

CoGIS Server

Publishing GIS services

Manual on publishing and managing GIS services via GIS server of CoGIS platform

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1. Preamble

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;
- **CoGIS Server** – a GIS server for publishing data and tools as web services.

CoGIS Server components

- Sever components provided for publishing of services and arranging web access to these services via REST API;
- Web console **CoGIS Server Manager** with graphic interface for publishing GIS services and setting GIS server.

CoGIS Server supports the following types of services:

- Map services (dynamic and tile services; available for view and/or edit only; with vector and raster layers);
- Geoprocessing services, including map printing services;
- Geocoding services;
- Network analysis services;
- Geometry services.

The given manual provides instructions on publishing and customizing the above-mentioned services. The only exception is the geometry service that is the embedded functionality of CoGIS Server supporting the following platform operations:

- Projecting geometries to other coordinate systems
- Applying additional transformations and transformation chains between coordinate systems during projecting or spatial calculations
- Calculating distances and areas
- Reducing geometry to geometry without self-intersections (geometry simplification)
- Topology operations:
 - Intersection of two geometries
 - Subtracting geometry from other geometry
 - Joining multiple geometries.

The geometry service cannot be additionally customized via the CoGIS Server Manager interface and so it is not considered in the given document.

The complete list of available manuals is provided in section **Ошибка! Источник ссылки не найден.**1.2

1.2.Additional information

Additional information about GIS server CoGIS Server and about CoGIS platform can be viewed in the following documents and manuals:

- General description of CoGIS platform, including description of GIS server;
- Manual on CoGIS Server - Installing and setting;
- Manual on CoGIS Server - Creating map projects in QGIS;
- Manual on CoGIS Portal - creating map applications;
- Manual on CoGIS Mobile - Working in mobile applications.

2. Getting started with CoGIS Server Manager

To get access to CoGIS Server Manager, you need to be authorized, see Figure 1.

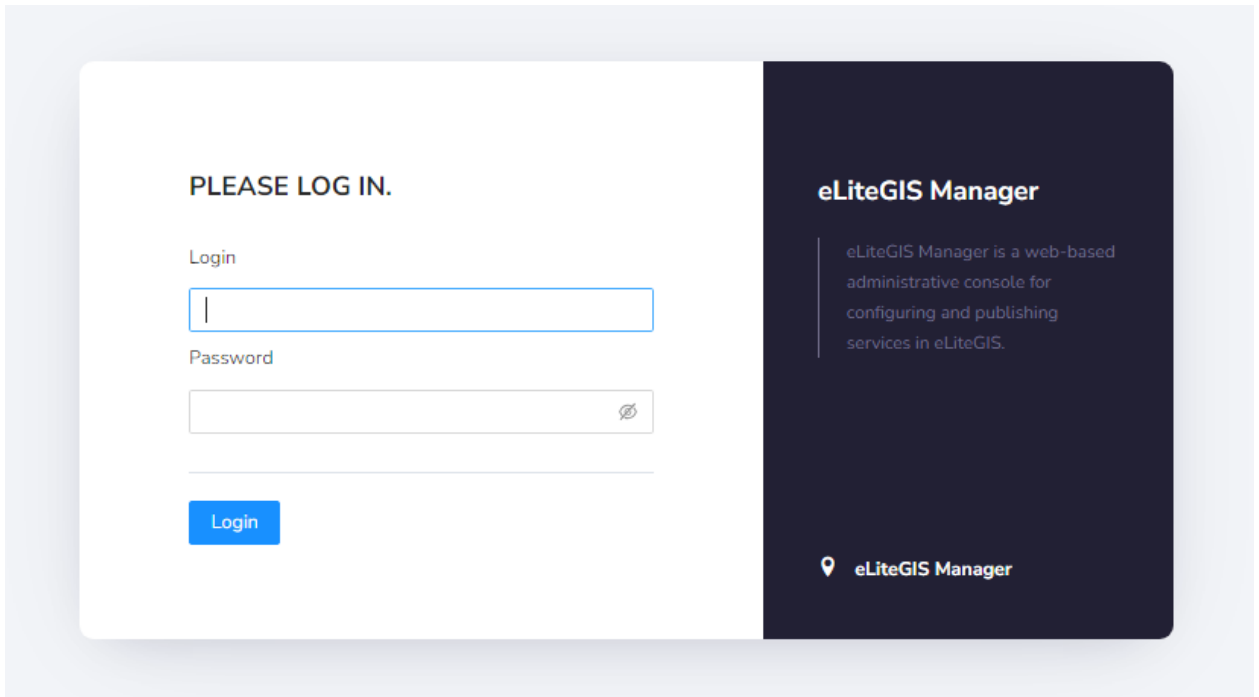
The image shows a web-based login interface for eLiteGIS Manager. On the left, a white box contains the text "PLEASE LOG IN." followed by "Login" and a text input field. Below that is "Password" and a password input field with an eye icon for toggling visibility. A blue "Login" button is at the bottom of this section. On the right, a dark blue sidebar contains the "eLiteGIS Manager" logo and a description: "eLiteGIS Manager is a web-based administrative console for configuring and publishing services in eLiteGIS." At the bottom of the sidebar is a location pin icon and the text "eLiteGIS Manager".

Figure 1 – CoGIS Server Manager authorization window

After authorization, the web console with the following sections will appear, see Figure 2:

- *Services (open by default)* - includes catalog of published services, catalog navigation tools and tools for adding new services. See 'CoGIS Server - Publishing GIS services' manual for more details (section 3-7).
- *Settings* - includes tools for setting up GIS server, paths to related resources and local directories for saving files, authorization parameters for access to databases, general parameters for publishing of map services, geoprocessing services, OGS services, and other settings. See more details in 'CoGIS Server - Installing and setting' manual.
- *Users and groups* - includes tools for managing users and user groups. See details in 'CoGIS Server - Installing and setting' manual.
- *Licensing* – includes information about CoGIS license. See details in 'CoGIS Server - Installing and setting' manual.
- *User account* - the section includes information about the current user with the ability to edit it.

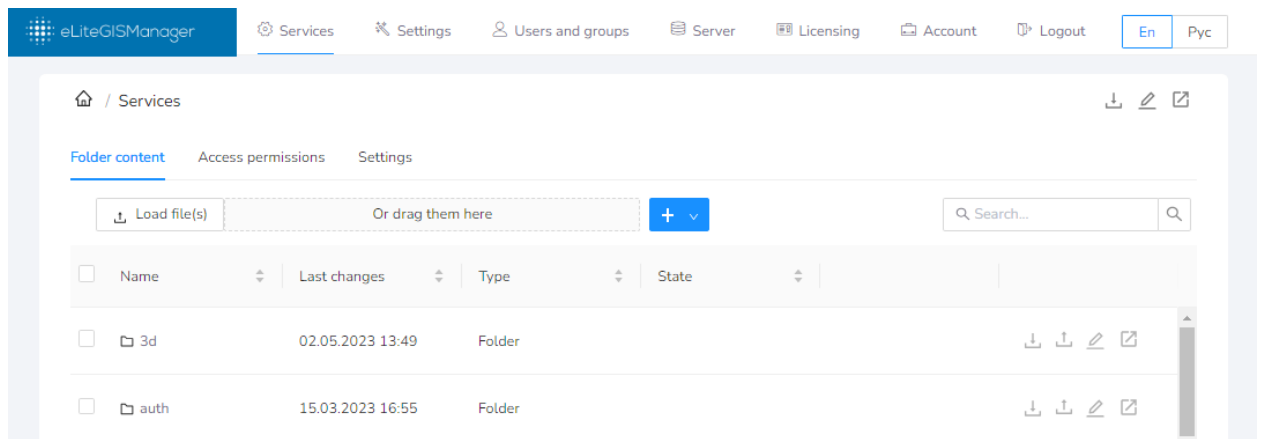





Figure 2 – Services section of CoGIS Server Manager web console

The panel contains  button for exit the application and buttons to switch language  .

3. Services catalog

3.1.General information

Services catalog located in *Services* section of the web console is the hierarchical list of different types of services, see Figure 3.

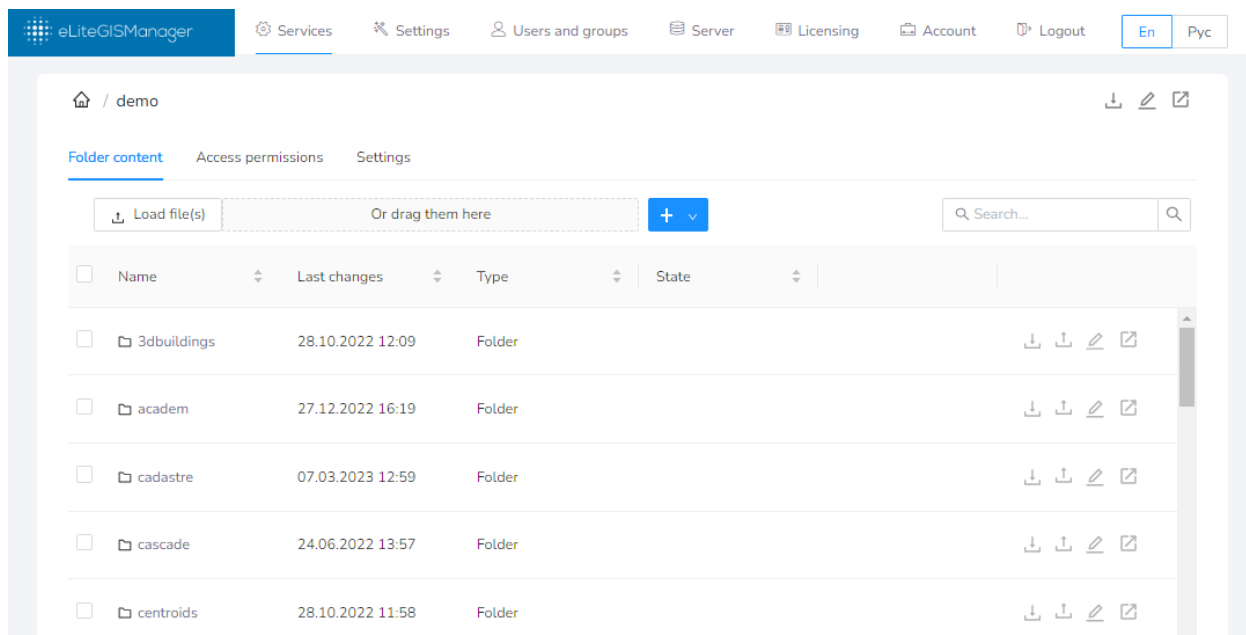


Figure 3 – Services catalog

Services can be grouped to folders with unlimited nesting level. List of services and their groups correspond to list of files and their grouping to folders in specified directory on the server. That is, the list of services can be managed (create new, delete, change structure) as following:

- via CoGIS Server Manager web console interface;
- manually, by downloading file to specific directory.

Instructions on working with services catalog via web console interface are provided in sections below.

3.2.Viewing information about service or folder

Services catalog is a table containing the following information:

about service:


- Name
- Date and time of last change
- Type
- For map services – map type (format of map project file or raster file based on which the service has been published)
- Status (see details in section 3.3);




about folder:

- Name
- Date and time of last change.


All the table elements can be sorted by name and date/time of last change.


3.3.Changing service status

In the *Status* field of the service there is the panel with controls: .

With these controls you can pause the service work ('Pause' mode ) , stop the service work ('Stop' mode ) , or restart it ('Start' mode ) .


Note that services are available in Start mode only.


In Pause mode the service project file remains in the sever RAM and can be restarted by pressing  less than in 1 second.

In Stop mode the service is fully stopped. To restart it, press  , but note that after that the project file should be downloaded to the server RAM which may take from 1 second to several minutes depending on the project.

The same controls for managing service status are available for each service in its properties window.

3.4.Updating service from file


On the right of the service name there is the toolbar: .

To update service, press  . The standard operation system window to select file for download will appear.

This toolbar is available for each service in its properties window.


3.5.Uploading service file

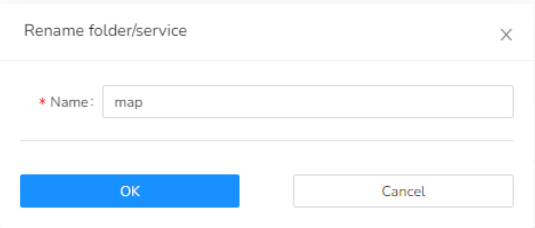
On the right of the service name there is the toolbar: .

To upload service file, press  . The standard operation system window to save service file will appear.

This toolbar is available for each service in its properties window.

3.6.Editing service name

On the right of the service name there is the toolbar: .



OK

Cancel

Cancel






[illegible]

-

3.8. Navigating through catalog

You can navigate through catalog as following:

- Click the required service or folder name to get to the properties of the service or to the list of services of the selected folder. On hovering over the service or folder name the correspondent line in the catalog is highlighted with grey color, and the service or folder name is marked blue, see Figure 6.

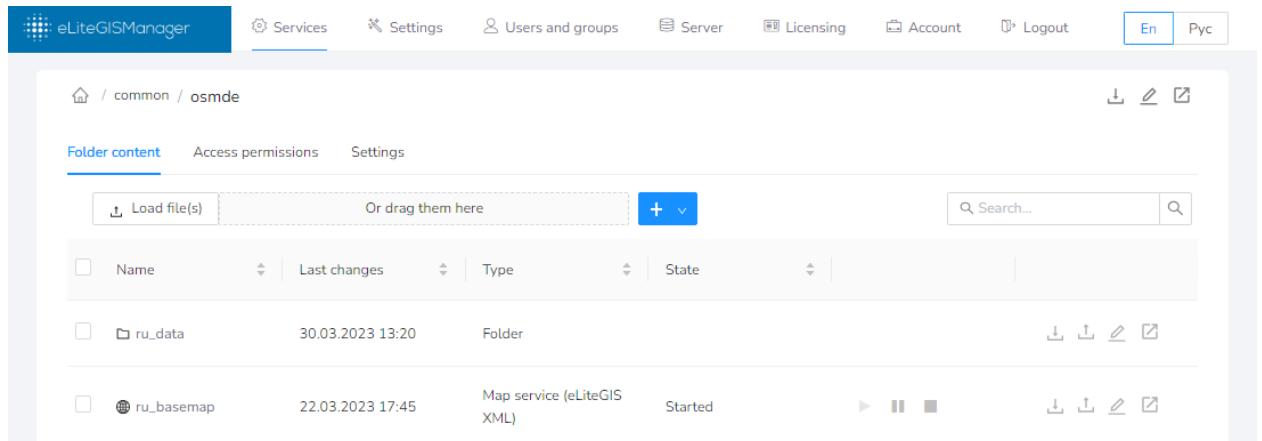


Figure 6 – Navigation through catalog: going to selected service or folder

- Use the path to the current folder specified in the lower left corner of the catalog as bread crumbs, see Figure 7. With the bread crumbs you can go to any folder specified in

the path. For example, using [/ demo / cluster](#) path, you can either go to the

home page with the list of all published services, or to the folder 'demo'.

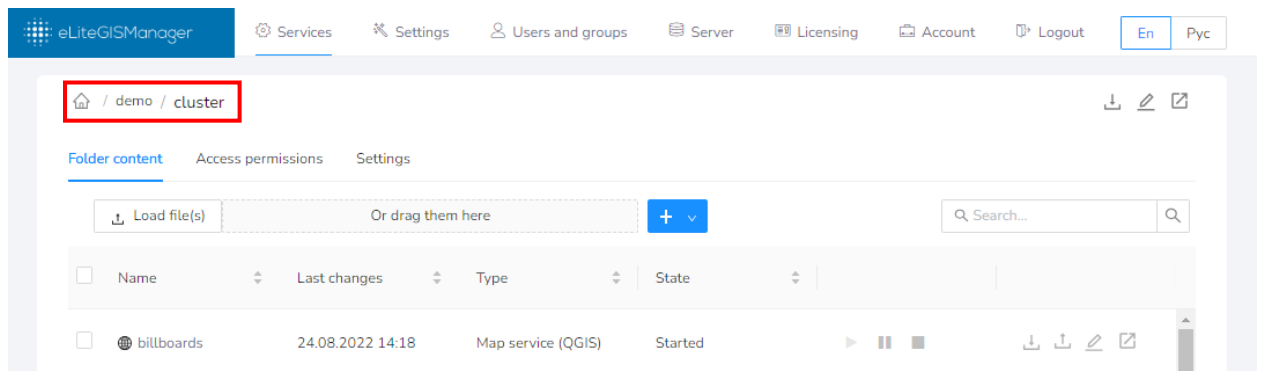



Figure 7 – Navigation through catalog using bread crumbs

3.9. Adding new folder

To add new folder to the catalog, press  in the upper part of the table and select *Add folder* from the drop-down list, see Figure 8.

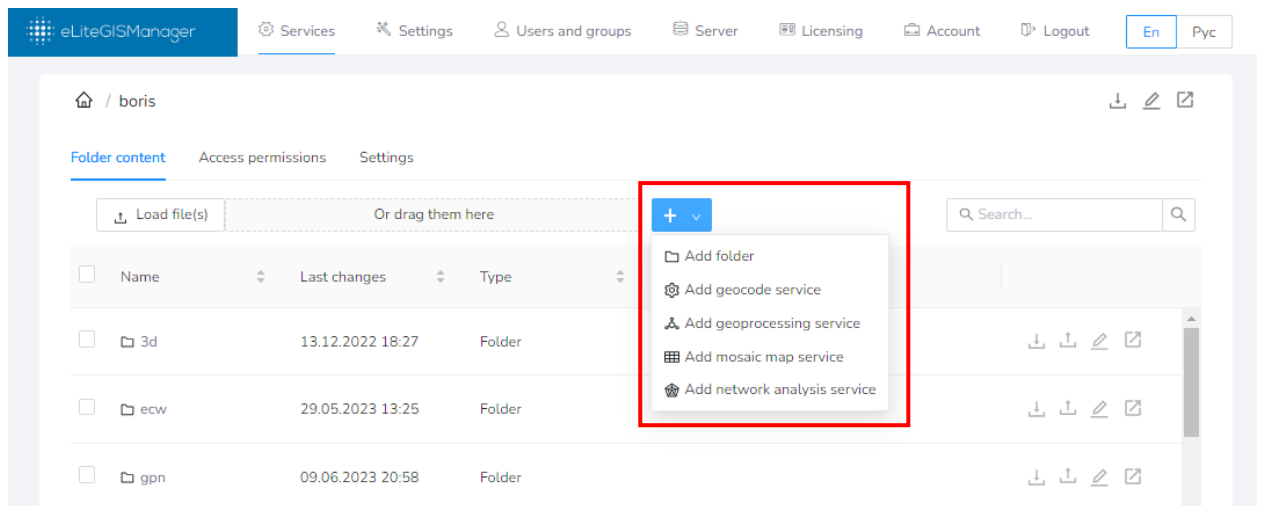


Figure 8 – Adding new folder to catalog

In the appeared window enter the folder name and access permissions for users, see Figure 9. The following parameters are specified by default:

- Name: New folder
- Availability: For all
- Hide for display in the list of items in a folder

Figure 9 – Adding new folder to catalog: folder parameters


Available access permission levels:

- For all
- For authorized
- For selected users
- For selected user groups
- No web access.

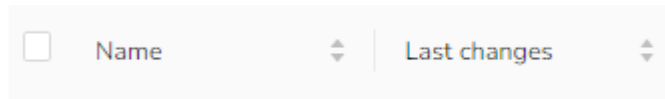
Note: these access permission levels are the same as permissions set for specific services.

3.10. Deleting and copying service or folder

To delete, copy or cut (deletion with saving to clipboard) service or folder, select it in the catalog

first. To do so, check the check box  on the left of the service or folder name. You can select multiple services or folders sequentially checking the appropriate check boxes. You can also select all services or folders in the current folder, checking the box on the left of the table

names:



As soon as at least one element in the catalog is selected, the buttons of additional tools appear in the upper part of the catalog:

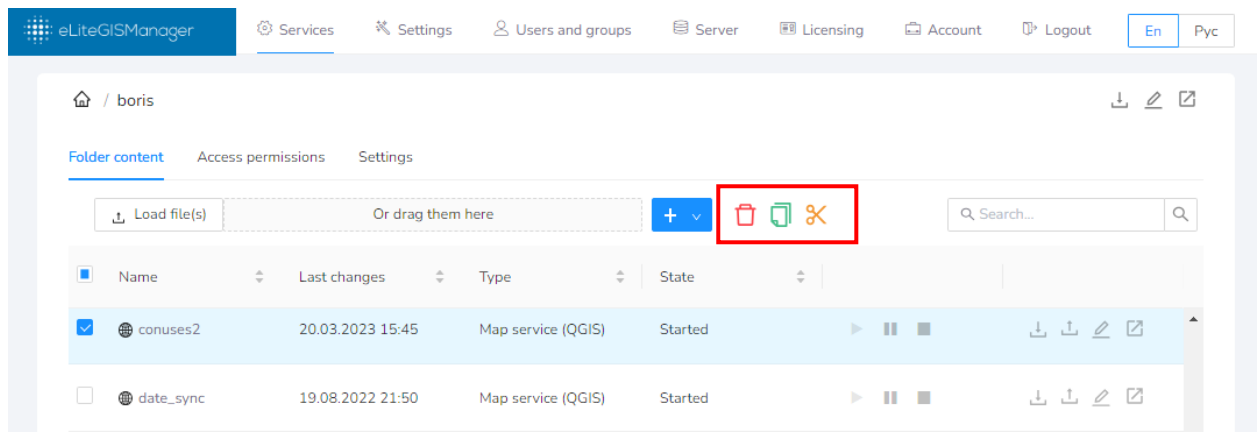






Figure 10 – Tools for work with selected service (folder)

To delete selected service (folder), press  and confirm your choice in the pop-up window.

To copy selected service (folder), press . The service or folder will be copied to clipboard

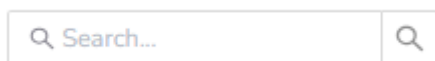
and the additional button  for pasting the copied item to the catalog folder will appear near the delete and copy tools buttons. This button will be available during navigation through catalog.

To cut selected service or folder (deletion with saving to clipboard), press . The selected

service or folder will be deleted and at that copied to clipboard, and the additional button  for pasting the copied item to the catalog folder will appear near the delete and copy tools.

3.11. Searching through catalog

To search through the catalog, use the search field located in the upper right part of the catalog:



. Enter the search request to the field and the search will be done by names of services and folders, see the example below.

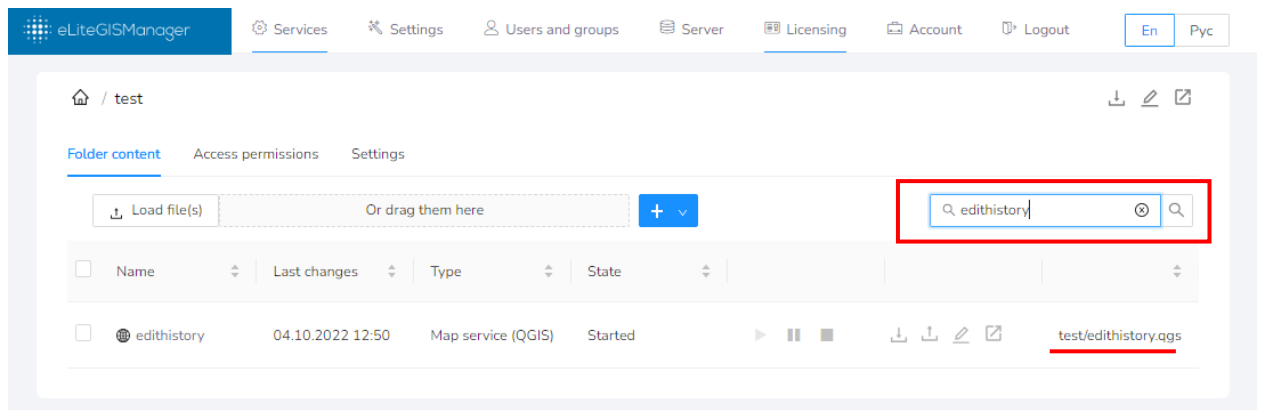



Figure 11 – Searching through catalog

The search results will be shown as the table. The path to each found service or folder will be shown in the rightmost column of the table (for example, `Test\poi_kaliningrad`).

The search results can be sorted by name, date/time of last change, or by path. To clear search results, press  in the search field.

4. Publishing map services

4.1.General information

CoGIS Server supports publishing of map services in accordance with the following standards and protocols:

- ArcGIS Server REST API MapServer10.x and FeatureServer10.x (ArcGIS REST API);
- OGC WMS 1.3.0 (WMS);
- OGC WMTS 1.0.0 (WMTS);
- OGC WFS 2.0.0 (WFS);
- OGC TMS (TMS).

The data in the following formats can be the data sources for the above services:

- Data sources of vector layers:
 - QGS/QGZ (map project QGIS/QuantumGIS);
 - GeoPackage (GPKG);
 - Shape-файл ESRI (SHP);
 - KML/KMZ.

In case of installed library for reading and recording raster and vector geospatial data formats **GDAL (Geospatial Data Abstraction Library)**:

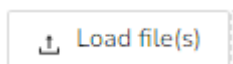
- ESRI File Geodatabase (GDB);
 - AutoCAD (DXF, DGN, DWG);
 - MapInfo (MID/MIF, TAB).
- Data sources of raster layers:
 - QGS/QGZ (map project QGIS/QuantumGIS);
 - GeoPackage (GPKG);
 - GeoTIFF;
 - ECW;
 - MrSID.

The scope of functionality available by publishing of map services depends on the data source format.

More details about available settings for QGIS map projects supported by CoGIS Server can be viewed in the 'CoGIS Server - Creating map projects in QGIS' manual.

4.2.Creating new service

To add a new map service to the catalog, go to the appropriate catalog folder. Press



button located in the upper left part of the catalog window, see Figure 122.

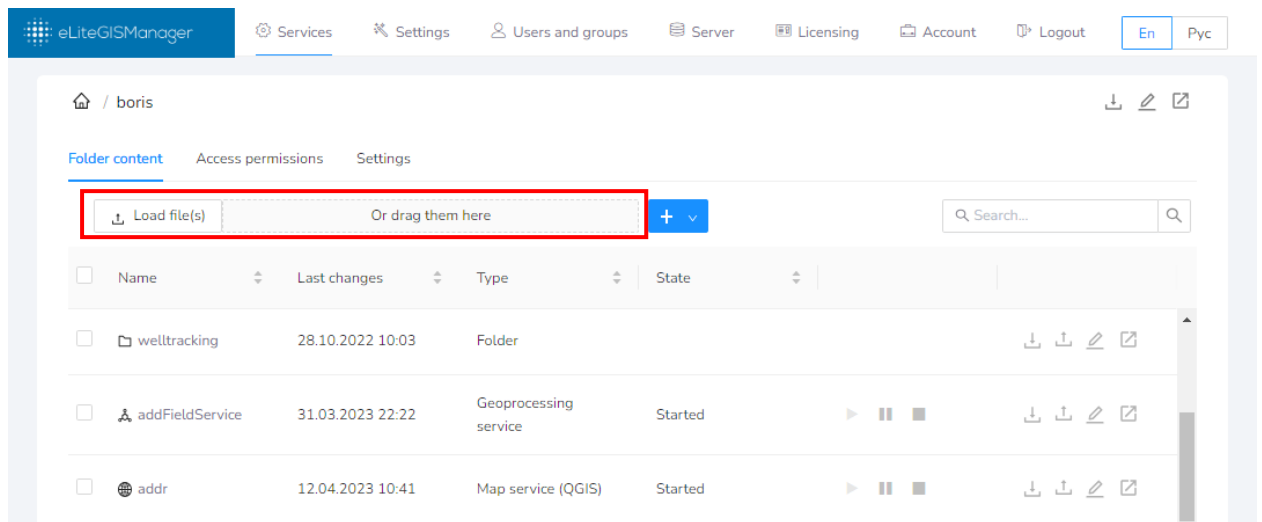


Figure 12 – Creating new service

A standard dialog for selection of map project file will appear. This map project file you can also drag to the Or drag them here field located on the right of the download button.

The map service will be published automatically after successful downloading the map project file.

4.3. Setting access rights

To proceed with the service setting, press its name in the services list.

The service settings window will appear, where *Access rights* section will be opened by default, see Figure 13.

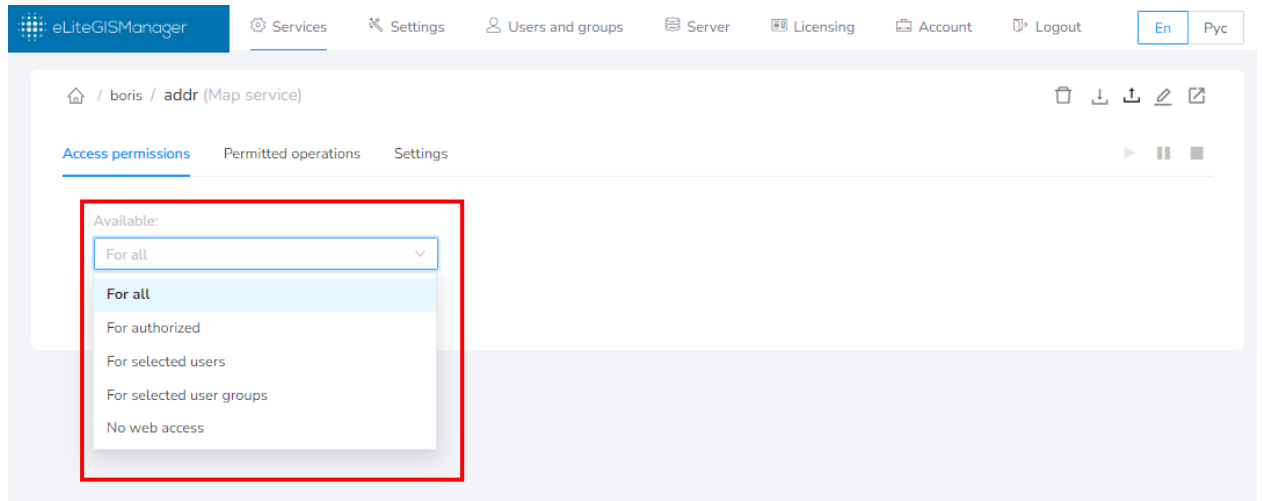


Figure 13 – Setting service access rights

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;

- For selected user groups;
- No web access.

4.4.Setting service operations

To get to the setting of service operations, press its name in the services list. The service settings window will appear. Go to *Permitted operations* tab, see Figure 14.

The screenshot shows the 'Permitted operations' tab for a 'Map service' in the eLiteGSManger interface. The interface has a top navigation bar with 'Services', 'Settings', 'Users and groups', 'Server', 'Licensing', 'Account', and 'Logout'. The 'Permitted operations' tab is highlighted with a red box. The main content area is divided into three panels:

- Protocols and agreements:**
 - ArcGIS REST API:**
 - ☒ MapServer
 - ☒ CoGIS SOE
 - ☐ FeatureServer
 - OGC:**
 - ☐ WMS
 - ☐ WFS
 - ☐ WMTS
 - ☐ TMS
- Functionality:**
 - Availability of declarative information:**
 - ☒ Availability of layers list (ArcGIS, WMS, WFS)
 - ☒ Availability of layers legend (ArcGIS, WMS)
 - ☐ Availability of where clause (ArcGIS)
 - Availability of objects data:**
 - ☒ Identify (ArcGIS, WMS, WMTS)
 - ☒ Search (ArcGIS)
 - ☒ Selection query (ArcGIS, WFS)
 - Maximum number of objects returned per request (ArcGIS, WMS, WMTS, WFS)
 - ☒ Availability of geometry for found objects (ArcGIS, WFS)
 - Availability of map as picture:**
 - ☒ Generating image of map area by extent (ArcGIS, WMS)
 - ☒ Allow to override coloring on the client (ArcGIS)
 - ☐ Raster cache support (ArcGIS, WMTS, TMS)
 - ☐ Vector cache support (ArcGIS)
 - Editing:**
 - ☒ Based on rules (COGIS SOE)
 - ☐ Simplified (ArcGIS, COGIS SOE)
 - ☐ Create
 - ☐ Update
 - ☐ Delete
 - For specified layer numbers only
 - For specified user groups only
 - ☐ Prohibited
- Start service:**
 - ☐ Override start service condition
 - ☐ Delayed start of the service on the first request
 - ☐ Override service start priority
 - Normal priority
 - ☐ Override service lifetime without request
 - 0 00.00.00
 - ☐ Isolate

Figure 14 – Setting permitted operations of selected map service


The tab consists of the following blocks:

- Protocols and agreements;
- Functionality
- Service start.

4.4.1. Protocols and agreements


By default the map service is published in accordance with ArcGIS REST API (MapServer) protocol.

Support for extended methods for work with layers and objects, CoGIS SOE (Server Object Extension), is also enabled for map service by default. Enabled CoGIS SOE for map service allows performing such operations as topology correction, creation of objects by address, turning on picture gallery for layer, upload of data to file, and more.

Enable/disable CoGIS SOE checking the appropriate checkbox . Further setting of CoGIS SOE rules is done in CoGIS Designer.

For published map service you can also enable support for the following protocols and agreements:

- FeatureServer;
- WMS;
- WFS;
- WMTS;
- TMS.

To enable/disable the protocol, check the box near its name .

4.4.2. Functionality

In CoGIS Server you can enable the following operations with map services:

Availability of declarative information

This group of operations includes the following settings:

- *Availability of layers list (ArcGIS, WMS, WFS)*
This option allows getting the list of layers and tables in service, as well as detailed information about layer or table. It is available for map services with any combination of layers. The option is enabled by default.
- *Availability of layers legend (ArcGIS, WMS)*
This option allows getting the layer's legend, it is available for vector layers only. The option is enabled by default.
- *Availability of definition query for layers (ArcGIS REST API)*
This option allows getting the definition query set for layer at the map project level, it is available for vector layers only. The option is disabled by default.

To enable/disable the operation, check the box near its name.

Availability of objects data

This group of operations includes the following settings:

- *Identify (ArcGIS REST API, WMS, WMTS)*
This option allows getting information about objects in specific location in all visible layers or in specific layers only. It is available both for vector and raster layers. The option is enabled by default.

- *One line search*

This option allows performing objects search:

- One line search of objects in specific fields of all visible layers or in specific layers only;
- One line search of objects in map service layers with sorting by distance relative to specified coordinates;

- *Selection by sql condition (ArcGIS REST API, WFS)*

Allows performing selection of objects:

- Getting objects in layer filtered by specified definition query (attribute filter);
- Spatial selection of objects in layer (geometry filter);
- Support for storage and request of 3D coordinates (if Z coordinate is supported in the database);
- Getting related objects in case of declarative relationship between layers;
- Export of selected layer data to Shapefile, Excel, CSV files;
- Getting file attachments for specific objects;
- Getting file attachments with previews for all objects found in specific extent.

For this option, an additional setting is available, namely setting of maximum number of objects returned per one request. The option is available for vector layers only and is enabled by default.

- *Availability of geometry for found objects (ArcGIS REST API, WFS)*

This option allows getting geometry for found objects. It is available for vector layers only. The option is enabled by default.

To enable/disable the operation, check the box near its name.

Availability of map as picture

This group of operations includes the following settings:

- *Generating image of map area by extent (ArcGIS REST API, WMS)*

Allows generation of map image in specified format (supported formats are PNG32, PNG24, PNG, JPG, TIFF, GIF, BMP) in specified coordinate system by specified extent considering specified layers, scale ranges for layers visibility and definition queries (whereclause) set on the client.

It is available both for vector and raster layers.

For this option, an additional setting is available, namely, to allow or prohibit redefining layers coloring on the client (for such services as MapServer and FeatureServer). The option is enabled by default.

- *Raster cache support (ArcGIS REST API, WMTS, TMS)*

Enables support of raster cache as tiles in PNG format. The tile cache parameters are set in the *Tile cache* section of the service settings (see details in section 4.5). The option is enabled by default.

- *Vector cache support (ArcGIS REST API, TMS)*

Enables support of vector cache as collection of PBF files built by Mapbox Vector Tiles specification provided for transfer of compressed vector data, and JSON files built by Mapbox Style Specification for transfer of information about data design. The tile cache

parameters are set in the *Tile cache* section of the service settings (see details in section 4.5). The option is disabled by default.

To enable/disable the operation, check the box near its name.

Editing

This group of operations allows selecting the following options for editing map service:

- *Based on CoGIS SOE rules*

This option allows using the advanced methods of work with layers and objects of map service in accordance with CoGIS SOE rules set in CoGIS Designer. The option is selected by default.

- *Simplified*

The use of the advanced CoGIS SOE methods is not provided with this editing option. The available operations are creation, deletion, and editing objects only. To select the required operation, check the appropriate checkbox. Besides, it is possible to specify service layers for which these operation will be available. To do so, enter the numbers of

needed layers to the field: For specified layer numbers only

Additionally you can specify the user groups for which these operations will be available. To do so, select the needed groups in the field:

For specified user groups only

- *Prohibited*

This option prohibits editing objects in the map service.

4.4.3. Service start

In this section the following rules of starting the service are customized:

- *Redefine service start parameters* - this option allows you to enable the option to delay the start of the service at the first start. This is important when there are many services and allows you to postpone the launch of secondary services.
- *Redefine service start priority* – this option allows you to define the priority levels of service start: low/regular/high.
- *Redefine service lifetime without requests* – this option allows you to specify the lifetime of service without requests, after which the service stops automatically.
- *Isolate service* – this option allows you to run a separate process for specific service.

4.5.Setting tile cache

Support for creation of tile cache can be enabled for each map service.

If tile cache is created, GIS server would be able to output the preliminarily generated map images (tiles) in accordance with the extent specified in the web request. This, in turn, allows you to speed up the map image generation, in case the default coloring and visibility settings are used in the request and if no filter is applied to layers by the user.

To enable support of raster and/or vector tile cache for map service, go to *Возможности* tab of the service settings window, see details in section **Ошибка! Источник ссылки не найден.** of the document.

To get to specific settings of the tile cache, open *Tile cache* tab of the service settings window, see Figure 15.

The screenshot shows the 'Tile cache' settings for the 'ru_basemap' map service. The interface includes a top navigation bar with 'Services', 'Settings', 'Users and groups', 'Server', 'Licensing', and 'Account' tabs. The 'Tile cache' tab is selected. The settings are organized into five main sections:

- Common:** Includes 'Tiles lifetime' (0, 00:00:00), 'Lifetime of client tiles caching' (0, 00:00:00), 'Maximum cache size (MB)' (0), 'Tile size (px)' (256), 'DPI' (96), a checked 'Image with transparent background' option, and a 'Format' dropdown set to 'PNG8'.
- Scales:** Features a 'Standard' radio button, a slider, a 'Custom' radio button, and an 'Add scale' button.
- Origin point:** Contains input fields for 'x' and 'y' coordinates.
- Regenerate cache on changes in geodata:** Includes an unchecked 'Enable monitoring changes in geodata' checkbox, a 'Change check frequency' field (00:00:00), and a 'Time for monitoring' section with a 'Use time for monitoring' checkbox and various time range inputs.
- Optimize cache storage in file storage:** Includes an unchecked 'Enable regular optimization' checkbox, a 'Time for optimization' section with 'from' and 'to' time inputs, and several checkboxes for 'Only in selected months', 'Only on selected days of month', 'Only on selected days of week', and 'Only in selected weeks of month'.

Figure 15 – Setting tile cache

The tile cache settings are grouped as following:

- Common parameters
- Scale range
- Origin point
- Parameters for regenerating cache on changes in geodata

- Parameters for optimizing cache storage in file storage
- Areas of initial interest
- Extent limits.

4.5.1. Common parameters

The group is shown on Figure 166.

Figure 166 – Group of common tile cache parameters

The group contains the following parameters:

- *Tiles lifetime*

Enter number of days, hours, and minutes in the appropriate fields:

- *Lifetime of client tiles caching* (the period during which the client will be able to not request the updated tiles from the server, but to use the local cache of the browser instead)

Enter number of days, hours and minutes in the appropriate fields:

- *Maximum cache size*

Enter the cache size in Mb in the appropriate field:

- *Tile size*

Enter the tile size in pixels in the appropriate field or use the default value of 256 px:

 Tile size (px)

- *DPI*

Enter the image resolution in dpi in the appropriate field or use the default value of 96 dpi:

 DPI

- *Image with transparent background*

If you need to use the tiles as non-transparent background for other data uncheck this option:

☒ Image with transparent background

If you need the other data is visible under the tiles, keep this box checked.

4.5.2. Scale range parameters

The group is shown on Figure 177.

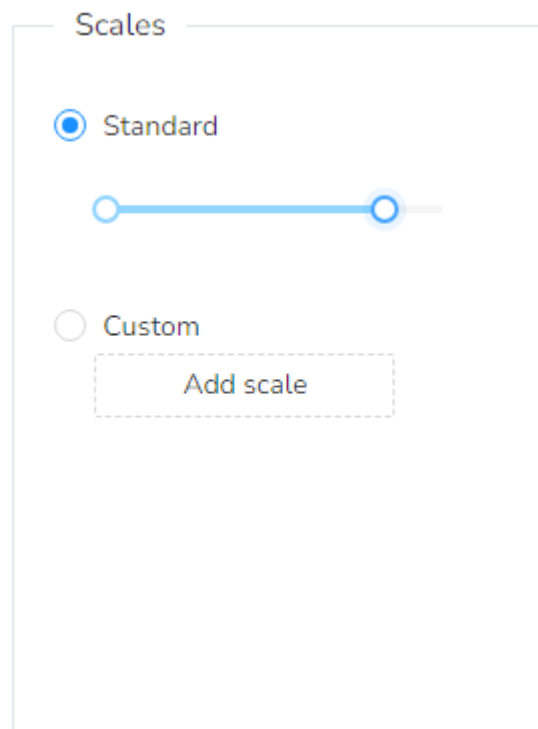


Figure 177 – Group of scale range parameters of tile cache

In this group of parameters you can select either to use the standard scale range for creation of map service tile cache or to set your custom scale range.

To use the standard scale, check the *Standard* option:

☒ Standard

Additionally, with the slider you can specify the needed scale range from the standard scales, for which the tile cache should be generated.

To set your custom scale range, check the *Custom* option:

☐ Custom

Add scale

Press *Add scale* button and enter the needed value in the appeared field:

☒ Custom

0 close

Add scale

Repeat these steps for each scale.

4.5.3. Origin point parameters

In this group of parameters the values for the origin point of tiles creation are specified. Enter the origin X and Y coordinates in the appropriate fields:

x

y

The entered values should be in the units of the service coordinate system.

4.5.4. Parameters for regenerating cache on changes in geodata

The group is shown on Figure 188.

Regenerate cache on changes in geodata

☐ Enable monitoring changes in geodata

Change check frequency

00:00:00

Time for monitoring

☐ Use time for monitoring

Time

from 00:00:00 to 00:00:00

Only in selected months

Only on selected days of month

Only on selected days of week

Only in selected weeks of month

Figure 188 – Group of parameters for regenerating cache on changes in geodata

This group provides settings for monitoring changes made in geodata based on which the cache regeneration is done. To enable the changes monitoring option, check the appropriate field:

☐ Enable monitoring changes in geodata

After that, the following monitoring parameters will be available for selection:

- *Changes check frequency*

Specify the needed period in the field:

Change check frequency

00:00:00

- *Time for monitoring*

Specify periods during which you need to check for updates in your geodata. That is, you can enter the time in the appropriate fields:

Time

from 00:00:00 to 00:00:00

Additionally, you can enter specific months, days, or weeks of the month:

Time for monitoring

☐ Use time for monitoring

Time

from 00:00:00 to 00:00:00

Only in selected months

February x

Only on selected days of month

4 x

Only on selected days of week

Wednesday x

Only in selected weeks of month

3 x 4 x

4.5.5. Parameters for optimizing cache storage in file storage

The group is shown on Figure 19.

Optimize cache storage in file storage

☐ Enable regular optimization

Time for optimization

Time

from 00:00:00 to 00:00:00

Only in selected months

Only on selected days of month

Only on selected days of week

Only in selected weeks of month



Figure 19 – Group of parameters for optimizing cache storage in file storage

This group contains settings to optimize cache storage in file storage.

To enable regular optimization (to free the unused disk space), check the box near the appropriate option:

☐ Enable regular optimization

After that, the optimization parameters will be available for selection. That is, you can specify the cache storage optimization period:



Time
from  to 

Additionally, for this period you can enter specific months, days, or weeks of the month:

Optimize cache storage in file storage

☐ Enable regular optimization

Time for optimization

Time
from  to 

Only in selected months

Only on selected days of month

Only on selected days of week

Only in selected weeks of month

1 ✓

2

3

4

last ✓

4.5.6. Areas of initial interest

The group is shown on Figure 20.

Области начального интереса

Количество используемых потоков

Превентивная регенерация кэша

☐ Включить регулярную регенерацию кэша

Временное окно для запуска регенерации

По времени

с по

Только в выбранные месяцы

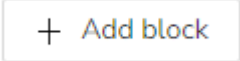
Только в выбранные дни

Только в выбранные дни недели

Только в выбранные недели месяца

Figure 20 – Setting areas of initial interest

For the tile map service, you can specify one or more areas of initial interest for which the tile cache will be pre-generated.

To do so, press  and specify the area parameters in the appeared window:

- Name;
- Scale limitation;
- Type;
 - Area by coordinates
 - Coordinate system;
 - Extent;
 - Feature class
 - Database;
 - Table name;
 - SQL filter;
 - Buffer (meters);

see Figure 21.

Figure 21 – Setting preliminary generation of tiles

If the requested tile has not been generated before, it will be generated on the fly.

Additionally, for areas of interest, you can enable regular regeneration of the tile cache. To do so, check the appropriate box:

☐ **Enable regular cache regeneration**

After that, the parameters of the temporary window will become available for setting regeneration start (regular rebuilding) of the tile cache.

In the corresponding input fields, you can specify the time range:

Time
from to

Additionally, you can specify specific months, days of the month, days of the week, or weeks of the month during which you can run regeneration. To do so, specify specific values in the corresponding input fields:

Proactive cache regeneration

☐ Enable regular cache regeneration

Time for regeneration

Time
from 00:00:00 to 00:00:00

Only in selected months
March x April x May x June x July x

Only on selected days of month

Only on selected days of week

Only in selected weeks of month
last x

Possible values for months: January, February, March, April, May, June, July, August, September, October, November, December.

Possible values for days in a month: from 1 to 31. In this case, if there are less than 31 days in a month, then if the value 31 (or 30 and 29 for some months) is specified, the last day of the month is selected.

Possible values for days of the week: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday.

Possible values for weeks of the month: 1, 2, 3, 4, last.

In addition, you can limit the number of threads used for the cache regeneration task. The number of threads used is the maximum number of parallel runs of the caching task.

By default, the corresponding input field contains the value 1:

1
Number of used threads

For there to be no restrictions on the number of parallel launches, specify the value 0.

5. Publishing geocode services

5.1.General information

CoGIS Server allows generating geocode service by map service. Generally, the geocode service in CoGIS Server can be used not only with address data for comparison of addresses and coordinates, but also with any other data as the general service for searching objects by free text.

Before publishing the geocode service, make sure that the source data is set appropriately:

- The layers and the fields in these layers by which the search should be done, are specified in the database;
- For layers that should be searched for using multiple fields, the join fields' values operation is done;
- The index for selected fields is built;
- The map project from the selected layers is created;
- The display field matching the fields by which the search should be done, is specified in the layers properties of the map project.

To publish the address geocoder, it is required that the layers with buildings and streets are present in the map project based on which the geocode service would be built.

See more details in 'Creating map projects in QGIS' manual.

5.2.Creating new geocode service

To add the new geocode service, go to the required catalog folder.

Now press  button located in the upper left part of the catalog window and select

 **Add geocode service** in the appeared drop down menu.

In the appeared window enter the service name and access rights, see Figure 22.

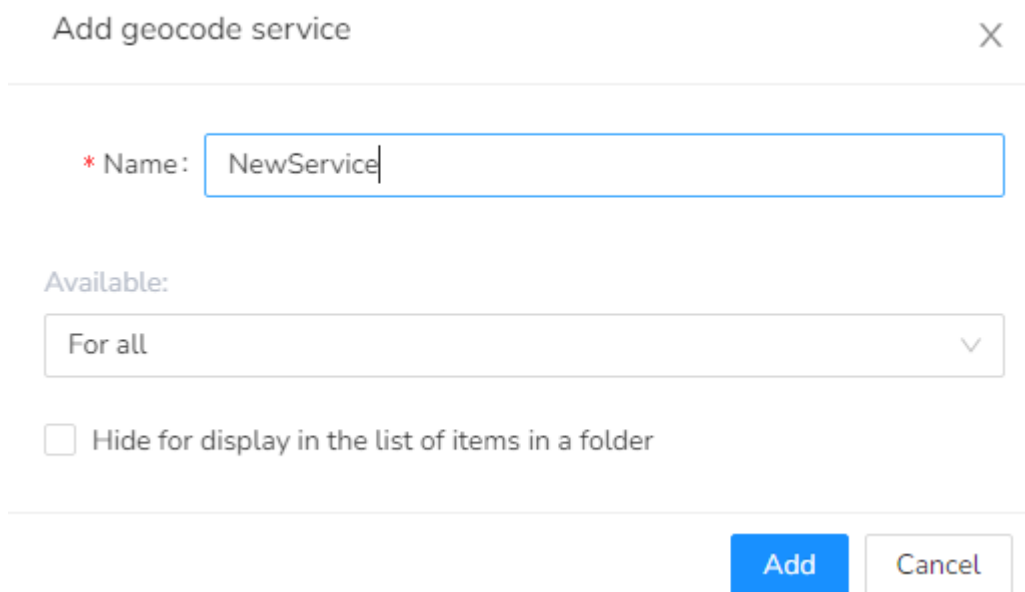



Figure 22 – Adding new geocode service

Selecting one of the provided options to set the service access rights:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

Press  and the service properties settings window will be automatically opened, see Figure 23.

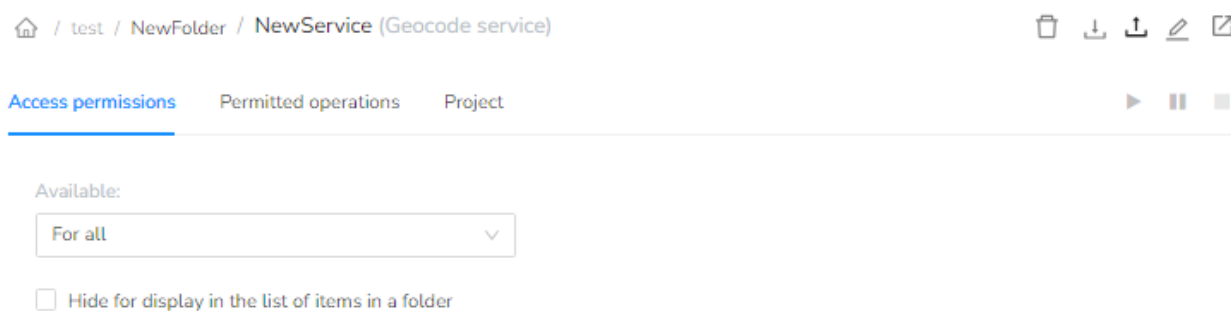


Figure 23 – Geocode service properties settings window

5.3.Setting service access rights

To proceed with the geocode service setting, press its name in the services list. The service settings window will appear, where *Access rights* section will be opened by default, see Figure 24.

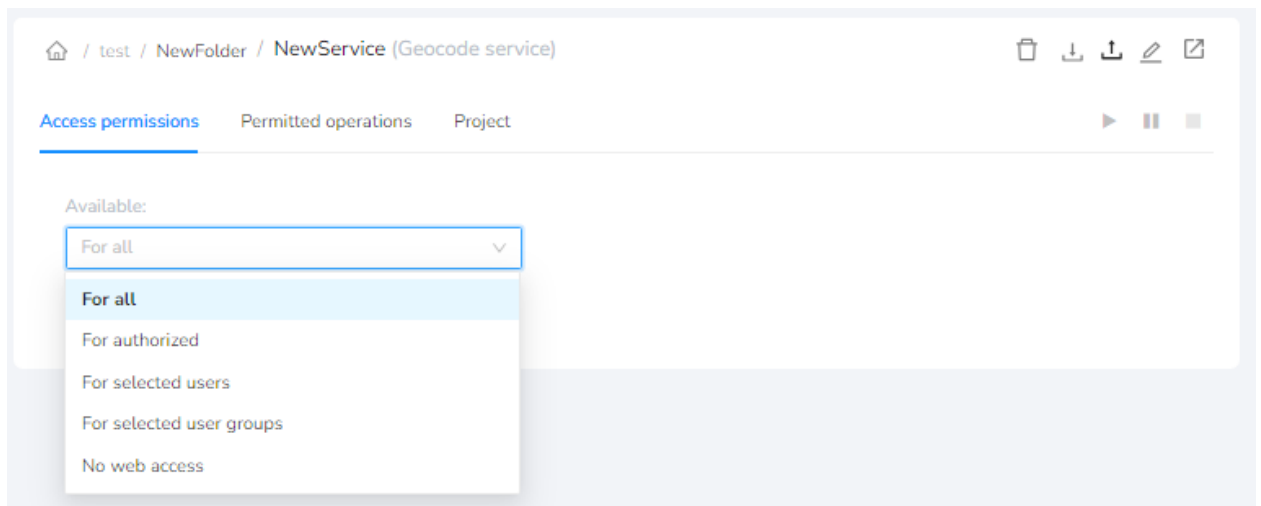


Figure 24 – Setting access rights for geocode service

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

5.4.Setting permitted operations for geocode service

To get to the setting of the geocode service options, select its name in the services list. In the appeared window go to the *Permitted operations* tab, see Figure 25.

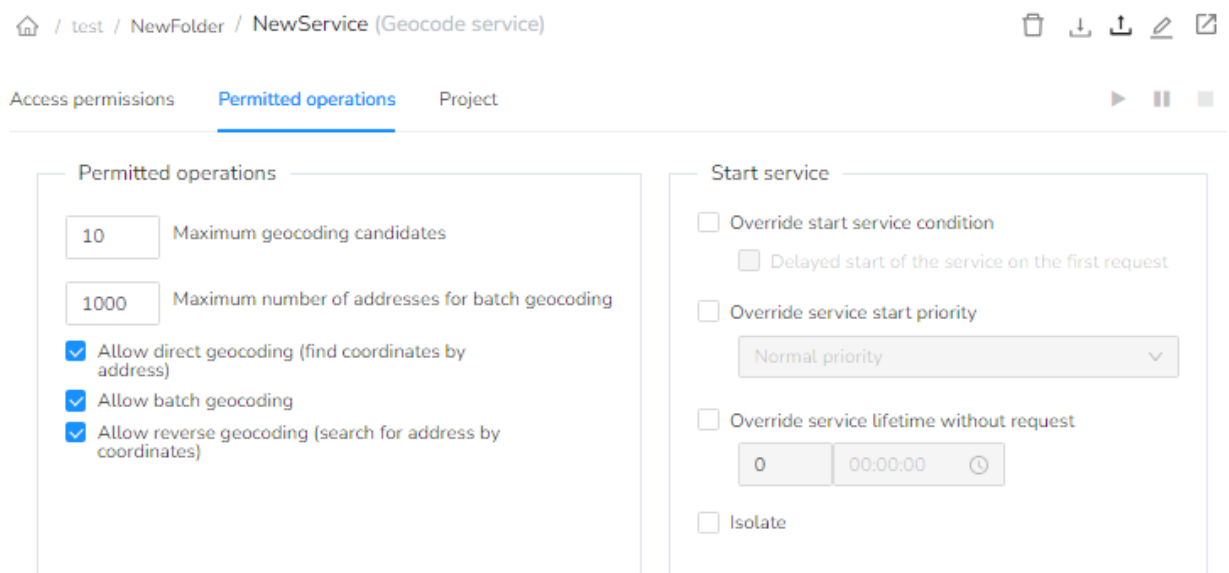


Figure 25 – Setting permitted operations for selected geocode service

CoGIS Server supports the following operations for geocode services:

- Allow direct geocoding (find coordinates by address);
- Allow batch geocoding;

- Allow reverse geocoding (search for address by coordinates).

In CoGIS Server you can also specify:

- Maximum geocoding candidates, the default value is 10;
- Maximum number of addresses for batch geocoding, the default value is 1000.

The following rules for starting the service are set in this section:

- *Redefine start service parameters*
It allows you to enable the postponed service start option at the first launch. This is important when there are a lot of services, as you can postpone the start of the secondary services.
- *Redefine start service priority*
It allows you to define the start service priority: Low/Regular/High
- *Redefine service lifetime without requests*
It allows you to set the service lifetime without requests. After this time, the service will automatically stop.
- *Isolate services*
It allows you to start the separate process for the given service.

5.5. Selecting map project

To select map project based on which the geocode service will be published, select its name in the list. In the appeared service settings window go to the *Project* tab, see Figure 25.

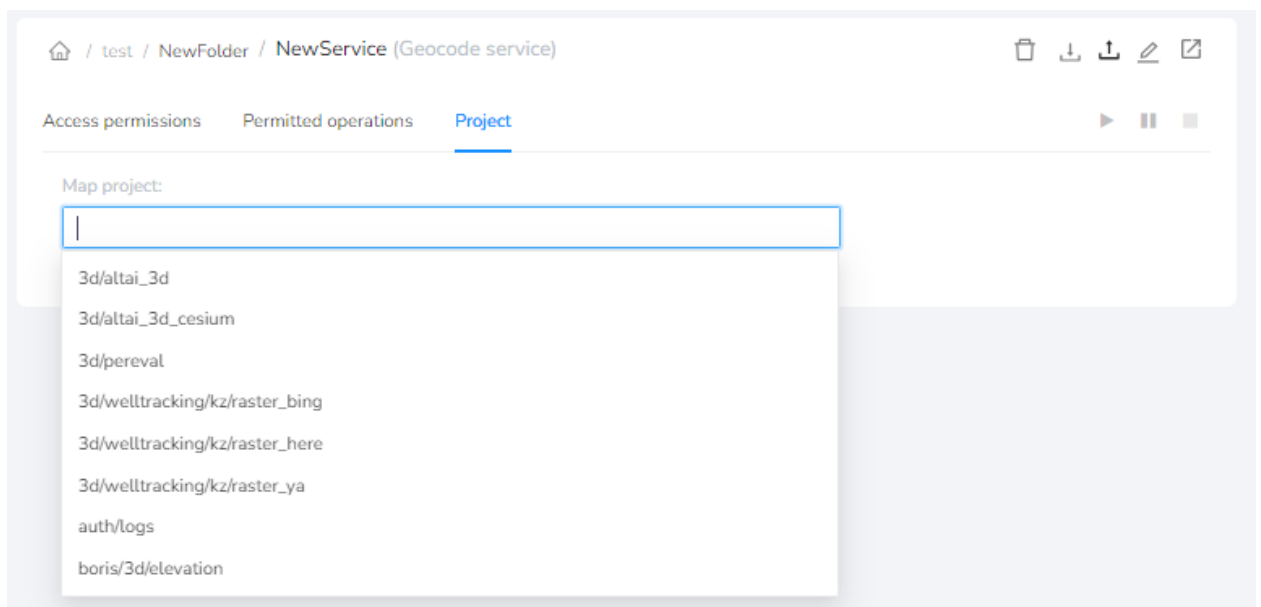


Figure 26 – Selecting map project for geocode service

In the appeared drop down list select the map project based on which the service will be published. The list contains map projects that have been loaded to CoGIS Server.

6. Publishing geocode services

6.1.General information

GIS server allows publishing geoprocessing services based on one or multiple geoprocessing models. Geoprocessing model is a visual representation of a workflow in which several geoprocessing tools are run in sequence. As a geoprocessing tool you can also use any other service model.

Geoprocessing tools can use maps and layers as input parameters. The full list of input parameters (variables) for geoprocessing models is as following:

- Integer
- Double
- Yes/No (Boolean)
- String
- Date and time
- File
- Geometry
- Coordinate system
- SQL expression
- Workspace
- Dataset (table)
- Layer (standalone table)
- Feature class
- Feature layer
- Map
- Image service
- Tile service
- Map service (dynamic service).

The ready-to-use tools that can be added to the geoprocessing model are listed in Appendix A below.

6.2.Creating new geoprocessing service

To add the new geoprocessing service, go to the required catalog folder. Now press button located in the upper left part of the catalog window and select



 **Add geoprocessing service** in the appeared drop down menu, see Figure 27.

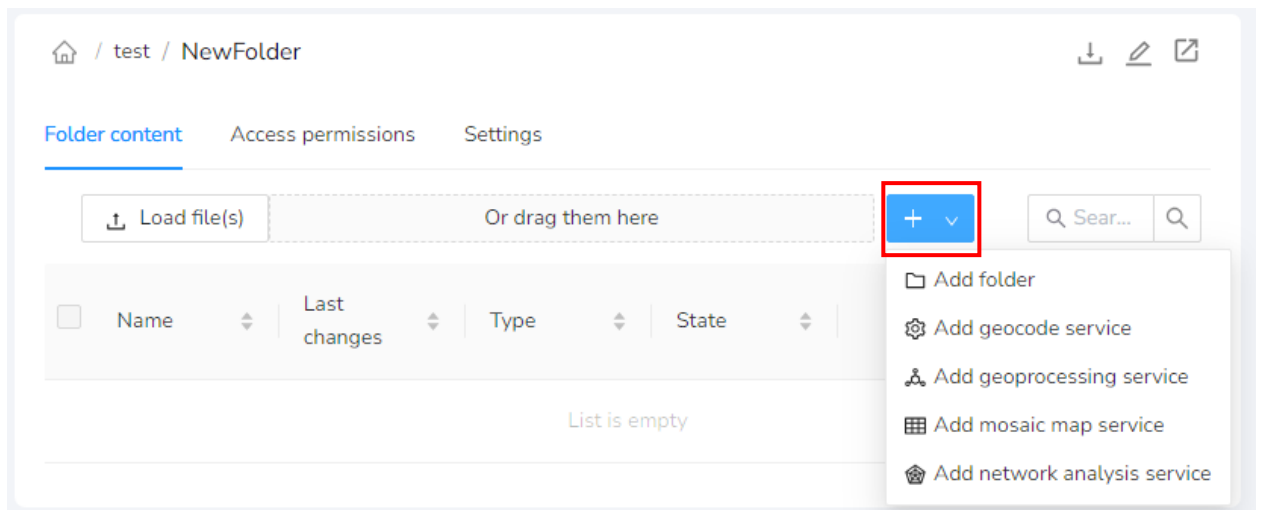


Figure 27 – Button for adding geoprocessing service

In the appeared window enter the service name and access rights, see Figure 28.

Figure 28 – Adding new geoprocessing service

You can select one of the provided access rights options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

6.3.Setting service access rights

To proceed with the geoprocessing service setting, press its name in the services list. The service settings window will appear, where *Access rights* section will be opened by default, see Figure 24.

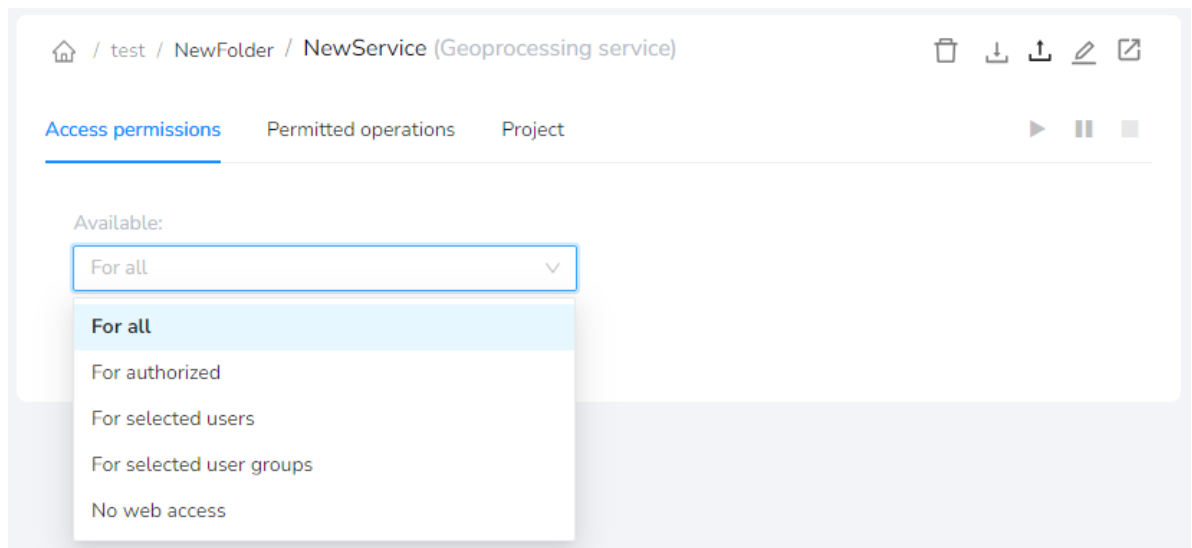


Figure 29 – Setting access rights for geoprocessing service

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

6.4. Setting permitted operations for geoprocessing service

To get to setting of the geoprocessing service options, select its name in the services list. In the appeared window go to the *Permitted operations* tab, see Figure 30.

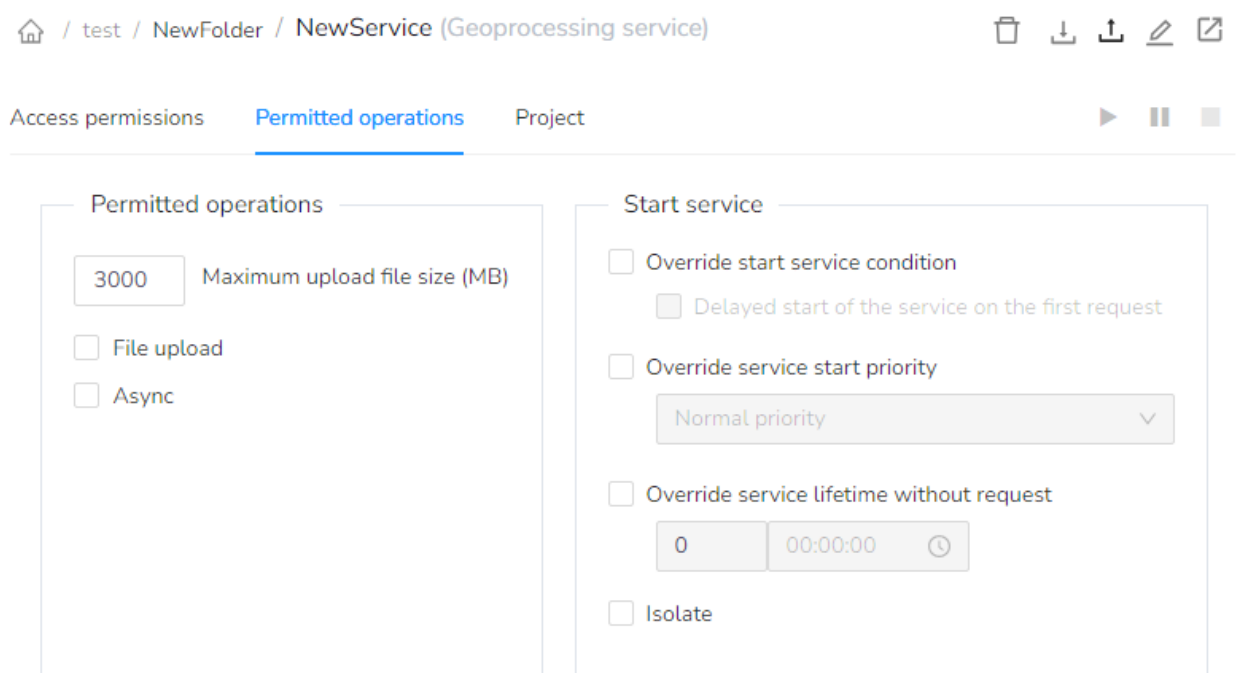


Figure 30 – Setting permitted operations for selected geoprocessing service

The following operations can be set in this section:

- The maximum size of files downloaded as variables for geoprocessing tools. The value in Mb should be specifies in the appropriate field:

Maximum upload file size (MB) ;

- The possibility of downloading files by the geoprocessing service;
- Asynchrony of geoprocessing process.

The following rules for starting the service are set in this section:

- *Redefine start service parameters*
It allows you to enable the postponed service start option at the first launch. This is important when there are a lot of services, as you can postpone the start of the secondary services.
- *Redefine start service priority*
It allows you to define the start service priority: Low/Regular/High
- *Redefine service lifetime without requests*
It allows you to set the service lifetime without requests. After this time, the service will automatically stop.
- *Isolate services*
It allows you to start the separate process for the given service.

6.5.Setting geoprocessing models

Geoprocessing service can consist of one or multiple geoprocessing models. To get to setting of the geoprocessing models, select the required service name in the list. In the appeared service settings window go to the *Project* tab, see Figure 30.

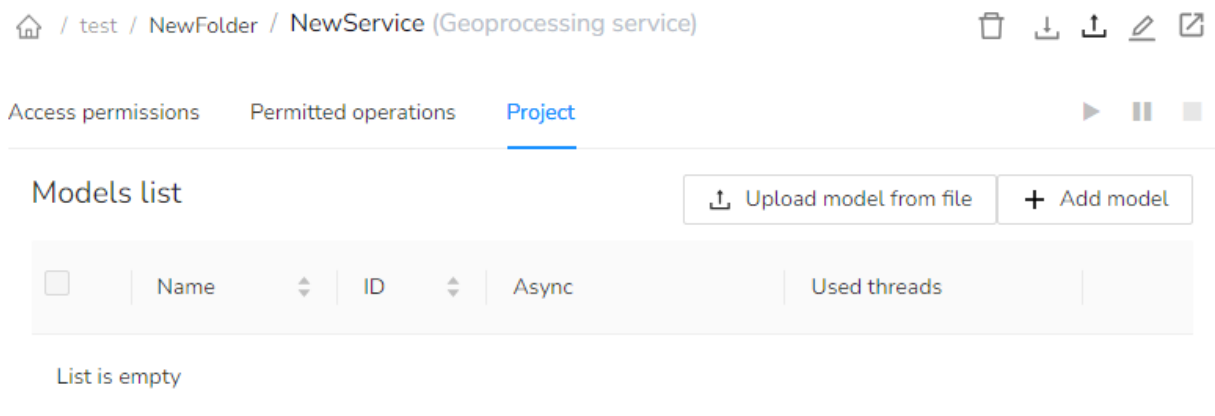


Figure 31 – Project tab of the geoprocessing service

The tab contains the list of models included to the service, see Figure 32.

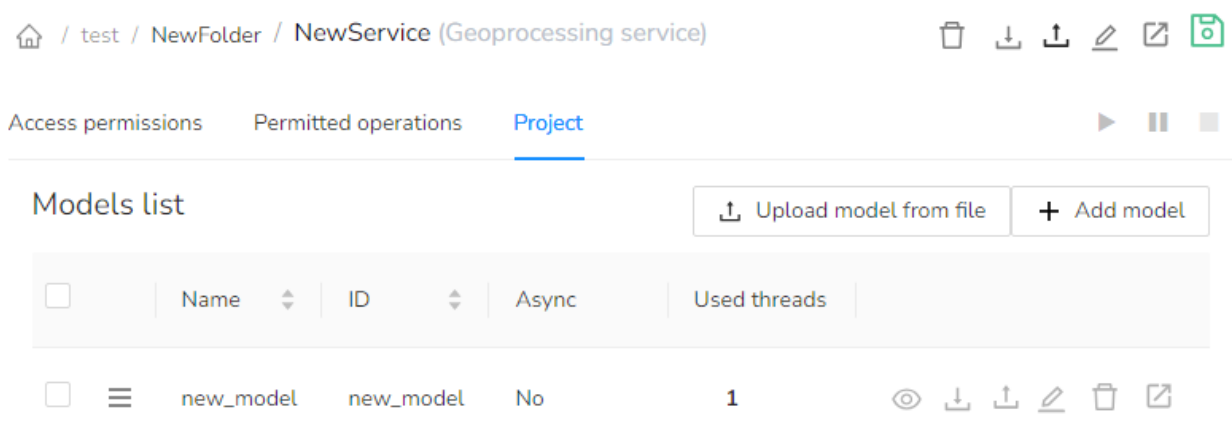


Figure 32 – List of geoprocessing service models

6.5.1. Viewing list of models

The list of available geoprocessing service models is shown as a table containing the following data about each model:

- Name
- ID
- Asynchrony
- Number of user threads.

The models in the table can be sorted by name. The recently added models are located on the top of the list by default.

6.5.2. Saving model to file



On the right of the model name there is a toolbar

To save your model to file, press . The standard system dialog for saving JSON file with the model description will appear.

6.5.3. Updating model from file



To update the model based on JSON file, press button located on the toolbar on the right of



the model name. The standard system dialog for selecting JSON file with the model description will appear.

6.5.4. Editing model parameters



To edit information about the model (but not the model itself), press button located on



the toolbar on the right of the model name. The dialog with the model parameters will appear, see Figure 33.

Model parameters X

* Name: new_model

Alias: new_model

Description:

☐ Async

☒ Enabled

* Number of used streams (0 - no limit): 1


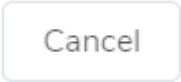
OK Cancel

Figure 33 – Editing model parameters


The model parameters are as following:

- *ID* – system name that will be used in URL to access the model;
- *Name* – model name displayed to the user;
- *Description* – additional information about the model;
- *Run asynchronous* – the setting for asynchronous run of the model;
- *Enable model* – the setting allows you to enable/disable the model;
- *Number of used threads (0 - no limit)* – maximum number of parallel running of one model. The default number is 1. If you need to set no limitations for running your model, enter 0.

To make edits in the model parameters, use the text fields near the parameter names.

Mandatory fields are marked with *. To save made changes, press . To cancel changes, press  or close the model parameters window.


6.5.5. Deleting selected model

To delete the model, press  button located on the toolbar on the right of the model name

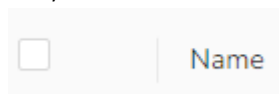


6.5.6. Deleting, copying, and cutting multiple models

To delete, copy or cut (delete with saving to clipboard) the model, select it in the list of modes

checking the box on the left of the needed name .

You can select multiple models if needed, subsequently checking the appropriate checkboxes. Or you can select all models of the service, checking the box on the left of the models list title:



After you select at least one model in the list, the buttons of additional tools for work with the models will appear on top of the list:

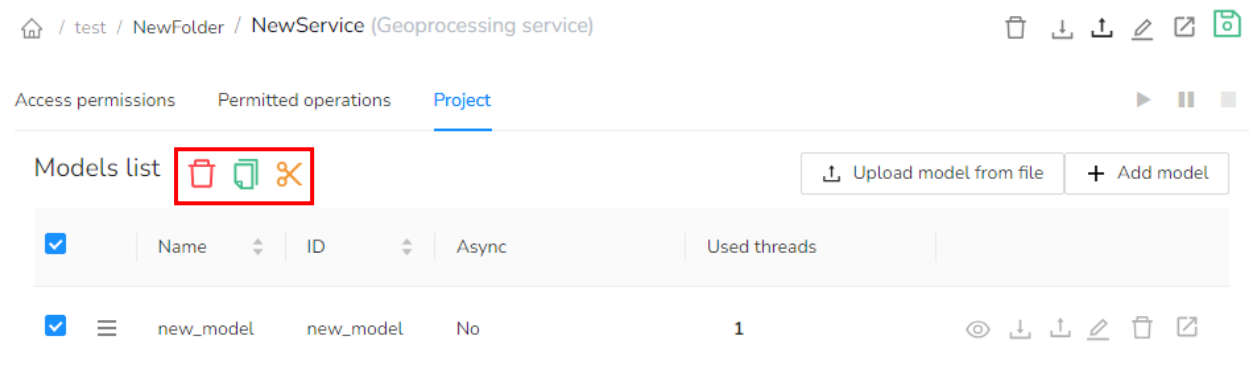





Figure 34 – Additional tools for work with selected model

To delete model, press  and confirm deletion in the pop-up window.

To copy model, press . The model will be copied to clipboard and the additional button

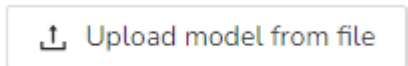
 provided to paste the copied model to the models list of the current or other service will appear near the deletion and copying buttons. This button will be available while you navigate on the services catalog.

To cut model (to delete with saving to clipboard), press . The model will be deleted but

saved to clipboard and the additional button  provided to paste the copied model to the models list of the current or other service will appear near the deletion and copying buttons. This button will be available while you navigate on the services catalog.

6.5.7. Uploading model from file

If you want to add geoprocessing model to service from file, press

, see Figure 35.

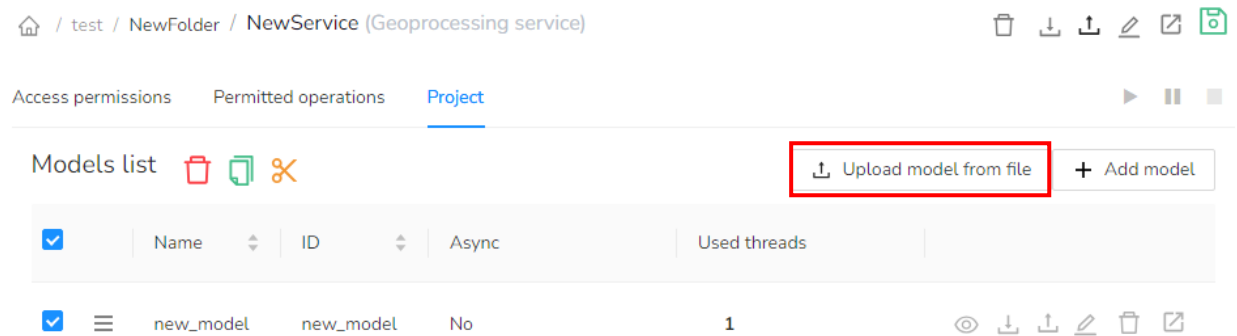
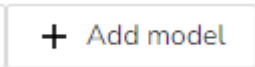


Figure 35 – Button for uploading model from file

The standard system dialog for selecting JSON files with the models description will appear. After selection of the needed files, the appropriate models will be added to the list.

6.5.8. Adding model

To add the new model that will be further customized in model designer, press

 button located in the right part of the *Project* section, see Figure 36.

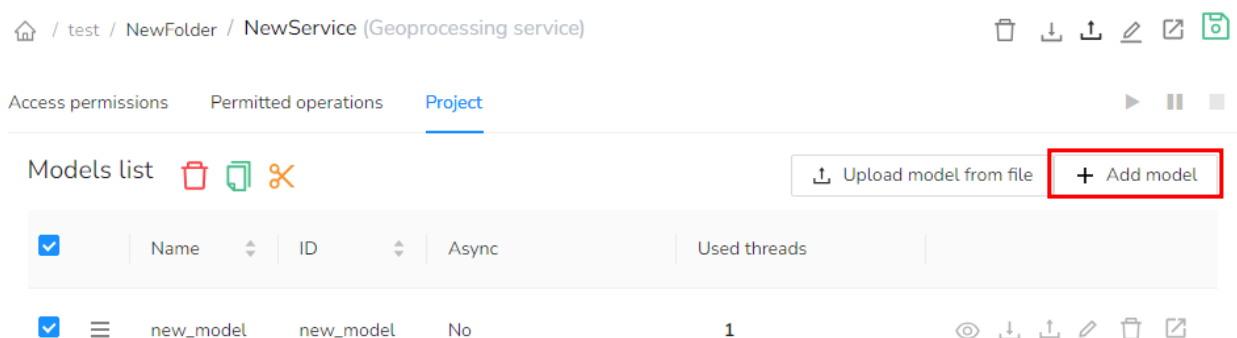


Figure 36 – Button for adding model for its further customization via model designer

The window to enter the model properties will appear, see Figure 37.

Model parameters X

* Name: new_model

Alias: new_model

Description:

☐ Async


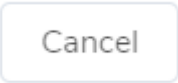
☒ Enabled

* Number of used streams (0 - no limit): 1

OK Cancel

Figure 37 – Model properties window

The list of properties available during editing of the existent model (see section 6.5.4) and by adding of the new model is the same. Mandatory fields are marked with *.

To save changes, press . To cancel changes, press  or close the model properties window.

6.5.9. Customizing model in model designer

Customization of geoprocessing models (adding and deleting variables and tools, setting their parameters, connecting variables and tools) is done in a specific graphic editor, model designer.

6.5.9.1. General elements of model designer

To start customizing the model using model designer, press the model name in the list. The model designer window will appear. For the newly created (empty) models the model designer window will look as shown on Figure 38.

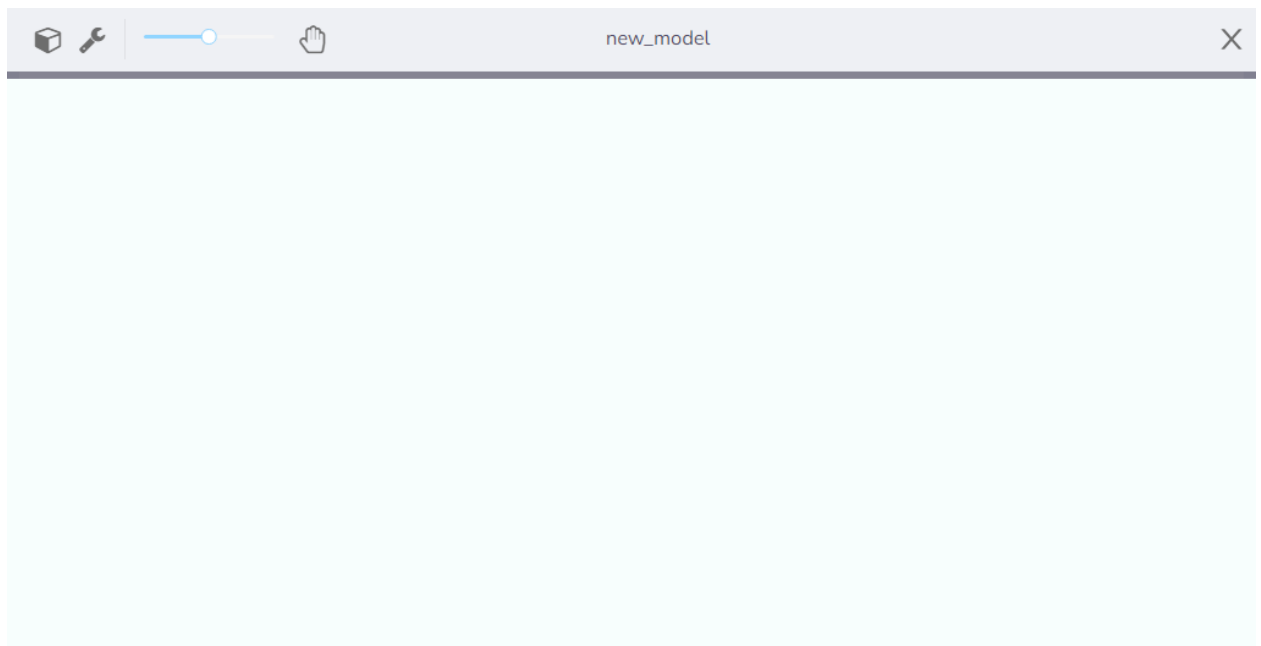


Figure 38 – Model designer window for empty model

For models that include some tools and variables, the model designer window will look as shown on Figure 39.

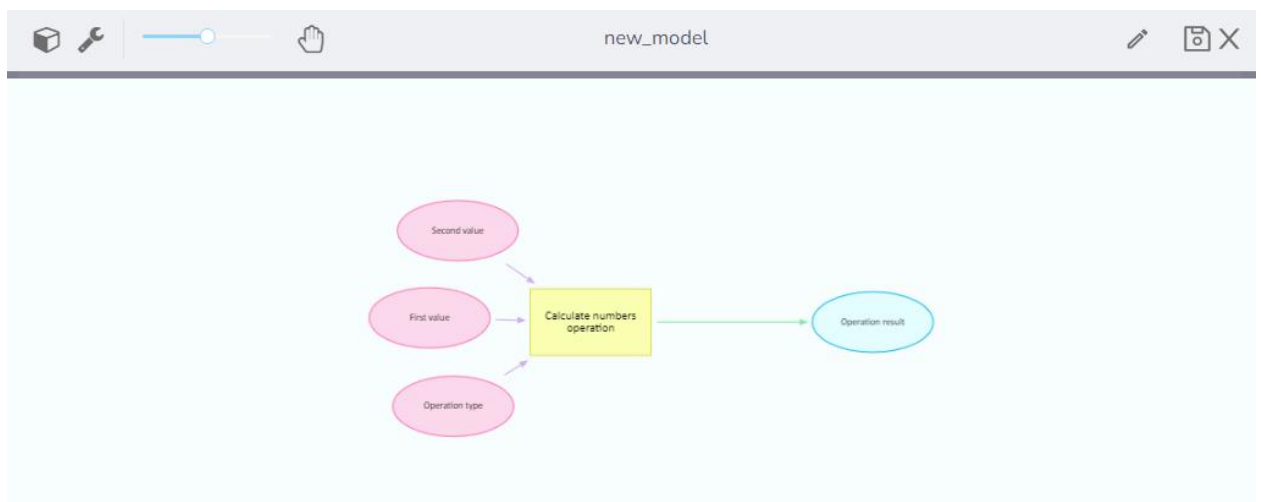


Figure 39 – Model designer window for working model

The model designer window consists of two parts:

- *Toolbar*
- *Workspace*

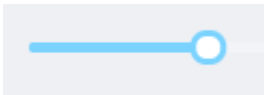
The *toolbar* provides general tools for working with models. The model name is displayed in the center of the toolbar. The tools are as following:



– adding new variable (see details in section 6.5.9.2);



– adding new tool (see details in section 6.5.9.3);



– zooming workspace scale: to zoom in/out the workspace, pull the scale slider accordingly, or press ALT +/- on the keyboard;



– panning workspace: press and hold this button to pan the workspace or use the arrows on your keyboard; the tool can be also enabled/disabled by pressing ALT/P on the keyboard;



– enabling editing mode for variable or tool; this button appears only when one of the tools or variables is selected in the workspace (see more details in sections 6.5.9.4 and 6.5.9.5);



– deleting selected variable or tool; this button appears only when one of the tools or variables is selected in the workspace; or you can press ALT/Del on the keyboard (see more details in section 6.5.9.7);



– saving made changes; this button appears when changes made with the model have not been saved;



– closing model designer window.

The model's workspace is provided to display the model image, i.e. this is the place where tools, variables, and connections between them are shown.

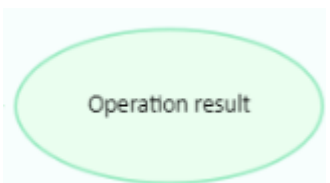
The following symbology is used to show model's elements:



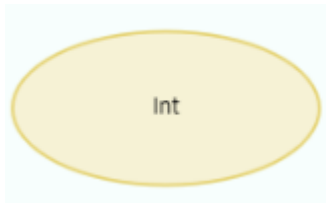
– Purple oval outlined with dashed line is used to show input variables for which no values are set.



– Purple oval outlined with solid line is used to show input variables for which specific values are set.




– Green oval outlined with solid line is used to show input variables.



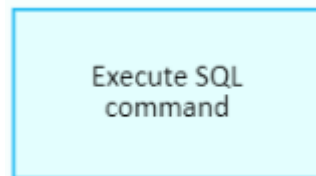
– Yellow oval outlined with solid line is used to show variables not related with any tool.



– Icon  is used to show variables that are public parameters.



– Yellow rectangle outlined with solid line is used to show tools.



– Blue color is used to mark currently selected tools or variables.




– Purple arrows are used to mark data threads from the input variables to the tool.



– Green arrows are used to mark data threads from the tools to the output variables.

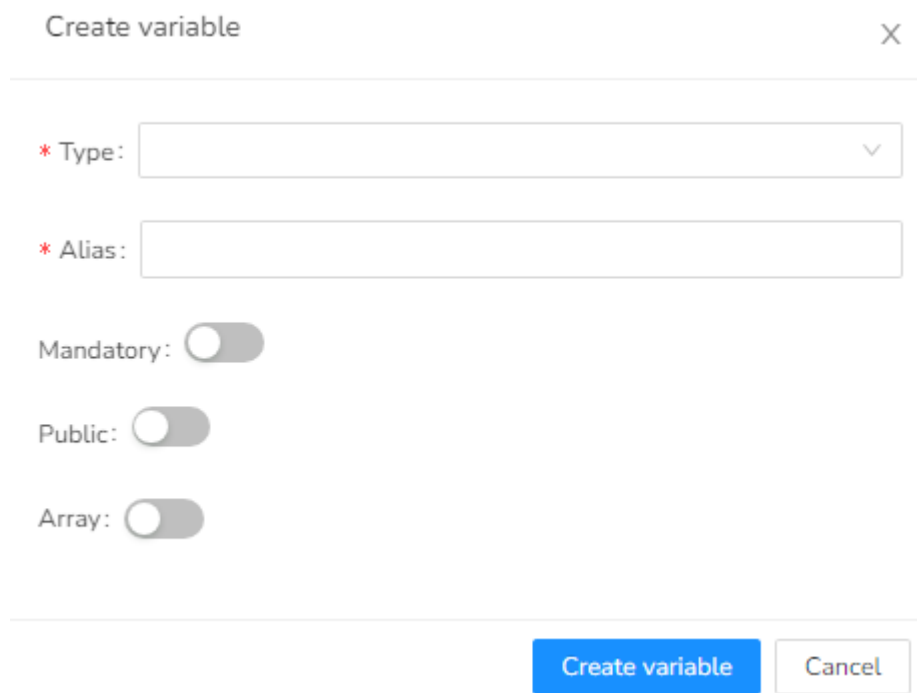
6.5.9.2. Adding variable



To add the new variable to model, press  button on the toolbar or press ALT and V on the keyboard. After that, the mouse cursor will look as following:



Left click on the place of the workspace where you want to locate your variable. The dialog for the new variable creation will appear, see Figure 40.



Create variable X

* Type:

* Alias:

Mandatory: ☐

Public: ☐

Array: ☐

Create variable Cancel

Figure 40 – Dialog for the new variable creation

The following parameters are specified for the variable:

- Type
- Name
- Whether the variable is mandatory, i.e. without specified value the model will not be available for run;
- Public - whether it is accessible/inaccessible from other models/tools and via web.
- Array - whether it is the collection of variables of selected type.

The variable type can be selected from the drop-down list, see Figure 41:

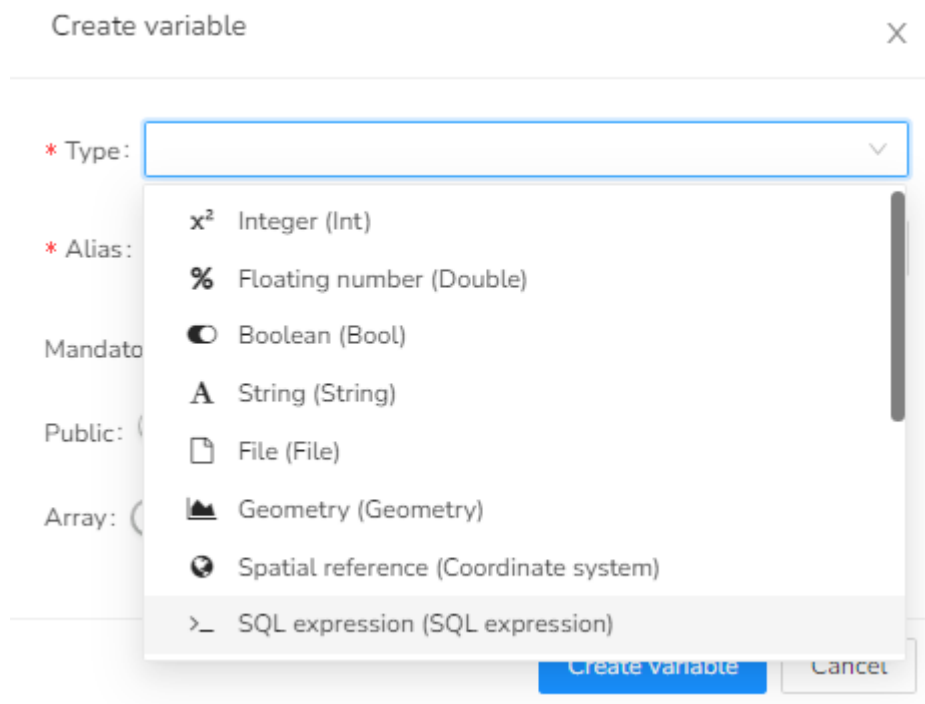



Figure 41 – List of available variable types

Specify the variable's name.

If your variable is public, press control  . The field to enter the public parameter name will appear, see Figure 42.

Create variable

X

* Type:

x² Integer (Int) v

* Alias:

Int

Mandatory: ☒

Public: ☒

* Public parameter name:

Int

Description:

Array: ☐

Create variable

Cancel

Figure 42 – Creating new public variable

If your variable is the array, press the appropriate control ☐. The button for adding value will appear

+ Add value

. Press this button as many times as many variables should be in the created array. If data type has been already selected for the array, you can set specific value for each variable of this array, see Figure 43.

50

Create variable

* Type: String (String)

* Alias: String

Mandatory: ☐

Public: ☐


Array: ☒


+ Add value

Value:


Create variable Cancel

Figure 43 – Creating new variable as array of data

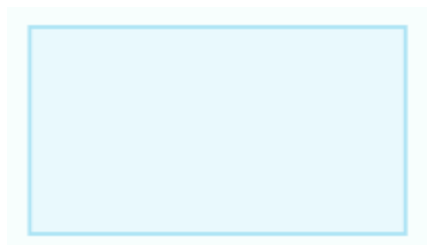
Fields marked with * are mandatory. To save made changes, press .

To cancel creation of the variable, press  or close the dialog.

6.5.9.3. Adding tool

To add the new tool to the model, press  button on the toolbar or press ALT and T on the keyboard.

After that, the mouse cursor will look as following:



Left click on the place of the workspace where you want to locate your tool. The dialog for the new tool creation will appear, see Figure 40.

Figure 44 – Dialog for the new tool creation

The following parameters are specified for the tool:

- Type
- Name

The tool type can be selected from the drop-down list, see Figure 45.

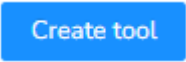

Category	Tool Name
Database workflow	Clip feature layer by geometry
Data workflow	Create bufferized feature layer
Map and layers workflow	Transform layer geometries to vertices
Geometry workflow	Filter feature layer by relation
Files workflow	Merge feature layer
Primitive utilities	Project feature class into another coordinate system
Model managing	Slice feature layer to rectangles
ЕКС ЯНАО	Slice polygons to rectangles
Дата Ист	Create extent

Figure 45 – Selecting geoprocessing tool type

The list of available geoprocessing tools and their parameters is provided in the 0.


Note: The tool can also be the existing geoprocessing model which is a part of the edited service. All the geoprocessing models of the service will be listed at the end of the tools list (Current service section). That is, CoGIS Server supports nested geoprocessing models and provides functionality for implementing complex geoprocessing algorithms.

Enter the tool's name in the Name field. After selecting the tool's type, its name will be filled in by default, but you can edit it if needed.

Fields marked with * are mandatory. To save made changes and complete the tool's creation, press . To cancel tool's creation, press  or close the dialog.

6.5.9.4. Editing variable

To start editing variable:

- Double-click the variable;
- Or left click the needed variable in the model and then press  button on the toolbar.

The dialog for editing variable will appear, see Figure 46.

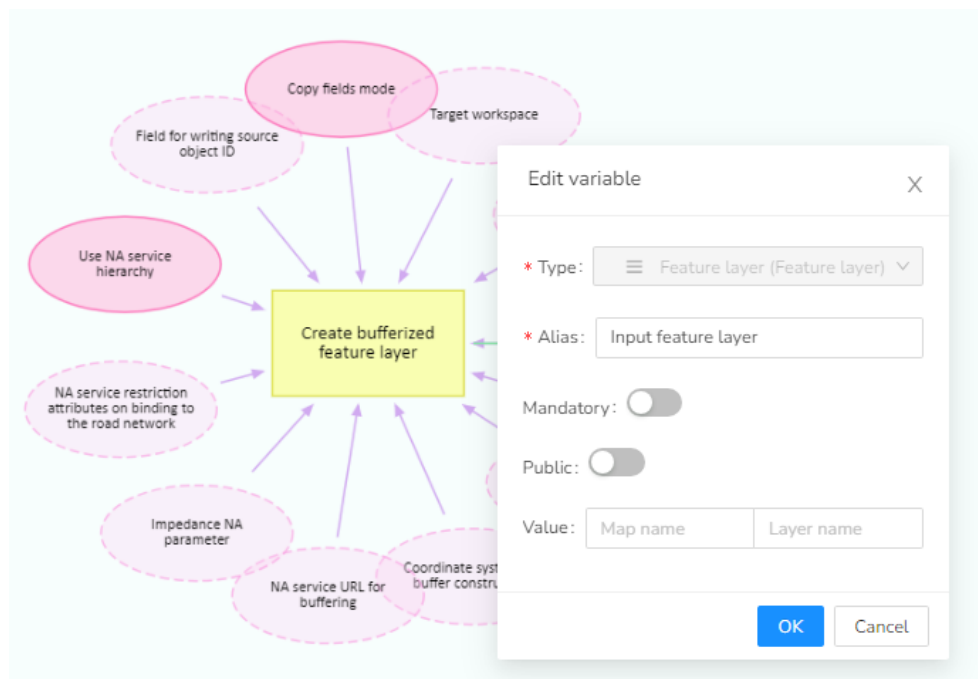




Figure 46 – Dialog for editing variable

As opposed to the new variable creation mode (see details in section 6.5.9.2), while editing variable you cannot change its type or specify that the variable is the array. But you can specify the variable's value in the appropriate field. Or you can specify that your variable is public by

pressing the control . After that, the field for entering the name of the public parameter will appear.


In case if during the variable creation it has been specified as public, you can disable this property when editing the variable.

To save made changes, close the variable editing dialog and press  button located on the toolbar on the right.

6.5.9.5. Editing tool

To start editing tool:

- Double-click the tool;

- Or left click the needed tool in the model and then press  button on the toolbar.

The dialog for editing tool will appear, see Figure 47.

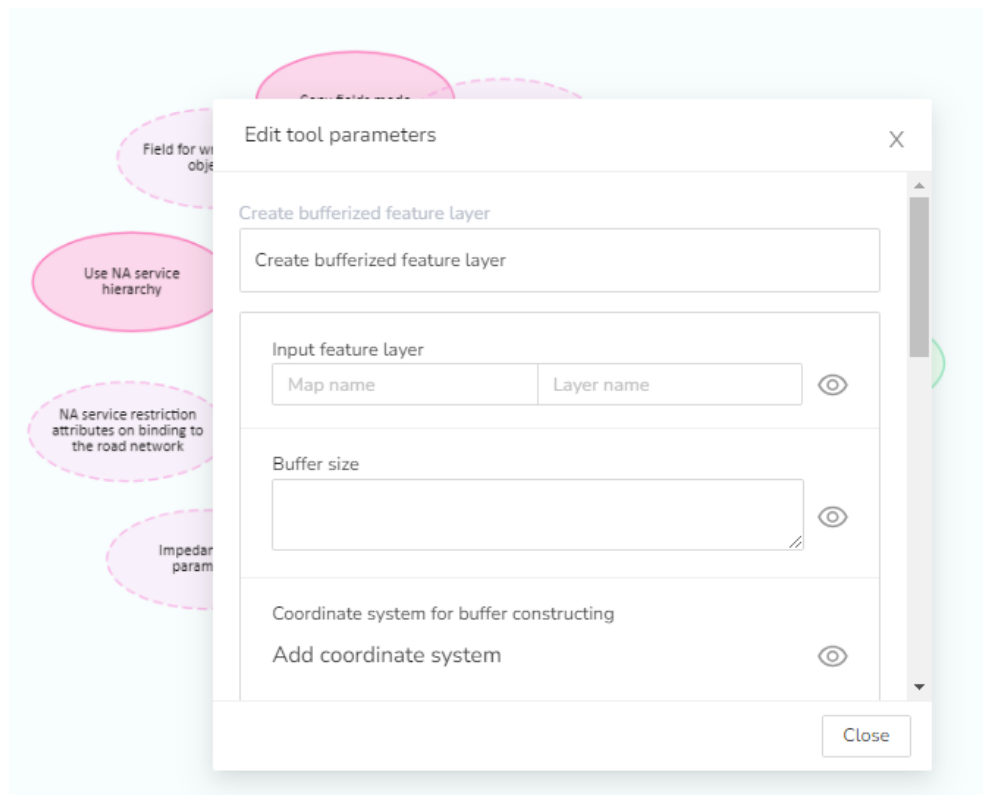


Figure 47 – Dialog for editing tool

As opposed to the new tool creation mode (see details in section 6.5.9.3), you cannot change the tool type during its editing.

But you can:

- *Edit tool name*
Click on the tool name to make it editable. Now you can change the name as needed, see Figure 48.

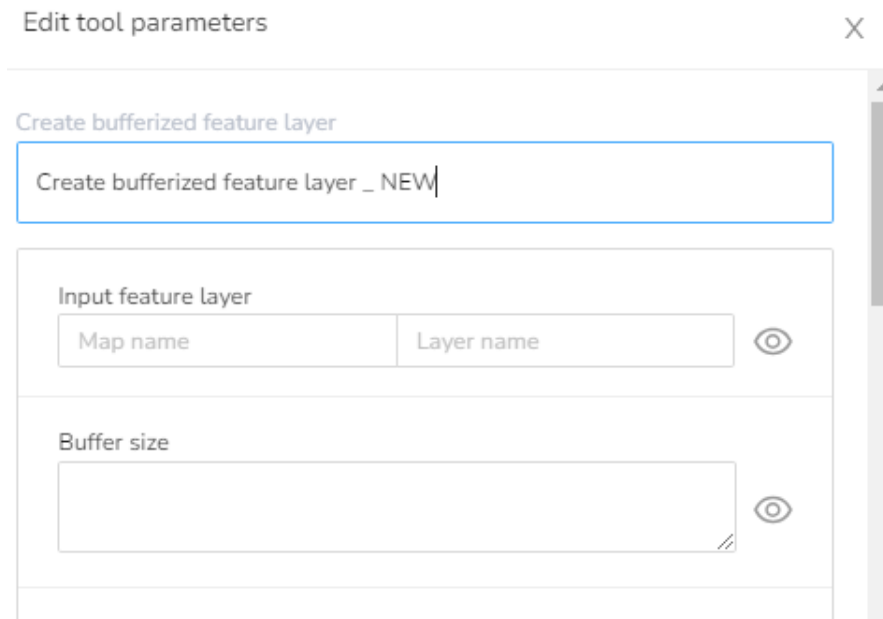



Figure 48 – Editing tool name


- *Specify values for input variables*

Type the needed values in the appropriate fields or select values provided in the drop-down lists. The values available in the lists correspond to the variable type.

Note: specific map services published on GIS server, as well as layers included to these services can be used as input variables.

- *Manage visibility of selected variables located in the workspace*

Press  button located near the variable name, and it will be hidden on the workspace.

To save made changes, close the tool editing dialog and press  button located on the toolbar on the right.

6.5.9.6. Relating tools and variables

The tools in the model are related with each other via variables, that is, the output variables of one tool are the input variables for another tool.

To establish such a relation, hold and drag the output variable to the needed input variable of the other tool to connect them. Note, if the related variables are of the same type, the input variable will change its color from purple to green, see examples below. Figure 49 and Figure 50 show that the output variable 'Layer with buffers built around objects' of the 'Buffers creation' tool became the input variable for the 'Projecting layer to other coordinate system' tool.



Figure 49 – Geoprocessing tools not related via variables

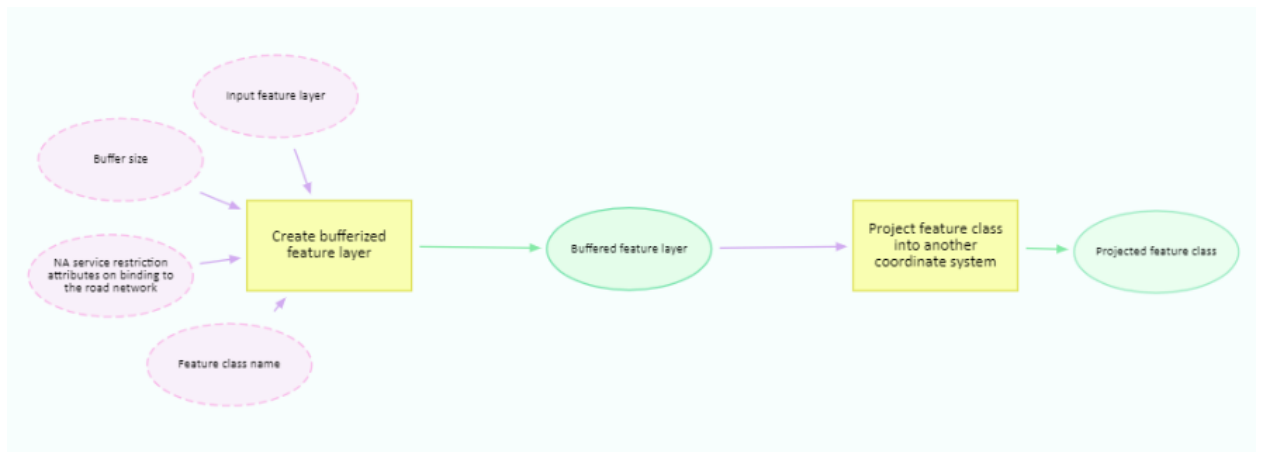


Figure 50 – Geoprocessing tools related via variables



To save made changes, press button located on the toolbar on the right.

6.5.9.7. Deleting selected variable or tool

To delete the variable or the tool, left click the item in the model. After that, the delete button



will appear on the toolbar. Press the button to delete the selected variable or tool. The item can also be deleted by pressing ALT and DEL on the keyboard.



To save changes, press located on the toolbar on the left.

6.6.Saving changes

When making any changes in the model properties, the save button appears in the upper right corner of the dialog, see Figure 51.



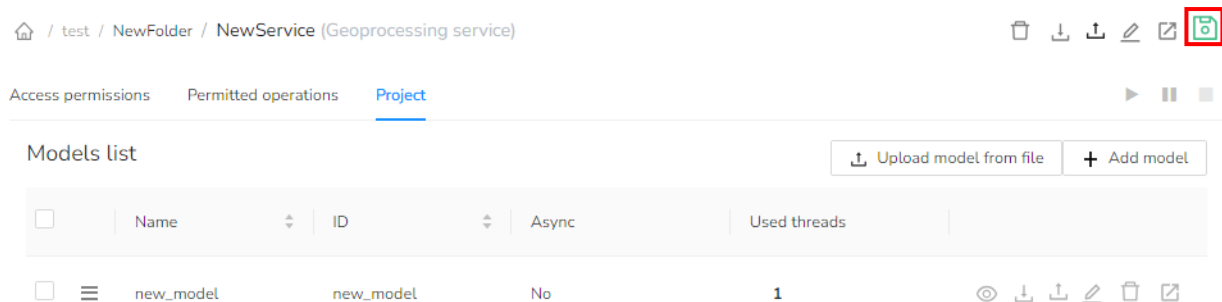


Figure 51 – Saving changes in the geoprocessing service

At that, when trying to get back to the services catalog or to go to another web console section without saving changes, you will see the appropriate warning message, see Figure 52.

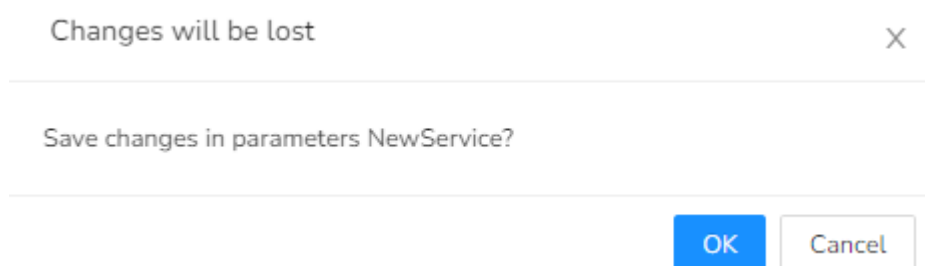



Figure 52 – Warning message appearing when you try to proceed without saving changes

Press  button if you want to save made changes and to go to the catalog of services or to another web console section. If you do not want to save changes, press



or close the window.

7. Publishing network analysis services

7.1.General information

CoGIS Server allows you to create network analysis service based on index rotix file, that, in turn, is created using TrueDrive library. The index rotix file can also be created based on OpenStreetMap and Here data or based on any other data.

7.2.Adding network analysis server

For publishing network analysis service it is required to add the network analysis server, the services from which will be published in CoGIS Server.

To do so, in Global settings, Network analysis servers tab press , see Figure 53.

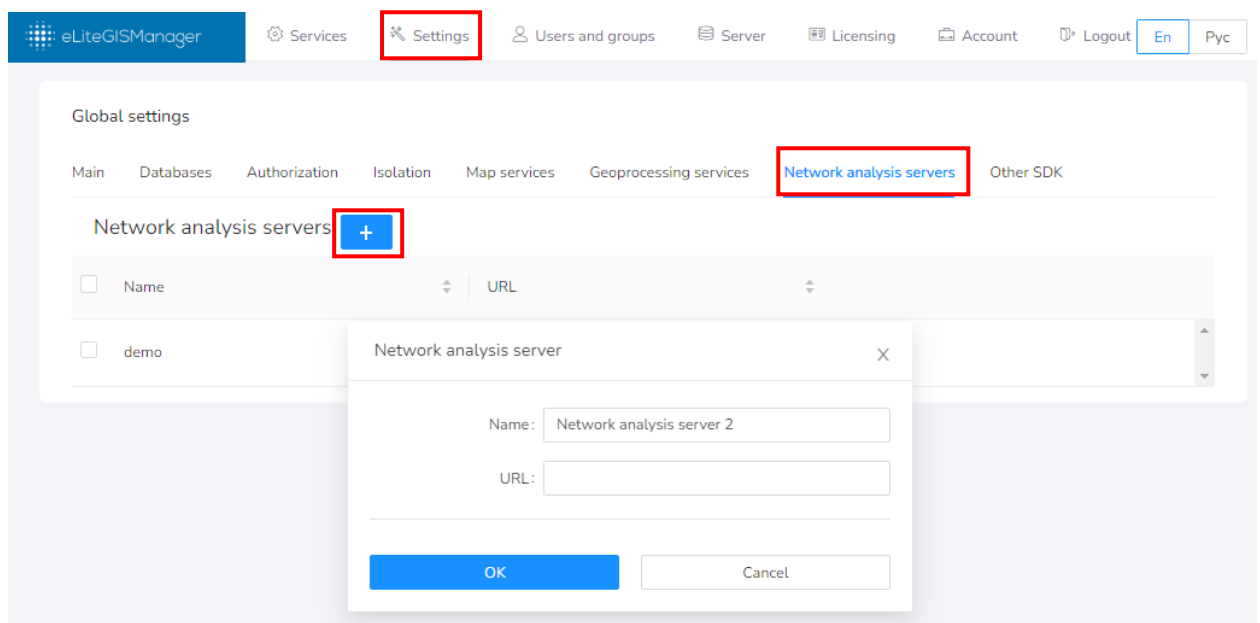



Figure 53 – Adding network analysis server

In the Name field enter the server name and in the URL field enter the server address.


Press .

After the server has been added to the list of servers, save edits by pressing .

7.3.Creating new service

To add the new network analysis service to the catalog, go to the required catalog folder. Press



in the upper left part of the catalog window. In the appeared drop-down menu select Add network analysis service  Add network analysis service, see Figure 54.

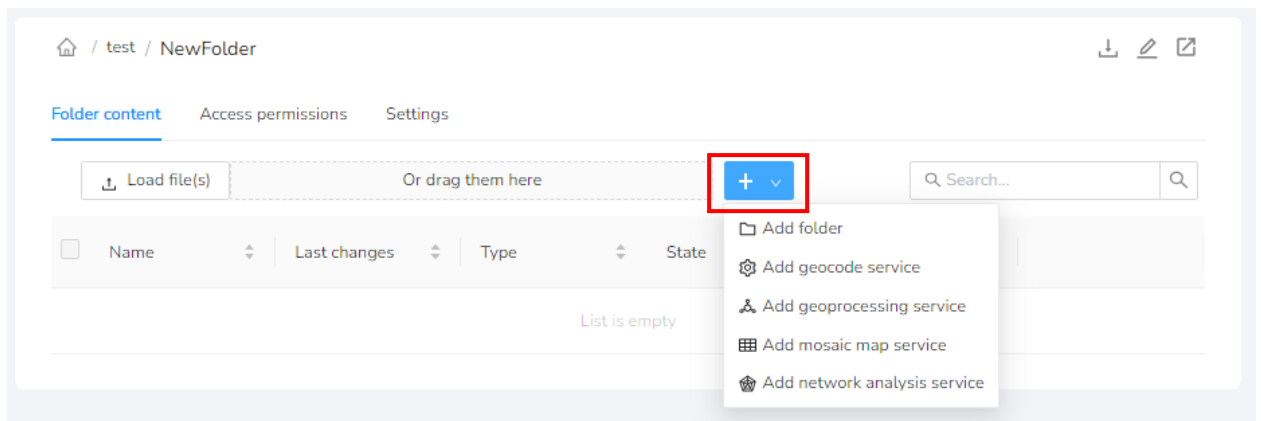


Figure 54 – The button for adding the network analysis service

In the appeared window enter the service name and access permissions, see Figure 55.

Figure 55 – Adding the new network analysis service

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

7.4.Setting permitted operations for network analysis service

To get to the setting of the network analysis service options, select its name in the services list. In the appeared window go to the *Permitted operations* tab, see Figure 56.

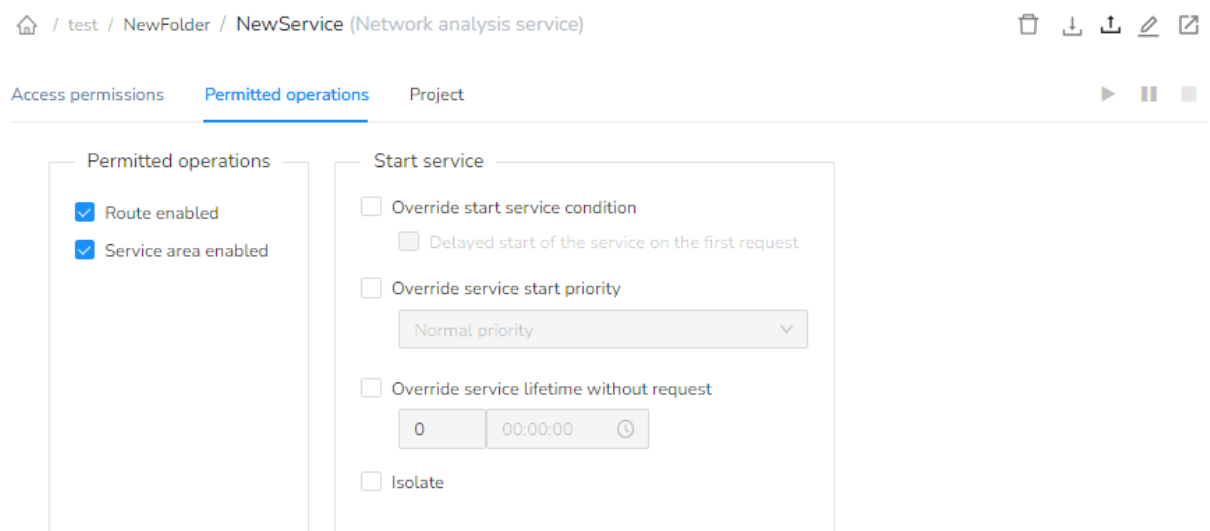


Figure 56 – Setting permitted operations for selected network analysis service

CoGIS Server supports the following operations for network analysis services:

- *Allow route search on road network*
This operation is provided to search route by two and more points of the road network.
- *Allow estimates of transport accessibility on road network*
This operation is provided to calculate service areas by road network.

At that, when performing the above operations the service algorithm supports the following options:

- Use road hierarchy;
- Use restrictions (no left turn, etc.);
- Specify point/polyline/polygon barriers;
- Calculate route cost using multiple rules, for example, the optimal route by time and by distance.

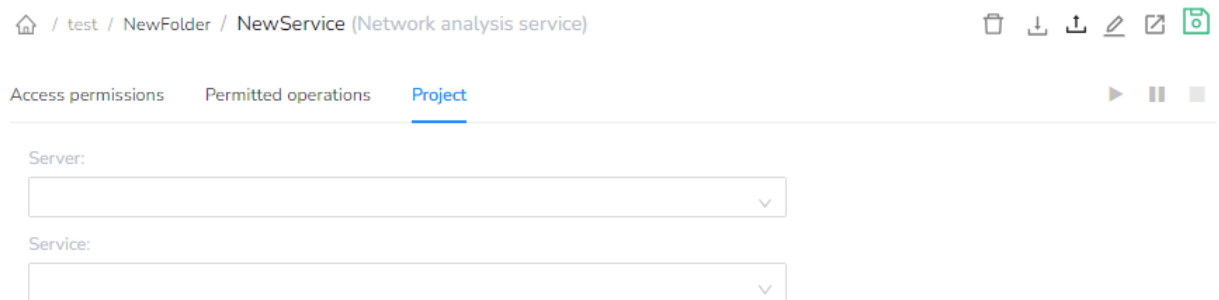
The above-mentioned parameters are set in CoGIS Designer by adding service to the map application. See more details in 'CoGIS Portal - Creating map applications' manual.

The following rules for starting the service are set in this section:

- *Redefine start service parameters*
It allows you to enable the postponed service start option at the first launch. This is important when there are a lot of services, as you can postpone the start of the secondary services.
- *Redefine start service priority*
It allows you to define the start service priority: Low/Regular/High
- *Redefine service lifetime without requests*
It allows you to set the service lifetime without requests. After this time, the service will automatically stop.
- *Isolate services*
It allows you to start the separate process for the given service.

7.5.Setting project

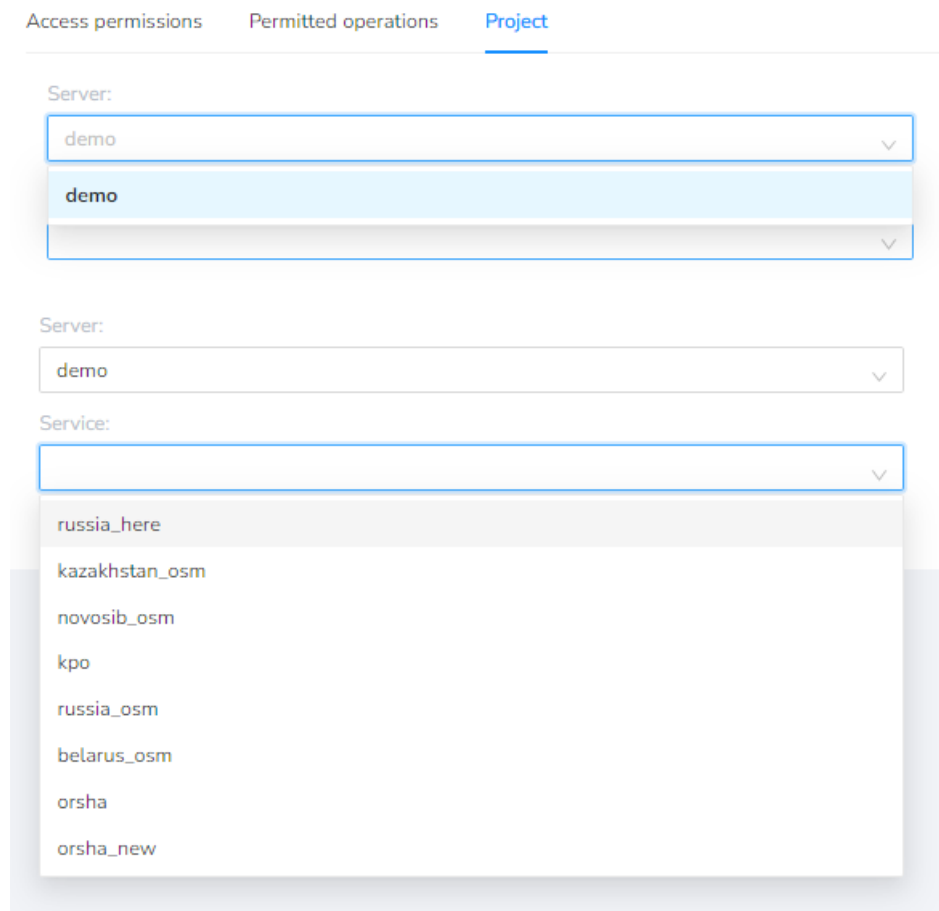
To get to the setting of the service project, select its name in the list. The service properties window will appear. Now go to the *Project* section, see Figure 57.



The screenshot shows the 'Project' tab of a service properties window. The breadcrumb path at the top is '/ test / NewFolder / NewService (Network analysis service)'. Below the breadcrumb are icons for delete, download, upload, edit, and save. The 'Project' tab is selected, and the 'Server' and 'Service' dropdown menus are visible. The 'Server' dropdown is currently empty, and the 'Service' dropdown is also empty.

Figure 57 – Setting the project for network analysis service

To select server based on which the network analysis service will be published, select its name in drop-down list *Server*. Then in the *Service* list select the required variant for your service, see Figure 58.



The screenshot shows the 'Project' tab of the service properties window. The 'Server' dropdown menu is open, showing a list of servers: 'demo', 'demo', and an empty option. The 'Service' dropdown menu is also open, showing a list of services: 'russia_here', 'kazakhstan_osm', 'novosib_osm', 'kpo', 'russia_osm', 'belarus_osm', 'orsha', and 'orsha_new'. The 'demo' server and 'russia_here' service are selected.

Figure 58 – Selecting the server for network analysis service

Save made edits by pressing  . The service has been published.

8. Publishing mosaic map services



8.1.General information

CoGIS Server allows you to build the seamless raster mosaic service via adding areal images to the common set of raster data.

Mosaic is needed when two or more adjacent or overlapping raster datasets are to be merged to one map service.

8.2.Creating new service

To add the new mosaic map service to the catalog, go to the needed catalog folder.

Then press  in the upper left part of the catalog window. In the appeared drop-down menu select  **Add mosaic map service** . In the appeared window specify service name and access permissions, see Figure 59.

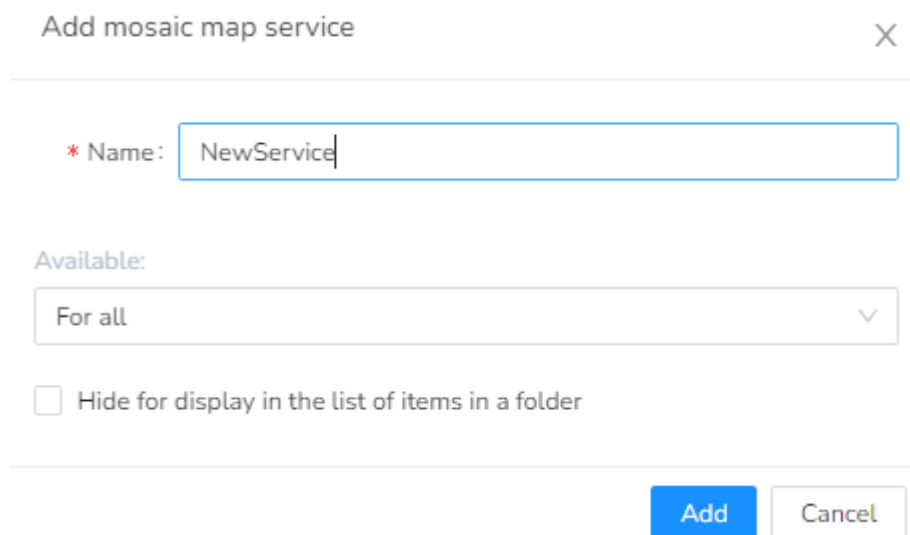
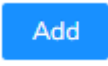


Figure 59 – Adding mosaic map service

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

After pressing  the service properties setting window will be automatically open, see Figure 60.

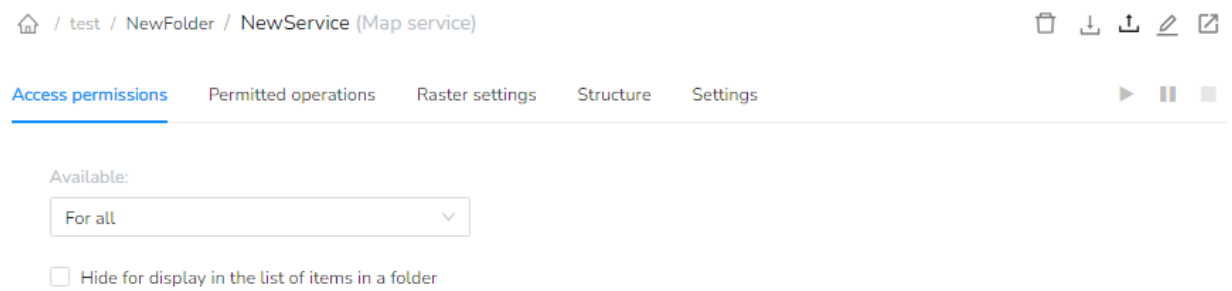


Figure 60 – The mosaic map service properties setting window

8.3.Setting access permissions

To get to the setting of access permissions for geocoding service, select its name in the list. The service setting window will appear. The Access permissions section will be open by default, see Figure 61.

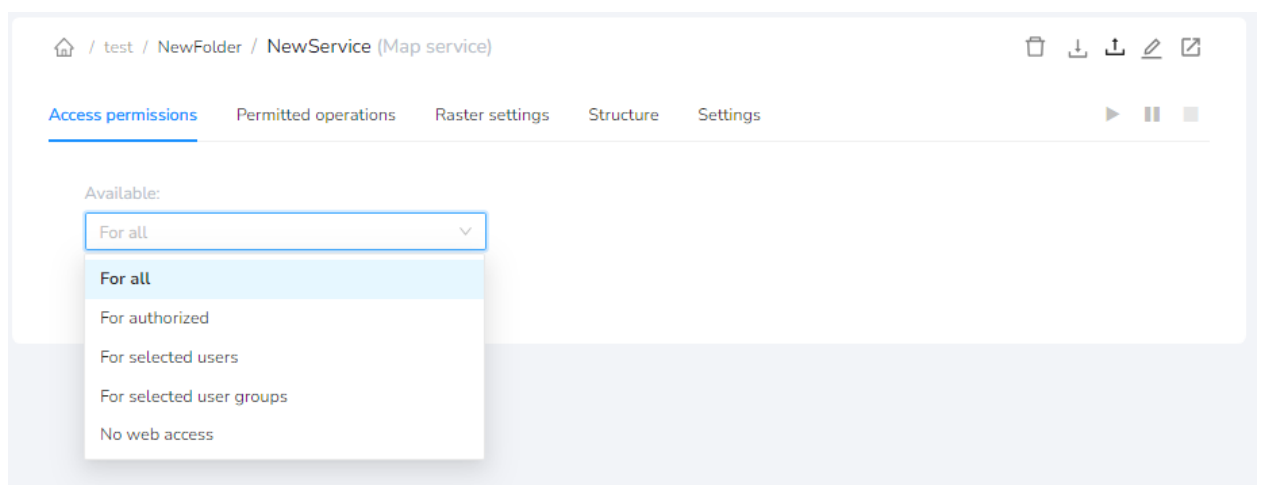


Figure 61 – Setting access permissions for geocoding service

By default the access to published service will be allowed for all users, but you can change this setting selecting one of the provided options:

- For all;
- For authorized;
- For selected users;
- For selected user groups;
- No web access.

8.4.Setting service options

To get to the setting of service options, select its name in the list. The service setting window will appear. Go to Features section, see Figure 62

test / NewFolder / NewService (Map service)

Access permissions Permitted operations Raster settings Structure Settings

Protocols and agreements

ArcGIS REST API

☒ MapServer

☒ CoGIS SOE

☐ FeatureServer

☐ ImageServer

OGC

☐ WMS

☐ WFS

☐ WMTS

☐ TMS

Functionality

Availability of declarative information

☒ Availability of layers list (ArcGIS, WMS, WFS)

☒ Availability of layers legend (ArcGIS, WMS)

☐ Availability of where clause (ArcGIS)

Availability of objects data

☒ Identify (ArcGIS, WMS, WMTS)

☒ Search (ArcGIS)

☒ Selection query (ArcGIS, WFS)

1000 Maximum number of objects returned per request (ArcGIS, WMS, WMTS, WFS)

☒ Availability of geometry for found objects (ArcGIS, WFS)

Availability of map as picture

☒ Generating image of map area by extent (ArcGIS, WMS)

☒ Allow to override coloring on the client (ArcGIS)

☐ Raster cache support (ArcGIS, WMTS, TMS)

☐ Vector cache support (ArcGIS)

Editing

☒ Based on rules (COGIS SOE)

☐ Simplified (ArcGIS, COGIS SOE)

☐ Create

☐ Update

☐ Delete

For specified layer numbers only

For specified user groups only

☐ Prohibited

Start service

☐ Override start service condition

☐ Delayed start of the service on the first request

☐ Override service start priority

Normal priority

☐ Override service lifetime without request

0 00:00:00

☐ Isolate

Figure 62 – Setting options of the selected map service

This setting is like setting of the regular map service (see details in section **Ошибка! Источник ссылки не найден.**).

8.5. Setting tile cache

For mosaic map service it is possible to enable support for generating the tile cache.

If there is a tile cache, GIS server can return map images (tiles) pre-generated based on the specified grid according to the extent specified in the web request. This, in turn, allows you to increase the speed of obtaining the required map image, if the request to the map service uses the default settings for rendering and visibility of layers and if there is no filter applied by the user on layers.

To enable support for raster and/or vector cache for map service, go to the *Features* section of the service properties window (see details in section **Ошибка! Источник ссылки не найден.** above).

To go to specific settings of the tile cache, go to the *Tile cache* of the service properties window, see Figure 63.

Figure 63 – Tile cache settings

Setting the tile cache is same as for the regular map service, see details in section 4.5 above.

8.6.Setting raster

In the *Raster settings* section of the mosaic map service properties window specify Coordinate system of the mosaic. To do so, press Not specified, see Figure 64.

Figure 64 – Setting raster of the mosaic map service

Now in the appeared window select the required coordinate system which can be found in the search field, see Figure 65.

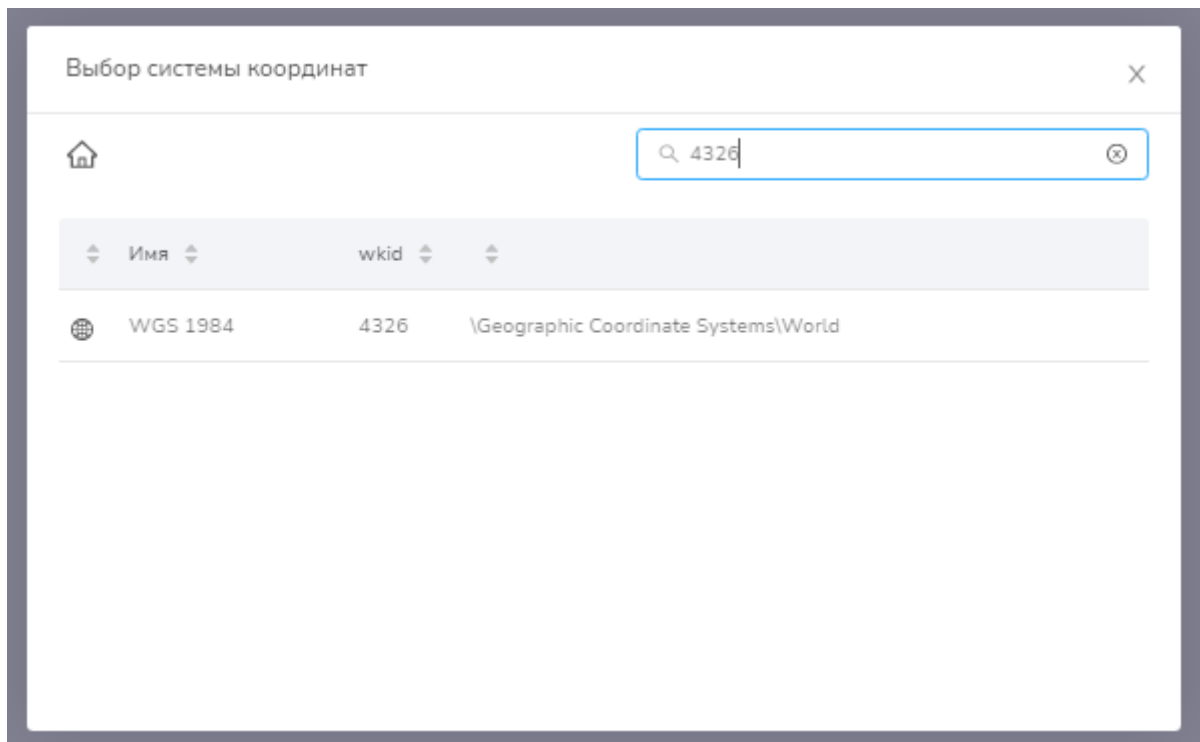



Figure 65 – Selection of coordinate system of mosaic map service

After coordinate system is specified, close the window, and save made edits pressing . The coordinate system has been set, see Figure 66

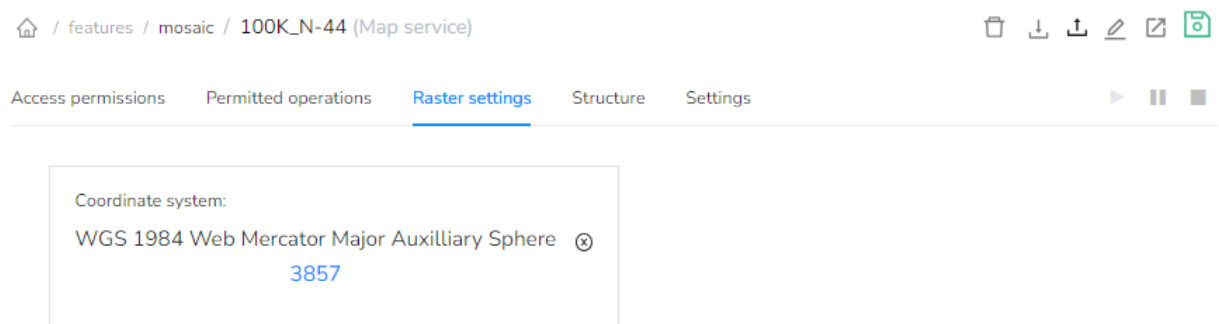


Figure 66 – Specified coordinate system of mosaic map service

8.7. Structure

The *Structure* section of the mosaic map service is the catalog of raster files added for generation of the common set, see Figure 67.

<div> <div>Load file(s)</div> <div>Or drag them here</div> <div>Add folder</div> </div>			
<input type="checkbox"/>	Name	Last changes	Type
<input type="checkbox"/>	N-44-079.tiff	15.05.2023 18:25	File (4.6 MB)
<input type="checkbox"/>	N-44-034.tiff	15.05.2023 18:25	File (3.7 MB)
<input type="checkbox"/>	N-44-059.tiff	15.05.2023 18:25	File (4.5 MB)
<input type="checkbox"/>	N-44-033.tiff	15.05.2023 18:25	File (2.5 MB)

Figure 67 - *Structure* section of the mosaic map service

This section is provided for managing the mosaic map service content: setting the catalog structure, adding, deleting, transferring, copying, editing rasters. General work principles and available tools are like management of the Services catalog (see section 3 above).

Appendix A – Ready-to-use geoprocessing tools available in CoGIS Server

No	Tool name	Input parameters	Output parameters
Working with database			
1.	Getting local geodatabase	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • Local geodatabase
2.	Getting tables from geodatabase	<ul style="list-style-type: none"> • Geodatabase • Name of the scheme • Regular expression for filtration of tables' names 	<ul style="list-style-type: none"> • Tables
3.	Getting names of feature classes in geodatabase	<ul style="list-style-type: none"> • Input geodatabase • Name of the scheme • Regular expression for filtration of feature classes' names 	<ul style="list-style-type: none"> • Names of feature classes in geodatabase
4.	Synchronization of geodatabases	<ul style="list-style-type: none"> • Input geodatabase • Target geodatabase • Names of datasets • Action for datasets • Action for fields 	<ul style="list-style-type: none"> • Input geodatabase • Target geodatabase
5.	Creating table in geodatabase	<ul style="list-style-type: none"> • Target geodatabase • Name of the target geodatabase scheme • Table name 	<ul style="list-style-type: none"> • Created table
6.	Creating attachments table in geodatabase	<ul style="list-style-type: none"> • Target feature layer 	<ul style="list-style-type: none"> • Created attachments table • Target feature layer
7.	Deleting feature classes from geodatabase	<ul style="list-style-type: none"> • Target geodatabase • Names of feature classes to be deleted 	<ul style="list-style-type: none"> • Geodatabase after deletion of feature classes
8.	Creating feature class	<ul style="list-style-type: none"> • Target geodatabase • Feature class name • Name of the target geodatabase scheme • Geometry type • Coordinate system • Support for 3D 	<ul style="list-style-type: none"> • Created feature class
9.	Cloning feature class	<ul style="list-style-type: none"> • Input feature class • Target geodatabase of the cloned feature class • Name of the target geodatabase scheme • Feature class name in the geodatabase • Cloning mode • Copy attachments table, if any 	<ul style="list-style-type: none"> • Cloned feature class

No	Tool name	Input parameters	Output parameters
10.	Getting fields' names in layer	<ul style="list-style-type: none"> • Input layer 	<ul style="list-style-type: none"> • Name of ObjectID field • Name of Shape field • Names of fields with data
11.	Adding field to feature layers	<ul style="list-style-type: none"> • Input feature layers • Field name • Field type • Default field value • Whether field is mandatory • Field length • Whether to stop the tool by error in adding the field 	<ul style="list-style-type: none"> • Output feature layers
12.	Deleting fields in feature class	<ul style="list-style-type: none"> • Target feature class • Names of fields to be deleted 	<ul style="list-style-type: none"> • Updated feature class
13.	Executing SQL command	<ul style="list-style-type: none"> • Target geodatabase for executing SQL command • SQL command 	<ul style="list-style-type: none"> • Result of execution of SQL command • Geodatabase after execution of SQL command
14.	Creating service CoGIS Portal tables	<ul style="list-style-type: none"> • Target geodatabase • Create cogis_users • Table name cogis_users • Create cogis_user_links • Table name cogis_user_links • Create elitegis_auth_users • Create elitegis_auth_groups • Create elitegis_auth_users_to_groups • Create elitegis_auth_tokens • Create elitegis_edit_history • Create elitegis_changed_extent_log • Create elitegis_attachment_groups • Name of the scheme 	<ul style="list-style-type: none"> • Updated geodatabase
15.	Copying layers	<ul style="list-style-type: none"> • Source layers • Target geodatabase • Name of the target geodatabase scheme • Data copying mode • Fields copying mode • Layers copying mode 	<ul style="list-style-type: none"> • Output layers
Working with data			
16.	Deleting duplicated fields	<ul style="list-style-type: none"> • Table • Field name • Make changes in source table 	<ul style="list-style-type: none"> • Table without duplicated fields
17.	Getting number of features in layer	<ul style="list-style-type: none"> • Input layer 	<ul style="list-style-type: none"> • Number of features in layer

No	Tool name	Input parameters	Output parameters
18.	Checking for features in layer	<ul style="list-style-type: none"> • Input layer 	<ul style="list-style-type: none"> • Whether there are features in the layer
19.	Creating feature in feature class	<ul style="list-style-type: none"> • Input feature class 	<ul style="list-style-type: none"> • ObjectID of created feature
20.		<ul style="list-style-type: none"> • Field names of new feature 	<ul style="list-style-type: none"> • Updated feature class
21.		<ul style="list-style-type: none"> • Values of specified fields 	<ul style="list-style-type: none"> •
22.	Creating feature in feature class	<ul style="list-style-type: none"> • Input feature class • Field names of new feature • Values of specified fields • Feature geometry 	<ul style="list-style-type: none"> • ObjectID of created feature • Updated feature class
23.	Deleting features in layers	<ul style="list-style-type: none"> • Input layers 	<ul style="list-style-type: none"> • Cleared layers
24.	Updating features in layer	<ul style="list-style-type: none"> • Input layer • Names of feature fields to be updated • Values of specified fields 	<ul style="list-style-type: none"> • Updated layer
25.	Synchronizing features in layer	<ul style="list-style-type: none"> • Input layer • Names of key fields for comparison • Target layer • Names of fields to be updated • Create features that are missing in the target layer. Delete features that are missing in the source layer from the target layer. • Update features that are present both in the source and in the target layer • Update geometry of the existing features • Paste geometry to new features • Delete extra attachments • Add missing attachments • Field for date of last update of the input layer • Field for date of last update of the target layer 	<ul style="list-style-type: none"> • Target layer after synchronization • Number of added features • Number of deleted features • Number of updated features
26.	Getting values of feature fields in layer	<ul style="list-style-type: none"> • Input layer Field name • Sorting by field • Delete repeated values • Maximum number of features 	<ul style="list-style-type: none"> • Field value

No	Tool name	Input parameters	Output parameters
27.	Converting layer to feature class	<ul style="list-style-type: none"> • Input table • Geometry representation • Geometry dimension • Fields for getting geometry • Geometry type • Feature class coordinate system • Feature class name • Target geodatabase • Name of the target geodatabase scheme • Skip features with empty geometry • Skip features with not correct geometry • URL of geocoding service 	<ul style="list-style-type: none"> • Output feature class
28.	Geocoding feature layer	<ul style="list-style-type: none"> • Input feature layer • Geocoder type • URL of geocoding service • Parameters of request to geocoder • Feature class name • Target geodatabase • Name of the target geodatabase scheme • Coordinate system of feature class • Skip features by unsuccessful geocoding • Minimum match score for an insert 	<ul style="list-style-type: none"> • Output feature class
29.	Importing ArcGIS map service	<ul style="list-style-type: none"> • URL of map server • User name • Password 	<ul style="list-style-type: none"> • Map
30.	Creating map from layers	<ul style="list-style-type: none"> • Input layers 	<ul style="list-style-type: none"> • Output map
31.	Updating geometry in layer	<ul style="list-style-type: none"> • Input layer • Input geometry 	<ul style="list-style-type: none"> • Updated layer
Working with geometry			
32.	Clipping feature layer by geometry	<ul style="list-style-type: none"> • Target feature layer to be clipped • Input geometry by which the layer will be clipped • Clipping mode • Field for recording ID of the input layer feature • Fields copying mode 	<ul style="list-style-type: none"> • Output clipped feature layer

No	Tool name	Input parameters	Output parameters
		<ul style="list-style-type: none"> • Target geodatabase • Name of the target geodatabase scheme • Feature class name 	
33.	Creating buffered feature layer	<ul style="list-style-type: none"> • Input feature layer • Buffer size • Coordinate system for building the buffer • Link to NA service for building the buffer • Distance parameter of NA service • Attribute of restrictions on binding to the road network of NA service • Use hierarchy of NA service • Field for recording ID of the input layer feature • Fields copying mode • Target geodatabase • Name of the target geodatabase scheme • Feature class name 	<ul style="list-style-type: none"> • Buffered layer with spatial features
34.	Converting layer geometries to set of vertices	<ul style="list-style-type: none"> • Input layer with geometries • Type of points for converting geometry • Field for recording ID of the input layer feature • Fields copying mode • Target geodatabase • Name of the target geodatabase scheme • Feature class name 	<ul style="list-style-type: none"> • Feature layer with geometries converted to points
35.	Filtering feature layer relative to another layer	<ul style="list-style-type: none"> • Input feature layer • Target feature layer • Type of relationship between features from the feature layers • Fields copying mode • Field for recording ID of the input layer feature • Target geodatabase 	<ul style="list-style-type: none"> • Output filtered feature layer

No	Tool name	Input parameters	Output parameters
		<ul style="list-style-type: none"> • Name of the target geodatabase scheme • Name of filtered feature layer 	
36.	Merging geometries of feature layer	<ul style="list-style-type: none"> • Input feature layer 	<ul style="list-style-type: none"> • Merged geometry
37.	Projecting feature class to another coordinate system	<ul style="list-style-type: none"> • Input feature class • Target coordinate system • Target geodatabase • Name of the target geodatabase scheme • Feature class name 	<ul style="list-style-type: none"> • Reprojected feature class
38.	Cutting feature layer into rectangles	<ul style="list-style-type: none"> • Input feature layer • Cutting scale • Rectangles overlap (0..40 %) • Metric coordinate system for cutting • Geometry cutting mode • Numbering origin angle • Numbering direction • Numbering origin in the row • Field for recording oid of the source feature • Rectangle width (mm) • Field for recording X index of rectangle by grid • Template of recording X index of rectangle by grid • Rectangle height (mm) • Field for recording Y index of rectangle by grid • Template of recording Y index of rectangle by grid • Target geodatabase • Name of the target geodatabase scheme • Feature class name 	<ul style="list-style-type: none"> • Cut feature layer
39.	Creating extent	<ul style="list-style-type: none"> • X minimum • X maximum • Y minimum • Y maximum • Coordinate system 	<ul style="list-style-type: none"> • Extent

No	Tool name	Input parameters	Output parameters
Working with layers and map			
40.	Importing Yandex map	<ul style="list-style-type: none"> • File with data to import • Target geodatabase • Name of the target geodatabase scheme 	<ul style="list-style-type: none"> • Map
41.	Importing KML/KMZ files	<ul style="list-style-type: none"> • KML file • Target geodatabase • Name of the target geodatabase scheme 	<ul style="list-style-type: none"> • Map
42.	Getting SQL expression of the layer	<ul style="list-style-type: none"> • Input layer 	<ul style="list-style-type: none"> • SQL expression of the layer
43.	Setting SQL expression for the layer	<ul style="list-style-type: none"> • Target layer • SQL expression for the layer • SQL change mode for the layer 	<ul style="list-style-type: none"> • Layer with new SQL expression
44.	Getting map layers	<ul style="list-style-type: none"> • Input map • Getting layers by geometry • Type of layers geometry • Values 	<ul style="list-style-type: none"> • Layers
45.	Getting layer from WFS service	<ul style="list-style-type: none"> • Link to WFS service • Layer name • Name of field oid • Where clause • Geometry type • Number of one-time uploaded features 	<ul style="list-style-type: none"> • Layer
46.	Getting descriptions of printing templates	<ul style="list-style-type: none"> • Input file with printing templates • File coding 	<ul style="list-style-type: none"> • Descriptions of printing templates
47.	Printing web map in PNG/PDF format	<ul style="list-style-type: none"> • Input web map (JSON) • Output file format • Margin template • Custom DPI • Custom printing width (px) • Custom printing height (px) • Custom scale 	<ul style="list-style-type: none"> • Output file for printing
48.	Multipage printing by specified rectangular areas	<ul style="list-style-type: none"> • Input rectangular areas for printing • Map services for printing • File naming template ({index}, [field_1], [field_2], ...) • Name of ZIP file • Output file format • X index by grid • Y index by grid • Start index of page numbering 	<ul style="list-style-type: none"> • Output printing files • Path to folder with printing files

No	Tool name	Input parameters	Output parameters
		<ul style="list-style-type: none"> • Overlap of rectangular printing areas (0..40 %) • Printing template • Extent for printing map preview (XMin, YMin, XMax, YMax) • System coordinate for printing map preview 	
49.	Exporting map to file	<ul style="list-style-type: none"> • Input map for export • Exported data format • Generate QGS file • Table data export mode • Non feature classes export mode • SQL filter for layers • Cut by geometry • File name 	<ul style="list-style-type: none"> • Output file
50.	Importing files to map	<ul style="list-style-type: none"> • Input files • Coordinate system 	<ul style="list-style-type: none"> • Output map
51.	Exporting map to QGS	<ul style="list-style-type: none"> • Input map • Folder for QGS file • QGS file name 	<ul style="list-style-type: none"> • Output QGS file
52.	Exporting map layer data to GeoPackage	<ul style="list-style-type: none"> • Input maps • Data export mode • Non feature classes export mode • Remove scheme name from the feature class name • GPKG file name 	<ul style="list-style-type: none"> • GPKG file • GPKG geodatabase
53.	Exporting map layer data to Shape	<ul style="list-style-type: none"> • Input layer • Data export mode • Non feature classes export mode • Shape file name • Feature class name 	<ul style="list-style-type: none"> • Output shape file
54.	Getting printing template by name	<ul style="list-style-type: none"> • Input files of printing templates • Coding template files • Required printing template 	<ul style="list-style-type: none"> • Printing template
55.	Getting size of printable area template	<ul style="list-style-type: none"> • Input printing template 	<ul style="list-style-type: none"> • Printing area width (mm) • Printing area height (mm)
56.	Getting map from WFS service	<ul style="list-style-type: none"> • Link to WFS service • Layers' names • Key field name 	<ul style="list-style-type: none"> • Map

No	Tool name	Input parameters	Output parameters
		<ul style="list-style-type: none"> • Number of one-time uploaded features 	
Working with files			
57.	Searching for files in the folder	<ul style="list-style-type: none"> • Path to folder • Search for files in all subfolders • File name template • Template type 	<ul style="list-style-type: none"> • Found files
58.	Getting file name	<ul style="list-style-type: none"> • Input files • File name with extension • File name with path to folder 	<ul style="list-style-type: none"> • File name
59.	Creating folder	<ul style="list-style-type: none"> • Path to parent folder • Folder name 	<ul style="list-style-type: none"> • Path to created folder
60.	Creating temporary file	<ul style="list-style-type: none"> • Folder for temporary file 	<ul style="list-style-type: none"> • Temporary file
61.	Deleting folder	<ul style="list-style-type: none"> • Path to deleted folder 	<ul style="list-style-type: none"> • Path to deleted folder
62.	Deleting files	<ul style="list-style-type: none"> • Deleted files 	<ul style="list-style-type: none"> • Number of deleted files
63.	Running executable file	<ul style="list-style-type: none"> • Path to executable file • Arguments for running file • Work directory 	<ul style="list-style-type: none"> • Information message after running the file • Error message after running the file
64.	Getting path to work folder	-	<ul style="list-style-type: none"> • Path to work folder
65.	Getting files from layer	<ul style="list-style-type: none"> • Input layer • Field with file content • Field with file name 	<ul style="list-style-type: none"> • Output files
66.	Getting files from table via link	<ul style="list-style-type: none"> • Input table • Field with file name • Folder name prefix 	<ul style="list-style-type: none"> • Output files
67.	Archiving folder to ZIP	<ul style="list-style-type: none"> • Path to folder • Path to folder to create archive • ZIP archive name 	<ul style="list-style-type: none"> • Output ZIP archive
68.	Archiving files to ZIP	<ul style="list-style-type: none"> • Input files • ZIP archive name • Path to target folder 	<ul style="list-style-type: none"> • Output ZIP archive
69.	Unzipping ZIP files	<ul style="list-style-type: none"> • Input files • Path to target unzipping folder 	<ul style="list-style-type: none"> • Path to folder with unzipped files
70.	Merging PDF files	<ul style="list-style-type: none"> • Input PDF files • Output PDF file name 	<ul style="list-style-type: none"> • Output PDF file
71.	Importing shape files to feature classes	<ul style="list-style-type: none"> • Shape files • Target geodatabase • Name of the target geodatabase scheme • Feature class name template 	<ul style="list-style-type: none"> • Feature classes

№	Tool name	Input parameters	Output parameters
72.	Importing ZIP archive with photos to layer	<ul style="list-style-type: none"> • Input ZIP archive with photos • Target layer • Exporting photos without geotags • Field for recording date • Size of buffer for grouping photos (m, 0 – no grouping) • Time range for grouping photos (дд.ЧЧ:мм:сс, 00:00:00 – no grouping) 	<ul style="list-style-type: none"> • Layer with photos
73.	Importing CSV file to feature class	<ul style="list-style-type: none"> • CSV file Custom field names • Target geodatabase • Name of the target geodatabase scheme • Feature class name • File coding • CSV separator • Recognize WKT of geometry • Coordinate system 	<ul style="list-style-type: none"> • Feature class from file
74.	Importing GeoJSON file to geodatabase	<ul style="list-style-type: none"> • GeoJSON file • File coding • Target geodatabase • Name of the target geodatabase scheme • Prefix name of feature classes • Coordinate system 	<ul style="list-style-type: none"> • Geodatabase
75.	Importing Excel file to geodatabase	<ul style="list-style-type: none"> • Excel file • Coordinate system of feature classes 	<ul style="list-style-type: none"> • Geodatabase
76.	Importing feature class from JSON file	<ul style="list-style-type: none"> • JSON file • File coding • Feature class name • Target geodatabase • Name of the target geodatabase scheme • Names of properties without data • Path to required field in the document • Redefined properties fields (if required) 	<ul style="list-style-type: none"> • Output feature class

№	Tool name	Input parameters	Output parameters
77.	Importing XML file to geodatabase	<ul style="list-style-type: none"> • XML file • XML file coding • Copy data • Fields names configuration • Configuration file coding • Target geodatabase • Name of the target geodatabase scheme • Reference map 	<ul style="list-style-type: none"> • Output map
78.	Vectorizing image	<ul style="list-style-type: none"> • Input image file • Extent 	<ul style="list-style-type: none"> • Output geometry
79.	Downloading attachments via links	<ul style="list-style-type: none"> • Input layer • SQL expression for URL of the attachment content • Download attachments for features without attachments only • Create previews for images • Maximum height of image in pixel • Maximum width of image in pixel • Maximum size of downloaded file in Mb • Download files without a known size • SQL template of file name 	<ul style="list-style-type: none"> • Processed layer • Number of skipped attachments • Number of downloaded attachments • Number of downloaded bytes
80.	Downloading file via URL	<ul style="list-style-type: none"> • File URL • File name 	<ul style="list-style-type: none"> • Downloaded file
81.	Reading text content from file	<ul style="list-style-type: none"> • Input file • File coding 	<ul style="list-style-type: none"> • Text content
82.	Recording text content to file	<ul style="list-style-type: none"> • File for changing text content • Text content • Text content changing mode • New content coding 	<ul style="list-style-type: none"> • Output file
83.	Renaming file	<ul style="list-style-type: none"> • File to be renamed • New file name 	<ul style="list-style-type: none"> • Renamed file
84.	Renaming folder	<ul style="list-style-type: none"> • Path to folder to be renamed • New folder name 	<ul style="list-style-type: none"> • Path to renamed folder
85.	Transferring files	<ul style="list-style-type: none"> • Input files • Path to root file folder • Path to target folder • Transfer type • Rewrite existing files 	<ul style="list-style-type: none"> • Output files
86.	Importing GeoPackage file to map	<ul style="list-style-type: none"> • GeoPackage file • Reference map 	<ul style="list-style-type: none"> • Output map

No	Tool name	Input parameters	Output parameters
87.	Importing tracks (trk) from GPX files to feature classes	<ul style="list-style-type: none"> • GPX files • Files coding • Time as Z coordinate • Metric coordinate system for statistics calculation • Critical distance between statistics calculation stop points 	<ul style="list-style-type: none"> • Table tracks • Feature class track_paths • Feature class track_points • Feature class track_segments
Simple utilities			
88.	Checking if a string is empty	<ul style="list-style-type: none"> • Input string 	<ul style="list-style-type: none"> • String is empty
89.	Adding feature to array	<ul style="list-style-type: none"> • Input feature array • Added feature 	<ul style="list-style-type: none"> • Output feature array
90.	Processing feature arrays	<ul style="list-style-type: none"> • First feature array • Second feature array • Type of arrays merging 	<ul style="list-style-type: none"> • Output feature array
91.	Merging strings	<ul style="list-style-type: none"> • Input strings • Separator 	<ul style="list-style-type: none"> • Merged string
92.	Replacing substring in string	<ul style="list-style-type: none"> • Input string • What to find • With what to replace • Replacement mode 	<ul style="list-style-type: none"> • String after replacement
93.	Building SQL expression for field by bool value	<ul style="list-style-type: none"> • Field name • Value • Type of field comparison by value 	<ul style="list-style-type: none"> • Output SQL expression
94.	Building SQL expression for field by numeric values	<ul style="list-style-type: none"> • Field name • Values • Type of field comparison by values 	<ul style="list-style-type: none"> • Output SQL expression
95.	Building SQL expression for field by string values	<ul style="list-style-type: none"> • Field name • Value • Type of field comparison by value 	<ul style="list-style-type: none"> • Output SQL expression
96.	Chaining SQL expressions	<ul style="list-style-type: none"> • Input SQL expressions for chaining • Chain in 	<ul style="list-style-type: none"> • Output SQL expression after chaining
97.	Performing math operation	<ul style="list-style-type: none"> • Operation type • First value • Second value 	<ul style="list-style-type: none"> • Operation result
98.	Comparing numbers	<ul style="list-style-type: none"> • First value • Second value • Type of values comparison 	<ul style="list-style-type: none"> • Comparison result
99.	Comparing features	<ul style="list-style-type: none"> • First feature • Second feature • Comparison type 	<ul style="list-style-type: none"> • Comparison result

No	Tool name	Input parameters	Output parameters
100.	Getting substring by regular expression	<ul style="list-style-type: none"> • Input string • Regular expression 	<ul style="list-style-type: none"> • Found substring
101.	Building string by template	<ul style="list-style-type: none"> • String template • Value to be substituted to the template 	<ul style="list-style-type: none"> • Formatted string
102.	Building string by template by 5 parameters	<ul style="list-style-type: none"> • String template • Value 1 to be substituted to the template • Value 2 to be substituted to the template • Value 3 to be substituted to the template • Value 4 to be substituted to the template • Value 5 to be substituted to the template 	<ul style="list-style-type: none"> • Formatted string
103.	Downloading text content via link	<ul style="list-style-type: none"> • URL • User agent 	<ul style="list-style-type: none"> • Text by link
104.	Getting array feature by index	<ul style="list-style-type: none"> • Feature array • Start index of the array • Feature index 	<ul style="list-style-type: none"> • Required feature
105.	Getting information about the current user	<ul style="list-style-type: none"> • Regular expression of groups filtration 	<ul style="list-style-type: none"> • User name • User groups • User email • Full name of user • User description
106.	Getting ID of the current work	-	<ul style="list-style-type: none"> • Work identifier
107.	Getting table from the tables array by name/index	<ul style="list-style-type: none"> • Input array of tables • Table name 	<ul style="list-style-type: none"> • Found table
Managing model			
108.	Ordering tools execution	<ul style="list-style-type: none"> • First feature • Second feature 	<ul style="list-style-type: none"> • First feature • Second feature
109.	Interrupting tool execution by condition	<ul style="list-style-type: none"> • Whether to interrupt the execution • Message in case of interruption 	<ul style="list-style-type: none"> • Whether execution has been interrupted
110.	Selecting feature by "if" condition	<ul style="list-style-type: none"> • Whether condition is met • Return object if condition is met • Return object if condition is not met 	<ul style="list-style-type: none"> • Selected feature