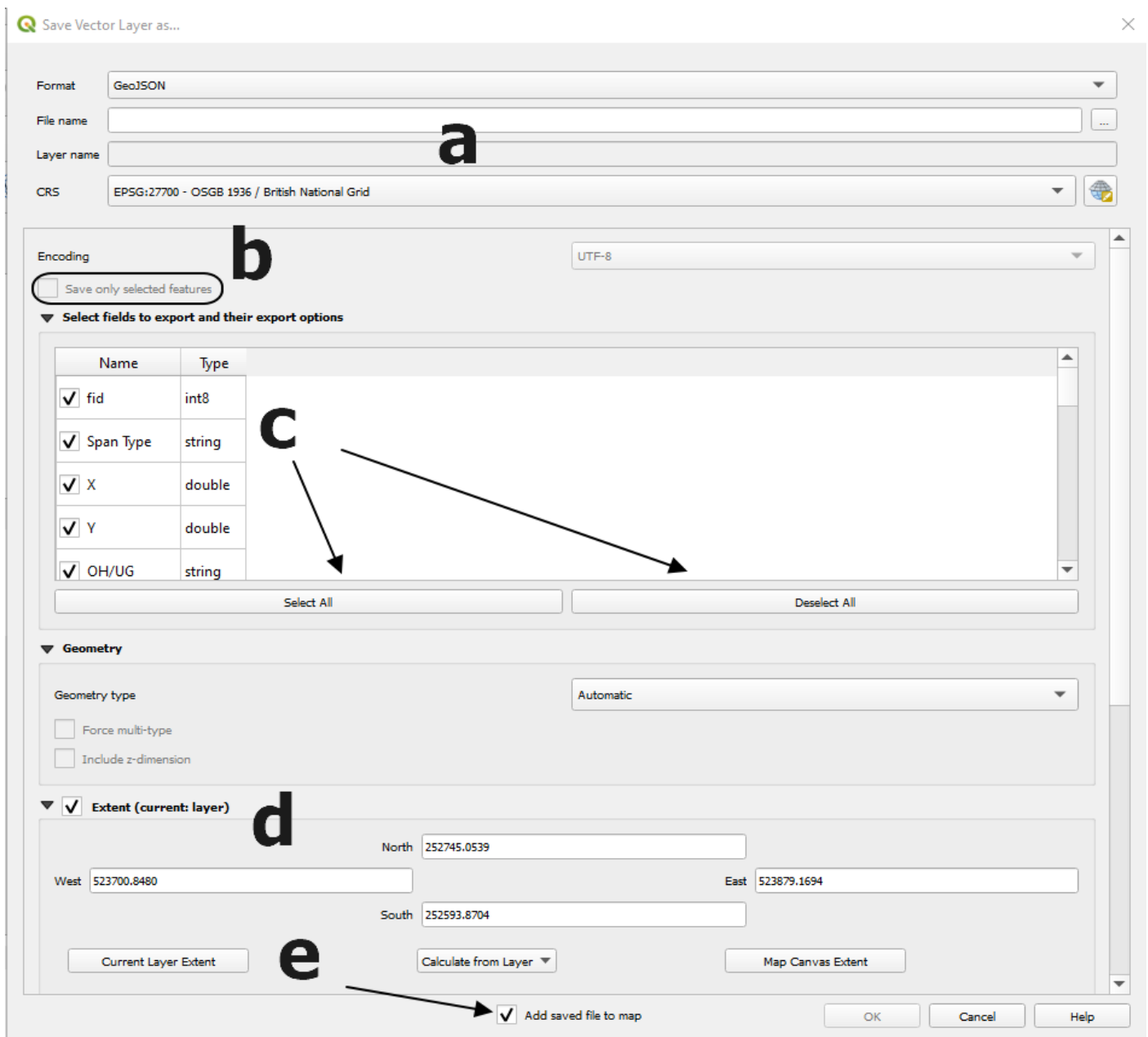
Pic. 111 Basic label rendering options with the most important highlighted.

a – Scale dependant visibility – determines **until which scale the label will be visible**. It’s very beneficial in the situation when we need to have our map **clear for printing**. When printing the general map, we don’t need labelling. They are needed mostly when we want some detailed view, therefore this option is crucial here. The **maximum scale** used here can be 1:1 or a bit smaller, whereas the **minimum one is the most important**. When going beyond the scale set in this box, the label is simply gone.

b – Show all labels for this layer (including colliding labels) – useful when we want to show all the labels **regardless of the density of various layers features**. When this option is switched off, one of the labels yields another label in the vicinity.

c – Show upside-down labels - as default set “Never” but it’s good to toggle to “When rotation defined” in the case when **we want to use the label toolbar for rotating or changing their position manually**. It won’t be covered in this text, as it’s mostly for viewers.

18. Exporting layer



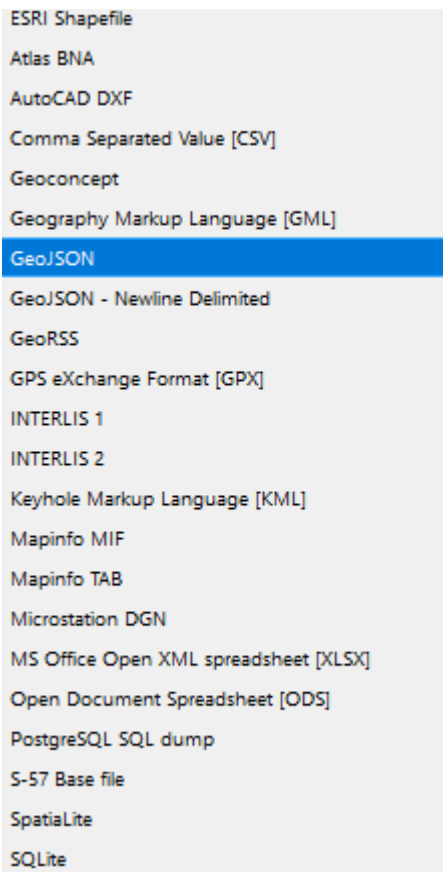
Pic. 112 Basic label rendering options with the most important highlighted.

For QGIS user, who just analyses and views some produced project, exporting layer will be very important. The quickest option of exporting our layer is **right-click on the layer -> Properties -> Export**, where we have a few important options:

- > Save Vector/Raster layer as... - typical saving option, which looks like below (Pic. 112).
a) File details – **Format, Name & Path** and **CRS**. The **most important here is the CRS system**. We need to make sure, that it **corresponds to our QGIS project!** It often happens, that we import some layer (especially comma delimited after previous geocoding) with the **WGS 84** coordinate system. Next our file doesn't match the QGIS project with **EPSG: 27700**. Another point is, that the CRS is often used for **reprojecting layer since QGIS 3x** is in use.

b) Save only selected features – option when we have **something selected across our layer**. If not, it remains inactive.

c) Select fields to export and their export options – very important option in the case when we want to “slim down” our file. When you don't need some fields (attribute columns), you can simply **untick them** and they won't be saved to the file. It's good to know about some options below. When you need just 2 layers out of



Pic. 113 File extensions available in the "Save as" option in QGIS.

10, quicker will be hit "*Deselect All*" and select just them 2 instead of unselecting other 8 😊.

d) Extent (current layer) – when we need just a piece of layer, which is visible in our map, we can set the area in this section. The options are:

- Coordinates (4 corners) as shown above

- Current Layer extent – basically exports our whole layer as it is in the QGIS project

- Map Canvas Extent – practically the same, because usually map canvas cover a whole world like OpenStreetMap

- Calculate from layer – I guess the best option to choose from. If for instance we need the file ranged just within other layer which is smaller, this option will be the best.

e) Add saved file to the map – it's not necessary, although switched on in default. I wouldn't change it, because emerging a new layer as a result of saving the current one states, that process has been successful. If not, an error should appear anyway. There are also other options in this box, but not necessarily for QGIS viewers/novices.

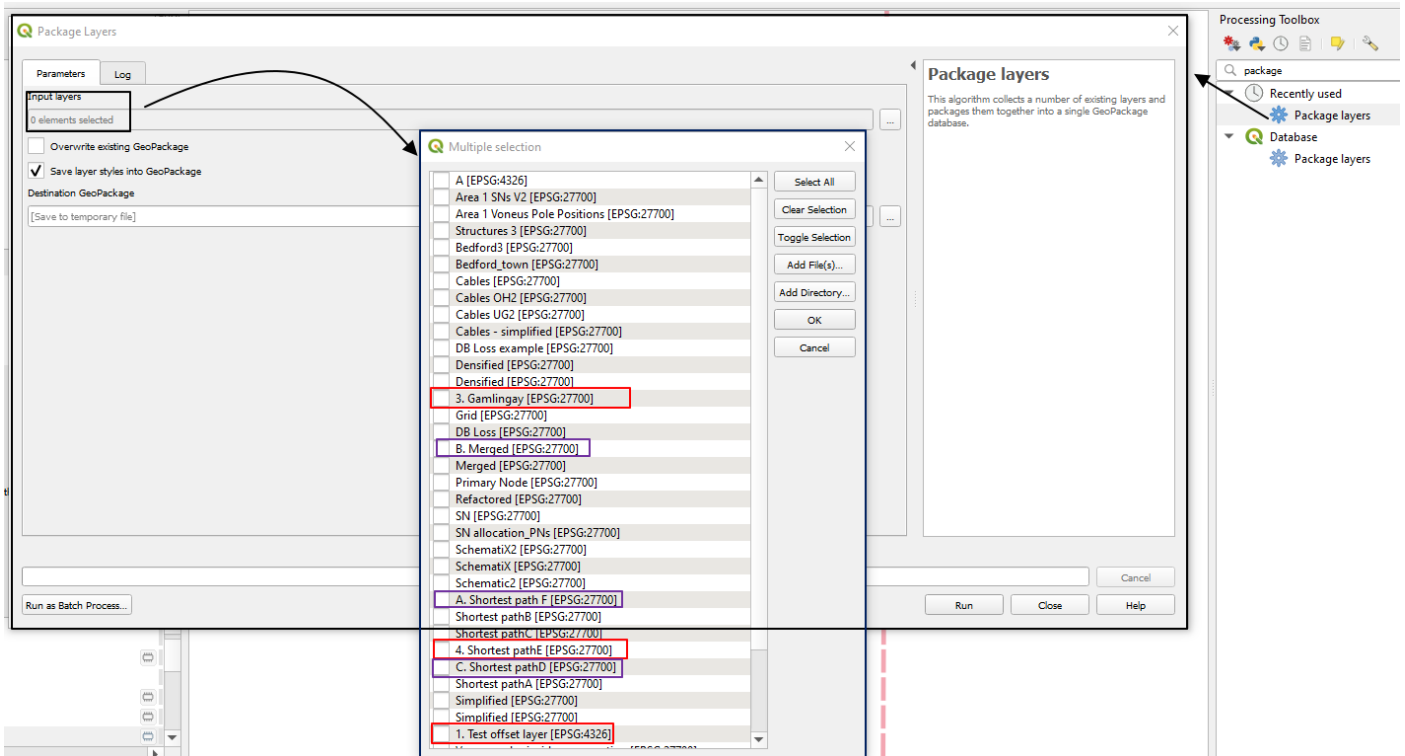
-> Save Selected Feature As – exactly the same options as shown above (Pic. 112), although appear as separate saving option. In practise it's just Pic. 112-point b) switched on. Anyway, it's a very useful option.

-> Save As Layer Definition File (.qlr) – this option allows us to retrieve the layer with styling. This file contains the pointer to the layer data source.

-> Save as QGIS Layer Style file (.qml) – another way of saving the style file, but just in .qml extension.

The export option in QGIS is also used for many conversions between the files. As you maybe know there is a lot of file formats in QGIS environment, but not all of them can be opened in various applications. Therefore, a user must know some way of conversion the files. QGIS seems to be a very good tool for it, because quite a few extensions can be opened here (imported) and exported under different format (Pic. 113).

In more complicated way the Geopackage file (.gpkg) can be saved. It's not possible with this simple option described above. Because the Geopackage layer is usually comprised of more than 1 layer, we must create the "package" (Pic. 114).

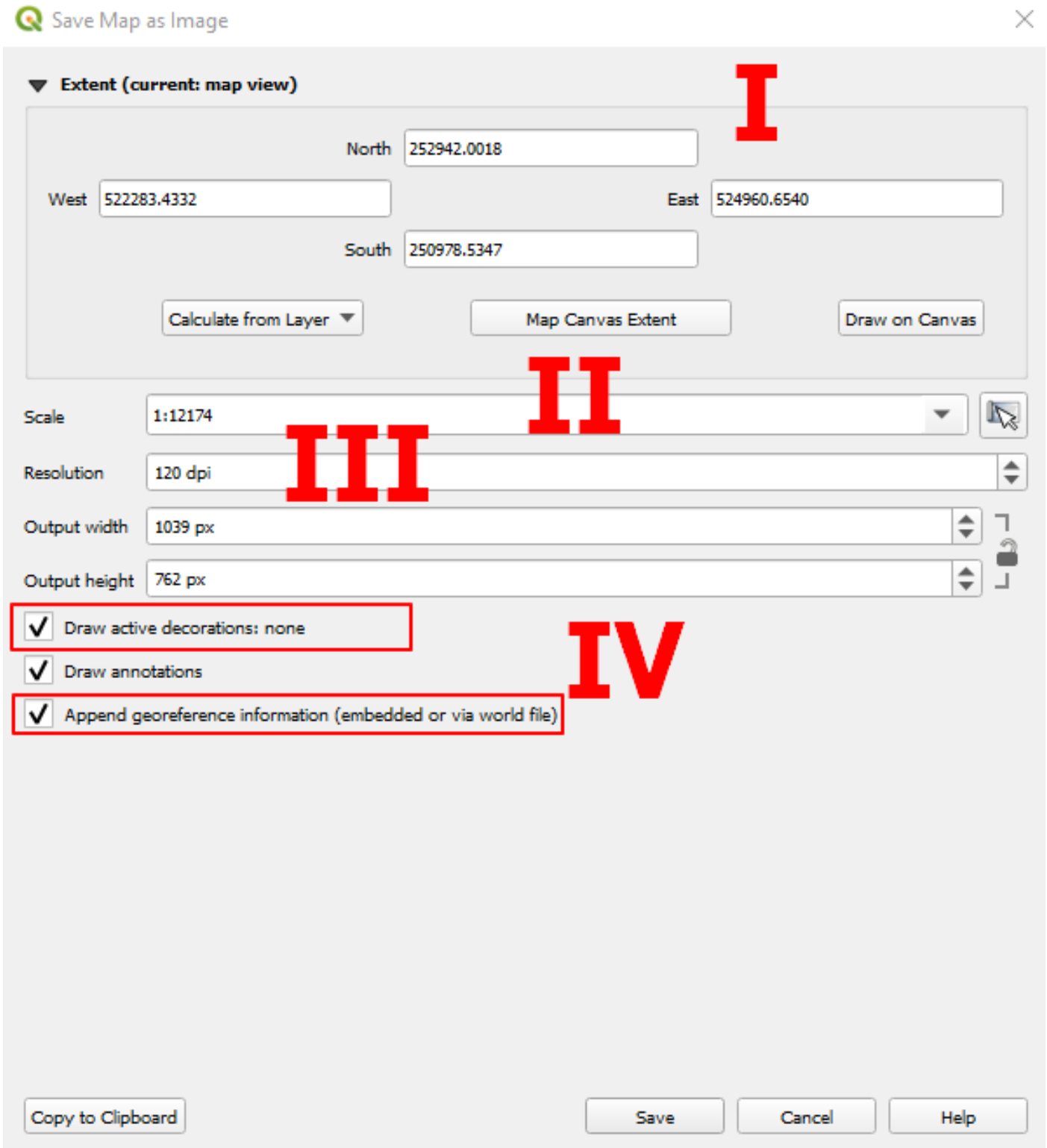


Pic. 114 Creating the Geopackage (.gpkg) file in QGIS.

This package can include up to all the layers belonging to our QGIS project. There is the **“Package layer”** tool in our **Processing Toolbox**, which can be run for this purpose. Next, we are selecting the layers, which must be included in our Geopackage file and simply clicking the **“Run”** button. The specificity of Geopackage file is **ordering all the layers alphabetically regardless their initial order in our layer panel!** Sometimes it might be disturbing if we want to have some specific layers on the top of others (like cable route at the top of driveway, land registry, and so forth). Good method for it is **adding the prefix** like **1,2,3** or **A,B,C** to the layers, which will mark the new order elsewhere the Geopackage file will be imported.

19. Exporting map to file

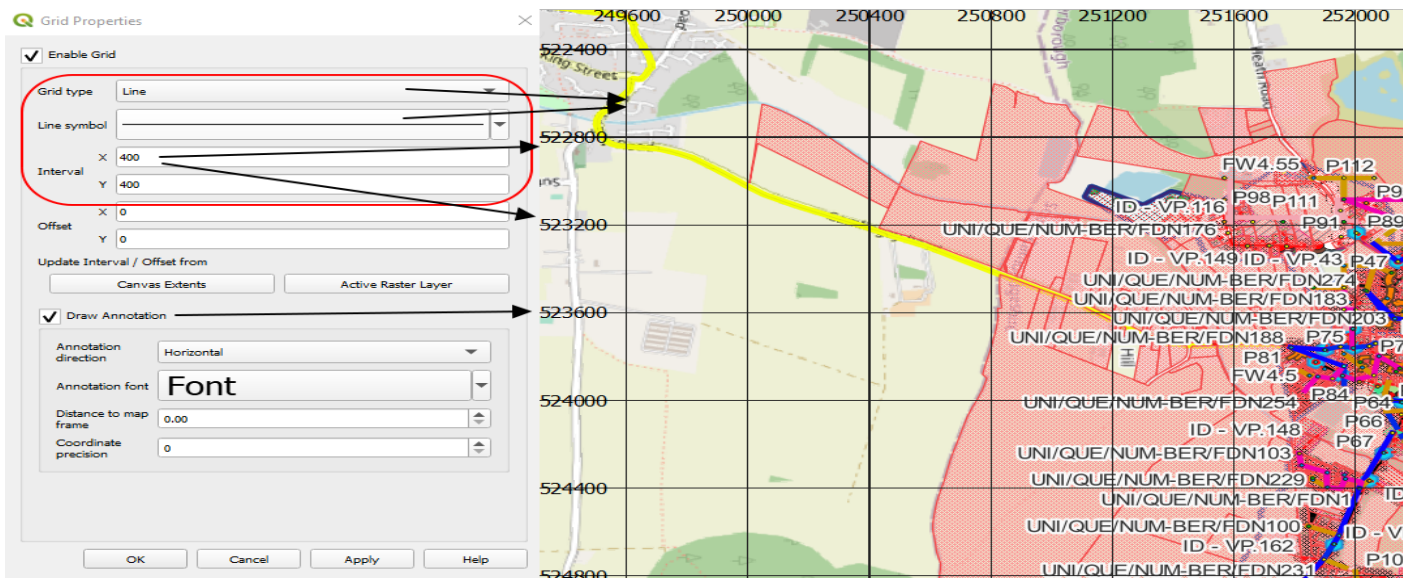
The quickest way of export any map produced in QGIS is in **Project -> Import/Export**. There are 3 options of exporting the map. Excluding the last one, which is export to the format **.dxf** and making it used in the **CAD environment**, the user can make it on the visual way by **producing the raster file**. There are 2 ways of export QGIS map to raster though – by using **“Export map to image”** and **“Export map to PDF”**. The first option – export map to image saves our image in the **.png** file including an **auxiliary file** with **.pgw** extension. It means, that we are receiving georeferenced **.png** file. It’s in the case, when we want to load the **.png** file **directly to our QGIS map in another project**. By having the geometry detail in the **.png** file, quick location of **.png** raster image in our map is possible. Otherwise, you would have to georeferenced this image manually, which obviously takes the time. It’s good to know about it then. The **.png** format is also georeferenced, so it can be plotted on random QGIS project easily at **previously defined location**. The export options for **.pdf** and **.png** files are quite similar. Regarding the georeferenced file, we don’t need to even think about it, as the **“Append georeferenced information”** option is set on as default (Pic. 115). That’s why the auxiliary **.pgw** file is created. If you need just pure **.png** image for print, you can switch this option off and the **.pgw** file won’t be generated. Other important settings, within the **“Export map as image”** option is highlighted in the image below (Pic. 115), though I guess most important is the extent of our image we want to generate. The **default setting provides the visible bounds of our current map view** expressed with the **coordinates of the CRS defined in our QGIS project properties**. The choice of our extent is quite wide, because we can stick to the particular layer used in our project or even **draw our custom range in the map** (Pic. 115).



Pic. 115 QGIS – Export map as image with important options highlighted.

The second feature is the *Scale* (II), which usually comes the same as set in the current map view. It’s still the moment when we can change it. Another thing, which regrettably always comes as 120 dpi is *Resolution* (III). The only method of how we can change the default resolution from 120 dpi to other is making the Magnifier value other than 100% (see Chapter 10, Pic. 39, 4). As we change the resolution the Output dimensions change accordingly. Last options to look at (IV) are “Draw active decorations” and “Append georeferenced information”. When we have “none” displayed, it means that no decorations have been applied to our map. The “Append georeferenced information” option was discussed earlier. Let’s focus on the potential decorations we can apply to this exported map image.

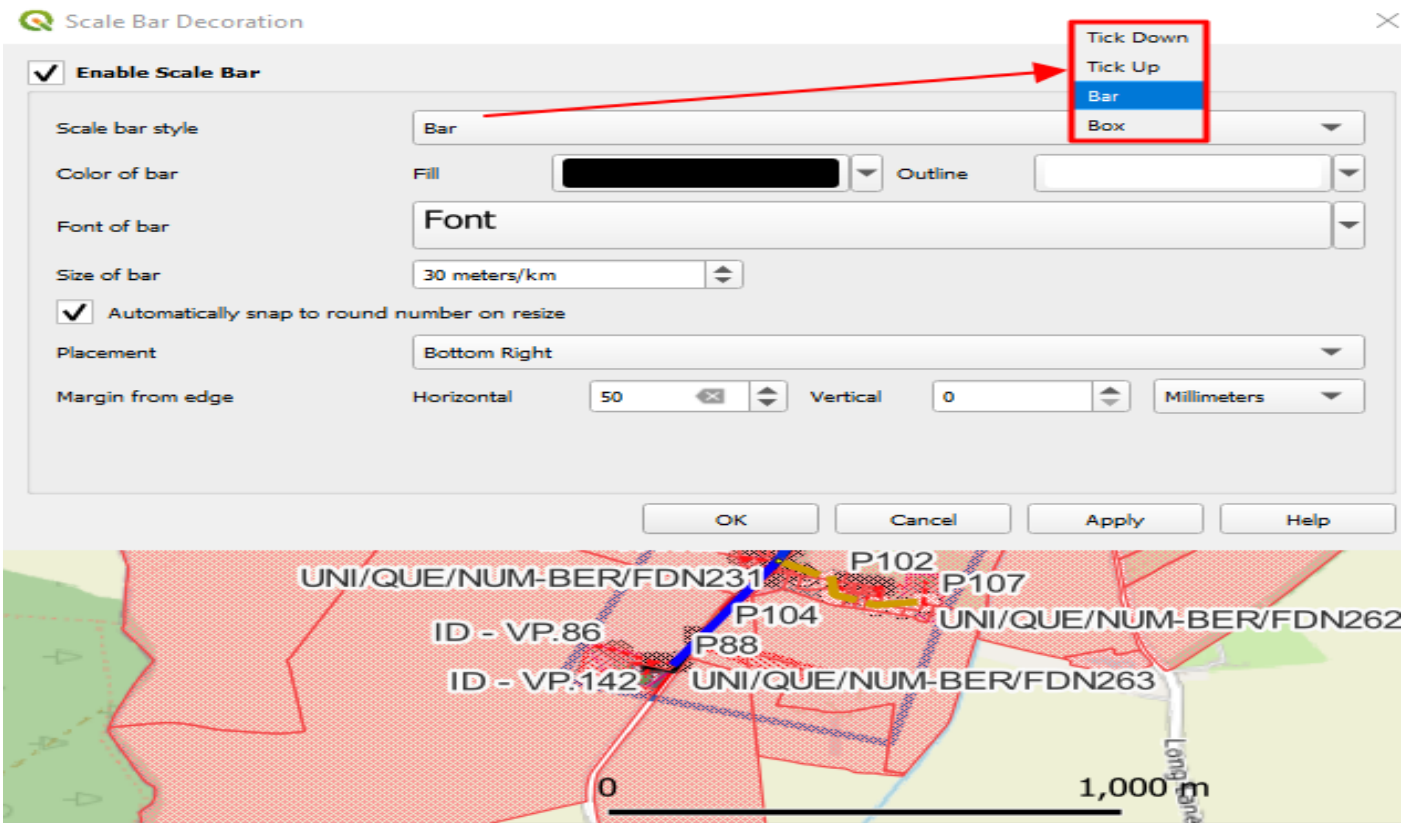
Decorations in other words mean the **map components**, which are usually inherent in the typical map canvas like **legend, scale, north arrow or grids**. Decorations available in QGIS are:
 -> **Grid** – based on the **current CRS coordinates** (Pic. 116).



Pic. 116 QGIS – Grid decoration.

A user can **define the grid interval, type of grid** and annotation options. Everything, which is needed to display the **grid** properly.

-> **Scale bar** – very simple way of defining the map scale. Admittedly it marks just **one section of distance**, which is very poor, although it's good to have something rather than "Not to scale" input in the corner (Pic. 117).



Pic. 117 QGIS – Scale bar decoration.

-> **Image** – refers rather to **logo or watermark**, which can be attached to our map image (Pic. 118). You can provide your own to the custom directory and use it.

Image Decoration

Enable Image

Image path: ...

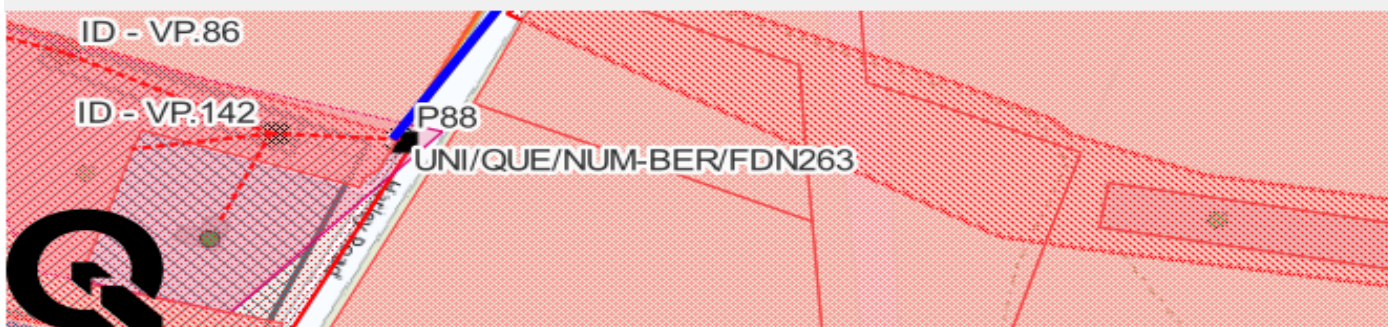
Color: Fill Stroke

Size: ...

Placement:

Margin from edge: Horizontal Vertical

OK Cancel Apply Help



Pic. 118 QGIS – Image decoration.

-> North arrow – very useful element the same as the scale bar. Likewise in the case of Image decoration, we can provide our own .svg pattern for the north arrow symbology (Pic. 119).

North Arrow Decoration

Enable North Arrow

Color: Fill Stroke

Size: ...

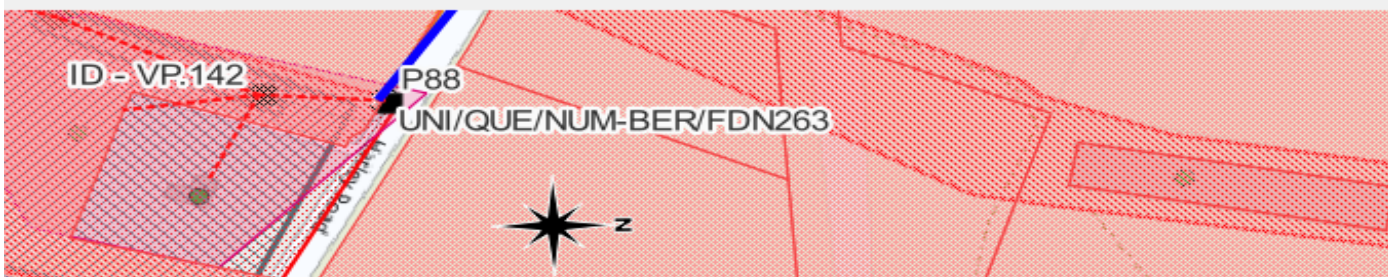
Custom SVG: ...

Angle: Automatic

Placement:

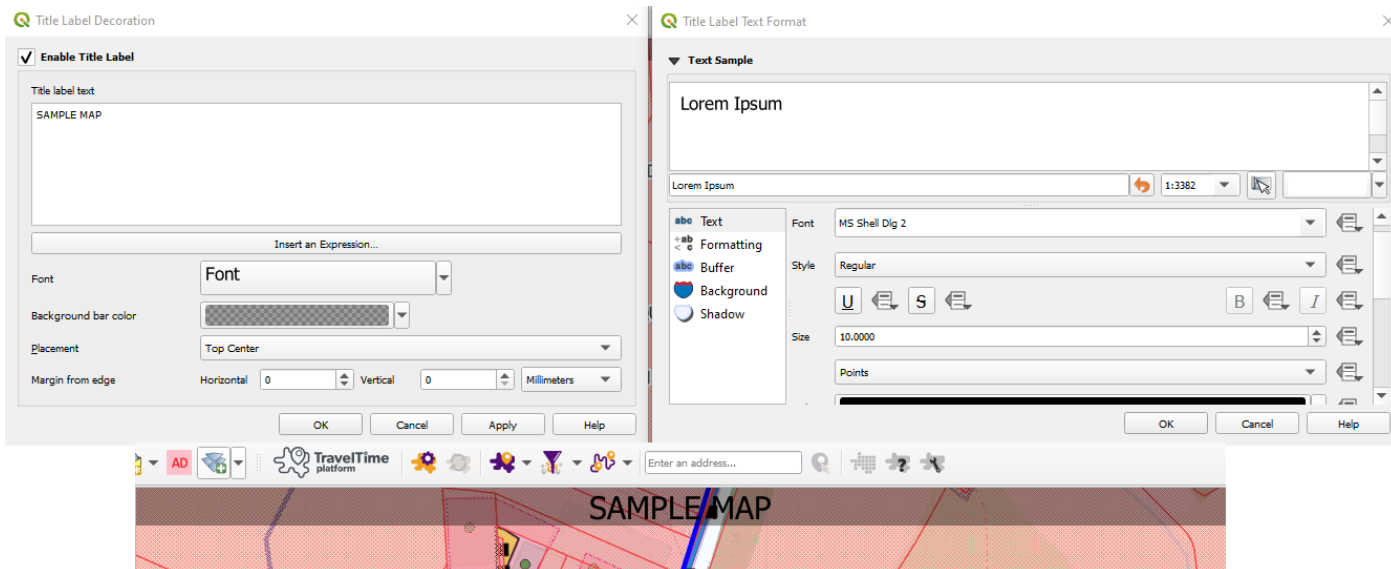
Margin from edge: Horizontal Vertical

OK Cancel Apply Help



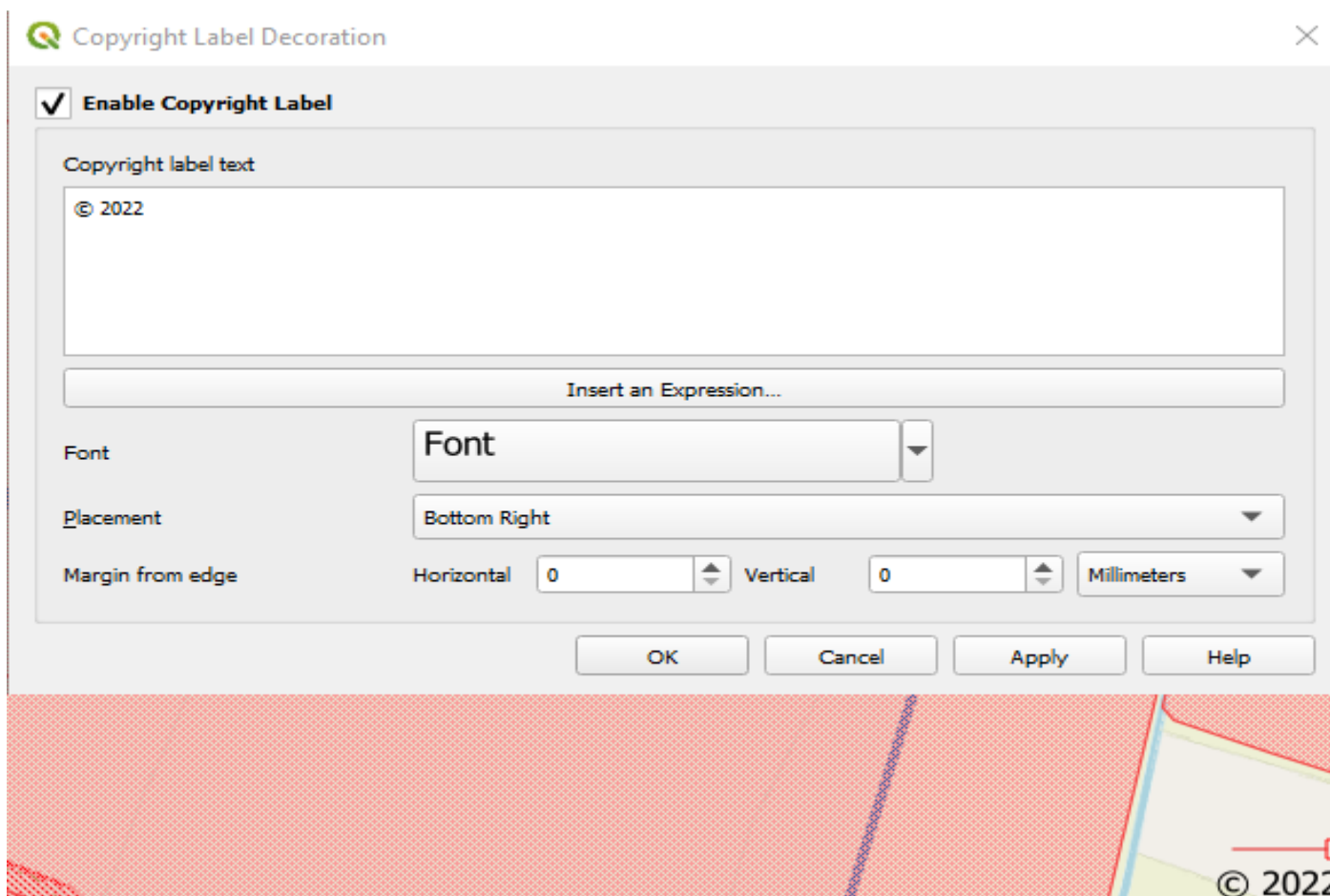
Pic. 119 QGIS – North Arrow decoration.

-> Title Label – simple way for adding title to our map (Pic. 120).



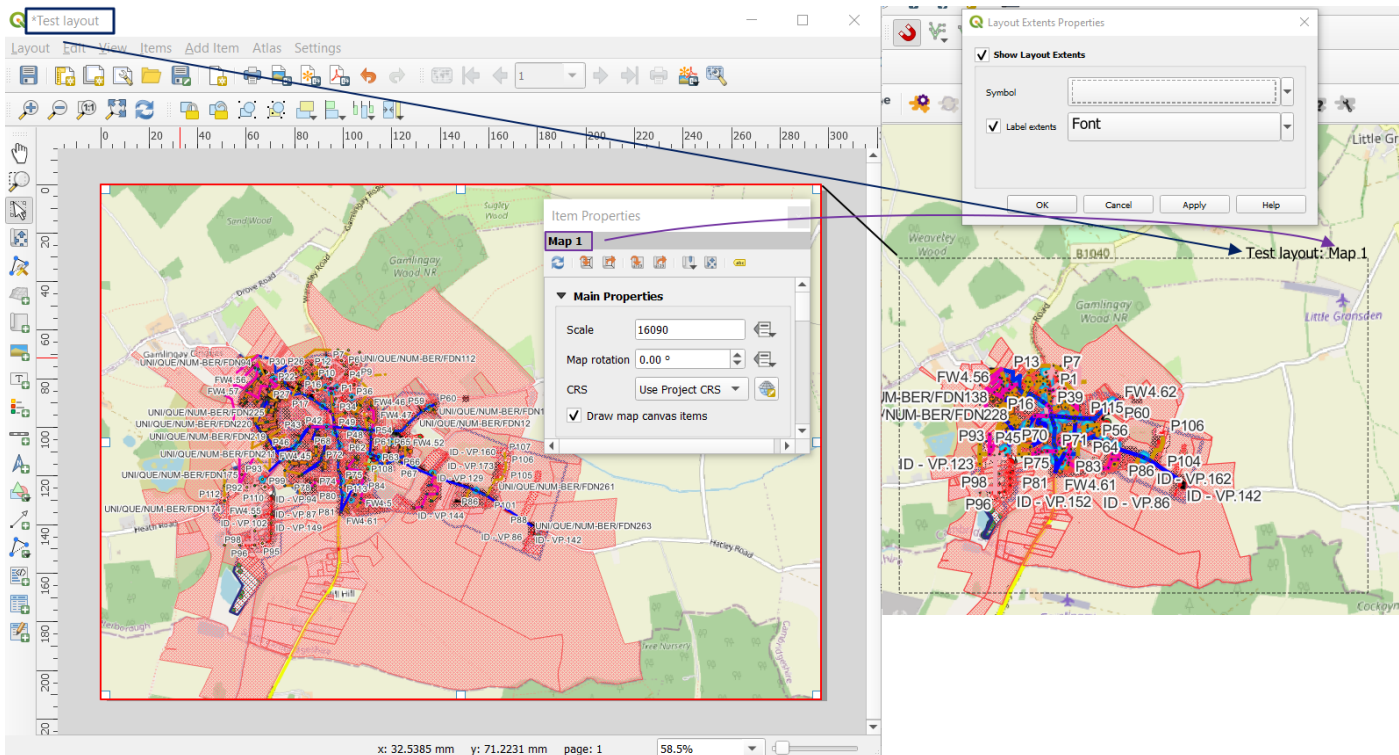
Pic. 120 QGIS – Title Label decoration.

-> Copyright Label – an option for adding copyright to our printed map (Pic. 121). We can also use the expression for it.



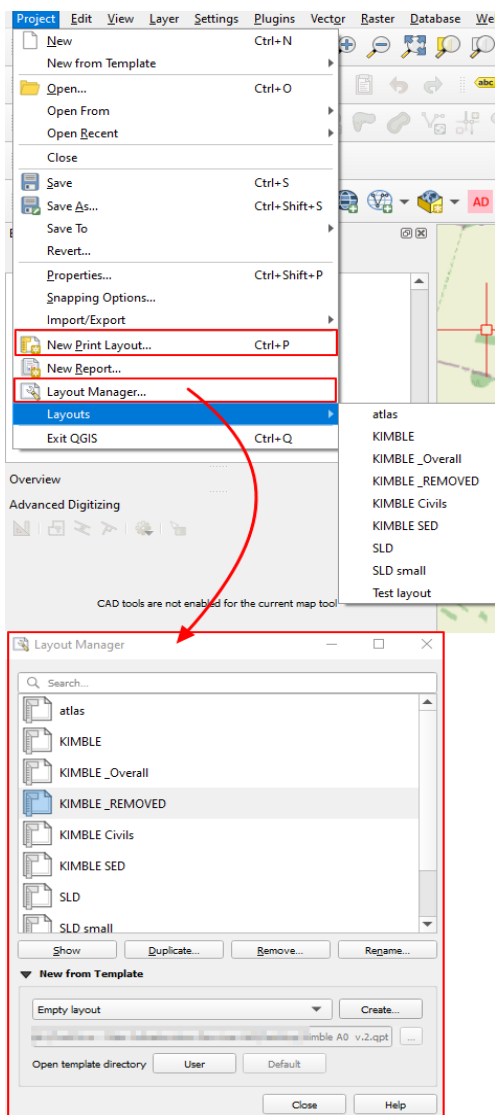
Pic. 121 QGIS – Copyright Label decoration.

-> Layout extent properties – works only when some [print layout is in use](#). It's rather subject for the last chapter of this publication. When we have already map opened in the print layout, the layout extent decoration shows the range of map within the main map canvas (Pic. 122). Moreover, we can apply the text label, which will display the name of layout and map included.



Pic. 122 QGIS – Layout extents decoration.

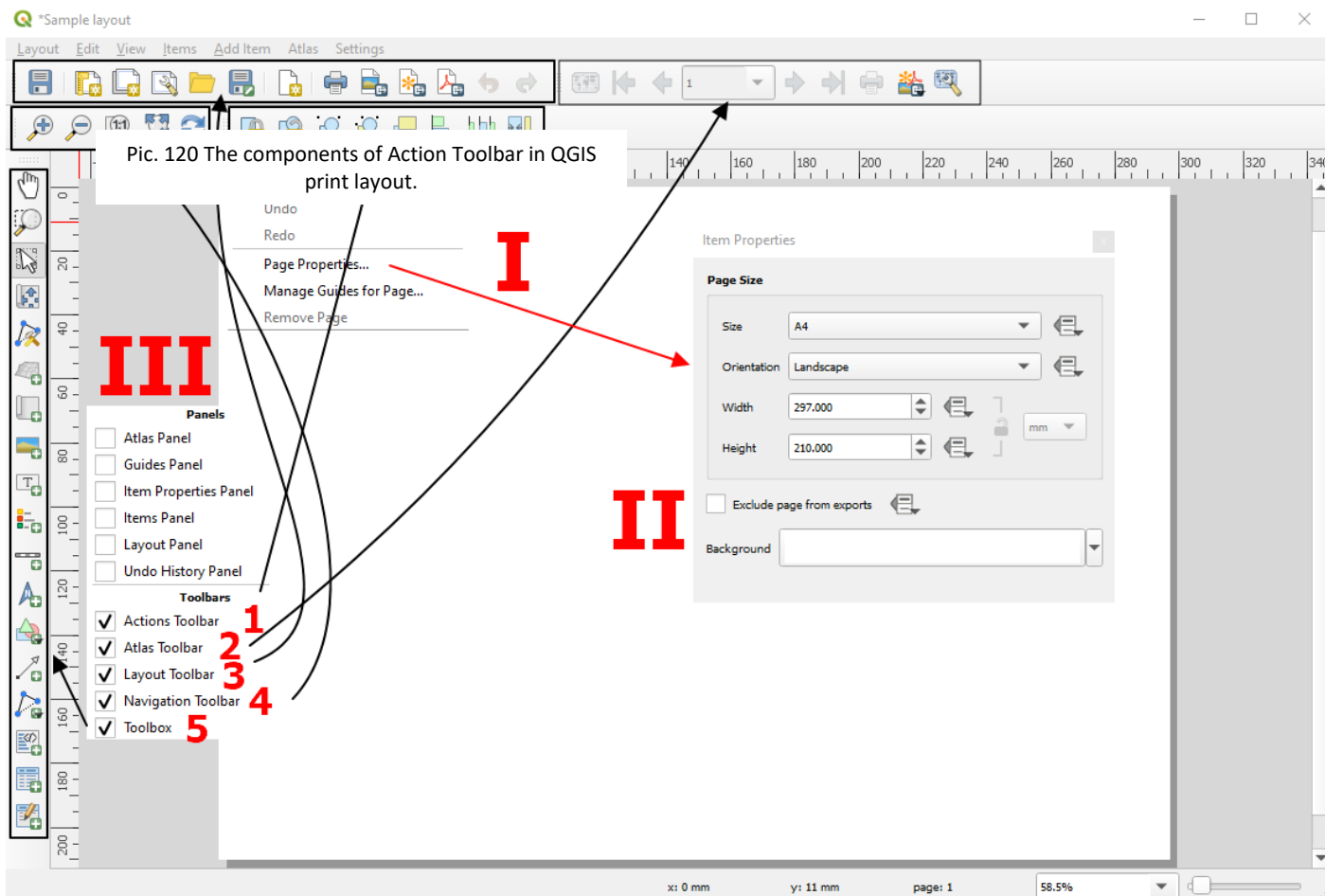
Pic. 123 Print layout management in QGIS.



20. Printing map

The final thing in our project is surely **getting the product outside**. Apart from exporting any layer to the different format, which allows to **migrate our work between various GIS software**, undeniably getting the map in printable version is the key thing within any range of work. In previous chapter just the simple and quickest way of getting map as image (which can be printed next) has been explained. This chapter is dedicated for exact explanations of how the user can **print the QGIS map out with all relevant components**. The most advantageous printing option can be found when we go to the **Project -> New Layout** in the **Layout & Report** section. There are also other options available, but useful just when some print layouts have been already created (Pic. 123). When we have **already some print layouts created**, they can be used via **Layout Manager** or **Layout** dropdown list. They are in fact the same, but the first one gives a way of small alterations like **Duplicate**, **Rename**, or **Remove** (Pic. 123).

It's just a pure information, because I guess you have no print layout created at all, as you have already started working in QGIS. If your situation is different, and you are **browsing some existing project**, then knowledge about the print layout management presented on your left will be more useful. Assuming, that you have nothing to print your map, you must **create a new print layout**. The very first step is providing the **unique print layout title** and click OK. Instantly a user should spot the print layout window (Pic. 124)



Pic. 124 Print layout working panel in QGIS.

This working panel has a lot of options which must be discussed. **I – Right-click on the layout** – we have 5 options here, but most useful are: *Undo*, *Redo* and *Page Properties*.

II – Page properties (Item properties) – give you options for *changing paper size and orientation* – frankly the most important settings here.

III – Right-click on the sidebar – shows *all panels and toolbars, which can be displayed in print layout*. It's not advisable to keep displayed all of them, because we are losing precious space for customizing our print layout area. The numeration below shows all the toolbars, which are already displayed as default. They all are discussed below:



Pic. 125 The Action toolbar components in QGIS print layout.

1 - Actions Toolbar – there is a few options, which are needed for keeping all the features in correct order and placement across the whole layout.

a) Lock selected items – *freezes all items being currently in use*. It's crucial feature for our painstaking work in print layout, especially when we want to adjust correctly all the elements against i.e., some frame border, etc. Sometimes it's hard to adjust another map element, when lies in the vicinity. As a consequence, we are accidentally picking up the other element, which have been already adjusted. It's troublesome and extends our work significantly. Therefore, locking that element is important. It prevents it from unforeseen changes of the position.

b) Unlock all items – unlock all elements provided to our map.

c) Group items – likewise group option i.e., in MS Excel – we can *group map elements previously selected*. Selection cannot be done by *holding the Ctrl button*. We can draw the box on our layout

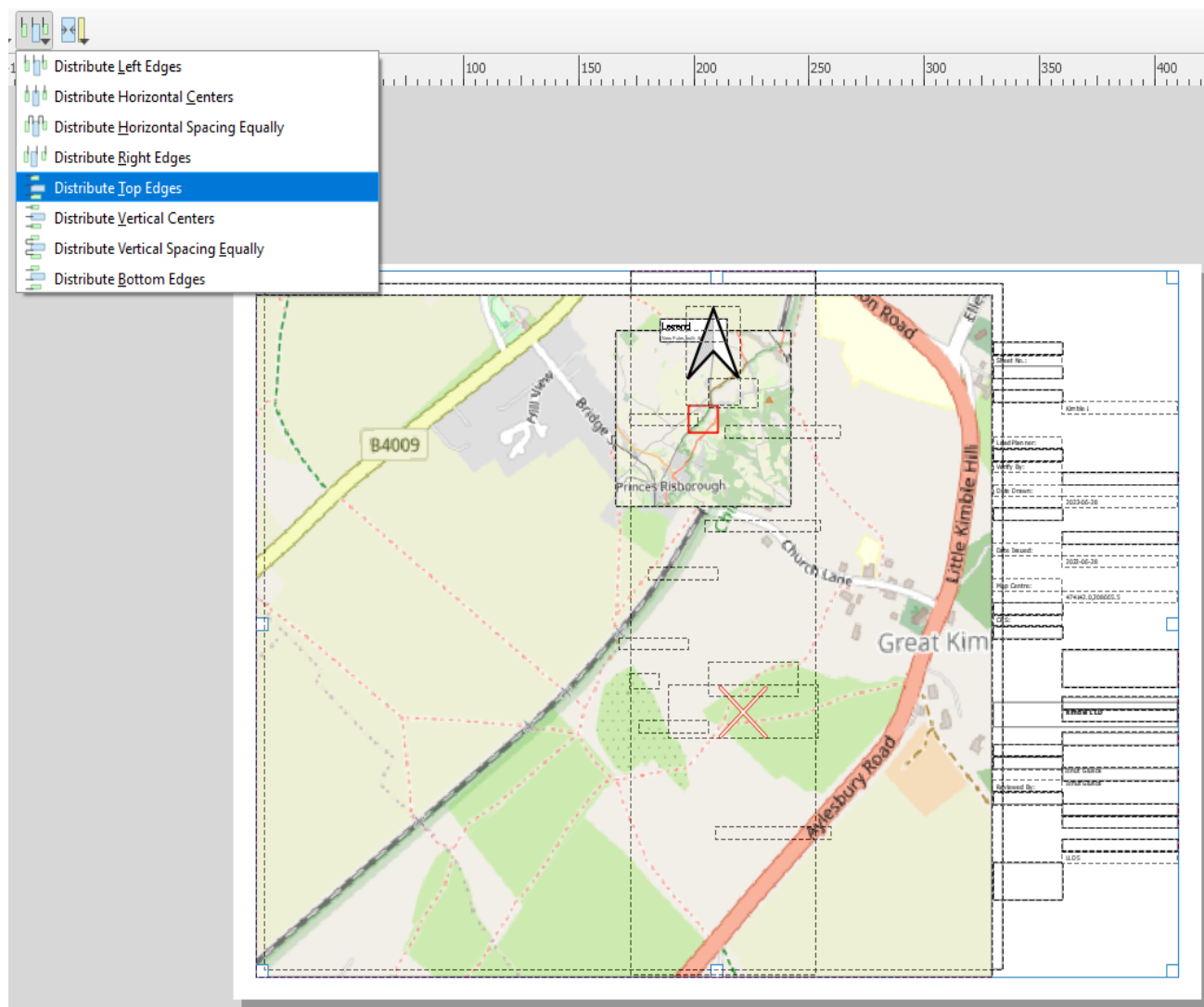
area which will include the map elements within. When items are grouped, the user can edit all of them simultaneously by dragging to other position, changing relative size, and so forth.

d) Ungroup items – ungroups all the items

e) Raise selected items – in other words moving them up (above). The other options as usual: *Lower, Bring to the front, Send to back.*

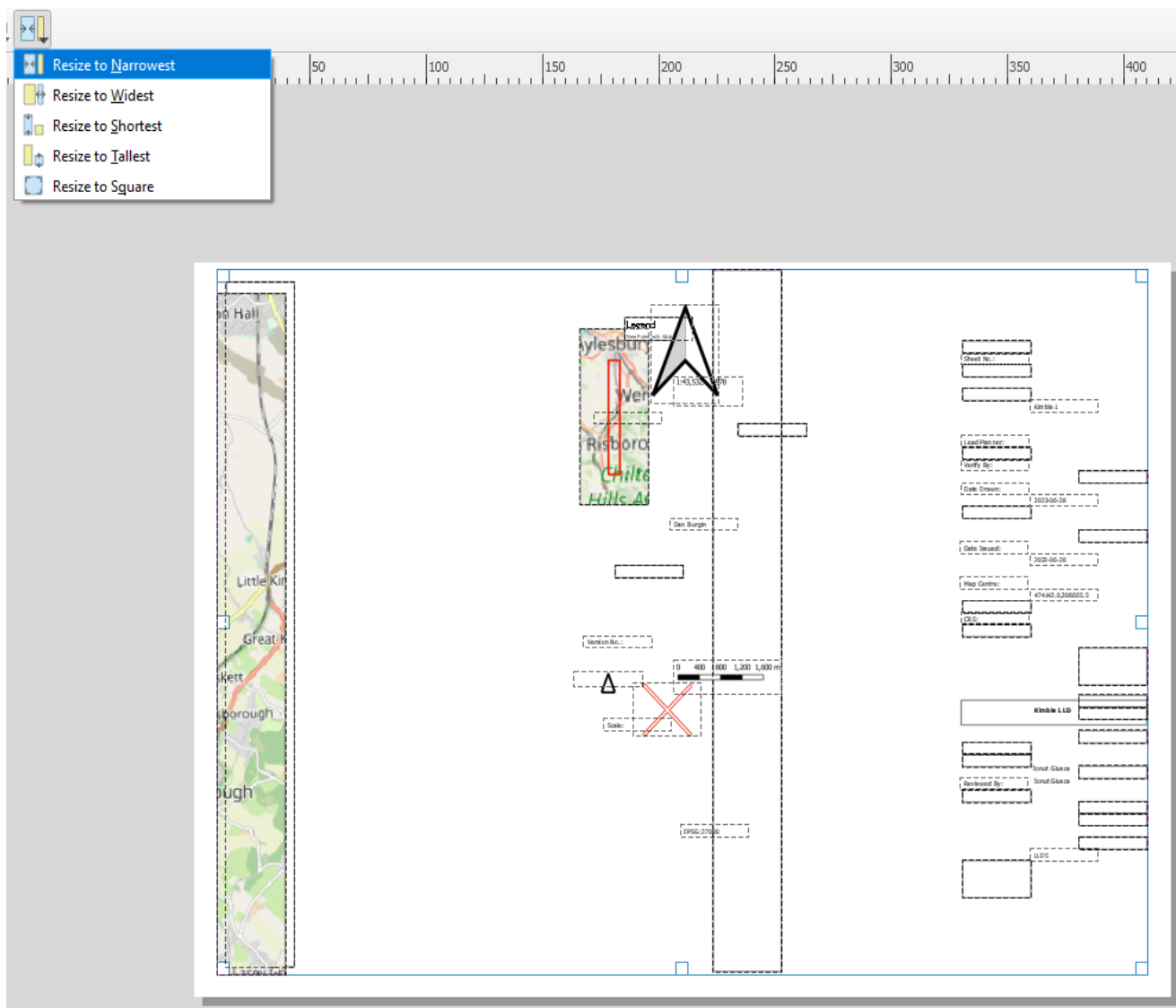
f) Align selected items – *Left, Top, Bottom, Right, etc.*

g) Distribute edges to the item equidistantly – displaces the random edges of the selected item against the options shown below (Pic. 126).



Pic. 126 Distributing top edges to the item (layout) equidistantly.

h) Resize item width to match the shape of selected item – all the options along with the example are provided in the image below (Pic. 127). Both *g* and *h* points represent the selection of all the items across our print layout. These options are rather beneficial for [adjusting some specific element](#) of our map to another element with the same size or distribution. In this case we can gain some time by omitting the alterations of some dimensions. Concluding all the options described here can be found in the **Main toolbar -> Items**. The main toolbar is located at the very top of our print layout. The same situation applies for other toolbars listed and described in this chapter. **2 – Atlas toolbar** – mostly inactive, because it requires toggling the **“Generate an atlas”** option. It’s the thing more for advanced QGIS users.



Pic. 127 Resizing width of items to match the narrowest shape of the item.

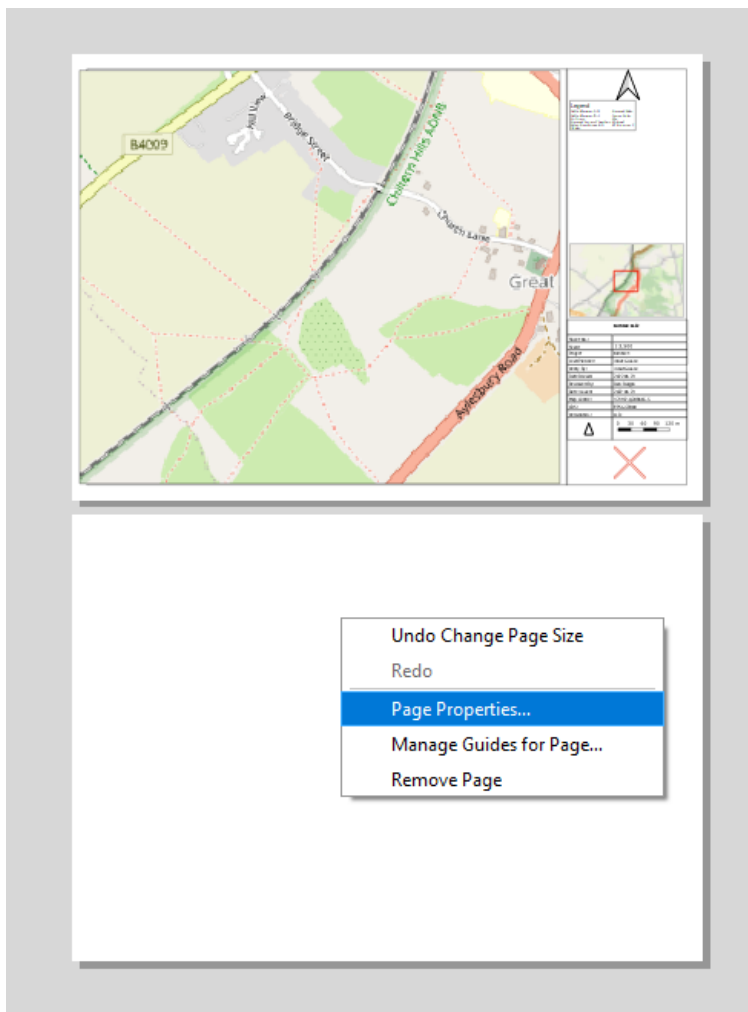
3 – Layout toolbar – the toolbar dedicated for exporting our “product” which at this stage should be prepared for printing.



We have the options known already from other software, which are listed below.

Pic. 128 The Layout toolbar components in QGIS print layout.

- a) Save project – simply **saves the progress of our work** on the current print layout.
- b) New layout – another way where we can create new layout at the same basis as discussed earlier.
- c) Duplicate layout – duplicated already existing layout with a whole job progress made to it.
- d) Layout manager – closes already opened print layout and opens the Layout manager discussed earlier.
- e) Add items from template – opens Windows dialog box, from which you can select some QGIS layout templates (.qpt files) from **some directory** and load them to the existing print layout. It's also an alternative for opening an existing print layout by loading the .qpt file into a blank (new) print layout.



Pic. 129 New page added to our print layout and right-click options.

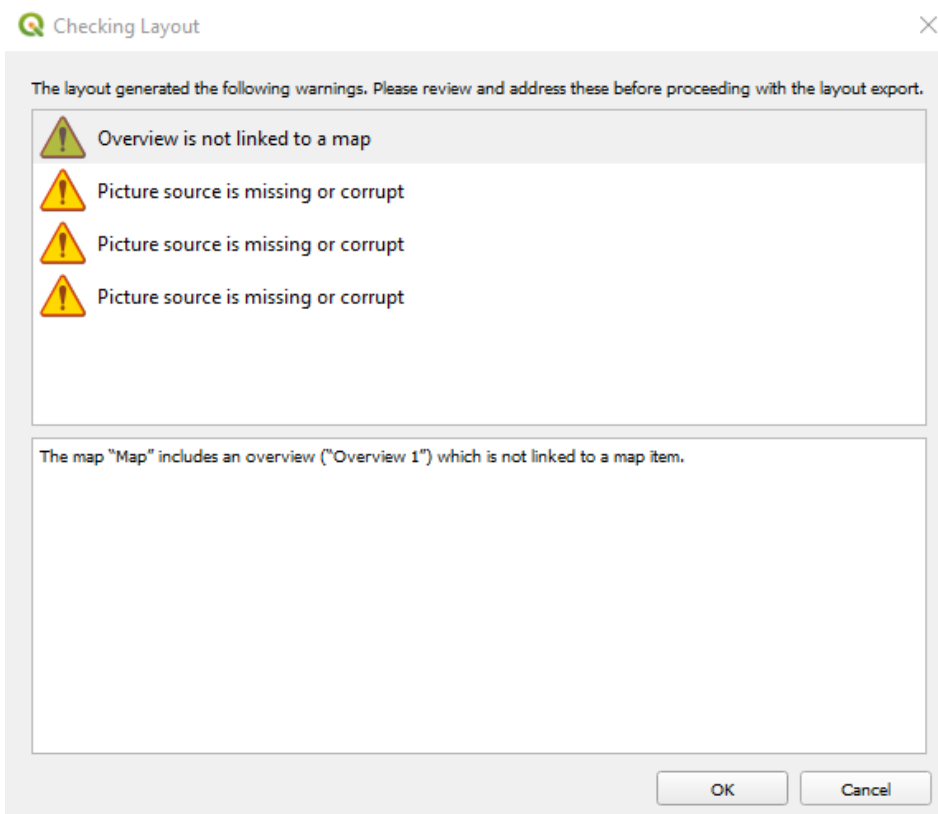
f) Save as template – saves our print layout in .qpt file.
g) Add pages – inserts new pages to our print layout. In default we are working on just 1 page. It can be always changed by using Atlas option or adding another page. The page options are exactly the same as discussed previously. We can change its dimensions and orientation, which can be different than our first page. It depends on what we need. We can also remove the page when needed.

h) Print layout – prints our layout, although it's not an instant printing. Before entering the print properties, QGIS makes the layout checking, which defines the validity of our work. If something is missing or isn't linked properly, then an error is thrown with potential suggestions of how to fix it (Pic. 130).

Obviously, a user can ignore them and hit OK, which eventually redirects him to print properties, however it's a moment, when he can

still consider some way of improving his tremendous work. The same "Checking layout" appears by export options discussed later.

i) Export as image – exports our work into the .png file.
j) Export as SVG - an interesting option of exporting our map to scalable vector graphic (.svg file), making it possible to display in the HTML environment.
k) Export as PDF – exports our map to the .pdf document.
 l) Undo recent



Pic. 130 Checking layout before printing options in QGIS print layout.

changes – we can undo our work by 1 step.
 m) Redo - repeats changes undid previously.

4 – Navigation toolbar – a few options which help us to work with the visibility of our print layout (Pic. 131).



Pic. 131 The Navigation toolbar components in QGIS print layout.

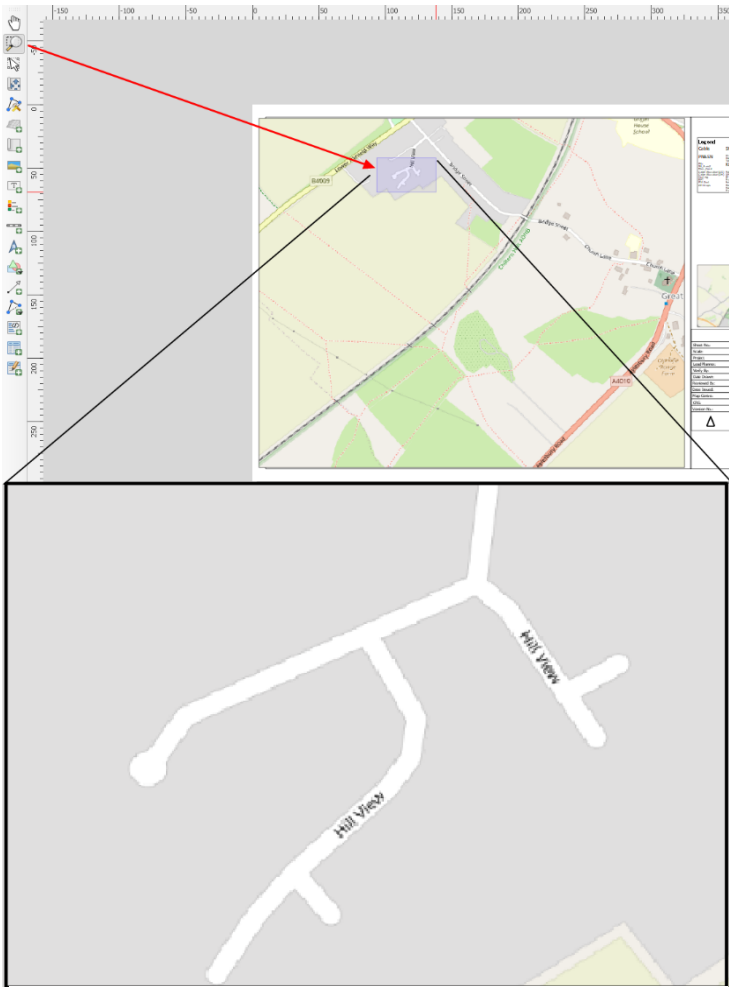
- a) Zoom in – enlarges our map by 2x.
- b) Zoom out – zooms out our map by 2x.
- c) Zoom to 100% - gives a real size of our print layout.
- d) Zoom full – adjusts zoom level to our print layout window.
- e) Refresh view – updates our print layout view.

5 – Toolbox – set of tools, which are used for **creating and customizing our map for printing or export** (Pic. 127).

Pic. 132 The Toolbox components in QGIS print layout.



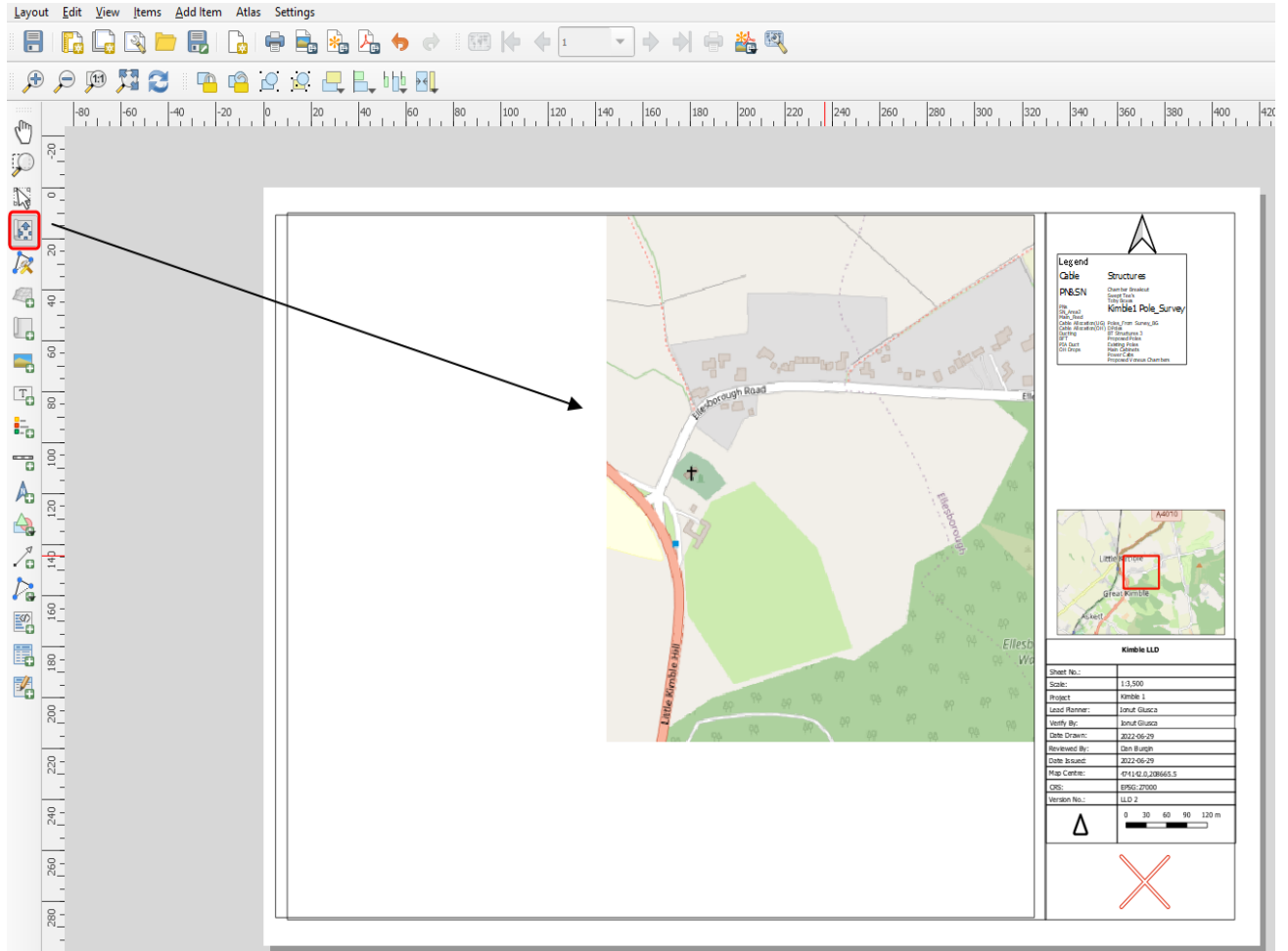
- a) Pan layout – pans the layout in the place where we want. Used only for the zoom other than full. If full zoom applied there is nothing to pan, as the view falls roughly at the centre of our print layout page. We can use this option for dragging our map too.
- b) Zoom to selection – zoom in to the area selected by user. We are marking our area by the box and QGIS makes it enlarged for entire screen even if the view is far beyond 100%. It can be pixelated in this case (Pic. 133).



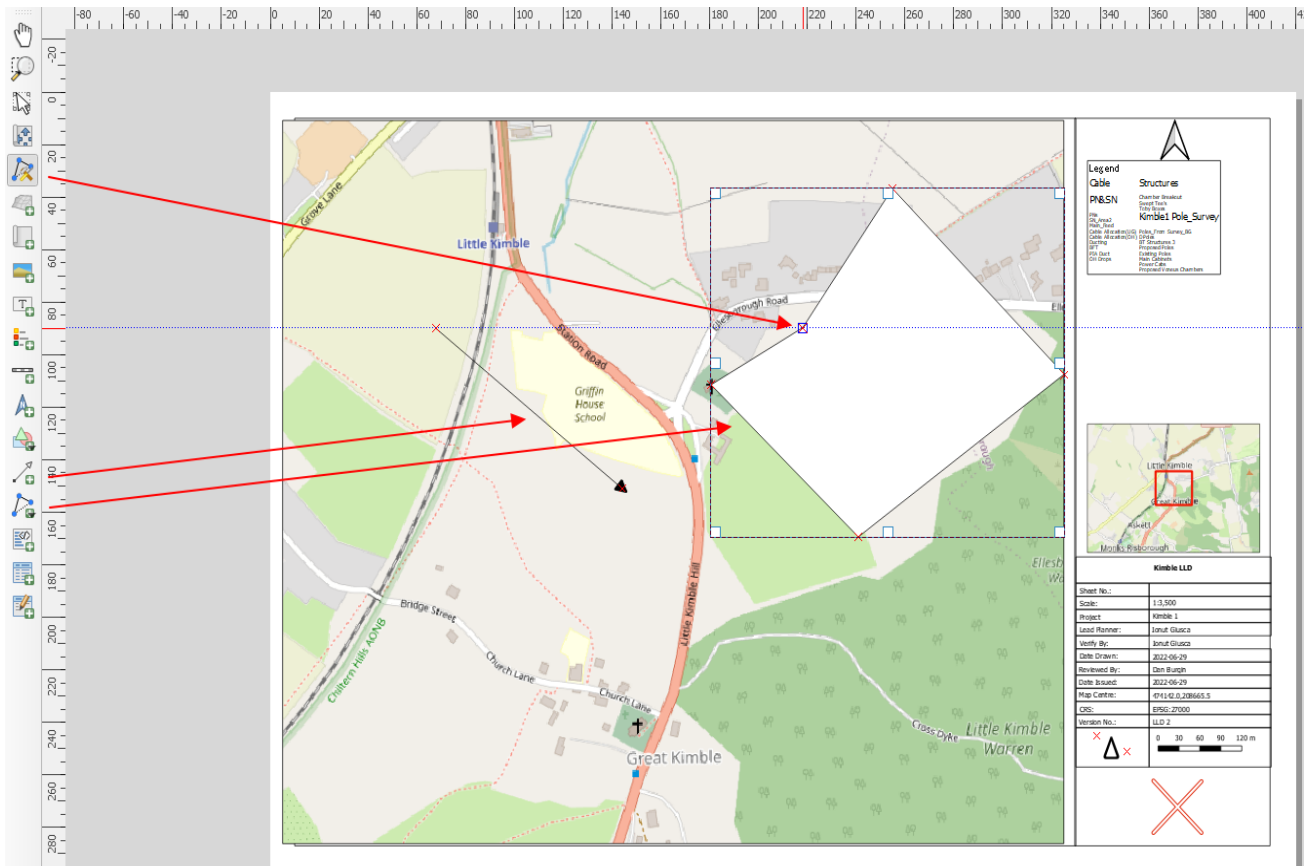
Pic. 133 Zoom to selection in QGIS print layout.

- c) Select & Move item - makes the selection and moves the given item where a user wants to.
- d) Move item content – a very important feature, which allows us to drag the map inside of the map element. It does happen quite often, that the map rendered in the print layout doesn't correspond to the view we want to print out. Therefore, running this option gives us an instant chance for alteration the map view for our work purposes (Pic. 134).
- e) Edit nodes item – this option is applicable only for newly created shapes in our print layout. It doesn't cover regular shapes (Ellipse, Triangle, Circle), just only Polygons, Polylines and Arrows

(Pic.



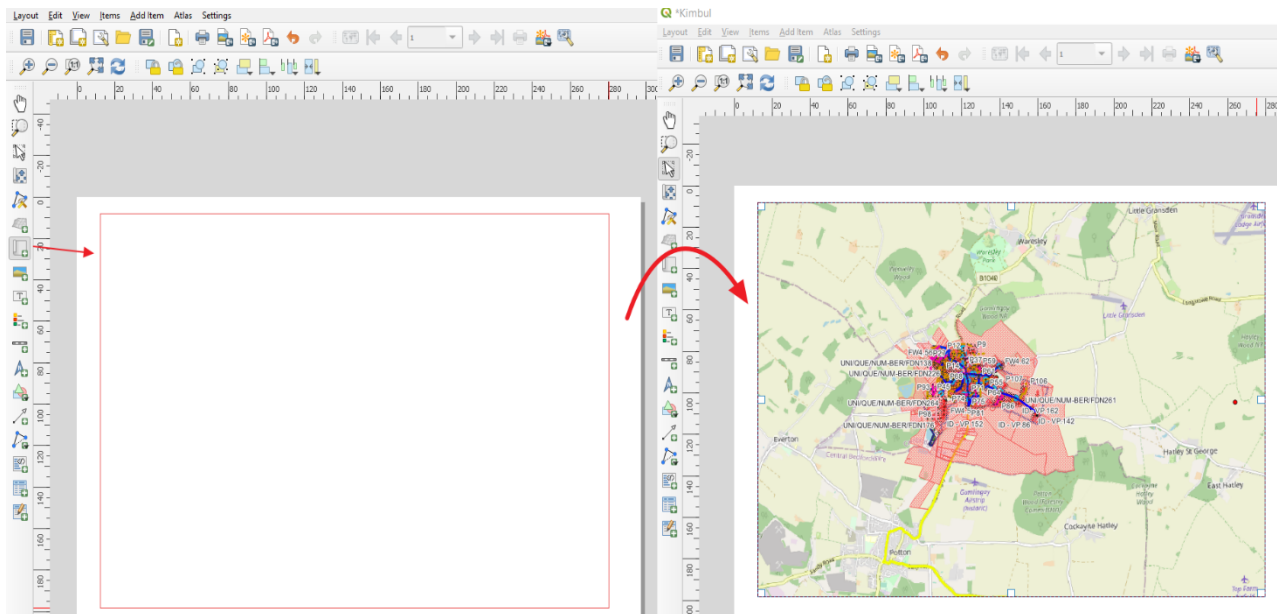
Pic. 134 Move item content in QGIS print layout.



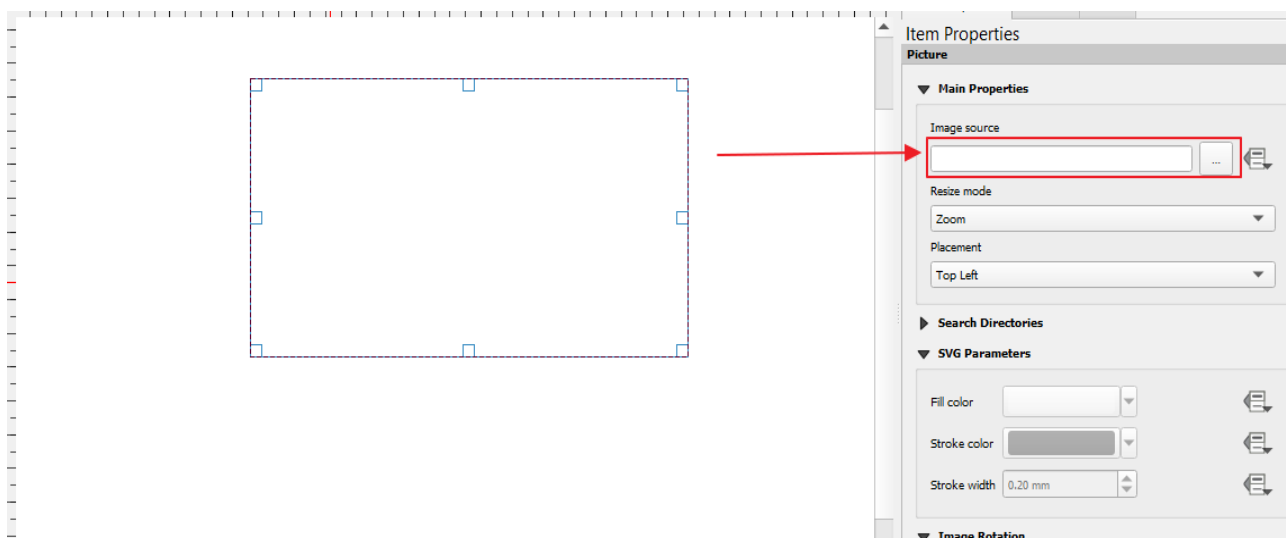
Pic. 135 Adding (drawing shapes) and editing node items in QGIS print layout.

f) Add 3D map – rather not used for QGIS newbies. It's the option for providing 3D map into our print layout.

g) Add map – the element, which will be discussed below. For now, just important to know where a user can add his QGIS project map to print layout. When this option is clicked, we need to **draw a box across the layout**, within bounds the map will be rendered as shown below (Pic. 136).



Pic. 136 Adding map to QGIS print layout.



Pic. 137 Adding image to QGIS print layout.

h) Add picture – works at the same basis as adding map, but instead of rendering map you will have just **blank box**, to which our custom image can be imported (Pic. 137) or .svg image from local directory.

i) Add label – simply **creates text box** in the print layout.

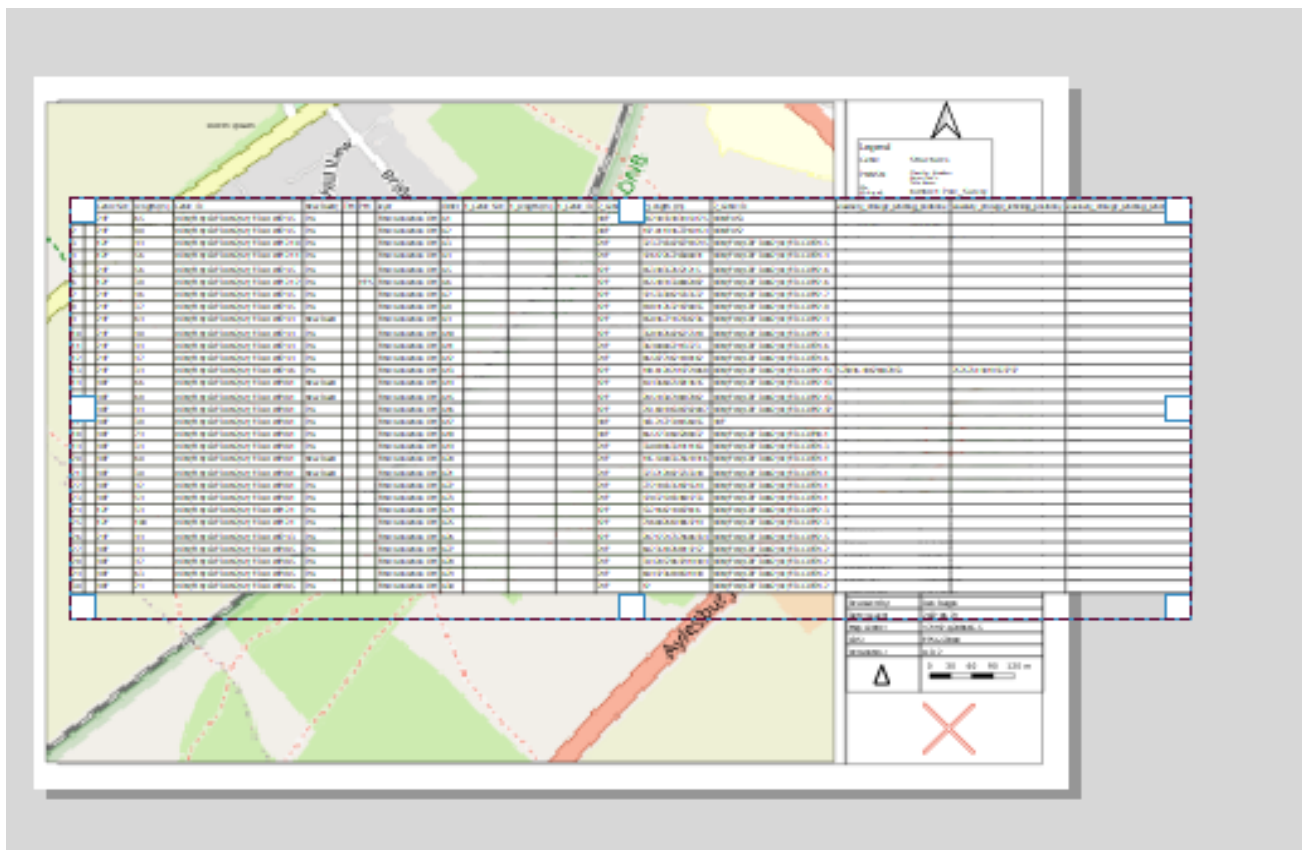
j) Add legend – creates default map legend in print layout. Initial legend content includes everything from our QGIS project.

k) Add scalebar – creates the scalebar on our map.

l) Add north arrow – creates north arrow on our map.

m) Add shape – we can create the **regular shape** (*Rectangle, Circle and Ellipse*) on our print layout. Again, the regular means, that **vertices cannot be edited** by the option described earlier (e, pic. 135).

- n) Add arrow – creates arrow on our map.
- o) Add node item (Polygon or Polyline) – the option for creating a custom shape on print layout (Pic. 135).
- p) Add HTML – adds the HTML frame item to our map, but it's rather too advanced option for newbies.



Pic. 138 Adding attribute table to QGIS print layout.

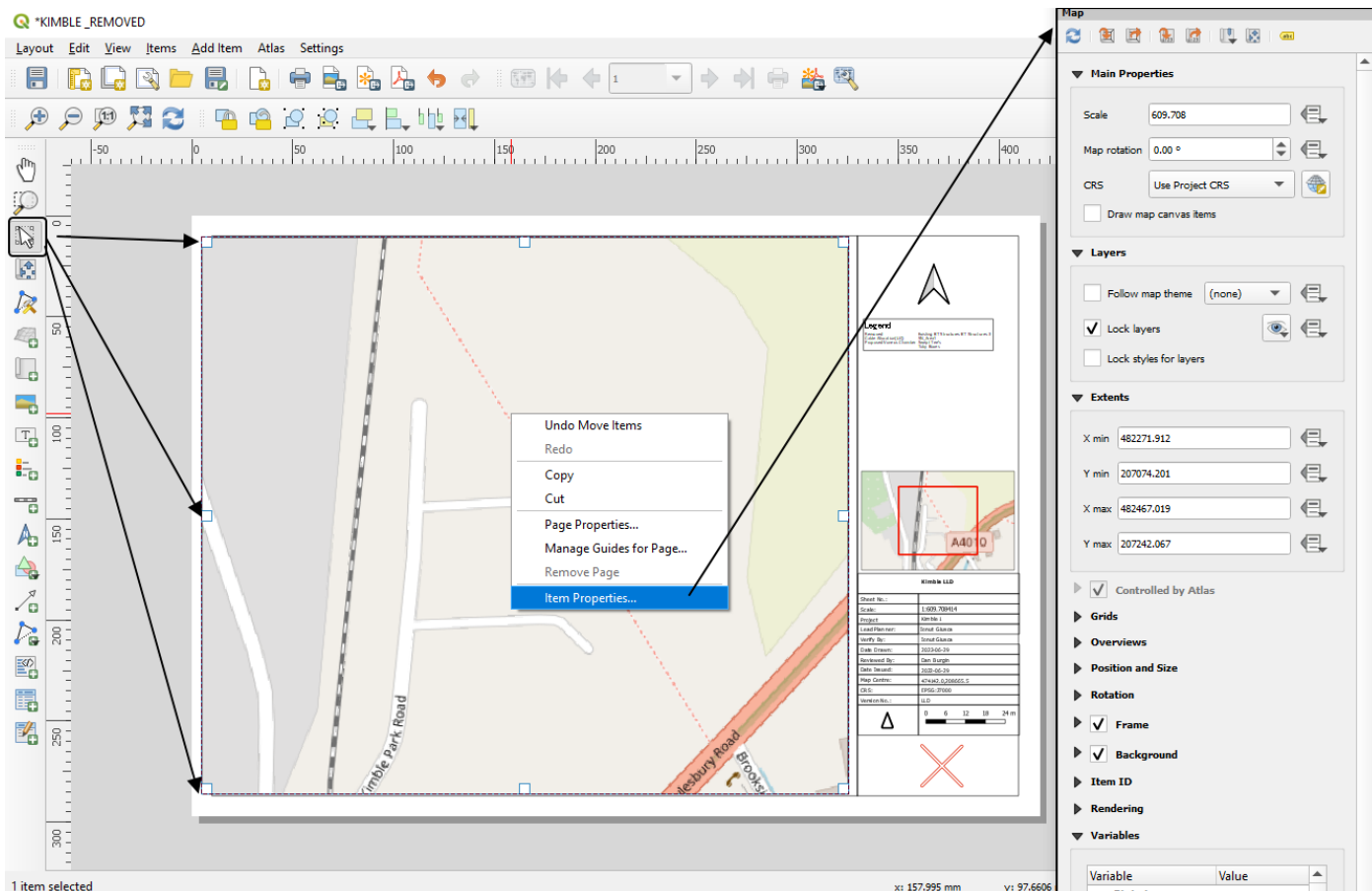
- q) Add attribute table – this option brings the **whole attribute table** to our print layout (Pic. 138).
- r) Add fixed table - likewise in Microsoft Word we can add the custom table for storing some data in the print layout.

Map item features

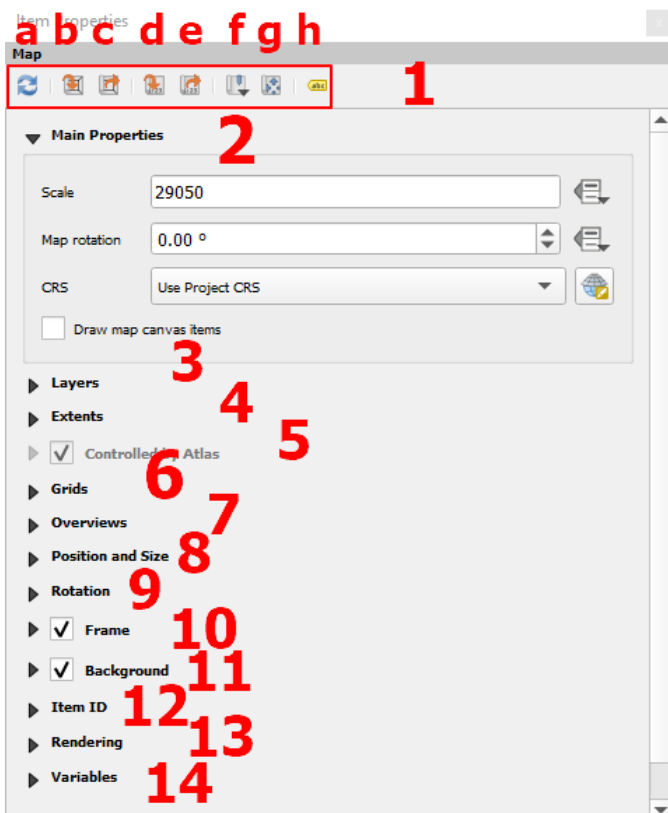
So far, we have discussed all the features possible to add from **Toolbox**. Basically, all these options have some **default settings**, which can be awkward for us when unchanged further. All the edits, alterations, and adjustments are to be found in the **“Item properties”** option, which is toggable when right-clicking on some feature (Pic. 139). This is the core thing of current chapter, which must be discussed separately, although not all option will be highlighted. We are focusing on the most necessary for viewing purposes. The **“Item properties”** option is available only when the **given feature is selected**, as shown in the image below (Pic. 139). The other option is right click on the left sidebar and switching on **“Item properties panel”** as discussed earlier, although without previous selection of the item it will be displayed empty. The Item properties panel usually can be docked on the right side, but if we want to have it taller and see a multitude of options at once it's vital to pop its out and place even outside of the main print layout window (Pic. 139).

l – Map – one of the most important properties and it shouldn't wonder anyone several options available here (Pic. 140).

1 – Main bar – a few handy options for map overview.



Pic. 139 Launching Item Properties in QGIS print layout.



Pic. 140 Map item properties in QGIS print layout.

a) Update map preview – refreshes our map in print layout.

b) Set map extent to match main canvas extent – adjusts the map view to the view visible in the main QGIS project.

c) View Current Map Extent in Main Canvas – the same option but in opposite direction. The map canvas in QGIS project is adjusted to the map visible in print layout.

d) Set map scale to match main canvas map scale – slightly different option from described above, where we had the same map view. In this case the **map scale matching**.

e) Set Main Canvas to Match Current Map Scale – the same option in the opposite direction.

f) Bookmarks – an option for saving current map view as the bookmark.

g) Interactively edit map extents – the same option as discussed earlier. If you are unhappy with the current map view, you can drag the map within its boundary.

h) Labelling settings – mainly define the **minimum distance from map edges where the label can be placed**.

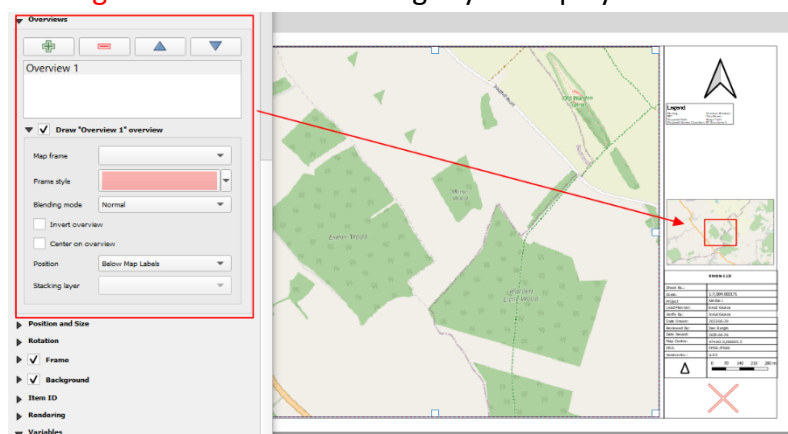
2 – Main properties – the information about **map scale**, which is always subject to change and **rotation** when necessary. You can also find the information about the CRS, although changing it it's not advisable.

3 – Layers – the most important option is “*Lock layers*” which prevents the map layers from disappearance, which might happen from time to time.

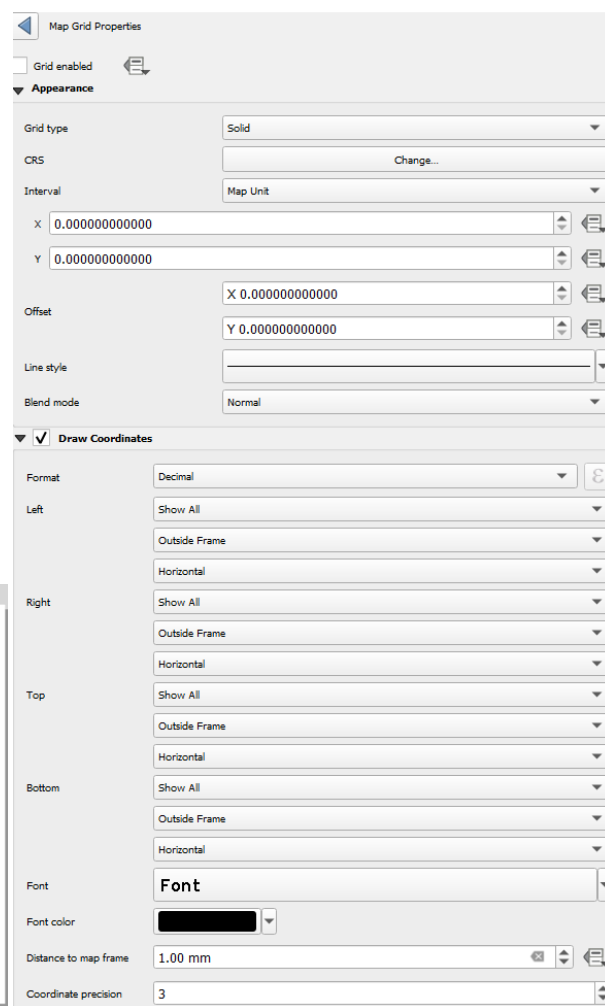
4 – Extents – marking coordinates of all the map corners defined by Xmin/max and Ymin/max

5 – Controlled by Atlas – usually inactive. We can use it when the Atlas option is enabled.

6 – Grids – option for adding one (or more) grids to our map. They can be added by using the “+” symbol. We can have an additional set of options here (Pic. 141), where we can adjust mostly their interval and label the coordinates. These both options are CRS-based unless changed from *Map Unit* to other value like *Centimetres*. Labels falls in the middle of coordinate grids, therefore it’s advisable to create another set of grids and offset them slightly to display labels more



Pic. 142 Map overview in action.



Pic. 141 Map grid - important properties in QGIS print

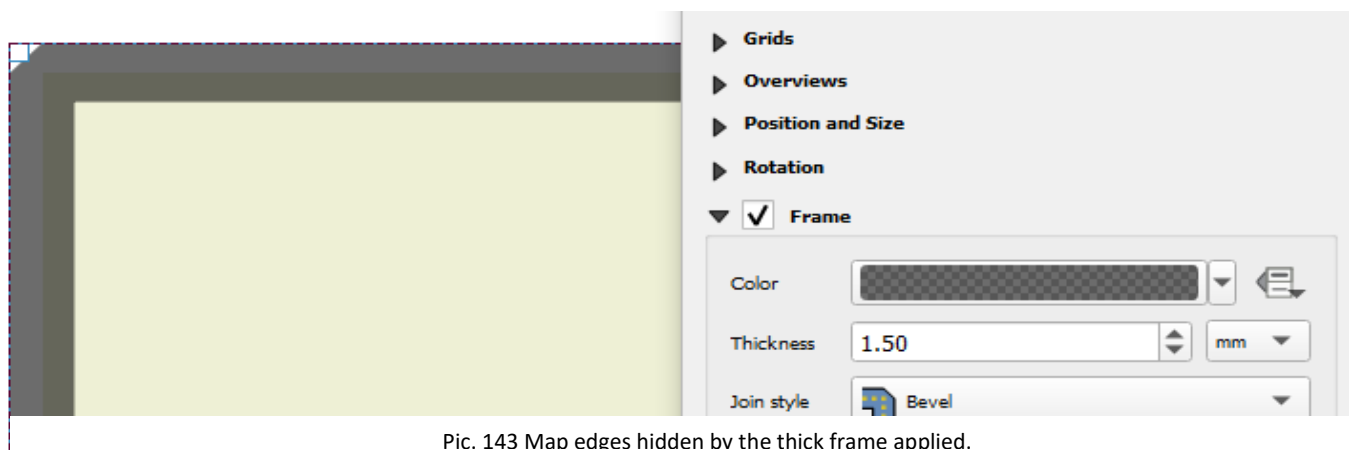
nicely by keeping line style invisible.

7 - Overviews – another cool option, where apart from the major map we can have the overview in around 10x smaller scale (subject for setting), which will place our current view in the boundary (Pic. 142).

8 – Position and size – defines the rough place of our map. We can set the page of our print layout (as default the first page) where the map can be placed and its XY position against the reference point defined underneath. The default unit is *Milimeter*. Moreover, you can also *Lock aspect ratio*, which is needed to keep proportions of your map when making it larger or smaller.

9 – Rotation – defines the rotation our map, the same as discussed above.

10 – Frame – it’s something optional, which can be set up. The problem is that the bounds mark roughly the map edges. When bigger thickness is applied, the most extremal areas of the maps are hidden by the frame (Pic. 143).

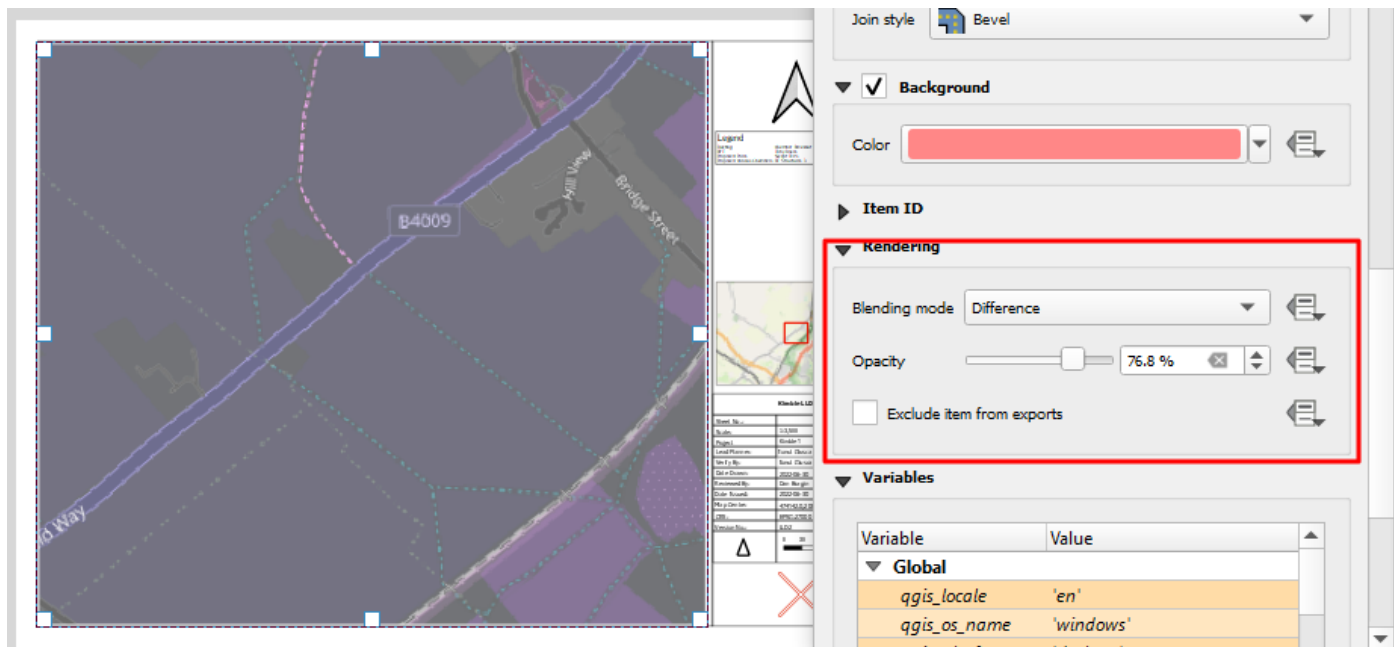


Pic. 143 Map edges hidden by the thick frame applied.

11 – Background – defines background colour below the map canvas.

12 – Item ID – displays the **name of our map** (“Map” as default), which can be also further displayed as the label in decoration (see Chapter 22, Pic. 122).

13 – Rendering – the way of how our map can be displayed for print or export or maybe we need to



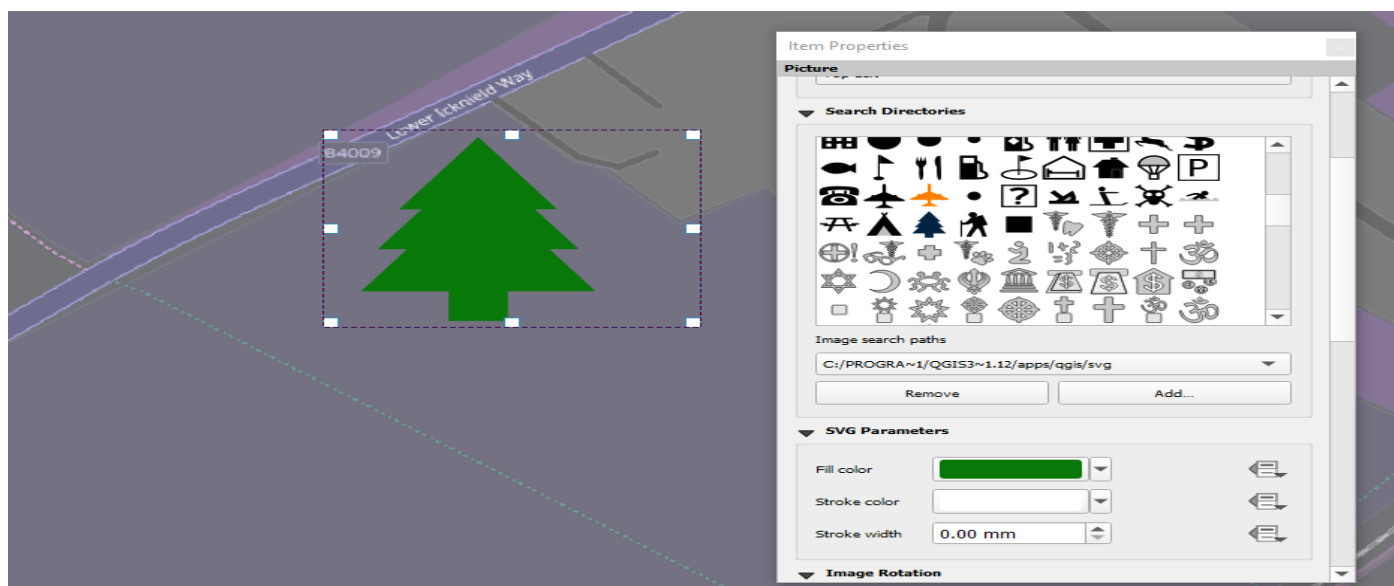
Pic. 142 Item rendering in QGIS print layout.

exclude it from export? (Pic. 144).

We can set there the *Opacity* of our item as well as apply some *Blending mode* (image filter) emphasizing, fading, or inverting our element coloration.

14 – Variables – just information about metadata.

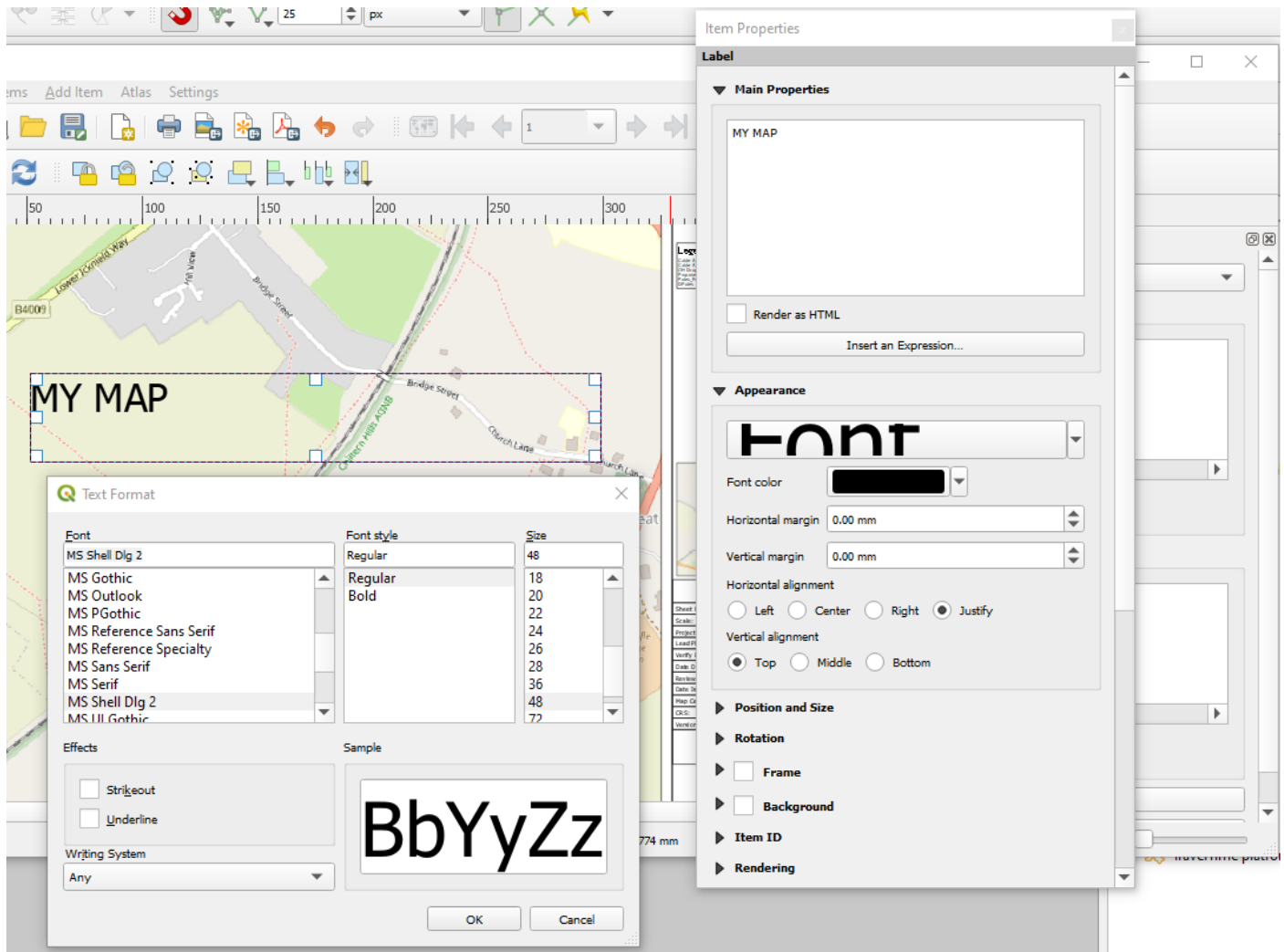
II – Picture – if we decide to place some image, the properties will be very similar to discussed above, but the list will be shorter. You will have an opportunity to change the: *Image rotation, Position and size, Frame, Background, Item ID* and *Rendering*. Interesting option is *SVG parameters*, which is active when instead of the raster image you will decide for placing some *SVG signature on your map* (Pic. 143).



Pic. 143 Adding .svg signature to your print layout.

Admittedly this is something, which you might forgotten when working on your QGIS project and instead of turning lot of stuff upside (redefining styling, etc) down you decided to use some signatures.

III – Text Label – First **very important map element**, in which we can **set some map name** or simply put text to our map. The text is displayed twofold, as normal and rendered as HTML (Pic. 144).



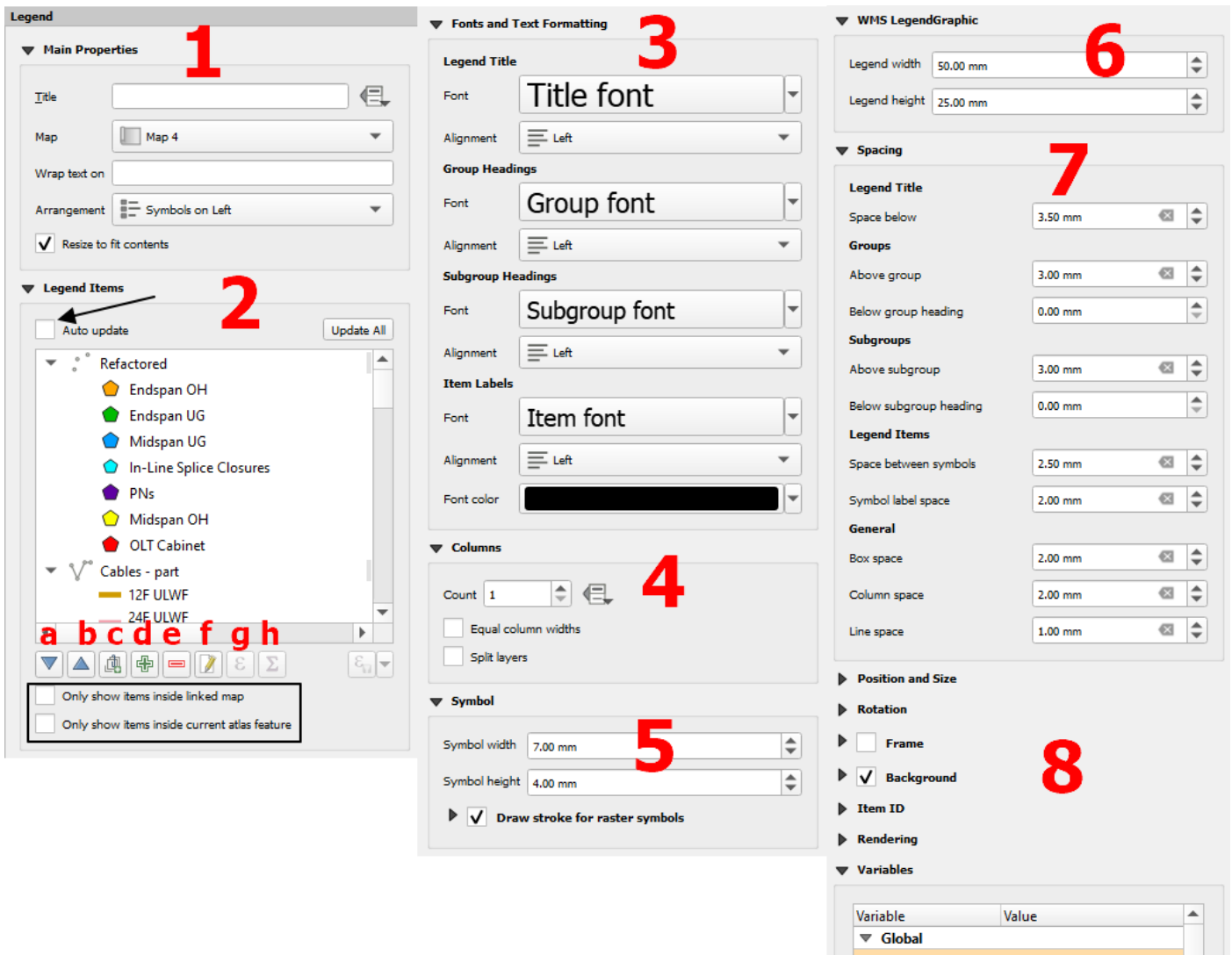
Pic. 144 Customizing text label in QGIS print layout.

Basic options are also similar to map options discussed earlier. In the case of the label the most important is **Appearance**, where we can define the **Font type**, **Font size** and **Alignments** against the box. Here is a nice trick to apply. If you need to have the **map title centred** exactly against the map item, **stick your label box to the opposite edges** of your map and align your font center. When you plan to put more text and justify it, then rendering HTML will be beneficial, where you can provide relevant HTML snippet for this purpose.

IV – Legend – the **most important map element**, which **always comes along with the map**. There are some crucial options here for customizing the legend display as best and most optional as possible. All of them are shown and explained below (Pic. 145).

1 – Main properties – include the **legend title**, the map to which our legend is assigned and some visual stuff like symbol arrangement (to left or to right). Another feature, set on as default is **“Resize to fit content”**, which controls the legend width to the length of the text. Interesting option is **“Wrap text on”** which requires **adding some specific character** occurring in our legend text or formula. As a result, our legend text will be broken down into 2 lines.

2 – Legend items – the most crucial element, which makes the style symbols used in QGIS project visible next to our print layout map item.

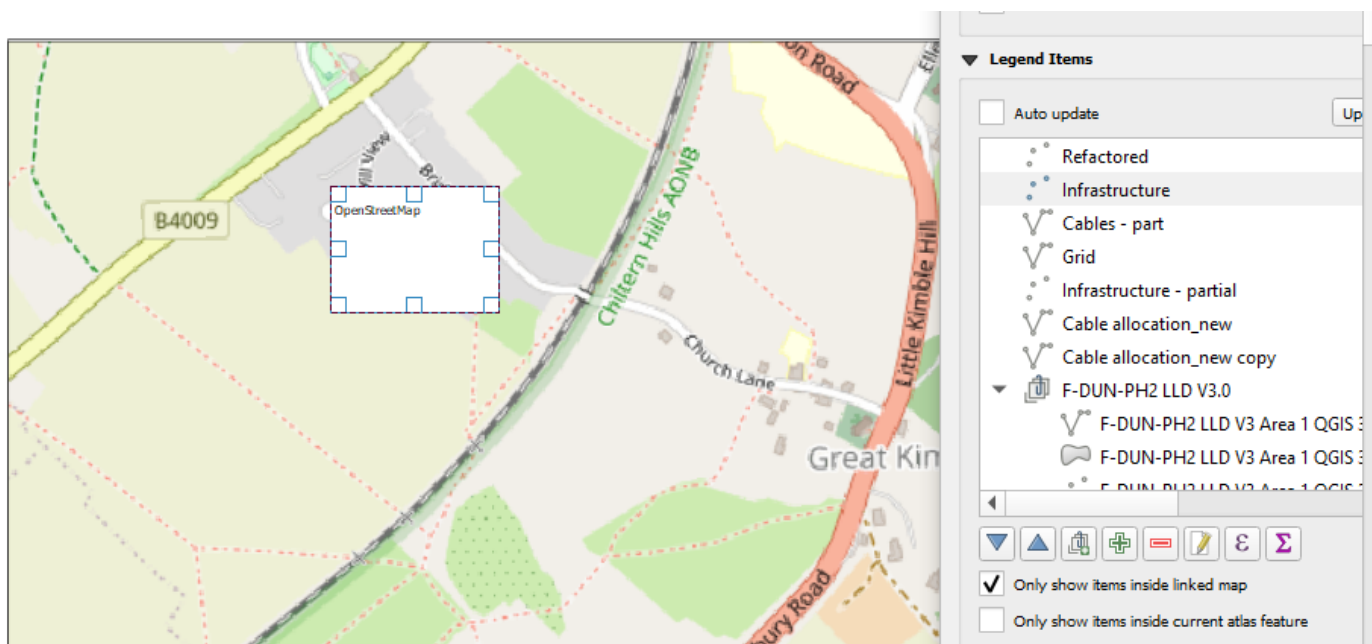


Pic. 145 Legend properties in QGIS print layout.

As default, the **“Auto update”** option is switched on. It means, that the legend is synchronized with our layer panel in QGIS. Unless some layer is not deleted it will be included in the legend! Switching off the layer from the panel doesn't work in this case. We can always switch this option off and play with the legend inputs manually by using the options below in the panel.

- Move item down – moves our legend item down by 1.
- Move item up – moves our legend item up by 1.
- Add group – by clicking this button, the empty group is created at the very bottom, to which the legend items can be dragged.
- Add legend item – in the case when we have autoupdate switched off.
- Remove legend item – clears out the element, which is not needed.
- Legend items properties – here we can change the name of the selected legend item.
- Add an expression to the vector layer and each child's symbol layer – for advanced users. It can be applied for example when we want to have to change number format to scientific and something like this.
- Show feature count for each class of vector layer – the same option as explained earlier (Chapter 12, Pic. 53), now we can have the values displayed in the legend.

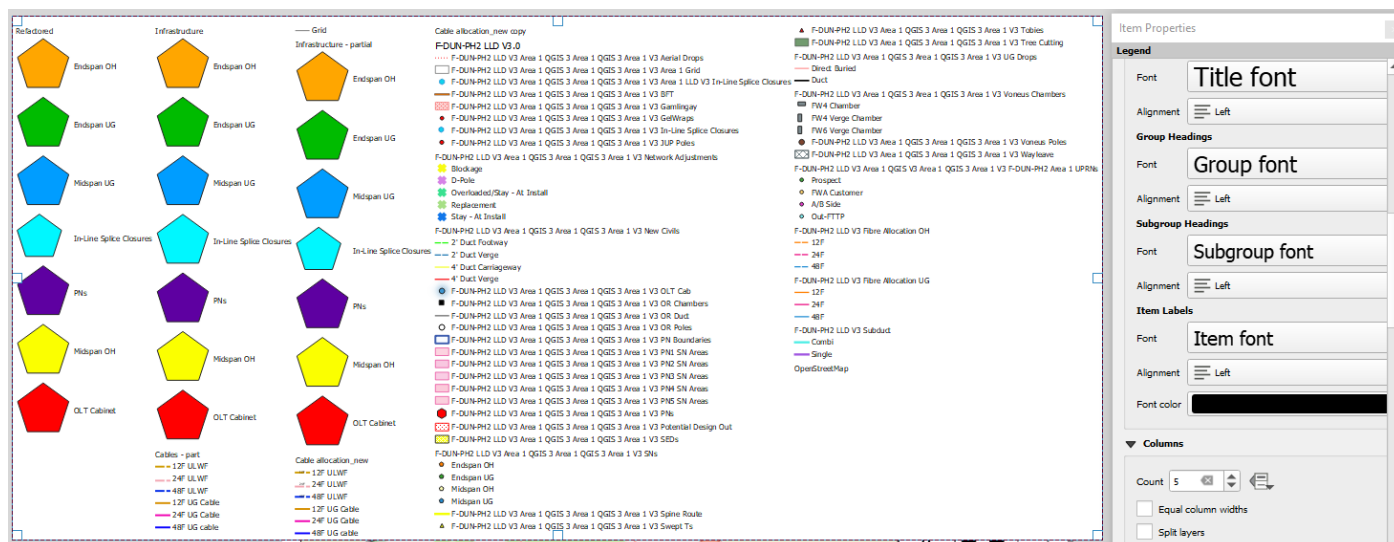
It's worth to mention another 2 features below, especially the first one: **“Only show items inside linked map”**, which shows just these features, which are displayed within the map in our print layout instead of a whole QGIS project (Pic. 146).



Pic. 146 Legend showing only items inside the linked map. In this case just OpenStreetMap canvas.

3 – Fonts and text formatting – the font settings for each text placement across the legend (*Title -> Group -> Subgroup -> Item*). Alignment also can be set here.

4 – Columns – important option for our legend display. As default we have everything in 1 column, but usually it's advisable to split the items between 2, 3 or even 4 columns (Pic. 147).



Pic. 147 Legend split by 5 columns in QGIS print layout.

5 – Symbol – defines symbol width and height.

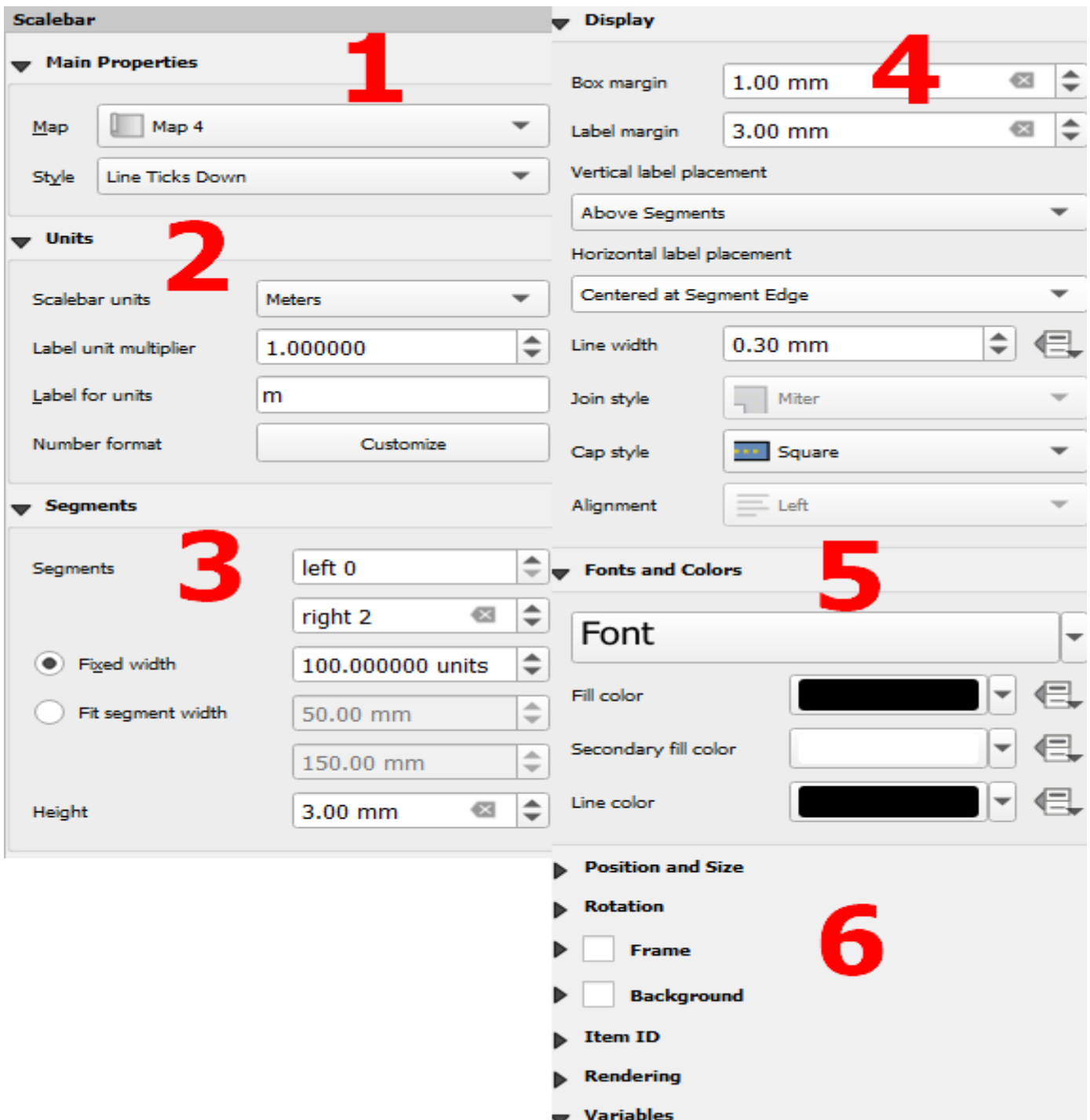
6 – WMS Legend Graphic – here you can set the overall legend dimensions, although bear in mind, that if the *“Resize to fit content”* option is active it won't work properly.

7 – Spacing – determines visual spacing between title, group titles, subgroup titles and item titles.

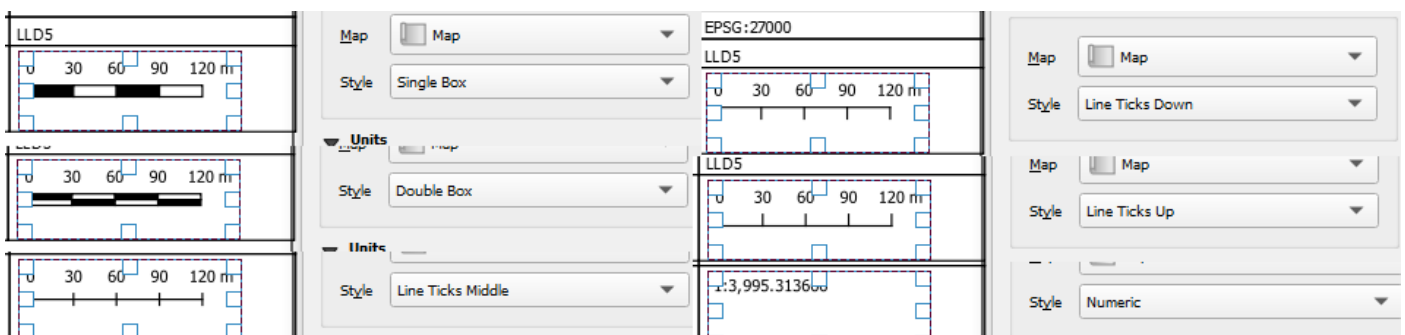
8 – Other options discussed by Map item.

V – Scalebar – beside Legend **another most important element of our map**, which helps us get around with the **distances** shown. The major options are listed below (Pic. 148).

1 – Main properties – the selection of map to which the scalebar is applied and the visual type of scalebar (Pic. 149).



Pic. 148 Scalebar options in QGIS print layout.



Pic. 149 Scalebar style options in QGIS print layout.

There are 5 types of scale layout available and numeric scale. All the options you can see above (Pic. 149).

2 – Units – as default it comes in *Meters*, but everything is customizable.

3 – Segments – as you can see in the screenshot above (Pic. 149) the default scale is divided by 4 segments **without the backward segment (left)**. Here is the place where we can change it. Usually, especially on traditional maps the backward segment used to be fractionated by 10 against the others to measure the distance more precisely (by using compass). Here we don't need it that much, but it's good to know about it.

4 – Display – determines the margins from the scale box as well as **label margin**, which seems to be much more important. By changing the label margin, a user changes the distance of the label from the scale body.

5 – Fonts & Colors – customization of the scale appearance. *Black & White* comes as default.

6 – Other options already explained.

VI – North Arrow – the properties are quite similar to the image (Pic. 150). Here the most important setting is surely the visual **changing of the north arrow symbol**, which is pure .svg graphic from QGIS directory. By expanding **“Search Directories”** option a user can change it quickly. In the SVG parameters we can do the same with the coloration.

VII – Attribute table – the last element classified as one of the most important, which can be found in the map or being precise next to the printed map. The option sections are listed below as usual and presented later (Pic. 150).

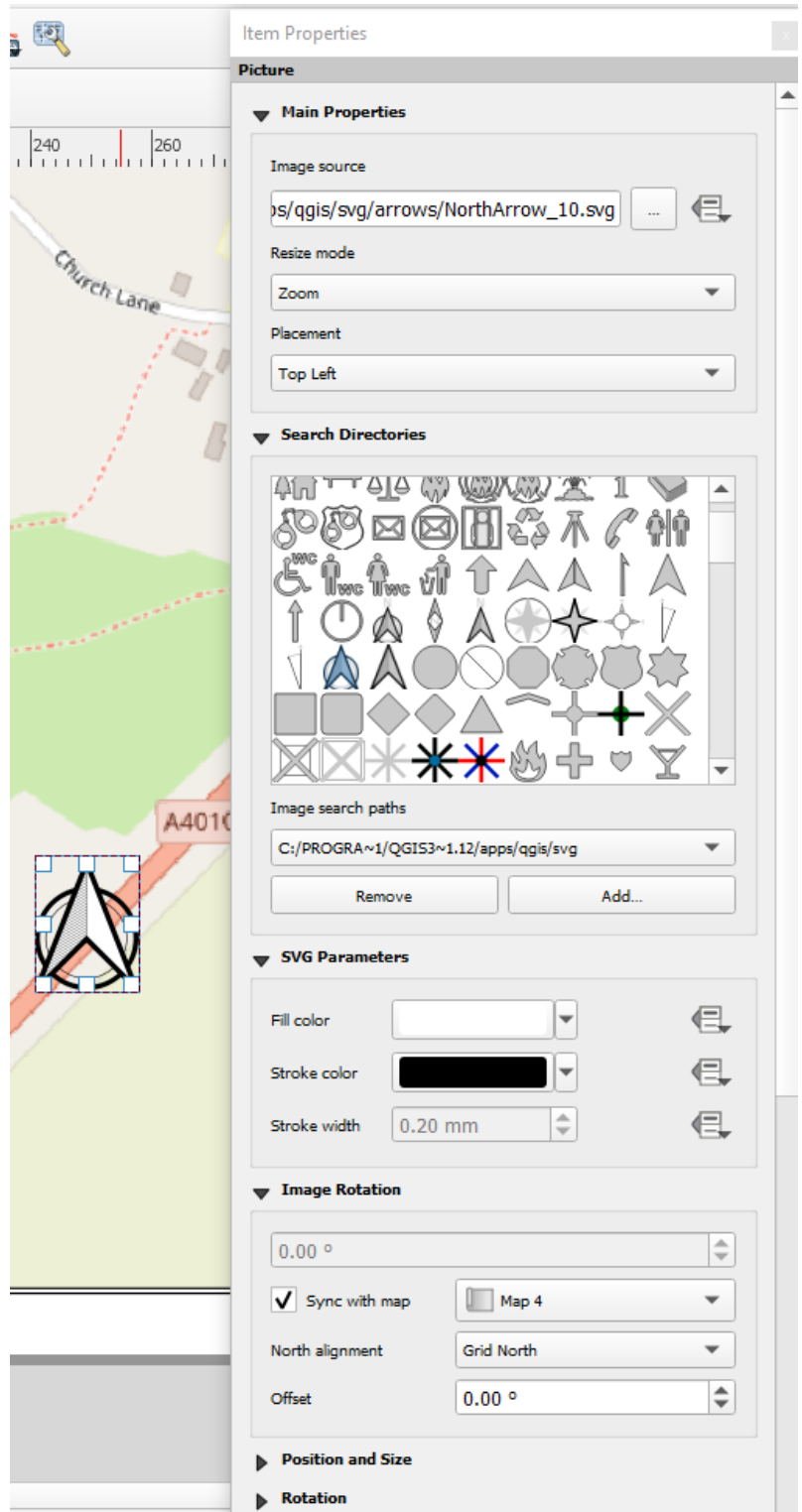
1 – Main properties – define the **source and layer of our attribute table attached**. We can refresh the attribute table view and adjust the specified attribute columns to its general appearance.

2 – Feature filtering – defines the **maximum number of rows to be displayed** (default set to 30). Moreover, a user can remove duplicate rows from table if exist any or show just features visible on the map.

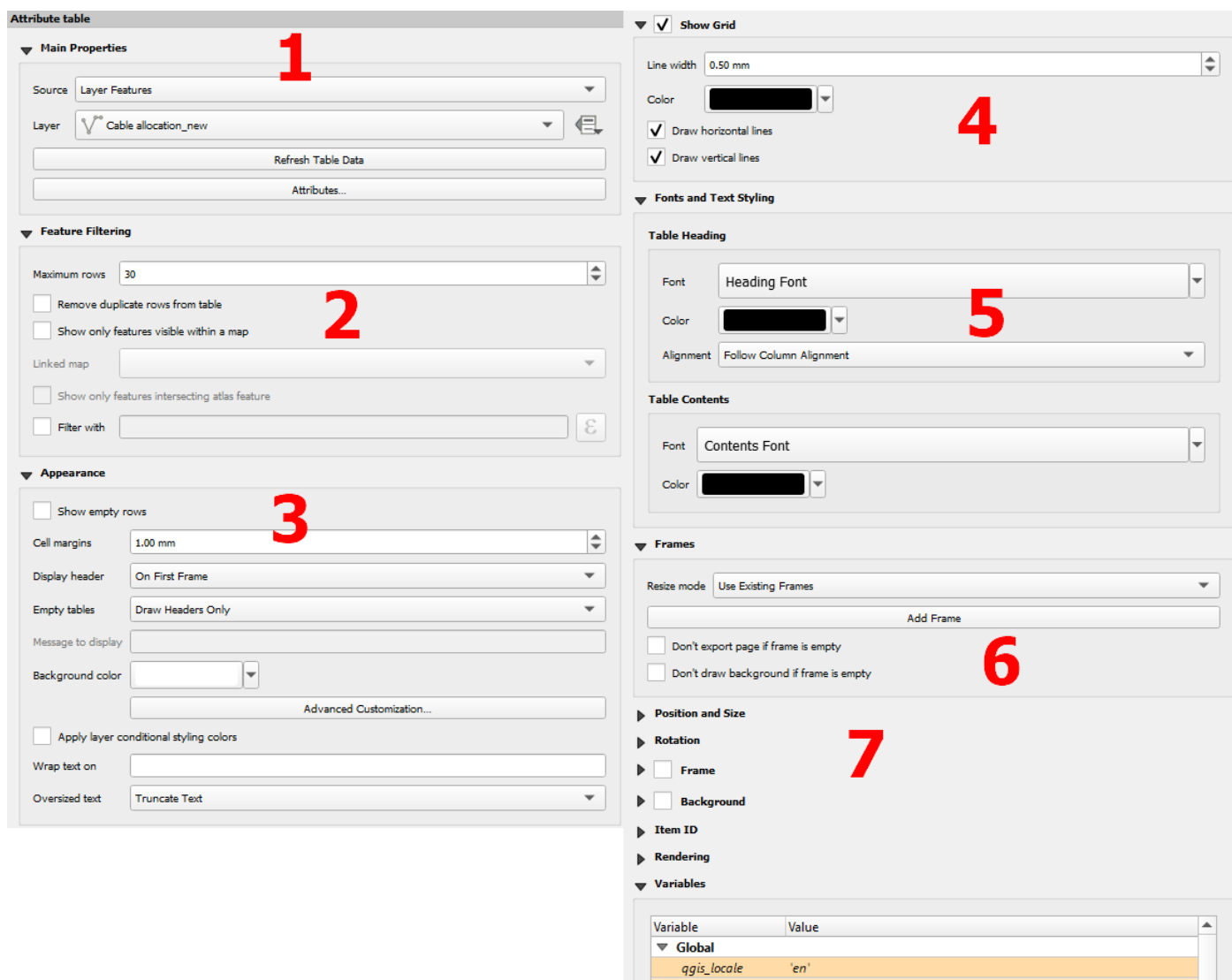
3 – Appearance – determines the settings of cell margins, the header appearance or background colour.

4 – Show grid – the lines **bounding the cells likewise in Microsoft Excel**. We can change their thickness and coloration here. We can define which lines do we need vertical, horizontal or both.

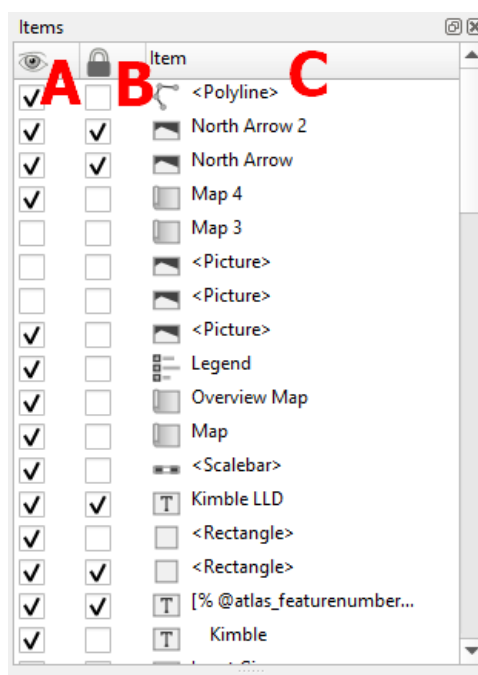
5 – Fonts and Text Styling – the place for customizing font, colour, and alignment both for Table Heading as well as Table contents.



Pic. 150 Scalebar style options in QGIS print layout.



Pic. 151 Attribute table options in QGIS print layout.



Pic. 152 Items panel in QGIS print layout.

6 – Frames – this section falls inside the “*Font and Text styling*” but its purpose is different, as it determines the **overall size of our attribute table**. It’s essential to use especially when we want to extend our attribute table to the next page and print it separately.

Items panel

The last important matter to discuss in this chapter is using the Items panel. It’s something different from Items properties, which applies to each feature separately. The Items panel can be **switched on from the sidebar after right-click** (Pic. 124 III). Next you should see the window including the list of all elements included in the print layout (Pic. 152). This list comes with two additional options, where the **option A** is the item visibility on our print layout page and **option B** informs us about **locking this item or not**. When the feature is locked, then the same option as discussed earlier (Pic. 125, b) is applied, although here you can lock and unlock more features quite quickly by ticking on/off.

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References

1. Cutts A., Graser A., 2018, *Learning QGIS. Your step-by-step guide to the fundamental of QGIS 3.4*, 4th Edition, Packt, Birmingham-Mumbai.
2. [QGIS User Guide. Release testing, QGIS project, 2015.](#)

Links:

1. <https://gis.stackexchange.com/questions/tagged/qgis>
2. <https://www.qgistutorials.com/en/>
3. https://docs.qgis.org/3.22/en/docs/user_manual/index.html

Youtube:

https://www.youtube.com/watch?v=kCnNWyl9qSE&ab_channel=KlasKarlsson

https://www.youtube.com/watch?v=NHolzMgagwE&ab_channel=GeoDeltaLabs

https://www.youtube.com/watch?v=Eg4_duqH5Q4&ab_channel=OpenSourceOptions

https://www.youtube.com/watch?v=rrj_XL-lAxI&ab_channel=Geoid

https://www.youtube.com/watch?v=-7v5qfJYWxA&ab_channel=QGISNorthAmerica