Creating map applications in CoGIS

Creation and setting of interactive maps and web map applications based on CoGIS platform

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1. Introduction

1.1. CoGIS platform components

CoGIS platform consists of the following software components:

- CoGIS Designer – a constructor for creation of interactive maps and fully functional web map applications based on map services, geoprocessing and analyses tools;
- CoGIS SOE (SOE, an abbreviation for Server Object Extension) – a module providing support for advanced methods to work with the map services layers and objects;
- CoGIS Portal – a geoportal consisting of catalog of published interactive maps and map apps, tools for searching and navigation, and web pages with reference information which structure and content are set in accordance with the users' needs;
- CoGIS Mobile – mobile applications for work with interactive maps and map apps on iOS and Android devices and mobile service for operation of these applications;
- eLiteGIS – a GIS server for publishing data and tools as web services.

This manual contains instructions on creating and setting of interactive maps and web map applications in CoGIS Designer, and also setting of map catalog in CoGIS Portal.

Complete list of instructions on work with platform components is provided in section 1.2 below.

1.2. Additional information

The following manuals with information about CoGIS platform can be also helpful:

- Publishing GIS services in eLiteGIS;
- Installing and setting eLiteGIS;
- Installing and setting CoGIS;
- Creating map projects in QGIS;
- Creating map applications in CoGIS;
- Working in mobile applications CoGIS Mobile.

2. Operating principles of work in CoGIS Designer

2.1. Multi-user mode. Saving settings.

CoGIS allows parallel work of multiple administrators, displaying the number of active administrators in the popup bar as shown on Figure 1.

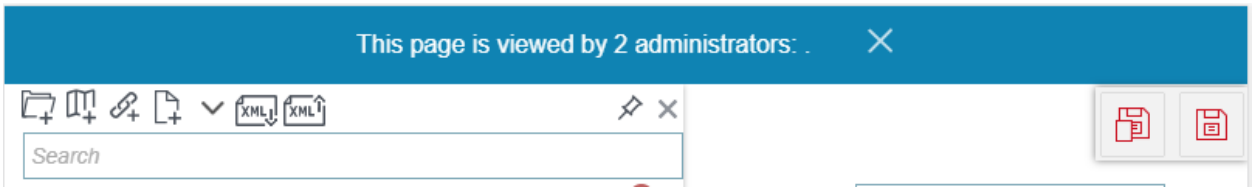

Figure 1 – Multi-user mode

Note that by pressing *Save all* button, all changes made in CoGIS are saved. That is, to avoid conflicts during parallel work, use *Save current project* button to save changes made for element on the current page only.

If one of the administrators saves made changes by pressing *Save all*, the other administrators will see a popup bar with the appropriate information as shown on Figure 2.

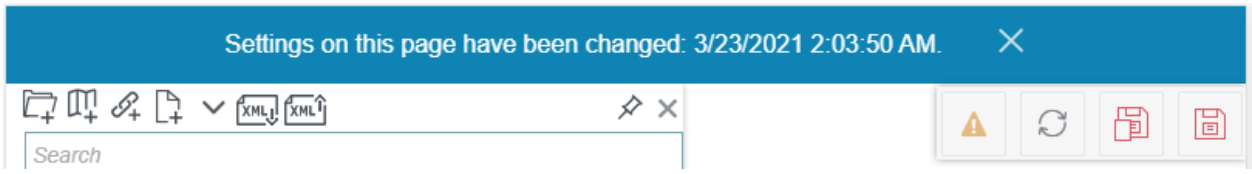

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Figure 2 – Changing settings

In order to your changes and changes made by the other administrator would not overlap, refresh the page.

2.2. Types of CoGIS elements

The following types of elements can be created in CoGIS:

- map - users can work with map in CoGIS and in mobile application when connected to internet.
- Link - provided for going to CoGIS elements and to external internet pages.
- Page - in this element you can locate text, graphic or statistical information, as well as links to other CoGIS elements, for example, map or any external source. The created page can be set it as Start page or menu item.
- Folder - provided for hierarchical storage in CoGIS Designer and display of elements in Map catalog. Elements added to folder inherit its settings.

2.3. Creating and setting elements

CoGIS elements are created and set in *CoGIS Designer* section of *Administration* menu shown on Figure 3. CoGIS Designer consists of two following parts:

- Elements control panel and catalog tree located on the left;

- Tabs of element settings located vertically on the right, and tab of element version and versions control panel located horizontally.

The number and content of settings tabs depend on element type.

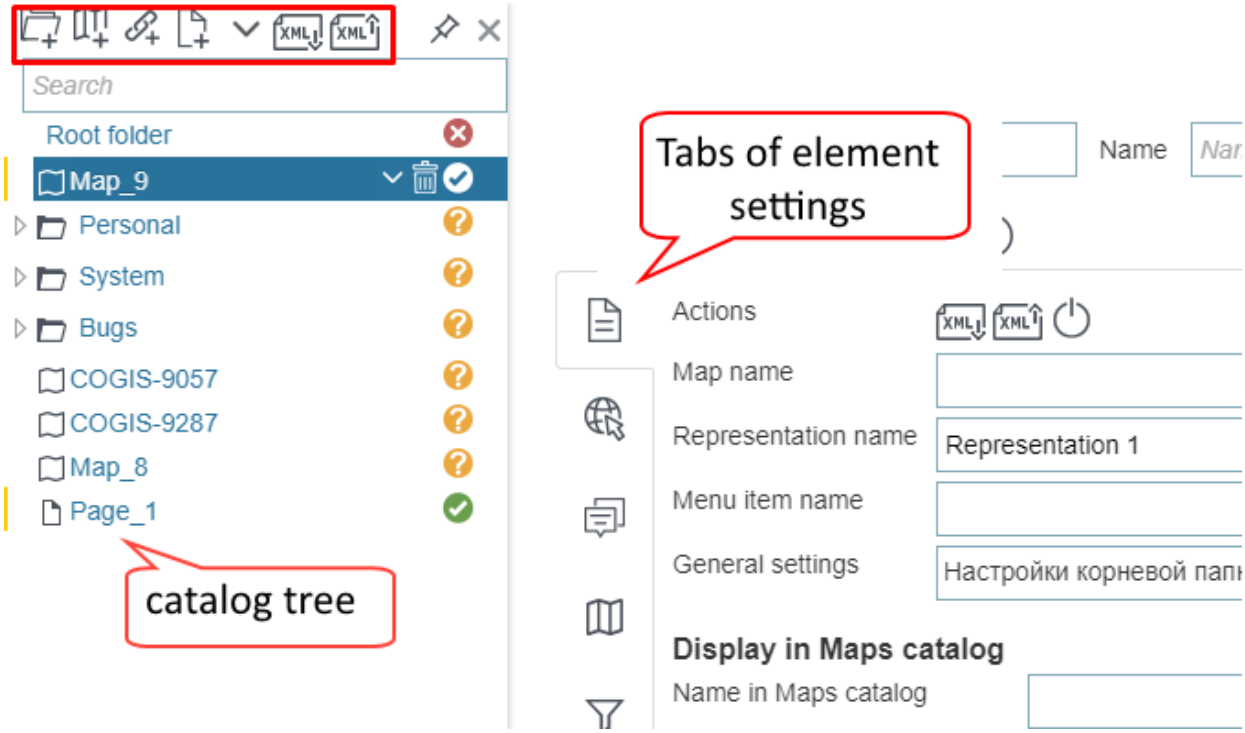


Figure 3 – CoGIS Designer tab

2.4. Managing elements

2.4.1. Creating element

To create element, select its type on the control panel and it will be shown in the catalog tree with default name. Created elements inherit the root folder settings. This is convenient when working with large number of elements with the same settings.

For root folder specify settings that will be inherited by all elements. See section 2.7 for more details.

2.4.2. Renaming element

For ease of administration you can specify two names for the element:

- Name that is included to the internet page address of the element and is displayed in the page title;
- Name that is shown in catalog tree only.

Element name in the address of its internet page is set by default, to change it, enter the new name in the *ID* field. For names it is recommended to use only Latin numbers and letters and not to use exclamation sign, space and such symbols as @, #, $, %, ^, &, *, (,).

The element name that will be shown in the catalog tree should be entered in the *Name* field. See Figure 4 for more details.

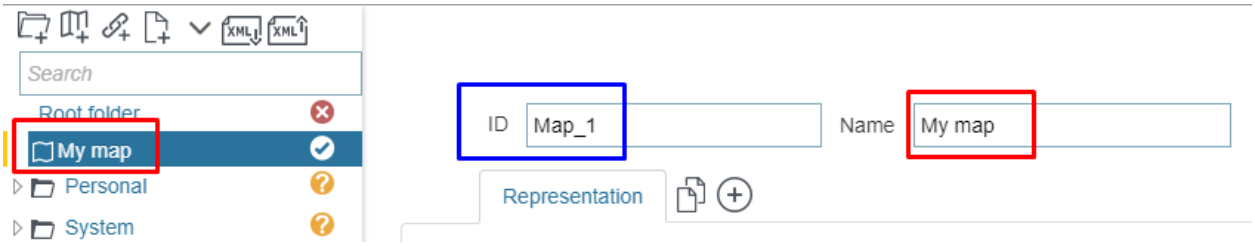


Figure 4 – Element name

2.4.3. Going to internet page of element

To go to map , folder, page and link, press the button selected on Figure 5.

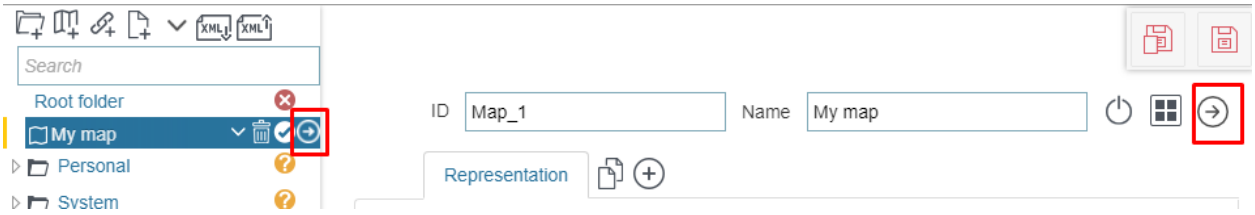


Figure 5 – Going to element page

You will be able to go there only if access to selected element has been allowed in CoGIS.

2.4.4. Limiting access to elements

If currently the element is not needed for work, but you do not want to delete it with all its settings, for example, the map with old data, just press the button selected on Figure 6. The element will be hidden in *Map catalog* and become unavailable by direct link. Press this button again to make the element available.

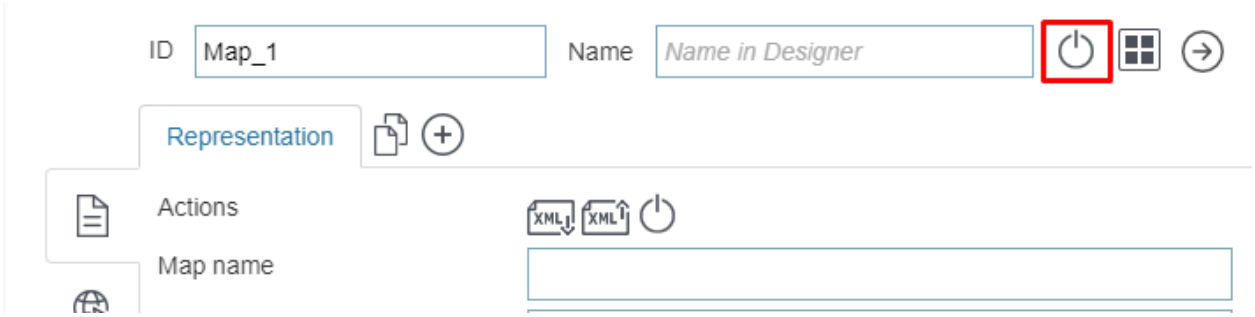


Figure 6 – Limiting access to element

2.4.5. Copying elements

To copy element with all settings, select it in the Map catalog tree and on toolbar press *Export to xml file* , then press *Import to xml file* .

2.4.6. Deleting elements

To delete element, press the button selected on Figure 7.

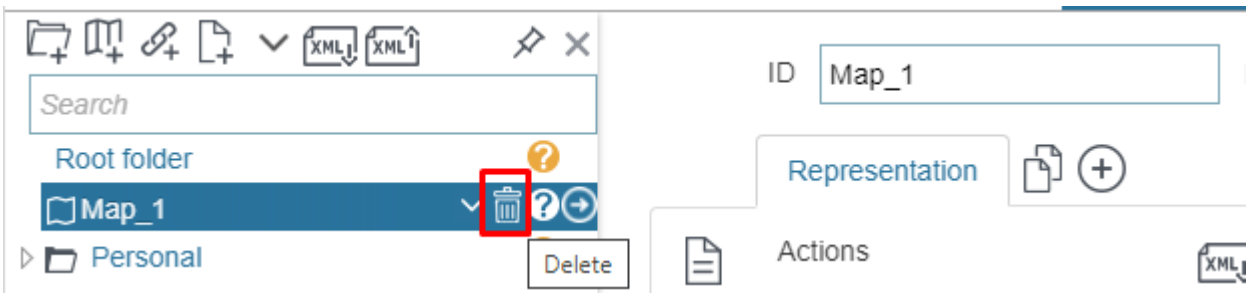


Figure 7 – Deleting element

2.5. Element representations

Sometimes one element needs to be differently shown to different users, for example, for one user group you want to hide part of features on map , for other user group you want to allow editing features on this map , for the third group - to show results of statistical analysis as diagrams only, etc. The element versions are provided for these purposes. The element representation is a tab with specific settings. Each type of elements has its own set of settings.

When creating the element, the representation is automatically created which name can be changed in the field selected on Figure 8. To create another representation for element, press ⊕.

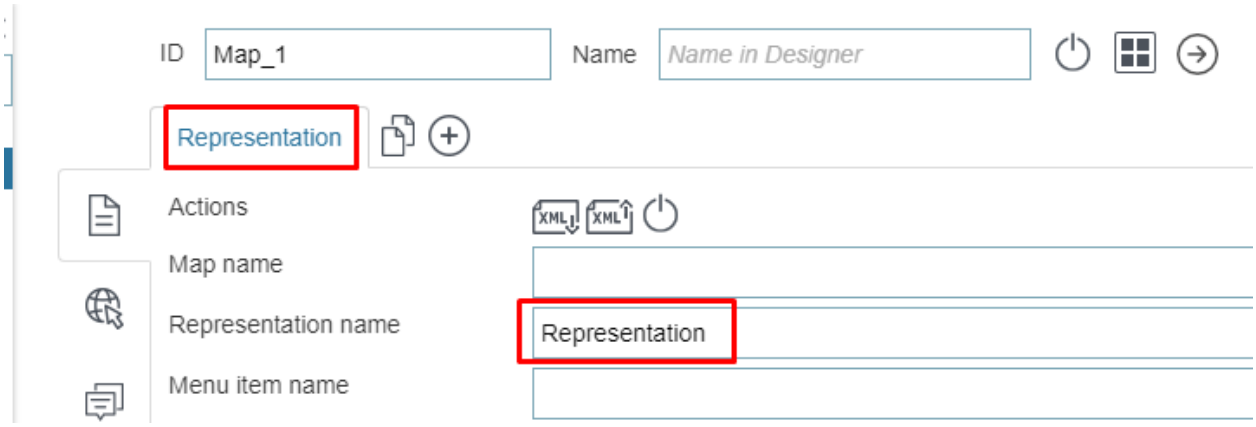


Figure 8 – Managing elements representations

Sometimes it is easier to copy existing representation instead of creating the new one. To copy the last representation with all settings, press . To copy specific representation, go to its tab and in *General information* tab press , the XML file will be uploaded, then press and download the file.

If element representation is not needed for work now, but you do not want to delete it, press . The representation will become inaccessible. Press the button again to make the representation accessible. If you do not need this representation anymore, delete it pressing .

2.6. Permissions for access to element

The element's settings can be specified in such a way that it will be displayed only for selected group of users and in mobile app. Or, for selected users and in browser. Or, for selected devices and when English is the interface language. You can specify multiple access permissions for different representations of the element. To do so, in the element representation go to *Access*

permissions and filtration settings tab and select the required access permissions. That is, the element can be accessible for:

- specific groups of users;
- specific users;
- specific mobile device;
- specific address;
- specific IP-address.

If you need that the element could be accessible for specific user group or specific user only, check the *Group access conditions* option, select the variant form the list and specify the name of the group or the user.

If you need that the element could be accessible by request from specific mobile device only, check the *Group access conditions* and *For specific device IDs* options. Enter the device ID. The ID for device is assigned during mobile app installation. To know your device ID, check your mobile app settings menu.

If you need that the element could be accessible by specific address only, check the *Client type conditions* option. In the list shown on Figure 9, select *Parameter in request*, enter parameter name, select condition type «=» and in parameter value enter <1>.

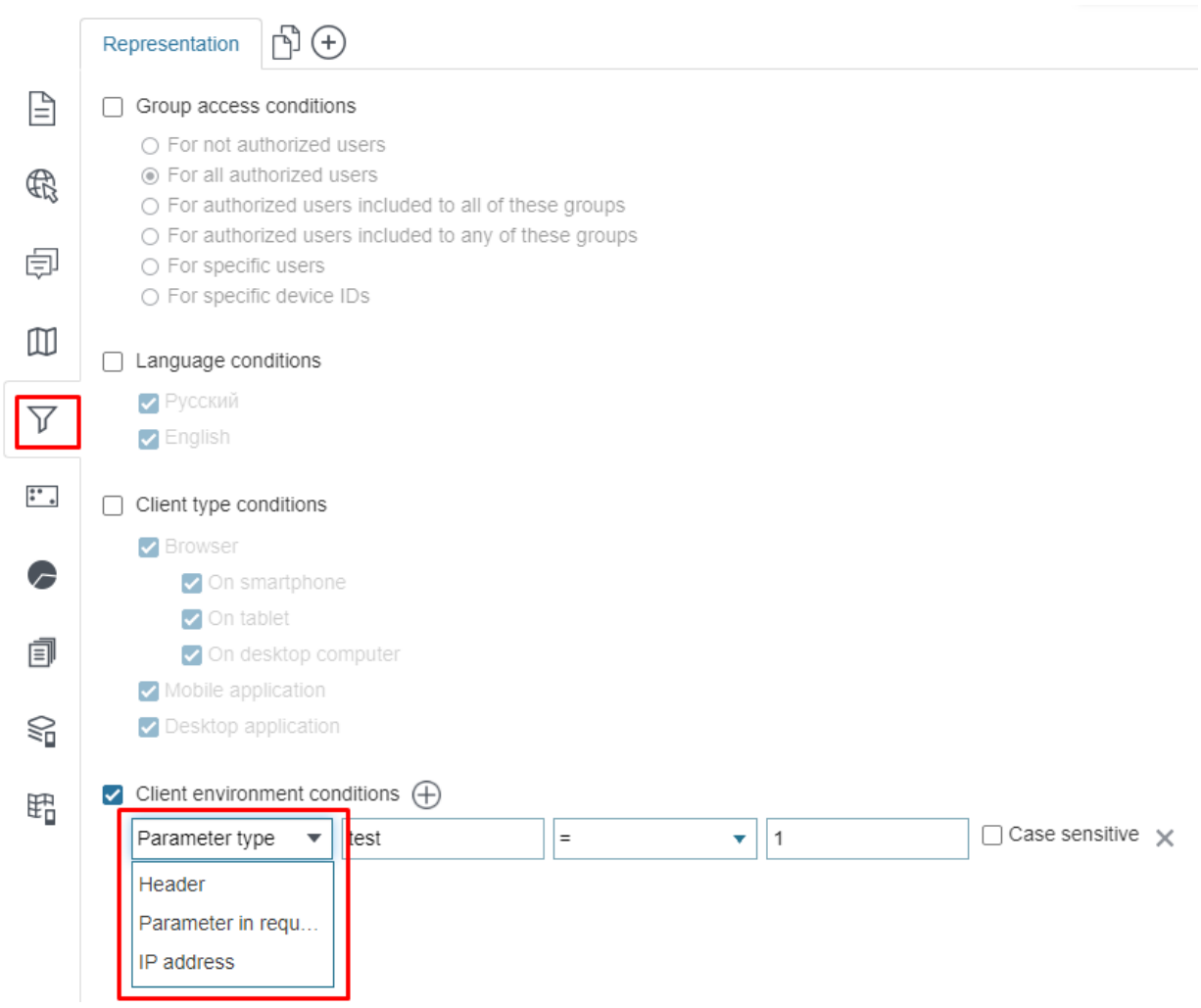


Figure 9 – Limited access to element

The element will be accessible only if in the address line you will add <?test=1> to the address, as shown on Figure 10.

Figure 10 – Parameter in the request

If you want that entering parameter name and value was case-sensitive, check the appropriate option.

If you want that the element could be accessible only by request from specific IP address, select *IP address* option in the list shown on Figure 9, in *Condition type* select «=» and enter IP address in the parameter value.

2.7.Inheriting settings. Grouping by folders.

When working with multiple elements, for example, with multiple map s, it may be convenient to specify the same settings for all maps at a time. The settings inheritance property is provided for this. By default all elements inherit settings of the root folder of the Catalog tree. To see which settings inherit specific element, go to its tab *General information* in *General settings* as shown on Figure 11, where name of folder representation is displayed and name of the folder shown in the catalog tree is displayed in brackets.

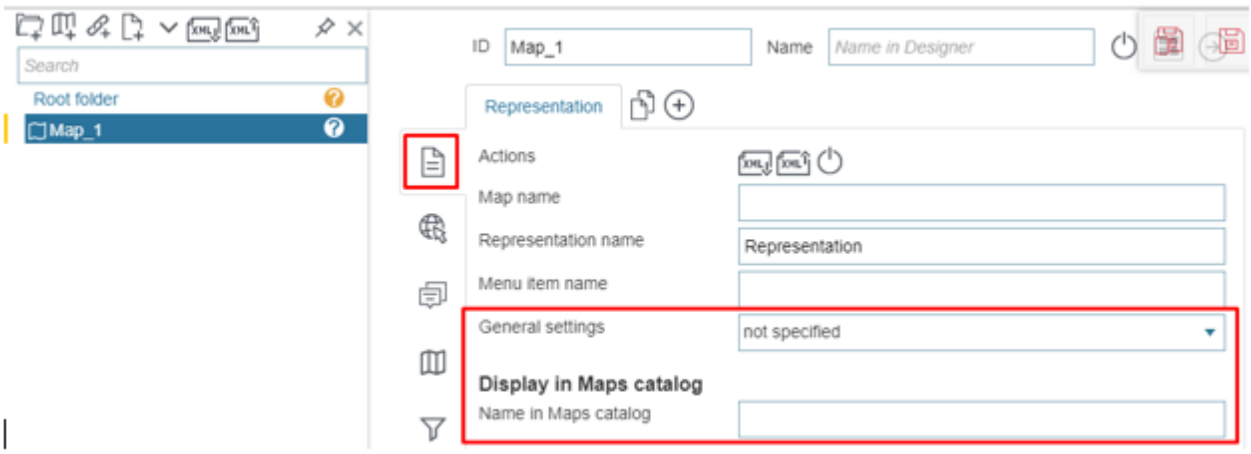


Figure 11 – Selecting inherited settings

When you need to create multiple elements, for example, multiple offline maps with settings different from ones of the root folder, group the required offline maps to the new folder. For this folder in the *General settings* list select *not specified*. Specify the folder settings that will be inherited by offline maps added to this folder.

If you plan to create a unique map and so you do not need that this map inherited any existing settings, select *not specified* in the *General settings* list.

3. Setting Map catalog

All elements created in *CoGIS Designer* are displayed in *Map catalog* as icons. The only exceptions are folders, as by default only their child elements are displayed.

If you want that the folder was displayed in Map catalog same as the other elements types (as icons), in CoGIS Designer in list selected on Figure 12 select *as folder* option.

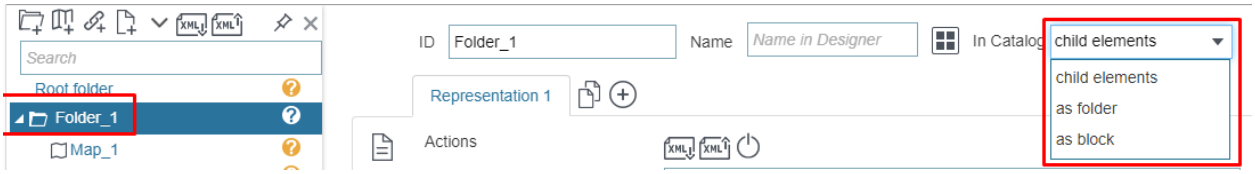


Figure 12 – Folder in Map catalog

The folder can be displayed as block. On Figure 13 it is shown how folder and its content will be displayed in this case.

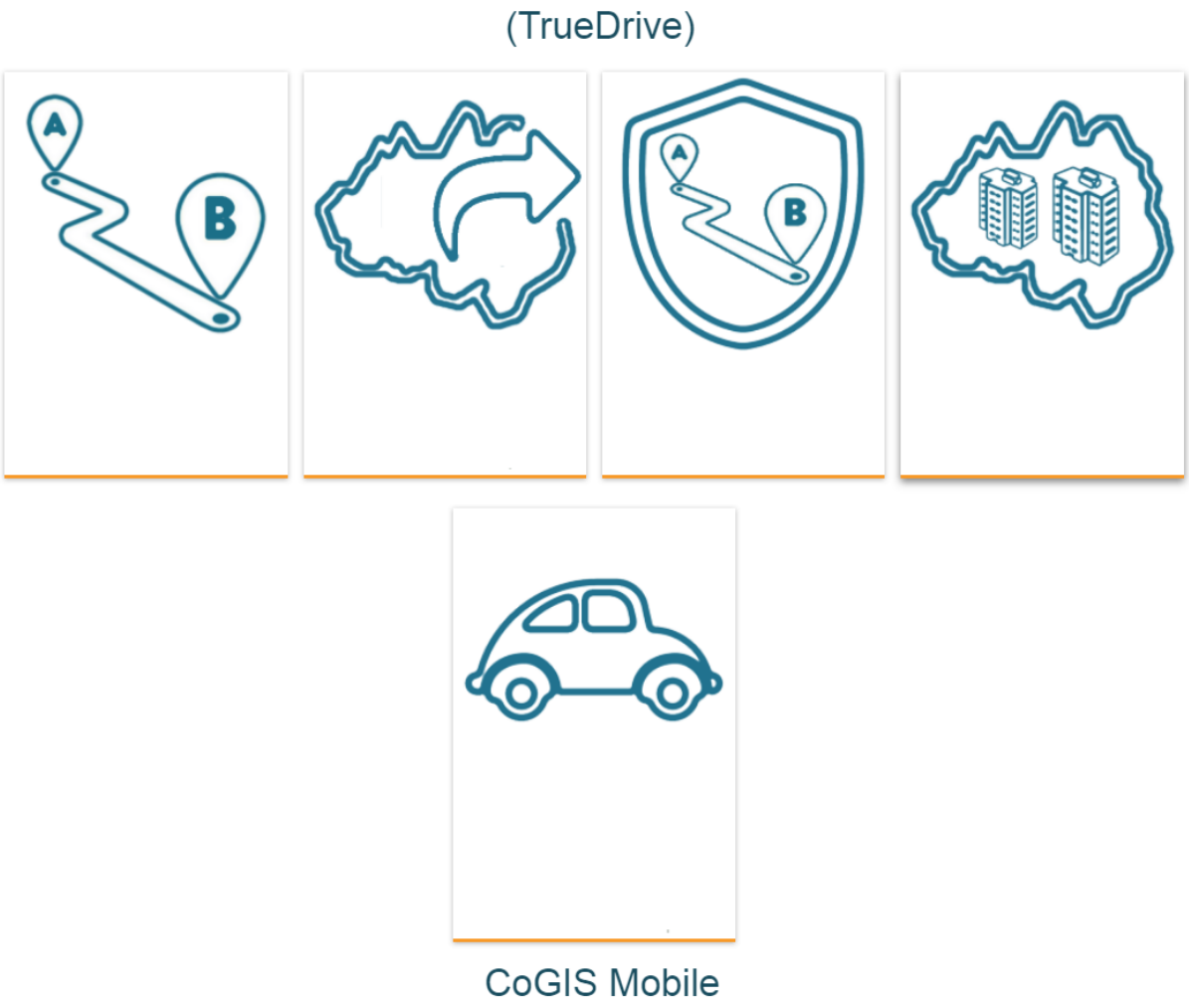


Figure 13 – Folder displayed as block

To display folder as block, in the drop-down list of the *In catalog* option shown on Figure 12, select *as block*. The folder name will be used as the block title and the folder description will be the block subtitle.

The icon can display the following:

- default number of visits, i.e. how many times users visited the element page;
- element name displayed in Map catalog only. Specify the element name, otherwise the representation name will be displayed.
- downloaded picture (the picture of size 224x224 px is displayed in the web version, and the picture of size 120x120 px is displayed in the mobile app);
- additional information, such as:
    - Description;
    - links to go to element page or to any external source.

See Figure 14.

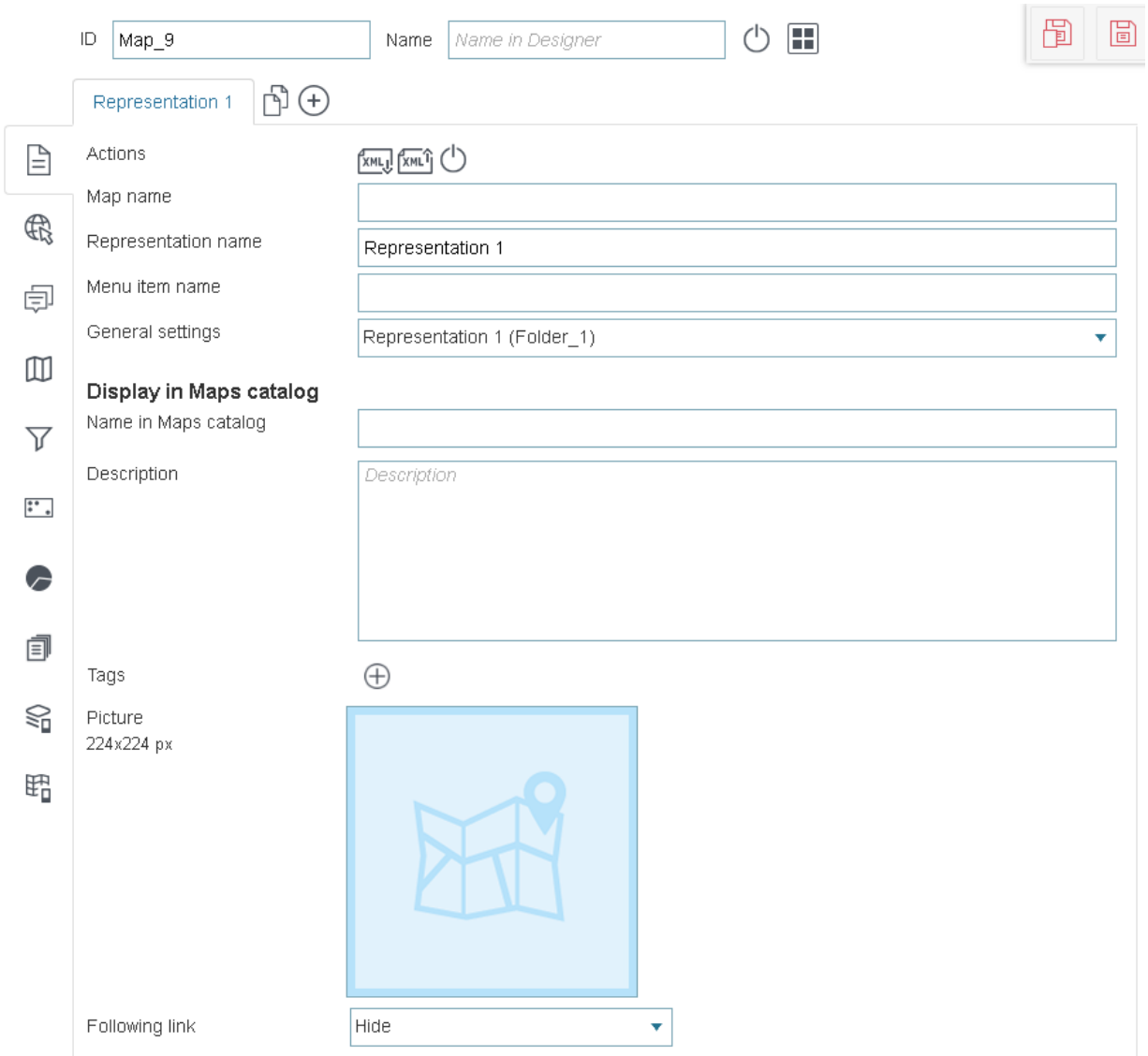


Figure 14 – Setting element display in Map catalog

For quick search in Map catalog it is recommended to use tags. Set the tag, enter the key word in the field selected on Figure 15. In Map catalog select your tag in the list of tags. One tag can be created for multiple elements. Or, create multiple tags for one element, if required.

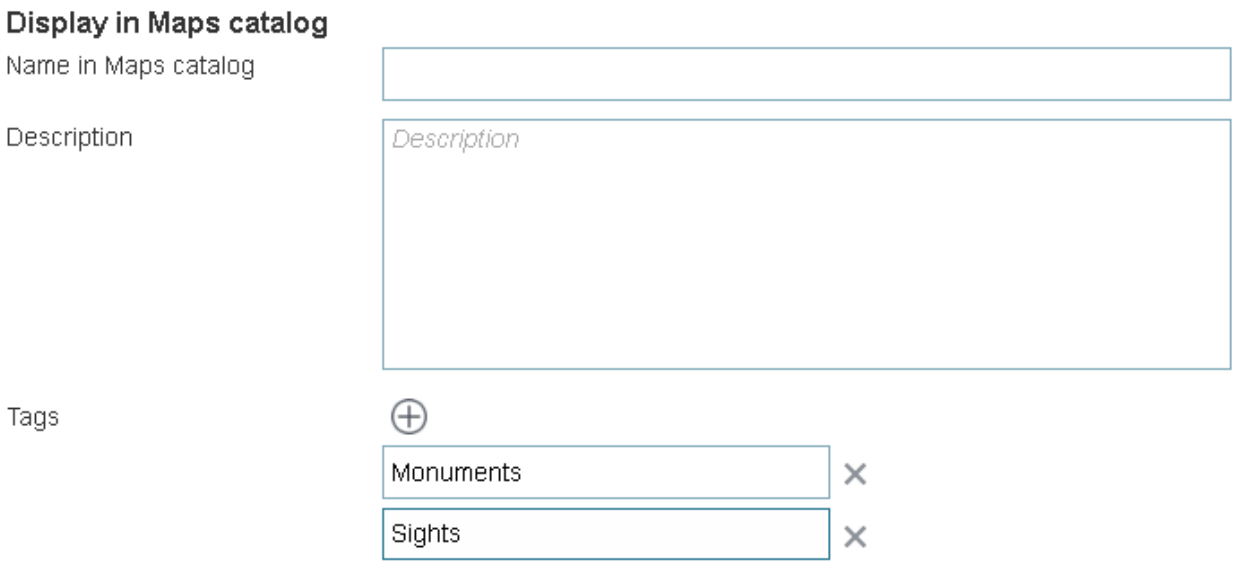


Figure 15 – Creating tag in CoGIS Designer.

You can hide buttons of selecting elements display in Maps catalog, as well as search panel and elements sorting from users. You can also hide statistics and links. To do so, go to settings of root folder of catalog tree and check the appropriate option as shown on Figure 16.

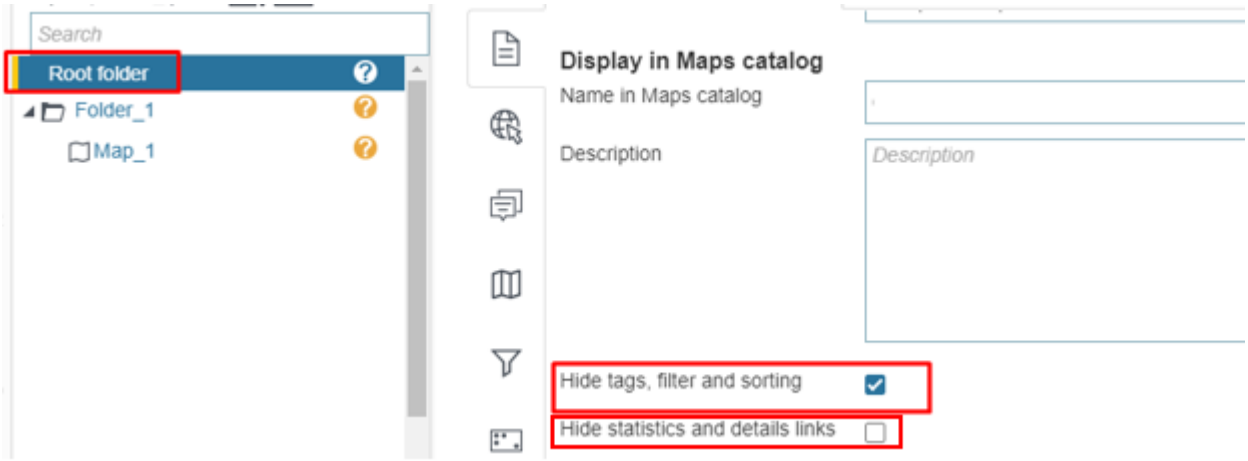


Figure 16 – Hiding Map catalog settings from users

If you need to hide element from Map catalog, go to CoGIS Designer. Select the element from the catalog tree and press button selected on Figure 17.

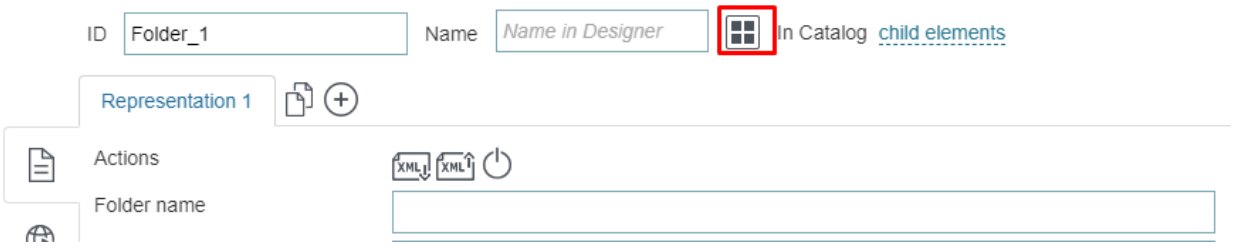


Figure 17 – Hiding map from Map catalog

4. Map

4.1. Basemap and its redefining

By default, the basemap of GIS server is used as basemap for map. But you can redefine the basemap if needed. To do so, in CoGIS Designer go to tab , press *Add service* and select the required basemap from the list of basemaps of tile web services shown on Figure 18.

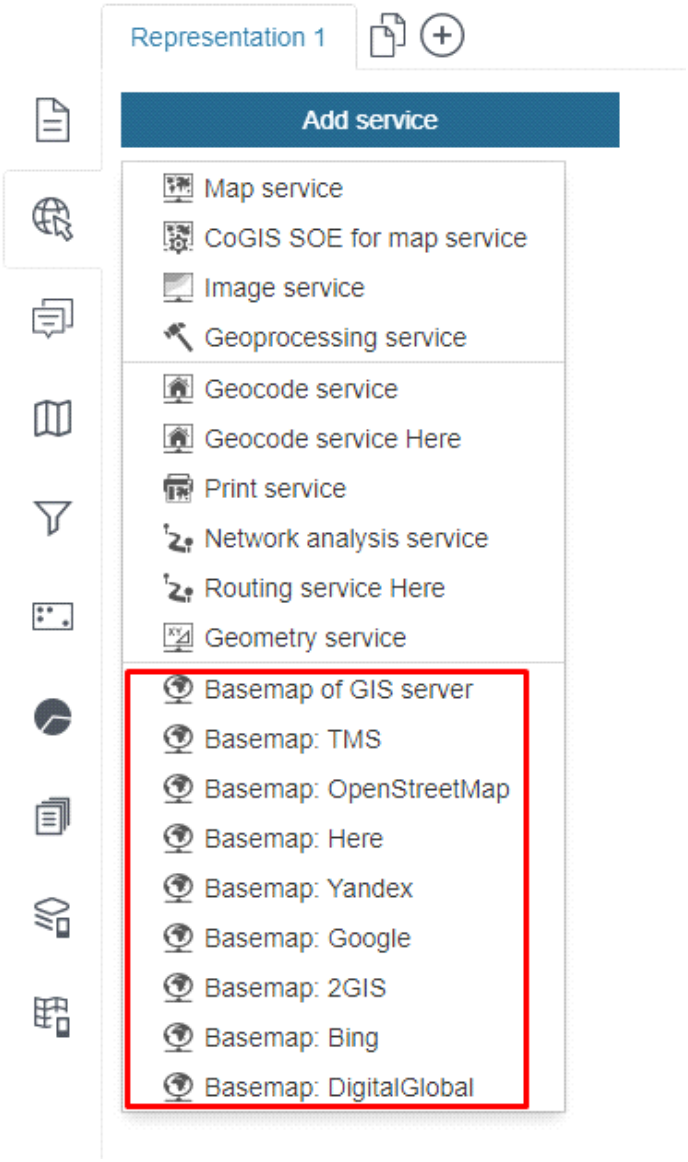


Figure 18 – List of basemaps of tile web services

If you selected:

- Basemap of GIS server - to add it on map, enter the address of tile service of GIS server in the *url* line or select basemap from list that will appear when pressing *url*.
- Basemap from TMS – specify template url, tile size in pixels, coordinate system, coordinates of origin point, subdomains and scales.
- Basemap from Google, OpenStreetMap, Yandex, or 2GIS - to add it on map , you need to get permission from the owner to use it.
- Basemap from Here – enter APP ID and APP CODE of the basemap.

- Basemap from Bing, DigitalGlobe - to add it on map , you need to get the key and permission from the owner to use it.

If you added multiple basemaps to map, specify, which basemap should be used as default one. To do so, press the button selected on Figure 19.

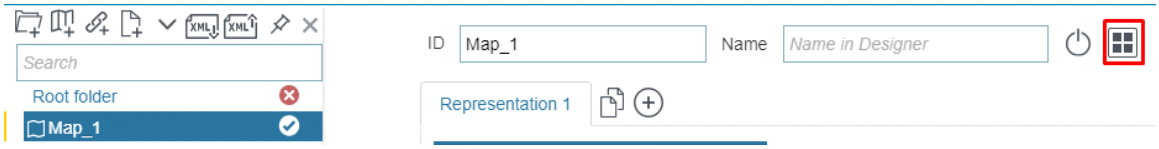


Figure 19 – Default basemap

If you do not want that the added basemap is displayed in the *Basemap* window on map, press . For your convenience you can group added basemaps, to do so, enter the group name in the field, see Figure 20, for example. You can also add copyright sign for the map, if needed.

Figure 20 – Grouping basemaps

You can work with map without adding basemap on it, to do so, use the *Allow viewing map without basemap* in the *Tools and map settings* tab, see section 4.4 for details.

4.2.Services

4.2.1. Services. General information.

For work with map the services are used, connection to which is established in *Services* tab . Select the required service from the list pressing the button shown on Figure 21.

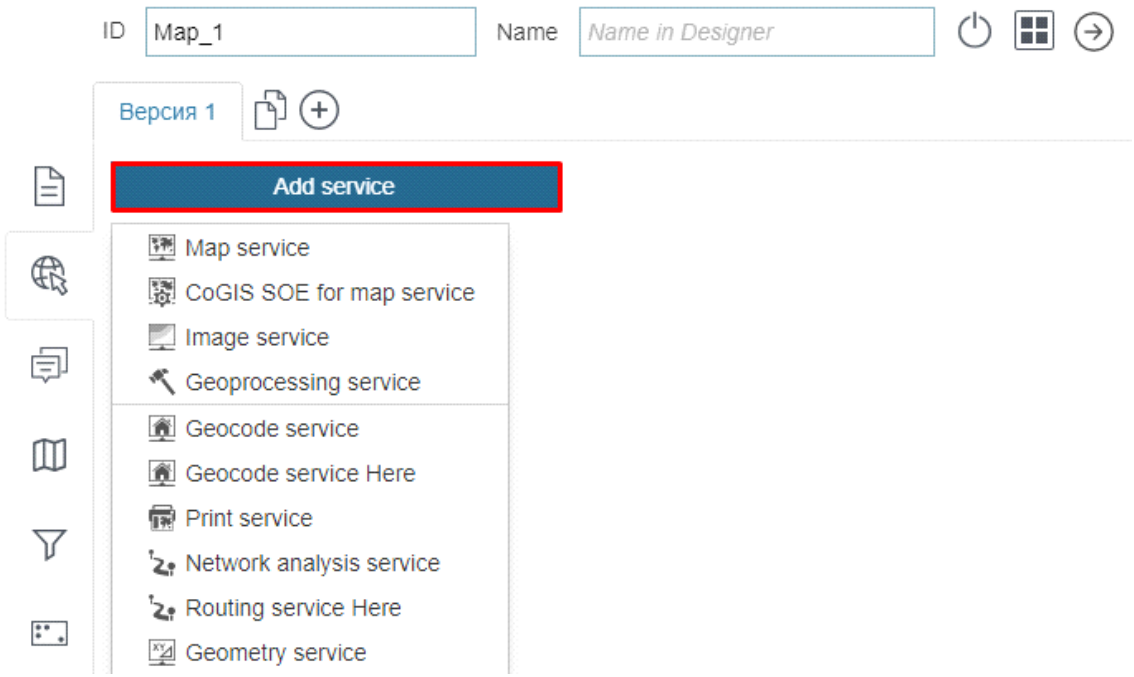


Figure 21 – Services

Each service has settings tabs that can be expanded or collapsed pressing the appropriate buttons in the upper right corner. You can upload XML file of service settings by pressing . If the created service will not be currently used, press .

4.2.2. Map service

4.2.2.1. Map service. General information.

To establish connection to map service, enter its address to the *url* field, as shown on Figure 22, for example.

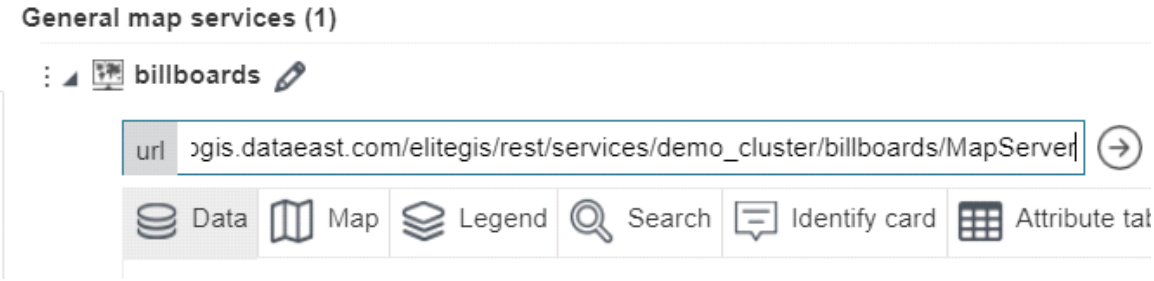


Figure 22 – Example of entering url address of map service

To go to map service page, press . To rename service, press . By default all layers of map service will be added to map. You can select layers and group layers of map service that should be added to map. To do so, specify their numbers.

To manage map service settings defined during its publishing on GIS server the following tabs are provided: *Data*, *Map*, *Legend*, *Search*, *Identify card*, *Attribute table*.

4.2.2.2. Data tab

The tab contains options provided for managing layers and objects of map service on the map. See Figure 23 for details.

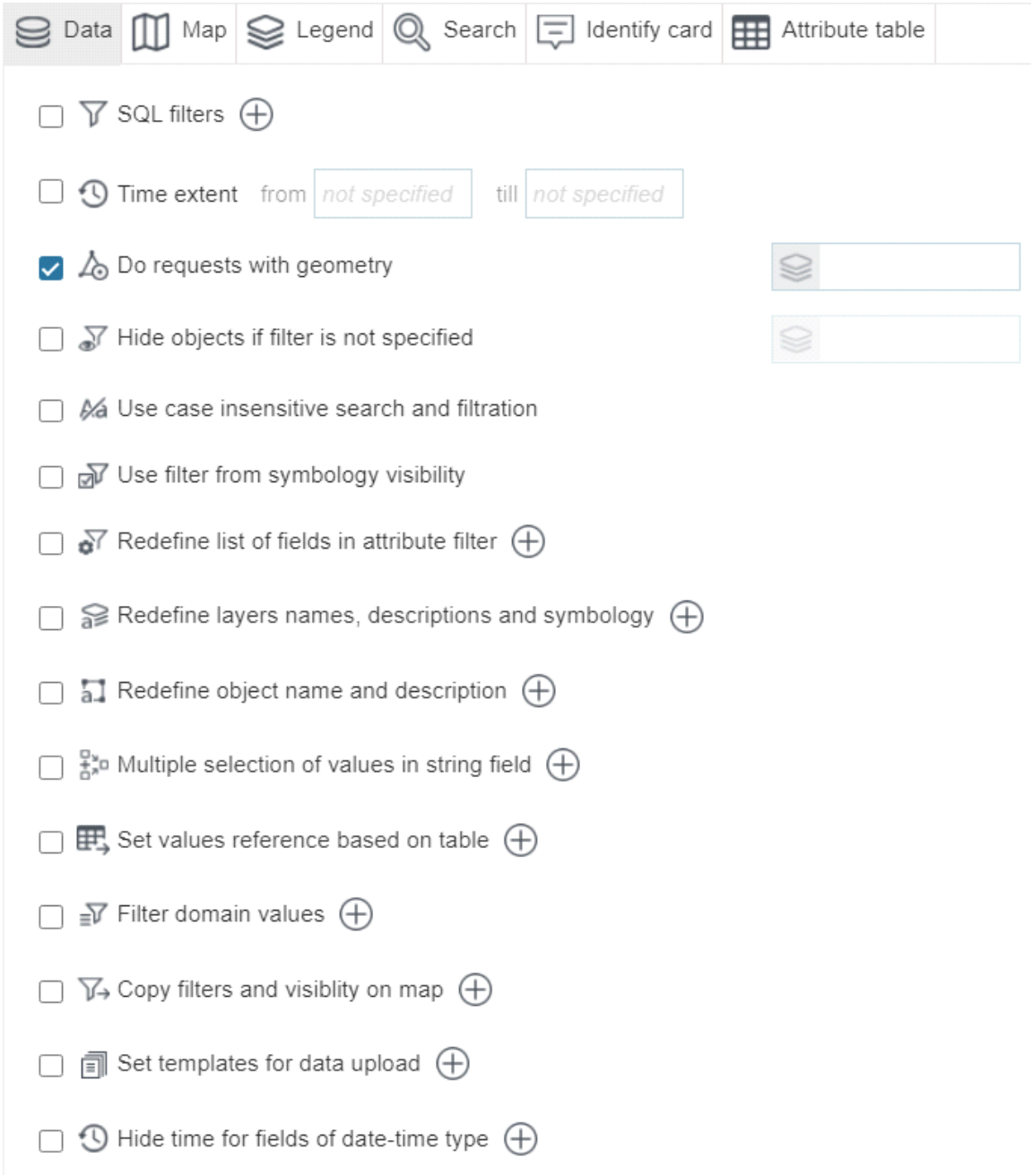


Figure 23 – Data tab of map service

- *Definition query* – to create definition query, check the option and enter the query. For example, if you enter query as <ObjectID>10> as shown on Figure 24, then only those objects with value of attribute field 'OBJECTID' more than 10 will be shown on your map.

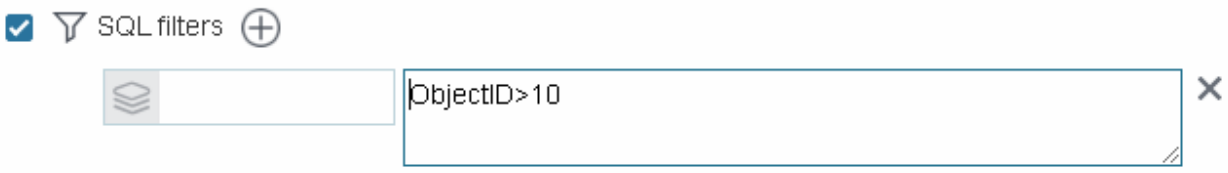


Figure 24 – Definition query

If you want that your query is applied to specific layers of group layer, specify their numbers.

For different layers different queries can be specified, for example, as shown on Figure 25. Add definition query pressing ⊕.

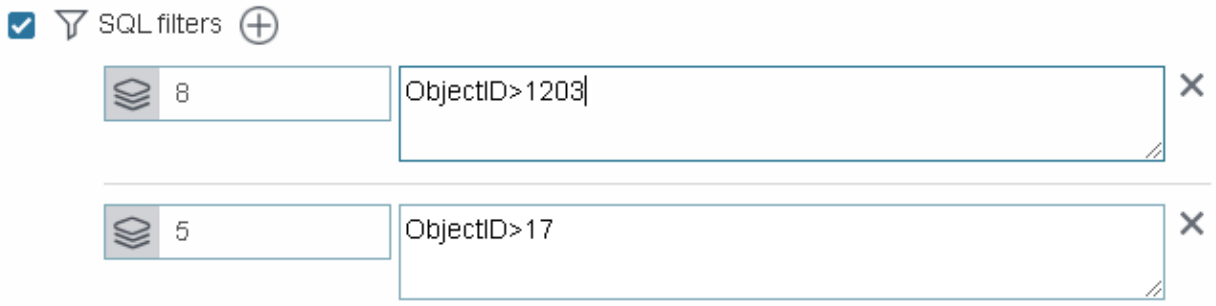


Figure 25 – Definition query

- *Data relevance by time* – option allows defining actuality of data for service. In case of using time range scale, data of such service will be displayed on map according to the time relevance settings defined in this section.
- *Request objects geometry* – option is enabled by default. We recommend disabling this option for layers that have objects with multiple nodes and which geometry coordinates are not required to be viewed one by one.
- *Hide objects if filter is not specified* – option allows hiding objects in layer if *Attribute filter* for layer is not specified in *Attribute table* or in *Widget*. For example, you can hide all objects of the layer by default and show them after result of geoprocessing service work with redirection.
- *Use case insensitive search and filtration* – check this option is you need make your search case insensitive.
- *Consider symbology visibility as filter* – check this option so that symbology visibility is considered for displaying objects in attribute table.
- *Redefine list of fields in attribute filter* – if you want to redefine list and order of attribute fields by which filtering in the layer is done, check this option and enter names of attribute fields separated with comma.
  If you want that order of entered fields names was considered in the attribute filter of the layer, check *Consider specified fields order* option.
  If you want to exclude attribute fields from the list by which filtering in the layer is done, enter their names separated with comma and check *All, except listed* option. To redefine list of attribute fields by which filtering only for specific layers will be available, enter the layers number, for example, as shown on Figure 26.

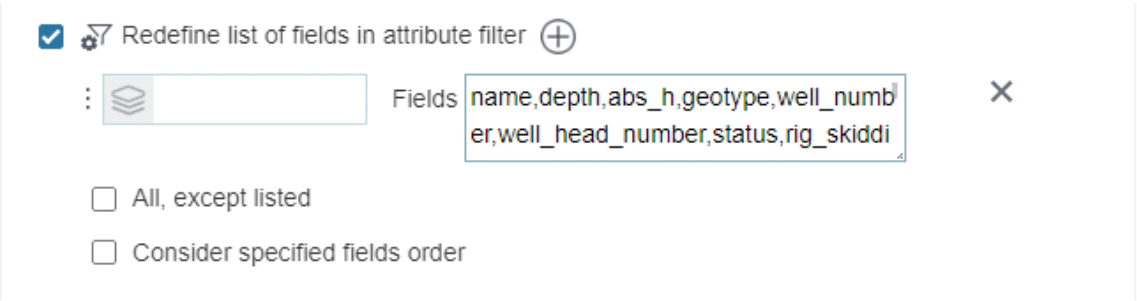


Figure 26 – Redefining list of fields in attribute filter

- *Redefine layer name, description and symbology* – to redefine layer name and description, check this option and press ⊕, specify layer number, enter the new name and description. The layer name will be redefined in *Legend, Identify card* and *Attribute table*. Layer description will be redefined in layer menu of *Legend* and in *Attribute table*. To redefine symbology of layer objects in Legend, check the option and download file. To hide layers of group layer in Legend, check *Hide child layers* option, as shown on Figure 27.

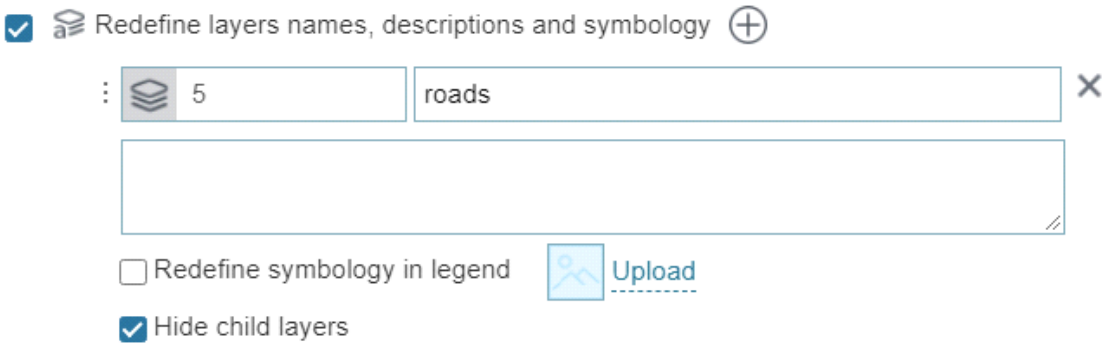


Figure 27 – Redefining layer name and description. Hiding layers of group layer.

- *Redefine object name and description* – to redefine name and description of layer objects, check the option and press ⊕, specify layer number, enter the new name or objects description. The object name will be redefined in the *Identify card* and its description in search results as shown on Figure 28.
-

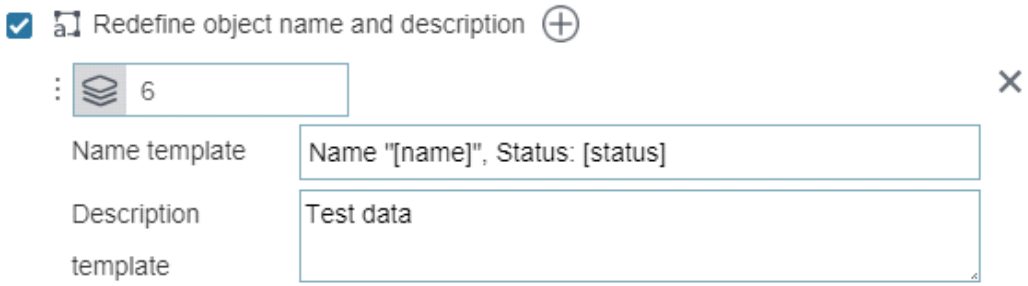


Figure 28 – Redefine object name and description.

- *Multiple selection of values in string field* – this option is provided to make multiple selection of values in a string field. To record multiple values to string field, check the

option and press ⊕, specify layer number and attribute field name for that multiple selection of values will be used. For example, Type: Residential building; Building with administrative premises.

- *Set values reference based on table* – the attribute field can have domain of predefined values. During editing and in attribute filter the value of such field is selected in the dropdown list from domain. This option allows using reference table published on map service instead of domain of predefined values or in case of its absence.
  Check this option and specify in the layer number and the attribute field, instead of domain of predefined values of which the reference table will be used. Specify the table number in *Table*. To limit list of possible values, specify SQL filter in . By editing, the value of attribute field specified in *Attribute with code* will be recorded on GIS server, and displayed will be the value specified in *Attribute with value*. In the *Sorting* field specify the field by which possible values will be sorted. Check *Distinct values*, to avoid values duplication. If *Distinct values* option is checked, then for sorting you can specify only one of attribute fields specified in *Attribute with code* or *Attribute with value*.
  If the attribute field does not have domain of predefined values and reference table, you can redefine its value to value of another attribute field, which name should be entered to both *Attribute with code* and *Attribute with value* fields.
- *Filter domain values* – in case if you have a lot of domain values, you can use this option to filter domain values by filling in the attribute field. Check the option, specify the layer number and name of attribute field where you want to use the filtration option. As the result, the text field will appear, and by entering of part of domain value, the values with the input text will be shown.
- *Copy filters and visibility on map* – – in order to already specified settings of attribute and spatial filters, definition queries of SQL filters or layer visibility could be applied to other layers, check this option. Press ⊕, enter the number of layer which settings should be copied and specify, settings of which filters and visibility will be copied. Enter the service and numbers of layers for which these settings will be copied, as shown on Figure 29.

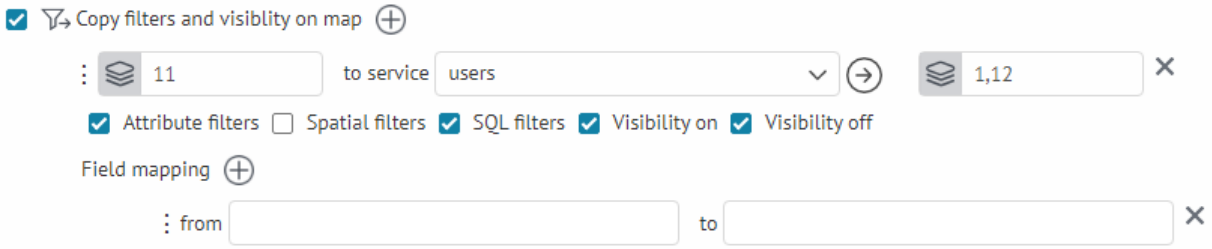


Figure 29 – Copying settings of filters and layers visibility

In case if names of attribute fields are different, then in ‘from’ and ‘to’ layers the filters are copied. Specify their correspondence in the Attributes correspondence option; if correspondence is not specified, the fields will be compared by name.

- Set templates for data upload – this option allows generating report by objects from layer of map service during work with map. To do so, check this option and enter the layer number. The report is generated by predefined template as XLSX file. Select the report template from the drop down list. The reports templates list is available if you have done all the preparation steps described in section 4.7. The option is applicable if for CoGIS SOE for map service the data upload is allowed and in rules for Server Object Extension the map service data upload is specified. CoGIS SOE description is provided in section 0. As the result, on map in Attribute table in menu of specified layer the sub menu Report generation will appear.
- Hide time for date-time fields – this option is applicable for attribute fields of the date-time type. In order to the rounded date could be displayed instead of date-time values, check this option and press ⊕. Enter the number of layers. Enter the attribute fields names. The rounded date is the date moved to the nearest one on the principle that if it is the past noon time, then the rounded date will be the next date, whereas if it is the before noon time, the rounded date will be the current date. For example, the object in attribute field has value 30.03.2019 17:45:57, after using this option the object will change its value to 31.03.2019. The object with value 28.03.2019 09:23:54 will take the value of the current date 28.03.2019.
- If rounding to the nearest date is not needed, but you need to show date without time, select Show date without time option.
- Set layers database type – use this option when the type of the database od the map service differ from the database type specified in Global settings. Without this option, some requests to map service may work incorrectly.

4.2.2.3. Map tab

The Map tab contains options provided to specify how to use and display map service layers on map. See Map tab on Figure 30.

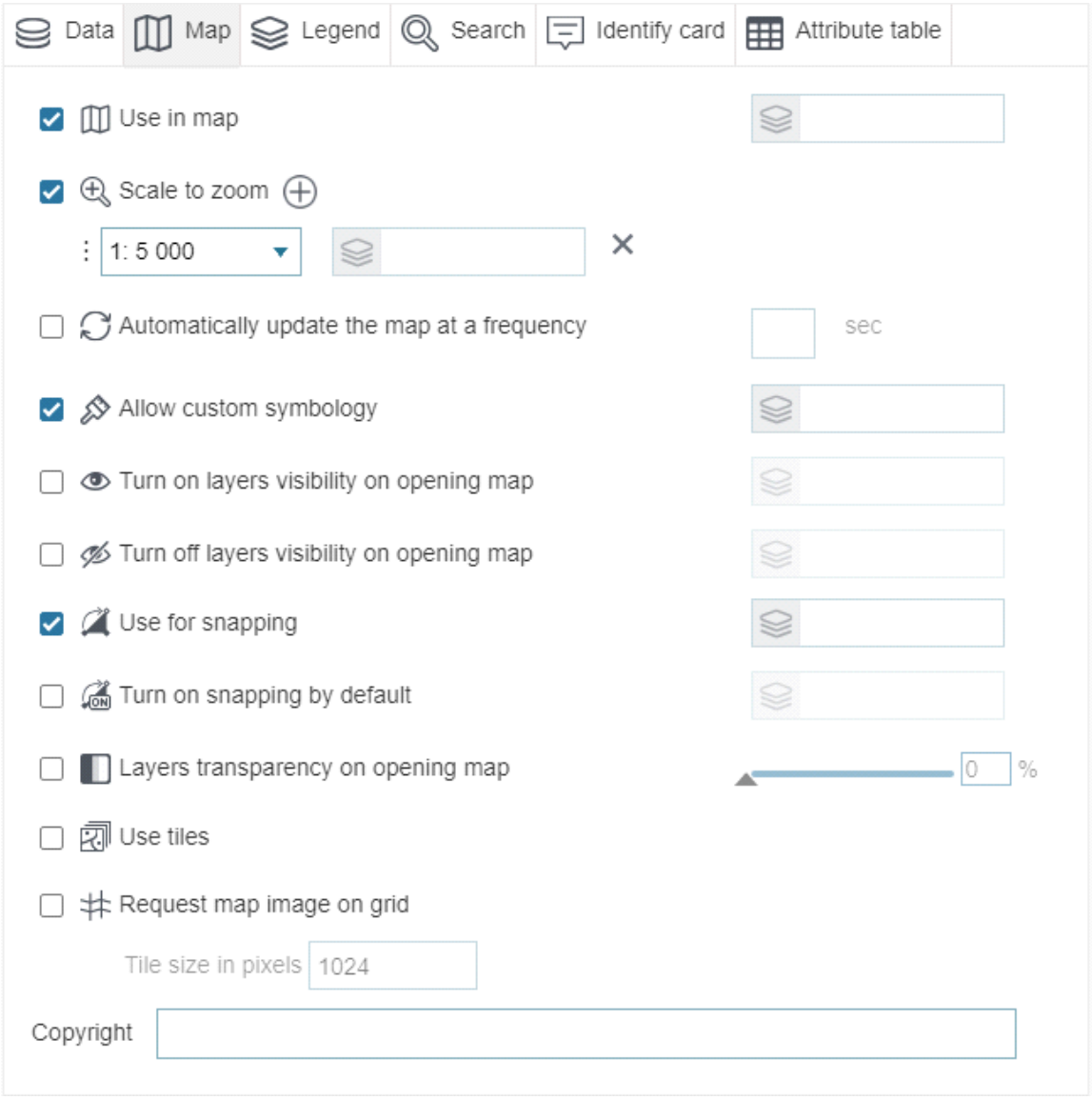


Figure 30 – Map tab view

- *Use in map* – the option is enabled by default, that is, all layers of map service will be added to map. If you need to add specific layers or group layer to map, enter their numbers in .
- *Scale to zoom* – the option is provided to specify scale of zooming to objects from *Identify card* and *Attribute table*. Check this option and specify different scale to zooming to objects from different layers, pressing and entering layer number.
- *Automatically update the map at a frequency* – with this option you can set period in seconds after that data of map service added to your map will be automatically updated.
- *Allow custom symbology* – if this option is enabled, the users will be able to change symbology of map service layers added to map. To allow changing layers symbology, enter their numbers in . Changing layer symbology on map is available in layer menu in *Legend*. Note that such layers will not be saved.

- *Turn on layers visibility on opening map* – this option is provided to manage layers visibility set during publishing of map service. To specify which layers will be visible when opening map, check the option and enter numbers of layers.
- *Turn off layers visibility on opening map* – this option is provided to manage layers visibility set during publishing of map service. To specify which layers will not be visible when opening map, check the option and enter numbers of layers. If you make appropriate settings in *Legend*, the users will be able to change layer visibility on map.
- *Use for snapping* – check this option if you want that snapping operation could be used when editing objects. To apply this setting to specific layers, enter their numbers.
- *Turn on snapping by default* – check this option if you want that snapping operation could be used by default when editing objects. To apply this setting to specific layers, enter their numbers.
- *Layers transparency on opening map* – check this option to specify layers transparency. If you allowed users to change layers symbology, they would also be able to change layers visibility as well.
- *Set image format* – this option allows you to redefine the format of the requested image to reduce its size and speed up the display of the map, which is especially relevant for displaying rasters.
- *Use tiles* – check this option if you want to use tiles.
- *Request map display using tiles* – the option is provided to request dynamic map service by tiles, with further caching.
- *Copyright* – the option allows adding the copyright sign to map.

4.2.2.4. Legend tab

The view of *Legend* tab and its settings is shown on Figure 31.

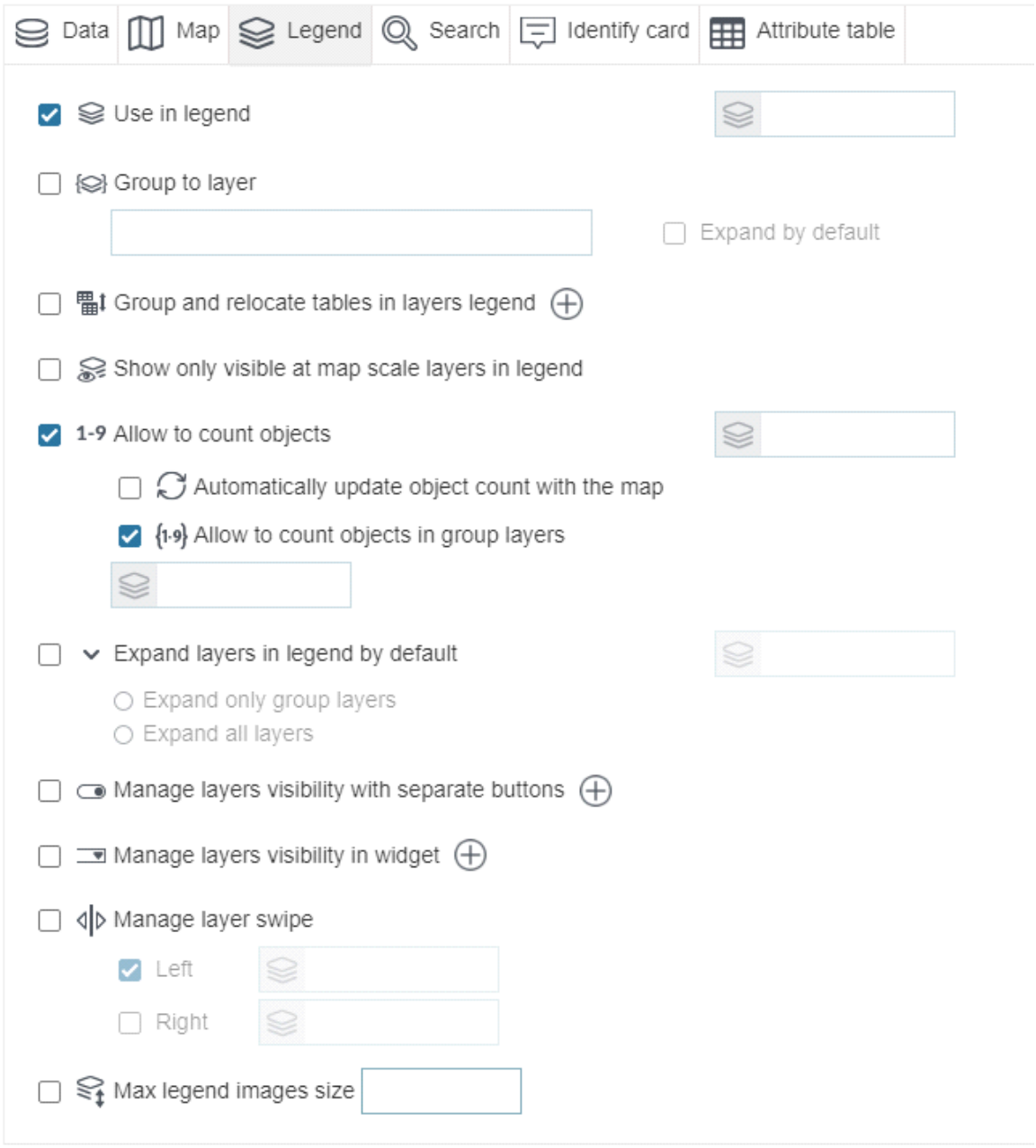


Figure 31 – Legend tab settings

- Use in legend – this option is enabled by default, that is, all map service layers will be displayed in *Legend*. The Legend will be available on map with appropriate settings only. To display only specific layers in Legend, enter their numbers in .
- *Group to layer* – for your convenience, layers of one service or from different services can be grouped to the group layer. Repeat this for all services, which layers need to be grouped.
- *Group and relocate tables in layers legend* – in Legend you can display tables of map service, preliminary grouping them and specifying their location. To do so, check this option, specify layer number of the table, group name, number of layer used to specify output location, see Figure 32.

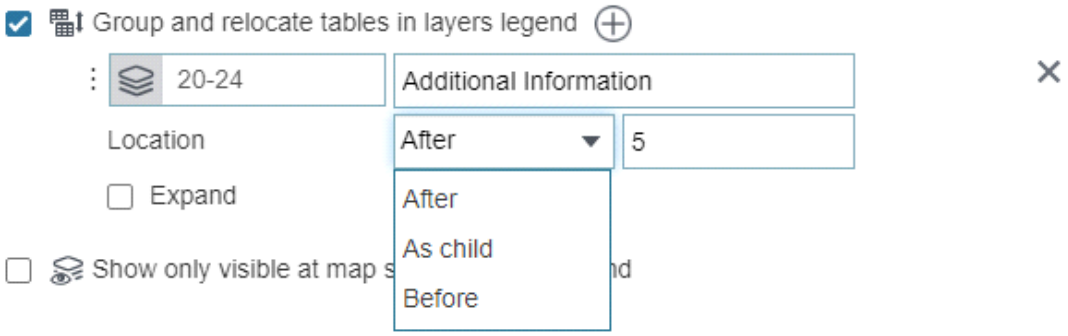


Figure 32 – Grouping and relocating table in layers legend

- *Show only visible at map scale layers in legend* – the option is provided to define default display settings for hidden service layers in legend.
- 1-9 *Allow to count objects* – check this option if you want that number of objects in each layer is displayed in Legend on map . The option is applicable if objects count is allowed for CoGIS SOE and in rules for Server Object Extension the objects number count is specified. See section 4.2.9.6 to learn how to allow objects count in CoGIS SOE settings. If you want that number of object is displayed for specific layers, enter their numbers in .

  The *Automatically update object count with the map* option is recommended to be used only if data are constantly updated independently from the user's activity, and it is important to display the current number of objects. If your data is not changed very often, this option is not recommended to be used to decrease number of requests. In case of editing data by user, the number of objects is updated without using this option.
- *Expand layers by default* – check this option if you want that all layers in legend are expanded by default, selecting the preferred unfolding variant. If you need to expand specific layers in legend, enter their numbers in .
- *Manage layers visibility with separate buttons* – you can manage visibility of layers on map not only in *Legend*, but also via separate buttons. To do so, check this option, press and specify settings shown on Figure 33.

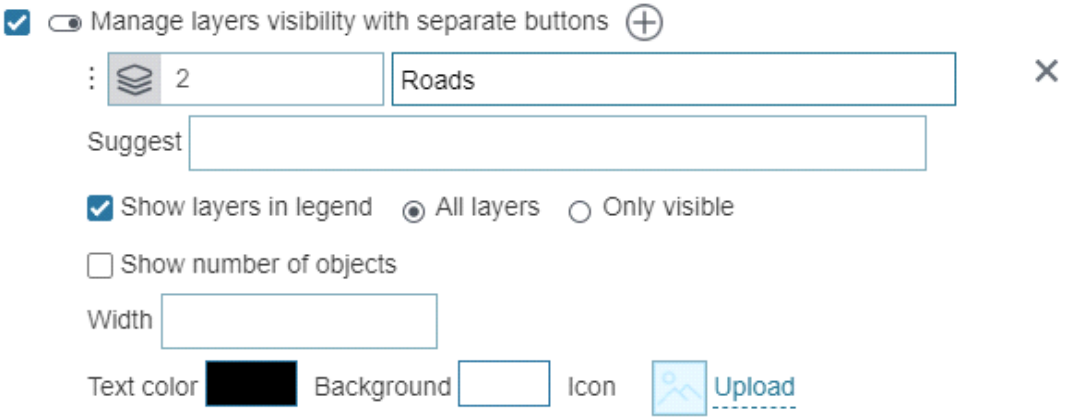


Figure 33 – Managing layers visibility via separate buttons

Specify numbers of layers or group layers which visibility will be managed via separate button. Enter the button name and the pop-up tip text. Specify whether you need to show layers in *Legend*. If the *Show number of objects* option is enabled, the number of objects in layer will be displayed on the button. The *Show number of objects* option will be applied if objects count is allowed for CoGIS SOE and in rules for Server Object Extension the objects number count is specified.
If you created multiple buttons to manage layers visibility, set their sizes. If button size is not specified, the button width will be selected automatically. Select button color, background and download icon. If after all these settings your buttons are not shown on map , make sure that in the *Buttons location on map* tab the option *Locate buttons by default* is enabled. Otherwise, add button *Layers*.

- *Manage layers visibility in widget* – you can manage visibility of layers on map via widget, i.e. in a separate window. To do so, enable this option, press and specify settings as shown on Figure 34.

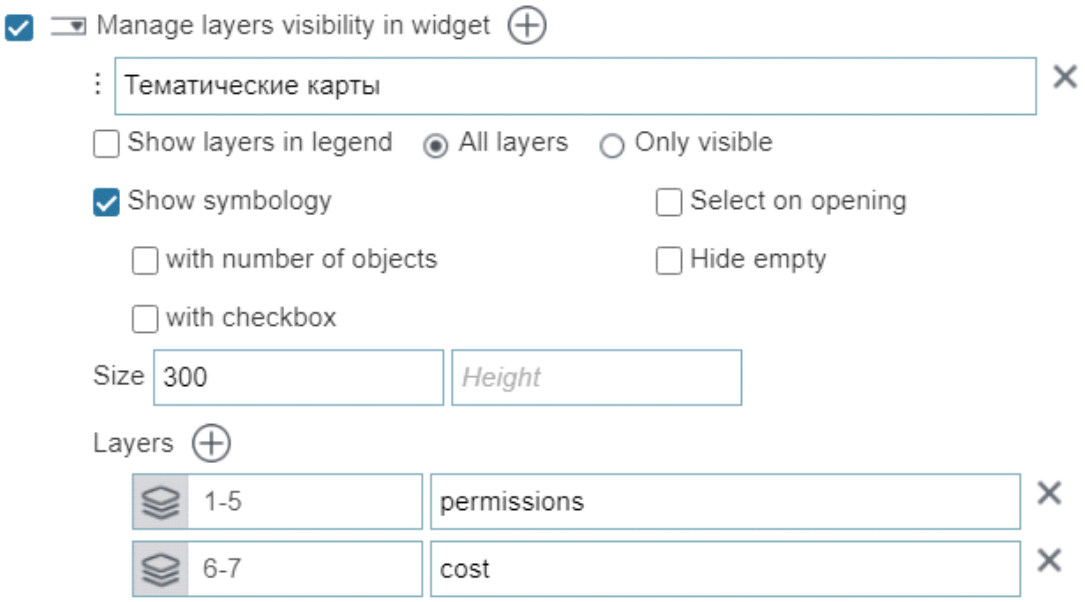


Figure 34 – Managing layers visibility in widget

Enter the widget name. In order to display layers in Legend, check *Show layers in legend* option. Specify layers which visibility will be managed in widget, enter their names and numbers in .
The following options are provided for widget:

- If you need that when selecting layers, the map zoomed to layers taking into account the scale of their visibility, check *Zoom to layers when selected;*
- if the map contains different datasets, so that the map zooms to the layers upon click, and not when selecting layers, check *Zoom to layers by link* option*;*
- if the first layer specified was the title of the drop-down list of layers, check *Select on open*. By default, *Select layers* is the title of the drop-down list of layers in the widget;
- if you need that the drop-down list of layers did not contain empty line *Select layers*, check *Hide empty variant* option*;*

- if you need that symbology was displayed, check *Show symbology;*
- if you need that the number of objects in the layer was displayed, check *with the number of objects*;
- if you need that there was a layer visibility switch, check *with visibility on-off.*

Specify widget size. If after all these settings your buttons are not shown on map , make sure that in the *Buttons location on map* tab the option *Locate buttons by default* is enabled. Otherwise, add button *Widgets*.

- *Manage layer swipe* – the option determines which layers will be displayed by default on the Left and which will be displayed on the Right when the Swipe tool is activated. It also determines whether the user can change the display of layers in the Swipe mode or not; this setting is specified for the entire map on the *Tools and map settings* tab.
  By default the Swipe button is not shon on map, you can add it manually on the Tools location on page tab, enabling the *Allow user to change Swipe settings* option.
- *Max legend images size* – the option allows you to limit the symbol size in case when it is needed to display big symbols on map.
- *Use in print* – the option determines which layers should be in the printed legend. If no layer is specified and the option is enambled, then all layers from the legend will be printed. If the user turned off some layer, this layer would not get to the printed form of the legend.

4.2.2.5. Search tab

The *Search* tab is provided to specify settings and rules of using quick and full search, as well as settings of search results display on map . The *Search* tab is shown on Figure 35.

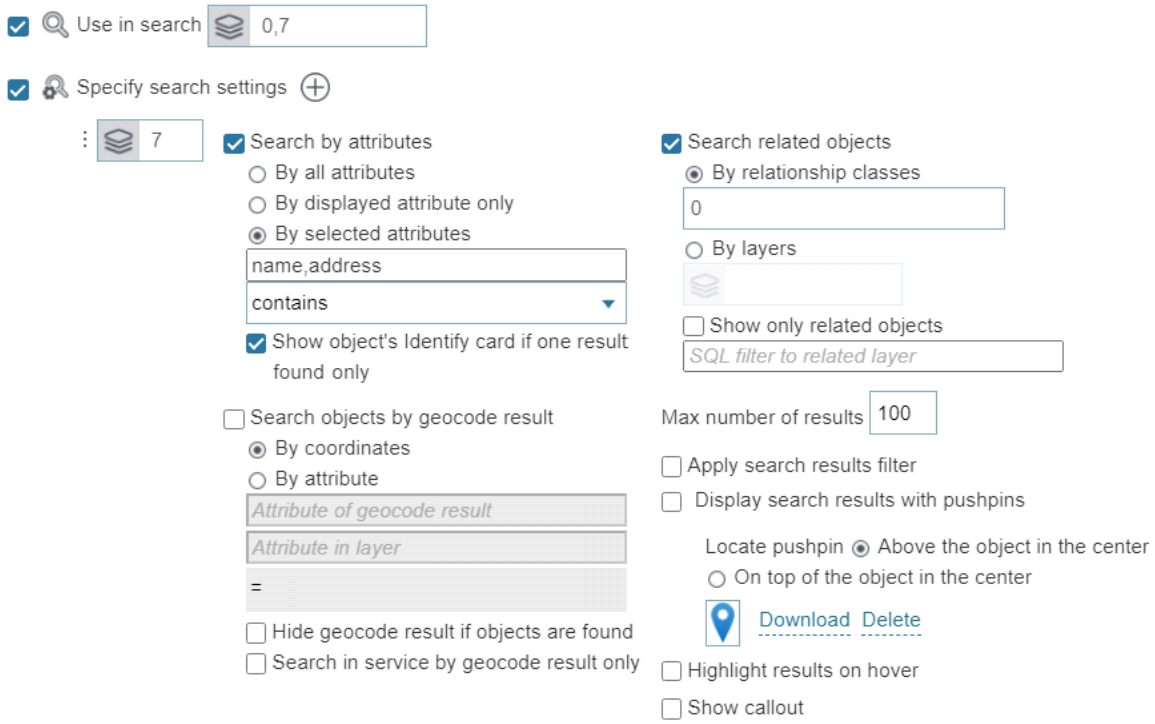


Figure 35 – Search tab settings

- *Use in search* – the option is enabled by default, that is, search will be done by all map service layers added to map . If you need to search by specific layers, enter their numbers in field .
- *Specify search settings* – you can specify different search rules for different layers. To do so, check this option, press , enter layers numbers in separated by comma.
    - *Search by attributes* – the search can be done by all values of attribute field, by specified value of attribute field, or by values of displayed attribute field only. The *By displayed attribute only* option will be active, if DisplayField field is set in layer properties of ArcMap document before publishing of map service. In case of single search result, the appropriate Identify card can be opened automatically. To do so, check *Show object's Identify card if one result found only*.
    - *Search objects by geocode result* – this option can be used if connection to geocoding service is established. The option allows searching layer objects by freely written address. After the address is found in geocode service, the search of object either by coordinates or by geocoder attribute is done. If you choose *By attribute*, specify *Attribute of geocode result* and *Attribute in layer*. If you need that only found objects are displayed in search results, check '*Hide geocode results*' option. If you check *Hide geocode result if objects are found* option, the search settings will be ignored, i.e. *Search by attributes* option and specified settings will not be used.
    - *Search related objects* – with this option, search of all related objects will be done by relationship classes or number of related layer. If *Show only related objects* option is not enabled, the search result will display not only related objects, but also initially found objects.
    - *Max number of results* – enter the maximum number of objects you want to see in the search result.
    - *Apply search results filter* – if this option is checked, only those objects answering search request will be shown on map upon search completion.
    - *Display search results with pushpins* – found objects will be marked with pushpins on map . Select how you want to locate pushpins, either *Above the object in the center* or *On top of the object in the center*. You can also download new icon for pushpin.
    - *Highlight results on hover* – with this option enabled, the found object selected in search result will be highlighted on map .
    - *Show callout* – upon search completion, found results will be shown on map . If you select the found object in search result window, you will be zoomed to this object on the map and its card will be opened. If you want to show objects Identify instead, check this option.

4.2.2.6. Identify card tab

This tab is provided for setting object's Identify card. The 'Identify card' tab is shown on Figure 36.

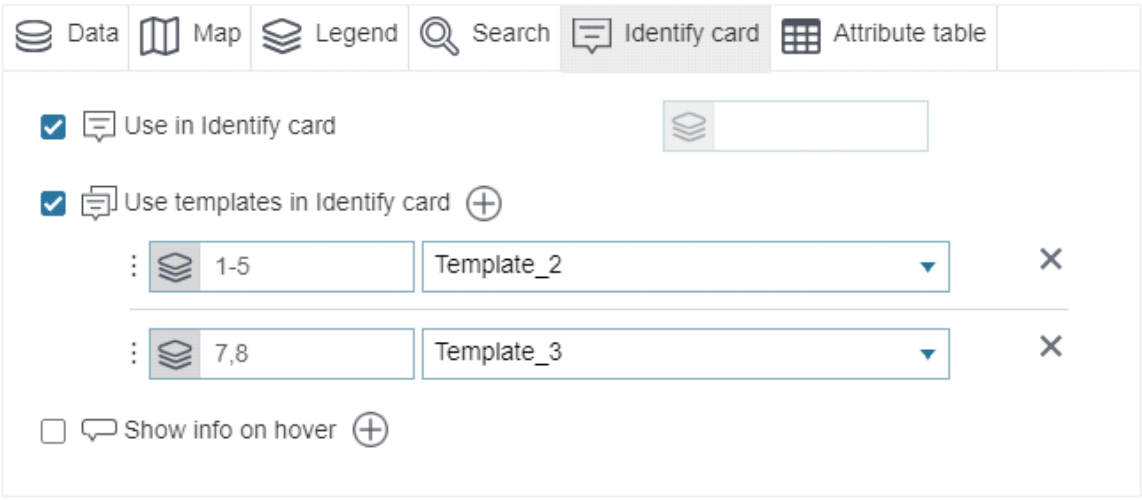


Figure 36 – Identify card settings

- *Use in Identify card* – option is active by default, i.e. for objects from map service layers the Identify cards will be displayed. If you want to display Identify cards for objects from specific layers only, enter layers or group layers numbers in .
- *Use templates in Identify card* – to use templates for Identify card, you need to create these templates first, which is done in *Identify card templates* tab described in section 4.3. Check this option, enter number of layers and select the created template from the list. Note that for different layers different Identify card templates can be used. If you need that Identify cards for objects of specific layers are not displayed on map , enter the layers numbers and select *do not show* option from the drop down list of templates.
- *Show info on hover* – this option allows displaying the pop up tip with attribute value on hover over the object. Check this option, press and enter field name in square brackets, for example, [Name]. Specify tip size and background. For different layers different tips can be specified.

4.2.2.7. Attribute table tab

Information about objects of map service layer added to the map is shown as the Attribute table. Each record of the attribute table is the object, the column titles are aliases of attribute fields, and the column values are objects values in the attribute field.

The Attribute table tab is provided for managing display of information about objects of map service layers and entering additional information to printed form of the attribute table. That is, here you will be able to specify information of objects of which map service layers should be displayed in the Attribute table and whether all values of attribute fields should be displayed. Besides, here you can also set calculation of statistics by objects of map service layer, which result should be displayed in the printed form of the Attribute table. The *Attribute table* tab view is shown on Figure 37.

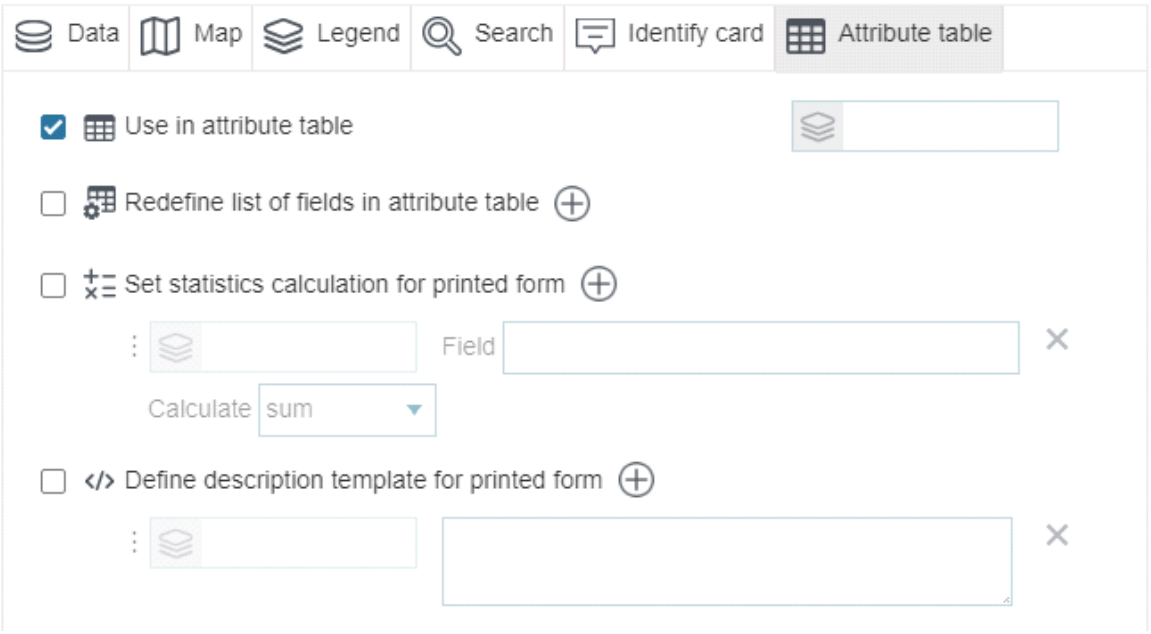


Figure 37 – Attribute table tab

Press Open Attribute table button located in the lower part of the map . To close the table, press this button again. The example of the Attribute table view is shown on Figure 38.

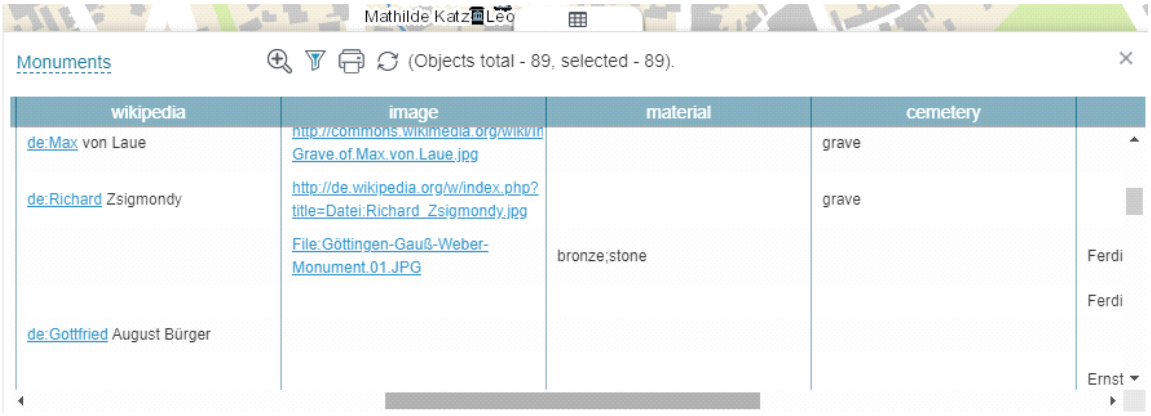


Figure 38 – Attribute table

The layer is selected by pressing the button in the upper left corner of the table, the button text is the same as the layer name. By default the first layer in the map service is displayed the first in the list.

In Attribute table the information about objects of all map service layer will be shown, as the *Use in attribute table* option is enabled by default. If you want to display attribute field values of objects from specific layers, enter numbers of layers or group layers in .

You can specify which columns will contain the Attribute table, to do so, check *Redefine list of fields in attribute table*, press *Add*, specify number of map service layer in *Layers* and in *Fields* enter names of attribute fields as specified in map service. The order of entering names of attribute fields will be considered for order of columns in Attribute table, if you check the *Consider specified fields order* option. If you need to exclude the field from the Attribute table, enter the appropriate attribute field name and check *All, except listed* option, see Figure 39.

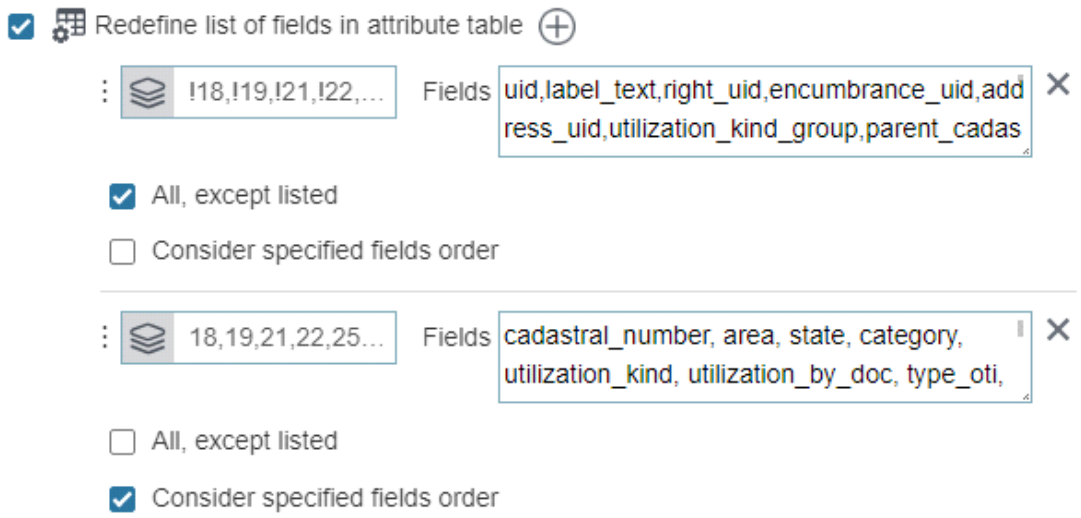


Figure 39 – Redefining list of fields in attribute table

Note that the attribute field *ObjectID* is hidden and not displayed in the Attribute table.

To share information from the Attribute table, for example, for report purpose, the printed form of the attribute table is provided. The Printed form settings window is opened by pressing button located above the table, see Figure 40.

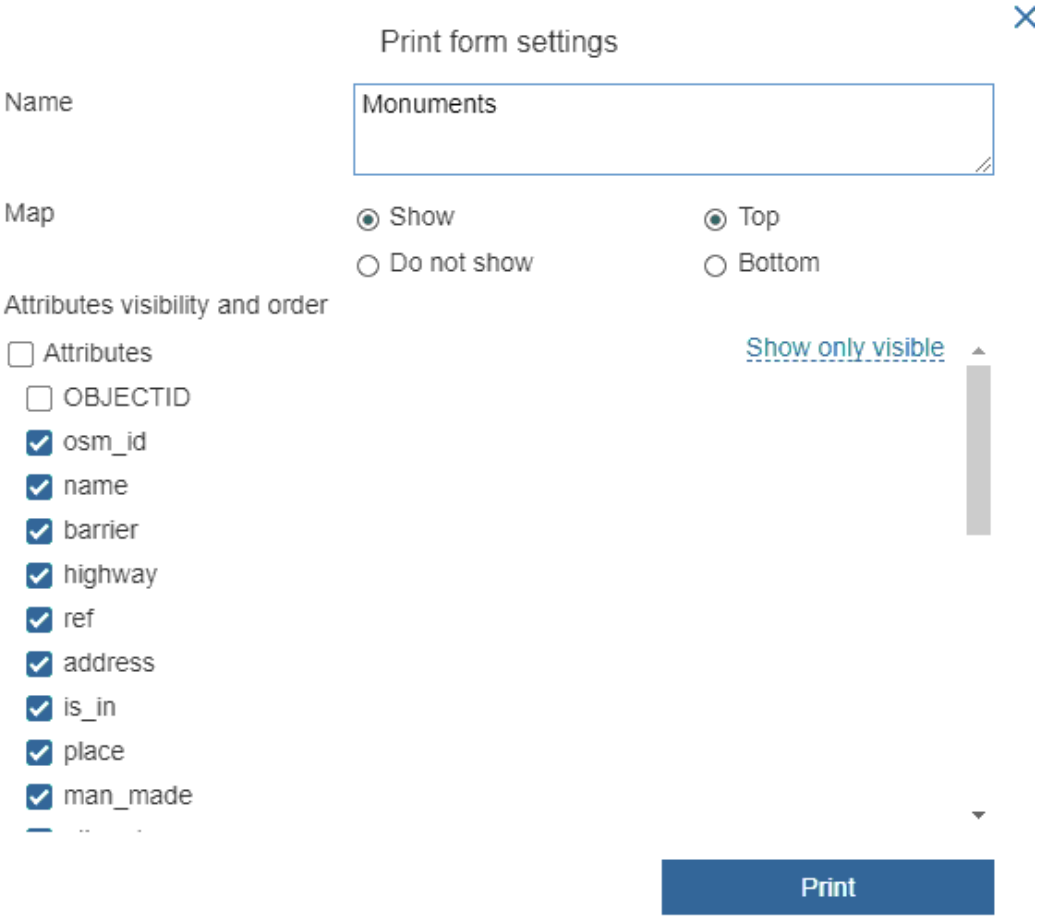


Figure 40 – Printed form settings

Specify settings of the printed form and press *Print* button to open the printed form of Attribute table with your settings.

For fields of date-time and numeric formats the statistical characteristics can be calculated. By values of attribute field of numeric format you can calculate minimum, maximum, average value, sum, and quantity. The result will be shown in the printed form in column with name of the appropriate attribute field. By values of attribute field of date-time format you can calculate minimum and maximum values. To do so, check *Set statistics calculation for printed form*, shown on Figure 41, and press *Add*.

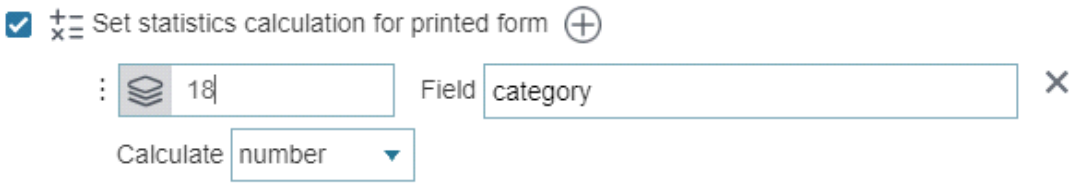


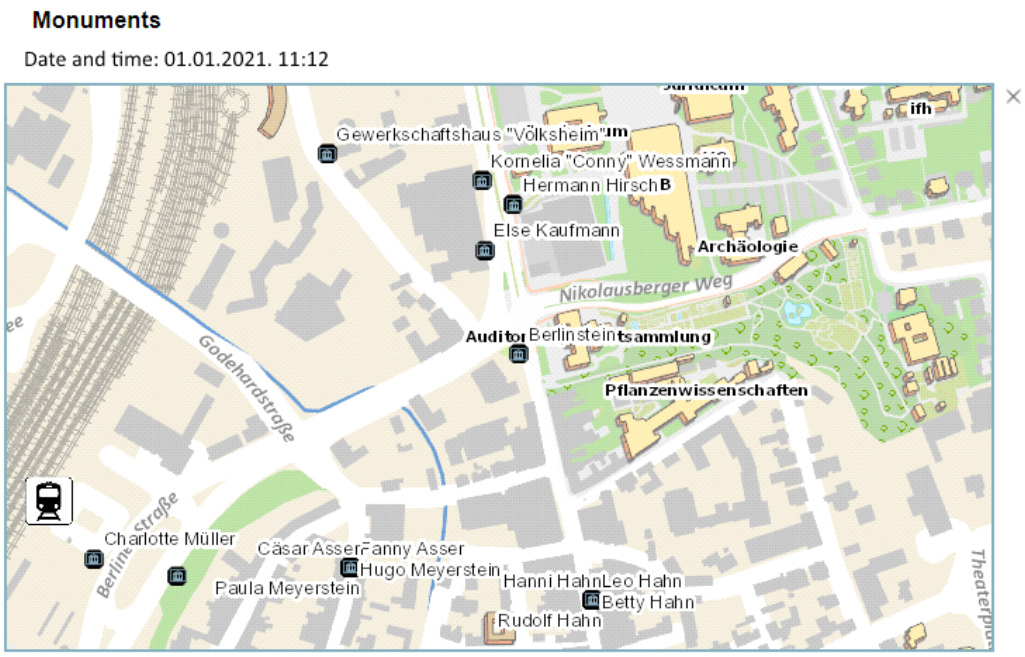
Figure 41 – Set statistics calculation for printed form

Enter the number of map service layer in *Layers*, name of attribute field by which statistics will be calculated, and in *Field* in the drop down list *Calculate* select the type of statistical characteristic. Save made settings and go to map . Open *Attribute table,* specify the needed layer, and go to printed form of Attribute table. The result will be shown in the printed form in column with name of the appropriate attribute field.

If you need to set description for the printed form of Attribute table, check *Define description template for printed form*, press *Add*. Specify layer number in *Layers* and create description template using HTML code or macros:

- `<div>количество {count} </div>`, number of uploaded objects
- `<div>карта {map} </div>`, name of current map
- `<div>слой {layer} </div>`, name of current layer
- `<div>дата {date}</div>`, date of uploading printed form of Attribute table
- `<div>дата и время {datetime}</div>`, date-time of uploading printed form of Attribute table.

Description will be shown in the printed form as a subtitle, see Figure 42.



osm_id	name	barrier	highway	ref	address	is_in	place	man_made	other_tags
268402471	Portal des ehemaligen Universitätsreitstalls								"historic"=>"memorial","start_ 75)","wheelchair"=>"yes","wil
317293810	Max Born								"cemetery"=>"grave","histori Grave.of.Max.Born.jpg","wiki

Figure 42 – Description of printed form of Attribute table

If you need to set sorting in attribute table, check *Default sorting* option and press *Add*, specify the layer and field by which the sorting will be done by default, and specify the sorting direction (ascending or descending).

4.2.3. Image service

4.2.3.1. Image service. General information.

To display image service data on map , establish connection to service. Enter the service address to 'url' field. To go to image service page, press . To rename service, press . The options provided for managing image service settings are shown on Figure 43.

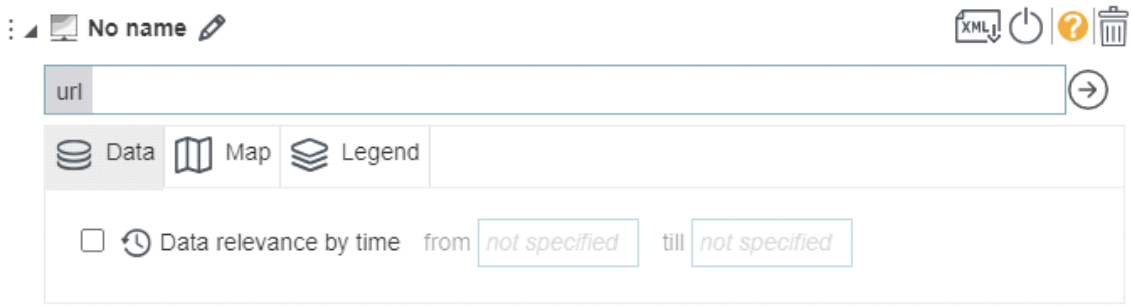


Figure 43 – Image service settings

The following tabs are available for managing image service settings:

- Data;
- Map;

- Legend.

4.2.3.2. Data tab

The *Data relevance by time* option allows setting relevance date for service. In case of using time scale, data of such service will be displayed on map based on relevance settings. Enable the option and select the date.

4.2.3.3. Map tab

The *Map* tab contains settings used to manage display of image service data on map . The tab settings are shown on Figure 44.

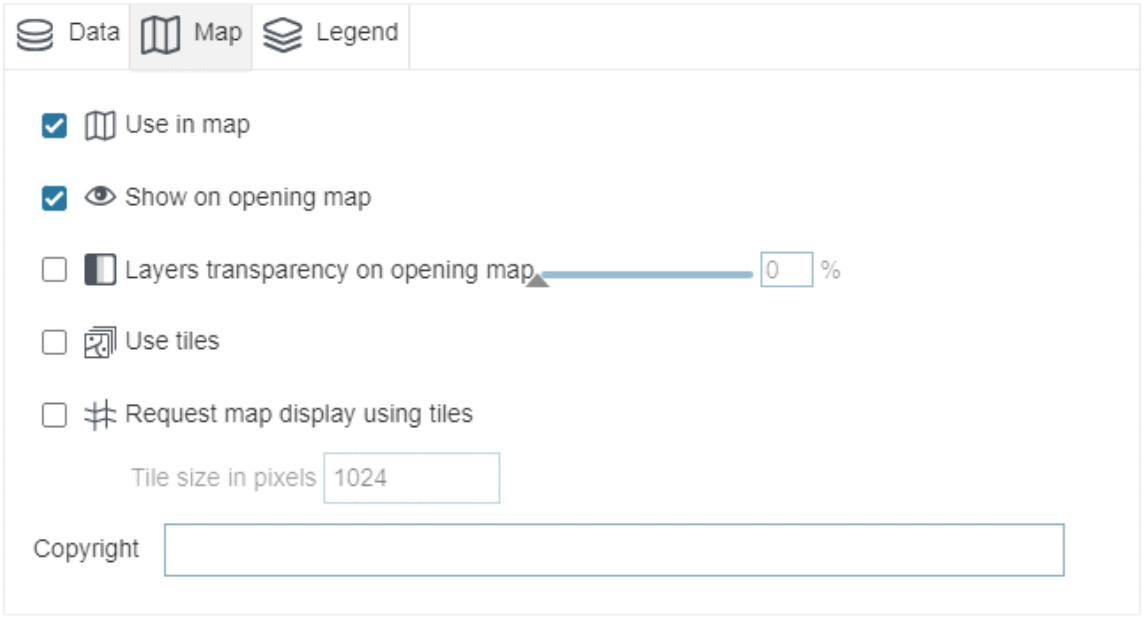


Figure 44 – Setting data display on map

- *Use in map* - the option is enabled by default, i.e. all data of image service will be added to map .
- *Show on opening map* – the option allows displaying data of image service by opening map .
- *Layers transparency on opening map* – check this option and specify transparency of layers, so that the users will be able to change transparency properties of layers on map .
- *Use tiles* - check this option to be able to use tiles.
- *Request map display using tiles* – check this option to request the map display by grid and specify the grid size.
  Copyright – allows you to add the copyright sign to the map.
  Mosaic rules – allows you to specify the mosaic rules, for example:
  {"ascending":true,"mosaicMethod":"esriMosaicAttribute","mosaicOperation":"MT_FIRST","sortField":"Best","sortValue":"0","where":"Dataset_ID = 'MODIS_Terra_CorrectedReflectance_TrueColor'"}

4.2.3.4. Legend tab

The legend settings are specified in this tab. See Figure 45 for details.

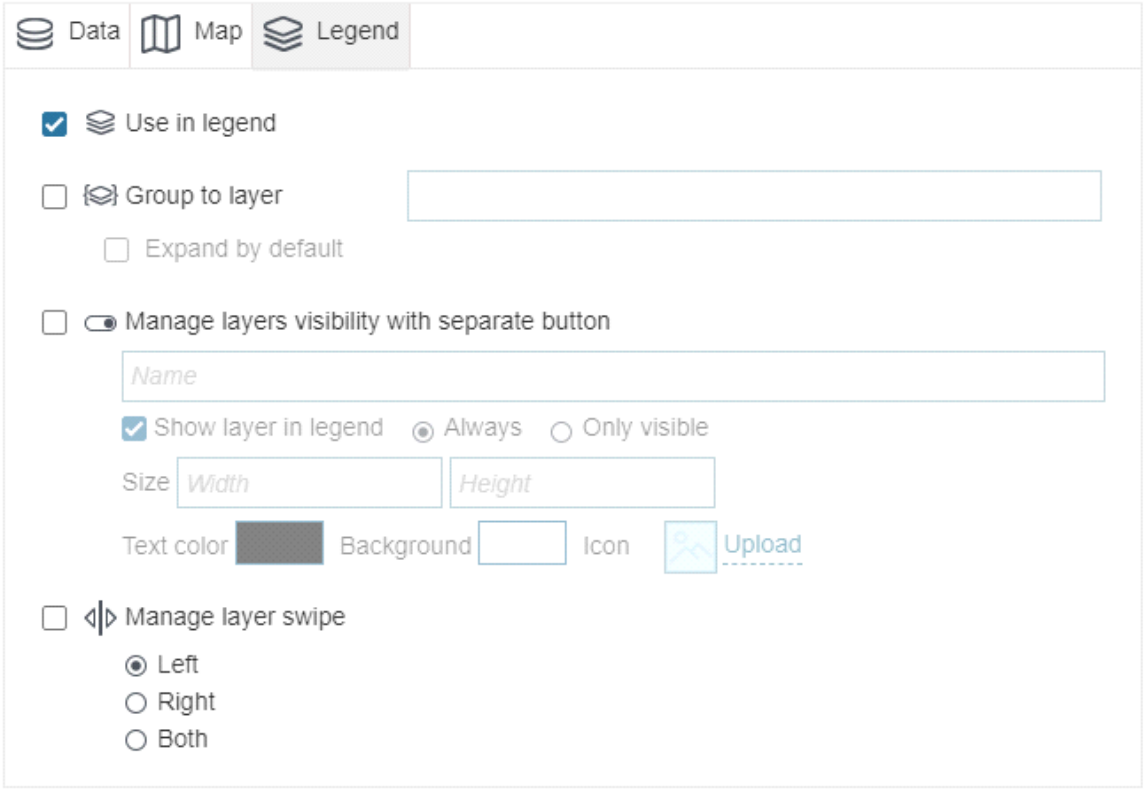


Figure 45 – Legend settings

- *Use in legend* - this option is enabled by default, that is, all image service layers added to map will be displayed in *Legend*. The Legend will be available on map with appropriate settings only.
- *Group to layer* – for your convenience, layers of one service or from different services can be grouped to the group layer. Repeat this for all services, which layers need to be grouped.
- *Manage layers visibility by separated buttons* – you can manage visibility of layers on map not only in Legend, but also via separate buttons. To do so, check this option, press and specify settings shown on figure above. Enter the button name. Specify whether you need to show layers in Legend. Select button color, background and download icon. If after all these settings your buttons are not shown on map , make sure that in the *Buttons location on map* tab the option *Locate buttons by default* is enabled. Otherwise, add *Layers* button.

4.2.4. Geoprocessing service

4.2.4.1. Geoprocessing service. General information.

Geoprocessing services are provided to represent geoprocessing and spatial data analysis tools in internet. Geoprocessing services allow extending functionality of map s without access to source codes of CoGIS. To be able to use your tool, in *Services* tab add *Geoprocessing service* and enter the geoprocessing service address in *url* field. For convenient work with geoprocessing

service and getting representative results, make settings in *Input parameters* and *Output parameters* fields.

Geoprocessing services contain geoprocessing tasks. As input data, geoprocessing task uses data from map, files, custom values or data obtained directly from geodatabase, and then processes this data and returns objects, reports and files as output. Enter the name of geoprocessing service task supposed to be run. Information about geoprocessing service tasks locates on its page, to go to service page, press  .

If during work the geoprocessing service shows messages, then if the option *Show messages during execution* is, the user will see these messages, which is important for geoprocessing, as some tasks are executed quite long.

Specify geoprocessing service description and description for the list, so that the user could understand functionality of this geoprocessing service.

Enter the text that will be shown on hover over the geoprocessing tool button. Download button icon. Go to *Buttons location on map* and define your button location.

If your tool will be run from JavaScript code entered in widget blocks, hide the tool button, pressing *Hide from user*  .

Based on geoprocessing service parameters, CoGIS dynamically creates user interface for geoprocessing tool. Depending on settings, input and output tool parameters can be displayed as following:

- when entering source data CoGIS will adjust interface according to set tasks and overall convenience of data input ;
- the geoprocessing result is shown in an easy-to-use form for the current task and further work with this data;
- with hidden input parameters, for example, where constants are used;
- without part of results that are not needed to user for work with map to solve current tasks.

Input parameters can be displayed for users as:

- simple value, either numeric or string, entered by user;
- selection of one or multiple values from predefined list;
- selection of one or multiple values from attribute domain of specific service layer;
- selection of one or multiple values from attributes of service layer;
- selection of one or multiple values as objects (geometry, attributes) from service layer;
- selection of one or multiple values as objects (geometry, attributes) from map;
- file download – the user can either drag and drop the file to the geoprocessing service window or download it manually pressing the button;
- installation of values by default;
- checkbox for logical operator *Yes/No*;
- dates, with selection of date and time from calendar;

Output parameters can be displayed for users as:

- vector layer on map with graphics and attributes. The layer is created based on spatial objects obtained from the result of geoprocessing. The following options are available for the layer:
    - identifying objects on map ;
    - printing;
    - viewing *Attribute table*;
    - custom symbology;
    - managing visibility of layers on map .
- raster layer on map . The layer is created based on raster surface obtained from the result of geoprocessing. To add raster to map , enable *Result as map service* option in geoprocessing service.
- filtering in service layers by results of geoprocessing tool. This option allows getting objects IDs obtained in the result of geoprocessing, and applying filters to map layer with these IDs. This allows seeing result of tool work on map and use map functionality that is not available for graphic layers for further work with geoprocessing results.
- creating new objects in the existing layer. Objects, their geometry and values obtained in the result of geoprocessing tool work, can be recorded to map layer.
- file;
- simple value.

4.2.4.2. Setting input data. Input parameters.

To improve work with geoprocessing tool for user, specify settings for input parameters and forms of entering these parameters. On the geoprocessing service page, input parameters are defined by attribute field Direction.

To set input parameters, the following needs to be done:

- Specify input parameter name as specified in geoprocessing service in attribute field Parameter.
- Enter parameter name and description that will be displayed on map for user.
- Set parameter type, i.e. the way it will be shown for user:
    - *As specified in service* – this parameter is automatically recognized and CoGIS provides required interface element for entering this parameter by user.
    - *SQL Expression field* – this parameter builds string for SQL request, for setting of which select the value type from the drop-down list, enter attribute field name, select comparison operator from the drop-down list and set default value. For proper work of this setting it is required that set input parameter is of String or Expression type. The information is available on geoprocessing service page, press ⊕ to go there. This parameter type is the definition query that filters objects of service layer for further transfer of dataset used for work of geoprocessing tool.
    - *Objects from map* – this parameter type adds to map tools for selecting objects from map – by point, by polyline, by free hand polyline, by polygon, by free hand polygon, that are further transferred to algorithm of geoprocessing tool. For proper work of this setting it is required that set input parameter is defined as set of layer objects GPFeatureRecordSetLayer. The information is

available on geoprocessing service page, press to go there. In settings for this parameter specify the service and numbers of layers that will be available for selection. Check the *Allow adding graphic objects* and *Allow drawing graphic objects* options, so that you would be able to select graphic objects.

- *Definition query of layer* – This parameter allows getting user's definition query from map. This parameter can be hidden, as selection of SQL condition is done by user's filters on map. For proper work of this setting it is required that set input parameter is of String or Expression type. The information is available on geoprocessing service page, press to go there. In settings for this parameter specify link to service and number of service added to map, from which you need to get definition query for further transfer of this parameter to algorithm of geoprocessing tool.

- If needed, specify value that will be used by default and shown in the interface element on its starting.
- Specify reference of values, if input parameter is the list or if the value needs to be selected from the list of predefined values. This setting allows creating list for selection of values of this parameter during work with the tool.
  The list can be specified as following:
  - *Manually* – to do so, select *List*. Administrator manually creates list of predefined values, defining parameter value and its caption that will be displayed to user. For example: <0 = C; 45 = CB; 90 = B> – cardinal directions and degrees.
  - *From layer attribute* – the list of attribute fields of service layer added to map . Specify list of attribute fields of service layer added to map . Enter map service address and layer number in . Enter attribute field. Specify attribute field for sorting, enter its name to *Sorting* field and select required variant from the drop down list.
  - *Objects from layer/table* – the list of service layer objects. The list shows objects values that they take in the displayed attribute field. The displayed attribute field is the attribute field of the layer, for which the Display Field property has been set during publishing of map service. The objects' list contains geometry and description, that need to be transferred to geoprocessing tool. Enter map service address and layer number in .
  - *From domain* – the list built based on attribute domain of service layer. Enter map service address and layer number in . Enter name of attribute field that uses attribute domain.
- Set visibility of parameters on map for users, in case if parameters use constants and they are not supposed to be changed by users.

4.2.4.3. Setting results. Output parameters.

For more effective analysis of geoprocessing results and further work with them, you need to define how they should be displayed for users.

Since there can be multiple results from work of one geoprocessing tool, each output parameter should be set. Output parameters defined by attribute field Direction can be viewed on the geoprocessing service page. To go there, press ⊕.

For setting output parameters the following needs to be done:

- Specify output parameter name as it is specified in geoprocessing service in attribute field `Parameter`.
- Specify parameter caption that will be displayed in the *Results* window on map . For example, if geoprocessing result is the new layer on map , the caption will define name of the new graphic layer with results.
- Define parameter type, i.e. how the geoprocessing result will be shown for users. According to selected result display type, for more detailed description the additional options should be activated in settings. The following parameters types are available in settings:
    - *As specified in service* – is recognized automatically and CoGIS outputs result according to type defined in service by default.
    - *Calculated value* – defines result as simple value that is shown for users in *Results* window on map .
    - *File* – defines, that result of work of geoprocessing service is the file that needs to be automatically downloaded and that user should be provided with download link shown in *Results* window on map .
    - *New layer on map* – is provided to display results of work of geoprocessing service as temporary graphic layer. The output layer is shown with symbology as specified in geoprocessing service by default or as you redefine it. To be able to set symbology of graphic layer by unique values or by range, geoprocessing service should be published with support of map service.
      To redefine layer symbology, check *Change symbology* option and select symbology type as following:
        - *Simple* – single symbol for all objects. Define symbol for point, polyline or polygon feature class.
        - *Range* – separates objects by attribute to specific values ranges according to number of classes, minimum and maximum value in attribute. In settings specify the field by which values for ranges should be defined, and number of intervals (classes) to which values should be separated.
        - *Unique* – defines symbols for objects by categories, selecting separate symbol for each group of objects with similar attributes. In settings of this option enter the field from which categories should be taken.

      In order to view or to hide objects description in the layer of geoprocessing service result, check or uncheck, respectively, *Use by identification* option, i.e. to view object's attributes in *Identify card*, or *Add to list of available attribute tables*, i.e. to view objects' values in *Attribute table* and to further work with them.
- *Filtering of existing layer* – redefines geoprocessing result as filter to the existing layer. If this result is set of objects based on one of the existing layers added to map, then parameter, after having obtained unique objects values, filters objects on map by these

values. In settings of this parameter type enter the service and number of layer, attribute in layer, comparison operator, attribute in results. For example, you can filter all objects in the layer, the value of attributes that will be less than the result of geoprocessing.

- *Edit objects in existing layer* – allows recording geoprocessing result to one of the map service layers. In settings of this parameter type enter the service and number of layer, to which results should be recorded. Specify the required action (adding, updating, deletion, changing geometry). Specify the attributes correspondence.
- *Zoom to extent* – the option allows you to zoom the map to the extent obtained after geoprocessing.

4.2.5. Print service

4.2.5.1. Print service. General information.

In order to print map , select *Print service* in the services list. Establish connection to service, entering printing service address to *url* field, set page format and orientation, and select text field of printed map .

You can establish connection to:

- standard print service published on GIS server by default;
- specifically prepared service.

Print service is one of the geoprocessing service types, that can contain multiple tasks. To refine the needed task, specify its name in the *Task* field.

While preparing map for printing, the visibility settings and user graphics are considered.

4.2.5.2. Printing

The *Use in printing* option is enabled by default. To allow user to add name, publisher, and copyright on printed map , check the box near *Allow to change* for fields *Print map name*, *Author* and *Copyright*, respectively.

You can add information that will be displayed by default. After made settings, by pressing on map the dialog *Printing* will appear, where specified text fields will be shown. Note that if *Allow to change* option is not checked, the text field will not be shown in *Printing* dialog.

4.2.5.3. Template for printed map

It is recommended to set template for printed map . The template for printed form of map is a set of parameters describing the output interactive map. The template contains page size, location of elements on the page, and location of text boxes.

To use the template, press and enter its name in the *Layout name* field. The templates names can be viewed on the Print service page.

If you established connection to the standard print service, in the *Map boundaries size* field specify the width and height values according to page orientation parameters, see Table 1.

Table 1 – Map boundaries size

Format	Orientation	width and height (cm)
A3	Portrait	27,6756 x 29,0002

Format	Orientation	width and height (cm)
A3	Landscape	39,998 x 21,1688
A4	Portrait	19,024 x 22,285
A4	Landscape	27,7564 x 15,918

If you established connection to specifically prepared service, in the *Map boundaries size* field enter printed map area sizes specified in map project of print service, as shown on Figure 46, for example.

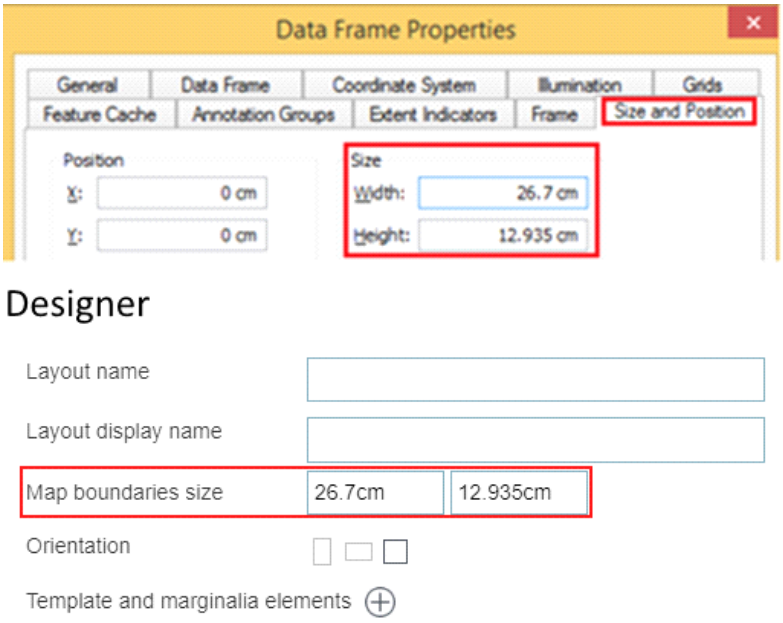


Figure 46 – Printed map size

All set printing templates will be available for users in the list of templates of Print map dialog, opened by pressing on map . The template name displayed in the list is specified in *Layout display name* field. You can also download picture that will be shown in the list.

Set page orientation – *portrait, landscape* or *not defined*. To allow users to select page orientation, use one template as many times as many orientations should be available for users. For each template enter the same name in the *Layout display name* field and specify page orientation. Then in Print map dialog the page orientation buttons will be available.

To display text box on printed map , add template element and marginalia representation, pressing . Text can be set as following:

- In map project of print service;
- In *Parameter value* field*;*
- In Print map dialog, if *Allow to change* option is enabled.

Figure 47 shows how you can set location of text box in the map project of print service.

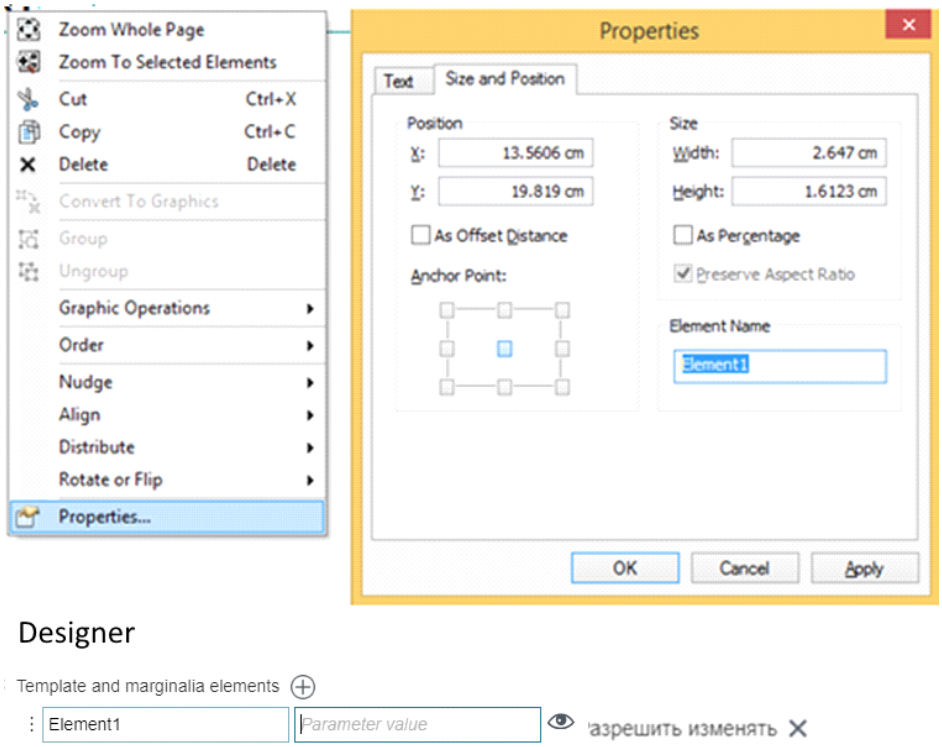


Figure 47 – Location of text box on printed map

You can set multiple template elements to provide users with selection option.

You can even not use templates. On map in Print map dialog there will be the list of print services. Note, that when using nonstandard formats, the printed map scale may differ from the expected result. The page orientation buttons will not be available.

4.2.5.4. Printed form of attribute table

While creating printed form of *Attribute table*, the user is provided with the following options – map will not be displayed on printed form or it will be displayed dynamically. In order that users could share printed form of map copying it without data loss, check the *Use in printed form of attribute table* option and specify size in pixels. In this case map will be displayed as static picture available for copying.

4.2.6. Geocode service

Geocode service gets address as input data and returns coordinates of requested location, and vice versa, returns address which is the nearest to input coordinates. Results of work of geocode service can be used by searching and identifying of objects, building optimal routes and service areas.

To establish connection to geocode service, enter its address to *url* field. To go to geocode service page, press . To rename service, press . For Here geocode service specify APP ID and APP CODE.

Search results are shown in *Results* window. You can set zooming scale to object found by address. To do so, select the required scale in the drop down list *Map scale when searching for address location*. Zooming to set scale is done by clicking on search result.

In the *Address search radius by reverse geocoding* specify radius from input coordinates, where geocode service will search for the nearest address.

If you want that geocode service could search coordinates by address in the input file, check *Use by downloading objects from file*. Upon completion of work of geocode service, the object with coordinates will be created.

Upon search completion, found objects can be marked on map . To do so, select *Display search results with pushpins* option and select position of pushpin – either *Above the object in the center* or *Above the object on the right*. You can download new pushpin icon, if needed.

You can specify working conditions of geocode service, namely, conditions for address search, for example, so that search by street name and building number is done in specific city. To do so, in *Filter for searching address* field press, enter *Parameter name* and needed value in *Parameter value*, for example, as shown on Figure 48.

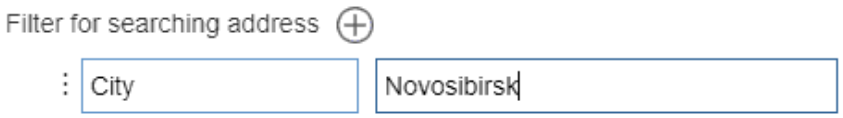


Figure 48 – Conditions for address search

4.2.7. Network analysis service

Establish connection to service (see. Figure 50), provided for making network analysis operations, such as:

- search for optimal route
- calculation and building of service areas.

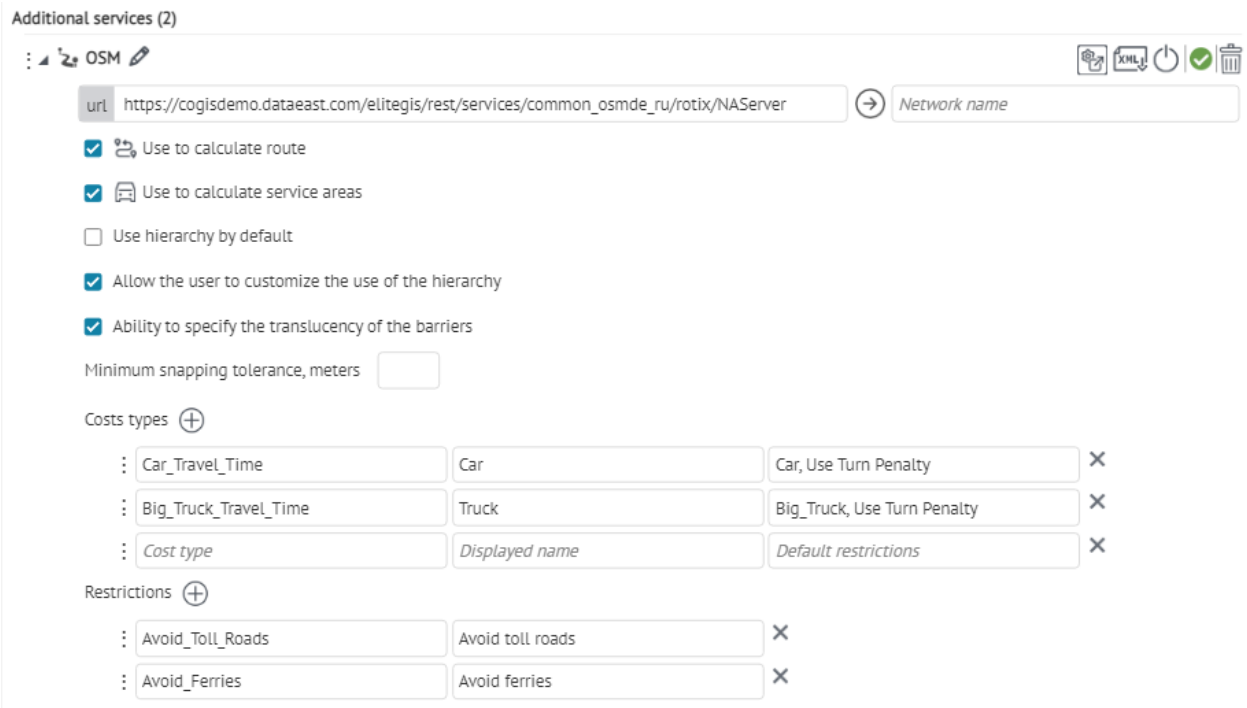


Figure 49 – Network analysis service

If you want to consider road types specified in network, check *Use road hierarchy* option. Specify parameter of network analysis service, by which optimality of built route will be estimated, for example, the shortest time, the shortest distance, etc. in *Cost type* field. The name entered to *Displayed name* will be shown on map . You can also specify restrictions.

As network analysis service you can also use service published based on the index rotix file built with TrueDrive product and available via REST API.

Besides, you can use Here routing service, in this case you will need to specify APP ID and APP CODE. Specify cost types that will be available to user and restrictions that the user will be able to select.

4.2.8. Geometry service

To redefine geometry service, enter its address to *url* field. To go to geometry service page, press . To rename service, press .

4.2.9. CoGIS SOE for map service

4.2.9.1. CoGIS SOE for map service. General information.

CoGIS SOE for map service allows editing spatial objects using editing tools based on specified access permissions. Besides, CoGIS SOE solves tasks of spatial search, allows using geometry networks to build routes, making topologic correction of objects, and more.

To add CoGIS SOE, press . To go to CoGIS SOE page, press . To go to CoGIS SOE rules, press , the page with filter by the current service will be displayed. To rename service, press .

By default, specified CoGIS SOE settings will be applied to all layers of map service. But you can select layers and group layers of map service to which you want to apply your settings, to do so, enter their numbers in .

The following tabs are provided for managing CoGIS SOE settings specified during its publishing on GIS server:

- Editing;
- Search;
- Picture gallery;
- Data;
- Legend;
- Routing.

4.2.9.2. Editing tab

The following options are provided in the tab:

- *Use in editing* – the option is enabled by default, i.e. all layers of map service will be used by editing. If you need to use selected layers or group layer, enter their numbers in separated with hyphen or comma.
- *Objects creation settings* – the tools provided for objects creating can be displayed on map :
  - in the popup toolbar of the *Objects creation* window;
  - as separate buttons.

  Check the option and press . The editing settings are shown on Figure 50.

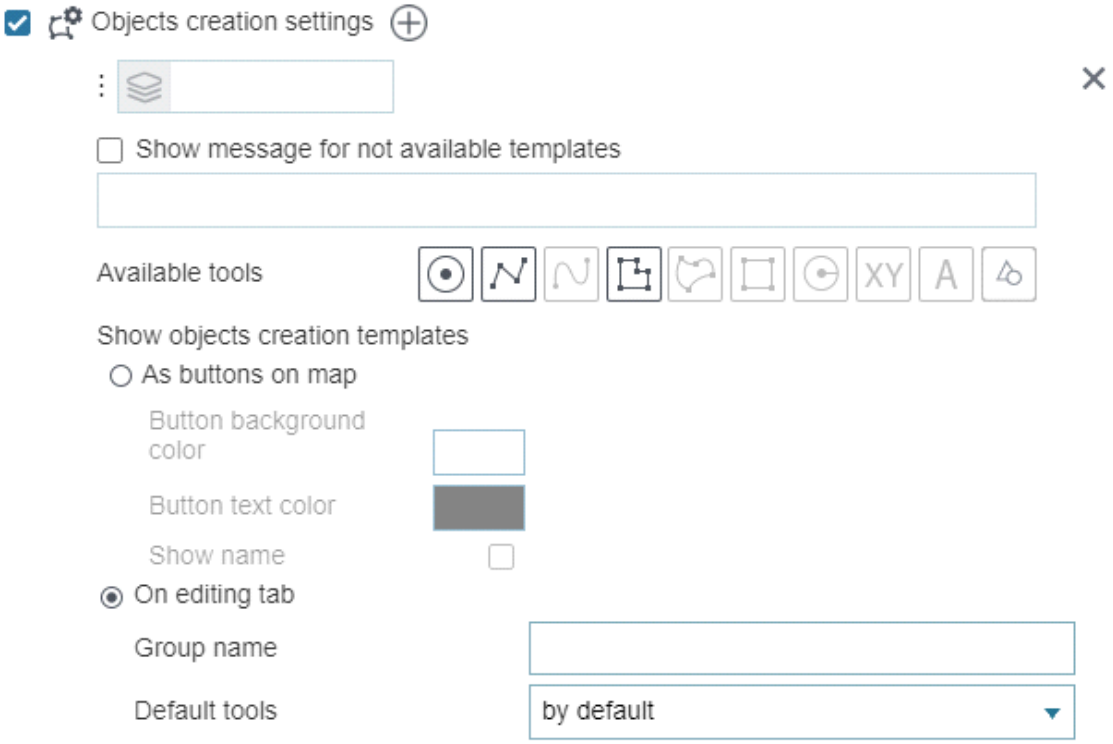


Figure 50 – Setting view of objects creation tools

In *Layers* field specify number of layer where objects will be created.
The *Show message for not available templates* option is provided to inform user when editing is not allowed for some reasons. For example, editing can be allowed for authorized users only, and for other users the editing buttons will be hidden. If you enable this option and add *Authorize to be able to edit objects* message, the not authorized users will see the editing buttons, but by pressing them they will see the warning message.
If you want that the tool for creating objects is displayed as separate button on map , check the *As buttons on map* option and select the tool type in the *Tool* drop down list. In order to display layer name specified in on the tool button, check *Show name* option. Select button background and font. The button will be shown on map , if in the settings tab *Buttons location on page* the option *Partially override and complete buttons location* or *Completely override buttons location* option is enabled and button is added.
If you want that the tools for creating objects are shown on map in pop-up toolbar of the *Objects creation* window, check *On editing tab* option. Select, which tools will be available in the pop-up toolbar in the *Available tools* field. You can define the tool that will be enabled by clicking the layer name, to do so, select the needed tool in the *Default tool* field. Layers in the *Objects creation* window can be grouped, to do so, enter the group name in the *Group caption* field. The *Objects creation* window on map is opened by pressing . If you want to display button on map , go to settings tab *Buttons location on page*, check *Partially override and complete buttons location* or *Completely override buttons location* option, select button location, press and select the button in the drop-down list.

- *Geocode by coordinates* – make sure that connection to geocoding service has been established. To define address by coordinates, check this option, then press ⊕ and specify all needed settings. Enter layer number. Enter address field, where to address attributes will be recorded. You can create template as macros using result of geocoder work, as shown on Figure 51.

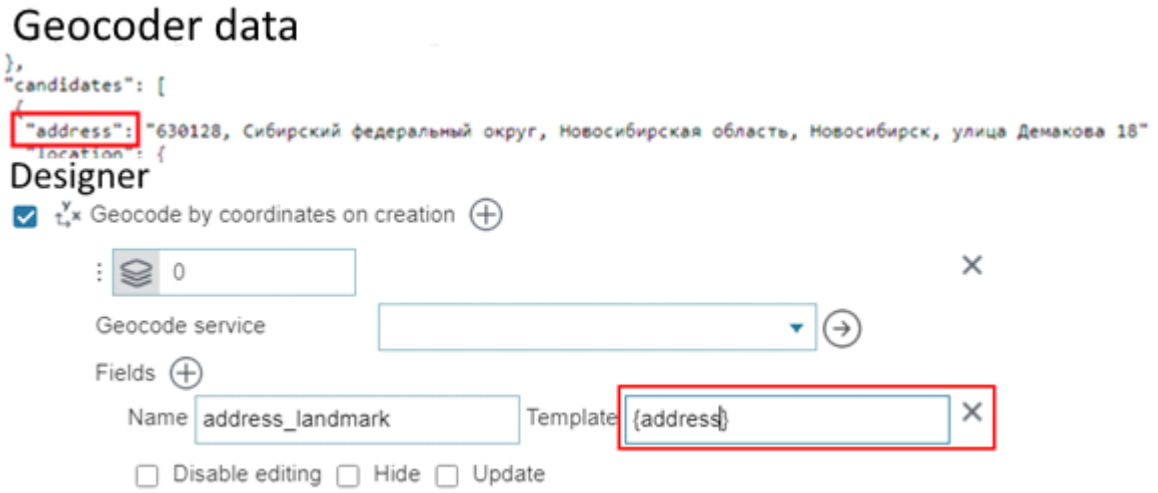


Figure 51 – Defining address by coordinates

If you do not want to allow users changing address field, check *Disable editing* option. To hide address field from users, check *Hide* option, at that note that record in the field will be sent to GIS server anyway.

For cases when user changed coordinates while creating the object and address attribute needs to be rewritten in the address field, check *Update* option.

- *Edit/create object using geocode service* – the option allows using result of geocode service when creating or editing objects, namely:
  - use geocode prompt by filling the attribute field;
  - create object by address;
  - set automatic recording of values of the address attribute field by results of geocode service.

Specify number of the map service layer and select *Geocode service*.

- If you need that by editing or filling in the attribute field the geocode service prompt is used, enter the name of its attribute field in the *Prompting field* and set the prompt, to do so, set the template in the *Result template*. The template can be set using macros with results of geocode service, see Figure 52.

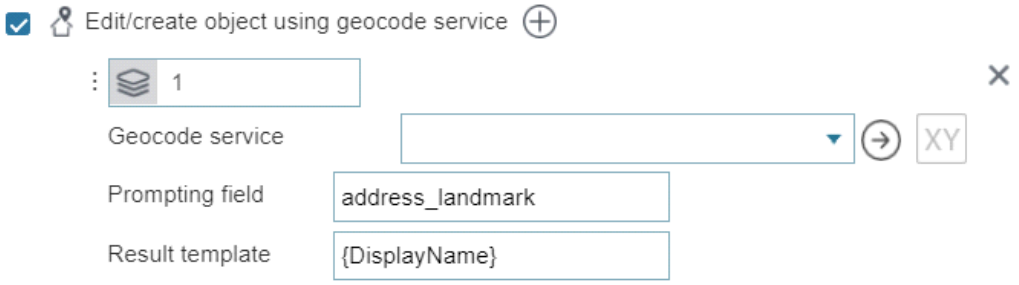


Figure 52 – Prompting template of the geocode service

During object's creation, its geometry can be set by the object's address. To do so, press XY *Set geometry when creating by address* button. In the Objects creation window press A in the pop-up toolbar and the window with textbox to enter address will appear. Object's coordinates will be defined by specified address.
Set automatic recording of address attribute field values by results of the geocode service, for example, to record attribute field value `Index` by results of geocode service `Postcode`. To do so, press *Add* ⊕ button shown on Figure 53.

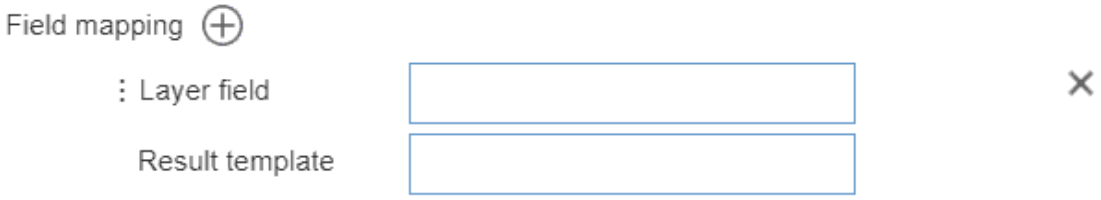


Figure 53 – Recording of attribute field values by results of the geocode service

Enter the name of the attribute field of map service layer in *Layer field* and in *Result template* set the template using macros with results of geocode service. In the result template the geocoder attribute is specified using braces, for example, `{Region}`.

- *Allow entering values outside domain* – the attribute field can have domain of predefined values (reference). By creating the object, by filling in its Identify card, the attribute field value is selected from the drop-down list of domain values. In order to allow users to enter random attribute field values by filling in object's Identify card, check the option, specify layer number and field name, as shown on Figure 54.

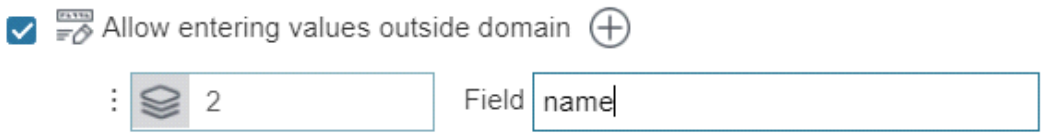


Figure 54 – Allow entering values outside domain option

- *Allow importing objects from file* – the option allows you to define layers for which the objects import will be available. Note, it is also required that for these layers the Data load and upload plugin should be also set in SOE rules.
- *Stop saving on error*- when this option is enabled, if any error occurs during the save process, the save process will be aborted and the dialog box will be shown to the user asking if the save should be interrupted or continued.
- Date fields settings– this option allows you to define how the field of the Date type will be edited. When opening the object card in the edit mode, you can configure three options depending on the user's needs:
    - Not specified – the date field will be empty,
    - Current date – the date field will show the current date,
    - Fixed date – the date field will show the date specified in constructor.

In the case of data for past time ranges (historical maps, archived data), it is possible to specify the range of years, which will be displayed by default in editing mode, see Figure 55.

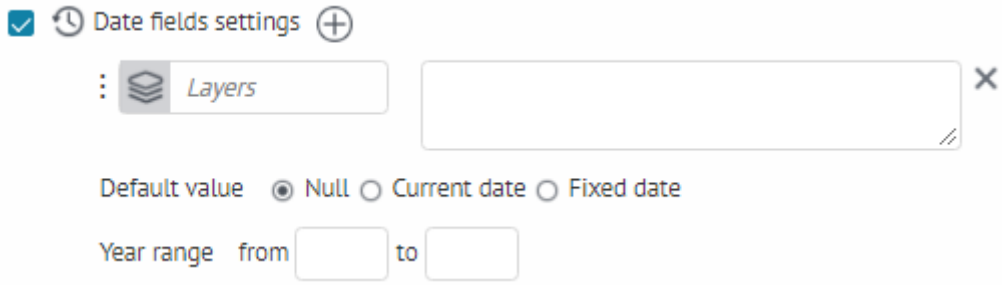


Figure 55 – Setting dates editing

- *Draft settings*– this option allows you to configure the pre-filling of attribute fields when creating the object based on existing objects. In the Layers field, specify for which layers the object will be created based on the draft. Specify the Service and Layer with the definition query where the draft is stored. Set the sorting and specify from which field and to which field the value should be substituted, see Figure 56.

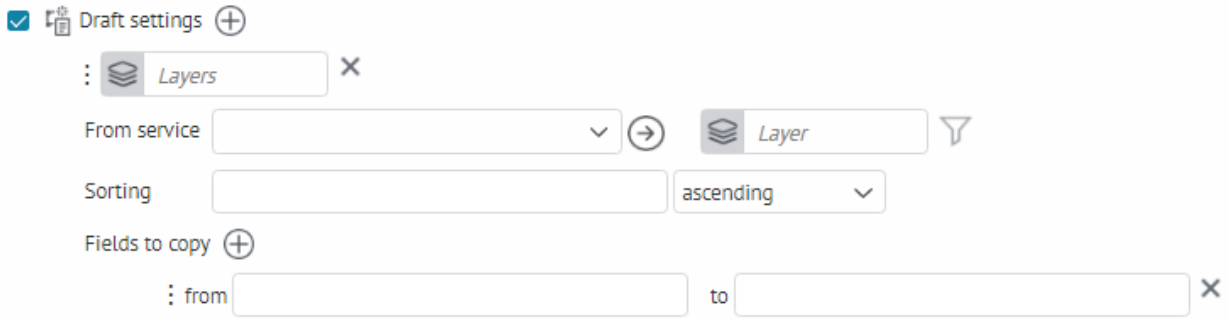


Figure 56 – Setting drafts for creating objects

- Customize the name of the object being created and the buttons in the card– the option is provided to redefine the label 'New object' when creating the new object, both in the object's card title, and by creating the child objects in the card of the parent object.
- *Use editing templates from feature service* – check this option if you want to use editing templates published in the feature service.

4.2.9.3. Search tab

The *Use in search* option is enabled by default, i.e. spatial search is done.

4.2.9.4. Picture gallery tab

The tab is provided for managing settings of *Picture gallery*, as shown on Figure 57.

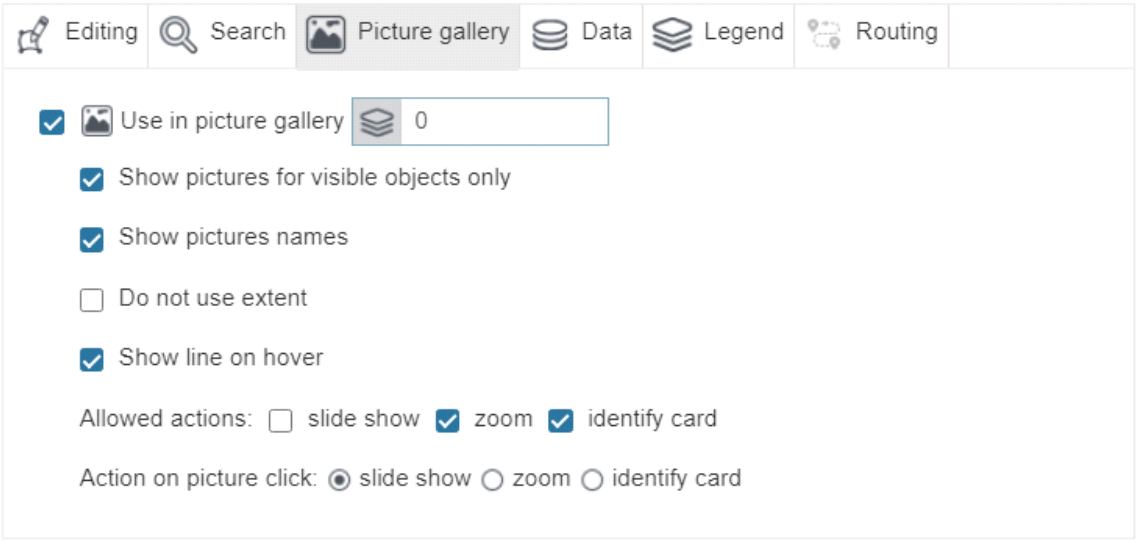


Figure 57 – Picture gallery

Managing settings of picture gallery will be available if the following rules for the gallery are specified in CoGIS SOE section:

- *Use in picture gallery* – the option is enabled by default, i.e. Picture gallery is shown on map . CoGIS SOE transfers information about pictures of appropriate map service. You can select layers and group layers, pictures from which will be displayed in the gallery. To do so, enter their numbers in .
- *Show pictures for visible objects only* – if this option is enabled, Picture gallery will show pictures of visible objects only according to map extent.
- *Show pictures names* – if this option is enabled, pictures will be shown with names.
- *Do not use extent* – if this option is enabled, pictures will be requested once without specifying extent, and will not be updated by extent change. If *Show pictures for visible objects only* and *Do not use extent* options are checked, *Picture gallery* will be updated by changing layers visibility only.
- *Show line on hover* – enable this option, if you want to visualize which picture relates to which object on map . That is, when hovering over picture, the red connection line will be displayed and the related object will be marked red, as shown on Figure 58.

Figure 58 – Line connecting object and correspondent picture

- You can put buttons for opening object's Identify card, viewing other pictures and zooming to object. To do so, in *Allowed actions* check the needed options: *identify card*, *slide show* or *zoom*.
- By click on picture the picture preview window is opened or zoom to object is done, or Identify card is opened. To do so, check appropriate options in *Allowed actions*.

4.2.9.5. Data tab

Allow uploading data with or without geometry, for example, to allow users to create reports by selected layer of *Attribute table* during work with map . To do so, check the option. If you want to specify selected layers only, enter their numbers in .

4.2.9.6. Legend tab

Number of objects in layer will be displayed in *Legend* according to settings described in section 4.2.2, if option 1-9 *Allow calculating objects* is enabled. In order that number of objects is displayed for selected layers, specify number of these layers in . Check *Allow calculating symbology* option to count objects by each symbology. If the legend displays one layer, and editing of the same data is done via another layer, or, for example, the data changes in one layer results in data changes in another layer, then check the Recalculate the number of objects in all layers when data changes option and the number of objects will be recalculated upon any changes made with the data in this service.

4.2.9.7. Routing tab

CoGIS SOE will be used for route calculation and building. If SOE itself is set for using geometry network, then CoGIS SOE for map service can be used for building routes on small networks.

4.2.10. Geometry service

To establish connection to geometry service, enter its address to *url* field, as shown on Figure 59.

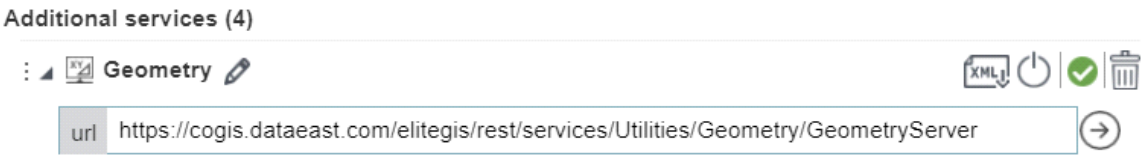


Figure 59 – Connecting to geometry service

To go to geometry service page, press . To rename service, press .

4.3.Identify card templates tab

By default all attribute data about object is displayed in the *Identify card* same as it is stored in the map service layer. Settings of the *Identify card templates* tab allow to display only specific information in the *Identify card* and to set structure of the *Identify card*.

For objects of different maps service layers added to map , different templates of Identify card can be used. To start creating the template, go to *Identify card templates* tab shown on Figure 60, and press *Add Identify card template.*

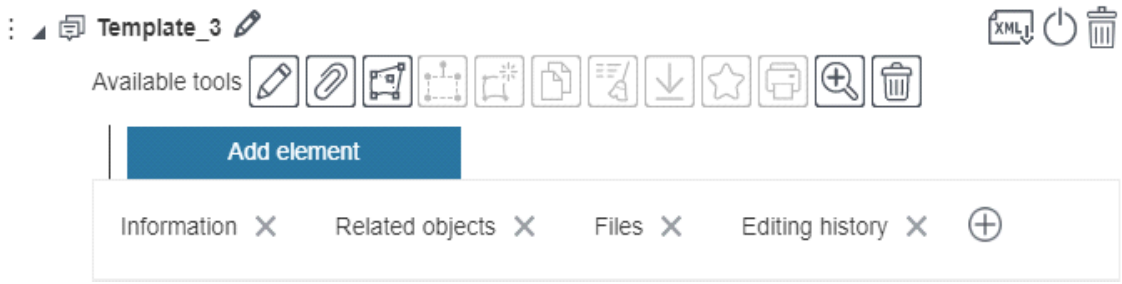


Figure 60 – Identify card templates tab

The window with Identify card settings will appear.

Specify which tools buttons should be displayed in the Identify card, which tabs should it contain and which blocks should contain each tab.

4.3.1. Tools buttons

The following tools buttons can be displayed in the object's Identify card:

- *Edit* – by pressing this button, the object card switches to the editing mode. The button will be displayed only if the user was allowed to edit this object.
- *Add attachments* – using this button you can add the file attachment to object. The button is displayed in the upper part of the identification card. By adding the attachment using the button, the attachment will be added to first appropriate block. If the card has multiple blocks for attachments with different settings, check the *Allow adding attachments in block* option.
- *Shift and edit object's vertices* – this button opens the tool for editing object's vertices of polygon or polyline layer or for its shifting. Note that this button will be displayed only if in the map settings tab *Services* the connection to CoGIS SOE is

established and the option *Use in editing* is enabled in the *Editing* tab. Besides this, for CoGIS SOE the settings should be set on the CoGIS SOE rules page, i.e. Editing plugin settings.
By pressing the button the object's vertices are highlighted , see Figure 61.

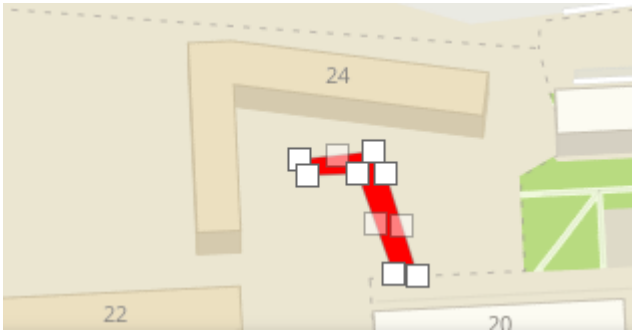


Figure 61 – Shift and edit object's vertices tool

To move the object, select and hold its center and move it to the required place on the map. Press *Save* in the *Identify card* when all changes are finished.
If auto save option is enabled, all changes will be saved to GIS server. Otherwise, press  *Save to server* button.

-  *Rotate and edit object's size* – this buttons opens the tool to rotate or resize objects from polygon or polyline layer. Note that this button will be displayed only if in the map settings tab  *Services* the connection to CoGIS SOE is established and the option *Use in editing* is enabled in the *Editing* tab. Besides this, for CoGIS SOE the settings should be set on the CoGIS SOE rules page, i.e. Editing plugin settings.
  By pressing the button the object will be selected with the frame with the rotation point, see Figure 62.

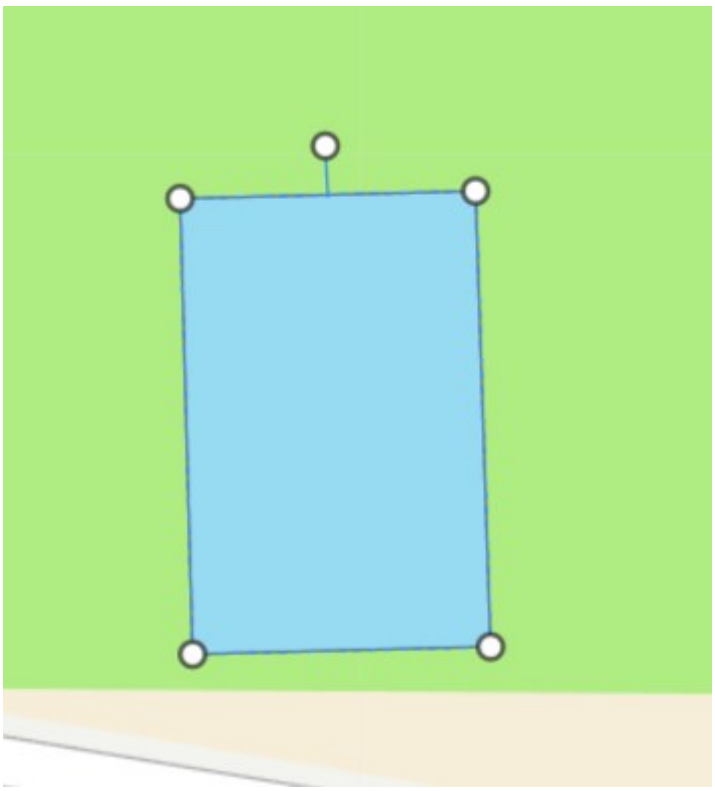


Figure 62 – Rotate and edit object's size tool

To resize the object, pull the frame vertices. To rotate the object, hold the rotation point and rotate the object as needed. Press Save in the Identify card when all changes are finished. If auto save option is enabled for your map , all changes will be saved to GIS server. Otherwise, press Save to server button.

- *Set new geometry* – this button opens the tool for editing object's geometry of polygon or polyline layer. Press the button and set new geometry of the object. Press Save in the Identify card when all changes are finished.
  If auto save option is enabled for your map , all changes will be saved to GIS server. Otherwise, press Save to server button.

  Note that this button will be displayed only if in the tab *Services* the connection to CoGIS SOE is established and the option *Use in editing* is enabled in the *Editing* tab. Besides this, for CoGIS SOE the settings should be set on the CoGIS SOE rules page, i.e. Editing plugin settings.
- *Copy object* – this button opens the tool for copying the polygon or polyline object. Press the button to create the object's copy. The object's vertices will be highlighted and available for editing. The copied object can be relocated. To do so, hold its center and move the object to the needed place on the map. The Identify card of the copied object containing the same information will appear on top of the source object's card. The values of attribute fields available for editing can be changed. Press Save in the Identify card of the copied object when all changes are finished.

Note that this button will be displayed only if in the tab  *Services* the connection to CoGIS SOE is established and the option *Use in editing* is enabled in the *Editing* tab. Besides this, for CoGIS SOE the settings should be set on the CoGIS SOE rules page, i.e. Editing plugin settings.

-  *Clear attributes* – this button opens the tool for editing attribute fields values. By pressing the button the attribute fields values will be deleted. Note that attribute fields can be edited only if the attribute field is editable. The values of attribute field are editable if in settings of the Editing plugin on CoGIS SOE rules page the name of this field is not specified in the *Not editable fields*. Press Save in the Identify card when all changes are finished. If auto save option is enabled, all changes will be saved to GIS server. Otherwise, press  Save to server button.

  Note that this button will be displayed only if in the tab  *Services* the connection to CoGIS SOE is established and the option *Use in editing* is enabled in the *Editing* tab. Besides this, for CoGIS SOE the settings should be set on the CoGIS SOE rules page, i.e. Editing plugin settings.

-  *Download attachments* – allows you to download the file attachments as an archive.
-  *Share link* – allows you to generate link to the selected object.
-  *Favorites* – by click on this button, the object will be saved to favorites. The list of favorites is displayed in the Favorites window shown by click on  . Add  button to map, to do so, go to Tolls location on page tab  .
-  *Print* – by clicking this button the print form of the identification card will be opened.
-  *Zoom* – press this button to center the map on the object.
-  Remove – press this button to delete the object.

4.3.2. Identify card tabs and blocks

Identify card can contain several tabs, and tabs, in their turn, can contain the following blocks:

- Attributes;
- Related objects;
- Child objects as table;
- Related objects with attributes;
- Files;
- Coordinates;
- Editing history;

- HTML code;
- Set of values in a string field.

By default, the tabs names coincide with names of their blocks. To add another block, press *Add block* button and select its type from the list. The tab name can be edited, same as title of each block. Where to enter tab name, block title, and where they will be displayed, is shown on Figure 63.

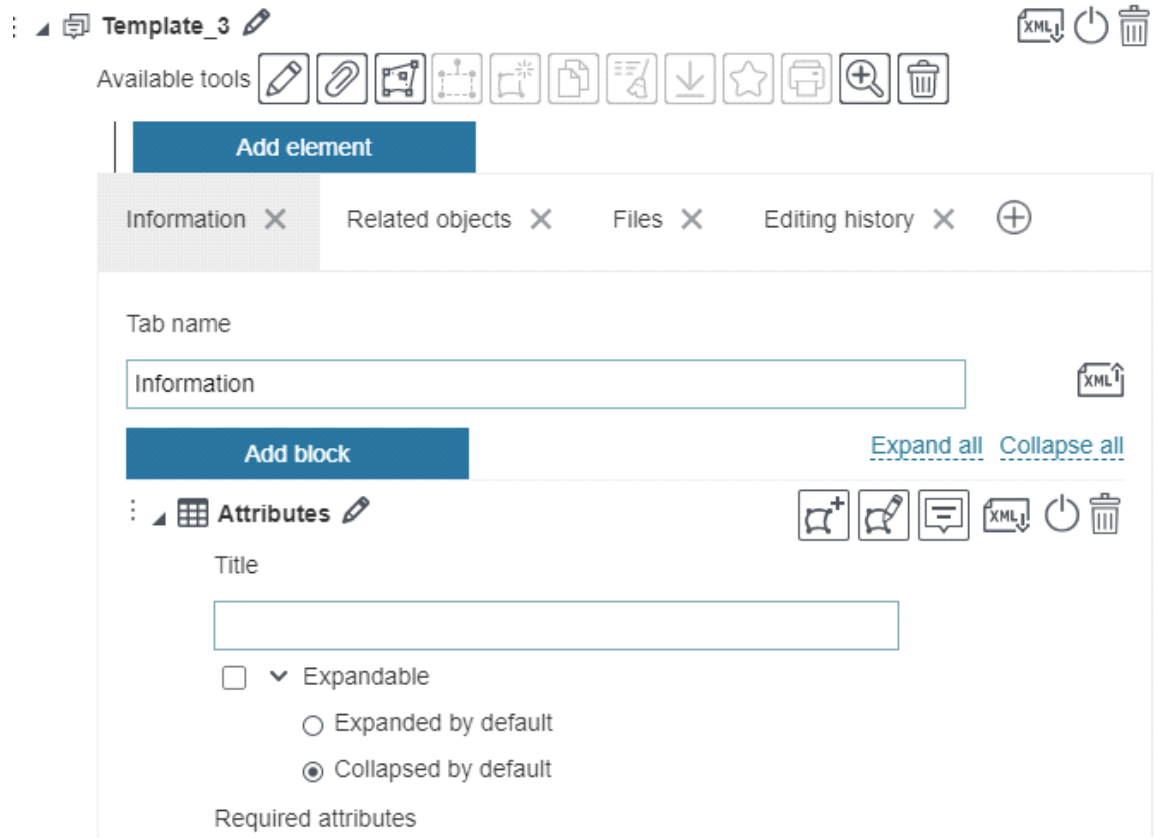


Figure 63 – Title of the *Attributes* block

To edit block's name, press . If your tab should consist of multiple blocks, check *Expandable* option, so that users could expand or collapse blocks content in the Identify dialog. Check *Expanded by default* or *Collapsed by default*.

Select by which operations the block will be displayed in the Identify dialog tab:

- By object's creation ;
- By object's editing ;
- By viewing Identify card

By default, the block will be displayed for all three operations. If you do not want to display the block during editing object, for example, press again. To not display the block in tab, press .

- *Attributes* – this block will not be shown in tab of *Identify card* if specified attribute field in *Required fields* section has empty value.
  To redefine list of attribute fields shown in Identify card by default, create the new list, press . If the object has a lot of fields of the same type with a repeating part in the

field names, you can specify a repeating part of the name, for example * Data, this will be considered as all fields ending in Data (the asterisk can be anywhere *Data Customer*Data, Data*). In the Comment field you can specify the area measurement units, for example, as shown on Figure 64.

Figure 64 – Redefining list of attribute fields

Check:

- *All, except listed* - to not display names of specified attribute fields and their values in the block.
- *Consider specified order of fields* - to display only names of specified attribute fields and their values in specified order.
- *Show with not empty values only* - to not display attribute fields names with empty values. In the object's editing/creation mode all fields, including those with empty values are displayed.
- *Hide fields names* - to display only attribute fields values in the block.
- *Show fields names on new line* - to display attribute fields names under titles.
- *Hide uneditable fields by object's creation* - to hide attribute fields that are not available for editing by creating the objects.
- *Align center* – allows you to make the alignment of the attribute information in the center of the card, this option is relevant, for example, when the field names are hidden.

- *Related objects* – specify numbers of or numbers of relationship classes to define which related objects of which will be displayed in the block. This block provides the following options:
  - *If Show in line* (by viewing only) option is enabled, in the view mode all related objects will be displayed in one line, otherwise, when disabled, each related object will be displayed in the new line. In the edit mode, all related objects are always displayed in the new line.
  - *Show"Relate"* option allows the user to establish relationship with other objects.
  - *Show"Create"* option allows to add button provided to open the object's Identify card to create the related object. At that the relationship with this created object will be established.
  - *Show "Show in table"* option allows to open attribute table and display the related objects there.
  - Expandable for specific relationship class – the option is useful when related objects from multiple layers are displayed in the block, see below.

- Show caption – allows you to specify, whether to hide or to show the name of the related layer.
- *Search objects by geocoder* - – when establishing relationship, the objects will be searched using the geocoding service.

To display related objects in particular order, specify the fields and sorting order. Messages in the absence of related objects will be displayed if there is no related object in this block.

- *Child objects* – this block is provided for viewing/creation/editing/deletion of objects directly in the Identify card of the parent object. Specify number of the related child layer and list of attributes that will be shown in the Identify card of the parent object. The attributes of the related objects can be shown as list or as table. The column width for the specified attributes can be set in pixels, in this case enter the needed value, for example, 30. The column width can be also set in percent of the *Identify card width*, in this case enter 30%, for example. By display of child objects as list, the following options are available:
  - *Show with not empty values only* – only filled fields will be shown;
  - *Allow to expand/collapse* – defines the view of the list of child object fields;
  - *Show name* – check this option to show or hide the object name.

  For example, in cases where there is only one child object, it is worth turning off the Show name and Allow to expand/collapse options, while the attributes should be expanded by default.
  If you need to create multiple child objects, you can use the *Enable cloning* option. To be able to go to the child object (to open its card), select the *With the ability to go to the object* option.
  Specify whether you need to expand the attributes of child objects by default, or whether child objects should be shown as list with the option to expand them.
- *Related objects with attributes* – this block is needed when relationship class has relationship attributes. In order to edit the service table that is the attribute relationship class, add this block. Set list of the attribute fields that will be available for viewing/editing, otherwise all attribute fields will be available for viewing and editing.
- *Weakly related objects* – the block is provided to display logically related objects without relationship class. Select service containing logically related objects, specify layer and definition query, if needed. Relationship of objects is defined the same as for related objects, i.e. by coincidence of values of correspondent fields. Specify the field in the current layer and the field in the related layer, by which values the relationship will be defined. In case of multiple logically related objects, check *Multiple values* option and specify *Separator*. Check the *Show each value on separate line* option, to display objects in a column.

- *Files* - attachments to objects are shown in this block. The pictures can be displayed in the block as following:
  - set of pictures of 150 x 100 size, select ;
  - list of icons of picture types and their names, select ;

- pictures are displayed one below the other by clicking the button. Pictures can be also viewed in the source size, to do so select .

The attached files are divided by categories:

- by file types and extensions;
- by attributes of attached files.

To set up filtering by file extensions, check the corresponding option and specify files with which extension will be displayed in this block.

In addition to the file extension, files can be filtered by attribute values. To do so, check the *Filter by attributes* option, specify the field name, comparison operator, and value. To display not all attribute fields, or if you need that when adding the file to a certain block, some field takes a certain value, check the *Redefine list of attributes* option, specify the name of the field and what value the field will take by default. The display of the field can be hidden from the user.

An example of settings for the document block is shown in the figure below. In this block, only files with the .doc extension will be displayed and can be added. Moreover, when adding a file through this block, the value “document” will be written to the Type attribute field.

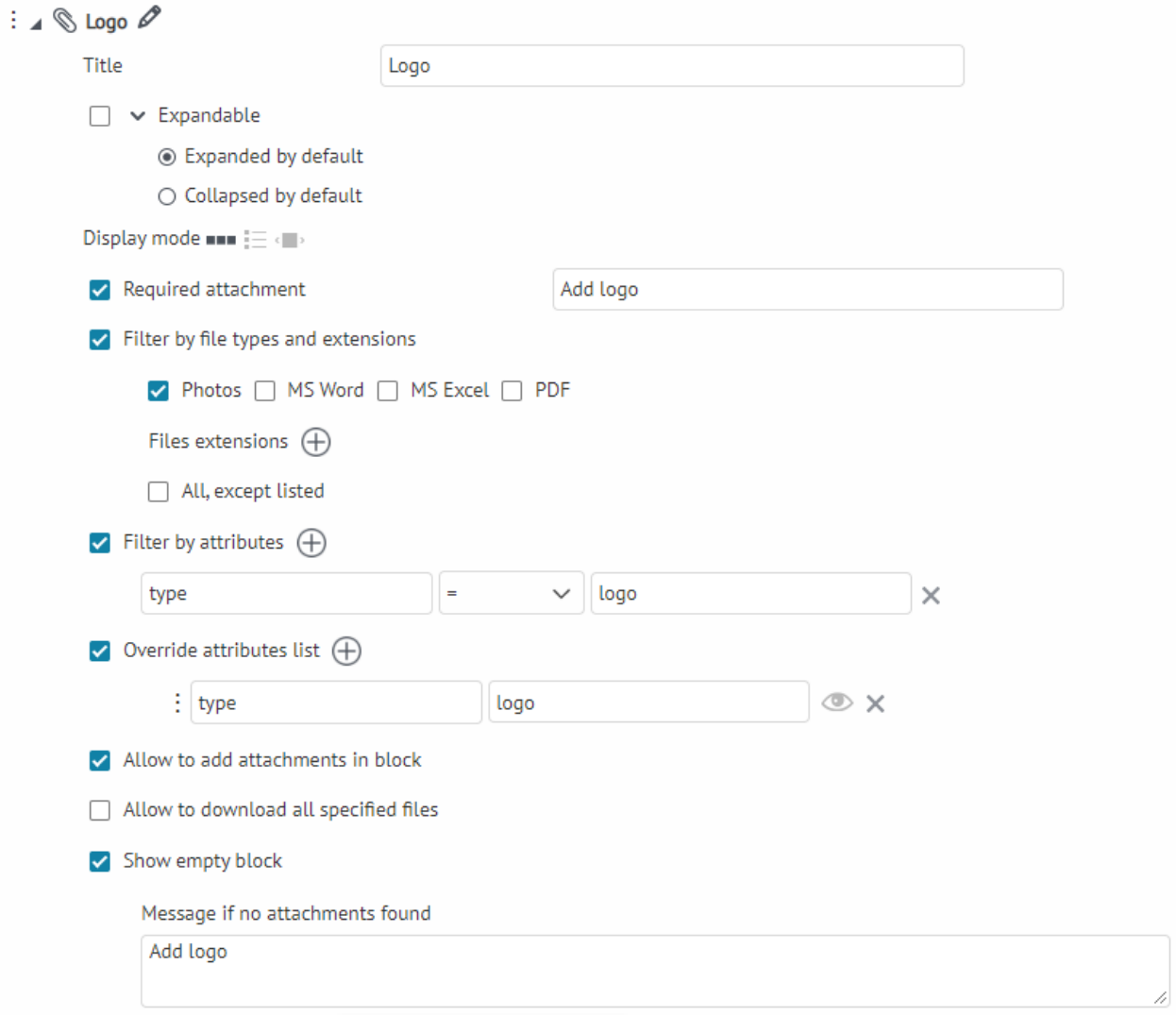


Figure 65 – Example of settings for the "Documents" attachment block, divided into categories by file extension and attribute field value

If you want certain values to be written to the attribute fields when adding a file, check the *allow adding attachments in the block* option and specify the default values for the required fields. However, in order for the empty block to be displayed and to be able to add the file to it, it is necessary to check the *show empty block* option.
To enable the user to upload the object's file attachments in a single zip archive, check the *Allow downloading all specified files* option.
Make sure you have specified the settings for the *Edit* plugin on the SOE page, described in the SOE rules section.
The *Show empty block* option is required to configure the ability to attach files directly in the block. If it is not checked, then the *Files* block will not be displayed, and when there are no attached files, the user will not be able to add the file in the block, but only through the general button in the object card.

- *Coordinates* – this block contains information about object's coordinates in specified coordinate system and measurement units. If the layer's coordinate system differs from the specified coordinate system, then to create the object by coordinates select the required coordinate system and specify the values. For projected coordinate systems, the coordinates are labeled X/Y and Longitude/Latitude for geographic coordinate systems. If the coordinates are specified incorrectly, for example, a letter value is entered, the user will see the error message. The example of creating object by coordinates dialog.
  The Coordinates block also provides the option to add/change/delete the component part of the object. To enable the user to work with the component part of the object, add the Coordinates block. Editing of the component part is the same as editing of the whole object and is performed using the *Shift and edit object's vertices* and *Rotate and edit object's size* buttons located in the *Coordinates* block.
- *Editing history* – the block contains history of object's editing.
- *HTML code* - enter HTML code and check *Display fields as HTML* option, otherwise your code will be recognized as text. See example on Figure 66. The first screenshot shows entered HTML code and checked *Collapsed by default* option, the second one shows text of object's description and view of Identify card with added blocks.

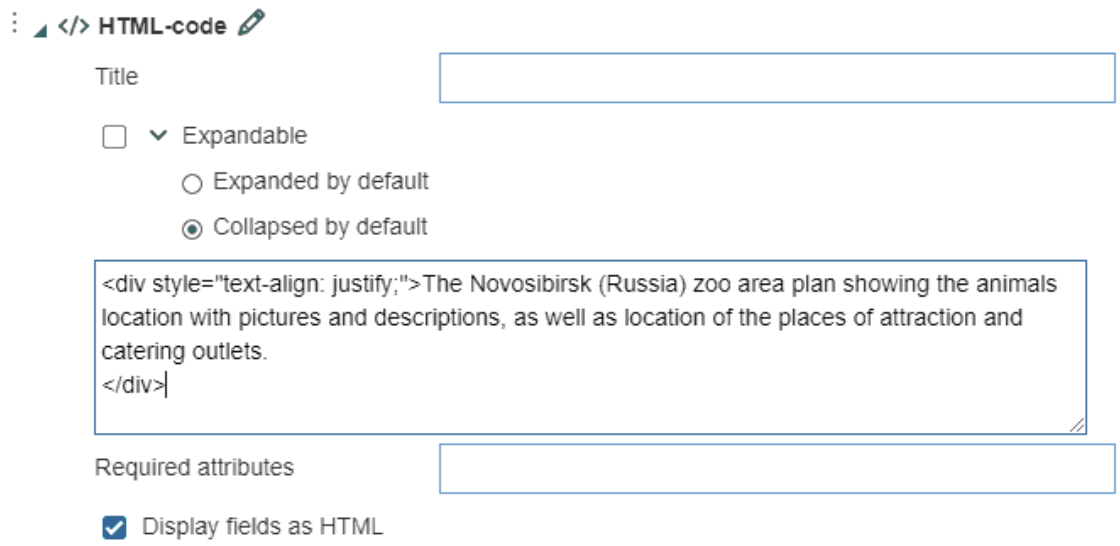


Figure 66 – HTML code block settings

Block will not be displayed in the *Identify card* tab, if attribute field specified in the *Required fields* section is empty.

- *Set of values in string field* – add this block to display information about the object stored as the JSON string and specify attribute containing JSON.

4.3.3. Additional elements

You can add one of the following buttons to the Identify card:

- *Generate report* – to generate report about the object.
- *Run geoprocessing service task* – to run the geoprocessing service task.
- *Create related object* – to create the related object in specific layer.
- *Create object in other layer* – to create the object in other layer, including one with the predefined fields values. In order to fill specific fields with the values of this object, use macros `{CurrentFeature.MyField}`, where `MyField` is the name of the field which value should be used.
- *Call JavaScript code* – to call the JavaScript code.
- *HTML block* – to display additional information in the Identify card, as shown on Figure 67, for example.

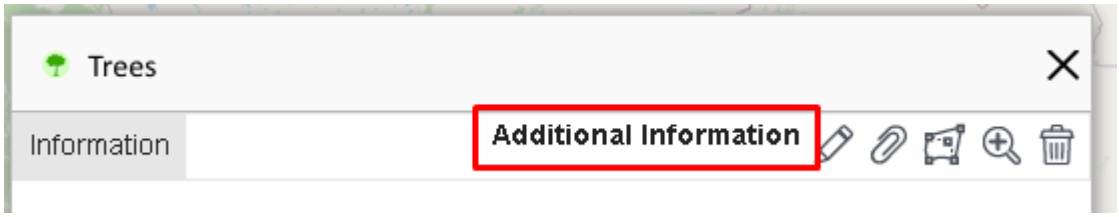


Figure 67 – Additional information in the Identify card

These buttons can be displayed in the upper part of the identification card where the tool buttons are displayed, or in the lower part of the card.

4.3.4. Using created Identify card template

In order to use the template, in Identify card settings described in section 4.2.2, in the *Identify card* tab check *Use templates in Identify card* and in the drop down list select the created template. See Figure 68 showing the process.

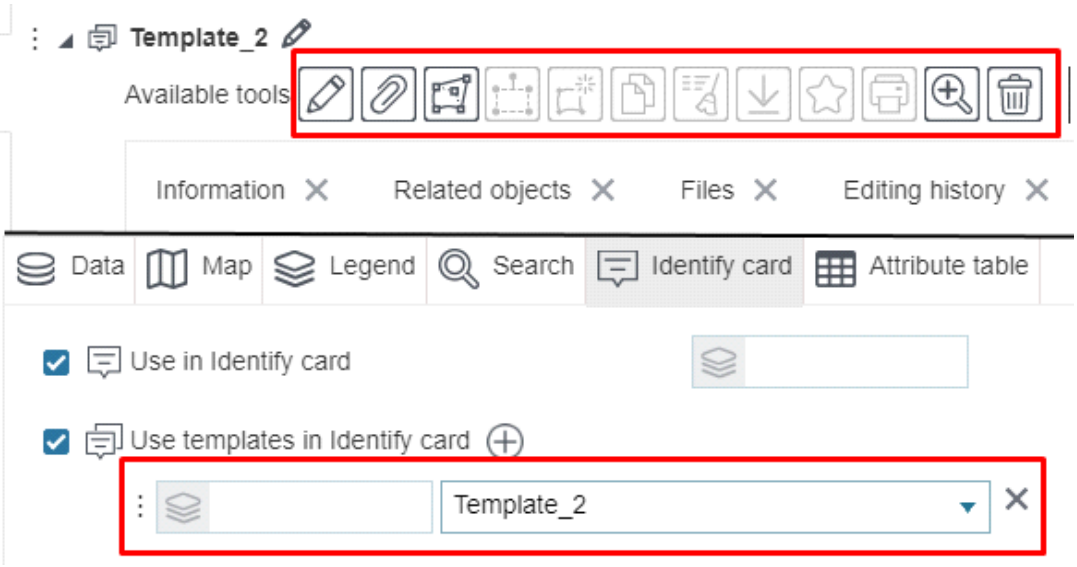


Figure 68 – Setting buttons display in Identify card

4.4. Tools and map settings

4.4.1. Tools and map settings. General information.

4.4.2. Tools and map settings. General information.

This tab is provided for redefining map settings, some of which can be hidden depending on access permissions of user and interface settings.

Displaying the maps catalog menu in the map application is optional. By default, the maps catalog menu is not displayed in map applications. To override the display of the maps catalog menu in specific map, check the *Override menu display in map* option. To override the default menu display in all maps, this option should be selected in the Root folder. The menu display override in the map is shown below, see Figure 69.

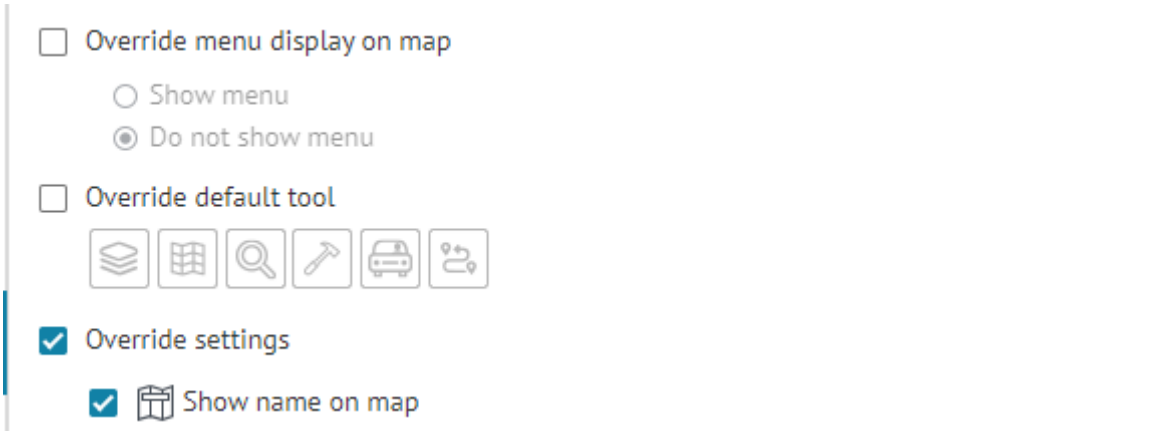


Figure 69 Setting menu display in map

By default there are buttons for opening windows with information about the basemap  , list of layers  , search results  , geoprocessing results  , service areas  and routing  .

If you need that by opening map one of the windows is open, check *Redefine default tool* and press the appropriate button. To redefine map settings, first check *Override settings*, then check the required options described in **Ошибка! Неверная ссылка закладки.**.

Table 2 – Options for redefining map settings

Name	Purpose
 Show name on map	The name entered in *General settings* tab  *General information* in *Map name* will be displayed in the upper part of map.
 Enable auto save	All changes made during work with online map will be automatically recorded on GIS server.
 Show popup window when operations complete	
 Define name for objects creation button	Allows you to define the name of the object creation button. Enter the name if necessary.
 Show callout	Displays object's name after its identification. Click on the name to open object's card. The list of identified objects will also be shown. If this option is not enabled, after object's identification the Identify card of object of the upper layer added to map will be opened.
 Enable objects calculation • in full extent; • in current extent	In Legend the number of objects for layer specified in Legend settings will be shown. Objects calculation can be done for the whole map or for current extent, depending on selected option.
 Define legend height	Redefines Legend height in mm.
 Hide layers menu	Hides button for going to layer menu in Legend.
Hide layers expand button	This option allows disable expanding or collapsing group layers in Legend. If group layers are collapsed by default, then group layers will be displayed in Legend without option to expand them.

Name	Purpose
Define Identify card size	Redefines length and width of Identify card in mm.
Define default zoom scale	Sets default zooming scale, used when zooming to object from Identify card or Attribute table.
Hide importing objects from file to map as graphics	In *Import data from file* window by loading data from file, the *Import to layer* option will be available and *Import to graphics* will be hidden.
Maximum search results	Allows limiting search results according to entered value. This parameter is set in the Search tab of map service.
Search only in visible layers considering all filters	Allows performing search by objects from visible layers only.
Use geocode suggest in search	If this option is enabled, while entering address to the search box, the user will be prompted to select from geocode service.
Show picture gallery on opening map	If this option is enabled, Picture gallery will be shown when opening online map.
Enable sorting search results	With this option the user will be able to sort search results in alphabetic order and by distance from the map extent center.
Set single date shift for data	Specifies time zone for maps.
Show attribute table on opening map	The option defines whether Attribute table should be shown or hidden when you open the map.
Set default attribute table height	If you often work with Attribute table, you can customize its height as you need, specifying which part of the page should it occupy in percent.
Enable snapping by default	Check this option if you need to use snapping when editing objects. This setting is applied to those services and layers, for which snapping is set in the Map tab of the map service.

By default the null layer of map service is open in the Attribute table. To redefine layer in the attribute table, check *Set default layer for attribute table*, and specify service and number of layer.

4.4.3. Redefining initial and full extents

You can redefine the initial and full extents of your map as extents calculated by map service data. The extent's calculation takes some time, that is why it is required to set the map extent to be used until the calculation completes. To do so you need to add *Favorites* button to your map first. Press *Buttons location on page* shown on Figure 70, to go to *Buttons location on page* tab.

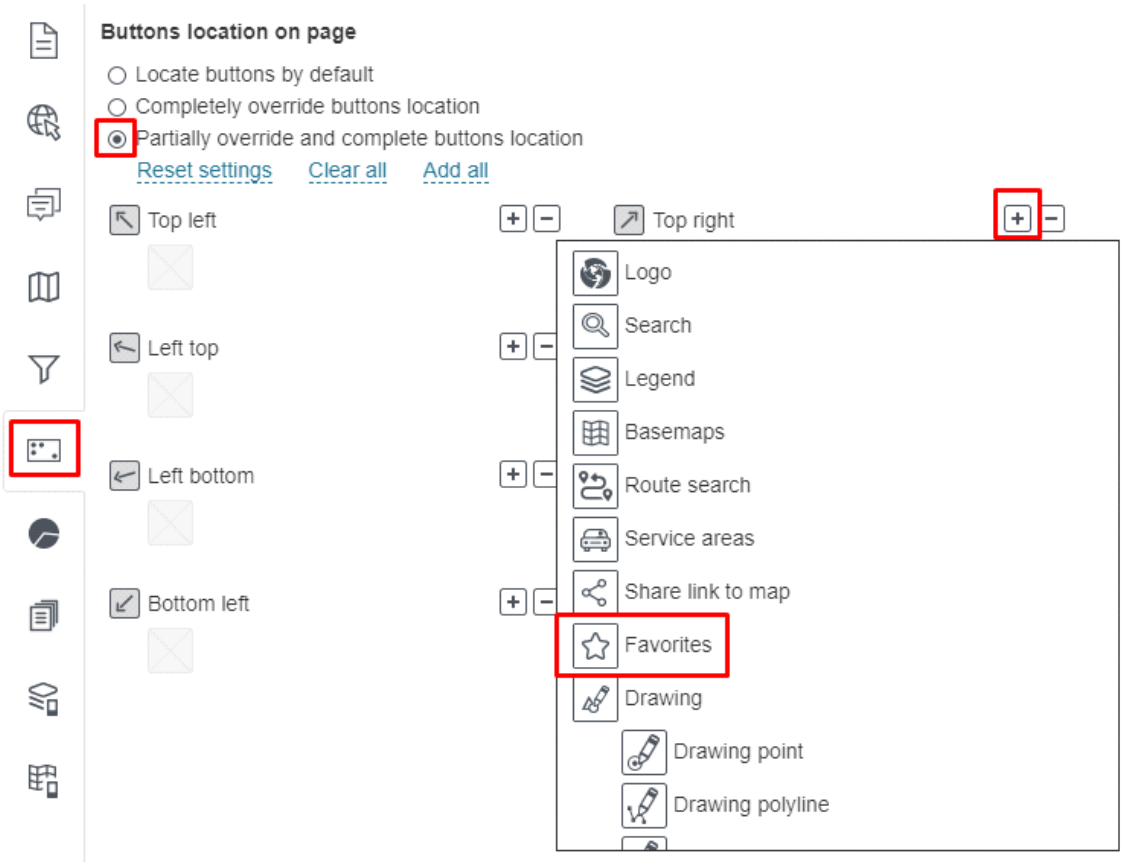


Figure 70 – Buttons location on page tab

Check *Partially override and complete buttons location* option, select the button's location, press and in the drop down list select *Favorites*. To change button's location, delete this button first and then set the new location. To delete the button, press and in the drop down list shown on Figure 71 press the cross icon.

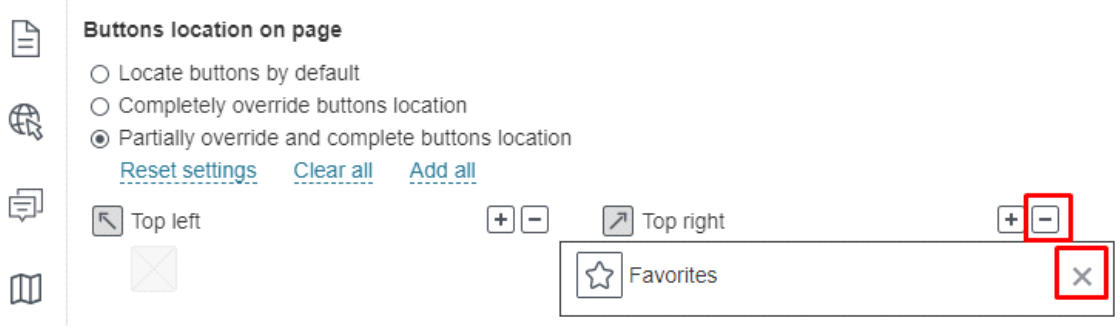


Figure 71 – Deleting button from the map

Save the settings and go to map . Press  *Favorites* shown on Figure 72. In the appeared window in the *Extents* tab press *Add current extent*.

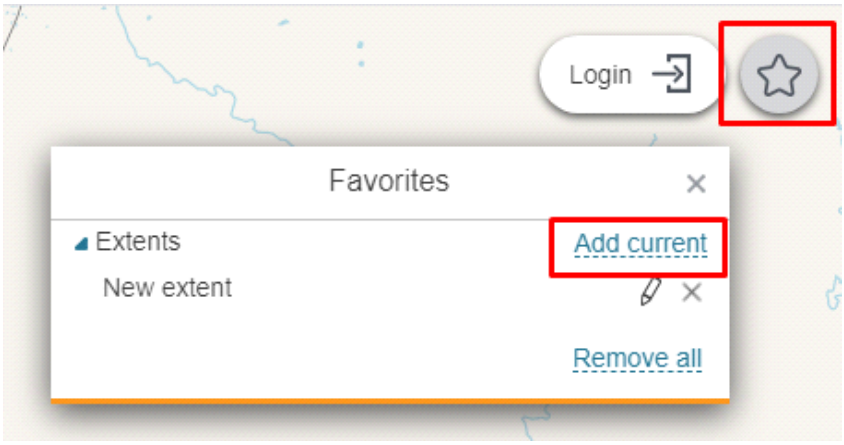


Figure 72 – Extent

The *New extent* button button will appear, if you hover over it, the specified extent will be selected on the map , see Figure 73.

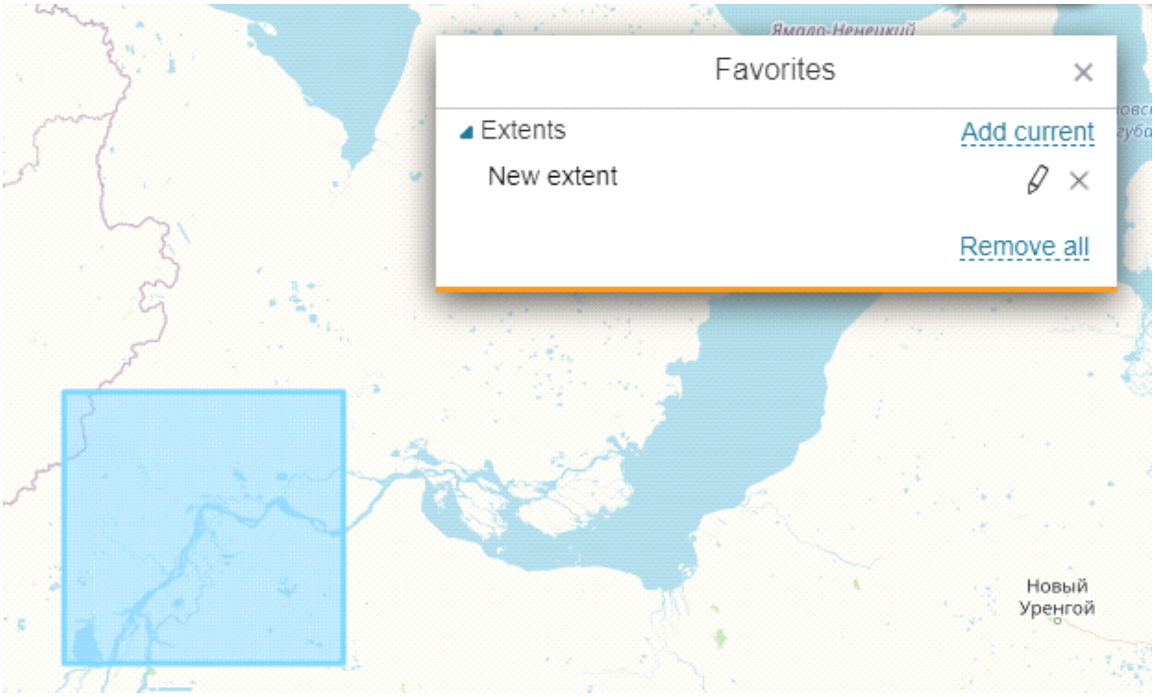


Figure 73 – Selection of the map extent

Press  and enter the extent name, then press *Enter*.

Go to *CoGIS Designer*. Check *Redefine initial extent* or *Redefine full extent* options. Check *Extent from Favorites* and in the drop down list select the required extent. This list is built from the extents saved to *Favorites*, see Figure 74, for example.

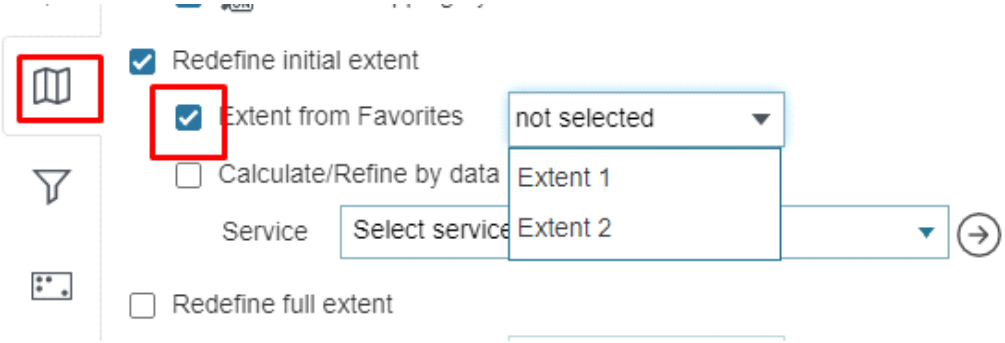


Figure 74 – List of extents

Specified extent will be defined as the map extent until calculation is completed.

Specify the calculation settings. Check *Calculate/Refine by data* option shown on Figure 75. Select map service from the drop down *Service* list. This list contains all map services added to map in the current version. For map it is possible to set multiple settings versions, see section 2.5 for details. To redefine extent by specific layers of map service, enter the number of layer or group layer in . To redefine extent by specific objects of map service layer, specify SQL query pressing and enter the query in the popup window.

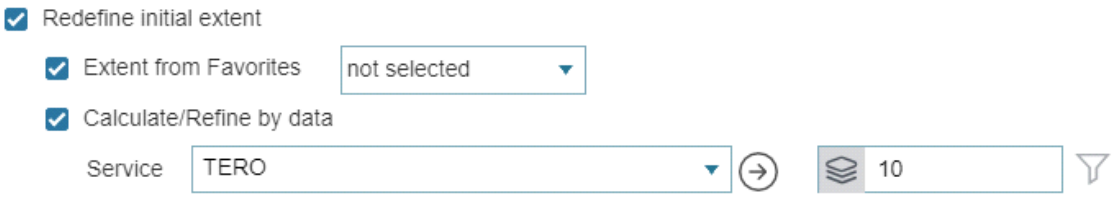


Figure 75 – Redefining extent by map service data

The process of the extent calculation is stopped if the user starts working with the map. After you selected extent from the list of extents saved to Favorites and specified settings of extent calculation by data of map service selected in the Service list, the map service extent specified during publishing would be defined as the map extent.

4.4.4. Time slider panel

If you need that the time slider panel is displayed, check *Window with time slider* and specify the following settings:

- Time slider display condition, checking *always* or *by call* option. If you selected *by call*, in the *Buttons location on page* tab check *Completely override buttons location* or *Partially override and complete buttons location*, select button location and add .
- Select slider type in *Slider type* field.
- Enter time slider description in *Title*.
- Set minimum, maximum, default and shift values.
- Set step.
- For user convenience, in order that time slider is displayed by pressing the button, check *Show 'for today' link* or *Show 'for last N days' link* and enter the value. Example of setting time slider is shown on Figure 76.

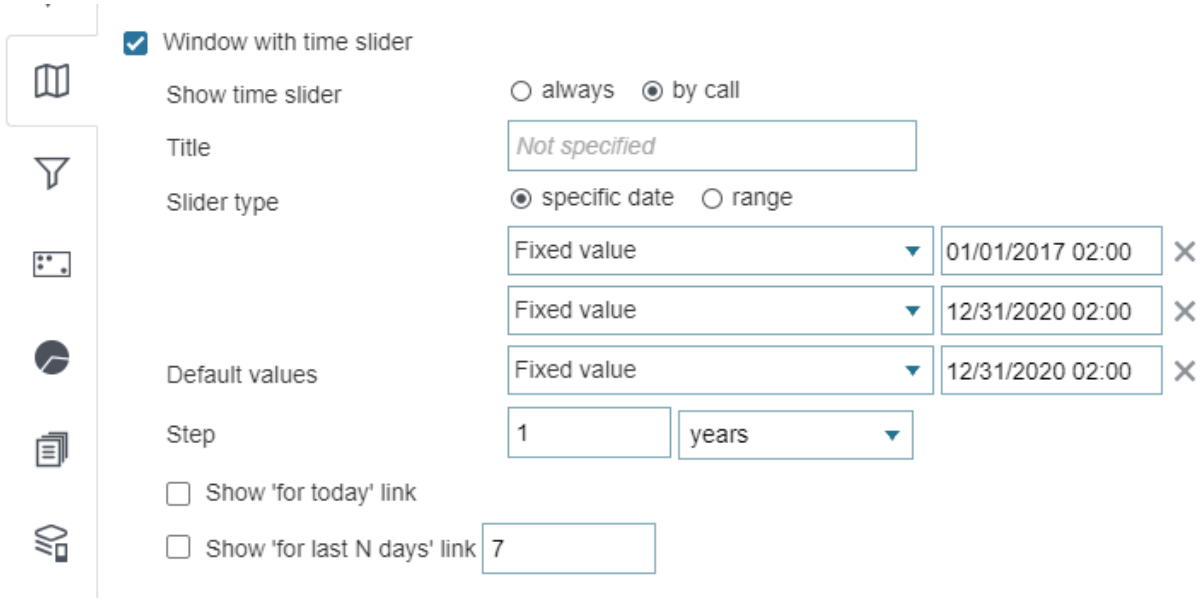
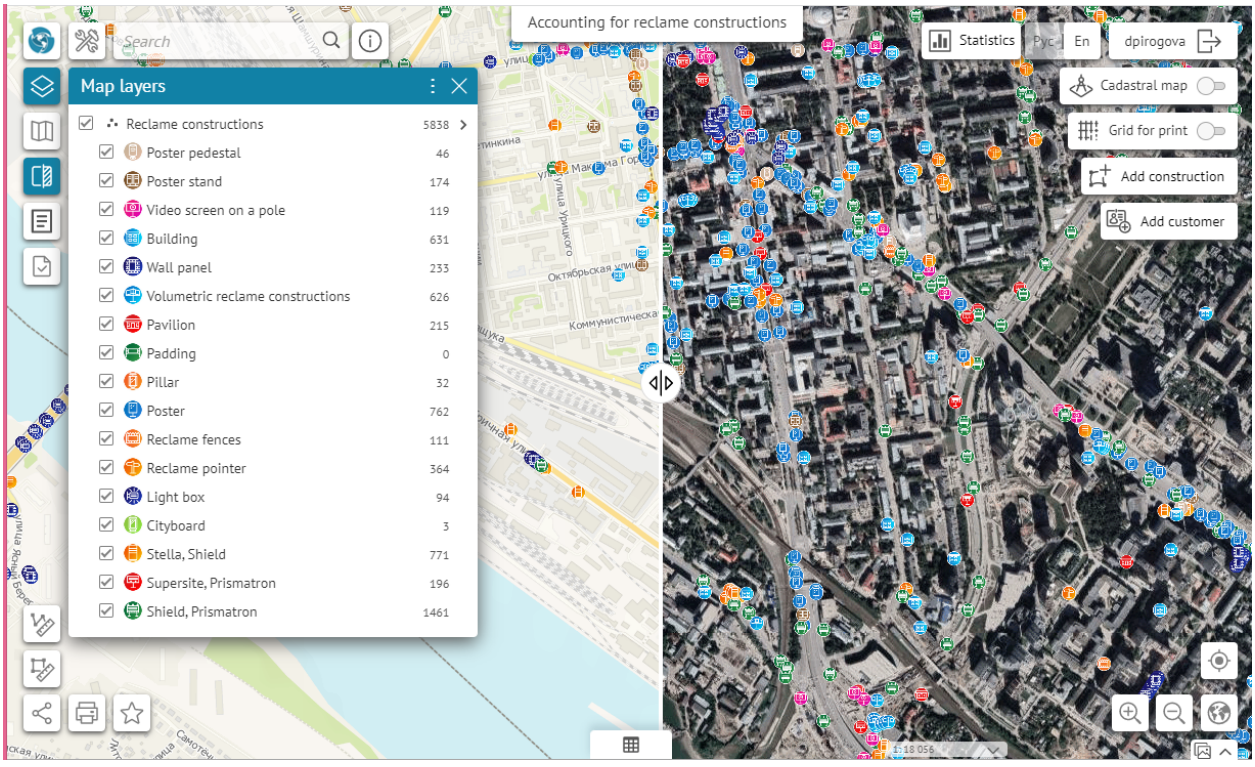


Figure 76 – Setting time slider panel

Note that if option *Data relevance by time*, described in *Data* section is enabled, service layers will be turned on and off at specified time.

4.4.5. Enabling the user to change Swipe tool settings

The Swipe mode provides two options when the user changes the setting for displaying layers on the right and left, or when the location of the layers is specified by the settings on the *Services/ Legend* tab, without the possibility of user control. Example shown on **Ошибка! Неверная ссылка закладки.** – Swipe tool modes.



Ошибка! Неверная ссылка закладки. – Swipe tool modes

4.4.6. Basemap transparency

To allow users to change transparency of basemap in the *Basemap* window and in layer menu in *Legend*, check *Allow setting basemap transparency*, see Figure 77.

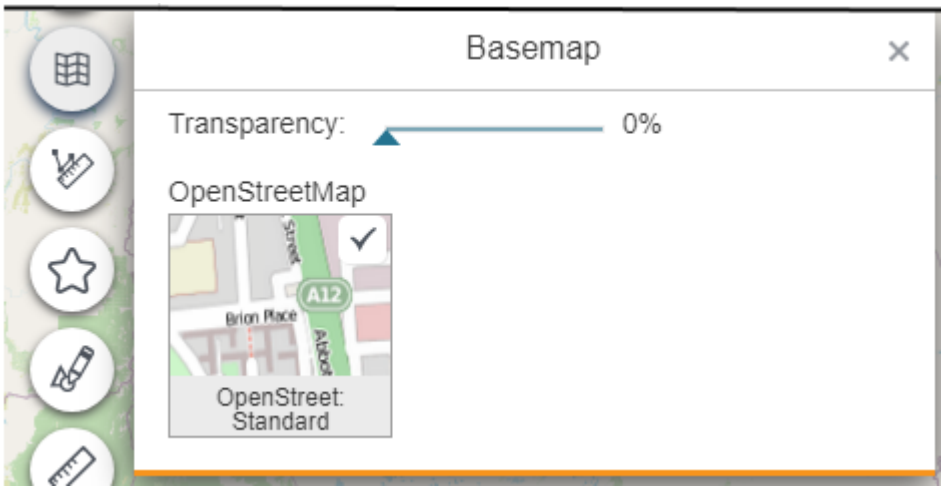


Figure 77 – Setting basemap transparency

Use the Transparency slider to set the required transparency, or enter the value manually. The figure above demonstrates example of the semitransparent map . The transparency slider set to 100% means that the basemap will not be seen on the map .

4.4.7. Viewing map without adding basemap

Note that you can view and work with map without adding basemap. If basemap has not been added to map , check *Allow viewing map without basemap*, shown on Figure 78 and if needed, select coordinate system for reference from the drop-down list. Set scalebar.

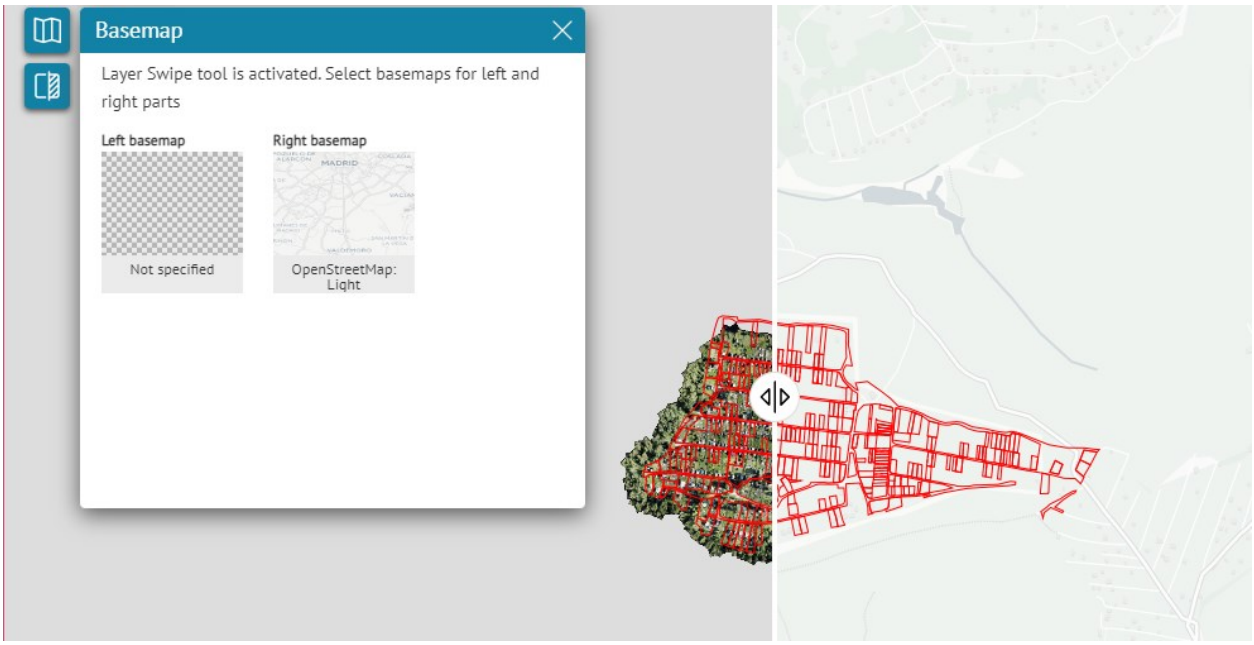


Figure 78 – Map viewing modes

4.4.1. Search with spatial restriction

To specify whether the search will be performed without extent restriction or only in the extent of the map, check the *Search with spatial restriction* option. If necessary, the extent of the search can be expanded, and the map scale is limited.

If you need to set up the search in the extent of a specific city, then specify the service and layer containing the city boundaries, based on which the search extent will be calculated. If more than one city falls within the extent, then the search will be performed on the extent of the combined city geometry.

To determine the extent of the search not by the city geometry, but by attributes, set the *Attribute field matching for search*. Specify the service and layer to search with city name attribute matching, specify the city field in the cities layer, and the city field in the data layer to be searched.

If there is no required object in the extent, the search automatically expands the search area over the entire map.

4.4.2. Filtering search results

You can provide your users with the option to find objects quickly and accurately on the map, setting the filtering search results by specific rules. The option of filtering search results is enabled by pressing the button located in the search results window of the *Search* tab. On Figure 79 you can see buttons *Monument* and Memorial. If you consequentially press each of these buttons, the search results will be filtered according to specified rules. The pressed button will be put in bold.

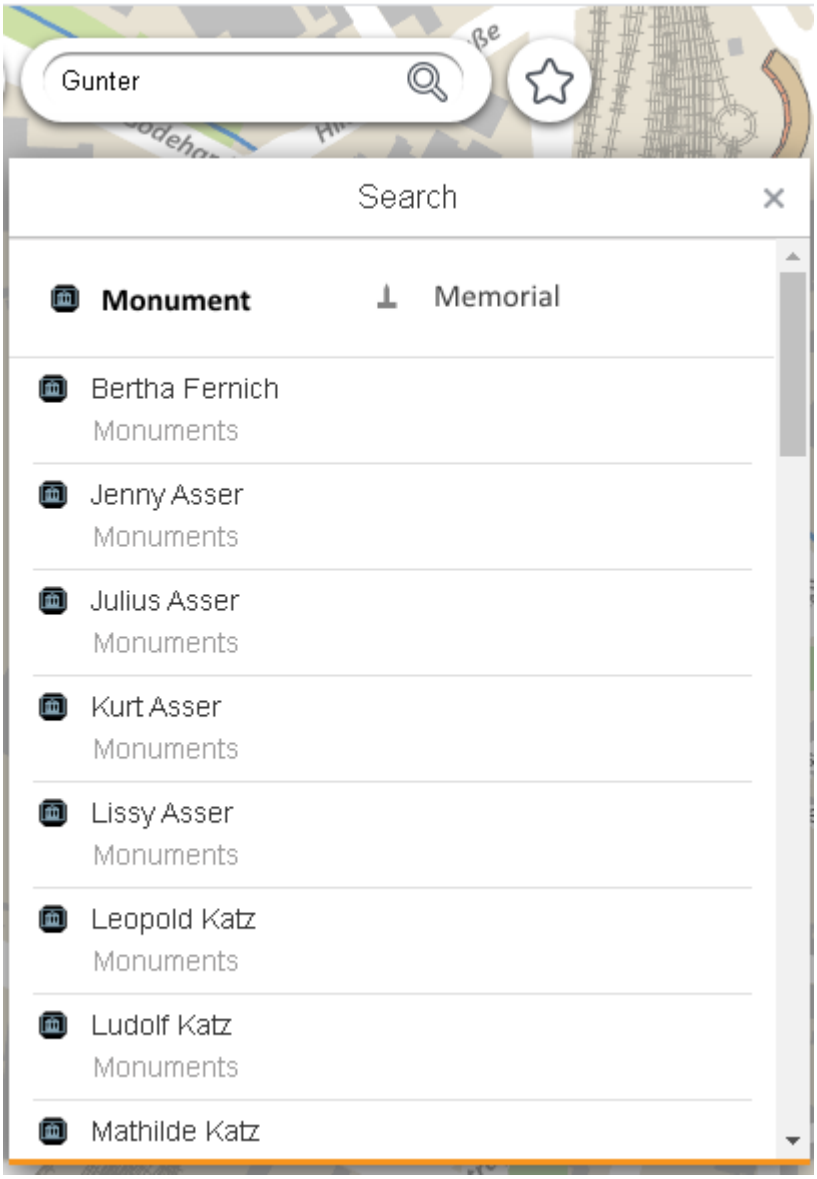


Figure 79 – Example of buttons for filtering search results

By default the search results window is shown at the moment of the search query entry. If you want that the search results window is shown on the map as soon as the map is open, check *Redefine default tool* shown on Figure 80, and press *Search* .

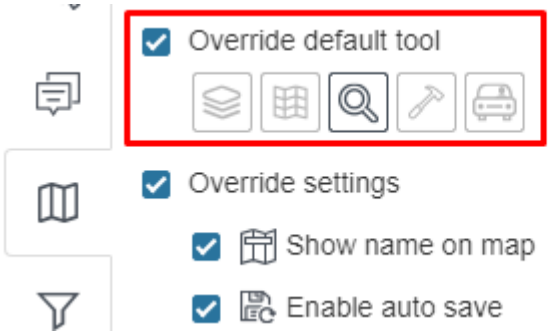


Figure 80 – Setting display of the search results window on map

You can press the button before entering the search request, or after all the search results will be displayed. Filtration is done according to specified rules. Note that you can set multiple filtration rules if needed.

The following should be done to set the search results filtration rules and to create the filtration button:

1. Check *Configure filtration of search results*, see Figure 81.
2. Press *Add* .
3. Enter the filtration button text and download picture.
4. Set one or multiple filtration rules.

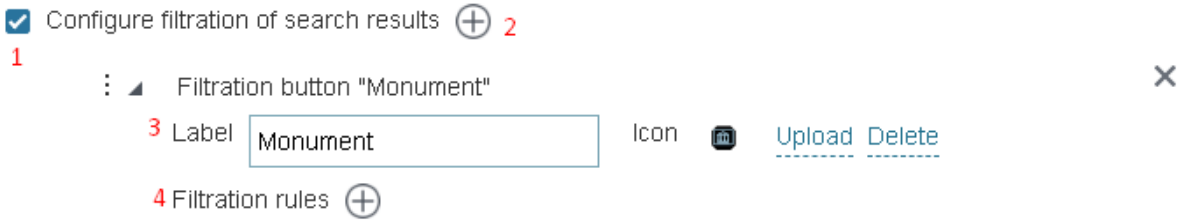


Figure 81 – *Configure filtration of search results* option

Open fields to set filtration rules, pressing *Add* .

Now set the rules:

- Select map service from the drop down list *Service*. The list contains all map services added to the current representation of map .

Note that you can specify multiple settings versions for your map , see section 2.5.

- Specify numbers of map service layers. To do so, in enter number of layers, group layers separated by hyphen or comma, for example, 0,1,5-10,14, and use exclamation sign to exclude layer.
- Set conditions for attribute fields values. To do so, press and in the popup field enter SQL query to geodata of specified layer from selected map service.

*Note that SQL query should correlate with definition queries to geodata specified in the **Data** tab of the map service, with search rules specified in **Search** tab of the map service, as well as with custom filters, if the option **Search only in visible layers considering all filters** in the current tab is enabled.*

Figure 82 demonstrates how filtration rule is set for the button shown on Figure 79. The condition as SQL query is set to attribute field `FullName`, namely that its values contain sequency of symbols: `<Monument>.`

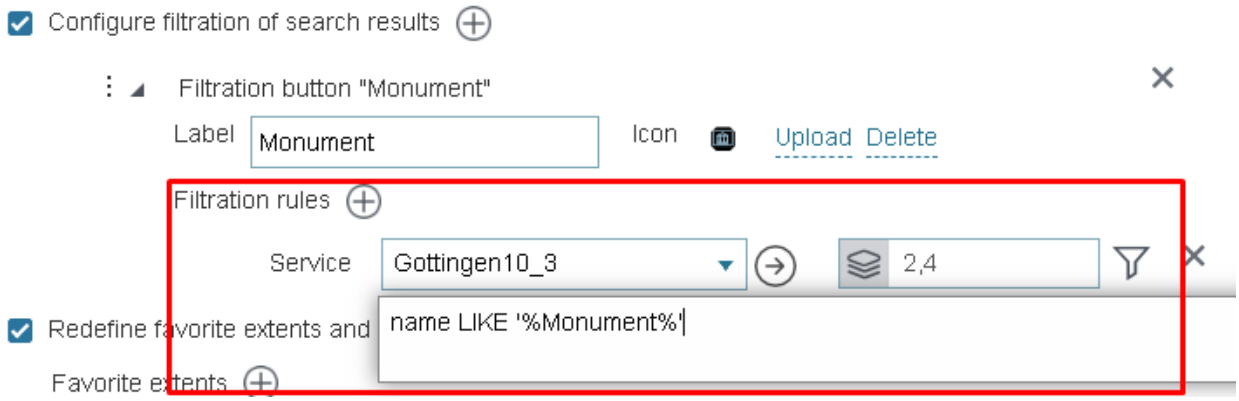


Figure 82 – Filtration rule

In SQL query you can use macros `{SearchText}`, as it guarantees exact match of search result with the search query, for example, `<GroupsCount='{SearchText}'>`.

In order to add the filtration rule, press *Add* ⊕ button on the right of the *Filtration rules* option. To delete filtration rule, *Delete* ✕. Note that the filtration buttons locate in the search results window in the order as they are specified in the current CoGIS Designer tab. To change this order, you need to change location of the filtration settings block in the current CoGIS Designer tab. To do so, left click and hold the icon ⋮, located on the left of the Filtration button, the filtration settings block will be highlighted with the frame as shown on Figure 83. Change location of the filtration settings block as needed.

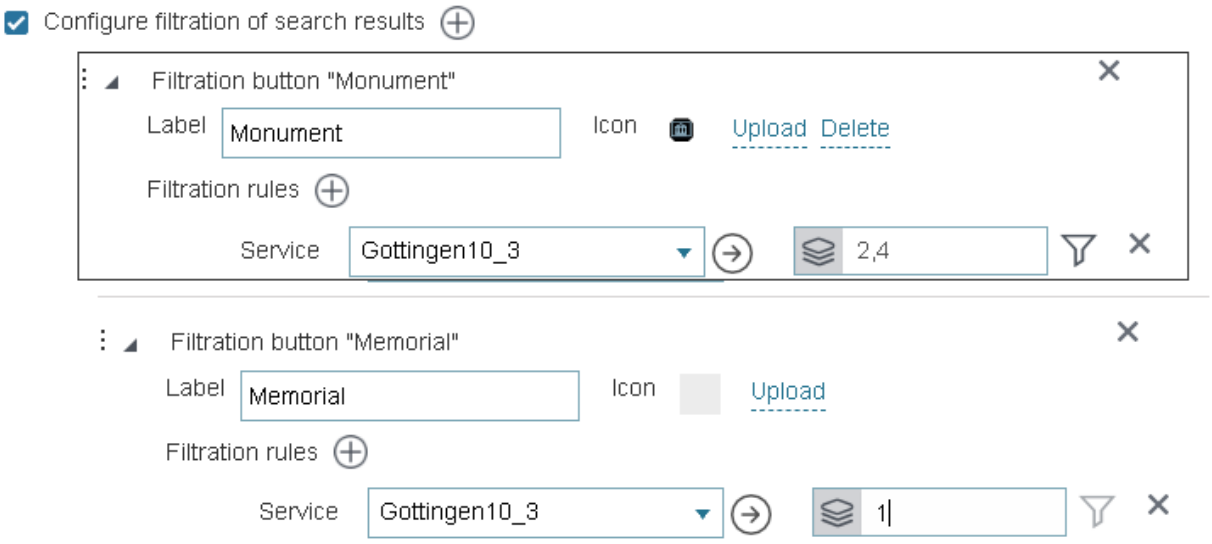


Figure 83 – Highlighting filtration settings block with the frame

In order that the list of predefined extents and created objects are shown on map , check the *Redefine favorite extents and objects* option shown on Figure 84. Press ⊕ and select the extent and object from the drop down list. The list is built from extents and objects saved as Favorites.

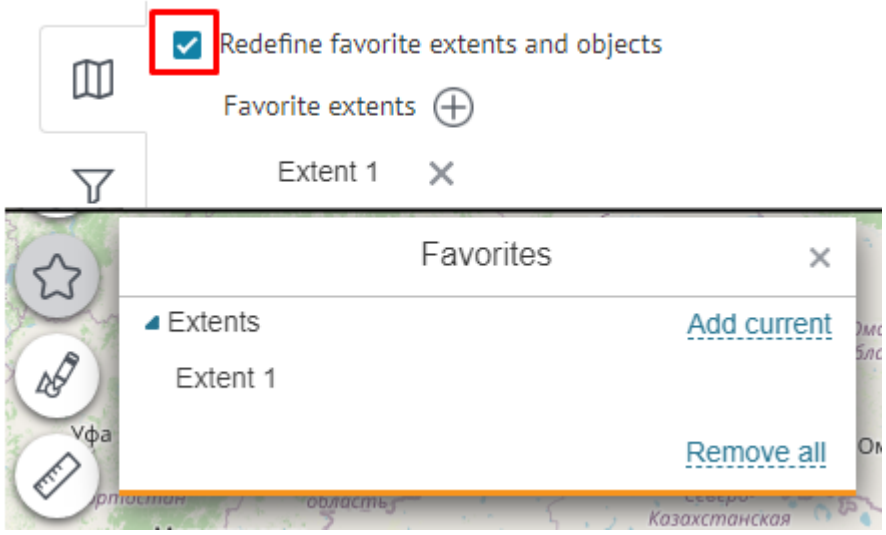


Figure 84 – Predefined extent

The extents of map are saved to Favorites by pressing *Favorites*. Add *Favorites* button to map . To do so, press *Buttons location on page*, see Figure 85, and you will get to *Buttons location on page* tab.

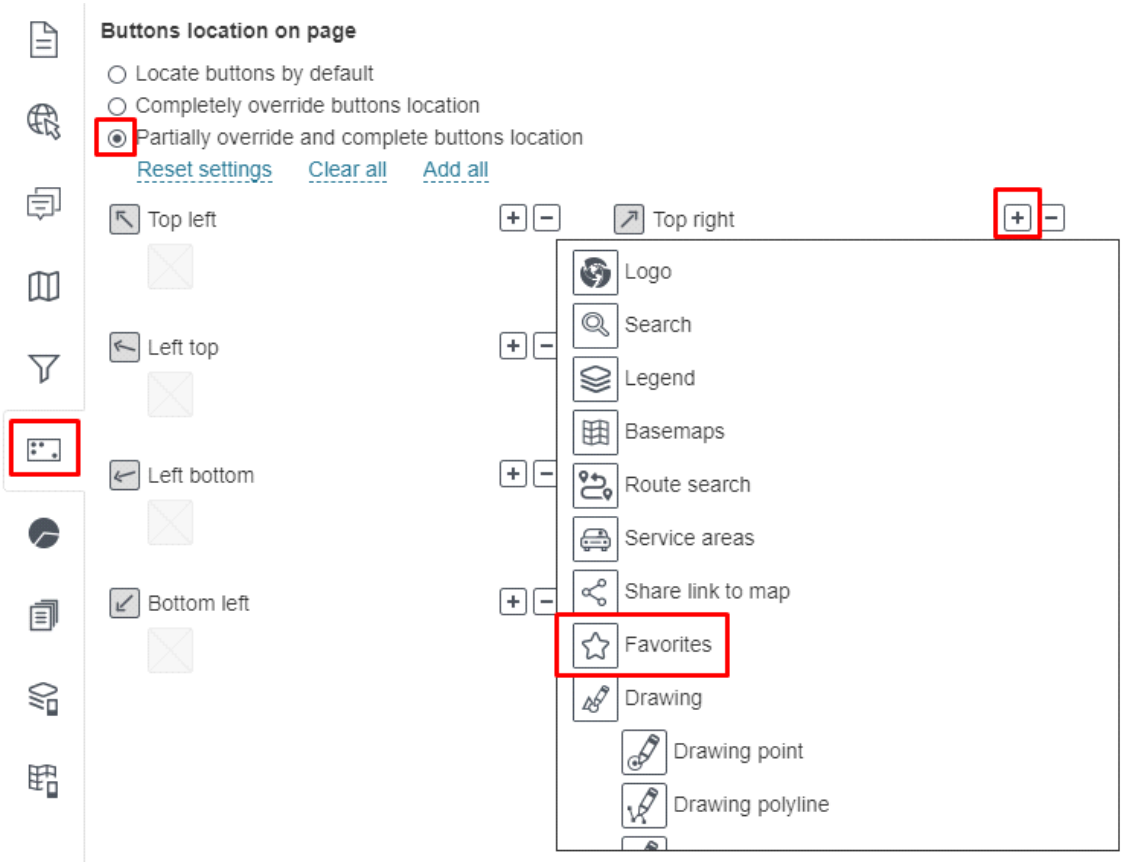


Figure 85 – Location of buttons on map

Check *Partially override and complete buttons location*, select the button location, press and in the drop down list select the line with *Favorites*. To change the button location, you need

to delete this button first and then to set the new place. To delete the button, press and press cross icon in the drop down list as shown on Figure 86.

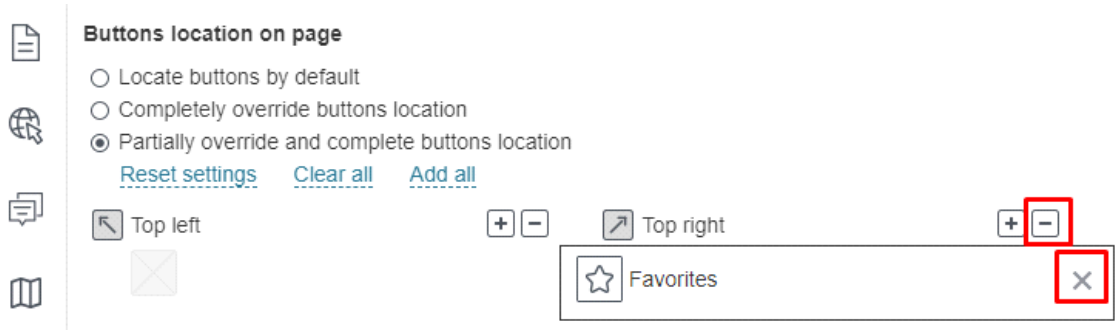


Figure 86 – Deleting button from map

The objects are saved to *Favorites* by pressing *Favorites* button in the Identify card. By default this button is not displayed in the Identify card, if you want to add it, go to *Identify card templates* tab, create the template and in the Services tab - Map service - Identify card check *Use templates in Identify card* and select the created template from the appeared list.

By default all saved extents and objects are displayed in the *Favorites* window. The user can change the name of the extent and object, or delete them. On hover over the extent or the object, the panel with buttons appears, see Figure 87.

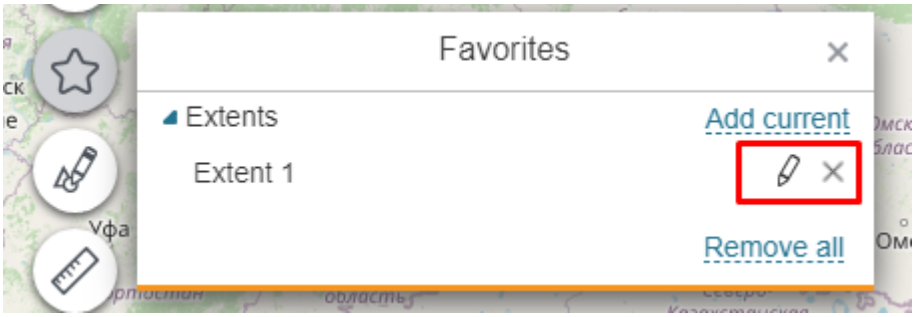


Figure 87 – Saved extents

4.4.3. Graphics templates

Graphics drawn on map can be saved as templates for further use during work with other maps. To do so, you need to add drawing tools on the map . Press *Buttons location on page*, see Figure 88, to open *Buttons location on page* tab.

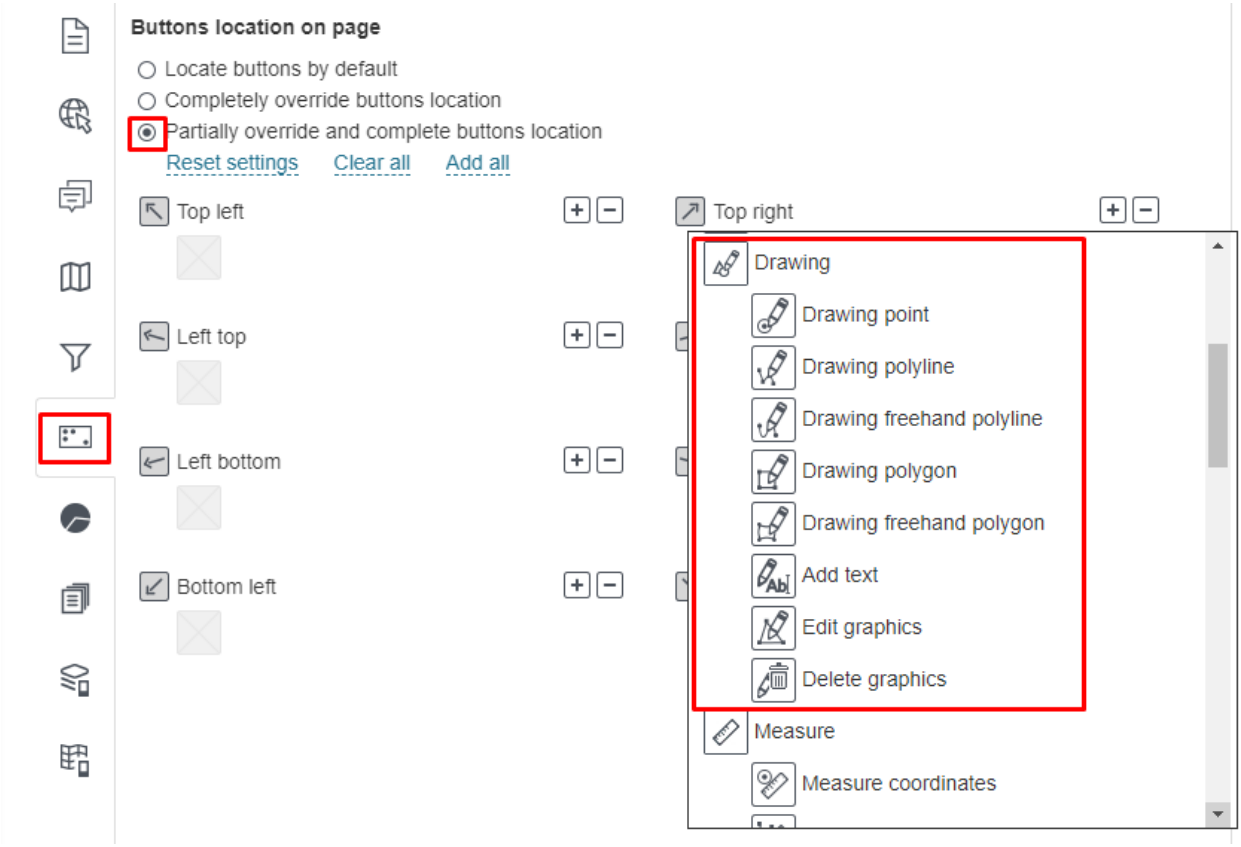


Figure 88 – Buttons location on page

Check *Partially override and complete buttons location*, select where the button will locate and press *Add*. In the drop down list select *Drawing*, to add this button on the map . Place the cursor over the button icon and the graphics drawing panel will appear, see Figure 89.

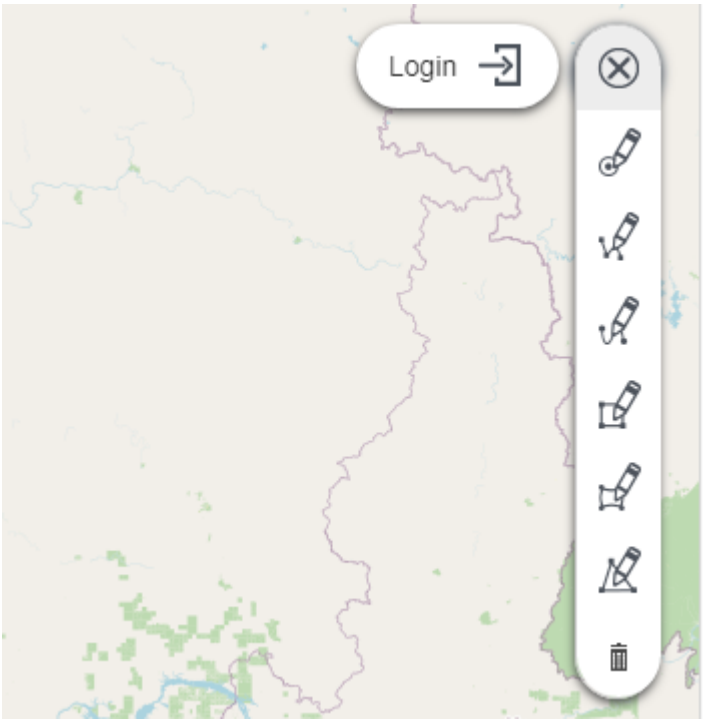


Figure 89 – Graphics drawing panel

You may not add the whole drawing tools panel to map , but add the specific tool button only. To do so, in the drop down list of buttons shown on Figure 88 select the required button.

To change the button location, you need to delete this button first and then to set the new place. To delete the button, press and press cross icon in the drop down list as shown on Figure 90.

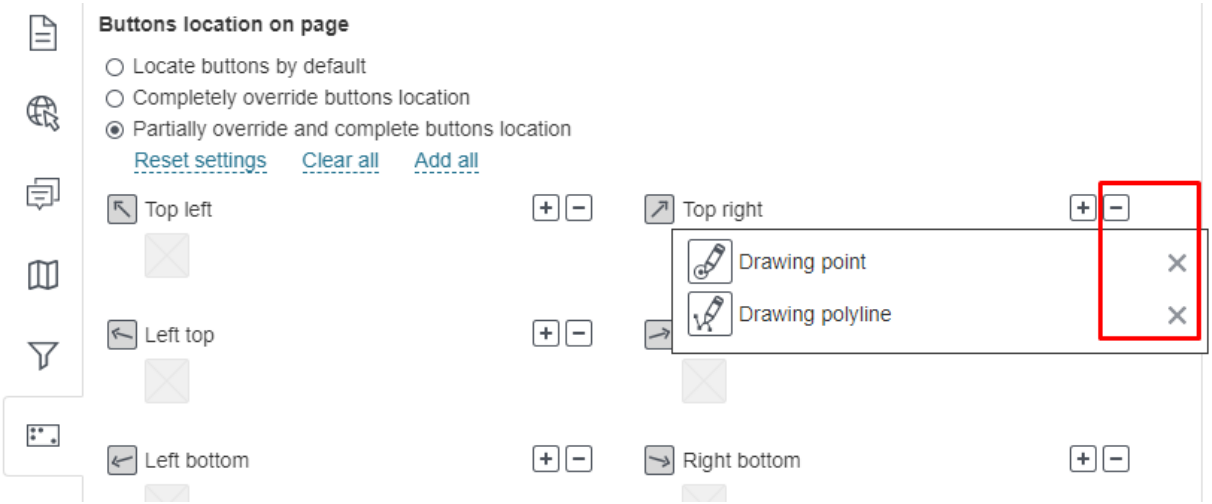


Figure 90 – Deleting button from map

After location of the tool button on the map, press the button to open the *Drawing* window, see Figure 91, where *Drawing point* button is added to the map.

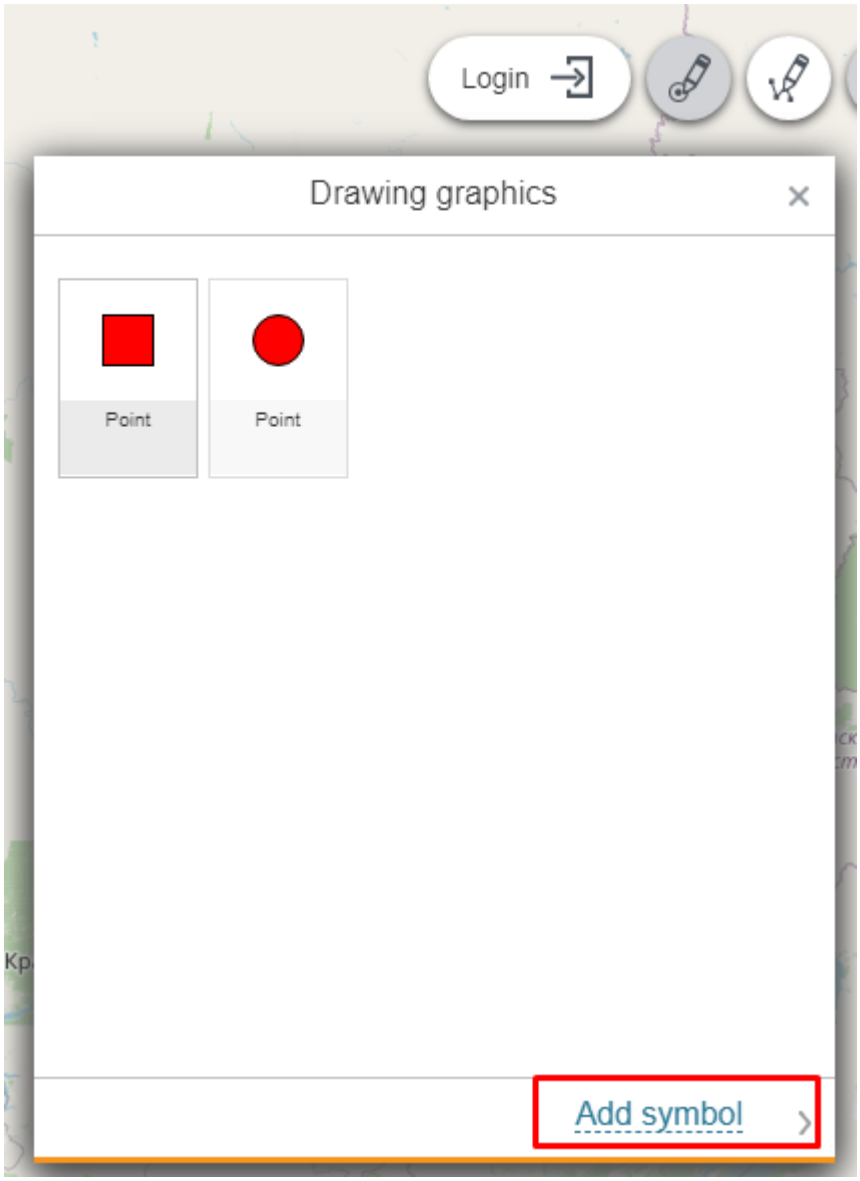


Figure 91 – Drawing window

In the Drawing window the custom templates are displayed. To create such template, press *Add symbol* button to open the symbol parameters settings, see Figure 92.

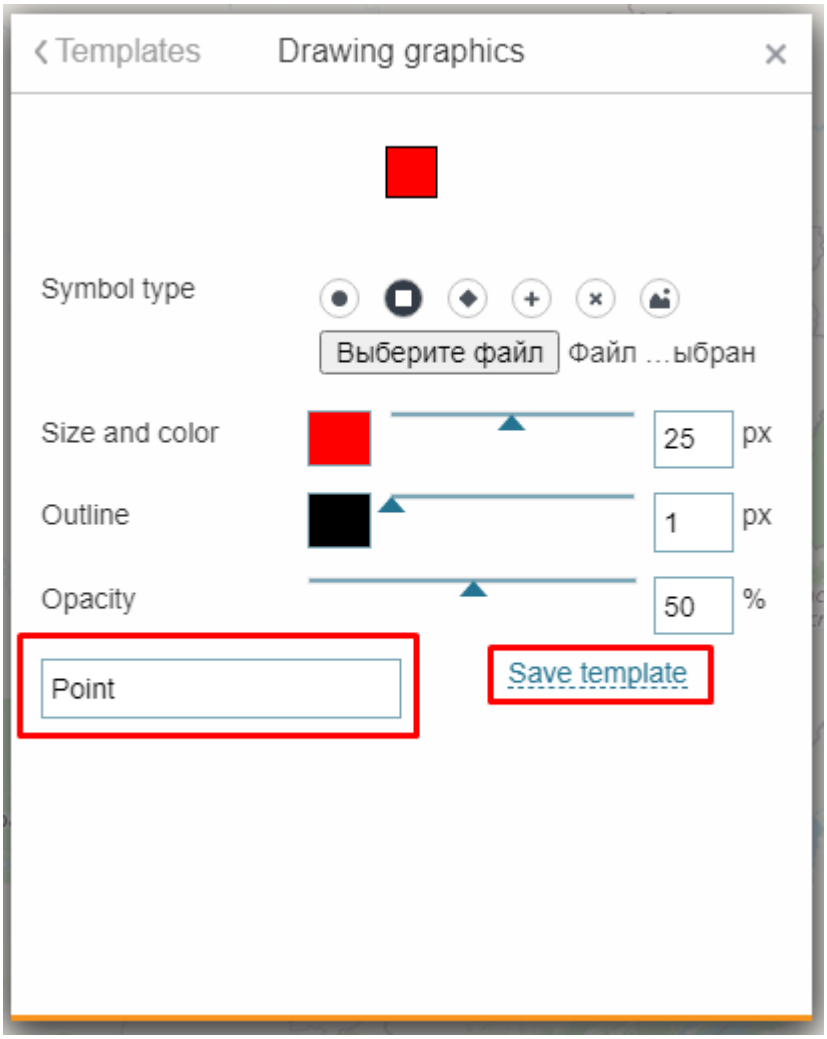


Figure 92 – Symbol parameter settings window

Select symbol type, color, size, transparency, enter the template's name and press *Save template* button. Now you can use this template on any other map , if needed. To do so, check *Saved drawing and layers rendering templates*, see Figure 93, press + near the symbol and select the template from the drop down list. After this the drawing template will appear on the map in the *Drawing* window.

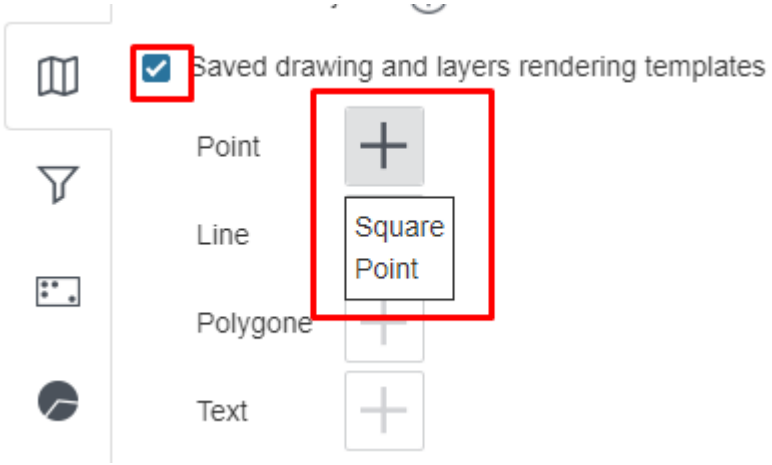


Figure 93 – Symbol parameters

Please note that graphics is not saved on the map. It is saved in the printed form of the map and contains in the server link.

4.5.Tools location on page

Location of buttons and tools on the map is set in the *Buttons location on page* tab that is open by pressing . The tab view is shown Figure 94.

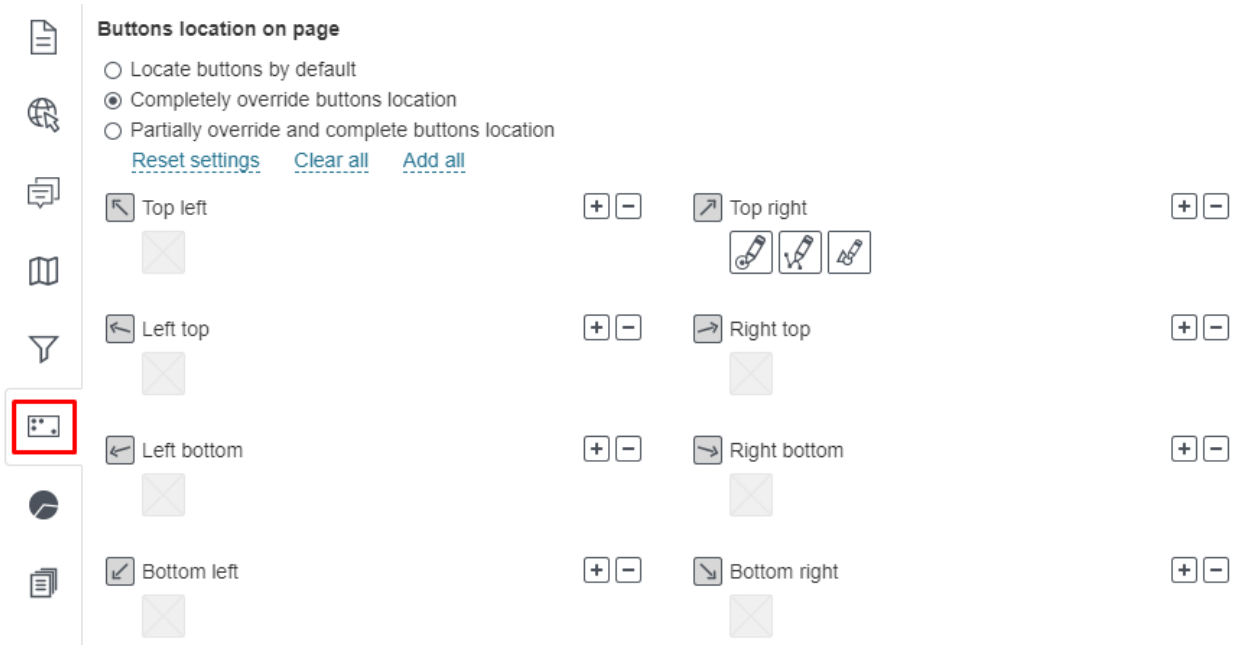


Figure 94 – Tools location on page tab

he default buttons location is set for the map - the *Default buttons location* option is checked. The Figure below shows the default layout of dialog box and toolbar buttons.

Presence of buttons on map depends on specified settings. For example, *Print* button will be shown on map by default if connection to print service is established. The *Widget* button will be shown if widget is added to map and its settings are specified, etc.

If you want to add other buttons to interface set by default, check *Partially override and complete buttons location*, option, select buttons location, press and select required buttons from the list. To completely redefine buttons location, check *Completely override buttons location* option and add needed buttons to map.

4.6.Statistics, widgets and plugins

4.6.1. Statistics, widgets and plugins. General information.

Settings specified on this tab are provided to:

1. Display information containing in the map service layer as graphs, charts and tables.
2. Display reference or descriptive information on map .
3. Specify tools for managing objects display on map .
4. Specify button to generate selected report.

5. Set going to external internet pages.
6. Set plugins.

The first three options are set in the *Widget* section, the fifths and sixth are set in the *Link to website* and *Plugin,* respectively. To go to this sections, select *Statistics, widgets and plugins* tab.

4.6.2. Widget

4.6.2.1. Widget. General information.

On map you can display information containing in the map service layer as following:

- Graphs
- Charts
- Tables
- References.

The information is shown in a separate window, the widget, which button location and view are set by the user. For your map you can set multiple widgets. Each widget consists of one or multiple blocks, where block is the variant of showing information. The widget can contain the following blocks:

- Blocks for showing statistics by map service objects, namely:
  - Graph;
  - Pie chart by rows;
  - Pie chart by columns;
  - Calculated value.

  The following statistical indicators are available:
  - number;
  - sum;
  - average;
  - minimum;
  - maximum.
- The *Scatter chart* block provided for showing which values the object has in specified attribute fields.
- The block with reference information:
  - Source data table;
  - HTML code;
  - Page with link.
- The block with tools for managing objects display on map :
  - Filter by layer attributes;
  - Filtration buttons;
- The block for designing button to generate selected report;
- The block for importing data from file.

Add widget to map and specify its settings. To do so, in the *Statistics, widgets and plugins* tab press *Add widget or plugin* and in the drop down list select *Widget,* see Figure 95.

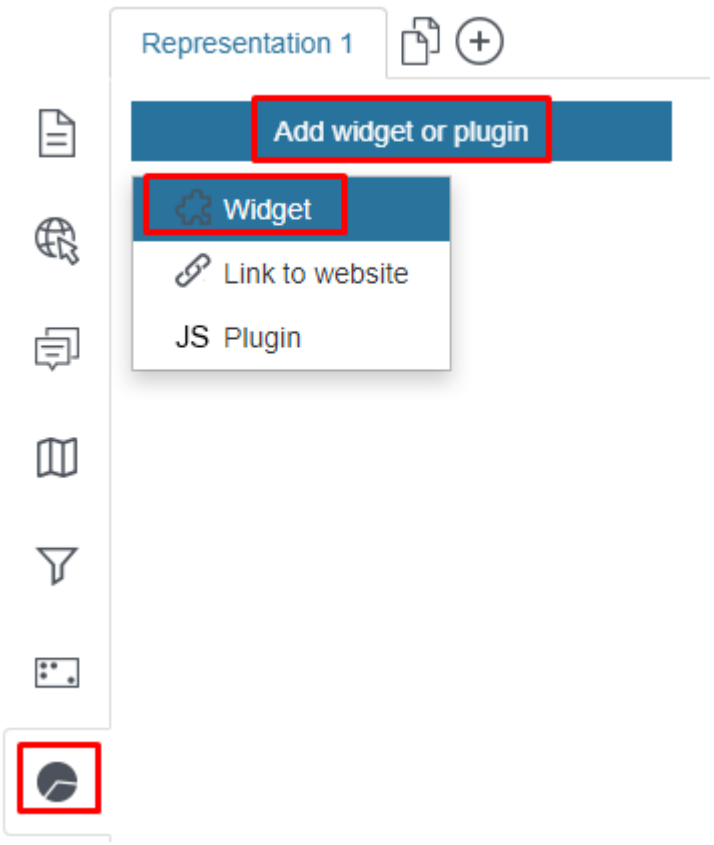


Figure 95 – Adding widget

The widget's Settings window will appear, see Figure 96.

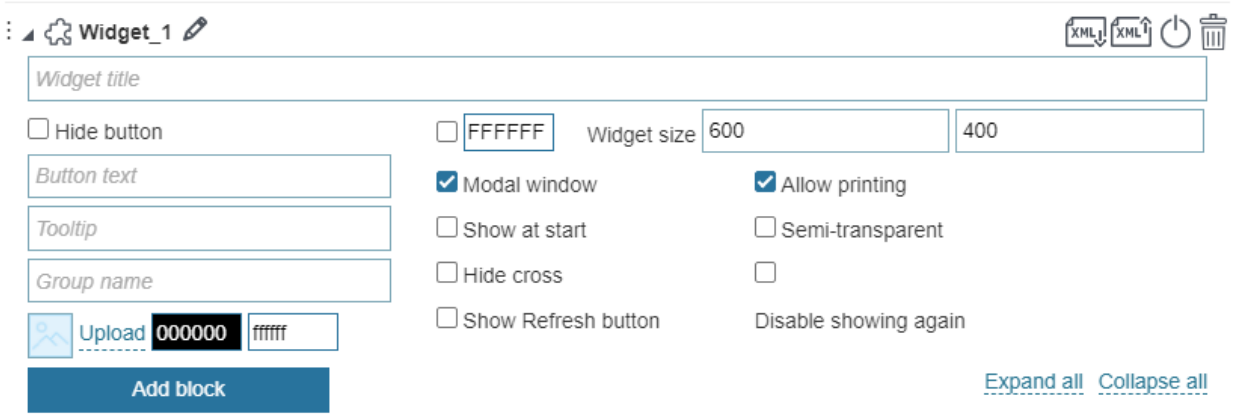


Figure 96 – Setting widget on map

Enter the widget title, set the widget's button, enter the button's text and download the picture, enter the tooltip that will pop up on hover over the button. Select text color and button background. See Figure 97 for details.

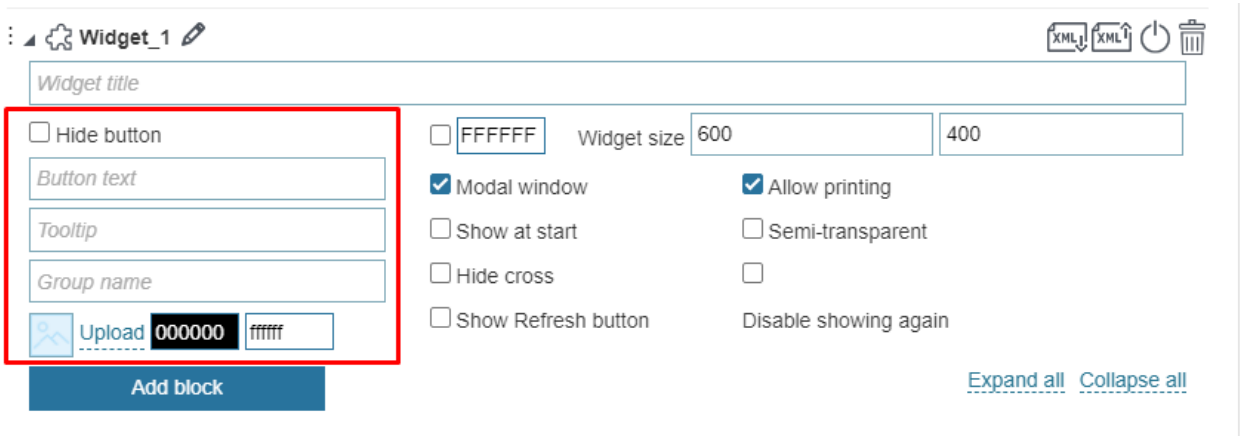


Figure 97 – Setting widget's button

The widget's button will be displayed on map by default, if in the *Buttons location on page* tab the option *Locate buttons by default* is enabled, otherwise add the button manually. To do so, press the button shown on Figure 98, and select the widget in the drop down list of the *Widget* section.

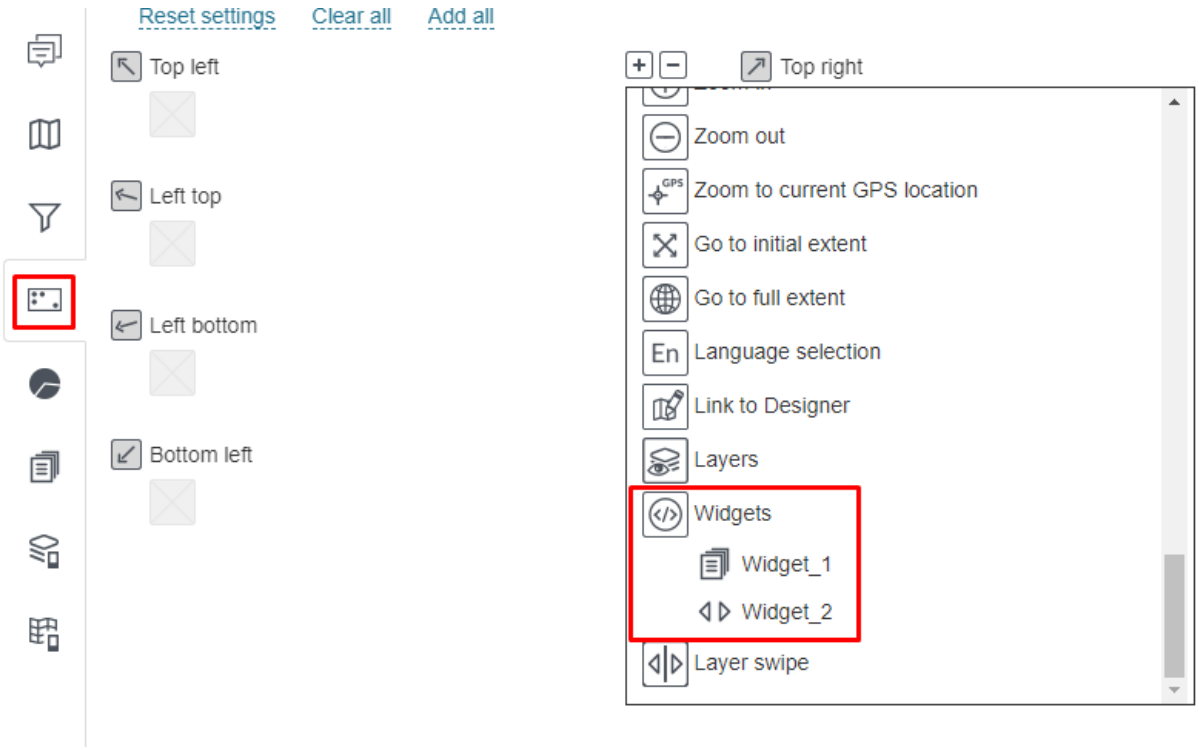


Figure 98 – Adding widget's button to map

By default the widget will be placed in the center of the map , as *Modal window* option is checked by default. Uncheck this option and widget will be placed near the button. The printed form of the widget is available by pressing button that is shown in widget by default because *Allow printing* option is checked by default.

If you want that widget would open by opening map , check *Show at start*. To not allow users to close widget, check *Hide cross*. Note that *Hide cross* option is not available if *Modal window* option is active. To allow users to update statistics displayed in widget blocks, check *Show Refresh button* option. In this case widget will be displayed with icon. To allow users to select

whether to display widget or not, check *Disable showing again*. With these options you can set various conditions of widget display. For example, if you need to display reference information such as *Map description* in the widget, check the options *Show at start, Hide cross, Modal window* and in this case when opening map the widget will be located in the center, the user will read the reference information and close the widget, but they will not be able to open it again, as the *Hide cross* option is selected.

If you created multiple widgets and added their buttons to map , you can divide them into groups, so that they would not overlap when open. To do so, enter the group name in *Group name*. For widgets of one group there is a rule that if user opens one widget on map , and then the second one, the first one will be closed before the second one will be opened.

If needed, specify widget color, size and name, as shown on Figure 99. You can also set widget transparency, checking *Semi-transparent* option.

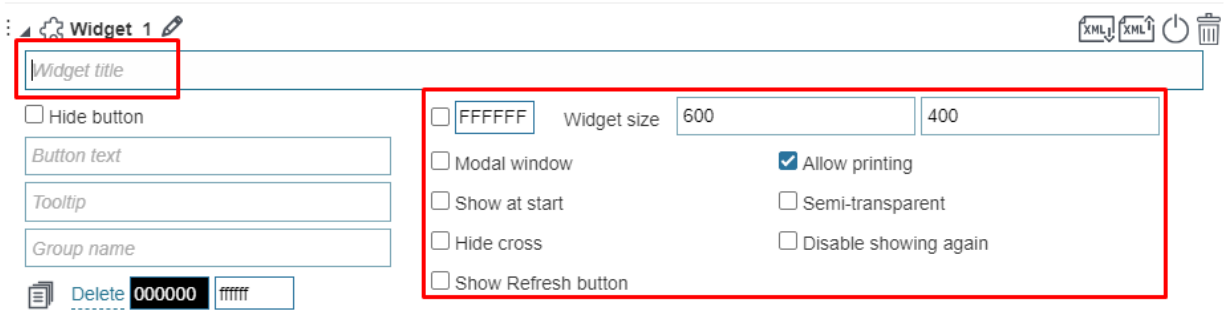


Figure 99 – Setting widget view

To add block to the widget, press the button shown on Figure 100, and select the needed block type in the drop down list.

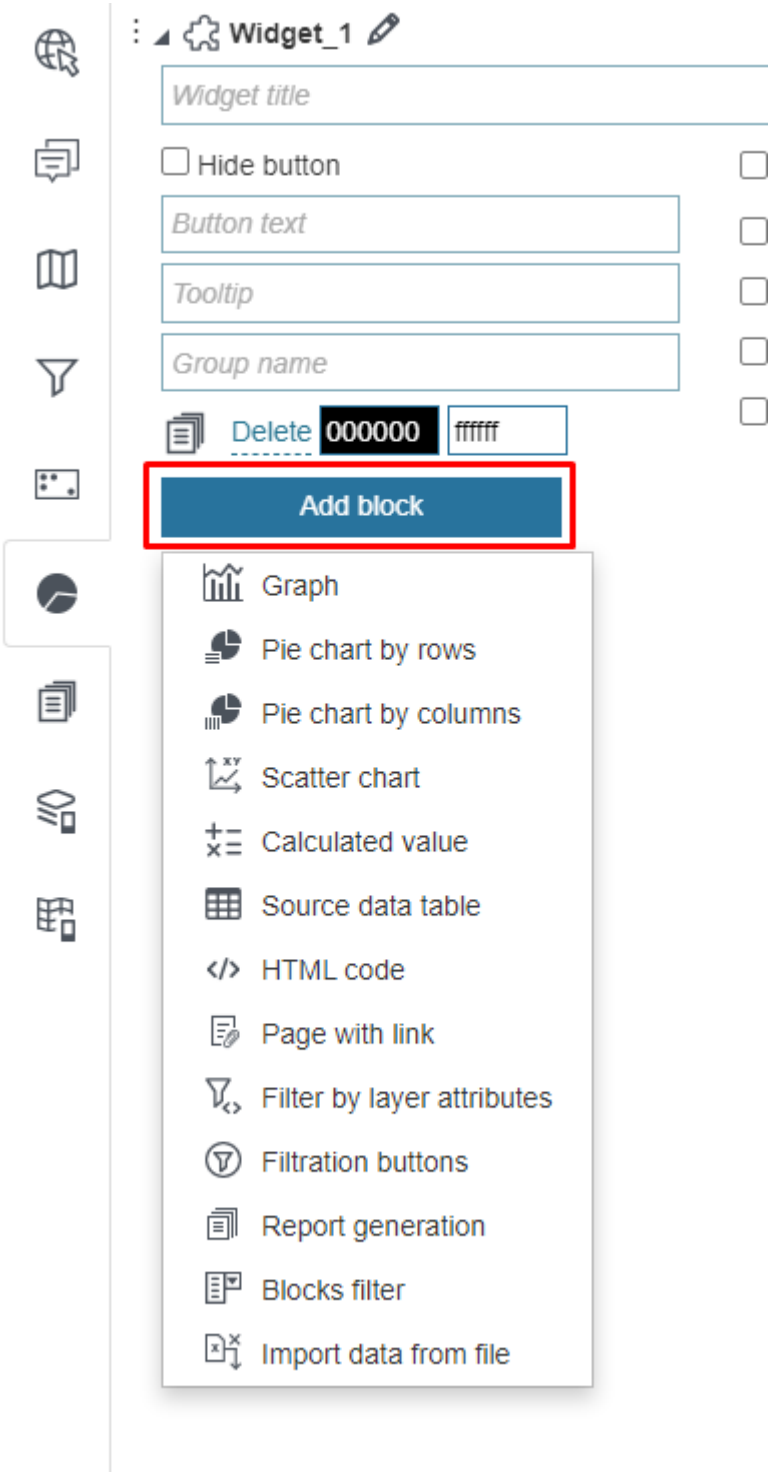


Figure 100 – List of available blocks

Enter the block name, set its size and color, see Figure 101.

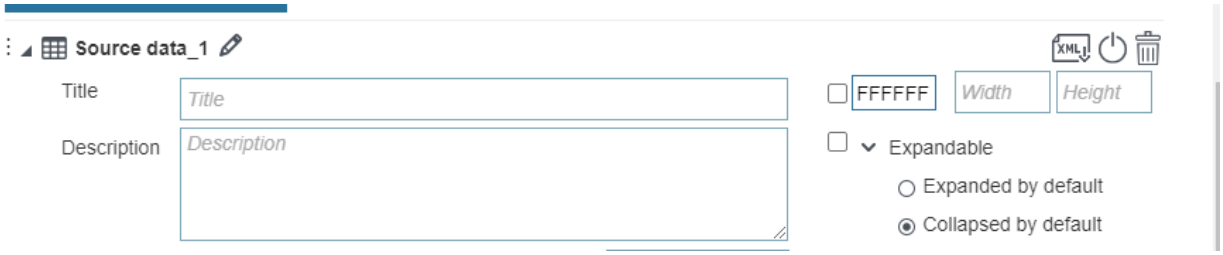


Figure 101 – Setting block view

For blocks *Graph, Pie chart by rows, Pie chart by columns, Calculated value* in the *Recalculation settings* (see section 4.6.2) specify when the data should be updated, which custom settings should be considered and which actions should be available for users.

If you do not need the block so far, press , and the block will not be shown in widget on map , see Figure 102.

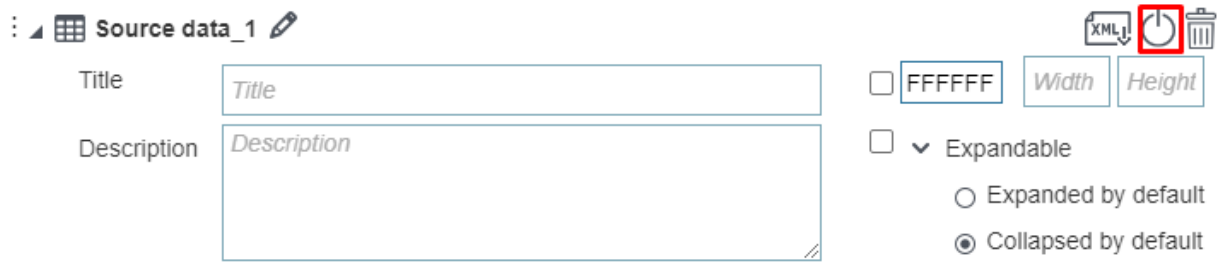


Figure 102 – Setting block view

Each widget can contain multiple blocks. In order to be able to expand or collapse the widget on map , in the block's settings check *Expandable* option shown on Figure 103, and select how you want to display the widget checking *Expanded by default* or *Collapsed by default*, respectively.

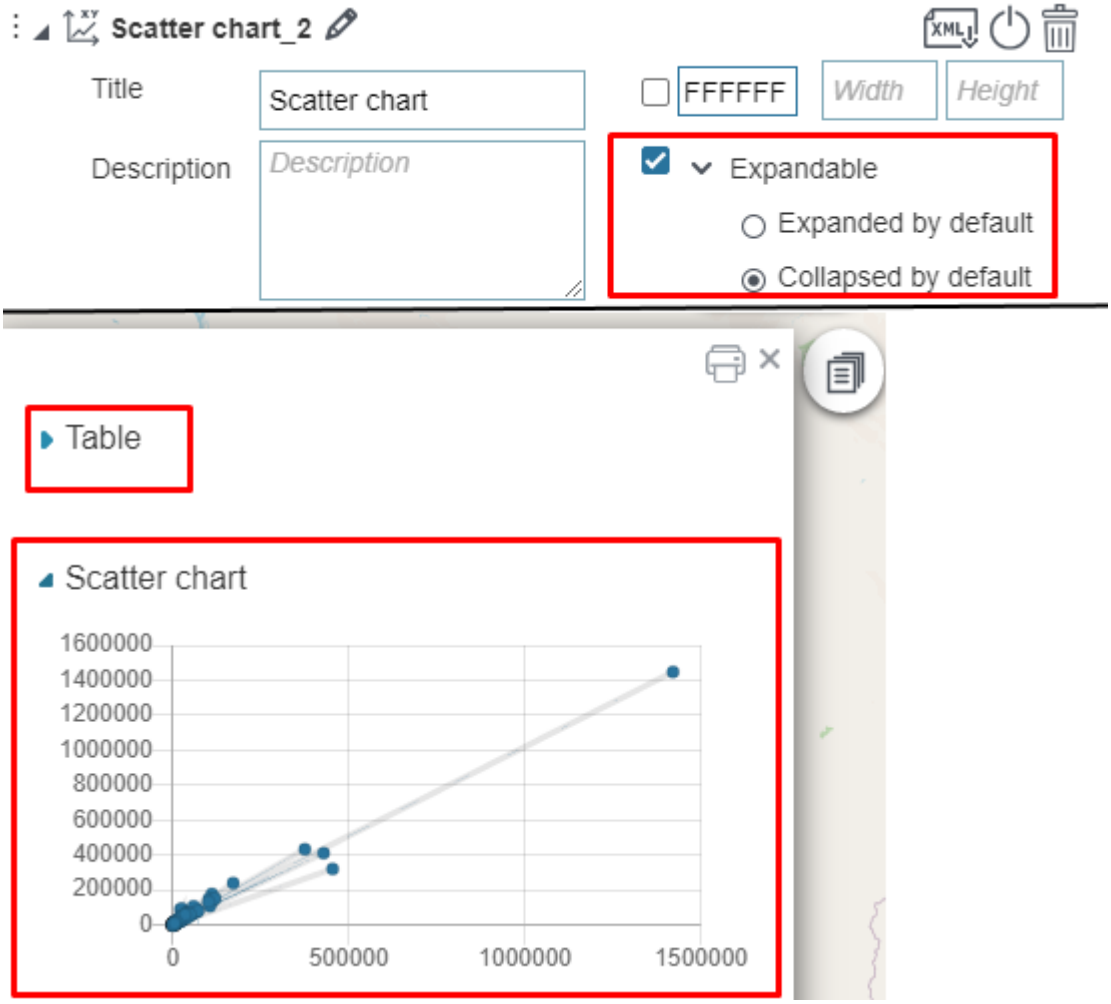


Figure 103 – Setting block's display in widget

If you do not need the widget so far, press , and it will not be shown on map , see below.

104 – Turning widget off

In case if the widget contains multiple blocks and you do not need to see them all at a time, you can use the filtering option. The blocks filter allows setting display of specific blocks only via drop-down list, list of links, or tabs, see example on Figure 105 and Figure 106. To do so, add *Blocks filter* block to widget, specify which blocks of the widget should be filtered and specify other settings. The option *Allow turning off* is provided to disable all the blocks, so that when there are no blocks in the widget that have not been enabled in *Blocks filter* block, the widget's window will be empty by turning all the blocks off. If the block's name would not been specified, then the name from the block's title will be taken. In order to display blocks in *Blocks filter* only and not to duplicate them in the bottom, you need to temporarily disable blocks selected in the *Blocks filter*, by pressing . In the tabs' names and in the links' names it is also possible to use the calculation value macros.

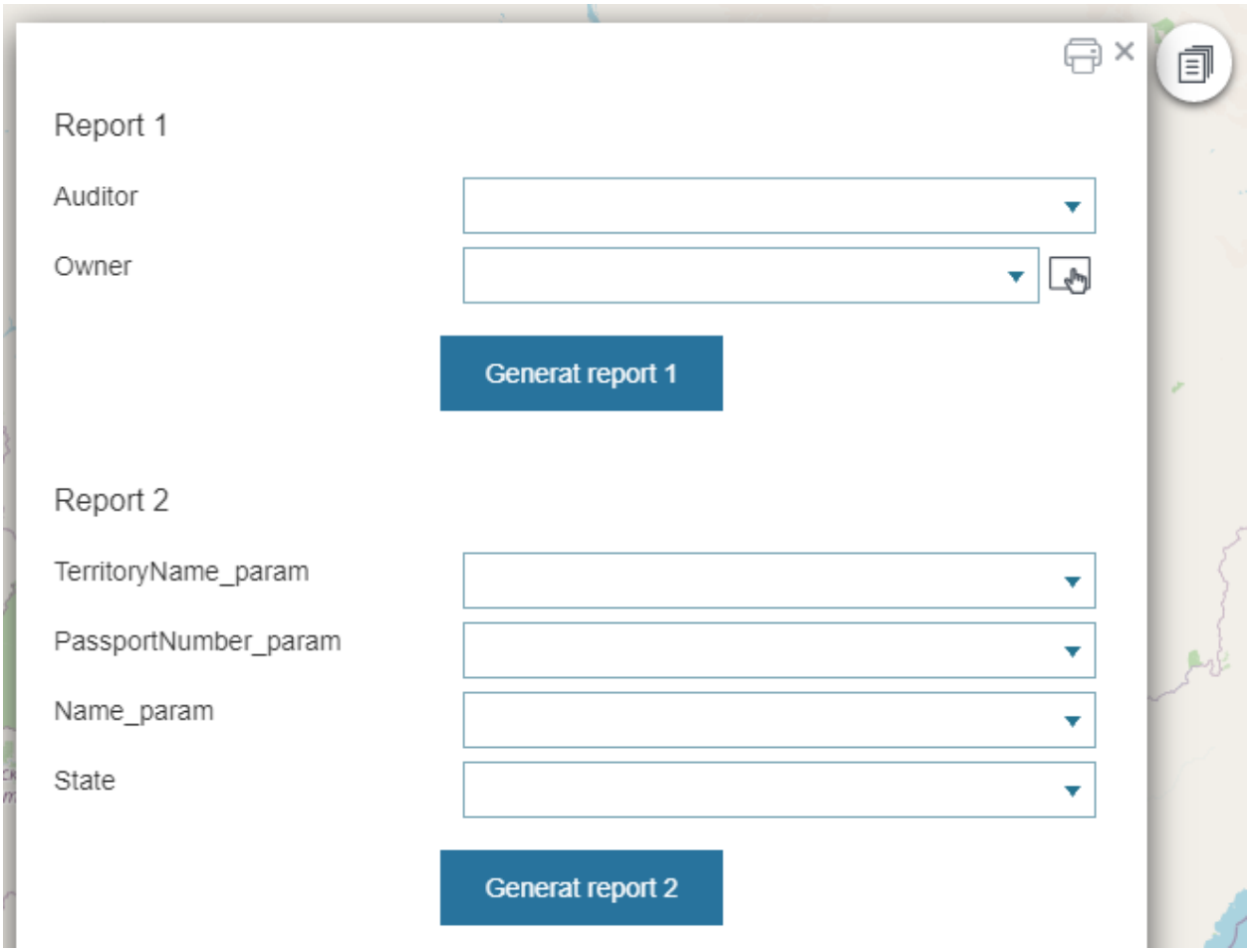


Figure 105 – Widget without Blocks filter

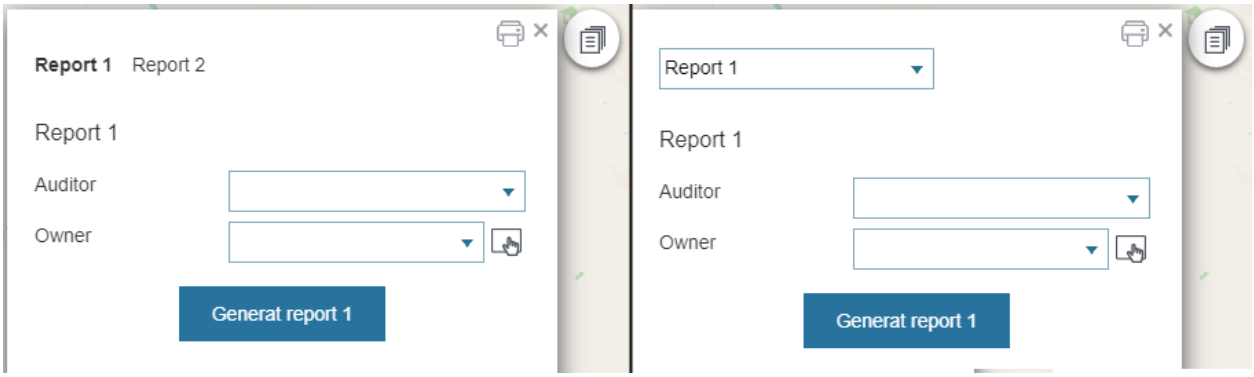


Figure 106 – Widget with Blocks filter

4.6.2.2. Graph, spider diagram, bar diagram and horizontal bar diagram

To visualize information containing in the map service layer and display of statistical data as graph, vertical or horizontal bar diagram, use *Graph _X* block , where X is the order number of created block.

Select the required visualization method by pressing the buttons shown on Figure 108:

1. Press if you want to display information as graph, for example, to demonstrate the data trends for specific period.
2. Press if you want to display information as vertical bar diagram, see Figure 107.
3. Press if you want to display information as horizontal bar diagram. The horizontal bar diagram is the graph which bars are drawn horizontally. It is used when the names of the bars are more important than the statistical values.
4. Press if the information contained in the map service layer is to be displayed as a spider diagram.

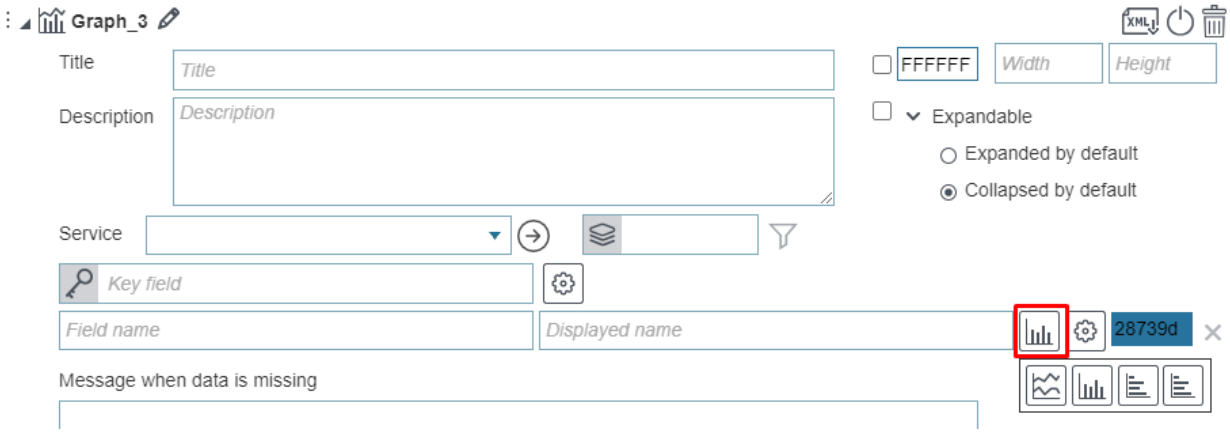


Figure 108 – Selecting data visualization method

Enter the block title and description if needed. Set the size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the current representation of map . In the block you can use specific map service layers, and not only those layers that have been added to map when establishing connection to map service in the *Service* tab. To do so, specify the number of the layer or group layer in *Layers*. Set condition

on the attribute field values pressing and in the popup field enter SQL query, as on Figure 109, for example, where the entered query imposes condition on the `GroupsCount` attribute field, and `null` values will not be displayed in the block.

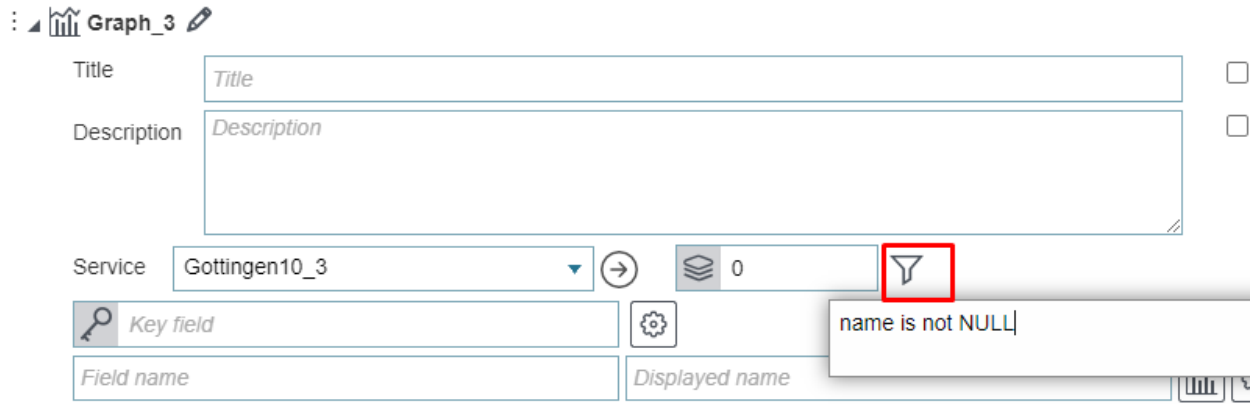


Figure 109 – Condition on attribute field value

On the horizontal axis the values of attribute field which name is specified in *Key field* are put. On the vertical axis the calculated values of the statistical characteristic by objects with values from the attribute field which name is specified in *Field name* are put. Now select which statistical characteristic will be calculated, press *Settings* button shown on Figure 110 and in the drop down list *Show* select the needed item. By default, the *sum* type is selected. Values of non-numerical key field are put on the horizontal axis depending on values of statistical characteristic and selected sorting. Sorting type is selected in the drop down list *Sorting*. The example on Figure 110 shows information about the kindergartens occupancy, namely the number of groups in kindergartens. The key field is the number of groups `GroupsCount`, statistical characteristic is the number.

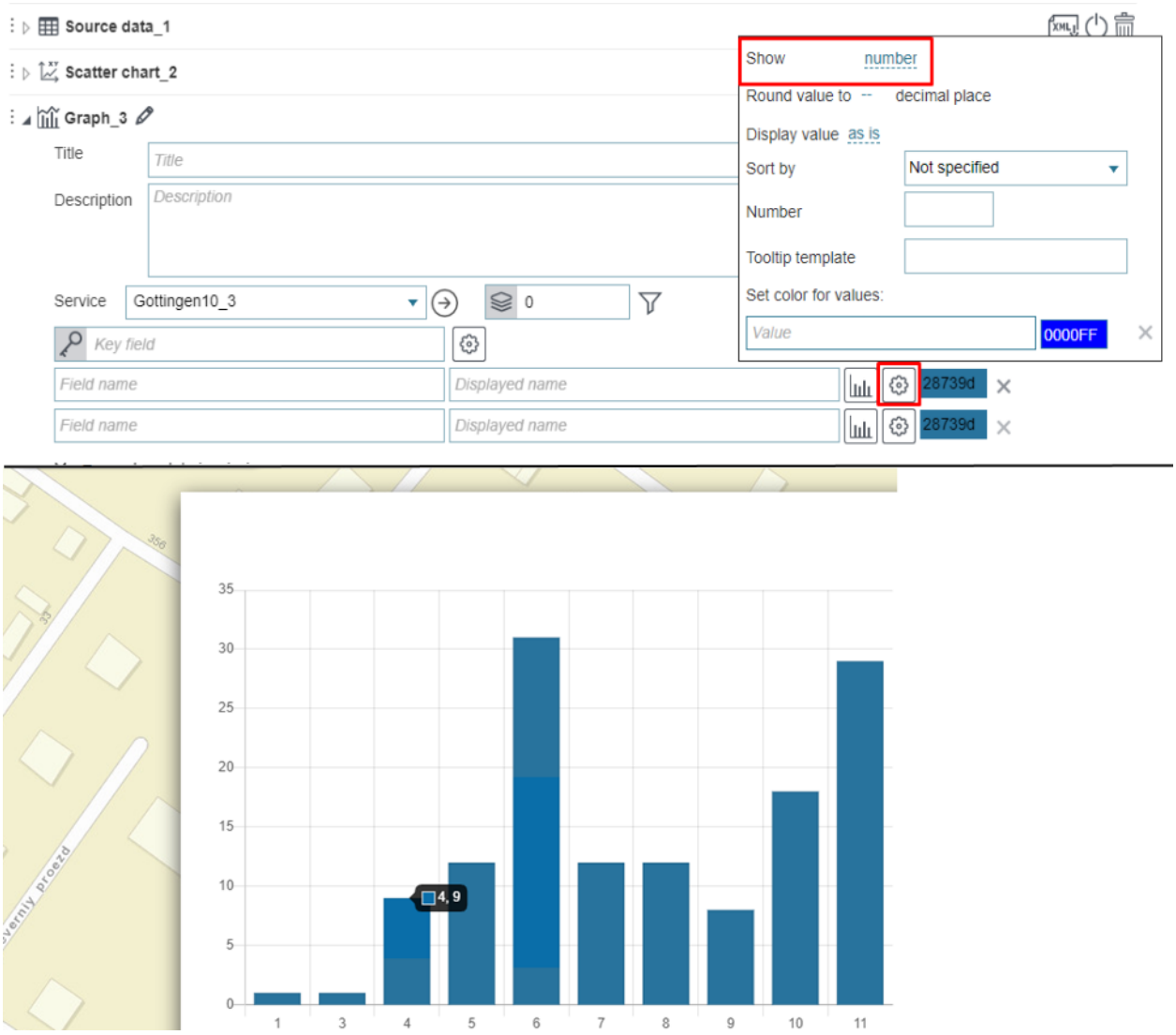


Figure 110 – Displaying information as bar diagram

Besides, the number of the horizontal axis partitions is specified in *number*. Here it is also defined in which format the statistical values will be displayed, *as is* option is selected in the *Display value* list, i.e. the values will be displayed in the format set for the attribute field in the map service layer. Or, you can select to display statistics values in percent, thousands, etc.

On hover over the diagram bar the pop-up tip appears, see Figure 111. The tip shows coordinates of vertical and horizontal axis, on the example the tip shows that each of the 12 kindergartens have 5 groups. This tip template is created using macros `{xLabel}`, `{value}`. You can create your own tip template. Enter the text and use macros`{xLabel}`, `<{value}>` in the *Tooltip template* field, as shown on Figure 111.

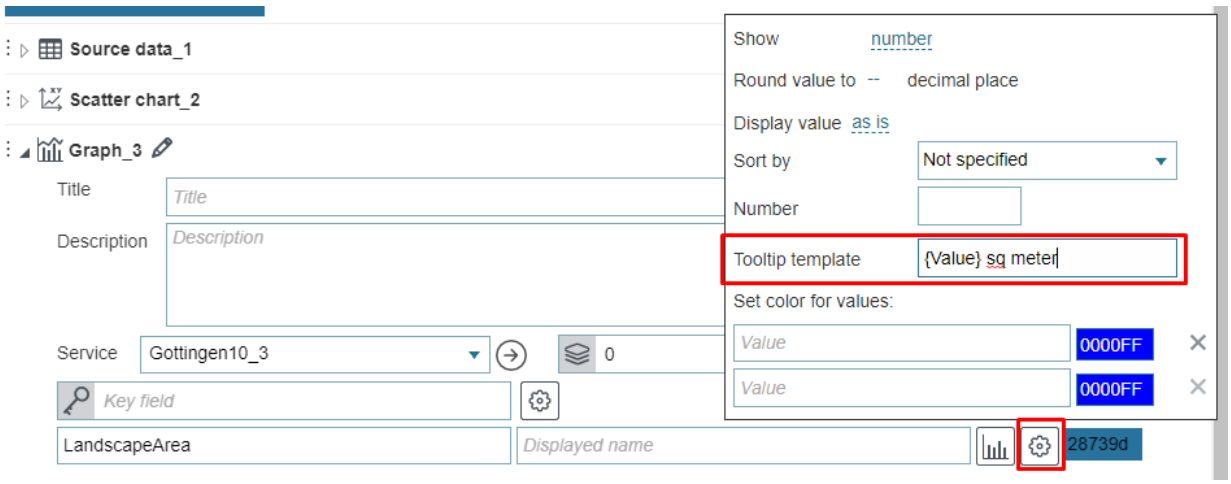


Figure 111 – Example of tooltip template

By default, the tooltip displays the value on horizontal axis, and the name of the attribute field specified in the *Field name* with value on the vertical axis. If you need that instead of the attribute field name the tooltip displays specific text, enter it in the *Displayed name* field. On Figure 112 see the example of the default tooltip and predefined tooltip.

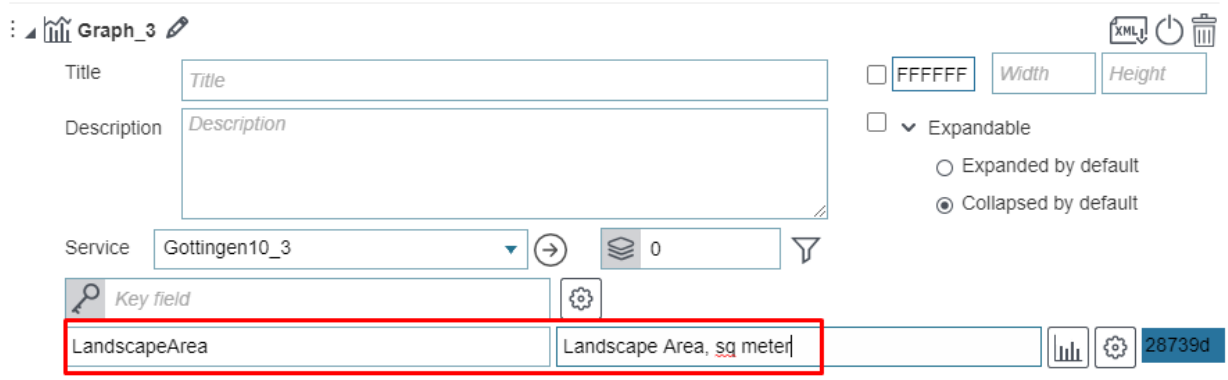


Figure 112 – Tooltip examples

If you need that the tooltip is displayed on the diagram, press *Settings* shown on Figure 113, and check *Hide tooltip* option in the pop up window.

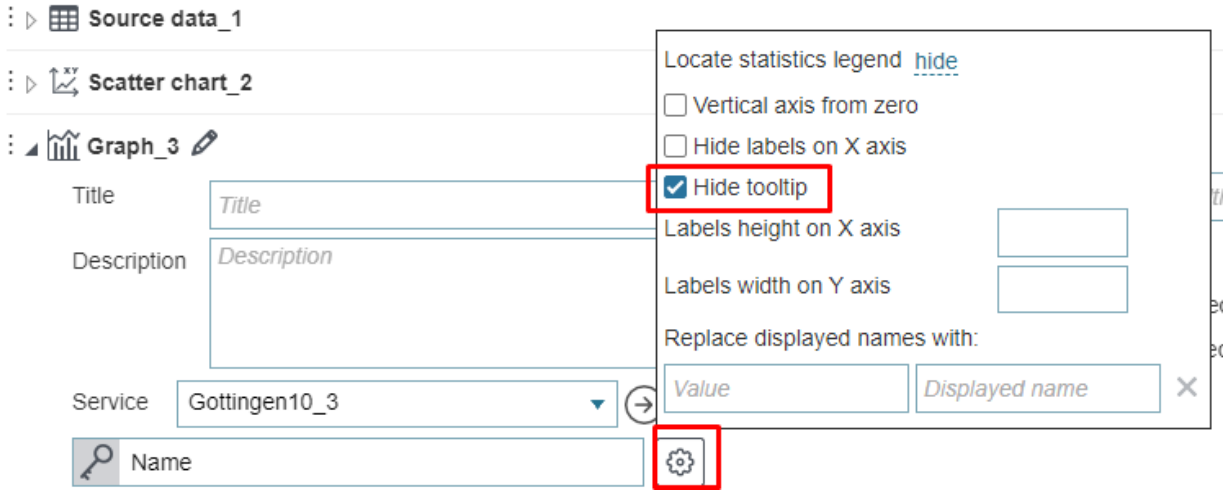


Figure 113 – Hide tooltip option

In order that the horizontal axis is displayed without partitions and labels to these partitions, check *Hide labels on X axis*. You can limit the area for partition labels, just enter the required number in the *Labels height on X axis* and *Labels width on Y axis* fields.

If attribute field values set for the map service layer are not appropriate to be displayed on the diagram for some reason, you can redefine them. Press *Settings* shown on Figure 114 and in the *Replace displayed names with* in the left window enter attribute field value as it is stored in the map service layer, and in the right window enter the value that needs to be displayed on the diagram and in the tooltip on the map .

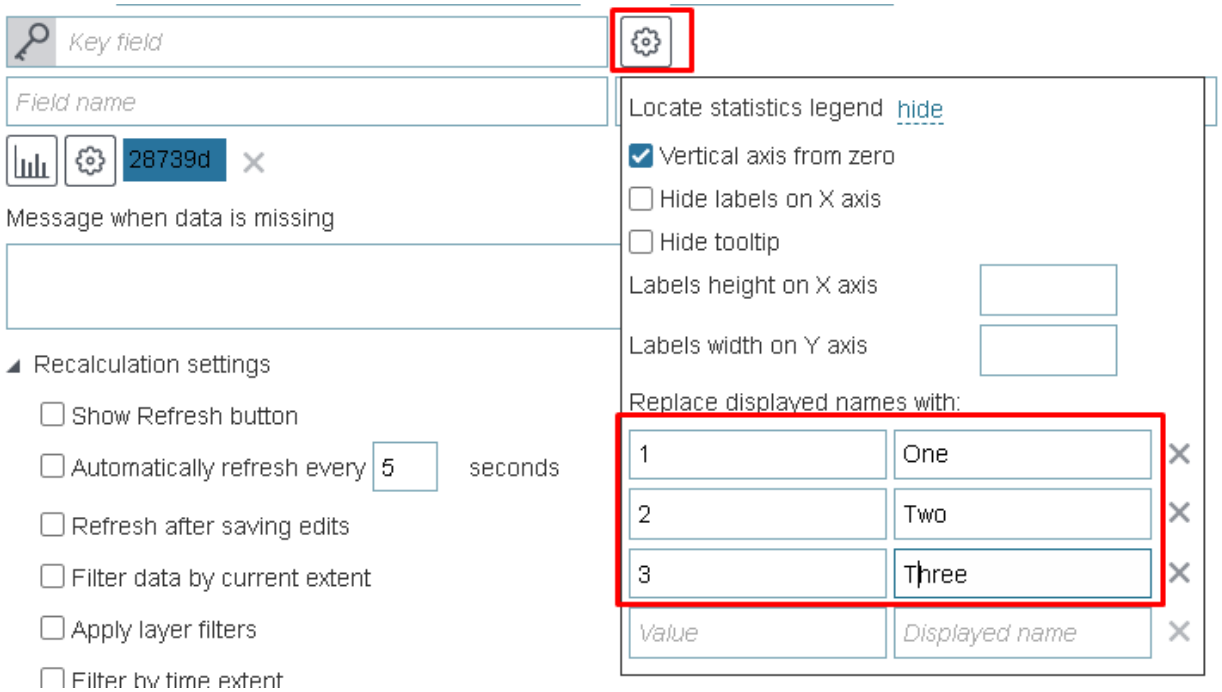


Figure 114 – Setting display of redefined values on diagram

When entering a long name, some deviation from system coordinate origin may occur. To avoid it, check *Vertical axis from zero*.

You can specify color for the diagram bars, press *Settings* shown on Figure 115, in *Set color for values:* enter the value of attribute field as it is stored in the map service, and select the color.

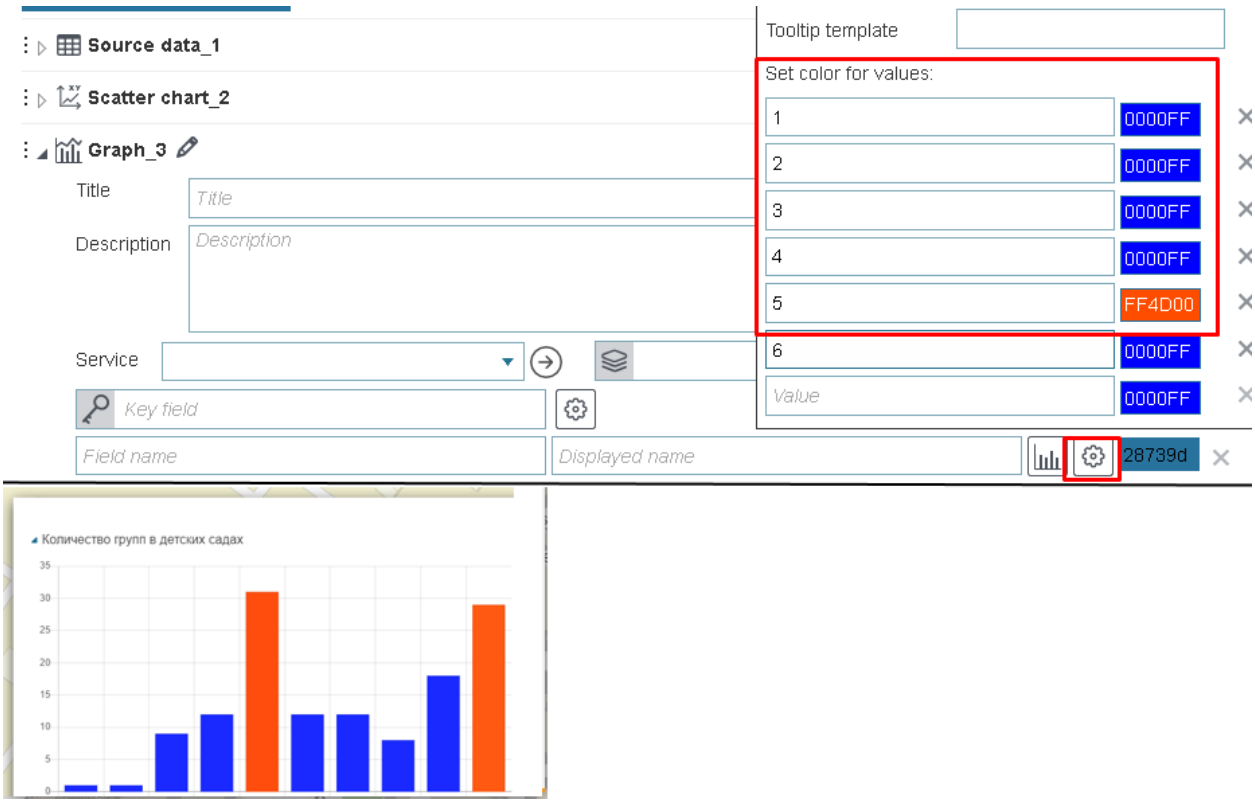


Figure 115 – Setting color for the diagram bars

In the block, for one coordinate system you can display the combined diagram built based on values of one key field that are put on the horizontal axis, and the values of attribute fields that are put on the vertical axis. To do so, enter the name of one more attribute field in the additional *Field name* field, select its values display method and specify other settings. The components of the combined diagram can be marked with different colors, to do so, press the button shown on Figure 116, and select the needed color from the color picker.

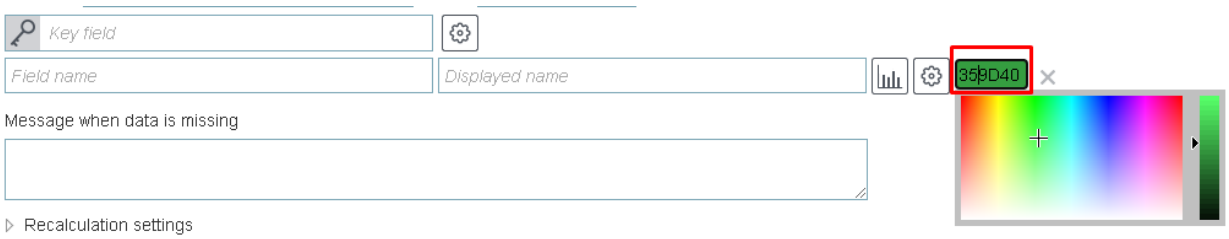


Figure 116 – Setting diagram color

Besides, in the block you can specify which information is shown in each component of the combined diagram. Press *Settings* button shown on Figure 117, in the drop down list *Locate statistics legend* select where diagram legend should be placed. The diagram legend represents color identifiers with names of the attribute field specified in the *Field name*. If texts are specified in the *Displayed name* fields, the diagram legend will show color identifiers with texts.

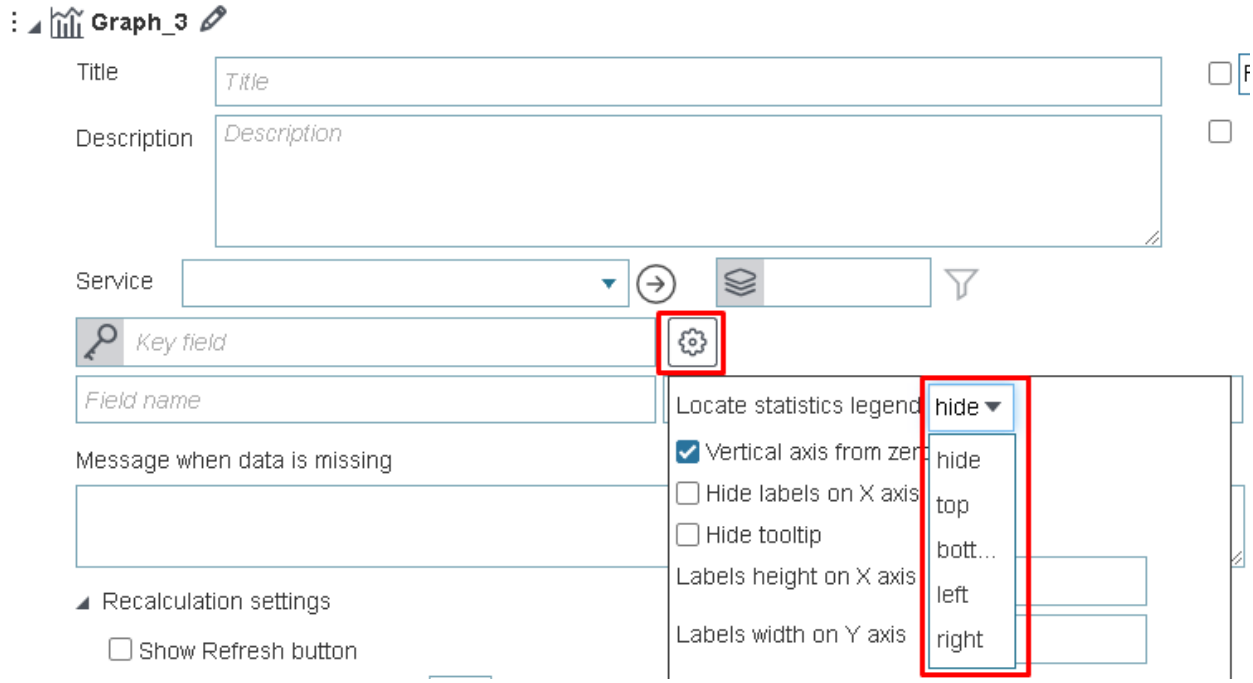


Figure 117 – Variants of combined diagram display

The color identifier with the text allows managing display of the combined diagram components. That is, if you press the color identifier with the text, the diagram will be hidden and the identifier will be marked strikethrough, as shown on Figure 117.

In case if data is missing, you can create the appropriate message informing users about this. Enter the required text in the *Message when data is missing* field.

The block contains information from the map service layer and statistical value calculated by objects of map service. If you need that in case of map service republishing or data editing the updated information is displayed in the block, specify conditions when the map service data in the block should be updated. In order that data shown in the block conformed with the filtration criteria specified by the user in the layer menu of the *Legend* tab, and in order to provide users with tools for managing information display in the block, refer to the *Recalculation settings* section shown on Figure 118, see section 4.6.2 for more details.

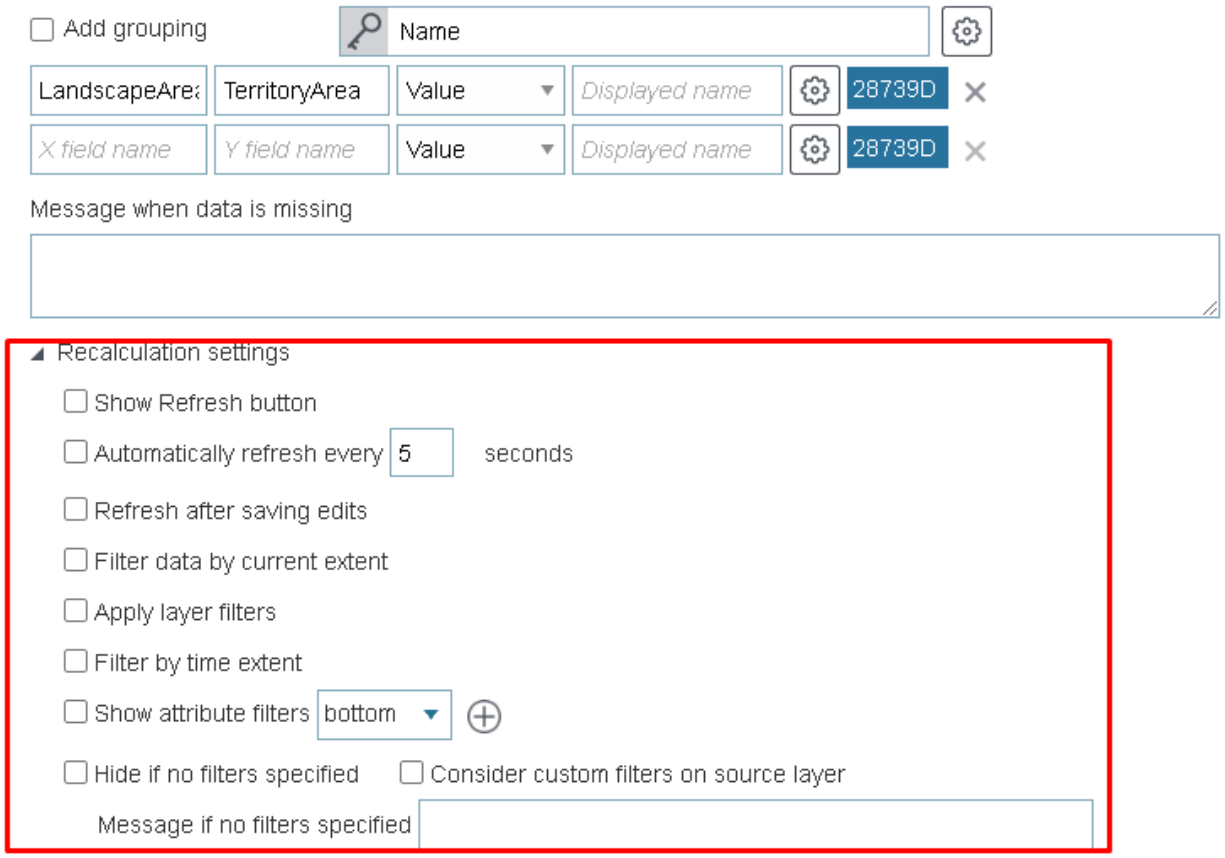


Figure 118 – Recalculation settings window

4.6.2.3. Showing statistics data as pie doughnut and polar charts

4.6.2.3.1. Pie and doughnut charts by rows

Pie and doughnut charts represent data as proportional parts of the whole. By default the pie chart is built, but you can select another chart type, to do so, check *Show as doughnut chart* option in the block, see Figure 119.

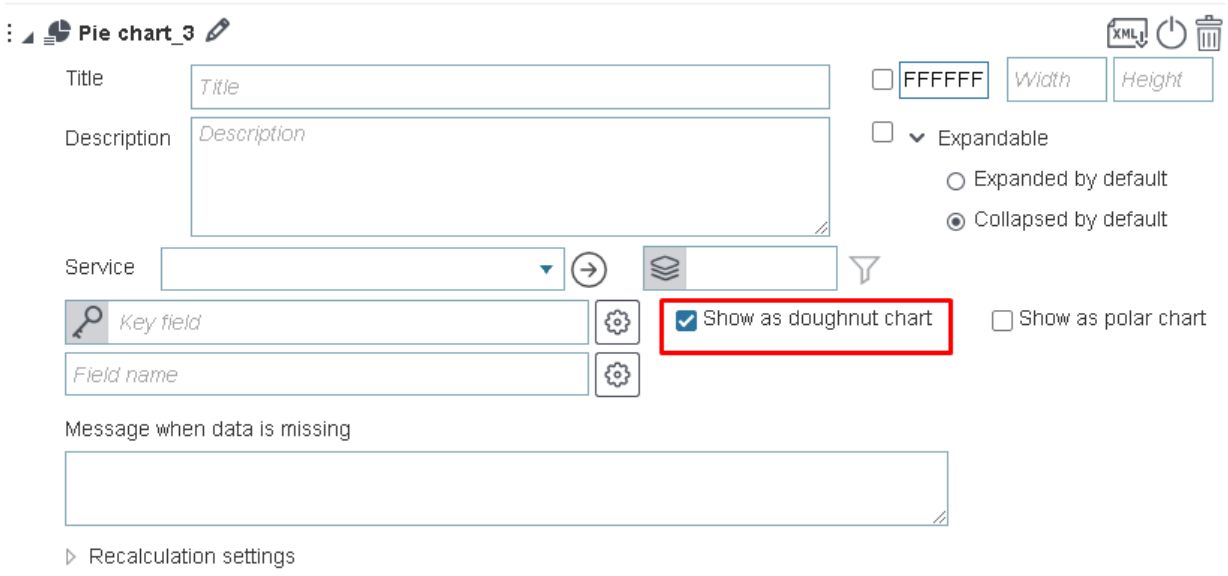


Figure 119 – Doughnut chart

Enter the block title and description if needed. Set the size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the

current representation of map . In the block you can use specific map service layers, and not only those layers that have been added to map when establishing connection to map service in the *Service* tab. To do so, specify the numbe r of the layer or group layer in *Layers*.

Slices of the pie and doughnut charts are built by grouped values of the numeric attribute field or by value of the attribute field with specified domain of coded values. Enter the attribute field name by which the parts of the pie chart will be built, in the *Key field* field. Now select which statistical characteristic will be calculated, press *S ettings* button shown on Figure 120 and in the drop down list *Show* select the needed item. By default, the *sum* type is selected.

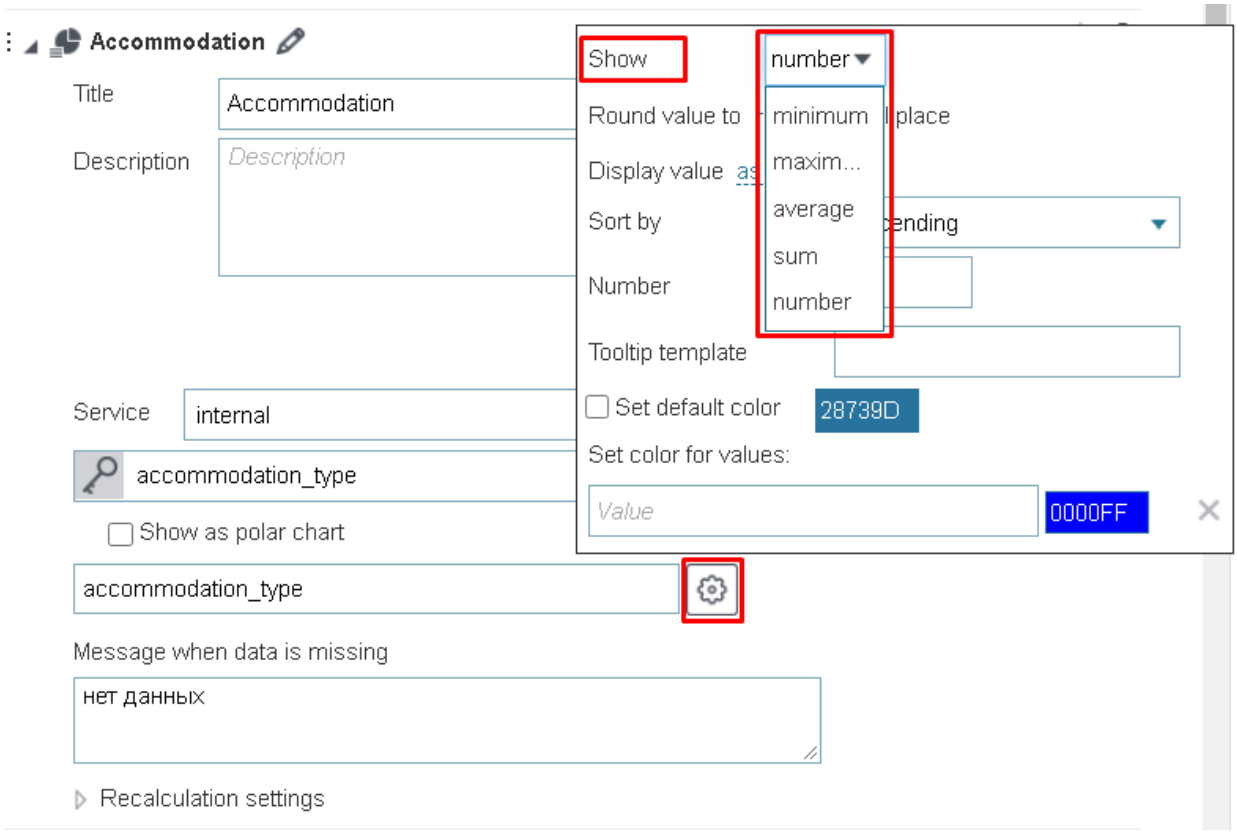


Figure 120 – Selecting statistical characteristic

If you need to hide specific attribute field values from the diagram, set condition on the attribute field values pressing and in the popup field enter SQL query, as on Figure 109, for example, where the entered query imposes condition on the `CreateClient` attribute field, and `null` values will not be displayed on the diagram.

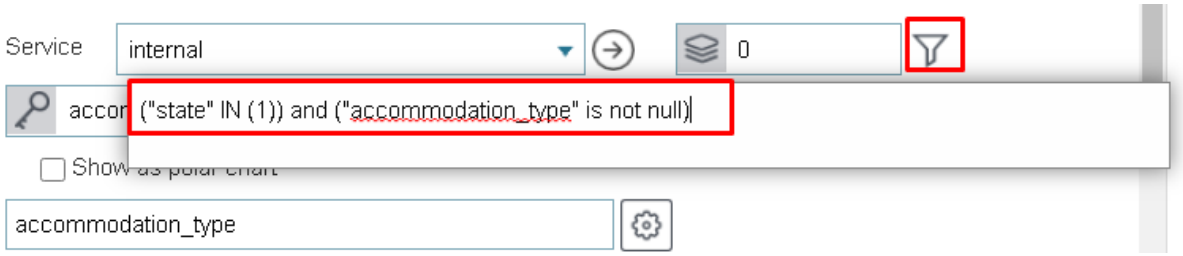


Figure 121 – Setting condition on the attribute field values

The chart slices color is defined randomly. If you want to select specific color for each slice, press *Settings* shown on Figure 122, and in the *Set color for values* in *Value* enter the attribute field

name as it is stored in the map service layer, and select the color. For example, in *Key field* the name of the attribute field with set domain of coded values is entered. To set specific color for each part, enter the coded value as it is stored in the map service layer, to *Value* field. Now click the color picker icon and select the color.

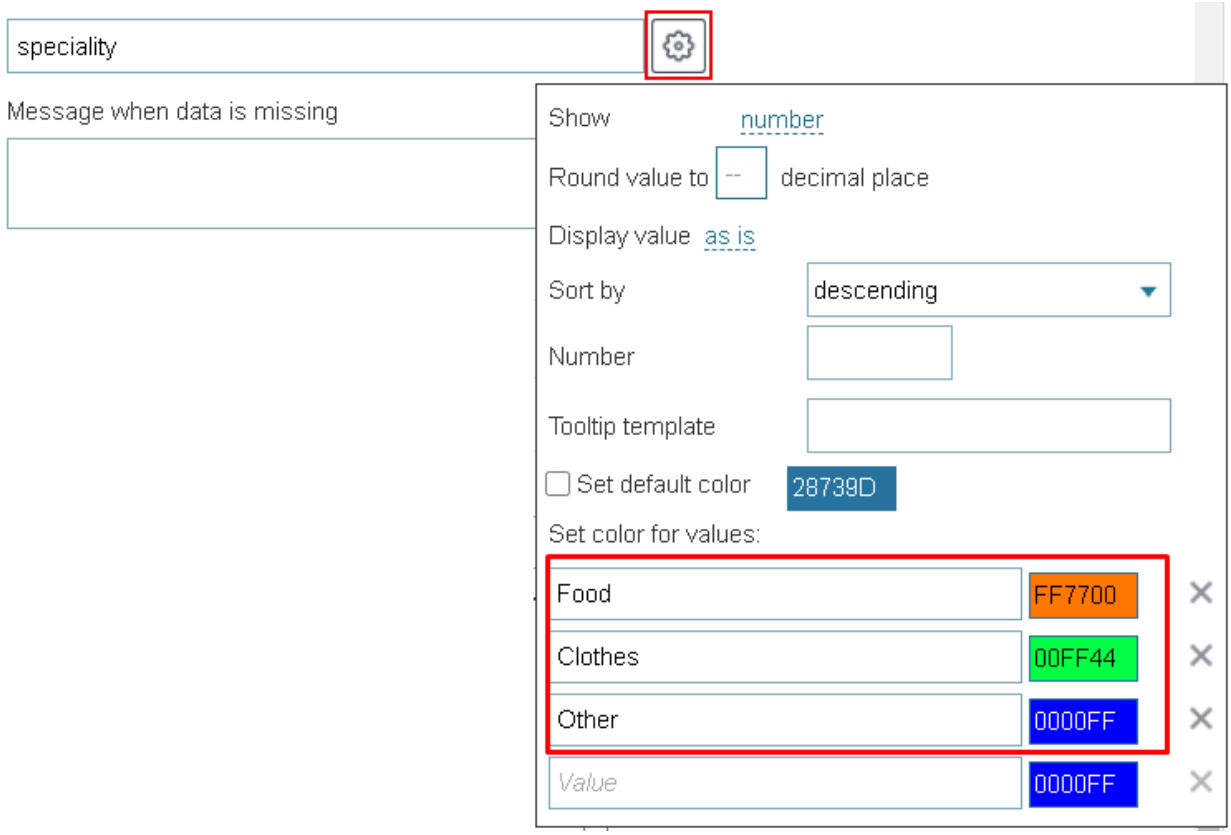


Figure 122 – Selecting pie chart slices colors

By default the chart legend is not shown in the block. If you want to add the chart legend, press *Settings* , see Figure 123, and in the popup window in the drop down list *Locate statistics legend* select location of the legend.

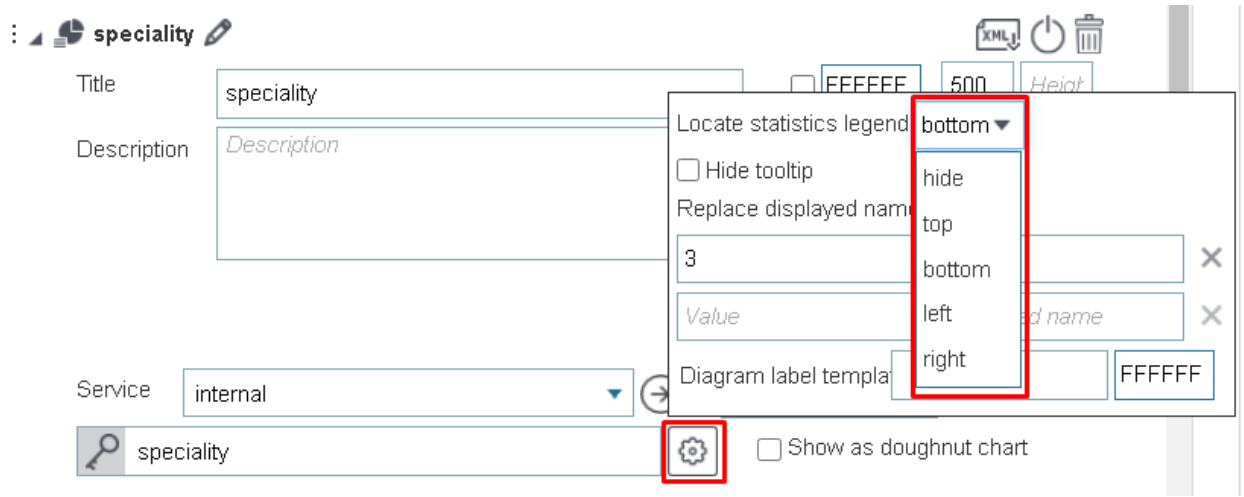


Figure 123 – Selecting chart legend location

The chart legend represents color identifiers of the slices with coded values of the attribute field as they are stored in the map service layer. The example of the chart legend is shown on Figure 124.

Figure 124 – Specified location of the chart legend

If attribute field values set for the map service layer are not appropriate to be displayed on the diagram for some reason, you can redefine them. Press *Settings* shown on Figure 125 and in the *Replace displayed names with* in the left window enter attribute field value as it is stored in the map service layer, and in the right window enter the value that needs to be displayed on the diagram and in the tooltip.

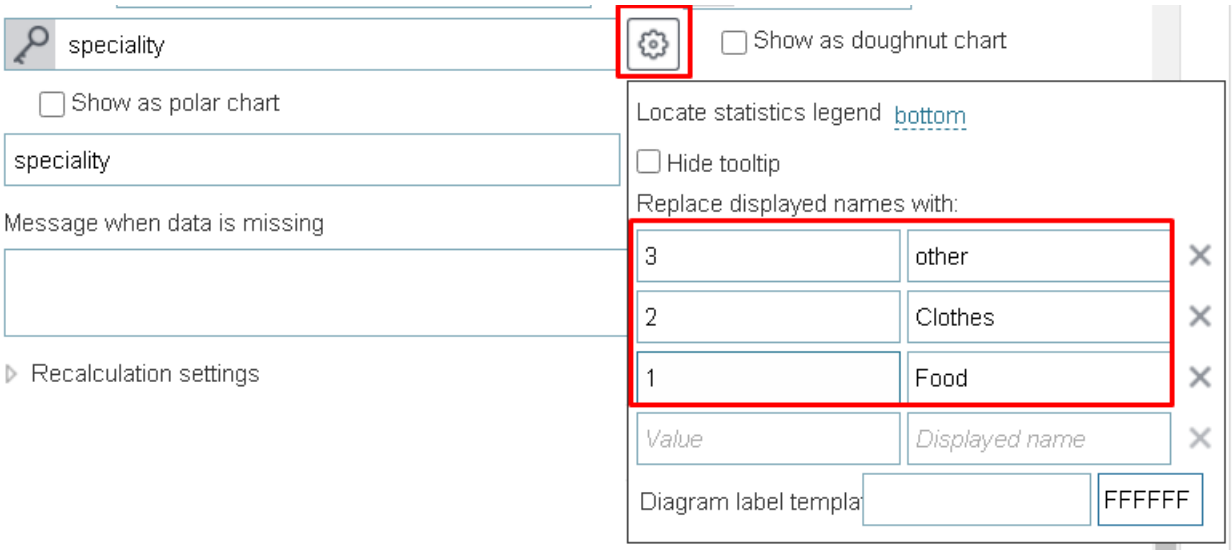


Figure 125 – Example of predefined values of the attribute field

By default, on hovering over the pie chart slice, the tooltip appears showing the color identifier, attribute field value and calculated statistical value. By default the attribute field value is show as it is stored in the map service layer. If you redefined this value in the *Replace displayed names with,* as described above for the diagram legend, then the tooltip would show this redefined value. The tooltip can be hidden, to do so, press *Settings* and check *Hide tooltip* option, see Figure 126.

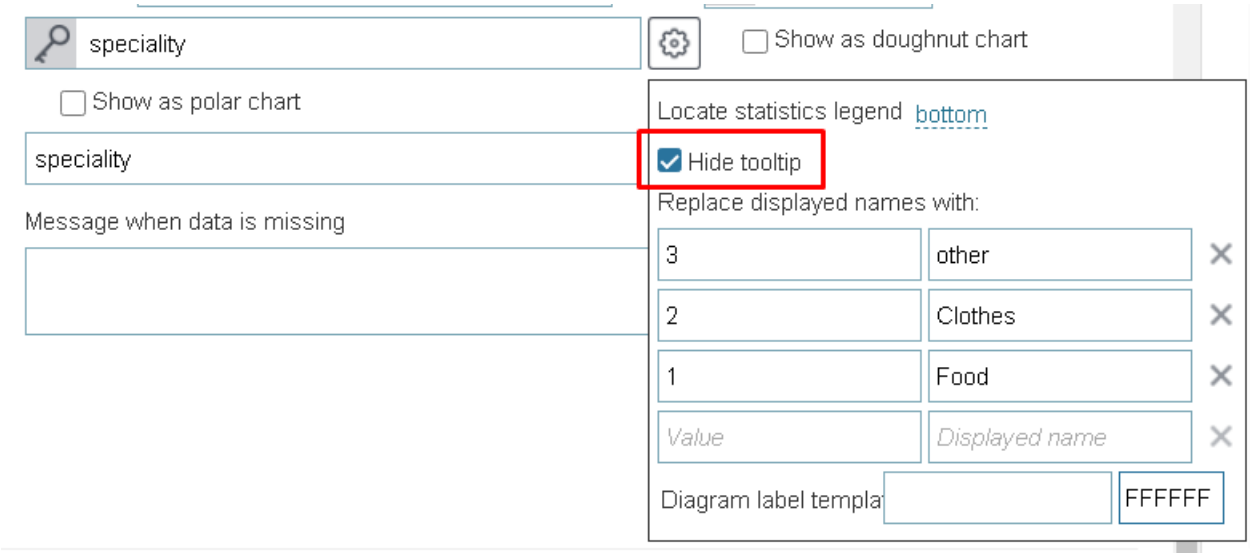


Figure 126 – Hide tooltip option

If you want to reorder the chart slices, press *Settings* , and in the *Sorting* list select the needed variant, see Figure 127.

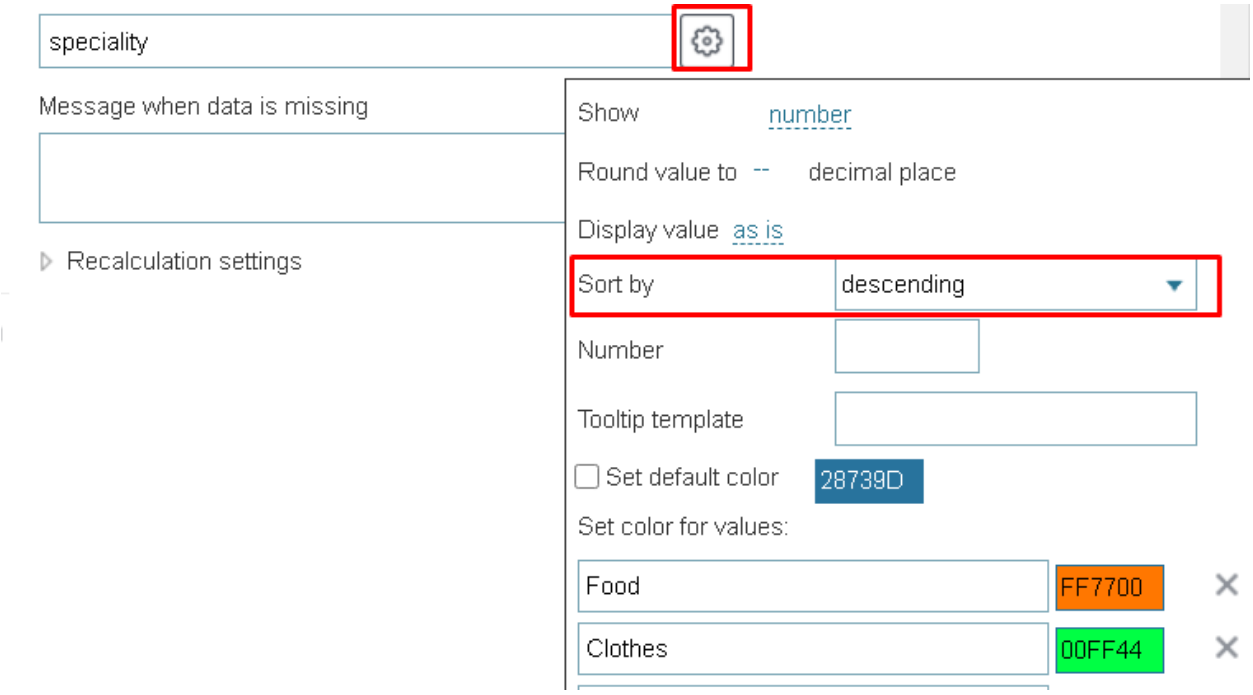


Figure 127 – View of list of displayed attribute values

You can specify, how many slices your chart should consist of. To do so, enter the number in *Number* field located under the drop-down *Sorting* list.

If you need that the attribute field values on your chart are shown in percent, thousands etc., select the appropriate option in the *Display value* list. The *Display value* list locates in the window popping up by pressing *Settings* , shown on Figure 128.

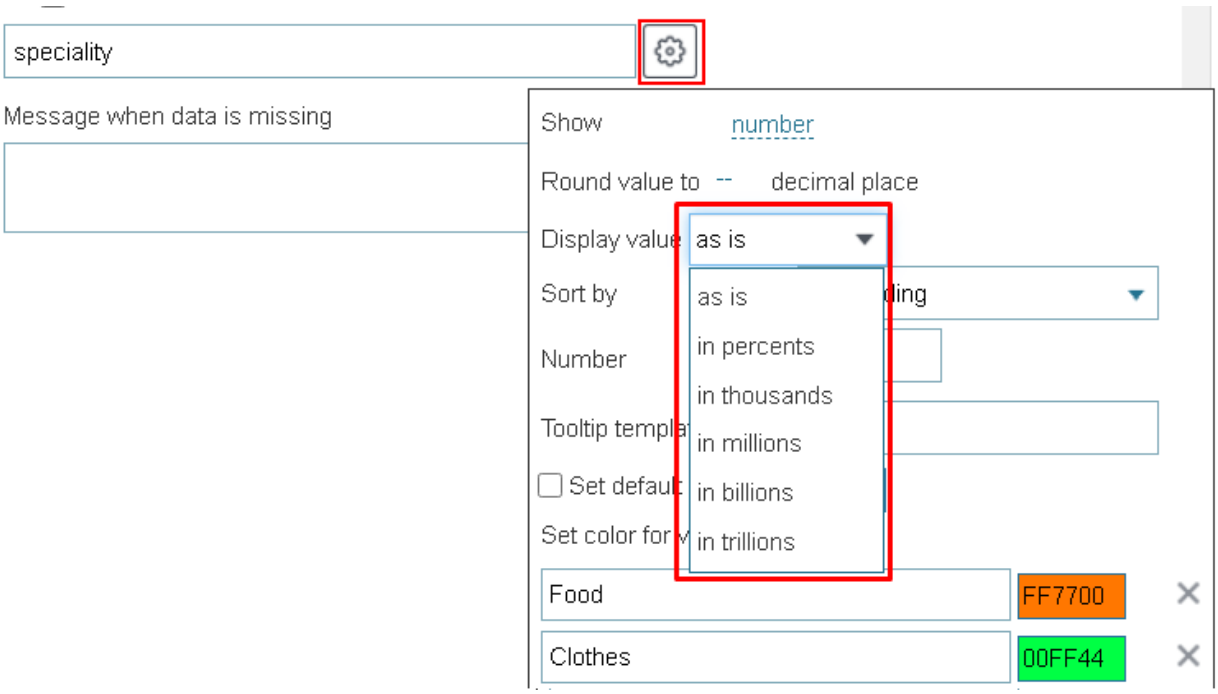


Figure 128 – Display value list

In case if attribute fields values are decimal numbers, you can display their rounded values on the chart. It is also possible to display rounded statistical characteristic if needed. In the *Round value to* enter the number defining to which decimal place the values should be rounded. The *Round value to* field locate under the *Display value* list mentioned above.

You can set values display *in percent* using macros `<{percent}>`. Enter this macros to the *Tooltip template* located in the window that is opened by pressing *Settings*  , see Figure 129. Add % sign in the *Tooltip template*, see Figure 129.

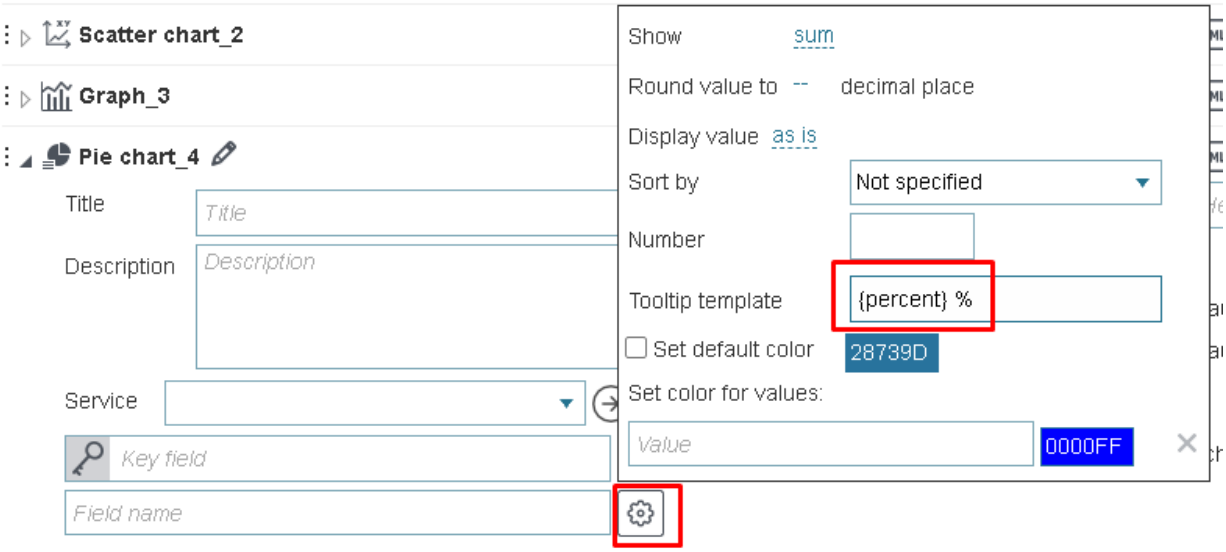


Figure 129 – Tooltip template

Besides the tooltip you can create labels for the chart slices using macros `<{percent}>` and `<{value}>`. Press *Settings*  shown on Figure 130, and enter macros and label text in the

Tooltip template. Select label color pressing FFFFFF and pick the color from the appeared window.

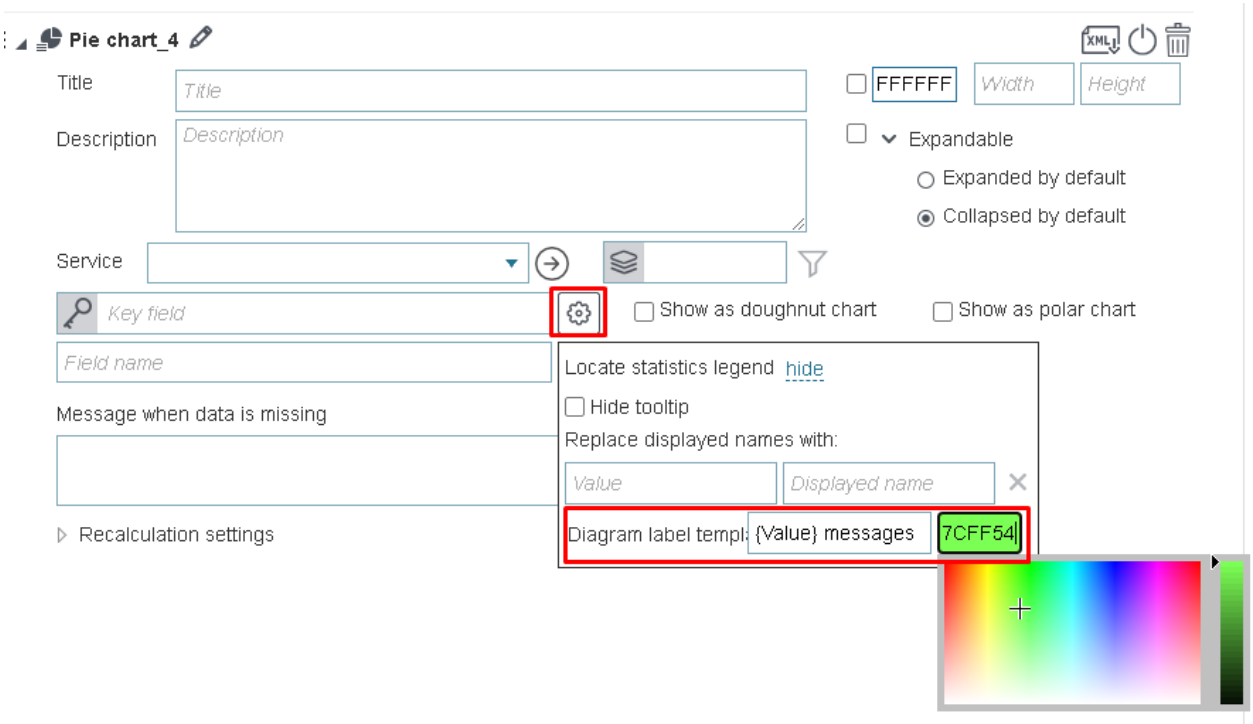


Figure 130 – Labels for the chart slices

In case if access to geodata is missing, for example, after map service republication, you can create the appropriate message informing users about this. Enter the required text in the *Message when data is missing* field, see Figure 131.

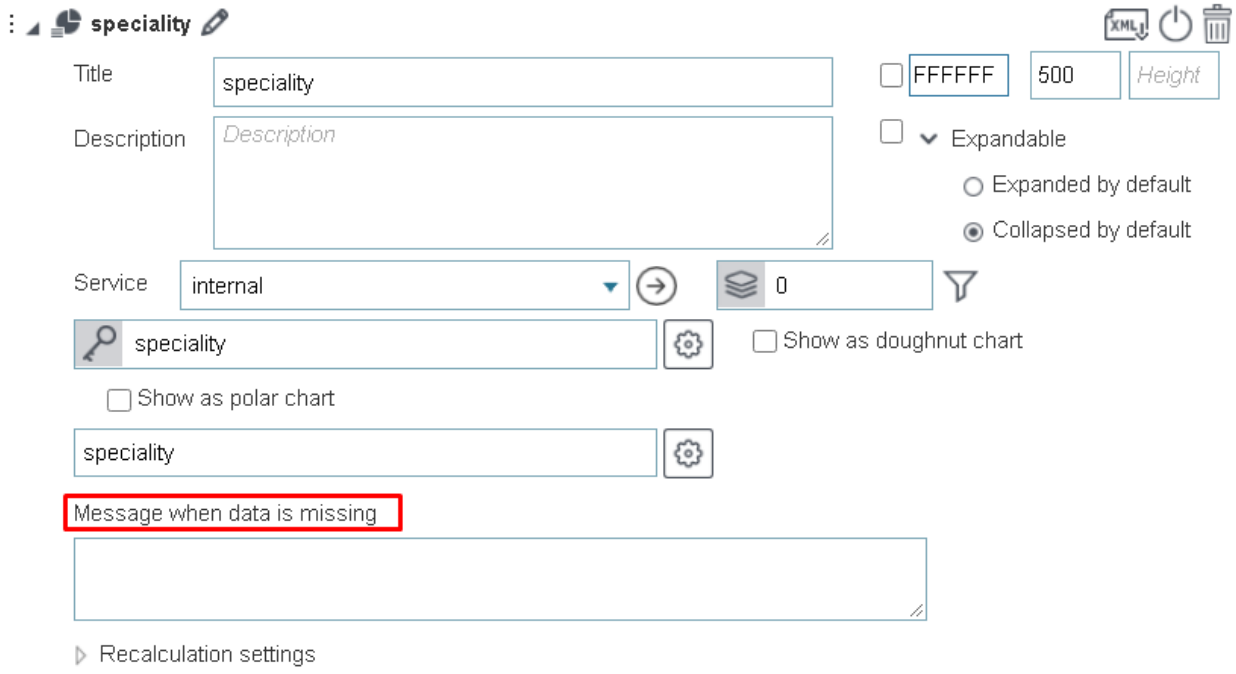


Figure 131 – Creating message when access to geodata is missing

The block contains information from the map service layer and statistical value calculated by objects of map service. If you need that in case of map service republishing or data editing the

updated information is displayed in the block, s pecify conditions when the map service data in the block should be updated. In order that data shown in the block conformed with the filtration criteria specified by the user in the layer menu of the *Legend* tab, and in order to provide users with tools for managing information display in the block, refer to the *Recalculation settings* section shown on Figure 132, see section 4.6.2 for more details .

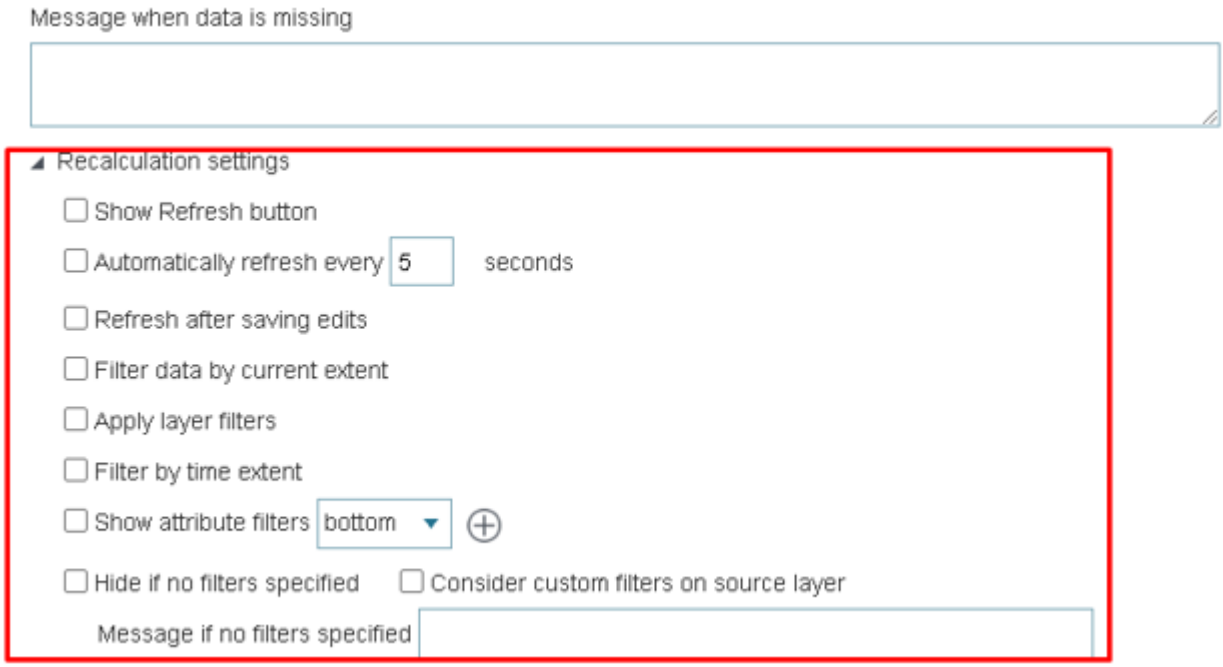


Figure 132 – Recalculation settings section

4.6.2.3.2. Pie and doughnut charts by columns

If multiple numeric attribute fields can be joined to a group, then you can build the pie or doughnut chart based on these attribute values. Each chart slice is the attribute field. The size of the slice is the statistical characteristic calculated by values of the correspondent attribute field.

By default the pie chart is built, but you can select another chart type, to do so, check *Show as doughnut chart* option in the block, see Figure 133.

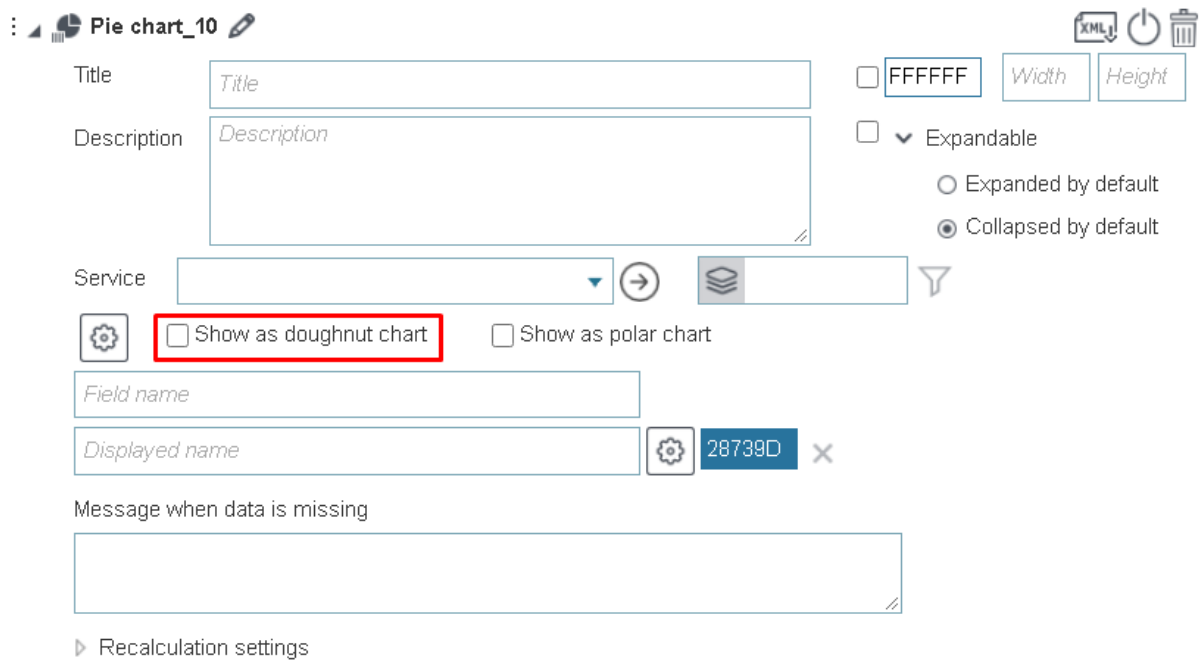


Figure 133 – Doughnut chart

Enter the block title and description if needed. Set the size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the current representation of map . In the block you can use specific map service layers, and not only those layers that have been added to map when establishing connection to map service in the *Service* tab. To do so, specify the number of the layer or group layer in *Layers*.

Enter the attribute field name by which the slices of the pie chart will be built, in the *Field name*. Now select which statistical characteristic will be calculated, press *Settings* button shown on Figure 134 and in the drop down list *Show* select the needed item. By default, the *sum* type is selected.

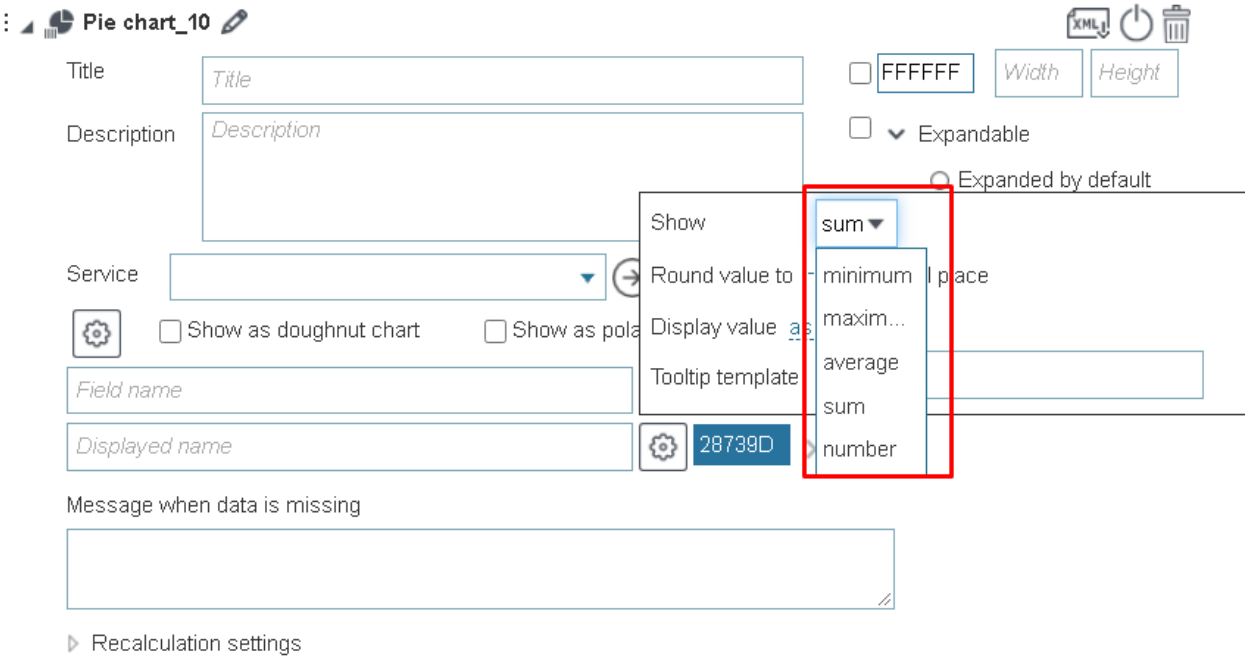


Figure 134 – Selecting statistical characteristic

If you need to hide specific attribute field values from the diagram, set condition on the attribute field values pressing and in the popup field enter SQL query, as on Figure 135, for example, where the entered query imposes condition on `PlacesCount` attribute field, and `null` values will not be displayed on the diagram.

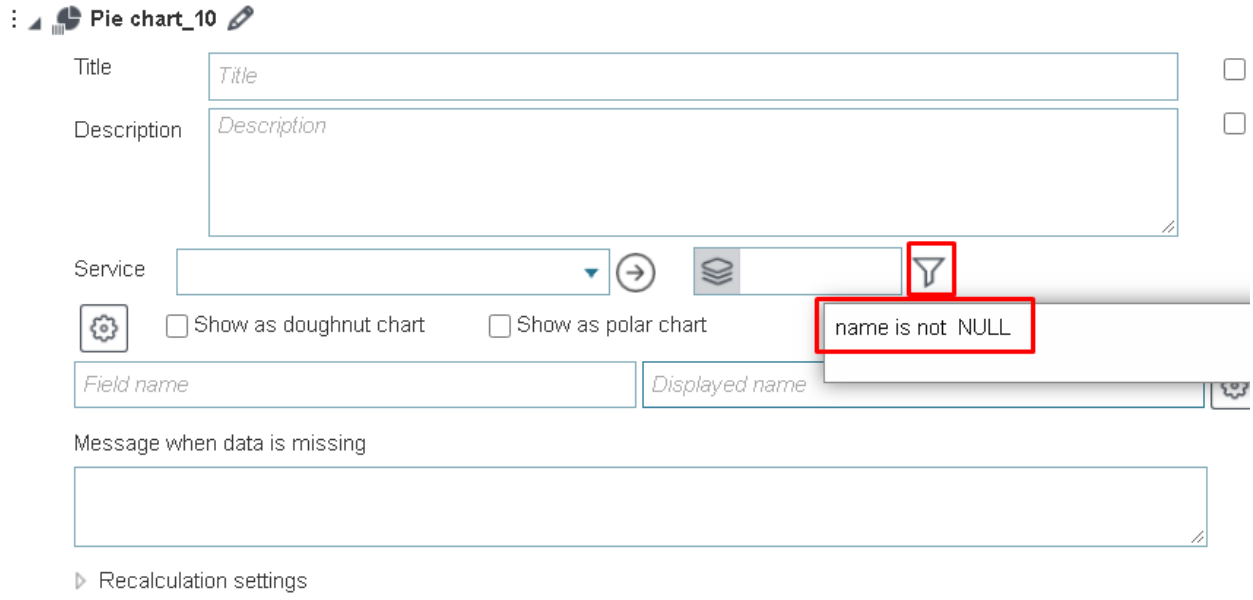


Figure 135 – Setting condition on the attribute field values

Set color for the chart slices pressing the button shown on Figure 136, and pick the needed color from the appeared color picker. Repeat these steps for each attribute field.

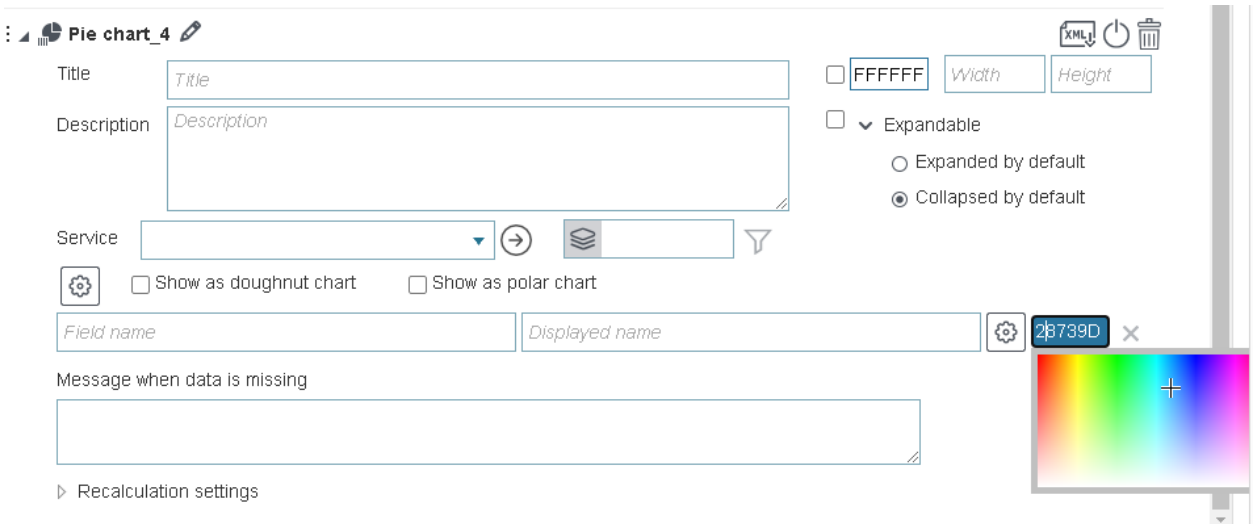


Figure 136 – Setting color for the chart slices

By default the chart legend is not shown in the block. If you want to add the chart legend, press *Settings* , see Figure 137, and in the popup window in the drop down list *Locate statistics legend* select location of the legend.

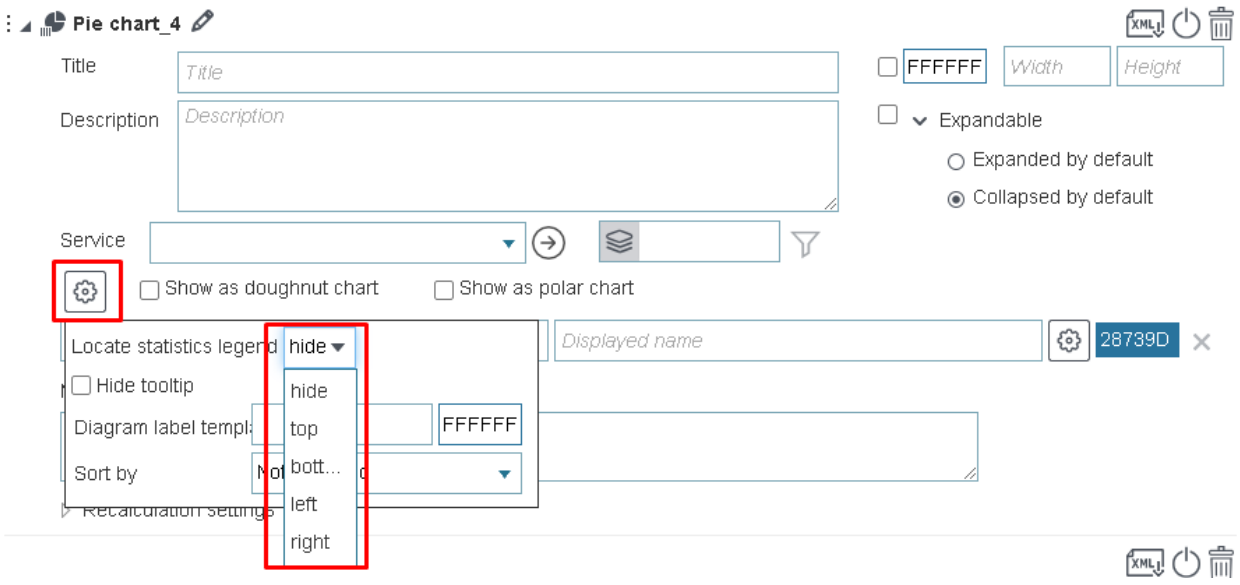


Figure 137 – Selecting chart legend location

The chart legend represents color identifiers of the slices with names of the correspondent attribute fields. If you want to display your text instead of the field name, enter it in the *Displayed name,* see Figure 138.

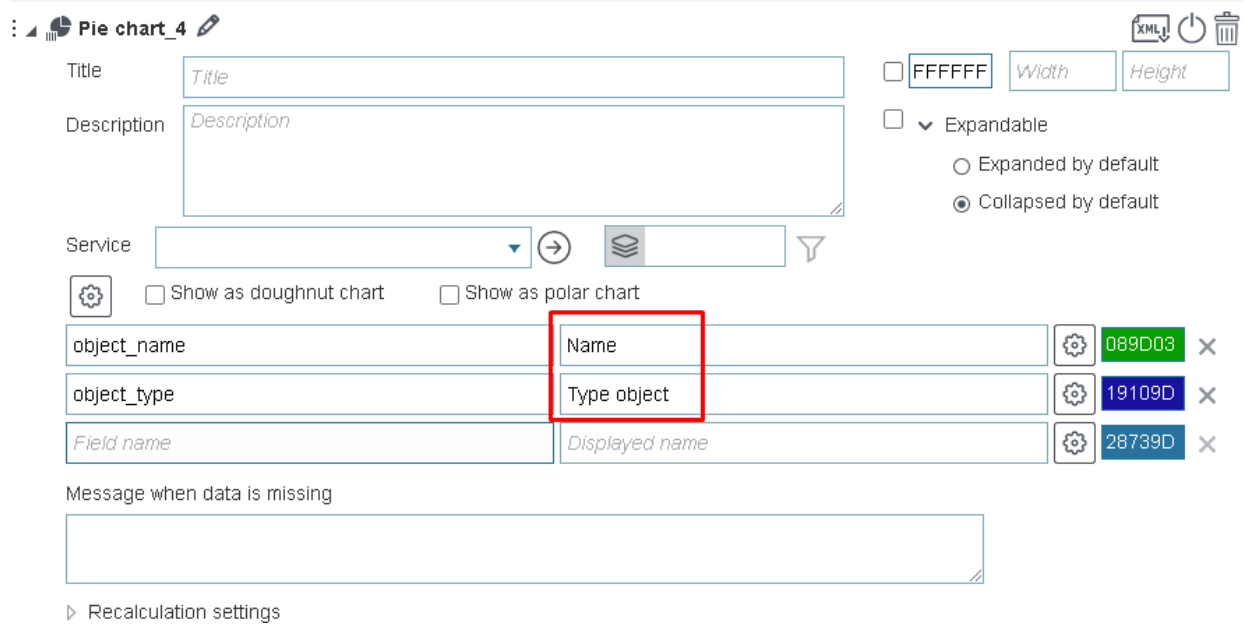


Figure 138 – Displayed name

By default, on hovering over the pie chart slice, the tooltip appears showing the color identifier, attribute field value and the number. If you entered your text in the *Displayed name*, the tooltip would show this text. The tooltip can be hidden, to do so, press *Settings* ⚙ and check *Hide tooltip* option, see Figure 139.

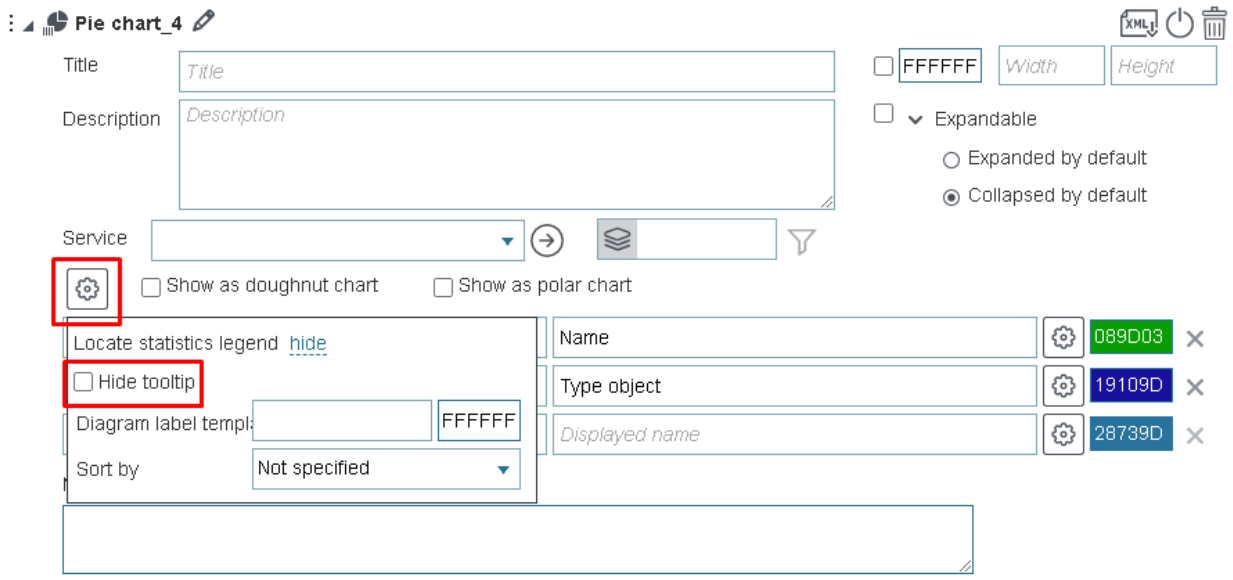


Figure 139 – Hide tooltip option

You can change the tooltip content. Use macros <{percent}> and <{value}> to create your custom tooltip template. Enter the tooltip text and macros in the *Tooltip template*, which appears by pressing *Settings*  , see Figure 140.

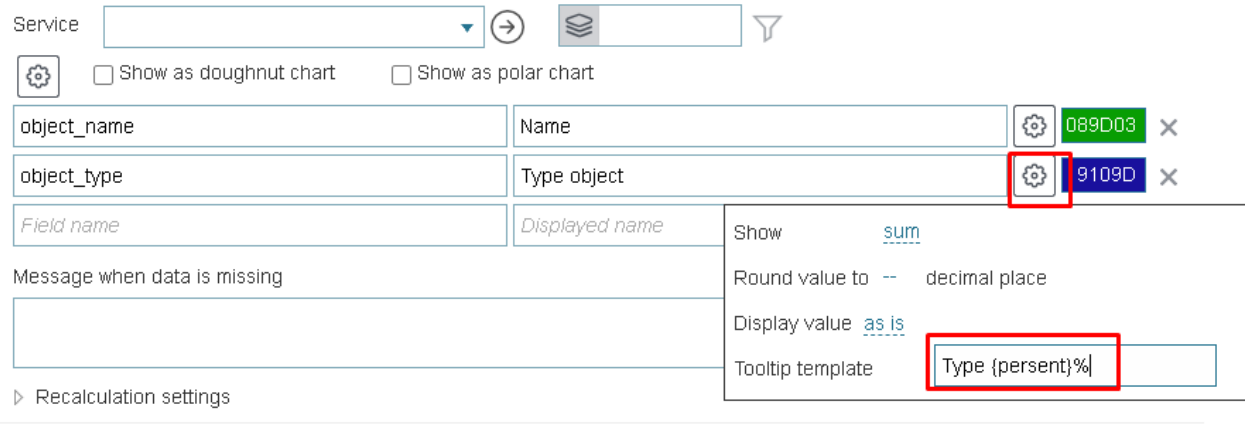


Figure 140 – Tooltip template

Besides the tooltip you can create labels for the chart slices using macros <{percent}> and <{value}>. Press *Settings*  shown on Figure 141, and enter macros and label text in the *Tooltip template*. Select label color pressing  and pick the color from the appeared window.

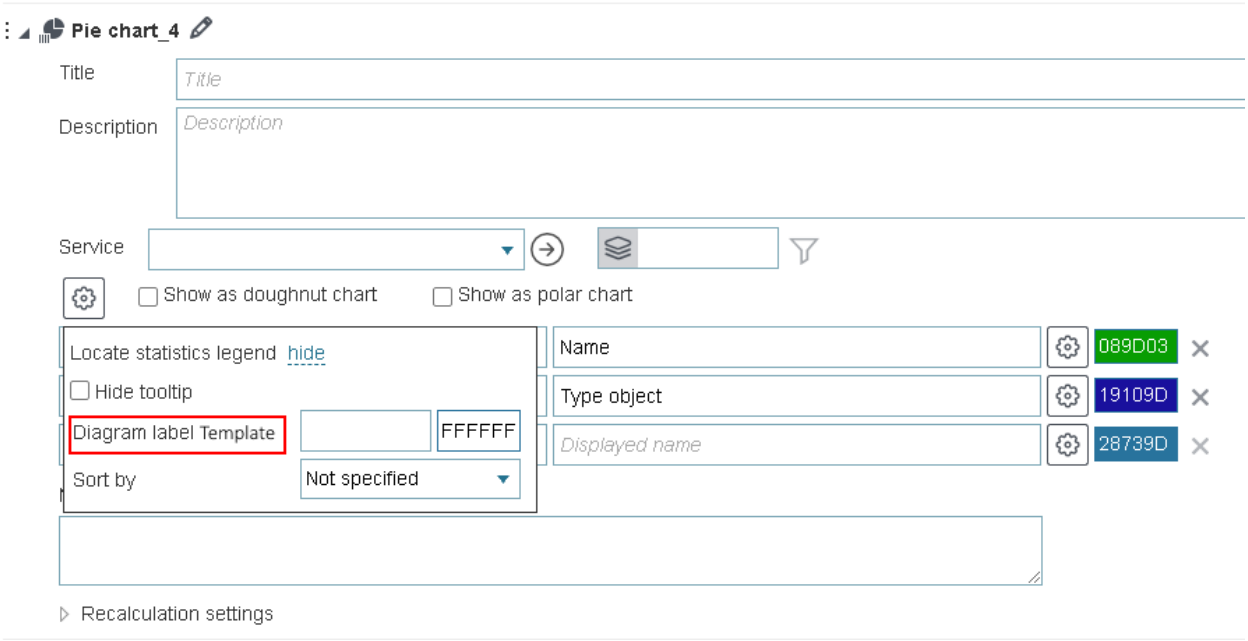


Figure 141 – Label template

Note that the label will be displayed on the chart slice if its size is appropriate, see Figure 141.

In case if attribute fields values are decimal numbers, you can display their rounded values on the chart. It is also possible to display rounded statistical characteristic if needed. In the *Round value to* enter the number defining to which decimal place the values should be rounded, see Figure 142. Repeat these steps for each attribute field.

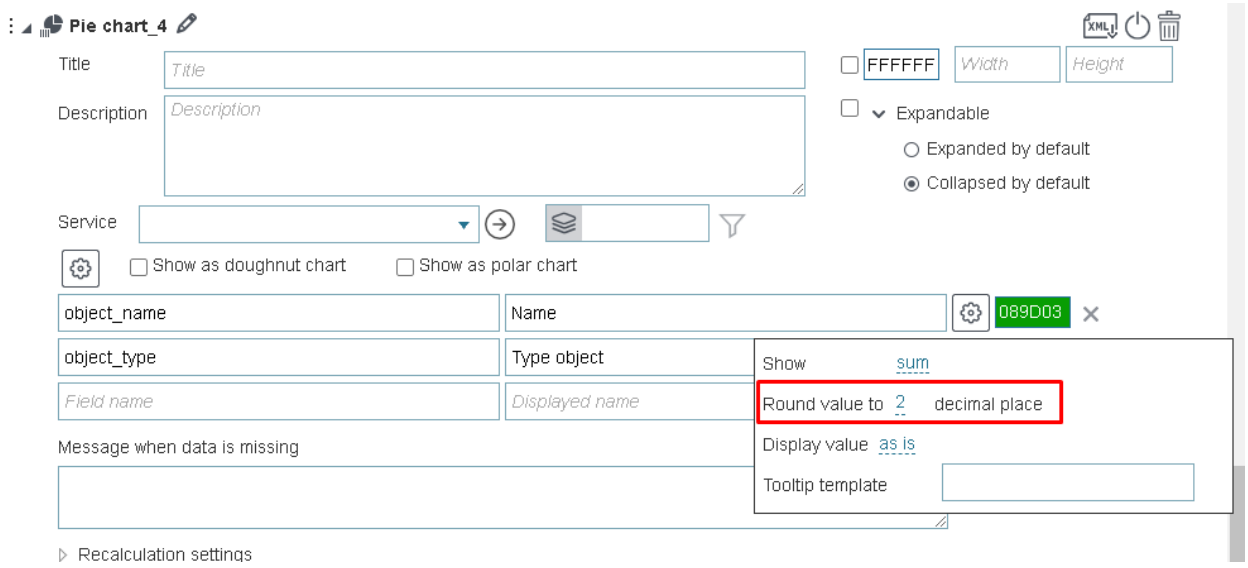


Figure 142 – Rounding attribute field values and statistical characteristic

If you need that the attribute field values on your chart are shown in percent, thousands etc., select the appropriate option in the *Display value* list. The *Display value* list locates in the window popping up by pressing *Settings* ⚙. Repeat these steps for each attribute field, see Figure 143.

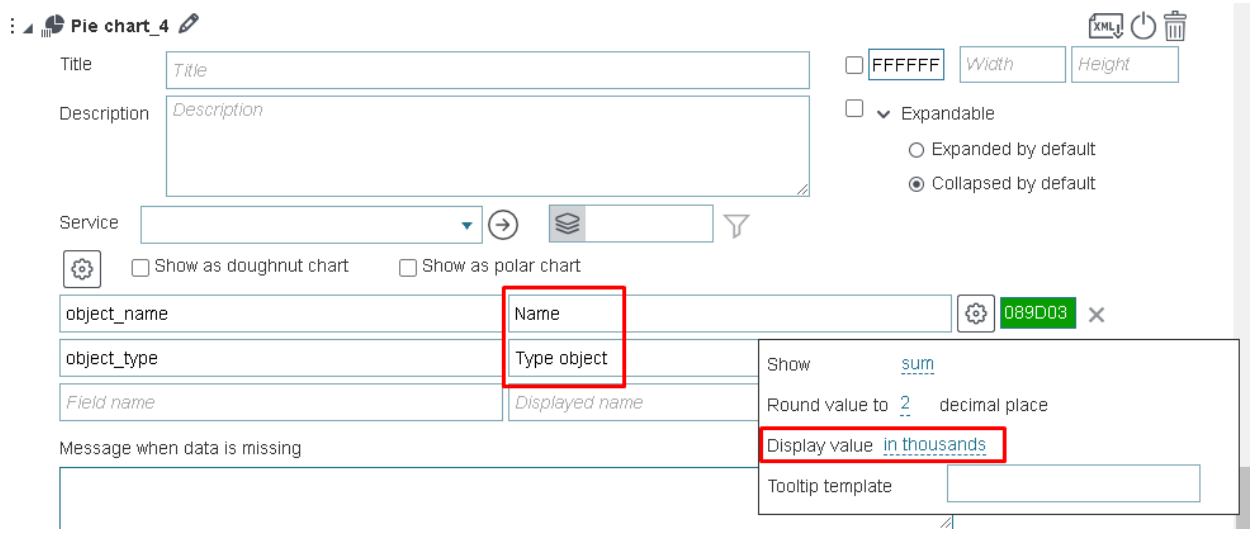


Figure 143 – Variants of showing displayed values of the attribute field

If you want to reorder the chart slices, press *Settings* , and in the *Sorting* list select the needed variant.

In case if access to geodata is missing, for example, after map service republication, you can create the appropriate message informing users about this. Enter the required text in the *Message when data is missing* field, see Figure 144.

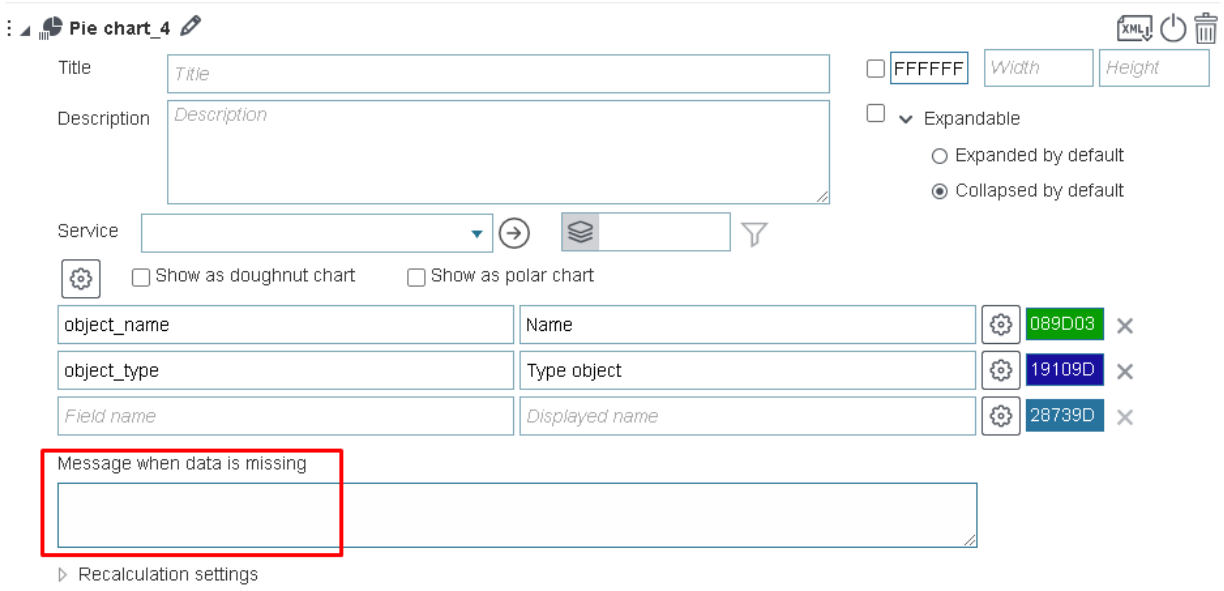


Figure 144 – Creating message when access to geodata is missing

The block contains information from the map service layer and statistical value calculated by objects of map service. If you need that in case of map service republishing or data editing the updated information is displayed in the block, specify conditions when the map service data in the block should be updated. In order that data shown in the block conformed with the filtration criteria specified by the user in the layer menu of the *Legend* tab on map , and in order to provide users with tools for managing information display in the block, refer to the *Recalculation settings* section shown on Figure 145, see section 4.6.2 for more details.

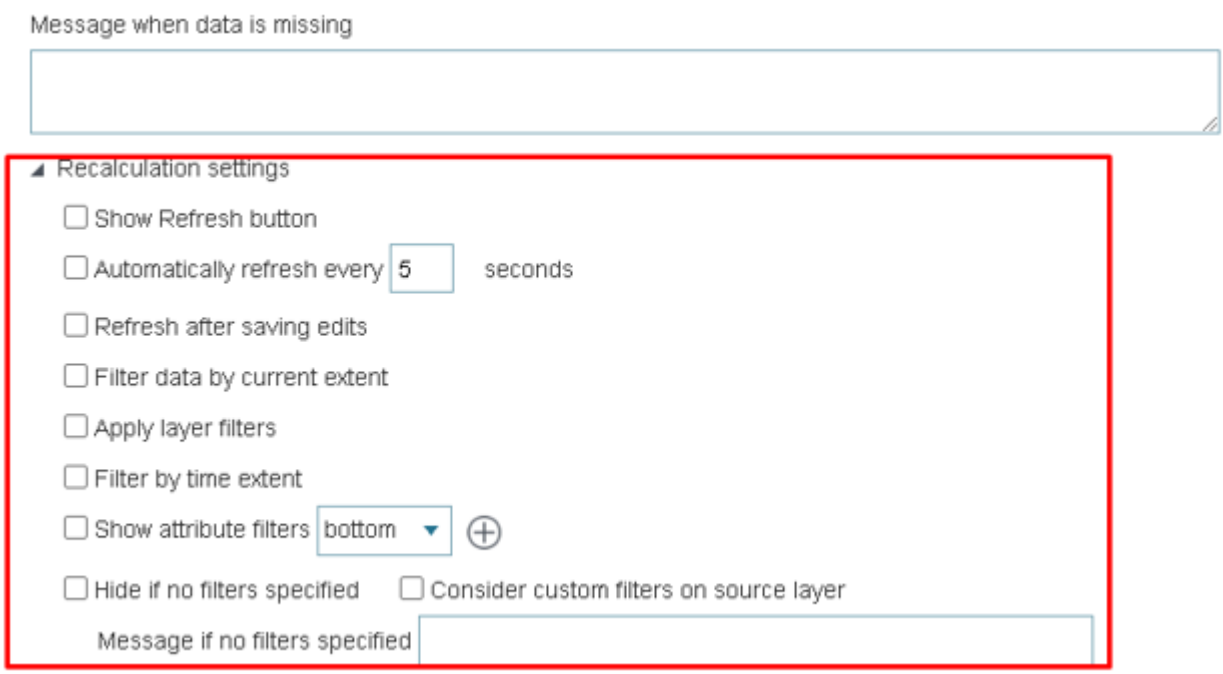


Figure 145 – Recalculation settings section

4.6.2.3.3. Polar diagram

To build the polar diagram, check the Display as polar option. For the polar diagram, it may be relevant to display sectors in the same color. To do this, check Set default color, and if necessary, highlight some value, override it separately.

4.6.2.3.4. Displaying statistical characteristic

The block *Calculated value* is provided to show quantitative data, for example to inform about occupancy of kindergartens. Besides, this block can be used as part of the HTML macros in the *HTML code* block.

To add this block to the widget, select *Calculated value* in the drop down list, see Figure 146.

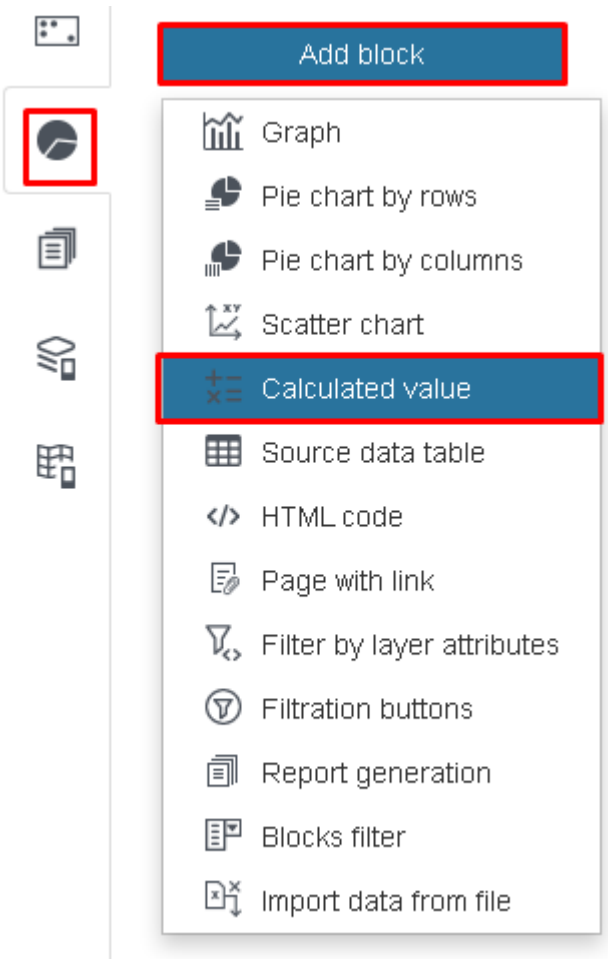


Figure 146 – Adding Calculated value block

Enter the block title and description if needed. Set the size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the current representation of map . In the block you can use specific map service layers, and not only those layers that have been added to map when establishing connection to map service in the *Service* tab. To do so, specify the number of the layer or group layer in *Layers*. If needed, set condition on the attribute field values pressing and in the popup field enter SQL query.

Enter the attribute field name by which the slices of the pie chart will be built, in the *Field name*. Now select which statistical characteristic will be calculated, press *Settings* button shown on Figure 147 and in the drop down list *Show* select the needed item. By default, the *sum* type is selected.

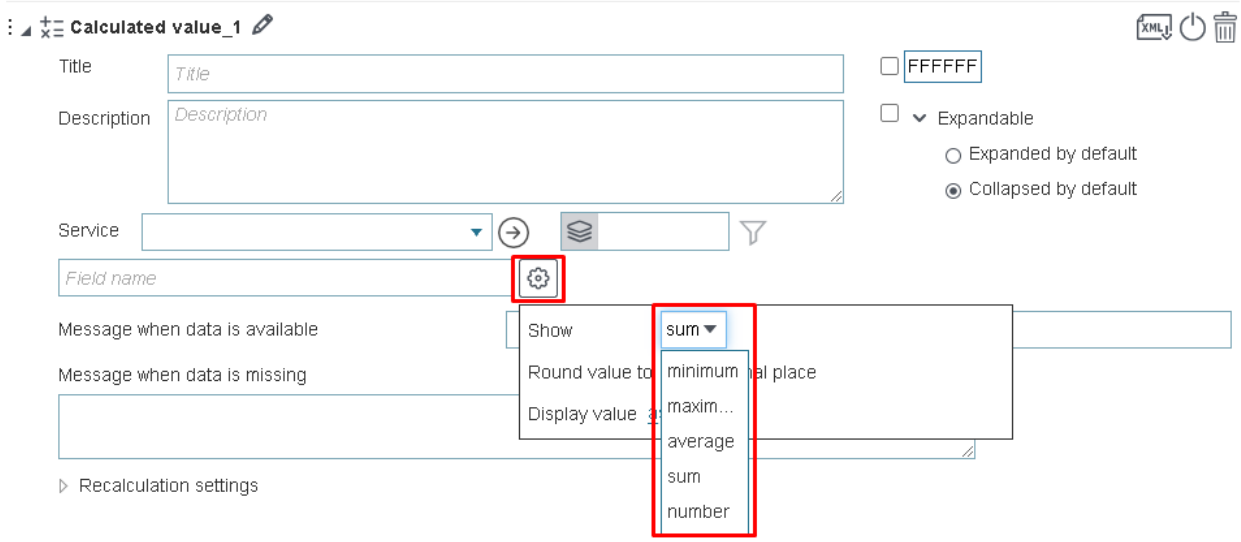


Figure 147 – Selection of statistical characteristic

In case if attribute fields values are decimal numbers, you can display their rounded values on the chart. It is also possible to display rounded statistical characteristic if needed. In the *Round value to* enter the number defining to which decimal place the values should be rounded. The *Round value to* field locates under the *Display value* list. If you need that the statistical characteristic is shown in thousands, millions, etc., see Figure 148.

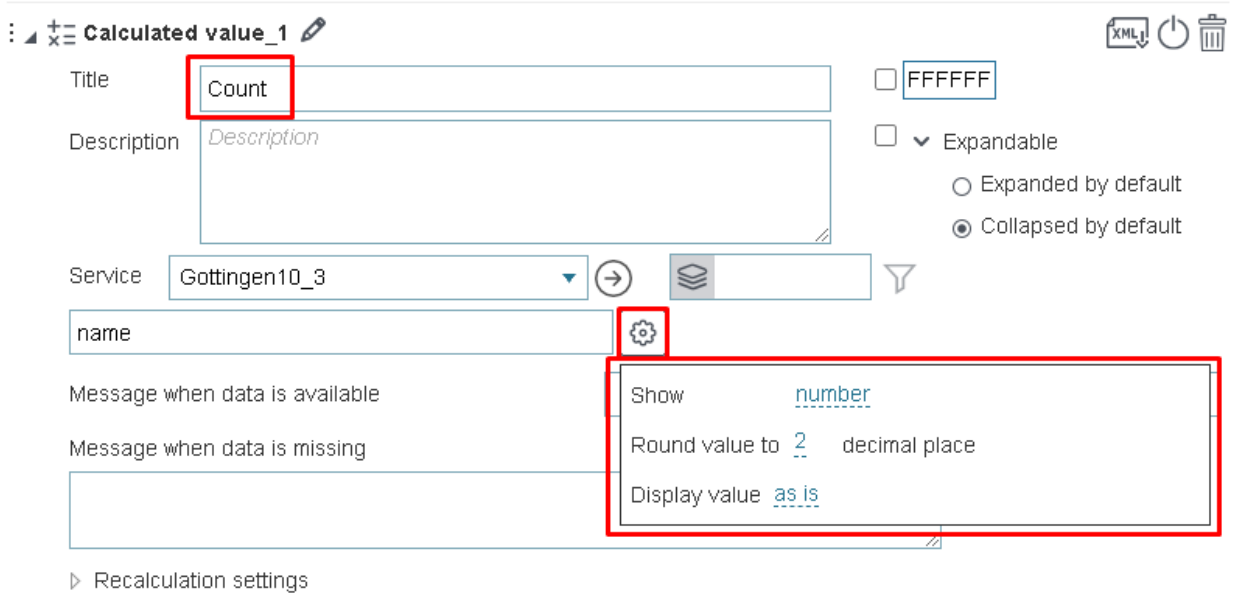


Figure 148 – Setting the Calculated value block

You can change the displayed text and statistical characteristic value and create your message template using macros <{value}>. In the *Message when data is available* enter your text and macros, see Figure 149.

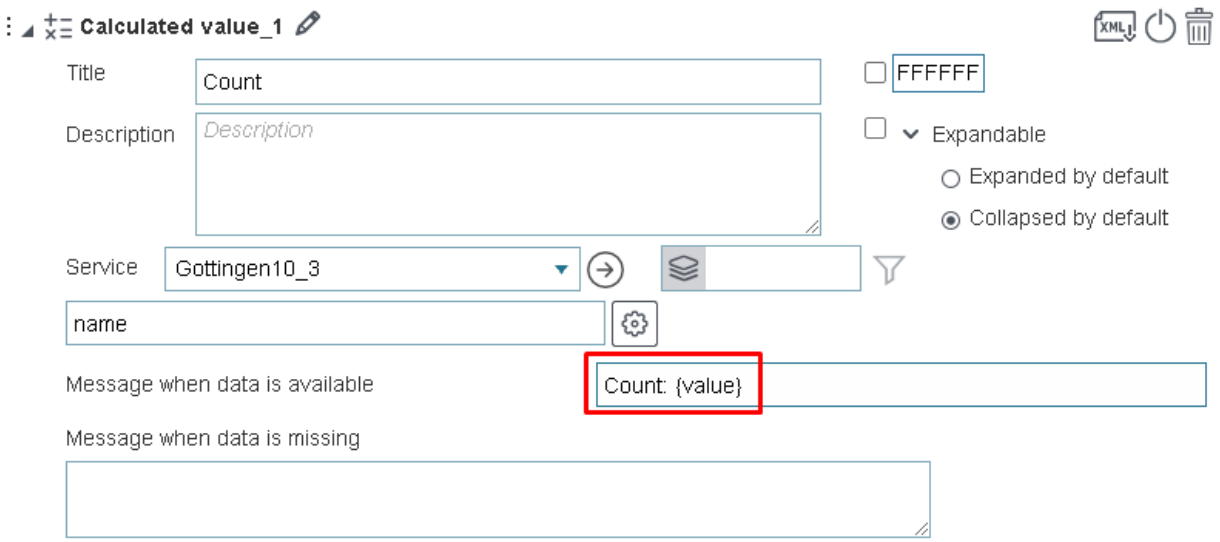


Figure 149 – Message template

In case if access to geodata is missing, for example, after map service republication, you can create the appropriate message informing users about this. Enter the required text in the *Message when data is missing* field, see Figure 150.

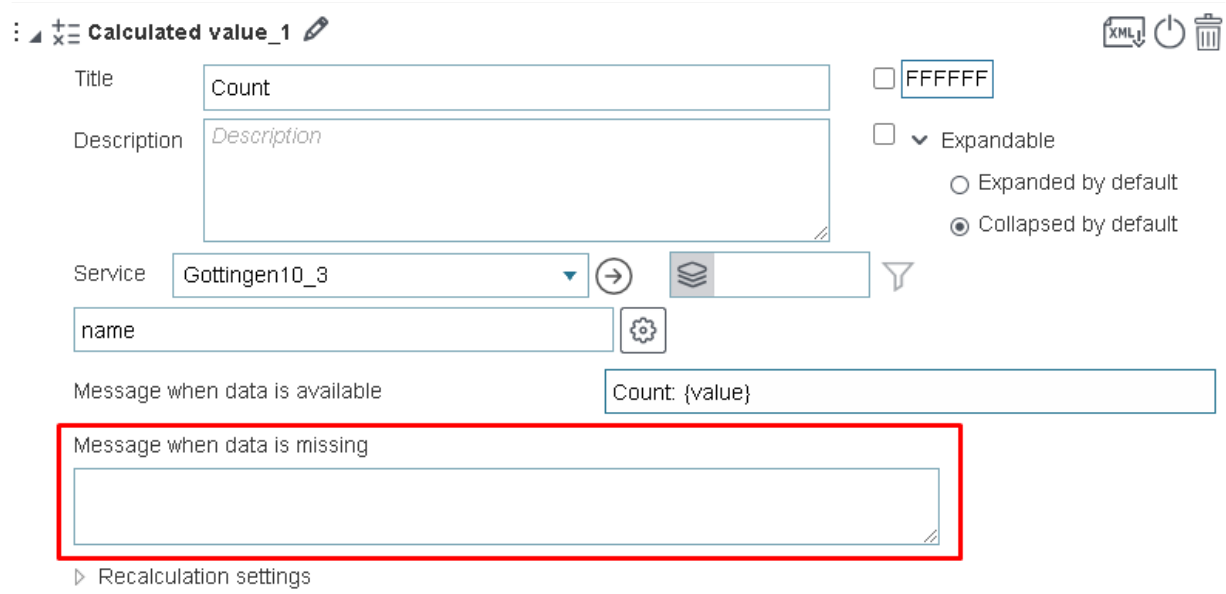


Figure 150 – Creating message when access to geodata is missing

The block contains information from the map service layer and statistical value calculated by objects of map service. If you need that in case of map service republishing or data editing the updated information is displayed in the block, specify conditions when the map service data in the block should be updated. In order that data shown in the block conformed with the filtration criteria specified by the user in the layer menu of the *Legend* tab, and in order to provide users with tools for managing information display in the block, refer to the *Recalculation settings* section shown on Figure 151, see section 4.6.2 for more details.

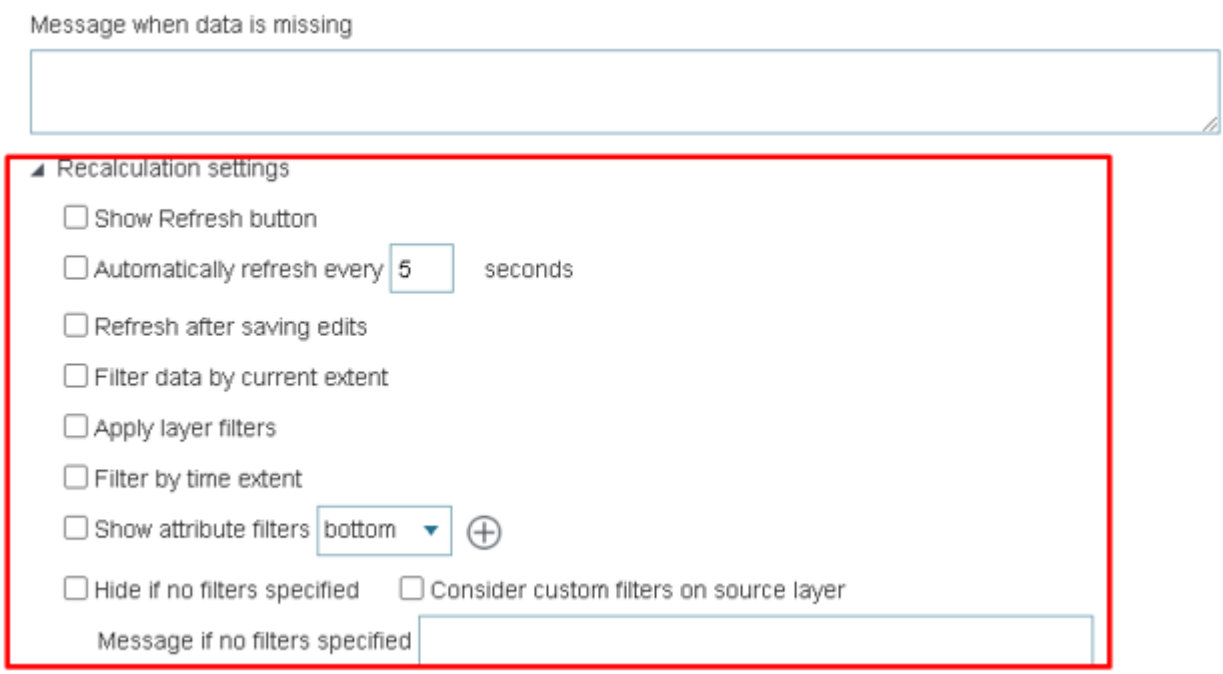


Figure 151 – Recalculation settings section

4.6.2.3.5. Scatter chart

The block *Scatter chart* is provided to show relationship between attribute field values in multiple geodata charts which enables performing various comparison analyses. The scatter chart is built in the Cartesian coordinate system.

The following geodata charts can be used:

- By grouped attribute field values or by coded values of domain assigned to attribute field.
- By minimum, average, maximum values.

By default, the Scatter chart color is defined randomly, and above the chart locates the legend representing color identifier of each chart and the attribute field value by which the chart is built. On hover over the chart points the tooltip appears showing the attribute field values and color ID of the chart. The values of the attribute fields by which the Scatter chart is built are shown same as they are stored in the map service layer. The applicable attribute fields types are numeric and date.

Settings of the current tab allow specifying values by which the chart should be built, the color, the line type and the number of points in the chart. Besides, the attribute fields values can be displayed randomly.

In the widget window press *Add block* button and in the drop down list select *Scatter chart*, see Figure 152.

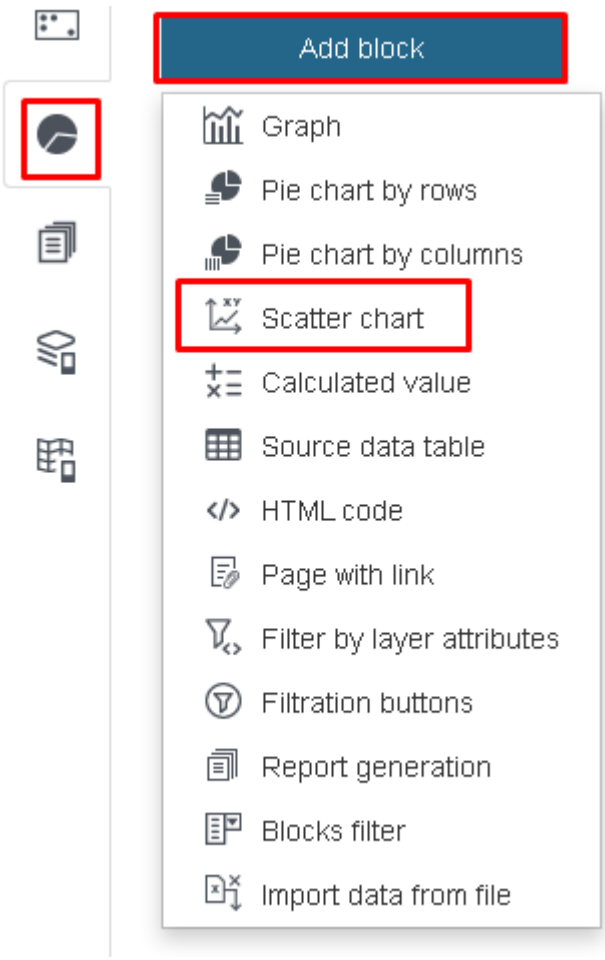


Figure 152 – Adding Scatter chart block

The *Scatter chart_Z* block will appear in the widget, where Z is the order number of the created block, see Figure 153.

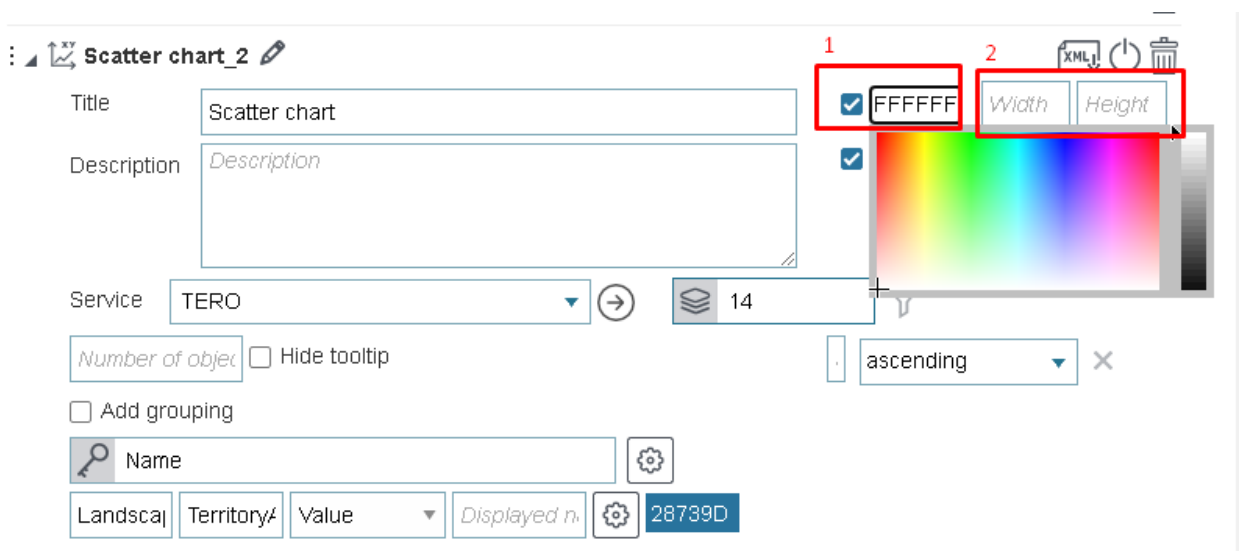


Figure 153 – The Scatter chart block settings window. 1 – Background color selection option. 2 – Fields to specify block's size.

Enter the block title and description if needed. Set the size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the current representation of map . In the block you can use specific map service layers, and not only

those layers that have been added to map when establishing connection to map service in the *Service* tab. To do so, specify the number of the layer or group layer in *Layers*.

The scatter chart is built in the Cartesian coordinate system. On X axis the values of the attribute field, which name is specified in *Field name X,* are put. The applicable attribute fields types are numeric and date. On Y axis the values of the attribute field, which name is specified in *Field name Y,* are put. The applicable attribute fields type is numeric.

If you need to hide specific attribute field values from the diagram, set condition on the attribute field values pressing and in the popup field enter SQL query, as on Figure 154, for example, where the entered query imposes condition on `GroupsCount` attribute field, which name is specified in the Key field . That is, only specified attribute field values will be shown on the diagram.

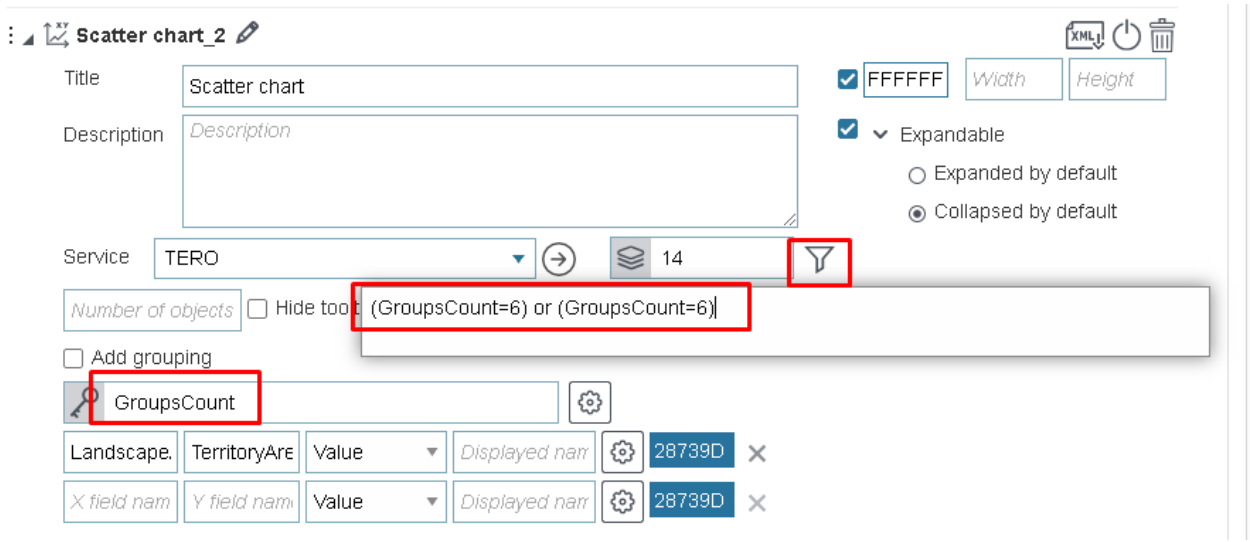


Figure 154 – Condition to attribute field value

The charts in the diagram are built by values of the attribute field. The chart can be also built by minimum, average and maximum values calculated by the attribute field name specified in *Field name Y*. See Figure 155 showing the drop down list with available options, by default the *Value* option is selected.

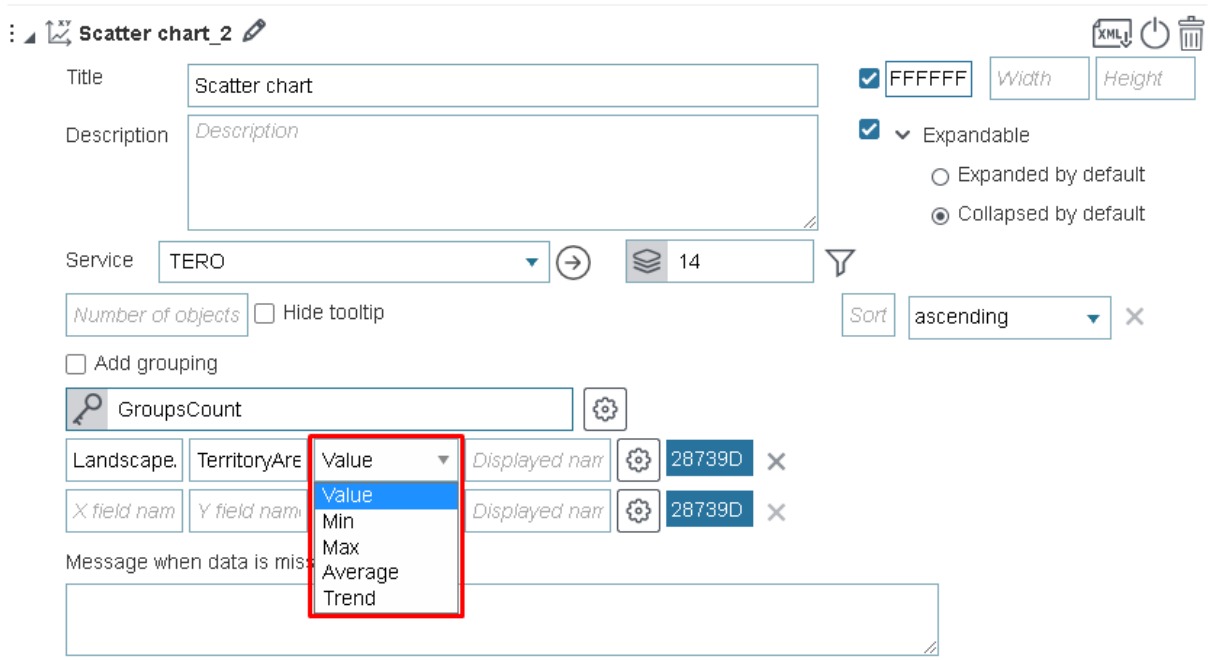


Figure 155 – Selection of values by which the chart should be built

Select the chart color and in *Displayed name* field enter description that will be shown in chart legend and in the pop up tooltip. If needed, specify by which field and in which direction the *Sorting* will be done.

The diagram charts can be also built by grouped attribute field values or by coded values of the domain assigned to the attribute field. Check the *Add grouping* option and in *Key field* enter the name of the attribute field to that the domain of coded values is assigned or by which grouped values the charts should be built. After you check the *Add grouping* option, the blocks settings window would be changed, see Figure 156.

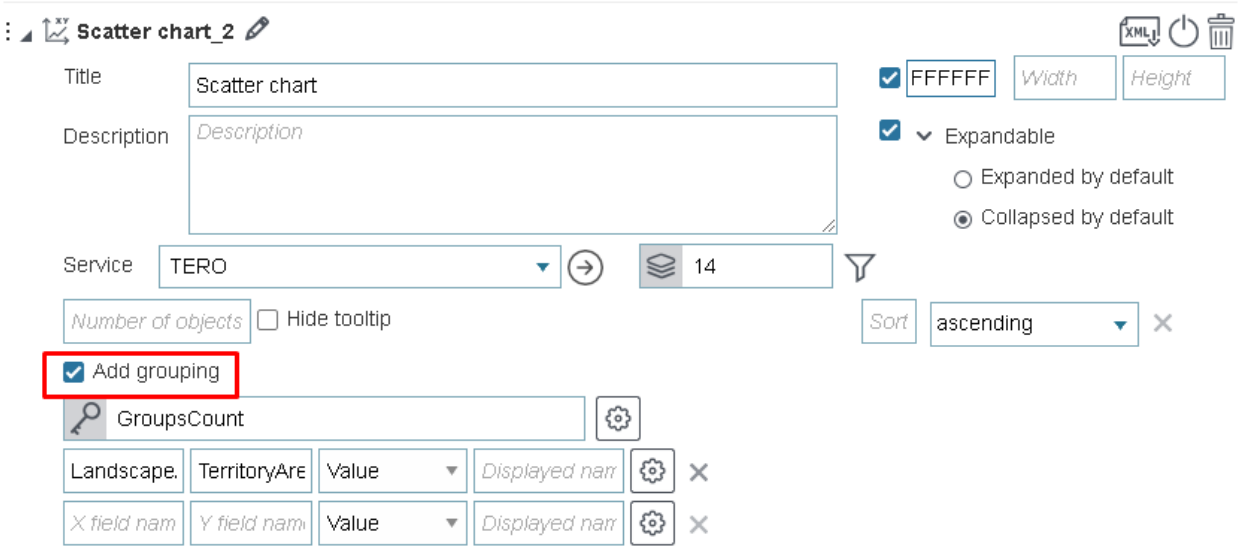


Figure 156 – View of block settings window when *Add grouping* option is checked

The diagram charts color is defined randomly. You can set specific color range built by grouped values of attribute field or by coded domain values assigned to attribute field. Press *Settings* shown on Figure 157, and in the *Value* field enter the grouped value or coded domain value as it

is stored in the map service layer, then press the button shown on the figure and select the color from the popped up color picker.

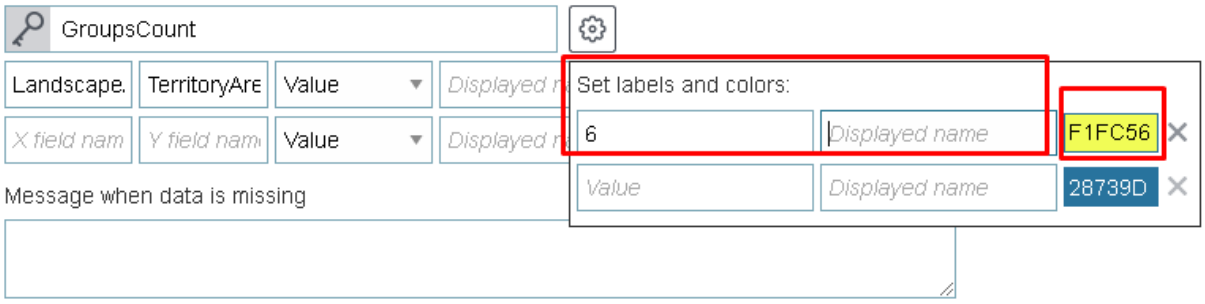


Figure 157 – Selecting color for the diagram chart

By default, the value of the attribute field by which the diagram chart is built, is shown in the chart legend and in the pop up tooltip as it is stored in the map service layer. But you can specify settings to show the value as you need. To do so, in the *Value* field shown on Figure 157 enter the attribute field value as it is stored in the map service layer, and in the *Displayed name* field enter your value.

By default, the area between X axis and the diagram chart is filled with the color selected for the chart, see Figure 158.

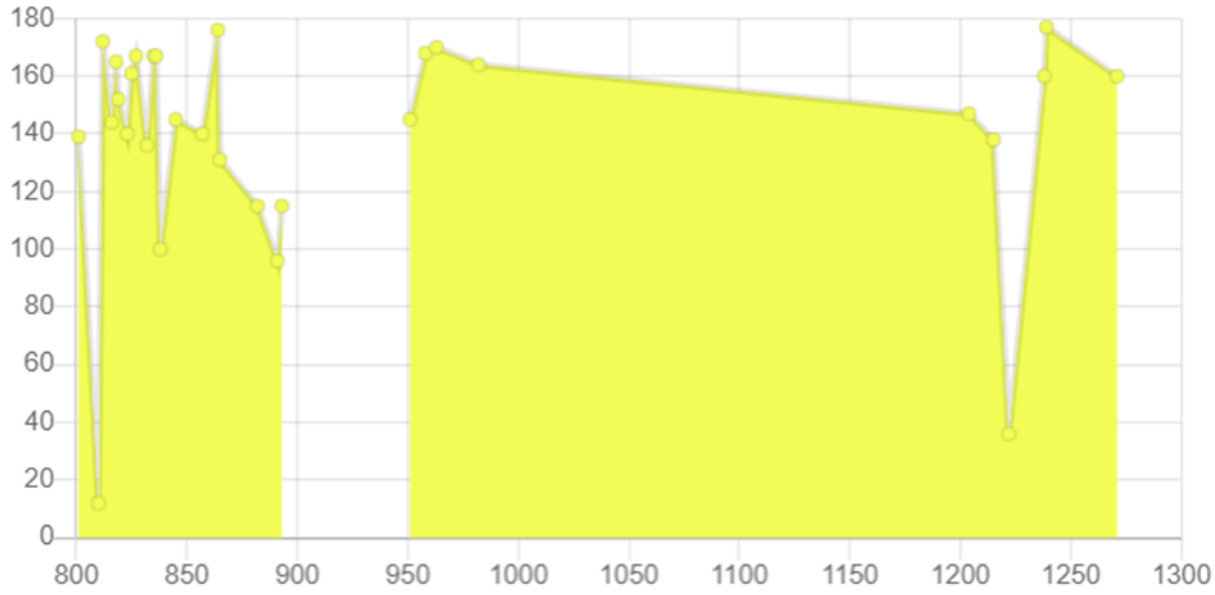


Figure 158 – Area between X axis and the diagram chart

If you want to display the chart without filling the above mentioned area, press *Settings* , shown on Figure 159 and uncheck *Fill* option. If diagram charts are built not by grouped values, i.e. the *Add grouping* option is not checked, repeat these steps for each chart.

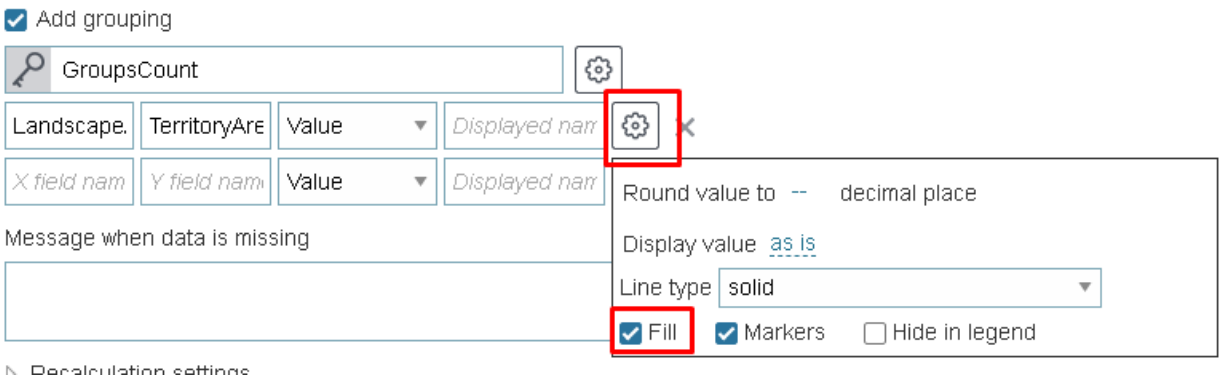


Figure 159 – Displaying chart without fill

By default, the chart is shown with marked points. If you want that the points are not marked , uncheck the *Markers* option. If diagram charts are built not by grouped values, i.e. the *Add grouping* option is not checked, repeat these steps for each chart.

If you specified drawing the charts by gr ouped attribute field values or by coded domain values assigned to the attribute fields and you want to add the chart description (created by attribute fields value, or by minimum, average and maximum value calculated by attribute field name specified in *Field name Y)*, use macros `{label}` in *Displayed name* field that locates in the *Settings* window, see Figure 160. If in the *Displayed name* field (marked 2) the `{label}` macros is added, then the text entered in the *Displayed name* field (marked 1) would be shown in legend after the text entered to the field that is marked 2 on the figure.

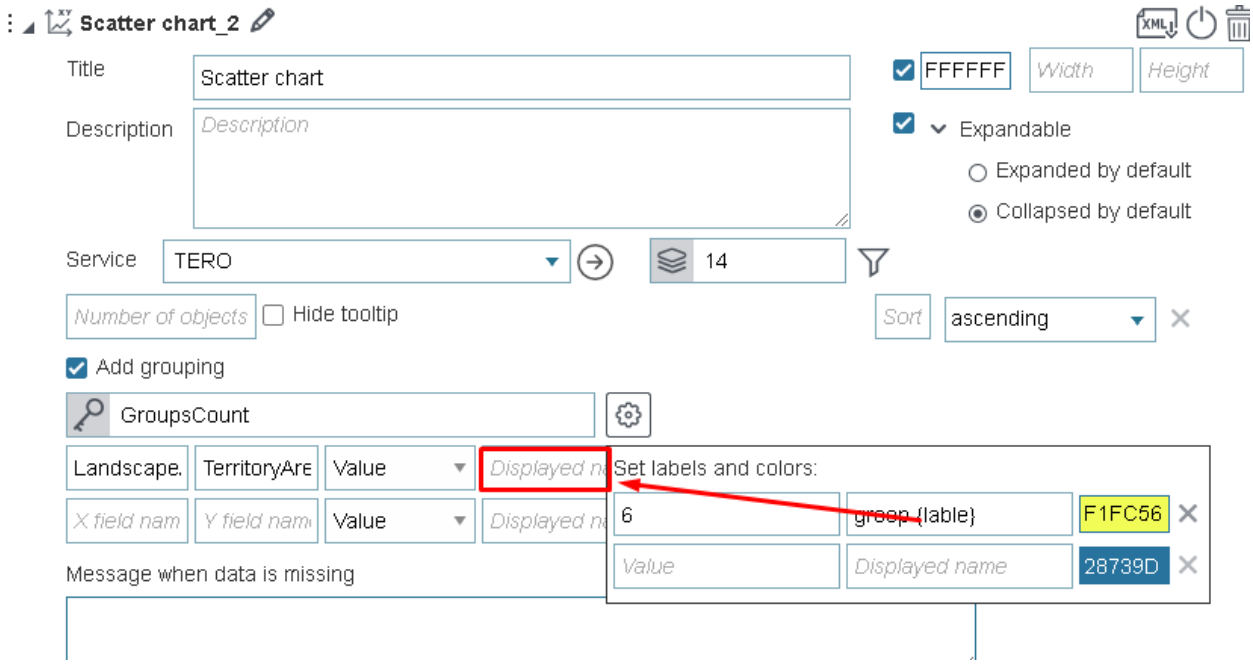


Figure 160 – Color of the diagram chart

You can specify the number of objects (points) by which the chart should be built. Enter the needed number in the *Number of objects* field shown on Figure 161.

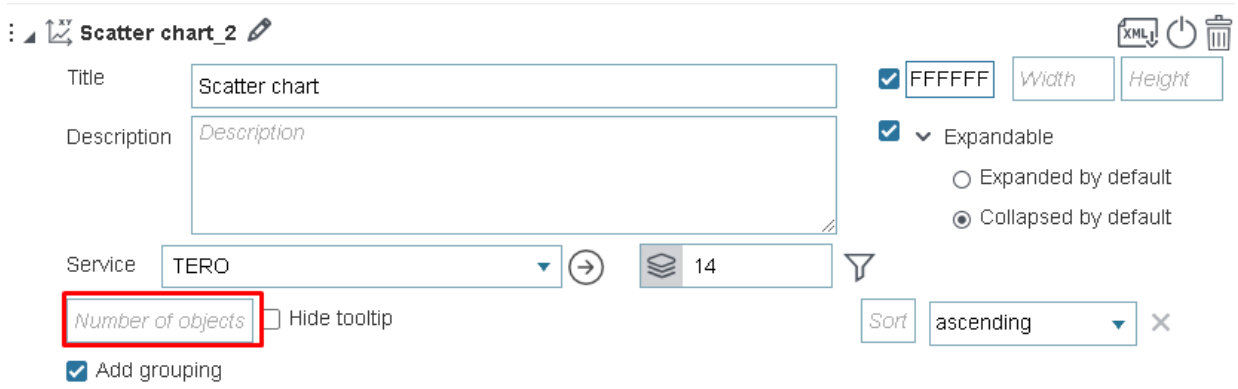


Figure 161 – Number of objects

Press *Settings* shown on Figure 162, and in the *Line type* drop down list select the needed variant. If diagram charts are built not by grouped values, i.e. the *Add grouping* option is not checked, repeat these steps for each chart.

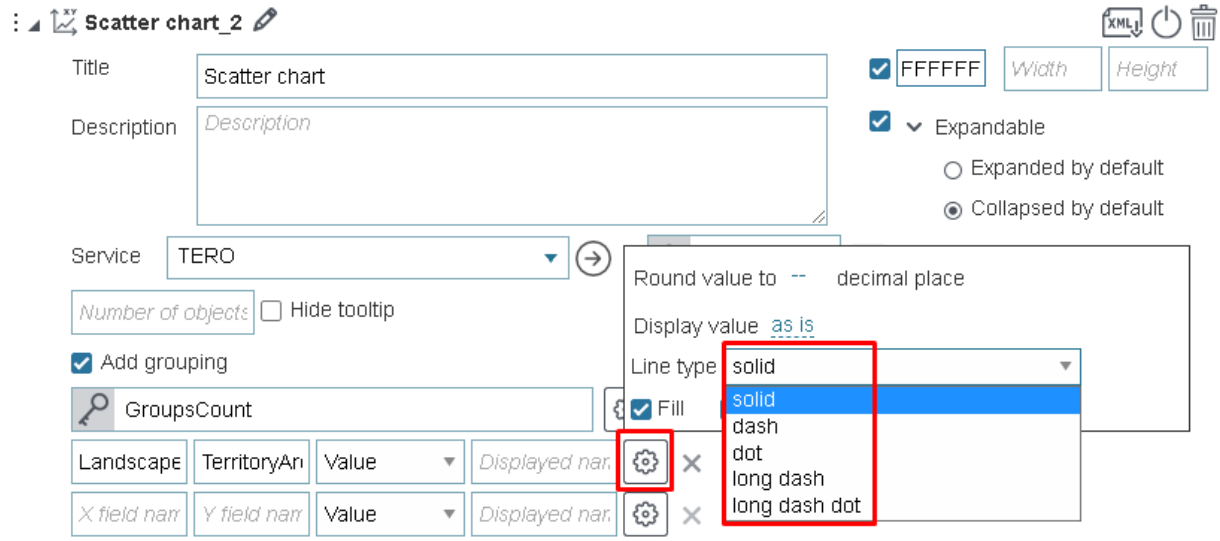


Figure 162 – Line types for chart

In case if attribute fields values are decimal numbers, you can display their rounded values on the chart. Press *Settings* and in the *Round value to* enter the number defining to which decimal place the values should be rounded, see Figure 163.

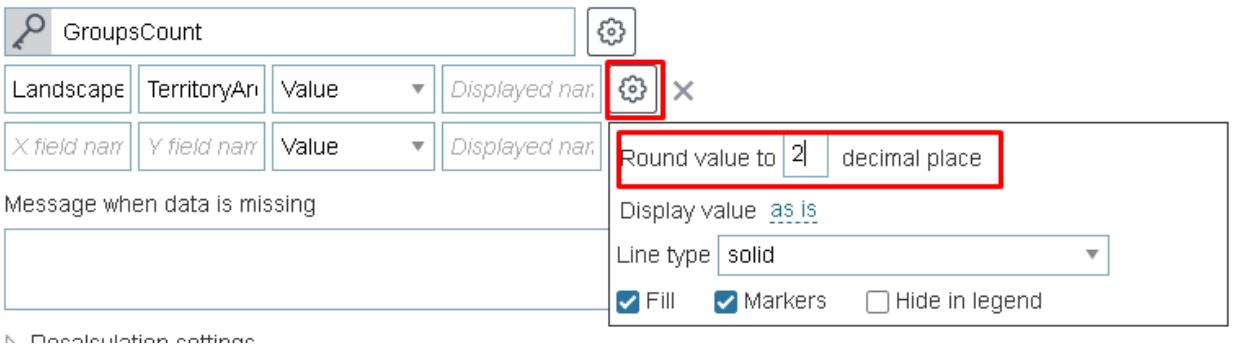


Figure 163 – Rounding attribute field values

If you need that the attribute field values on your chart are shown in percent, thousands etc., select the appropriate option in the *Display value* list located under the *Round value to* field. If

diagram charts are built not by grouped values, i.e. the *Add grouping* option is not checked, repeat these steps for each chart.

By default, on hovering over the chart points, the tooltip appears showing the color identifier and attribute field names specified in *Field name X*, *Key field* and *Field name Y* as they are stored in the map service layer. The tooltip can be hidden, to do so, press *Settings* and check *Hide tooltip* option, see Figure 164.

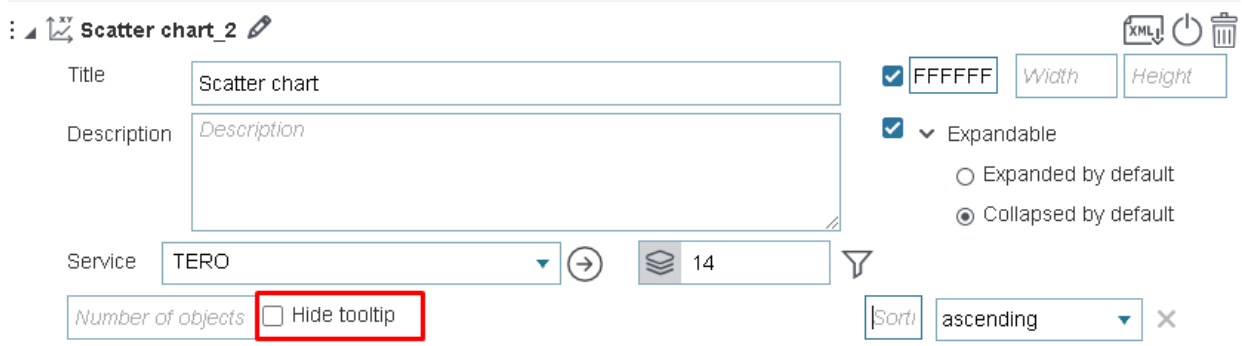


Figure 164 – Hide tooltip option

By default, the legend is located above the chart in the form of a series color identifier and the value of the attribute field, according to which the chart is built, for example, as on Figure 165.

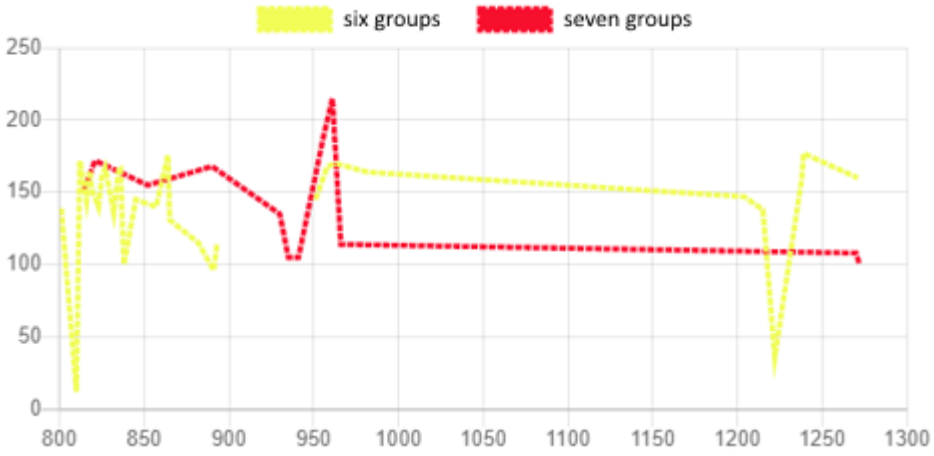


Figure 165 – Legend view

To hide the legend for specific chart, press *Settings* and select *Hide in legend*, see Figure 166. If diagram charts are built not by grouped values, i.e. the *Add grouping* option is not checked, repeat these steps for each chart.

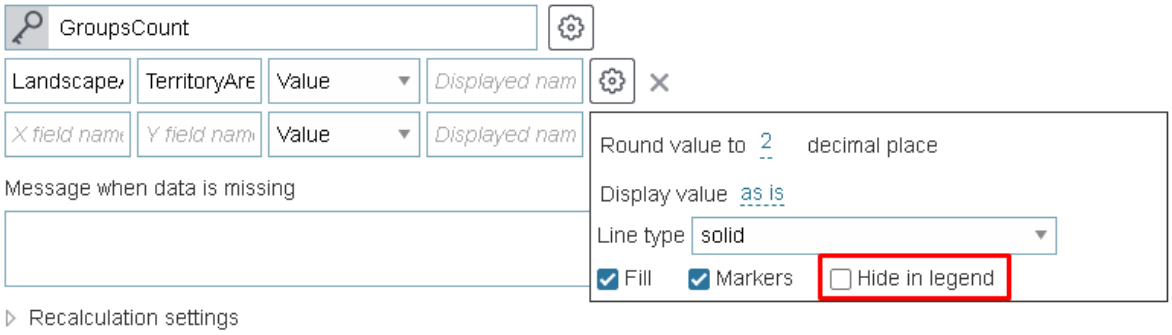


Figure 166 – Hide in legend option

In case if access to geodata is missing, for example, after map service republication, you can create the appropriate message informing users about this. Enter the required text in the *Message when data is missing* field, see Figure 167.

Figure 167 – Message when data is missing

The block contains information from the map service layer and statistical value calculated by objects of map service. If you need that in case of map service republishing or data editing the updated information is displayed in the block, specify conditions when the map service data in the block should be updated. In order that data shown in the block conformed with the filtration criteria specified by the user in the layer menu of the *Legend* tab, and in order to provide users with tools for managing information display in the block, refer to the *Recalculation settings* section shown on Figure 168, see section 4.6.2 for more details.

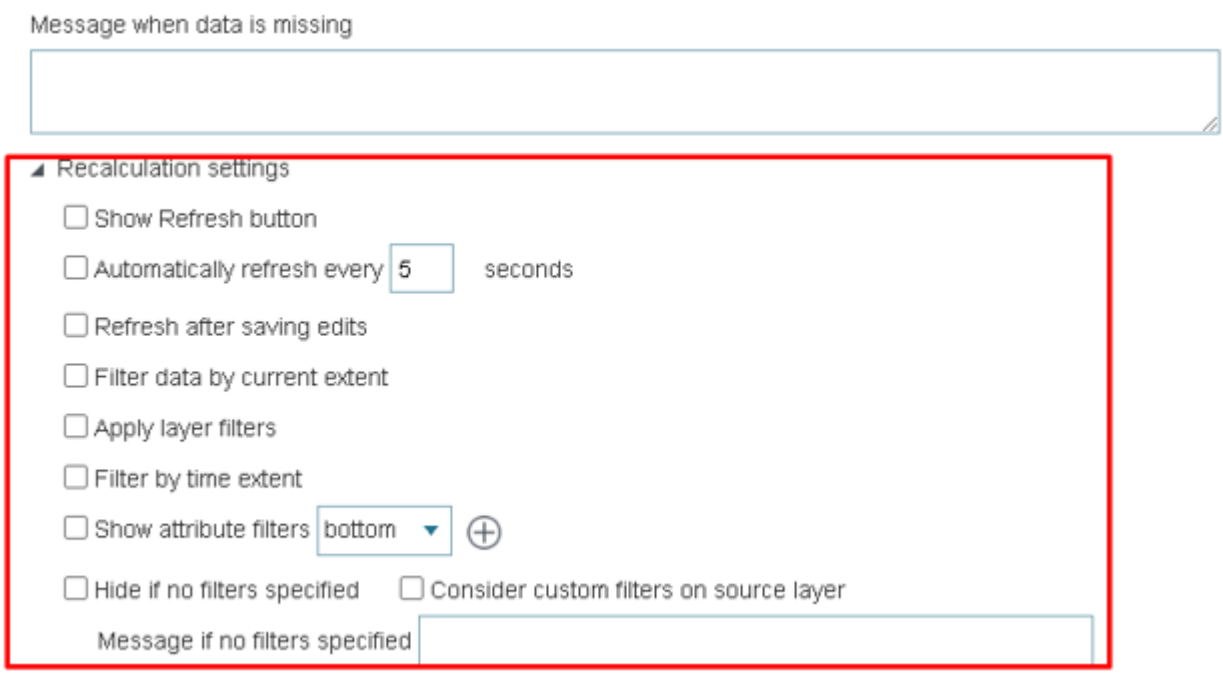


Figure 168 – Recalculation settings

4.6.2.3.6. Source data table

If you need that in widget the object values in specified attribute fields are displayed in a table, add *Source data table* block.

Enter the block title and description of the table if needed. Set the block size and background color. In *Service* tab select map service from the drop down list. This list contains all map services added to the current representation of map . Specify map service and numbers of layers *Layers*.

By default, the number of rows in the table depends on the number of objects in the specified map service layer. You can limit the number of rows entering the needed value in the *Number of objects*. In the *Field name* enter the names of attribute values that will be displayed in the table, see Figure 169.

Figure 169 – Setting block with table

In the table you can redefine the following properties:

- table columns width, press  and in *Column width* enter the number in mm;
- description of attribute field specified in *Displayed field*;
- type of displayed values – press  and in the *Display value* select needed variant, either same as in attribute field (select 'as is'), or in percent, thousands, etc.;
- empty values of attribute fields – enter text to the *Empty value* field, for example <no data> or <–>, then empty cells will not be shown in table;
- shown values of attribute field – press  and in *Template* enter required value, for example, for area–<{value} sq.m>, for date-time – <{value:dd.MM.yyyy}>, <{value: yyyy}>, <{value: MM.yyyy}>, <{value: dd.MM}>.

If you want to hide the head of the table, check *Hide table head.*

When clicking on table row, map will zoom to specified scale, as *zoom* option is enabled by default. Select action that will be done by click on table row, selecting the required option in *Action on click*:

- none;
- show object's Identify card and zoom;

- show callout and zoom.

Check *Show pushpins* to display pushpins  on map .

To display the table you can also apply *Use HTML template for display* option. Enter the name of the template located in the `Customer` folder. The template should be in HTML format.

Example of the HTML template:

```
<script type="text/html" id="tableTemplates">
    <div>
      <div>
        <table border="0" cellpadding="5" cellspacing="10"
style="background-color:#e5b636ff; width:400px; border-collapse: separate;
border-spacing: 5px">
  <tbody>
<tr>
<td style="width:90px"><span style="font-size:12px"><div data-bind="text:
$data['SignificanceLevel']"></div></span></td>
<td><span style="font-size:11px"><div data-bind="text:
dateToString($data['InventoryDate'], 'ru')"></div></span></td>
</tr>
  </tbody>
        </table>
      </div>
    </div>
</script>
```

To redefine the table head display, in *Use HTML template for display* option enter the name of HTML template stored in the Customer folder, with the space.

There are situations when the *source data table* displays data on some statistical layer that is not displayed on the map. In this case, from the table you would want to open the related object that is not the object based on which the table is built, but which is displayed on the map. To do so, you can define the target object to which the map will zoom. Specify the service, layer, and fields that can be used to establish relationship between the source and target objects. If the match fields are not set, then the relationship will be established by the OBJECTID field, see example on Figure 170

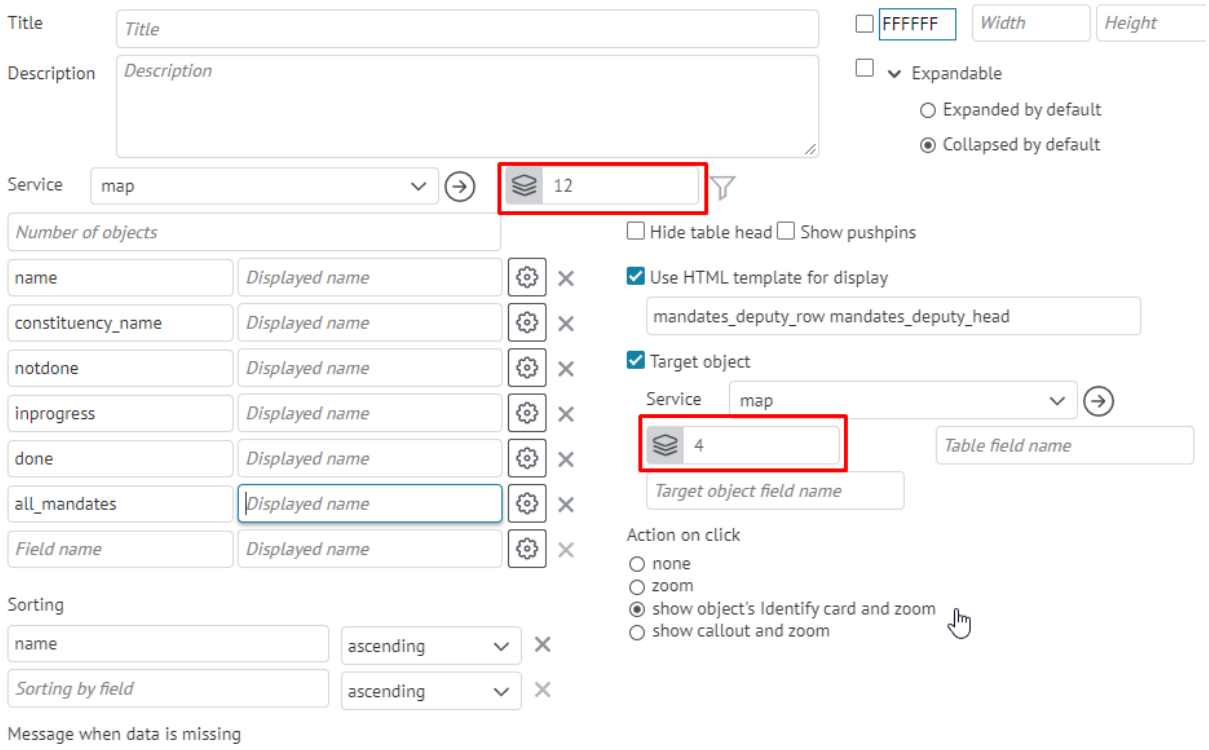


Figure 170 – Setting zoom to target object

4.6.2.3.7. Recalculation settings

Define when data displayed in the block will be updated, and which settings will be considered and which actions will be available for users. To do so, open *Recalculation settings* in the block, and check the required options as following:

- *Show Refresh button* - so that users could update statistical data shown in block, by pressing .
- *Automatically refresh every* – so that statistical data shown in block could be updated automatically.
- *Refresh after saving edits* – so that after editing map service layer objects, the statistical data shown in block could be updated.
- *Filter data by current extent* – so that calculation of statistical characteristics by objects of map service layer was performed considering the map extent.
- *Apply layer filters* – to consider layer filter specified in *Legend*.
- *Filter by time extent* – to consider time range.
- *Show attribute filters* – to display in the block attribute filter with specified attribute field. Objects on map will be filtered by selected values of specified attribute field. Enter the attribute field. To display attribute field in attribute filter with other description, enter the new field to *Displayed name*. Enter comparison operator and default value. To not allow users to change comparison operator, check *Disable changes of comparison operator* option. To allow users to select attribute field values from drop-down list, check *Multiple selection* option. Select location of attribute filter in the block. The comparison operator can be also specific operator *near*, for which you need to specify the values range in the *Deviation value* field.

The deviation value for different types of fields is specified as shown in Table 3.

Table 3 – Deviation values indicators

Indicator	Deviation value
5	+- 5
2d	+- 2 days for date fields
2h	+- 2 hours for date fields
2m	+- 2 minutes for date fields

T

To add one more attribute filter, press ⊕. Note that filters will be displayed in the order of adding. To reorder them, hold ⋮ and drag filters to needed place.

- *Hide if no filters specified* – you can specify condition to display calculated value and graphic representation of data containing in the map service layer, in the widget's block. The graphic representation means graphs and different diagram types. Each type of graphic representation is shown in separate block.
  Let's consider this option by the example of the graph. The graph can be not displayed in the block if no filter is specified, i.e. the *Show attribute filters* option is not enabled and settings of the option are not selected. To do so, check the *Hide if no filters specified* option, and create the explanatory message for users entering the required text in the *Message if no filters specified* field.
  You can specify additional condition to display the graph in the widget's block, namely, if filter in the *Show attribute filters* option settings is not specified, the graph will not be displayed in the block until the user specifies filtration criteria in the attribute filter of the *Legend* layer menu on map . As soon as the user specified the filtration criterion, the graph would be built based on data satisfying the user's condition, and would be displayed in the block. To do so, enable *Hide if no filters specified* and *Consider custom filters on source layer* options.

4.6.2.3.8. Filtration by layer attributes

To display in widget the attribute filter with specified attribute field, add *Filter by layer attributes* block ⧩. Objects on map will be filtered by selected values of specified attribute field. Enter map service address to *url* field. Select layer or group layer of map service, by which filtration will be done, to do so, enter their numbers in .

Enter the attribute field name. To display attribute field in attribute filter with other description, enter the new field to *Displayed name*. Enter comparison operator and default value. To not allow users to change comparison operator, check *Disable changes of comparison operator* option. To allow users to select attribute field values from drop-down list, check *Multiple selection* option. To add one more attribute filter, press ⊕. Note that filters will be displayed in the order of adding. To reorder them, hold ⋮ and drag filters to needed place.

To be able to zoom to objects after filtering, check *Zoom to filtration result* option. Zooming scale will correspond to scale specified by publishing of map service. If scale has not been specified by

publishing of map service, it can be specified in settings tab *Tools and map settings* , to do so, check *Define default zoom scale* option and select the required value.

If there is a need to reduce the widget window width, you can use the *Show field names on a separate line* option.

In different situations, it may be convenient to see different behavior of filters when the widget is closed. To do so, enable or disable the *Reset filters on widget close* option. If the filter settings are configured so that the user does not need to explicitly *Clear filters*, check the *Hide Clear* option. In addition, in lists of values, you can redefine the name of the empty filter value, for example, designate it as "All data".

To set the list of values for the filter, check the *Set list of values* option, and select how the list will be created:

• From layer attributes – you can specify any service, layer and field from which the possible values for filtering will be taken.

• Custom list – defines the fixed list of values for filtering.

4.6.2.3.9. Displaying information as HTML code

In order to display reference information in widget, add block *HTML code_X*, where X is the order number of the created block. You can also create block title and set its size and background color. Enter HTML code to appropriate field.

For example:

```
<Date: {CurrentDate} </br> Year: {CurrentYear}>,,
```

see Figure 171.

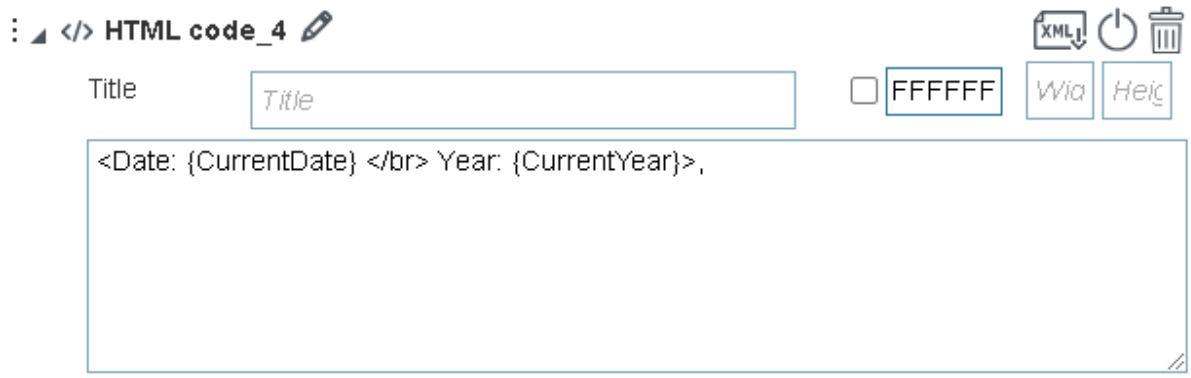


Figure 171 – HTML code block

4.6.2.3.10. Filtration buttons

Filtration buttons can be added to the widget as a separate block. These buttons are provided for quick filtration of objects on map.

The buttons block has *Title* and *Description*, besides, you can also change its background color, set its size, and add the option to expand or to collapse the block. One block can contain multiple filtration buttons. For each button, the icon and the label are specified. One button can be used to apply different filters to different layers.

Specify map service and number of layers, and SQL filter of the appropriate button. The *Turn on layers visibility*, *Turn off layers visibility* options define visibility of specified layer after pressing the filtration button. Using these options, it is possible to set that by pressing one button the user could turn specific layers off, apply specified filters to these layers and turn other layers on. Changes in the layer visibility will be shown in *Legend*. If *Do not change visibility* option is enabled, the appropriate filter would be applied to the layer and the layer visibility would remain unchanged, see Figure 172.

In order that the user could cancel all the filters, you need to set specific button, which layers visibility setting corresponds to the source visibility settings.

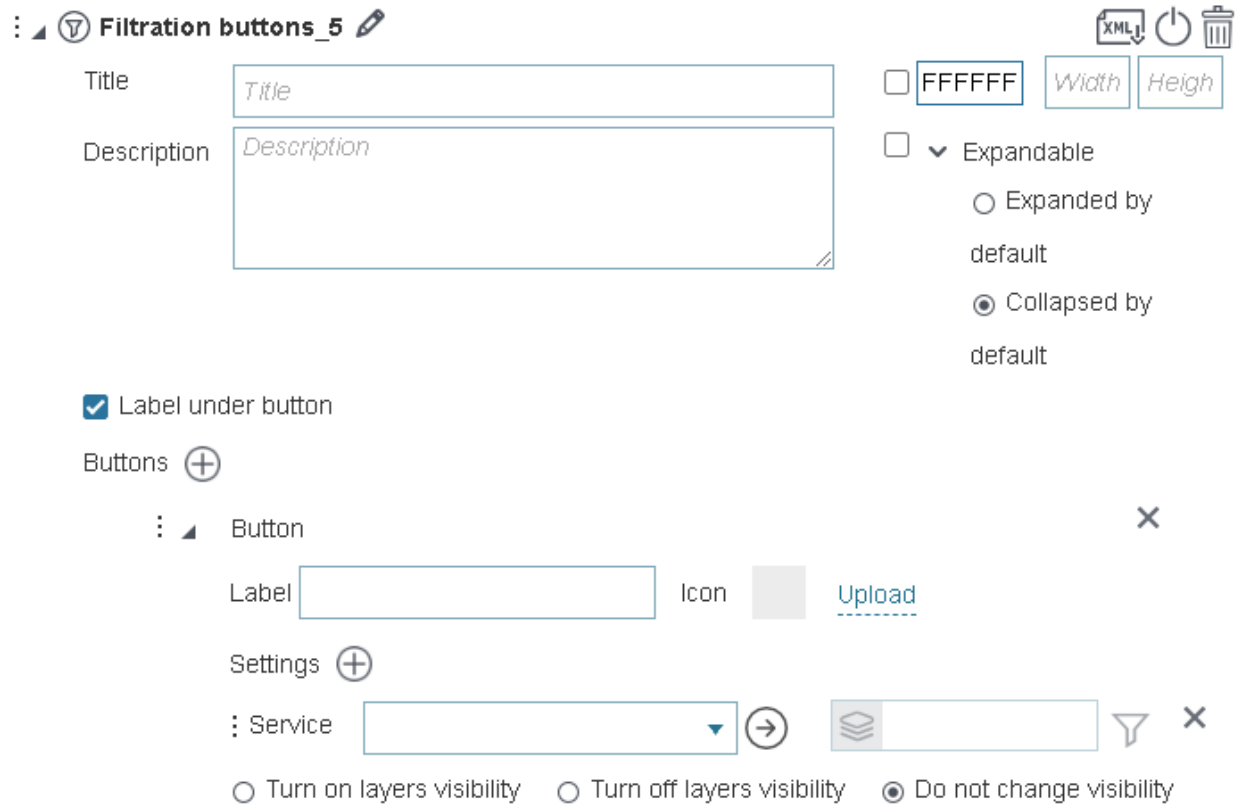


Figure 172 – Filtration buttons

4.6.2.3.11. Importing data from file

The system provides possibility to import data to specified map layer. If your map application considers regular import of data from standardized files, for user's convenience you can set specific block *Import data from file*. In this case the user will not need to select layer for importing data, to specify accordance of attributes, and other settings.

Specify map service and layer where the data should be imported. Set import parameters:

- Add new objects to layer;
- Update objects in layer;
- Delete those objects from layer that are not in the imported file.

Set importing coordinates from the table. Select coordinate system of imported coordinates from the list.

If the table contains description of object's geometry in WKT format, enable *Geometry from column* option and specify the field with this description.

If in the imported file the point objects and their coordinates are stored in separate fields, select *X and Y coordinates from columns* option and specify X and Y fields, respectively.

If in the imported file there is the field with the object's address, select *Address for geocoding* option and specify the field where the address is stored. Set attributes match and comparison key.

It is possible to set logging of the import process to separate table. To do so, specify map service and number of table where to the logging will be done and correspondent table fields for recording of the data import process.

4.6.2.3.12. Displaying reference information

In order to be able to go to external pages with reference information from the widget, add *Page with link_X* block, where X is the order number of created block. Enter the go to text in the *Link name*. By default icon will be displayed for the go to text, but you can download the other icon, if needed.

Enter reference information as HTML code, to which the user will be redirected by pressing go to text, as shown on Figure 173.

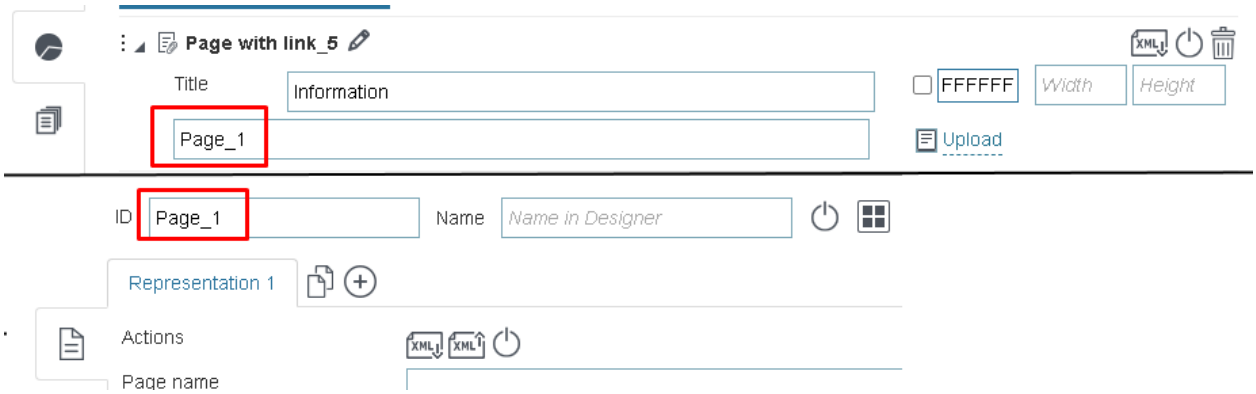


Figure 173 – Displaying reference information in widget

4.6.3. Going to website

Here you can set redirection to Internet page done by pressing the button. To do so, press *Add widget or plugin*, select *Link to website*. Enter the Internet page address in the *url* field. Enter the name shown on the button, text for tooltip and select its color. Add button to map .

4.6.4. JavaScript plugin

Here you can create JavaScript plugin that will be activated by pressing the button. To do so, press *Add widget or plugin*, select *Plugin*. Create the code. Enter the name shown on the button, text for tooltip and select its color. Add button to map .

Note: If JavaScript plugin has been created, blocks with HTML code will not be displayed in widget in mobile app.

JavaScript plugin can use API functions, see section 5 of this document.

4.7.Reports

4.7.1. Reports. General information.

Web portal provides functionality of generating .xlsx and .docx reports by map services data. The steps of setting the report generation function are as following:

- Create .xlsx or .docx report template.
- Add created report template to list of available templates.
- Set report on the *Reports* tab.
- Set report generation option in the interactive map.

4.7.2. Creating template for .xlsx report

Create report template in .xlsx format. In order that specific value is put to specific table cell, enter the inserted value ID. The following items can be used as the inserted value:

- Macros value
- Value of specific field of map service object
- Parameter value
- Statistical value.

The following expressions can be used as macros, see Table 4.

Table 4 – Macros that can be used in report templates

Macros	**Example**	**Description**
`CurrentUser`	`{CurrentUser}`	Name of authorized user
`CurrentDate`	`{CurrentDate}`	Current date
`CurrentDate-1d` `CurrentDate+1d`	{CurrentDate-7d} `{CurrentDate+2d}`	Current date +/- a few days
CurrentDateTime-1h `CurrentDateTime+1h`	{CurrentDateTime-1h} `{CurrentDateTime+2h}`	Current data and time +/- a few hours
`CurrentDateTime`	`{CurrentDateTime}`	Current date and time
`CurrentYear`	`{CurrentYear}`	Current year
`CurrentMonth`	`{CurrentMonth }`	Current month
`CurrentQuarter`	`{CurrentQuarter}`	Number of current quarter
`__Index`	`{__Index }`	Number of row in table

Note that using macros as the inserted value is case sensitive. To insert value of the specific field of map service object, enter the inserted value ID to the cell as `{Source1.Rows.Name}`, where

- `Source1` is the name of data source, specified in the report settings, see Figure 174.
- `Rows` is the parameter defining that the row of values will be inserted.
- `Name` is the name of map service which value should be inserted.

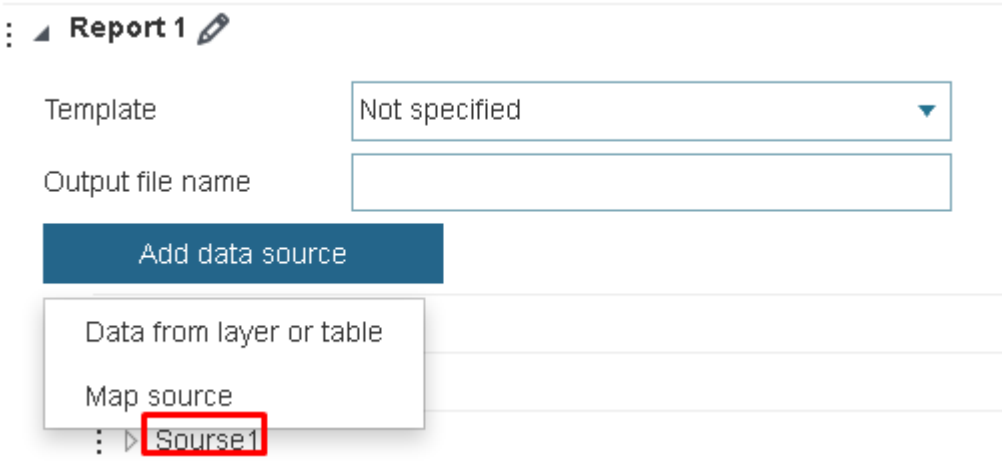


Figure 174 – Data source in the report settings

Besides macros and field value, you can insert the value of parameter specified in the report settings. See section 4.7.5.3 *Parameters* for details. The parameter value should be entered in braces, see Figure 175 and Figure 176.

Figure 175 – Parameters in report settings

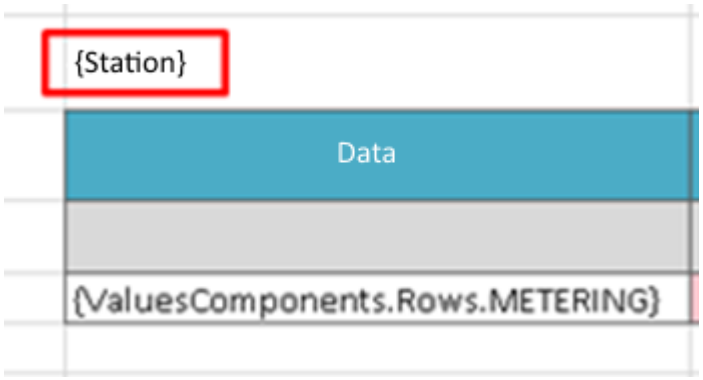


Figure 176 – Inserting parameter value to report

The output report cells will be generated based on settings specified in the report template.

The following statistical parameters can be inserted:

- Count – number of objects in table
- Sum – sum of not empty values for number columns
- Min/Max – minimum and maximum value for number columns and dates
- Ave – average value for number columns
- NotEmptyCount – number of not empty values for all types of columns
- DistinctCount – number of not empty unique values by specified field for all types of columns.

To insert statistical value, specify the appropriate identifier as {Source1.Stat.Name.Fild}, where:

- `Source1` – name of data source specified in the report settings
- `Stat` – parameter specifying whether statistical parameter will be inserted
- `Name` - name of inserted statistical parameter
- Fild – field by which the statistics is calculated.

To insert the field value of the map service, specify the appropriate identifier as `{Source1.Rows.Name}`, where:

- `Source1` – name of data source specified in the report settings
- `Rows` – parameter specifying whether the value row will be inserted
- `Name` – field name of map service which value should be inserted.

4.7.3. Creating template for .docx report

To create template in .docx format, in *MS Word* open *File/Parameters* and in *Customize Ribbon* section select *Developer* tab, see Figure 177 and Figure 178.

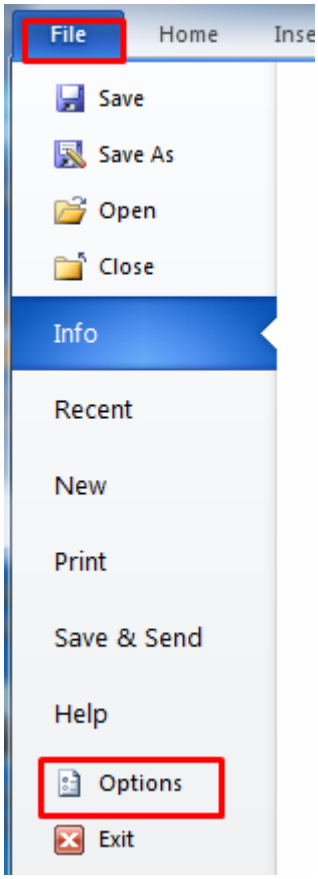


Figure 177 – Parameters. Opening Developer tab.

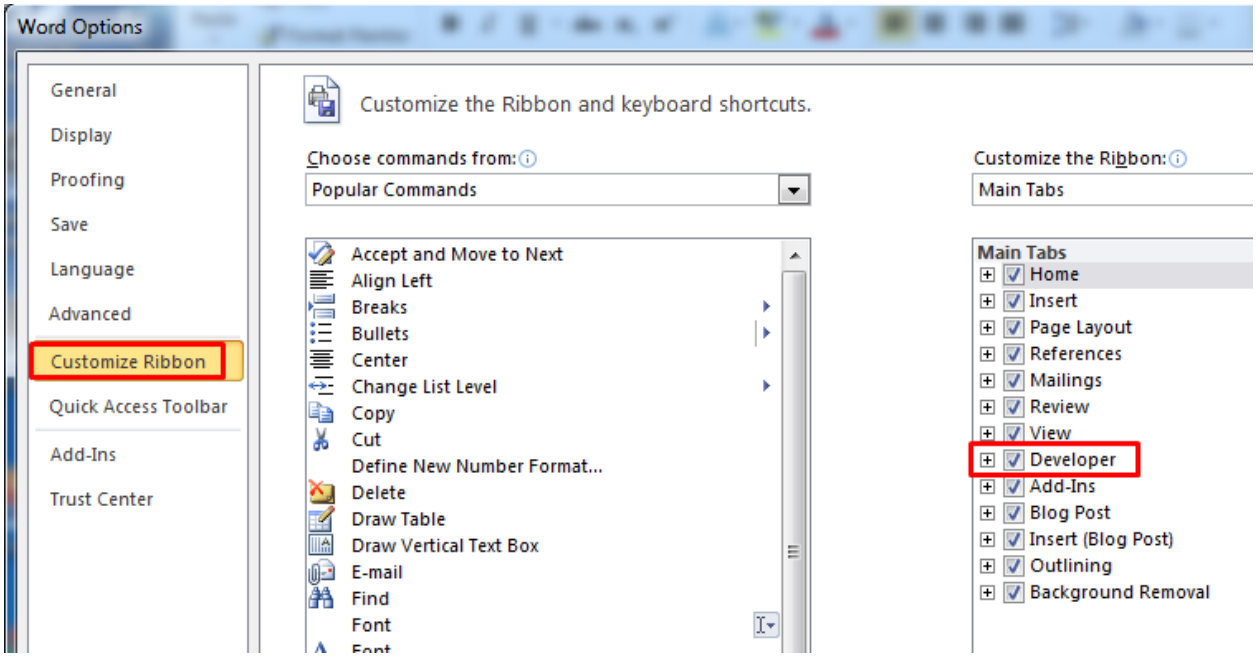


Figure 178 – Selecting Developer tab

Create report template in .docx format. If you want that the value is inserted to specific place of the document, in *Developer* tab go to *Design Mode* and add *Content Control*. In the control settings in *Tag* field specify the inserted value ID, see Figure 179. The text specified in the *Tag «Click here to enter text»* will not be shown in the output report, here you can specify the name of the inserted value for further work with report template.

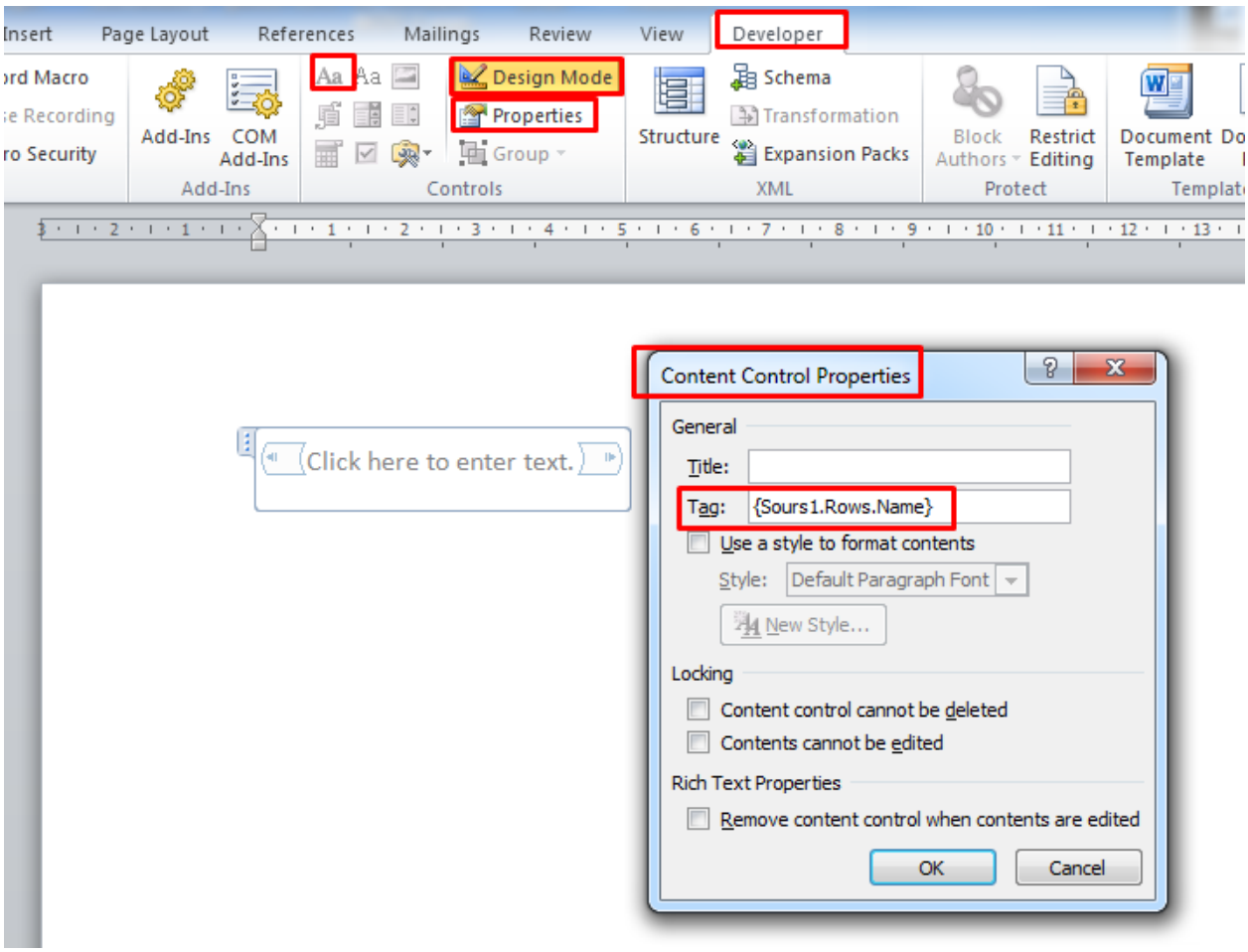


Figure 179 – Content Control

The following items can be used as the inserted value:

- Macros value;
- Value of specific field of map service object;
- Parameter value.

The following expressions can be used as macros, see Table 5.

Table 5– Macros that can be used in report templates

Macros	**Example**	**Description**
`CurrentUser`	`{CurrentUser}`	Name of authorized user
`CurrentDate`	`{CurrentDate}`	Current date
`CurrentDateTime`	`{CurrentDateTime}`	Current date and time
`CurrentYear`	`{CurrentYear}`	Current year
`CurrentMonth`	`{CurrentMonth }`	Current month
`CurrentQuarter`	`{CurrentQuarter}`	Number of current quarter
`__Index`	`{__Index }`	Number of row in table

Note that using macros as the inserted value is case sensitive. To insert value of the specific field of map service object, enter the inserted value ID to the cell as `{Source1.Rows.Name}`, where

- `Source1` is the name of data source, specified in the report settings, see Figure 174.
- `Rows` is the parameter defining that the row of values will be inserted.
- `Name` is the name of map service field which value should be inserted.

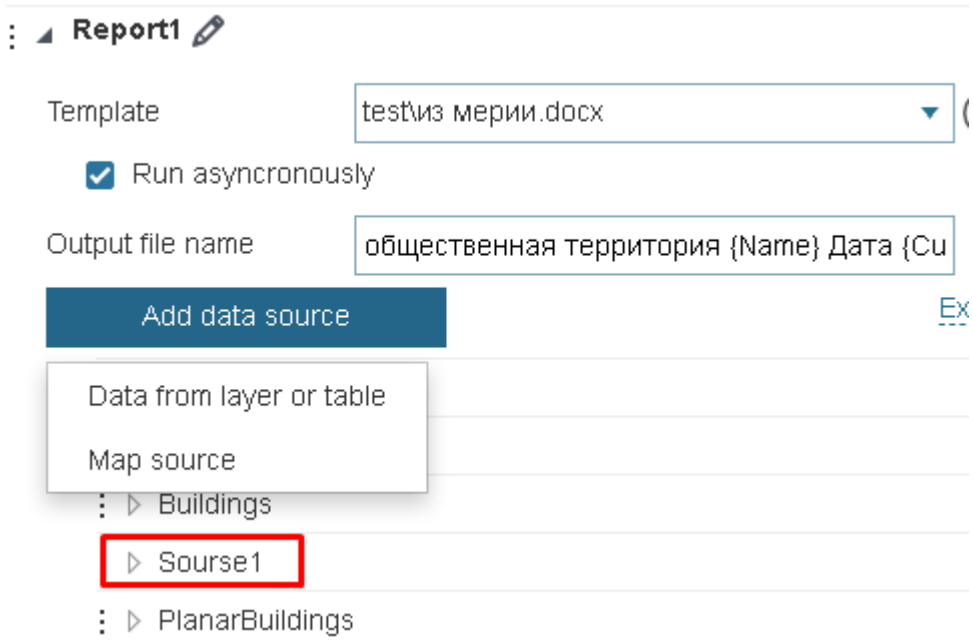


Figure 180 – Data source in the report settings

Besides macros and field value, you can insert the value of parameter specified in the report settings. See section 4.7.5.3 *Parameters* for details. The parameter value should be entered in braces, see Figure 181 and Figure 182.

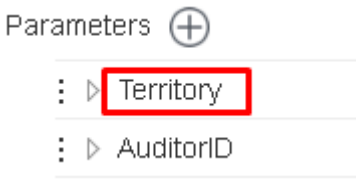


Figure 181 – Parameters in report settings

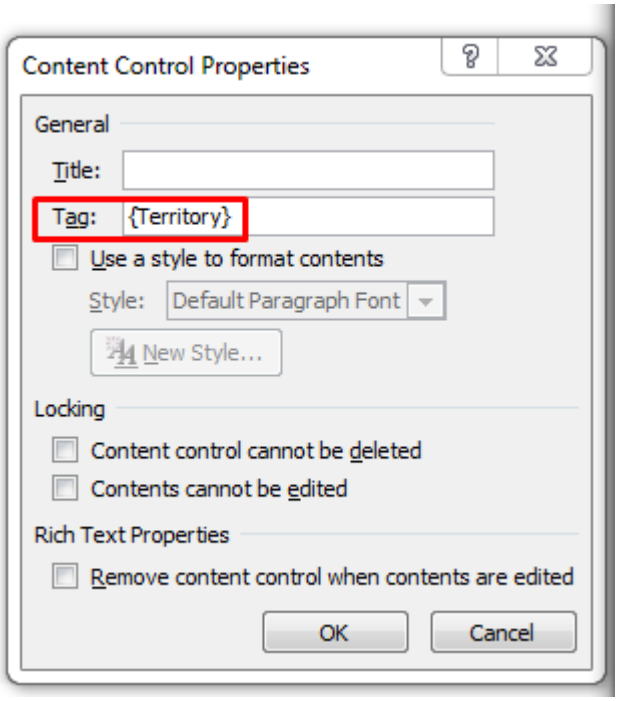


Figure 182 – Inserting parameter value to report

Create the table, specify ID of the inserted value in the table cell. If your data contains multiple objects, then for each object a separate row will be created. To number the rows, enter the inserted value ID in the column, where in tag `{__Index}` will be specified.

The name of the data source and `Rows` parameter can be specified in the Table properties, see Figure 183, where 3,5 is the range of rows where the values will be inserted. In this case in the table cells for value ID you will just need to enter the name of the map service field, i.e. `{Name}` instead of `{Source1.Rows.Name}`.

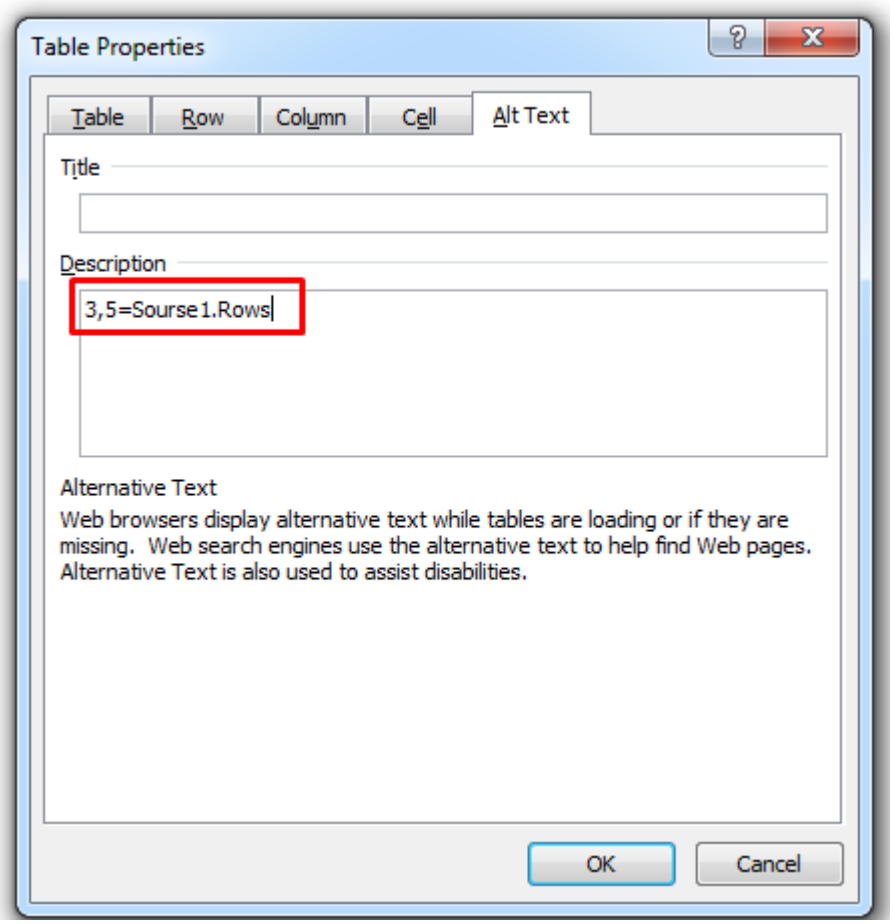


Figure 183 – Setting report table properties

In order that the dates are inserted in the specific format, select Date Picker Content Control, in the control properties select the required format and in tag enter the field name, from which the data will be imported, see Figure 184 and Figure 185.

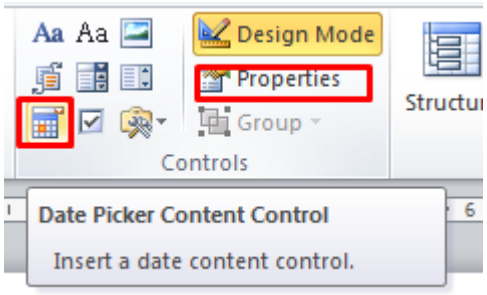


Figure 184 – Date Picker Content Control

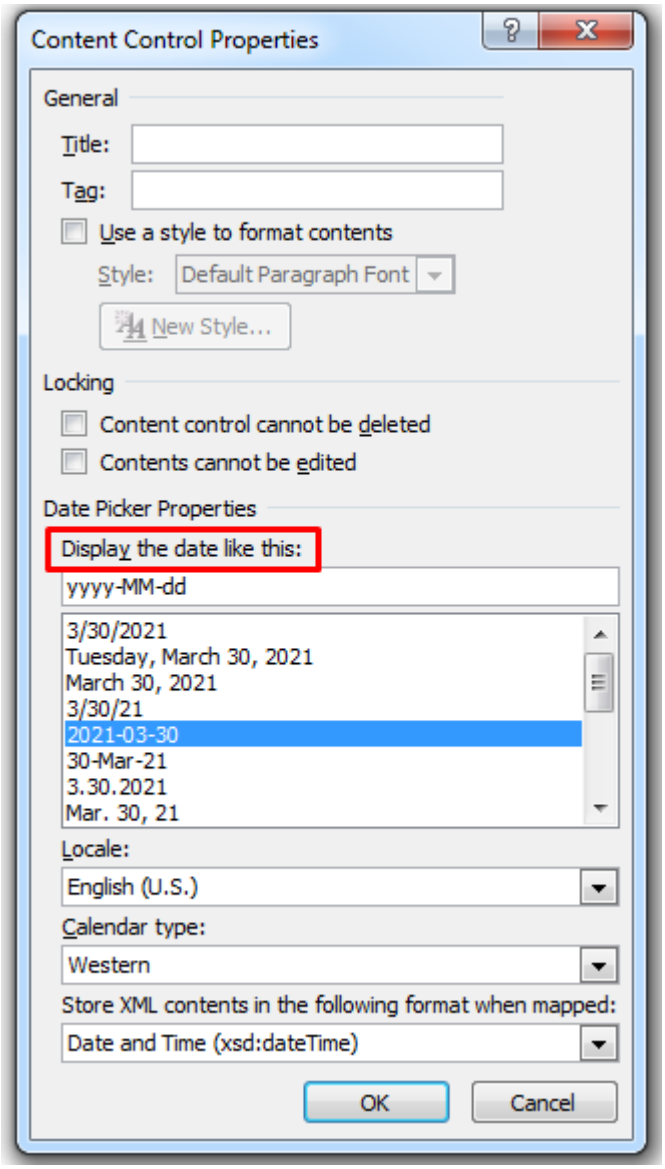


Figure 185 – Date display format

Also, to build the date, you can define its format as follows: {myfield:dd'.'MM'.'yyyy' 'HH':'mm}.

If the inserted string is too long, you can reduce the number of characters by putting the beginning and end of the string in square brackets, for example {AdditionalData[0..20]}, see Figure 186.

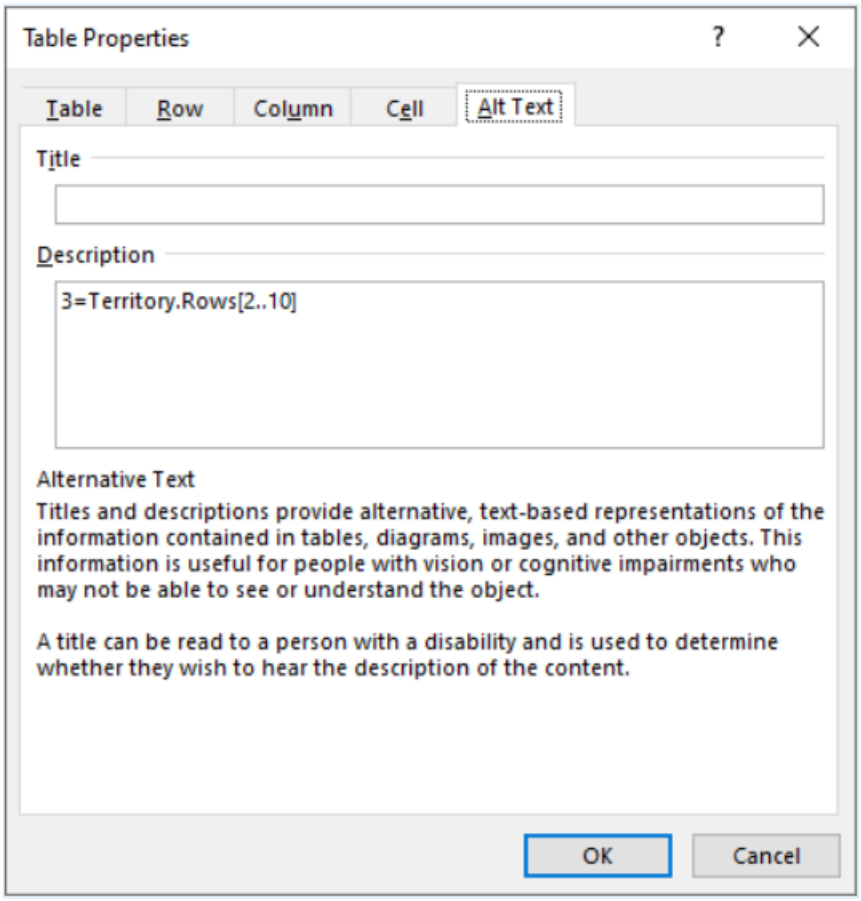


Figure 186 – Example of reducing the inserted text

For formatting and rounding numbers, you can specify the number of decimal places, as well as the Russian or English version of the separator (comma or period), for example {myfield:F4:ru} to get 4 decimal places and the comma separator.

Sometimes, in the case of an empty value, it is necessary to insert certain text, for this, specify it in the following form: {myfield=not defined} or {myfield:F4:ru=not specified}.

In order to add map document to report, in the report template add the *Content Control Picture* and in the control properties in *Tag* field specify the inserted picture ID as `{Territory.Image}`, see Figure 187. `Territory` is the name of the map document source, and `Image` is the parameter defining that the picture will be added. To specify the map scale, enter `{Territory.Scale}` to the *Tag* field of the correspondent control, where `Territory` is the name of the map document source, and `Scale` is the parameter defining that the scale will be inserted.

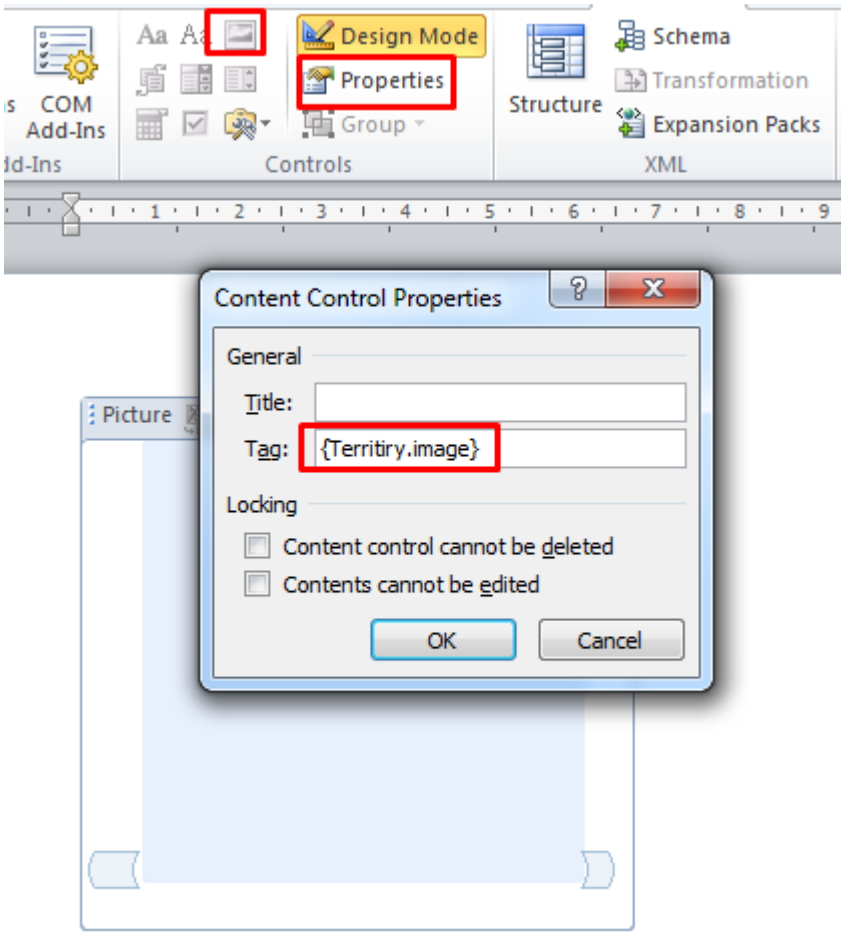


Figure 187 – Adding map document to report

In addition, it is possible to insert information about attachments, file name and size, attachment attributes, image and image preview thumbnail.

To add information about files, add the table, indicate which attachment property or attribute (the name of the attribute in the database, considering lowercase and uppercase letters) should be inserted.

Attachment property	**Example**	**Description**
`Image`	`{Name}`	Insertion of image (from object attachments)
`PreviewImage`	`{PreviewImage}`	Insertion of image preview (from object attachments)
`Name`	`{Name}`	Attachment name
`Size`	`{Size}`	Attachment size

In the table properties specify which rows should be multiplied for each object (n and m, see Figure 188), source (Source1, see Figure 188), and specify which rows should be multiplied for each object attachment (k, see Figure 188).

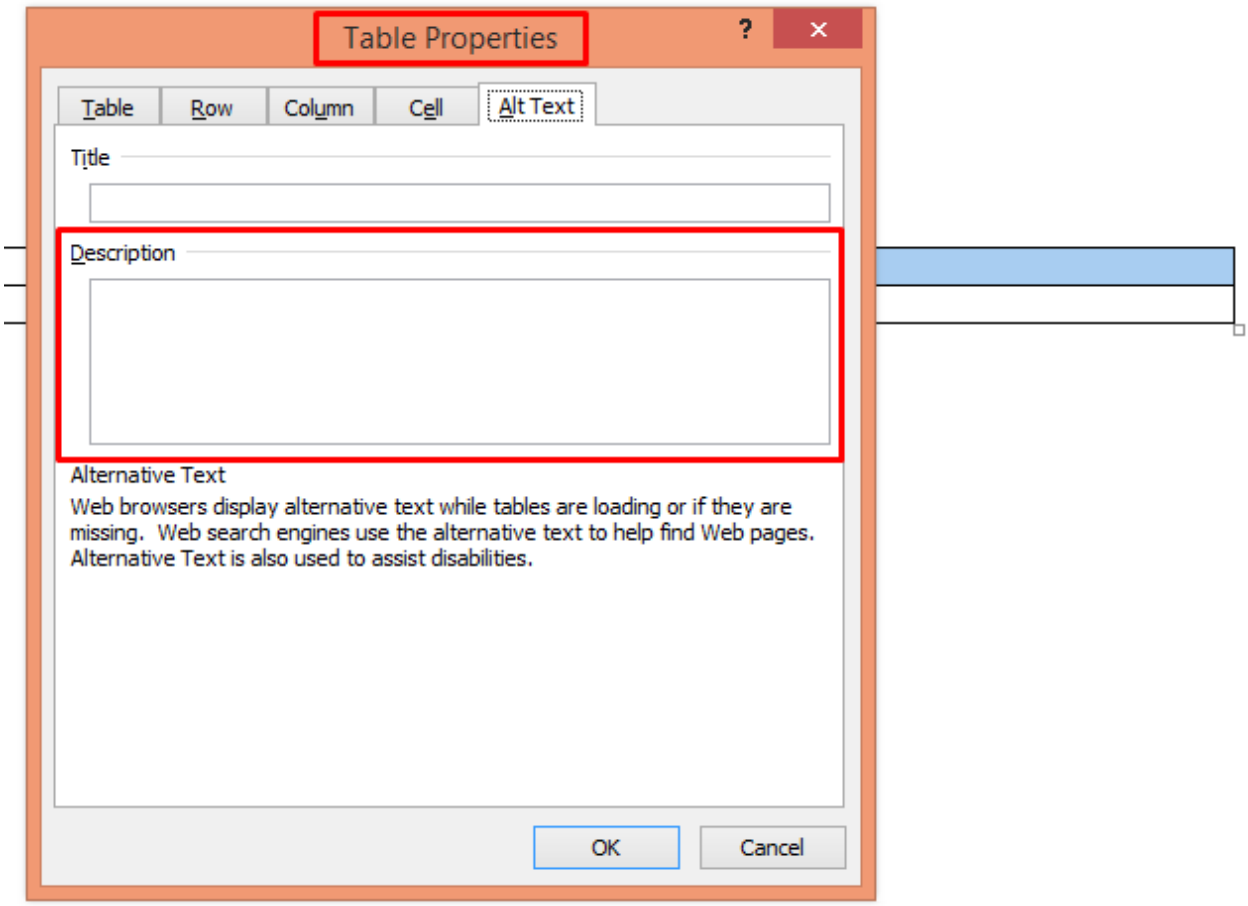


Figure 188 – Table properties for information about attachments

4.7.4. Adding report template

The created report template should be added to the Templates folder. This can be done via the managing files tab or by download on the report tab. When downloading the template on the reports tab, the file will be placed in the root folder with templates. When updating the template, if the file name differs from the previously selected template, a new report file will be generated, and if the file name matches the current one, the file will be updated.

If there is a need to organize the report files into subfolders, go to the files management tab and add the corresponding subfolder and the corresponding template file to the report templates folder. After that the added template will be available in the drop-down list of templates in the Reports tab, see Figure 189.

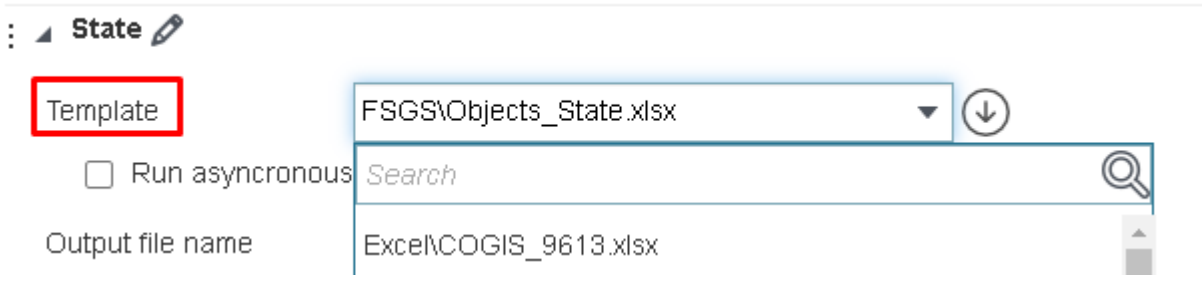


Figure 189 – List of available report templates

4.7.5. Setting report in the Reports tab

Go to *Reports* tab, add the report, set its name and select the needed template. Set report data sources and parameters.

The data source for .xlsx report can be layer or table. The data source .docx report can be map document or data from layer and table. In one report multiple data sources can be used.

4.7.5.1. Data from layer or table

The name of the data source is used in the report template by default, so it is recommended to rename the template, for example, by layer or table name.

Specify service and number of data source layer. In the drop down list all map services of the map are shown. If you want that filters specified in the map would be considered by generation of report, check the *Use filters from map* option. To define sorting of data added to the table, specify field name and sorting order, see Figure 190.

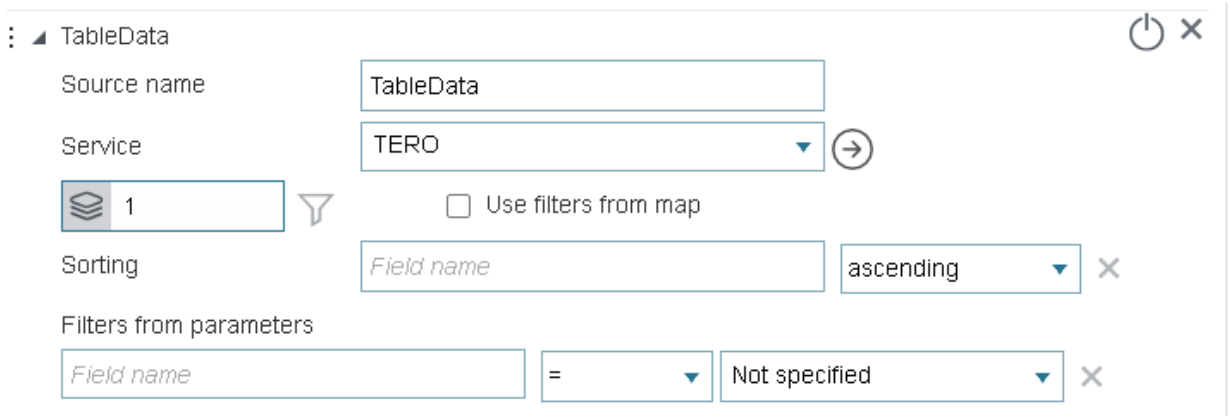


Figure 190 – Setting data source from layer or table

In order that the user could apply filters not on map only, but also in the report generation window, specify filters from parameters. Specify, by which field the filtration will be done and to which parameter will it correspond, see Figure 191.

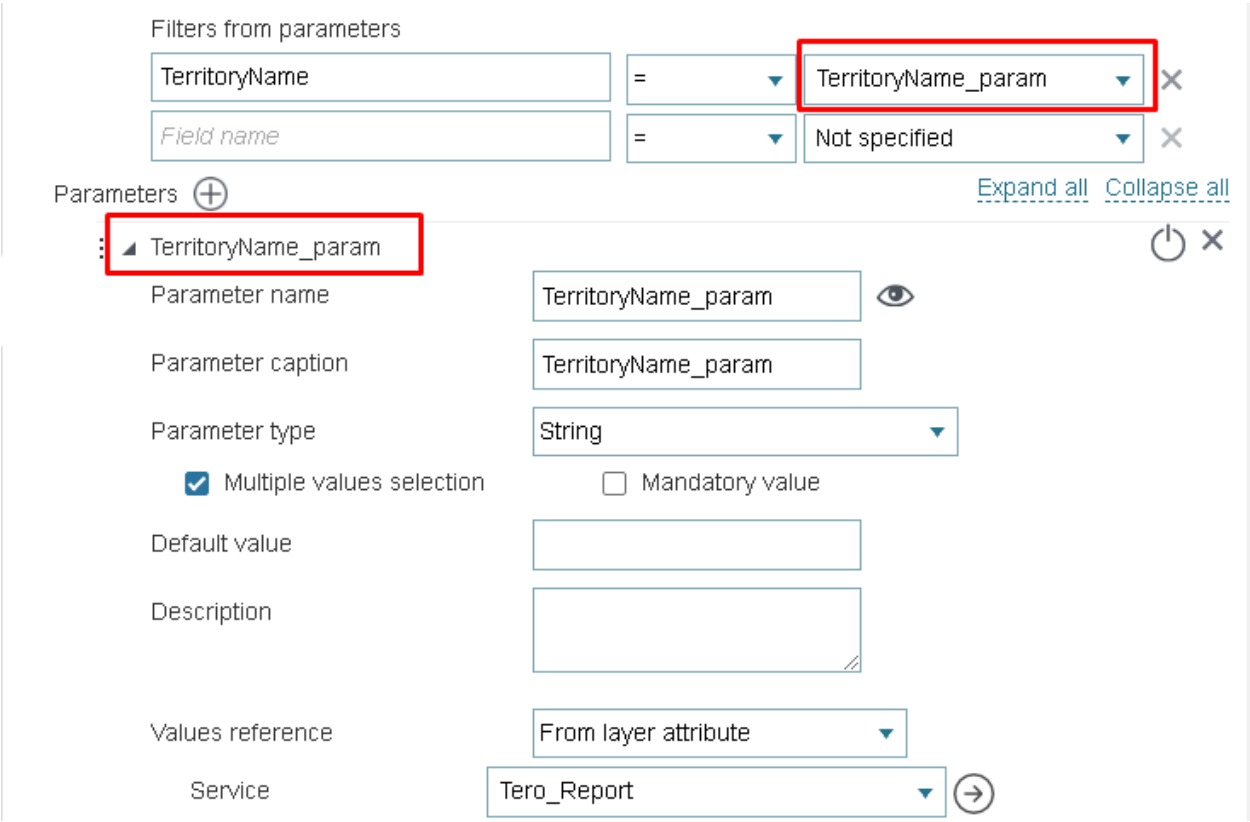


Figure 191 – Setting filters from parameters

Parameter defining the field which values should be added to report is specified in the report template.

4.7.5.2. Map source

The name of the data source is used in the report template by default, so it is recommended to rename the template, for example, by layer name.

Specify the print service. If your map document should contain basemap, select it in the drop down list. All basemaps available for map will be shown in the list, see Figure 192.

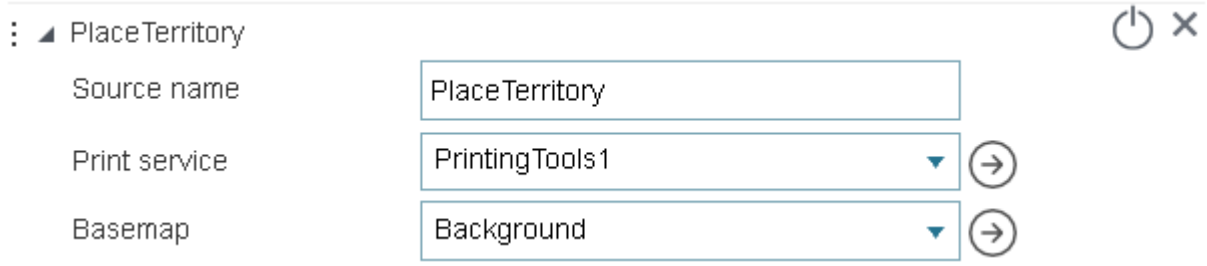


Figure 192 – Map document. Selecting print service and basemap.

Specify map services and number of layers by which the map document will be created, set filters, if needed, see Figure 193.

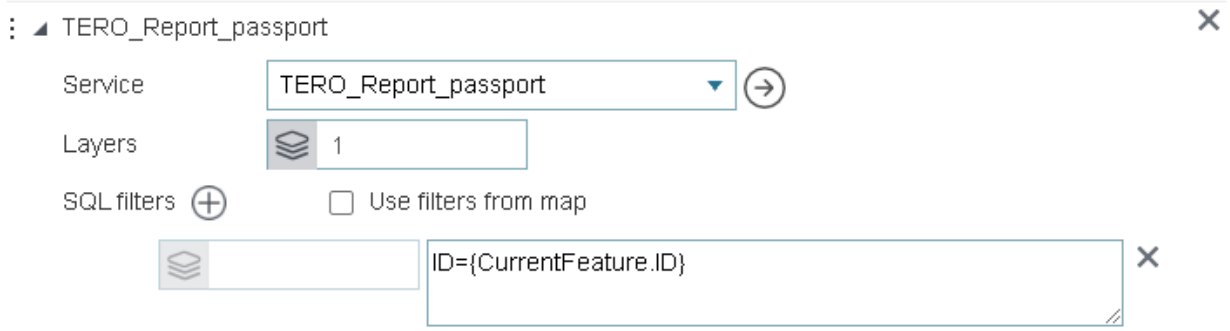


Figure 193 – Map document. Setting data source.

Specify extent by which your map document will be created:

- *Current from map* – the map will be created using the current extent of map . That is, the map area currently displayed on the screen will be added to the report.
- *From Favorites* – the map will be created using the extent selected from the list of favorite extents, see section 4.4.3 for details.
- *Calculate by data* – the map extent will be automatically selected according to the data change. Specify service, layer number and SQL filter. For example, if map extent should be created by boundary of the object, by which the report is generated, enter the filter 's ID as `ID={CurrentFeature.ID}`, see Figure 194.

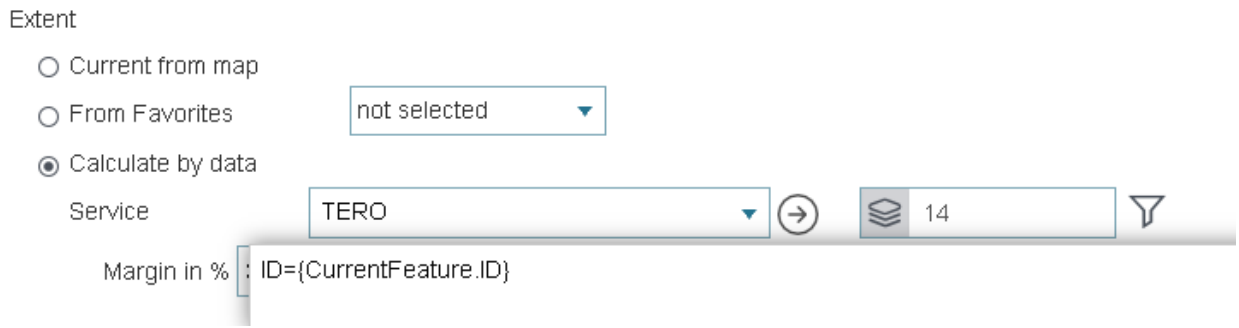


Figure 194 – Example of setting map extent by object's boundary

Set *Margin in %*, to add specific margin to the selected map extent. If the map scale corresponding to the specified extent does not fall within the range of the specified values of the minimum and maximum scale, the map document will be generated within the specified restrictions. For example, if *Current from map* option is selected and at the moment of the report generation the user works with the map of scale 1:500, and the specified minimum scale is 1:2000, in this case the map document will be created at scale 1:2000. If the accuracy of the selected scale is not important for the calculation, but you want to get whole numbers, check the *Round scale* option. As a result, the rounded scale will be selected for the map, for example, 1000, and not 916.

Enter the map width and height, DPI, select printing template (the print service templates are available for selection). If needed, specify *Name, Author, Copyright,* see Figure 195. Template and marginalia elements are specified same as print service elements and can be redefined by the user. See section 4.2.5 for details.

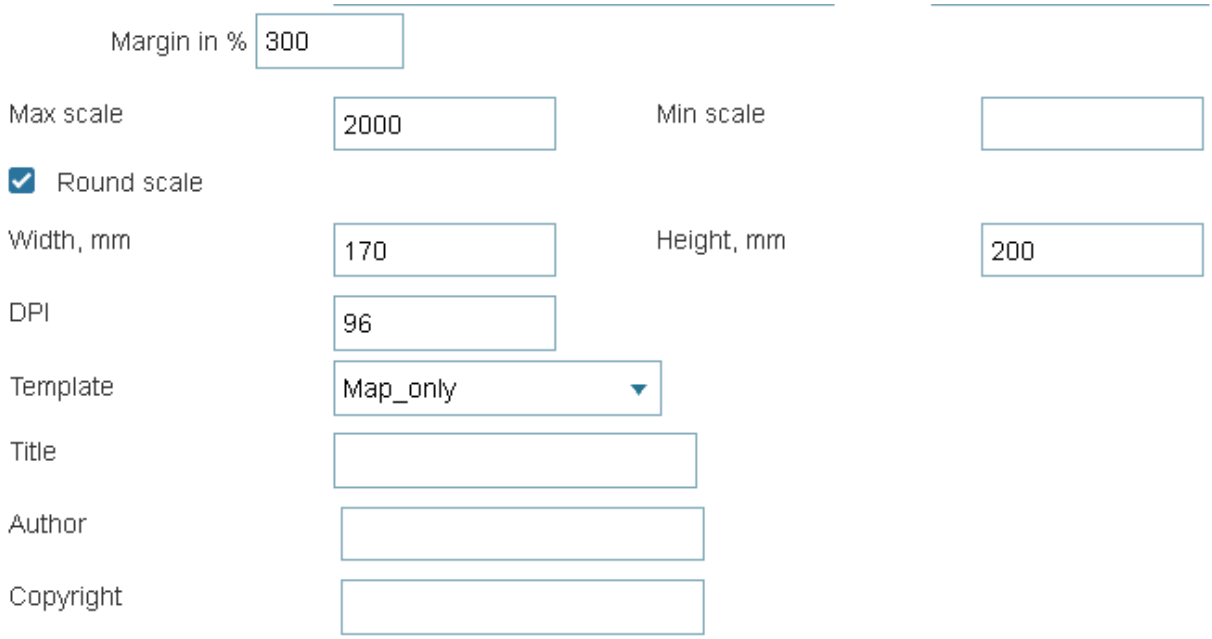


Figure 195 – Map document settings

4.7.5.3. Parameters

The report parameters are used to define the input parameters applied by report generation, and to add parameter value to the report form.

The following steps should be done to set the report parameters, see Figure 196:

1. Enter the name of parameter that will be added to the report or used to set filters from parameters.
2. Enter the parameter name which will be shown to user during the report generation.

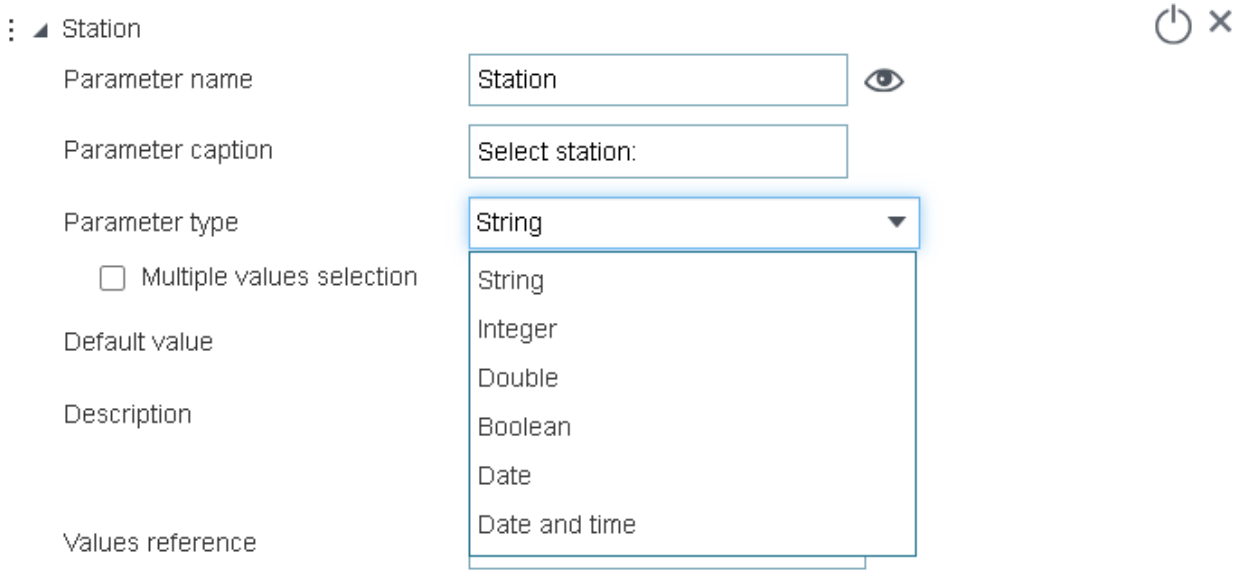


Figure 196 – Setting report parameters

3. Select the parameter type:
    - String;
    - Integer;
    - Double;

- Boolean;
- Date;
- Date and time.

4. Enter the default value, specify whether parameter is mandatory to generate report, whether multiple values can be selected. For parameter description you can use HTML code, the description will be visible for the user.
5. Specify the reference of values, if the parameter is the list or if the value should be selected from the predefined list. This setting allows to create the list of values for parameter. The list can be set as following:
    - *Manually* – select *List* and create the list of predefined values, defining the parameter value and displayed label. For example, 01- January; 02 – February, etc.
    - *From layer attribute* – the list of attribute fields of the service added to the map. Specify map service and number of layer. Enter the attribute field containing the code and the name of the attribute field with the value. Specify attribute field for sorting, enter its name in the *Sorting* field and select the needed variant from the drop-down list.
    - *From domain* – the list built based on the attribute domain of the service layer. Enter the attribute field that uses the attribute domain.
6. Specify visibility parameters for user, for example, turn it off if the constants are used and if they are not supposed to be changed by the user.

4.7.6. Setting report generation in interactive map

You can start the report generation from the object's card or in the widget window. If the report is generated by one object, then the report generation parameter would be the object's ID.

For example, you need to generate report by specific territory and objects located in this territory. In this case you can set the start of the report generation from the identify card of the territory's object. To do so, create parameter, for example, `TerritoryID`, specify the default value as `{CurrentFeature.ID}`, where `ID` is the attribute field which value will be the input parameter for report generation, see Figure 197.

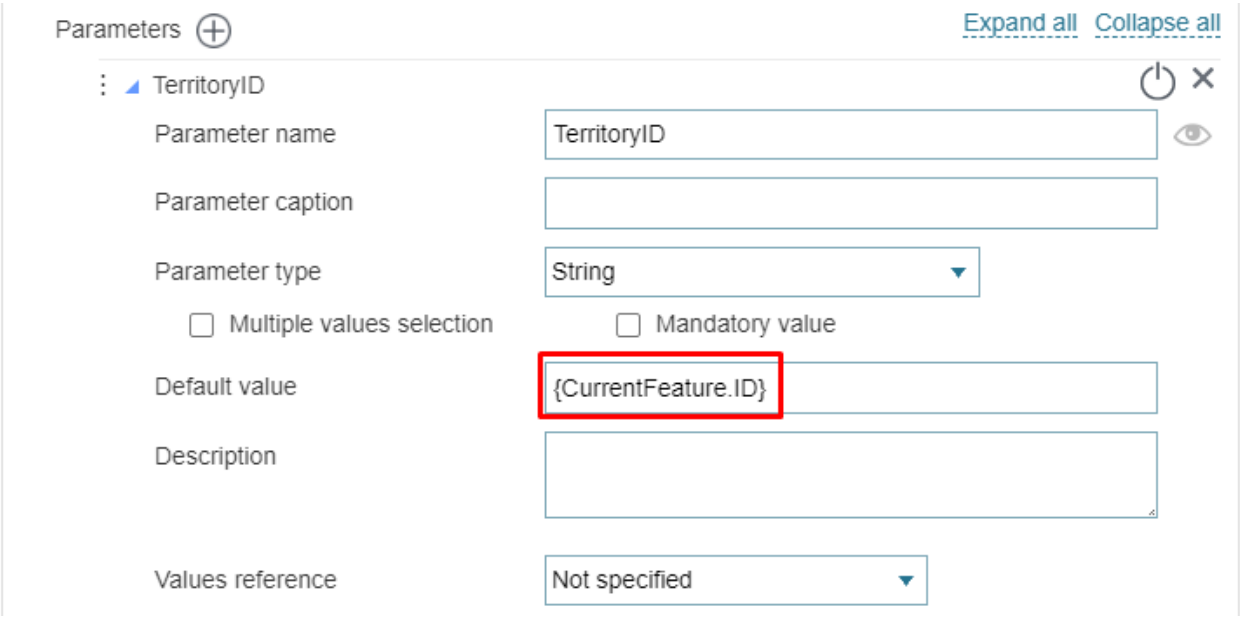


Figure 197 – Example of setting parameter to generate report from the object's identify card

Go to the vertical tab *Identify card template* and in the required template add *Generate report* block, specify the report and download report button icon, as shown on Figure 198.

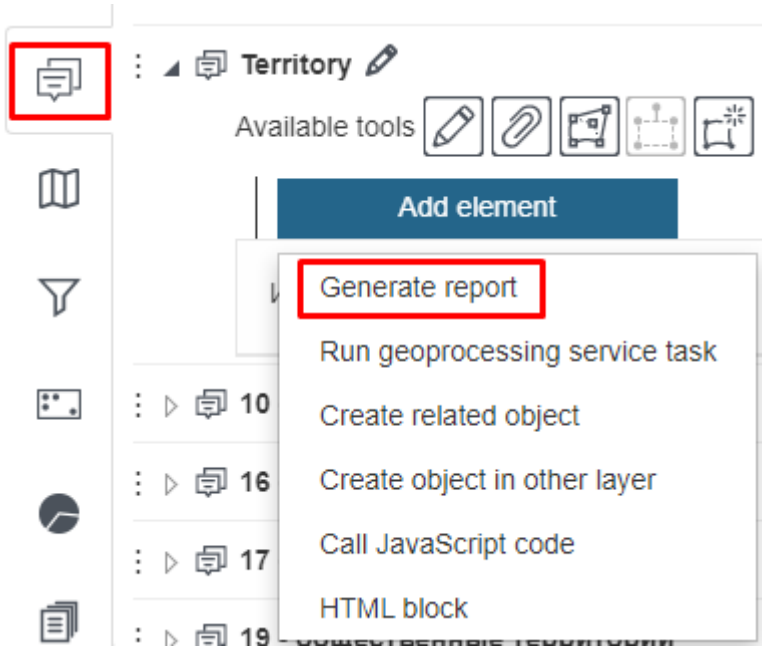


Figure 198 – Setting report generation button in the object's identify card

If the report is built by multiple objects, its generation will be started from the widget window. Go to the vertical tab *Statistics, widgets and plugins,* add the widget and specify its settings (see section 4.6). Add *Generate report* block, specify the required settings and select report that needs to be generated, see Figure 199.

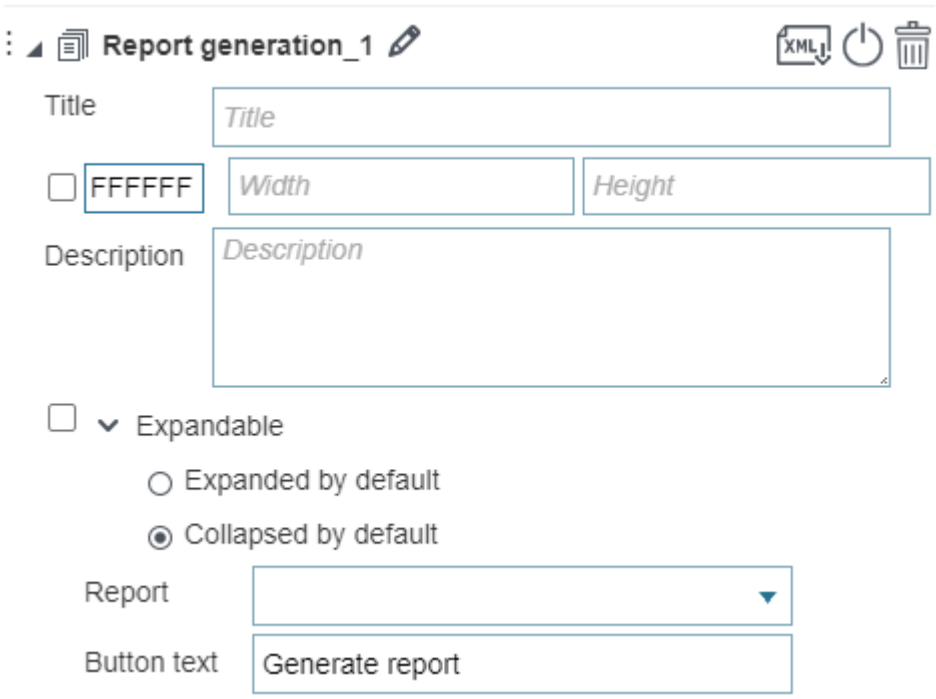


Figure 199 – Setting report generation in the widget window

4.8.Setting map for mobile application

4.8.1. Basemap and its redefining

For display in the mobile app, you can add a basemap as:

- Basemap of tile web service
- File in CMF2 format that will be downloaded to mobile device and can be used offline.

To add offline basemap as CMF2 file, press *Offline basemap*. In Path to cmf2 select the required CMF2 from the drop-down list. Note that this list is displayed only if the relationship has been established between the folder of CMF2 files generation and CoGIS. To establish this relationship, in General settings tab check Enable support for offline data and specify the folder location.

To enable the user to search for objects in basemap, check the *Use in search* option. Check the *Use in object card* option and the object cards will be displayed for basemap objects.

If offline basemap is added to the map and the *Default basemap* option is checked, then the in the mobile app the offline basemap will be displayed by default, regardless of whether the *Default basemap* option is enabled for the tile web service basemap. Offline basemaps are not displayed in the browser.

4.8.2. Adding offline layers to map in mobile application

To add CMF2 layer to the map, go to Services tab and add Offline layer. Enter the layer name and in the Path to cmf2 field select the required CMF2 file from the drop-down list. Note that this list is shown only if there is a connection established between CMF2 files generation folder and CoGIS. In the General settings tab check Enable support for offline data and specify the folder location. Offline layers are not shown in browser.

In order to define visibility of offline layer, check Visibility by default option.

4.8.3. Offline work with data on mobile device

All map service layers added to the map application that are not used in the map will be downloaded to the offline layer of the mobile application. An example setup is shown in Figure 217, in this case layers 6-10 are added to the map application but are not used in the online service. All objects of these layers will be downloaded to the mobile device. If editing is configured, it will be available, including in the offline mode of the mobile application.

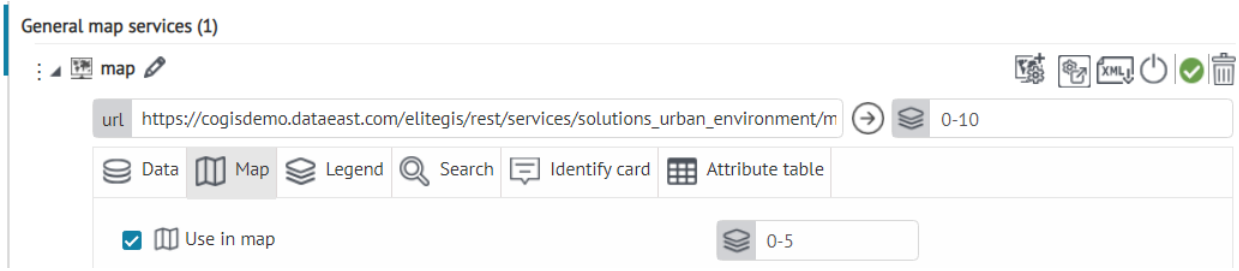


Figure 200 – Example of setting layers for download on mobile device in mobile application

5. API

The API functionality can be used in widget in the JavaScript plugin and in the object's identify card in the JavaScript code block.

The API functionality includes the following:

- Basic functionality for work with the map:
  - `createExtent(xmin,xmax,ymin,ymax,sr)` – creation of extent's geometry;
  - `createPoint(x,y,sr)` – creation of point's geometry;
  - `getCentroid(geometry)` – getting of centroid by geometry;
  - `getSpatialReference(id)` – getting of coordinate system by wkid or wkt;
  - `project(geometry, sr)` – projecting of geometry to the required coordinate system;
  - `goTo(geometry, maxScale, minScale, marginInPercent=20)` – zooming to specified geometry with possibility to set optional minimum and maximum scale, and to set buffer around the object before zooming to it, in order that the source geometry is displayed considering margins (specified in percent);
  - `highlight(geometry, withLines=false)` – highlighting of geometry with display of directional lines or without lines;
  - `showPushpin(geometry, icon=icon set by default or by URL)` – showing of pushpin which disappears after panning or zooming the map only;
- Logical functions of the project:
  - `getLayer(serviceUrl, layerId, existsIn=map/legend/search/attributeTable)` – searching for layer for use in the JavaScript plugin;
  - `searchInLayer(layer, whereClause, objectIds, geometry)` – requesting array of objects (with geometry and values of all attribute fields, if such requests are allowed in settings) by specified conditions, `objectIds` and which locate in specified geometry in specified layer, the coordinate system corresponds to the coordinate system of the map;
  - `geocodeAddress(address, filters={prop1:value1,prop2:value2]})` – geocoding by address to get objects by the one line address or/and by additional parameters of the geocode service. In case if multiple geocode services are used in the project, the first service will be applied;
  - `addFilterToLayer(layer, criterion), removeFilterInLayer(layer, filter), clearAllFiltersInLayer(layer)` – function of adding/deleting of specific or all layer filters.
- Visual functions of the map:
  - `search(text)` – call of the one line search in accordance with the map project settings;
  - `openIdentify(feature, goTo=true, calloutOnly=false)` – display of the object's card for the found object;
  - `identify(geometry)` – call of the object's identification as click by coordinate simulation;

- `openAttributeTable(layer, panelHeight)` – opening of attribute table with specified height and selection of layer. The table height can be specified as number (in pixels) or in percent (string value with % at the end);
- `openWidget(name)` – opening of specified widget.
- `showAlert("Message title", "Message")` – display of message.

- Methods for calling the build service area and find route functions with display of data on map:
  - api.constructServiceArea = function (points, cost, breaks, restrictions) – Building service area.
    example: api.constructServiceArea([api.createPoint(82.9246, 55.0304, api.getSpatialReference(4326))], 'Geodesic_Length', [3, 6], ['Car'])
  - api.findRoute = function (points, cost, restrictions) – Find route.
    example: api.findRoute([api.createPoint(82.9246, 55.0304, api.getSpatialReference(4326)), api.createPoint(82.9546, 55.4304, api.getSpatialReference(4326))], 'Geodesic_Length', ['Car'])
  - api.addGraphic = function (geometryInWGS84, symbol) – Add graphic object on map.
  - api.deleteGraphic = function (graphic) – Delete created graphic object.
  - api.createColor = function (red, green, blue, alpha) – Define color for graphic object on map.
    example: api.createColor(255, 2, 2, 0.5)
  - api.createSimplePointSymbol = function (color, size, outline, type) – Create simple point symbol (color, size, type) to color the point graphic object.
    example: api.createSimplePointSymbol(api.createColor(255, 2, 2), 10);
  - api.createPicturePointSymbol = function (icon, iconSize, locationX, locationY) – Create point symbol as icon (raster image) to color the point graphic object.
  - api.createSimpleLineSymbol = function (color, width, type) – Create simple polyline symbol (color, width, type) to color the polyline graphic object.
  - api.createSimpleLineSymbol = function (color, width, type) – Create simple polyline symbol (color, width, type) to color the polyline graphic object.
  - api.createSimpleFillSymbol = function (color, outline, type) – Create simple areal symbol (color, outline, type) to color areal graphic object.
  - To clear found route or service are, run the appropriate function with an empty array of points.

Examples:

- Opening of attribute table:

```
<script>
api.openAttributeTable(api.getLayer("https://.../MapServer", 0),300);
</script>
```

- Opening of object's identify table:

```
<script>
```

```
var point = api.createPoint(7414817.879000001, 1.0027362619900003E7,
api.getSpatialReference(3857));
api.goTo(point);
api.identify(point);
</script>
```

- Call of search:

```
<script>
api.search('Administration');
</script>
```

- Filtering of objects:

```
<div>
 <div>Enter status (for example,'Under construction') and press
enter</div>
    <input id='filtrationExample' style="width: 300px;margin-bottom:
10px;" type="text" data-bind="
  event: {
    keypress: function (data, event) {
      if (event.keyCode == 13) {
        api.addAttributeFilterToLayer(
api.getLayer('https://.../MapServer' , 0),
           'status',
           [$($element).val()],
           'Equal');

return false;
    }
return true;
}
      }" />
</div>
<button class='action' data-bind="click: function() {
var layer = api.getLayer('https://.../MapServer' , 0);
api.removeAttributeFilterToLayer(layer,
           'status',
           [$('#filtrationExample').val()],
           'Equal')
}">Delete filter</button>
```

- Generation of report:

```
<script>
api.generateReport("simple.xlsx", {serviceUrl:
"https://.../MapServer", layerId: 4, whereClause:"", orderBy:""},
{Caption: "test"});
</script>
```

6. Customization

6.1. Save button in the Identify card

The behavior of *Save* button in the *Identify card* can be customized in accordance with specific tasks if needed.

To do so, you need to put the HTML file with the corresponding code to the `\Customer\openProject\` folder.

Example:

```
<script type="text/javascript">
    window.checkBeforeSave = function (object, project) {
        var getAttributeValue = function (attributeAlias) {
            return object.attributes().keyValues.first(function (x) { return x.key == attributeAlias }).value();
        };
        var checkRequired = function (requiredFieldAlias, error) {
            var value = getAttributeValue(requiredFieldAlias);
            if (value == undefined || value == "")
                return error;
            return null;
        };
        var checkAnyCondition = function (condition, error) {
            if (condition())
                return error;
            return null;
        };
        var resultErrorList = ko.observable(undefined);
        var errors = [];
        if (object.service.isApplicable('http://localhost/arcgis/rest/services/Test/MapServer') && object.id.layerId == 0) {
            errors.addArray([
                checkAnyCondition(
                    function () {
                        return getAttributeValue< getAttributeValue('Поле2');
                    },
                checkRequired(

)
```

```
            ]);
        }
                resultErrorList(errors.where(function (x) { return x !==
null; }));
        return resultErrorList;
    };
</script>
```

6.2. Customizable buttons in the object's card header

If needed, you can specify whether you want to show or hide buttons in the object's card header or footer. To do so, add the following HTML file with the code in

`\Customer\openProject\`.

Example:

```
window.checkButtonVisibilityInCard = function (object, button, project) {
        var result = ko.observable(undefined);
        if (button.caption == " Report generation ") {
           result(false);
        }
        else {
           result(true);
         }
        return result;
    };
```

If needed, you can specify whether you want to run the task on button click the object's card header or footer. To do so, add the following HTML file with the code in

`\Customer\openProject\`.

Example:

```
window.checkBeforeExecuteButtonInCard = function (object, button, project)
{
        var result = ko.observable(undefined);

        if (button.caption == " call a new task" &&
object.attributes().get("Area")() == " Central") {

            api.showAlert("header ", " error");
            result(false);
        }
        else {
           result(true);
         }
        return result;
    };
```

7. Page

7.1. Page. General information.

Page is the element where you can locate text, graphic or statistical information, as well as links to other CoGIS elements, for example, map or any external source. One of the benefits of the page element is the possibility for user to create customized page using the ready-made tools.

To create the page, press *Add page* in the Catalog control menu. The page access permissions are set in *Access and filtration permissions* tab. The page can be used as Start page and web portal menu item, see Menu section for details. If you need to display the page without menu and footer, add `?withoutLayout=true&withoutPadding=true` parameter.

7.2. Page layout

To customize your page layout, go to *Stripes* tab, press *Add stripe* and select type of stripes used on the page, see Figure 201.

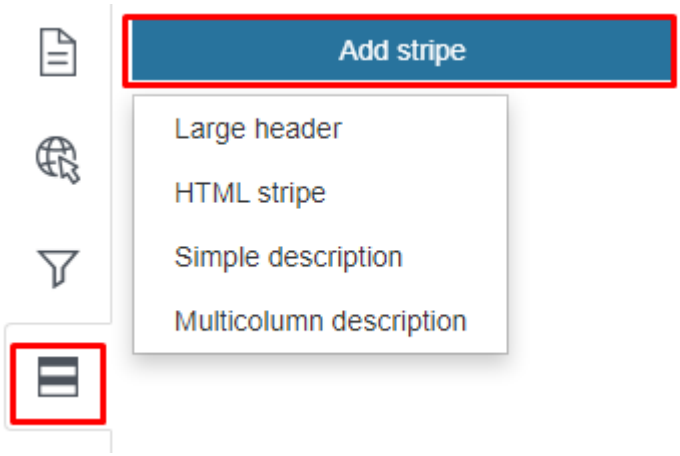


Figure 201 – Adding stripe to page

Select type of stripes used on the page:

- *Large header* – specify the stripe size and the header location (on the left or in center).
- *HTML stripe* – this stripe type is used if you need to enter data using HTML code where you can use statistical characteristic values. The statistical characteristics are set in the *Statistics* tab.
- *Simple description* – provided to display text, graphic or statistical data in the page stripe.
- *Multicolumn description* – provided to organize page content description in columns. Columns can be displayed as simple columns, one by one or as drop-down list. The columns number and width depend on the specified settings.

Specify the required settings for the selected type of stripe, see Figure 202.

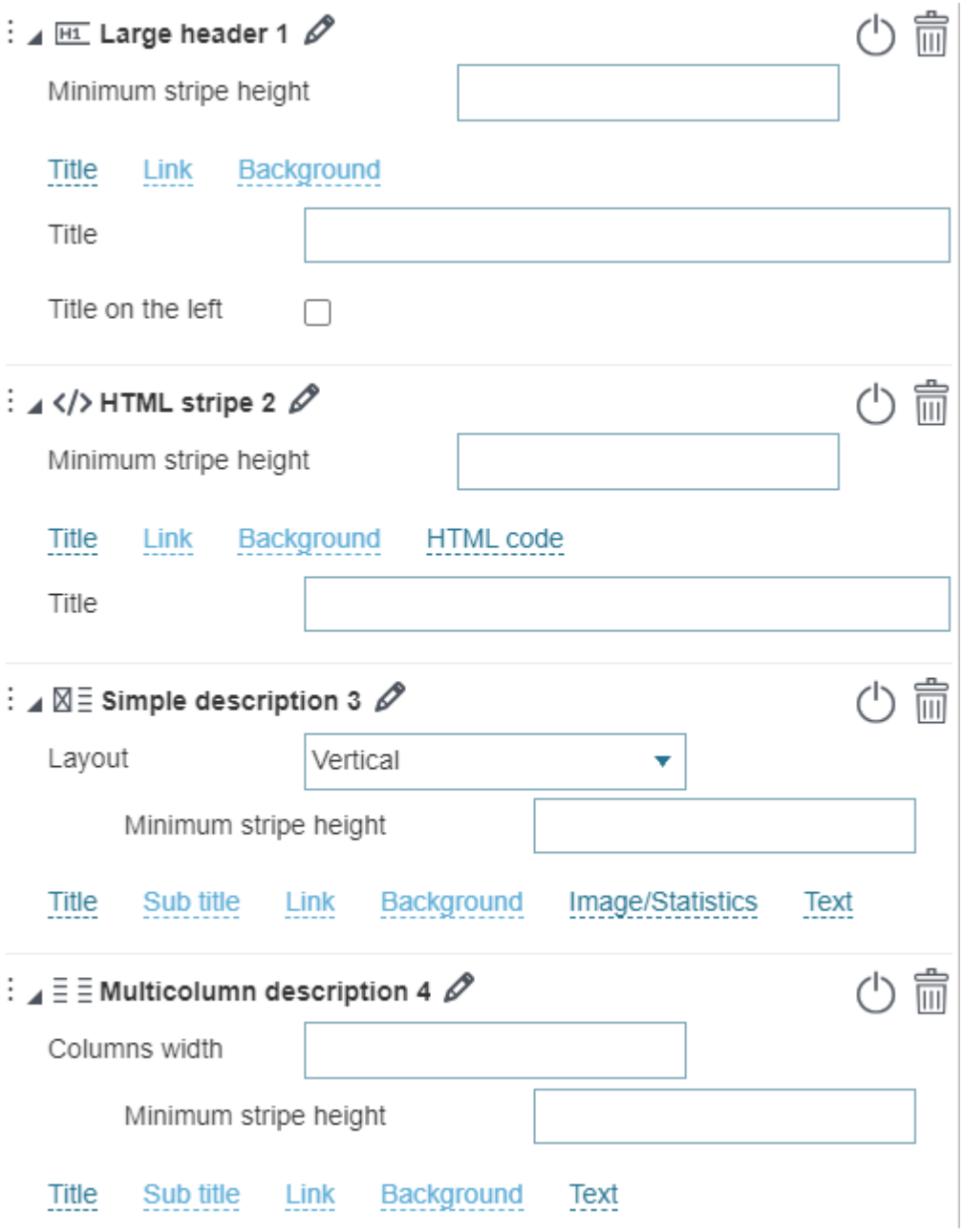


Figure 202 – Page stripes settings

You can add as many stripes to the page, as you need. Note that the stripes are added to page in the order as their settings have been specified.

To change the stripes order, click and hold the ⋮ icon on the left of the stripe name, the stripe settings block will be selected with the frame, now drag the frame to the needed place on the page.

Note that if you added the stripe to the page and did not specify its settings, the added stripe would be empty. To avoid this, press ⏻ *Enable/Disable* button. The same should be done, if until now you do not need to display the currently set stripe on the page.

The stripe height depends on the content and the total number of stripes added to the page. If you want to display all the stripes consistently, set their height in the *Minimum stripe height* field.

Enter the stripe title by pressing the Title button. If you selected the Large header stripe type, the entered title would be placed in the center by default. If you want to locate it on the left, check the respective option.

You can add to the stripe the link to other web portal elements, for example, to other portal page or map or any external Internet page. To do so, press *Link* button and enter the url address in the appeared field. If you want to add the link to the web portal element, select its name from the drop down list pressing the button shown on Figure 203.

Specify the button name, for example More, if you need to display the separate button for going to link.

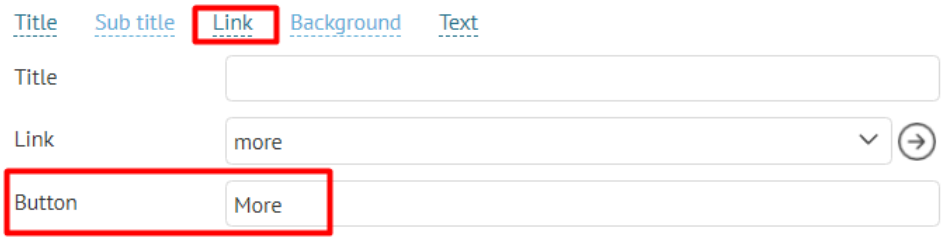


Figure 203 – Selection of the web portal element

If needed, set the stripe background and the text color pressing *Background* button.

To use HTML code, add *HTML stripe* to the page and press *HTML code* button. In the HTML code you can use values of the statistical characteristic, which calculation is set in the *Calculated value* block of the *Statistics* tab. The block name should be written in braces, see Figure 204.

Figure 204 – Example of using the *Calculated value* block in HTML code

To display text, graphic or statistical data in the stripe, add *Simple description*. To add text, press *Text* button. If you want to display image or block created in the *Statistics* tab, press *Image/Statistics* button. The *Image* and *Statistics* option windows will open, the *Image* option will be enabled by default. Download the required image.

Location of stripe elements is customized via the Location option, the available variants are shown on Figure 205.

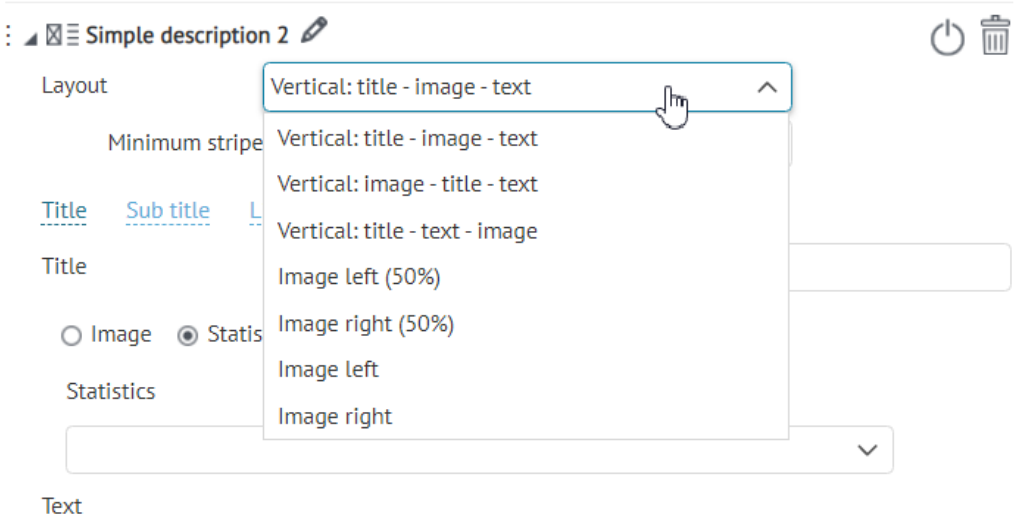


Figure 205 – Customizing location of stripe elements

To display information in columns, add the *Multicolumn description* stripe to the page. Add the column to the stripe pressing *Add column.* Note that the columns are shown in the order as their settings in CoGIS Designer have been specified. To change the columns order, click and hold the ⋮ icon on the left of the column name, the column settings block will be selected with the frame, now drag the frame to the needed place on the page. Define the columns width in the *Columns width* field. If you want to set a general description for your columns, press *Text* button and enter the description in the appeared field. If you want to display image or block, press *Image/Statistics* button. The *Image* and *Statistics* option windows will open, the *Image* option will be enabled by default. Download the required image.

Note that if you added the column to the stripe and did not specify its settings, the added column would be empty. To avoid this, press *Enable/Disable* button. The same should be done, if until now you do not need to display the currently set column in the stripe.

To delete stripe or column, press *Delete* button.

7.3. Adding statistics blocks to pages

The following statistics blocks can be added to pages:

- Graph built based on statistical indicator value calculated by objects of map service layer.
- Graph built based on values of object in specified attribute fields.
- Value of statistical indicator calculated by objects of map service layer.
- Table with map service layer data. In this table you can enter any text for the column titles, whereas for the Attribute table the aliases of attribute fields as they are stored in the map service can be used.

To add statistics block to the page, go to *Statistics* tab and press *Add block* button, see Figure 206.

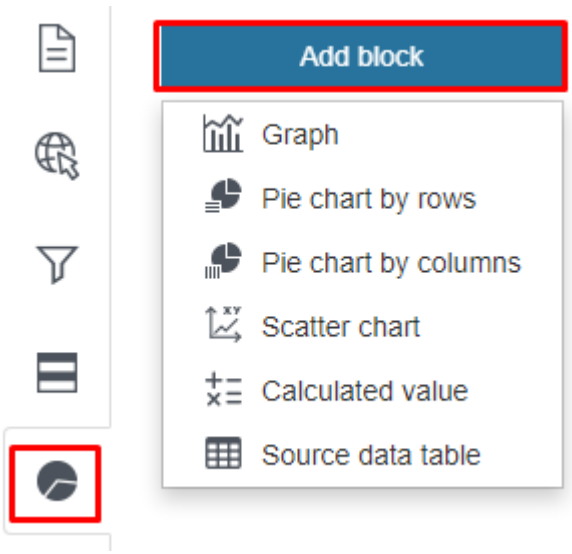


Figure 206 – Adding the block

Select the needed block type from the drop down list:

- *Graph* – to visualize information containing in the map service layer and display of statistical data as graph, vertical or horizontal bar diagram.
- *Pie chart by rows* – to visualize statistical data as pie or doughnut chart. Slices of the pie and doughnut charts are built by grouped values of the numeric attribute field or by value of the attribute field with specified domain of coded values.
- *Pie chart by columns* – to visualize statistical data as pie or doughnut chart. If multiple numeric attribute fields can be grouped, then based on these attribute fields you will be able to build the pie or doughnut chart. The chart slice is the attribute field.
- *Scatter chart* – with this block it is possible to show which values has the object in specified attribute fields. The block is provided to show relationship between attribute field values in multiple geodata charts which enables performing various comparison analyses, for example, about atmospheric pollution or about the kindergartens occupancy, etc. The scatter chart is built in the Cartesian coordinate system.
- *Calculated value* – the block is provided to display values of statistical characteristic.
- *Source data table* – the block is provided to display data of map service layer as table with customized column titles.

All the blocks settings are similar to settings of blocks in widgets, see details in section 4.6.2.

To display the block in the stripe, go to *Stripes* tab and add *Simple description* or *Multicolumn description* stripe. In the stripe settings press *Image/Statistics* button. The *Image* and *Statistics* option windows will open, check *Statistics* and select the block name from the drop down list.

8. Link

This element type is provided for going to other CoGIS elements and external Internet pages.

Enter Internet page address in *General information* tab in *url* field.

See section 2.6 to learn how to set different access rules for users and groups of users.

9. Managing user accounts

For managing user accounts the *User accounts management* section of the *Administration* menu is provided. Access permissions for this section are set on *Settings* page. Make sure that you have set users registration procedure as described in section *2.6. Permissions for access to element*.

The *User accounts management* section consists of two toggle tables *Users* and *Groups*.

In the *Groups* table you can create the new group of users, *press Add group* and enter its name and description.

In the *Users* table you can create the new user and add this user to the group. Press *Add users* and in the appeared window *Create users* fill in the required fields. The data about new user will be saved to GIS server. To redefine group for the user, press  . Here you can also edit data about the user. All made changes will be also saved to GIS server.

10. Managing files

For managing files the section *Files* in *Administration* menu is provided. The folders and web server files available for download are displayed here.

You can create new folders pressing , download files and use them for information purposes. For example, you can create the link following that will result in automatic file download. Besides, the dates of files and folders creation and editing are shown here. If the file or folder contents have changed, after opening the page with files, in order not to refresh the page and view the current version, click the Reload button, and the current content will be displayed.

Deleting epy folder does not delete the files it contains. To clear the contents of epy folder, hover your mouse over the folder and click delete all files in folder button .

11. SOE rules

11.1. Purpose

Web portal uses SOE to extent functionality of map services. Make sure that SOE is installed on GIS server, and that connection to CoGIS SOE for map service is established in *CoGIS Designer* in *Services* tab  .

SOE is an abbreviation for Server Object Extension that CoGIS uses to extent functionality of map services. SOE is provided to:

1) Create and then update and delete objects, relationships between objects and files. The editing can be limited by:

- operations;
- groups of users;
- layers;
- objects values;
- territory;
- objects.

2) Run geotriggers provided for:

- creating relations;
- editing related objects;
- updating field;
- geocoding;
- building buffer zone;
- sending messages
- updating topology;
- calculating relations numbers;
- calculating geometry attributes.

GEOTRIGGERS OPERATE AUTOMATICALLY WHEN PERFORMING OPERATION OF 'EDIT' PLUGIN.

3) Limit views and requests by:

- groups of users;
- layers;
- objects.

4) Track editing history by operations. Restore object after changes.

5) Download and upload data from file of SHP, XLS, XLSX, CSV, GPX formats to and from map service layer. When loaded, the data can be transformed using custom coordinate systems and transformation parameters.

6) Display files in Picture gallery, and establish condition to:

- number of files allowed to be attached to object;
- total number of files for layer;

- scale;
- attachment file size.

7) Store files on disk outside database. Work with user attachment attributes.

8) Calculate number of objects, including objects for each symbology.

Note: calculation is done considering filters set in Constructor and specified by the user on map.

9) Perform advanced search for objects, namely:

- quick and flexible search by map service layers;
- search based on filters selected by the user;
- sorting search results by distance;
- search based on restrictions by SQL condition, by territory;
- sort search results by matching criteria;
- search with preliminary splitting of request to separate words, without considering the words order.

11.2. Managing SOE capabilities

Managing SOE capabilities is made on CoGIS SOE page. To go to this page, select *SOE rules* item in *Administration* menu as shown on Figure 207. Access permissions for this page are set on *Settings* page of the *Administration* menu in *Administrator permissions* tab, see details in *Managing access to web portal administration* section.

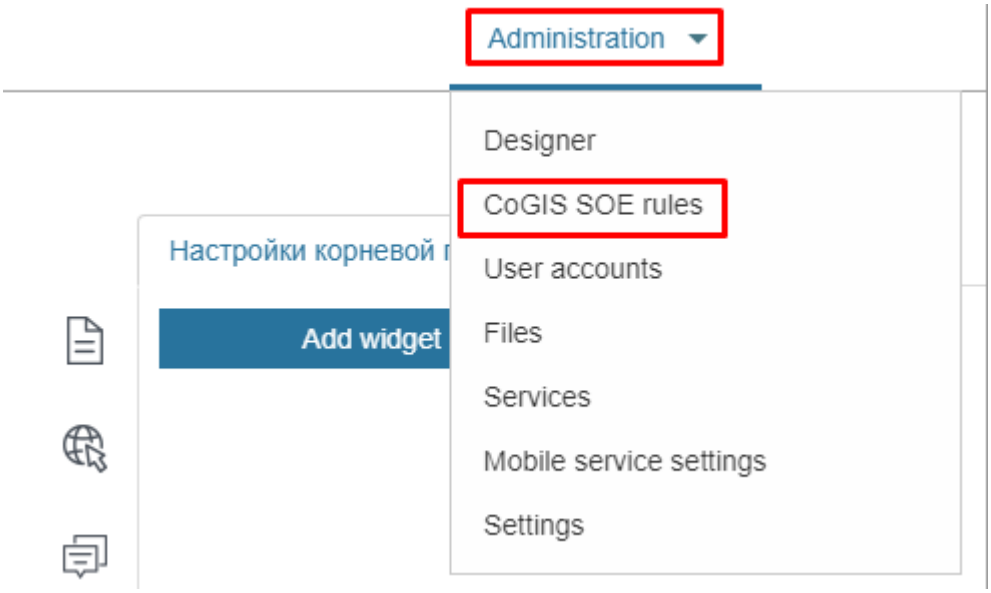


Figure 207 – Going to SOE rules page

The page consists of two parts: the left part contains toolbar marked on Figure 208, search panel and catalog tree, the right part contains a field for specifying settings.

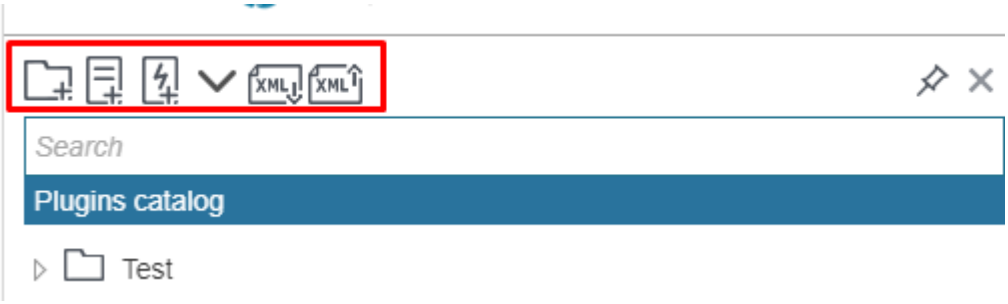


Figure 208 – Structure of SOE rules page

11.3. Plugins. General information.

Operations to extent functionality of map service and their usage conditions are set in plugins.

Press *Add plugin* on control panel, the list of available plugins will appear:

- Edit;
- View only;
- Editing history;
- Data downloading and uploading;
- Attachments gallery;
- Objects calculation;
- Search;
- For administrator.

Select the required type, add plugin and specify its settings. Note that plugin cannot be inserted to another plugin. On Figure 209 you can see general settings for all plugin types.

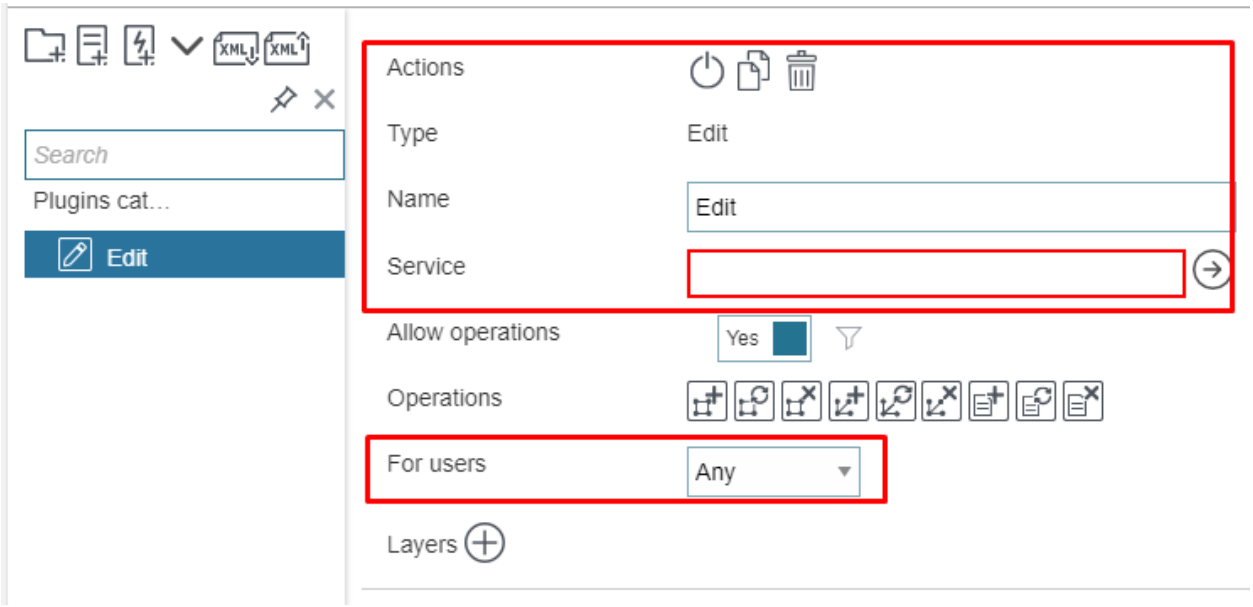


Figure 209 – General plugin settings

By default plugin in the catalog tree is displayed with name set by plugin type. To rename plugin, enter its new name.

For better visualization, the plugin type is shown in the *Type* field and in catalog tree near each plugin the appropriate icon is shown.

For correct work of plugin, in Service field enter the map service name, which functionality is extended by plugin.

To apply plugin to all services, enter *. If the Service field is empty, the plugin will not be applied to any service.

You can specify the group of users, to which your settings will be applied. To do so, select the group in the drop-down list of *For users* option. If you selected *From any group* or *From all groups*, press ⊕ and enter the name of the group in the appeared window.

The list of users groups is shown in *For users* item of *Administration* menu, see section 9 for details. Access permissions for user accounts are set on Global settings page, Administrator permissions tab.

Plugins are read from bottom to top. If plugin settings overlap, the bottommost plugins are used and applied.

To save all created folders, plugins and triggers, copy the root folder of the catalog tree *Plugins catalog*. To do so, press *Export to XML file*  . To download XML file, press *Import from XML file*  .

11.4. Editing objects. Plugin 'Edit'.

11.4.1. Editing objects and table records on map . Plugin 'Edit'. General information.

For one service you can set multiple access permissions with different restrictions for different user groups.

Operations and their usage conditions set in Edit plugin, allow the following:

1. create and then update and delete on map :
    - objects in map service layer and their values; edit objects geometry; combine objects;
    - records in tables of map service;
    - files attached in Identify card or to records in tables.
2. add and delete relationships:
    - one to one – by creation or updating of object in layer, it is related with object from another layer by key field;
    - one to many - by creation or updating of object in layer, it is related with objects from another layer by key field;
    - many to many - by creation or updating of objects in layer, they are related with objects from another layer by key field.
3. limit editing objects by:
    - operations
    - groups of users
    - layers
    - objects' values

- territory
- objects.

4. run the following geotriggers:
    - creating relations
    - editing related objects
    - updating field
    - geocoding
    - building buffer zone
    - sending messages
    - calculating relations numbers
    - calculating geometry attributes.

Note: geotriggers operate automatically by performing plugin Edit.

For correct work of plugin, in Service line enter the map service name, to which the connection for map will be established in CoGIS Designer and which functionality will be extended by Edit plugin.

Specify work principles of Edit plugin, such as:

- whether users will be allowed to do editing operations, if yes, all operations will be available by default. If you need to allow or to restrict editing operations with specific data, set *Condition to allow operations*, enter the name of the database table and definition query. The condition will be true if at least one object from the specified table that satisfies the query would return.
- which operations will be allowed.
- which group of users will be allowed to do editing operations.
- objects of which map service layer will be edited, which restrictions will be applied.
- whether users will be allowed to edit object's value in specified attribute field.
- whether users will be allowed to edit objects geometry.
- which restrictions should satisfy edited object.
- whether following map service settings will be redefined:
    - symbology of object's creation;
    - default object's value in attribute field.
- what is the maximum number of files that users can attach to object; what is the maximum size of files and what are the picture properties. The files are attached to objects on map by pressing , if the template for *Identify card* has been created and one of its blocks is *Files*. See section 4.3 to learn how to create Identify template and add *Files* block there.

Select which operations will not be available and press the appropriate button. The buttons description is provided in the Table 6 below.

Table 6 – Editing operations buttons

Operation subject	Operation type		
Objects	Creation	Update	Deleting

Relationships	Adding 	Deleting 	
Attachments	Adding 	Update 	Deleting 

Select the group of users that will be allowed to do operations in the drop-down list of *For users* option.

You can specify, to objects of which layers the editing operations will be applied. To do so, press ⊕ and specify layers in  .

Specify map service layers, to which objects the settings will be applied. To do so, press ⊕ in Layers and specify layers in  .

Specified settings can be applied to layer objects, which values satisfy specific condition. This condition is written as SQL expression in the *Definition query* field opened by pressing icon  . SQL expression is built as following:

```
<Name of attribute field> <Comparison operator> <'Name of value in attribute field'>
```

or

```
<Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.
```

For example:

```
Status = 'Done'
```

```
Length > 20.
```

Specify territory within which boundaries your users will be able to create or edit objects. To do so, check *Limit by extent* option and specify coordinates and coordinate system.

Specify object of map service layer. To do so, check *Limit by objects* option, specify feature class name and create SQL request defining the needed territory.

For all plugins, excluding *View only* plugin, you can set conditions not only for layer objects, but for extent.

Verifications of these settings can be done either before saving to GIS server or after sending changes to GIS server.

By default users are allowed to edit objects geometry. To disable this option, select 'No' for *Edit geometry*.

Besides creating or updating objects, you can allow users to enter or edit values of specific attribute fields. To do so, press ⊕ in *Editable fields* or *Not editable fields*, enter attribute field.

If you want to allow users to edit values of selected attribute fields only, press ⊕ *Editable fields* and enter required attribute fields names.

If you want to allow users to edit values of all attribute fields, excluding selected ones, press ⊕ *Not editable fields*.

To make fields mandatory when editing, even when those fields are not required in the map service, click Required fields and specify all the fields that must be filled in.

Besides this, you can specify condition to value of created or updated object in attribute field, define territory within which boundaries object will be created, and specify conditions which object should satisfy. To do so, press and specify all necessary conditions.

The following settings can be redefined for map service:

- object's symbol;
- default attribute field value.

You can set name of the button that opens *Create object* window, where users will fill in attribute fields values available for editing. To do so, press *Objects creation templates*, and enter number of layers.

To redefine object's symbol, download the file. Set default value, entering attribute field name and value. In *Name* enter the button that will open *Create object* window.

Specify maximum number of files that can be attached to object, their size and picture properties.

11.4.2. Geotriggers

11.4.2.1. Geotriggers. General information.

Geotrigger operates while performing one of the 'Edit' plugin operations.

Geotriggers can be embedded to 'Edit' plugin, in this case they will operate while performing one of the operations of this editing plugin.

If you have created geotriggers outside editing plugin and have not specified name of map service in the 'Service' field, then geotriggers will operate by performing operation of any editing plugin, which is not quite correct. For proper work of geotrigger, in the 'Service' field specify name of map service, which functionality is extended by editing geotrigger, and by performing of which operation geotrigger will operate.

The following geotriggers can be added to editing plugin or folder:

- creating relations;
- editing related objects;
- updating field;
- geocoding;
- building buffer zone;
- sending messages;
- calculating relations numbers;
- calculating geometry attributes.

To add geotrigger, press and select geotrigger. In the 'Service' field specify name of map service. Specify the user group, for that geotrigger will operate. To do so, select the group from the drop-down list of 'For users' option.

Plugins are read from bottom to top. If plugin settings overlap, the bottommost plugins are used and applied.

To describe all geotriggers of one type, in the search line enter the geotrigger name, for example, Creation of relationships.

11.4.2.2. Connecting objects by intersection. Creating spatial relationships.

During creation or changing location of the object, geotrigger *Spatial relationships creation* automatically creates or edits relations between objects of map service by their intersections. Information about relationship class, that stores connections between objects of map service, is stored on map service page. If after changing location the object has not intersected another object or if the object has been deleted, geotrigger will delete specified relation.

To add geotrigger, press  and select *Spatial relationships creation*. In the 'Service' field specify name of map service. Specify the user group, for that geotrigger will operate.

Define the following geotrigger operation conditions:

1. Whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation, editing, or deletion of the object.
2. For which user group geotrigger will operate. To do so, select required group in 'For users' field.
3. By editing in which map service layers geotrigger will operate. In 'Layers' field press  and specify layers in  .
4. By editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL expression and geotrigger will operate by editing layer object, which value meets the expression. Press  .
      SQL expression is built as following:

      `<Name of attribute field> <Comparison operator> <'Name of value in attribute field'>`

      or

      `<Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>`

      For example:

      `Status = 'Done'`

      `Length > 20.`
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.

- define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL filter defining the needed territory.

5. Relationship type of object. In the drop-down list select, how to define relationship between layer objects, by feature class name or by relationship class name.
6. Relationship. Specify feature class name or relationship class name.
7. With which objects it will be allowed to connect the created or edited object. Specify *Definition query* in SQL.
8. How to select object to create relationship, if created object intersects multiple objects:
    - create relationships between created object and objects which have been intersected by this object. Select 'all'.
    - create relationships between created object and object, intersection with which was built first. Select 'first'.
    - create relationships between created object and object, intersection with which is the most optimal. Select 'best'.
9. Spatial relations by defining relationship.
10. Whether by creation of new relationship the other ones should be deleted, in case of 'one to many' or 'many to many' relationship type.
11. Define minimum intersection percent for polyline and polygon objects.
12. Define additional buffer zone for search of intersection to 'relationship buffer'.

11.4.2.3. Automatic recording value of one of related objects. Editing related objects.

This geotrigger operates by performing the following operations:

- creation of relationship between objects;
- deletion of relationship between objects;
- update of one of related objects.

Geotrigger automatically records the following values to attribute field:

- simple value, constant;
- composite or calculated value;
- value of related object;
- value by absence of relationship;
- geometry of related object.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or deletion of relationship, or update of one of related objects.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.

3. by editing in which map service layers geotrigger will operate. In ‘Layers’ field press ⊕ and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL expression and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL expression is built as following:

      `<Name of attribute field> <Comparison operator> <‘Name of value in attribute field’>`

      `or`

      `<Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.`

      `For example:`

      `Status = ‘Done’`

      `Length > 20.`
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. Relationship type of object. In the drop-down list select, how to define relationship between layer objects, by feature class name or by relationship class name.
6. Relationship. Specify feature class name or relationship class name.
7. Name of attribute field, where to the value will be recorded.
8. Value for recording of:
    - simple value, constant;
    - composite or calculated value written in JavaScript, Visual Basic, Python, C#, Json. *For example, <[AREA] / 10000> means recalculation of area value taken from attribute field AREA from square meters to hectares*;
    - values of related object in one or multiple attribute fields. Name of attribute field, which value is taken is specified in square brackets. *For example, <[CITY] & “, “ & [STREET] & “, “ & [HOMENUMBER]> define complete address*;
    - value by absence of relationship;
    - geometry of related object. *For example, Object.Shape.X*.
9. Type of joining – join, sum, average, number, minimum value, maximum value.
10. Additional buffer zone for search of intersection in *Delimiter*.
11. Whether to join different values.
12. Maximum number of values.

13. Sorting by attribute field.

11.4.2.4. Automatic recording object value to attribute field. Updating attribute field.

This geotrigger operates by performing the following operations of editing plugin:

- creation of object;
- update of object.

Geotrigger automatically records the following values to attribute field:

- simple value, constant;
- composite or calculated value;
- value of one or multiple attribute fields of its class;
- value by absence of relationship;
- geometry of object.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or update of objects.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.
3. by editing in which map service layers geotrigger will operate. In 'Layers' field press  and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL expression and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL expression is built as following:

      `<Name of attribute field> <Comparison operator> <'Name of value in attribute field'>`

      `or`

      `<Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.`

      `For example:`

      `Status = 'Done'`

      `Length > 20.`
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

5. Name of attribute field, to that value in *Field name* will be recorded.
6. Value for recording of:
    - simple value, constant;
    - composite or calculated value written in JavaScript, Visual Basic, Python, C#, Json. *For example, <[AREA] / 10000> means recalculation of area value taken from attribute field AREA from square meters to hectares*;
    - values of related object in one or multiple attribute fields. Name of attribute field, which value is taken is specified in square brackets. *For example, <[CITY] & ", " & [STREET] & ", " & [HOMENUMBER]> define complete address*.
    - value by absence of relationship;
    - geometry of related object. *For example, Object.Shape.X.*
    - information related to object, using macros described in Table 7.
7. Whether geotrigger should operate if all attribute fields have been changed. By default, yes. Otherwise, select 'No' for *Execute if all fields are changed*.
8. Value of object, by which geotrigger should operate. Specify SQL *Definition query* for attribute fields, which values have been changed.

Format of time and date is specified according to description standards, for example, "dd.MM.yyyy" = 01.01.2019.

Table 7 – Macros

Macros	What will be recorded to value
DateTime.Now:<format>	Current date and time with value insertion format
LocalDateTime, LocalDate, LocalTime, LocalDay, LocalMonth, LocalYear, LocalHour :<format>	Current date and time with value insertion format. The inserted values are in local time.
CurrentDate: <format>	Current date with value insertion format
CurrentDateTime:<format>	Current date and time with value insertion format
CurrentYear	Current year
CurrentMonth	Current month
CurrentDay	Current day
CurrentHour	Current hour
User.Name	Current user
CurrentUser	Current user
CurrentGroups	Group of current user
CurrentGroup.mygroup	1 – if the user is included to mygroup group, otherwise 0
MapService.Name	Name of map service, in which layer the object is created, updated or deleted

Macros	What will be recorded to value
Layer.ID	Number of layer, where object is created, updated or deleted
Layer.Caption	Name of current layer, where object is created, updated or deleted
Object.ID	Unique number of created or edited object. Value of object, which it takes in system attribute field OBJECTID.
Action	Operation of editing plugin performed with the object
Objects.Caption	Value of edited object, which it takes in attribute field Display Field
Objects.Caption.Previous	Value of object, which it takes in attribute field Display Field before editing
Object.Attributes	List of values of edited object, which it takes in all attribute fields of layer. You can use a colon-separated suffix to format the output string, for example - Object.Attributes.MyFieldDate:UTC:dd.MM.yyyy - Object.Attributes.MyFieldDate:LOCAL:dd.MM.yyyy HH:mm:ss
Object.Attributes.Previous	List of object values, which it takes in all attribute fields of layer before editing
Object.AttributeStates	List of object values, which it takes in all attribute fields of layer before and after editing
Object.Updates	List of changed object values before and after its editing
Relation.From.Row.ID	Unique number of current object, to which relationship is added. Object value, which it takes in system attribute field OBJECTID.
Relation.To.Row.ID	Unique number of object, for which relationship with another layer object is built. Object value, which it takes in system attribute field OBJECTID.
Relation.From.Row.Caption	Object value in attribute field Display Field, to which relationship is added
Relation.To.Row.Caption	Object value in attribute field Display Field, for which relationship with another layer object is built

Macros	What will be recorded to value
Relation.From.Row.Attributes	Values of object, to which relationship is added, in all attribute fields
Relation.To.Row.Attributes	Values of object, for which relationship with other layer object is built, in all attribute fields
Attachment.Row.ID	Unique number of object, for which attachment is added or deleted. Object value, which it takes in system attribute field OBJECTID.
Attachment.Row.Caption	Object value in attribute field Display Field, for which attachment is added or deleted
Attachment.ContentType	Types of attachments, that can be transferred by MIME standards
Attachment.FileName	Name of attachment file
Attachment.Size	Size of attachment
Attachment.ContentType.Previous	Types of attachments, before attachment changing
Attachment.FileName.Previous	Name of attachment file before attachment changing
Attachment.Size.Previous	Size of attachment file before attachment changing

11.4.2.5. Direct and reverse geocoding by objects creation and update

This geotrigger operates by performing the following operations of editing plugin:

- creation of object;
- update of object.

Geotrigger operates by direct and reverse geocoding, creation or updating objects on map and downloading files of specific formats, containing addresses or coordinates. That is, geotrigger solves the following tasks:

- creation of object by address;
- creation of objects by addresses by downloading Excel or CSV file containing address;
- defining of object's address by its creation or changing location on map , recording of value to attribute field;
- batch recording of objects addresses created by coordinates, to the appropriate attribute fields by downloading of Excel or CSV file containing address.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or update of objects.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.

3. by editing in which map service layers geotrigger will operate. In 'Layers' field press ⊕ and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      `<Name of attribute field> <Comparison operator> <'Name of value in attribute field'>`

      `or`

      `<Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.`

      `For example:`

      `Status = 'Done'`

      `Length > 20.`
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. Address of geocoding service, based on which geotrigger will operate. By this address of geocoding service, connection in *CoGIS Designer – Services – Geocode service* should be established, see section 4.2.6.
6. How to associate values. Association of attribute field of geocoding service with attribute field of layer, where object has been created or edited. Enter attribute field of geocoding service to *Service attribute* and name of attribute field of layer, where object has been created or edited, to *Value from object*.
7. Fields in feature class for recording address by searching of coordinates by address.
8. By entering object address to appropriate attribute field, object location will be automatically changed. This setting is specified by default, i.e. *Yes* is selected for option *Update location by address*.
9. By changing object location, new location will be automatically defined and address rewritten to value of the appropriate attribute field. This setting is specified by default, i.e. *Yes* is selected for option *Update address by location*.
10. If both address and geometry are changed, then priority will be given to address by default and coordinates will be recalculated. If priority is given to geometry, select *No* for *Address priority*.
11. Address search radius relative to edited object, for example, to set address reference for object that locates near building with specified address.

11.4.2.6. Creating buffer zone for edited object

This geotrigger operates by performing the following operations of editing plugin:

- creation of object;
- update of object;
- deletion of object.

Geotrigger is used for automatic creation, correction, and deletion of object's buffer zone in specific polygon layer. Buffer zones can be created for objects with different geometry types.

The main geotrigger options are as following:

- creation of buffer zone by circle, by square, considering road network (service area);
- establishing connection between buffer zone and its main object;
- correcting buffer zone by changing geometry of its main object;
- setting and correction of buffer zone size by attribute of main object or by calculated value;
- defining coordinate system and method of buffer zone creation;
- deleting buffer zone by deletion of its main object.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either during creation, deletion or update of objects.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.
3. by editing in which map service layers geotrigger will operate. In 'Layers' field press  and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;

- define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
- define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

5. How to set relationship between layer of main object and layer for buffer zone. How to find related layer by name of relationship class, specifying polygon feature class.
6. Enter name of feature class or name of relationship class of geodatabase.
7. Select buffer zone type.
8. Set buffer zone size:
    - as constant;
    - as value of main object in specified attribute field, enter attribute field;
    - as calculated value written in JavaScript, Visual Basic, Python, C#, Json.
9. Attribute field of buffer zone, where to the buffer zone size by its creation or update will be recorded.
10. Select coordinate system for creation of buffer zone to get correct geometry values (area, perimeter).
11. Type of buffer zone creation (geodesic or planar). The default type is geodesic. To select planar type, select '*No*' for *Use geodesic buffer*.
12. If buffer zone is created by road network as service area, enter address of network analyst service.

This geotrigger is provided to send automatic notifications for selected users in cases when object has been changed. The message can contain information about edited object. The template of such message can be created using macros provided in Table 8 below.

Geotrigger operates by performing of any editing plugin operations.

Table 8 – Macros. Message templates.

Macros	Description
CurrentDate	Current date
CurrentDate-7d CurrentDate+2d	Current date+/- a few days
CurrentDateTime	Current date and time
CurrentDateTime-1h CurrentDateTime+1h	Current date and time+/- a few hours
By object	

Macros	Description
Object.Name	Value of edited object, which it takes in attribute field Display Field
Object.Caption	Value of edited object, which it takes in attribute field Display Field
Object.NameBeforeUpdate	Value of object, which it takes in attribute field Display Field, before editing
Object.CaptionBeforeUpdate	Value of object, which it takes in attribute field Display Field, after editing
Object.Id	Unique number of created, deleted or edited object. Value of object, which it takes in system attribute field OBJECTID, that can be used for generation of dynamic link to map.
Object.FieldValues	Values of object, which it takes in all attribute fields. Values are shown as table for HTML and as string for text.
Object.Attributes	Values of object, which it takes in all attribute fields, with output of attribute domains values instead of code. Values are shown as table for HTML and as string for text.
Object.AttributeChanges	Values of object, which it takes in all attribute fields, with output of attribute domains values instead of code, before and after object's editing. Values are shown as table for HTML and as string for text.
Object.FieldValuesChanges	Values of object, which it takes in all attribute fields, before and after object's editing. Values are shown as table for HTML and as string for text.
Object.AttributesBeforeUpdate	Values of object, which it takes in all attribute fields, with output of attribute domains values instead of code, before object's editing. Values are shown as table for HTML and as string for text.
Object.FieldValuesBeforeUpdate	Values of object, which it takes in all attribute fields, before object's editing. Values are shown as table for HTML and as string for text.
Object.Attributes.<Field>	Value of created or edited object, which it takes in requested attribute field. *For*

Macros	Description
	example, macros Object.Attributes.STATUS will insert object value in attribute field STATUS to the message body.
Object.ShapeBeforeChanges.CentroidX	X coordinate of point object or polyline centroid, polygon before updating
Object.ShapeBeforeChanges.CentroidY	Y coordinate of point object or polyline centroid, polygon before updating
Object.Shape.CentroidX	Current X coordinate of point object or polyline centroid, polygon
Object.Shape.CentroidY	Current Y coordinate of point object or polyline centroid, polygon
By attachments	
Attachment.Object	For macros Attachment.Object all sub macros 'By object' are available
Attachment.File.Size	Attachment size
Attachment.FileBeforeUpdate.Size	Attachment size before changing
Attachment.File.Name	Attachment file name
Attachment.FileBeforeUpdate.Name	Attachment file name before changing
Attachment.File.Type	Attachment file type
Attachment.FileBeforeUpdate.Type	Attachment file type before changing
Attachment.FileChanges	Attachment file size, name and type before and after changing. Values are shown as table for HTML and as string for text.
By related objects	
Relation.To.Attributes.<Field>	For macros Relation.To all sub macros 'By object' are available. Value of object, to which relationship is added, in specific attribute field. For example, Relation.To. Attributes.Name.
Relation.From. Attributes.<Field>	For macros Relation.From all sub macros 'By object' are available. Value of object, from which relationship is created, in specific attribute field. For example, Relation.From. Attributes.Type.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.
3. by editing in which map service layers geotrigger will operate. In 'Layers' field press ⊕ and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. Specify emails of users by pressing ⊕ in *To*.
6. Specify email subject. You can use macros, for example, *<Object Object.Name has been changed>*.
7. Enter message text. You can use macros, for example:

```
Object has been changed: {Object.Name}

Object has been changed by: {CurrentUser}

Object coordinates before changing: X
{Object.ShapeBeforeChanges.CentroidX}, Y

{Object.ShapeBeforeChanges.CentroidY}

Current coordinates of object: X {Object.Shape.CentroidX}, Y
{Object.Shape.CentroidY}
```

8. Whether text can be in HTML format.
9. You can also redefine SMTP server settings. These settings are set on ‘Global settings’ page, ‘Administration’ menu.

11.4.2.7. Checking and correcting topology of polygon objects. Updating topology.

Geotrigger is provided for checking and correcting topology of polygon objects. It operates by performing the following operations of editing plugin:

- creation of object;
- updating of object;
- deletion of object.

Geotrigger allows defining and correcting topological errors between polygons using predefined settings. Depending on settings, geotrigger automatically performs the following operations:

- corrects polygon object boundary by boundary of adjacent polygon, cutting them;
- defines topology rules breach by overlap and records it to attribute field value.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or update or deletion.
2. for which user group geotrigger will operate. To do so, select required group in ‘For users’ field.
3. by editing in which map service layers geotrigger will operate. In ‘Layers’ field press ⊕ and specify layers in .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <‘Name of value in attribute field’>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = ‘Done’

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.

- define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

5. Specify target feature class, by which topology of created object is checked. This can be either edited class, where object is created (checking topology of two plots), or another polygon feature class (checking topology of plot and block).
6. Select for which objects topology should be checked. Set SQL Definition query.
7. Select topology type.
8. Select maximum correcting percent of objects overlapping when boundaries should be automatically corrected or objects with topologic errors should be marked.
9. Set priority of edited object, by which the created object or the existing object, which is intersected by the created object, will be changed.
10. Enable changing geometry option which is active by default.
11. Field of error in the target feature class, with which objects the created objects are checked.
12. Field of error in the source feature class, where objects are created.
13. Type of error.
14. Value of error occurrence 'True', value of error absence 'False', recorded to attribute field value.

11.4.2.8. Calculating geometry attributes of edited object

Geotrigger is provided to record values of edited object to attribute fields:

- Centroid;
- Area;
- Geodesic area;
- Length;
- Geodesic length;
- Number of parts;
- Number of points;
- WKT.

Geotrigger operates by performing the following actions of editing plugin:

- creation of object;
- update of object.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or update of object.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.

3. by editing in which map service layers geotrigger will operate. In ‘Layers’ field press ⊕ and specify layers in  .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <‘Name of value in attribute field’>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = ‘Done’

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. Select coordinate system used to calculate geometry.
6. Select measurement units used to calculate geometry.
7. Rounding value, number of decimal places.
8. Specify what will be calculated by geotrigger and to which field the result will be recorded:
    - Select X, Y, Z attribute fields for recording centroid coordinates.
    - Attribute field for recording area/geodesic area of polygon object.
    - Attribute field for recording length/geodesic length, line distance or polygon perimeter.
    - Attribute field for recording number of parts of multi-polygon objects.
    - Attribute field for recording number of points of multi-point objects.
    - Attribute field for recording object’s geometry in WKT format.

    11.4.2.9. Recording to object’s value the number of related objects from another layer to value. Calculating number of relates.

Geotrigger allows recording to object’s value the number of related objects from another layer. Geotrigger operates by performing the following actions of editing plugin:

- adding relationship;

- deleting relationship.

After each adding or deleting of related object, geotrigger calculates current number of related objects. After that it records the value to attribute field that is specified in geotrigger settings.

Define the following geotrigger operation conditions:

1. whether geotrigger will operate by performing editing plugin operations. By default, yes. Select, during which operations it will operate, either creation or update of relationship.
2. for which user group geotrigger will operate. To do so, select required group in 'For users' field.
3. by editing in which map service layers geotrigger will operate. In 'Layers' field press ⊕ and specify layers in .
4. by editing of which objects geotrigger will operate:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. Relationship type of object. Find related layer by name of feature class or relationship class.
6. Enter name of feature class or relationship class.
7. Specify, to which object the value should be recorded, set SQL *Definition query*.
8. Enter name of attribute field, to which the number of related objects will be recorded.
9. Select calculation type.
10. *True* value recorded to attribute field in case of relationship presence, works by selection of calculation type *Relations calculation*.

11. *False* value recorded to attribute field in case of relationship presence, works by selection of calculation type *Relation exists*.

11.5. View only plugin to restrict viewing of map service data

With this plugin, you can limit access to map service data for selected group of users. To do so, on control panel press  and select *View only* plugin. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent.

Define the following conditions:

1. Which group of users will be allowed to access map service data – view on map , identify, send requests and view data in attribute table. Select required group in *For users* field.
2. Objects of which map service layers will be allowed to view. In 'Layers' field press  and specify layers in  .
3. Which objects will be allowed to view for group of users:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

11.6. Tracking objects editing history

Plugin allows saving editing history in CoGIS system tables, providing the following options:

- viewing object editing history in Identify card;
- restoring of object state by specific date of changing, as well as restoring of geometry and attribute fields values.

Press on control panel and select plugin *Editing history*. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent. Within one service you can set multiple plugins with different restrictions for different groups of users.

Define the following geotrigger operation conditions:

1. By which editing operations the editing history will be tracked.
2. For which user group the editing history will be tracked. Select the group in *For users* list.
3. By which map service layers the editing history will be tracked. In *Layers* field press and specify layers in .
4. By editing of which objects the editing history will be tracked:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

11.7. Downloading and uploading data

This plugin allows to:

- download data to map service layer added to map , from files in SHP, XLS, XLSX, CSV, and GPX formats;
- upload data from map service layer added to map , as files in SHP, XLSX, CSV formats;
- convert data by its download using custom coordinate systems and transformation parameters.

Coordinate system is set for basemap or for map service. Data for upload and download can be set in another coordinate system. In this case define data transformation from one coordinate system to another.

Press on control panel and select plugin *Data downloading and uploading*. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent. Within one service you can set multiple plugins with different restrictions for different groups of users.

Define the following geotrigger operation conditions:

1. Which operations will be available for group of users on map – data downloading or uploading, transforming coordinate system.
2. For which group of users data downloading or uploading will be available. Select required group in the drop-down list of the *For users* option.
3. To which layers data downloading and uploading will be available. Press in *Layers* and enter numbers of layers separated with hyphen or comma. For example, 0,1,5-10,14.
4. Which objects will be available by data downloading and uploading:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
5. What is the maximum or minimal number of objects that can be downloaded or uploaded.
6. Whether uploading of objects coordinates is allowed. By default, yes, that is *Yes* is selected for *Allow geometry export* option.

11.8. Attachments gallery

Plugin allows showing *Picture gallery* on map . Pictures are attached to object in its *Identify card* on map .

The following operations can be done in *Picture gallery*:

- view all pictures attached to objects or only those attached to objects displayed in the current extent;
- search object location on map , clicking on the attached picture, if appropriate settings have been selected;
- view information about object, to which pictures are attached, in the *Identify card*.

Press  on control panel and select plugin *Picture gallery*. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent.

Define the following geotrigger operation conditions:

1. For which group of users *Picture gallery* will be shown on map . Select required group in the drop-down list of the *For users* option.
2. Attachments to objects of which map service layers will be shown in *Picture gallery*. Press  in *Layers* and enter numbers of layers separated with hyphen or comma. For example, 0,1,5-10,14.
3. Attachments of which objects will be displayed:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press  . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;
    - define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
    - define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.
4. Maximum number of attachments that will be displayed in *Picture gallery*. This parameter can be used, when multiple pictures are attached to objects and there is no need to show them all in the gallery.

5. Maximum number of attachments that can be shown for one layer. For example, if multiple map service layers are added to map , which objects have attachments as pictures, and for all layers it is set to show pictures in the gallery.
6. Maximum number of attachments that can be shown per one request to map service.
7. How pictures will be sorted.
8. Whether pictures in *Picture gallery* will be labeled by the file name or object value.
9. Minimum and maximum scale, at that *Picture gallery* will be shown. This setting is recommended to use with setting of showing pictures depending on extent.
10. Minimal and maximal file size in bytes to regulate quality of shown pictures.
11. Filter for files names, for additional filtering of pictures in *Picture gallery*.

11.9. Calculating number of objects in layer

Objects calculation plugin is provided for calculating number of objects in map service layer. Calculation is done by different criteria. Number of objects is shown in *Legend* on map , if appropriate settings of map service and CoGIS SOE are selected, see 4.2.2 and Ошибка! Источник ссылки не найден. for details.

Press on control panel and select plugin *Objects calculation*. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent.

Define the following geotrigger operation conditions:

1. For which group of users the number of objects will be shown. Select required group in the drop-down list of the *For users* option.
2. For which map service layers calculation of objects will be allowed. Press in 'Layers' and enter numbers of layers separated with hyphen or comma. For example, 0,1,5-10,14.
3. For which groups of objects calculation should be done:
    - define objects, by editing of which geotrigger will operate. Specify SQL Definition query and geotrigger will operate by editing layer object, which value meets the expression. Press . SQL query is built as following:

      <Name of attribute field> <Comparison operator> <'Name of value in attribute field'>

      or

      <Name of attribute field> <Comparison operator> <Numeric representation of value in attribute field>.

      For example:

      Status = 'Done'

      Length > 20.
    - define attribute field, by editing of which values geotrigger will operate;

- define territory, within which boundaries by editing or creating objects geotrigger will operate. To do so, check *Limit by extent* option, specify coordinates and coordinate system.
- define object of map service layer. To do so, check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

4. By default, number of objects for every symbology will be shown.

11.10. Advanced objects search. Flexible search and nearest objects.

This plugin is provided for the following operations:

- searching by standalone tables of map service;
- displaying found objects sorted by distance and distance value;
- sending request to get related objects;
- sending request to get attribute table of relationship class;
- limiting search by attributes or territory;
- searching by matching criteria;
- searching with preliminary splitting of request to separate words, without considering the words order.

Press on control panel and select plugin *Search*. In *Service* field specify map service name, to which connection for map is established in *CoGIS Designer*, and which functionality plugin will extent, see Figure 210.

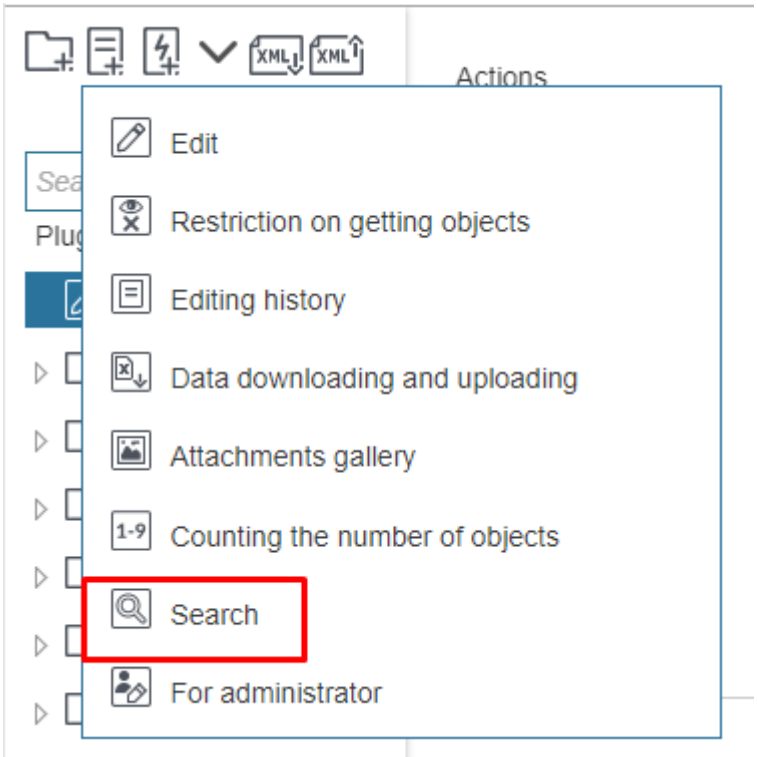


Figure 210 – Adding Search plugin

Wait until the plugin appears in the Plugins catalog tree and in the right part of the window the Search plugin settings appear, see Figure 211.

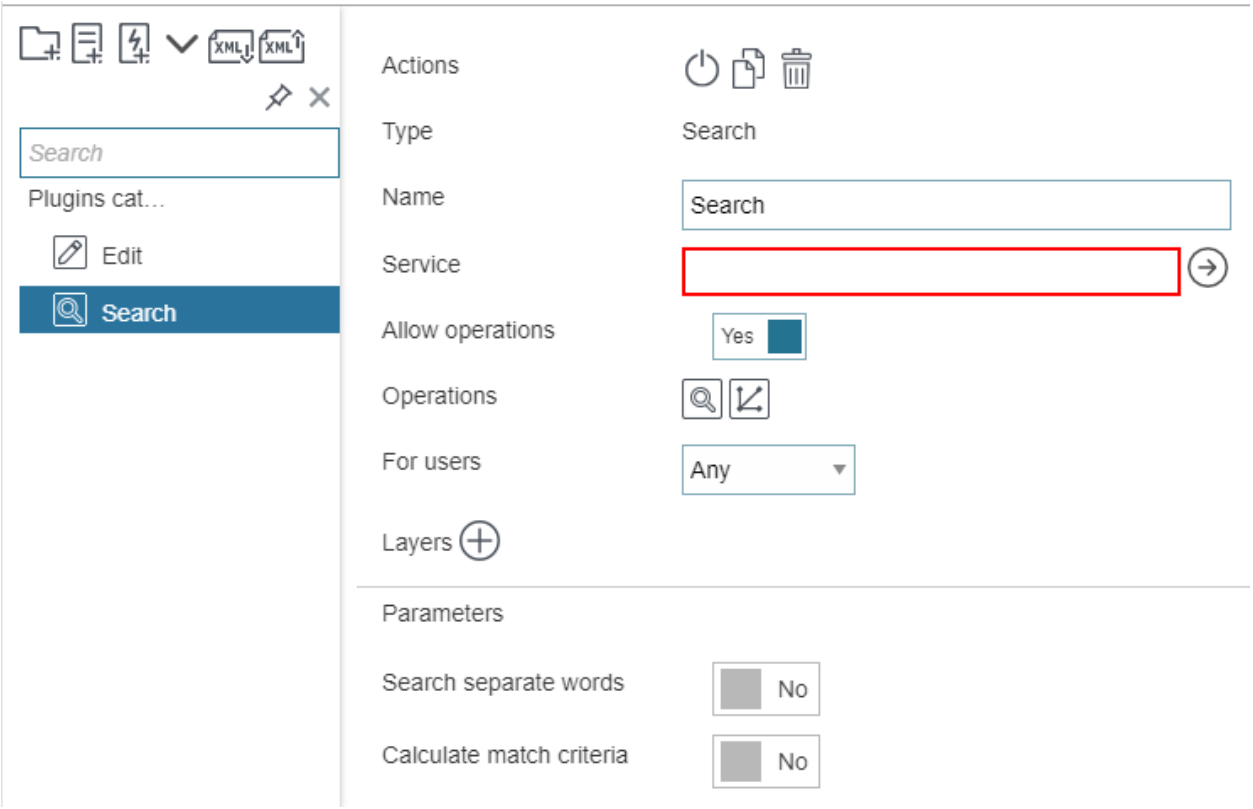


Figure 211 – Settings of the Search plugin

By default, the plugin is displayed in the Plugins catalog with the name based on the plugin's type. To rename plugin, enter the new name in the *Name* field. In *Service* field specify map service name, which functionality plugin will extent. Note that this field is mandatory for correct work of all the plugins added to the Plugins catalog tree.

By default the users can send requests to get related objects and attribute table of relationship class, as in the Search plugin settings the *Allow operations* control is set to *Yes* and the *Search* and *Request related objects* options are enabled. You can specify the group of users allowed to use these operations. Select required group in the drop-down list of the *For users* option, see Figure 212.

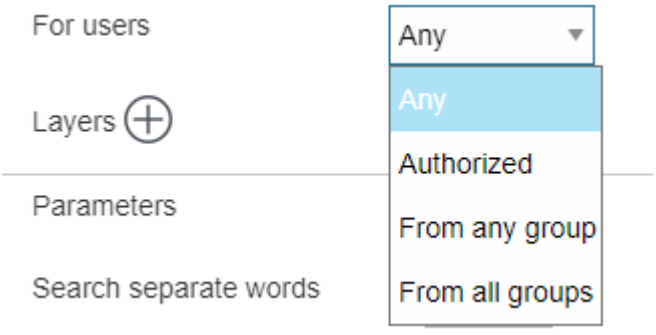


Figure 212 – Selecting user group

If you selected *Any* or *From any group*, press ⊕ button and enter the name of the group in the appeared field, see Figure 213.

Figure 213 – Entering user group name

The list of user groups is displayed in the *User accounts* section of the *Administration* menu, which is described in section 11. The user account access rights are set in the *Settings* section of the *Administrator permissions* tab.

Specify, for which map service layers the search of objects will be allowed. Press ⊕ in *Layers* and specify layers in .

Figure 214 – Entering layers numbers

You can specify SQL Definition query defining for which objects of map service layer the search will be allowed. Press button shown on Figure 215.

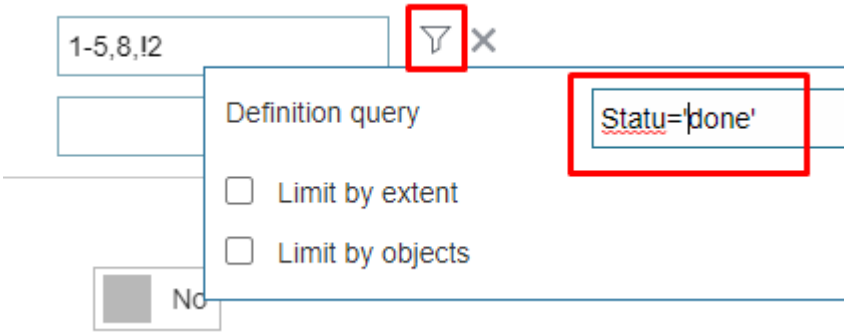


Figure 215 – SQL query for attribute field value

In the *Definition query* enter your SQL expression as `<Attribute field name> <Comparison operator> <'value'>` or `< Attribute field name > < Comparison operator > <Numeric value>`. For example, as on Figure 215 above: `Status = 'done'`.

You can specify territory where search for objects will be done. To do so, press button, check *Limit by extent* option in the appeared window and specify the required territory entering values to *XMax*, *XMin*, *YMax*, *YMin* fields.

Check *Limit by objects* option and specify name of feature class and create SQL query defining the needed territory.

You can also customize flexible search for objects. In this case search request will be split to separate words, the search will be done by values of attribute fields containing the request words, and the words order will not be considered.

To set such advanced flexible search, in *Parameters* select *Yes* for *Search separate words* option, see Figure 216.

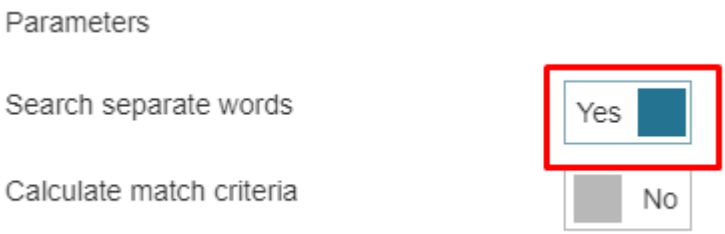


Figure 216 – Setting flexible search

The search results can be sorted based on the match criteria which supposes the exact match of search request and its result. If such match is not found, the match criteria supposes that the search result starts from the search request, and if this match is not found, then the match criteria will be the case when the search result contains the search request. In order that the search results are sorted by match criteria, in *Parameters* select *Yes* for *Calculate match criteria* option, see Figure 217.

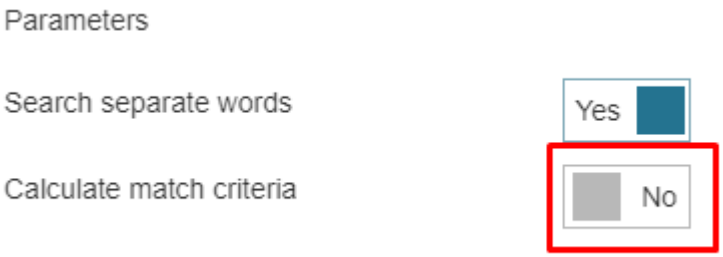


Figure 217 – Sorting search results by match criteria

If you did not set all the plugin settings, disable it for proper work of the other plugins pressing  *Enable/Disable* button.

Plugins are read from bottom to top. If plugin settings overlap, the bottommost plugins are used and applied.