

# Integrated Planning Tool User Guide

**Version 1.1**

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## 1. Introduction

### Purpose

The “Viva Grass Tool” consists of three modules: “Viva Grass Viewer”, “Viva Grass BioEnergy” and “Viva Grass Planner”, each designed for different user groups and context of decision-making. The tool is based on web GIS platform and allows users:

- to assess the supply and trade-offs of grassland ecosystem services in user-defined areas, as well as
- to develop ecosystem-based grassland management and planning scenarios.

This document is a user manual of all three “Viva Grass Viewer”, “Viva Grass BioEnergy” and “Viva Grass Planner” modules.

### Definitions, Acronyms and Abbreviations

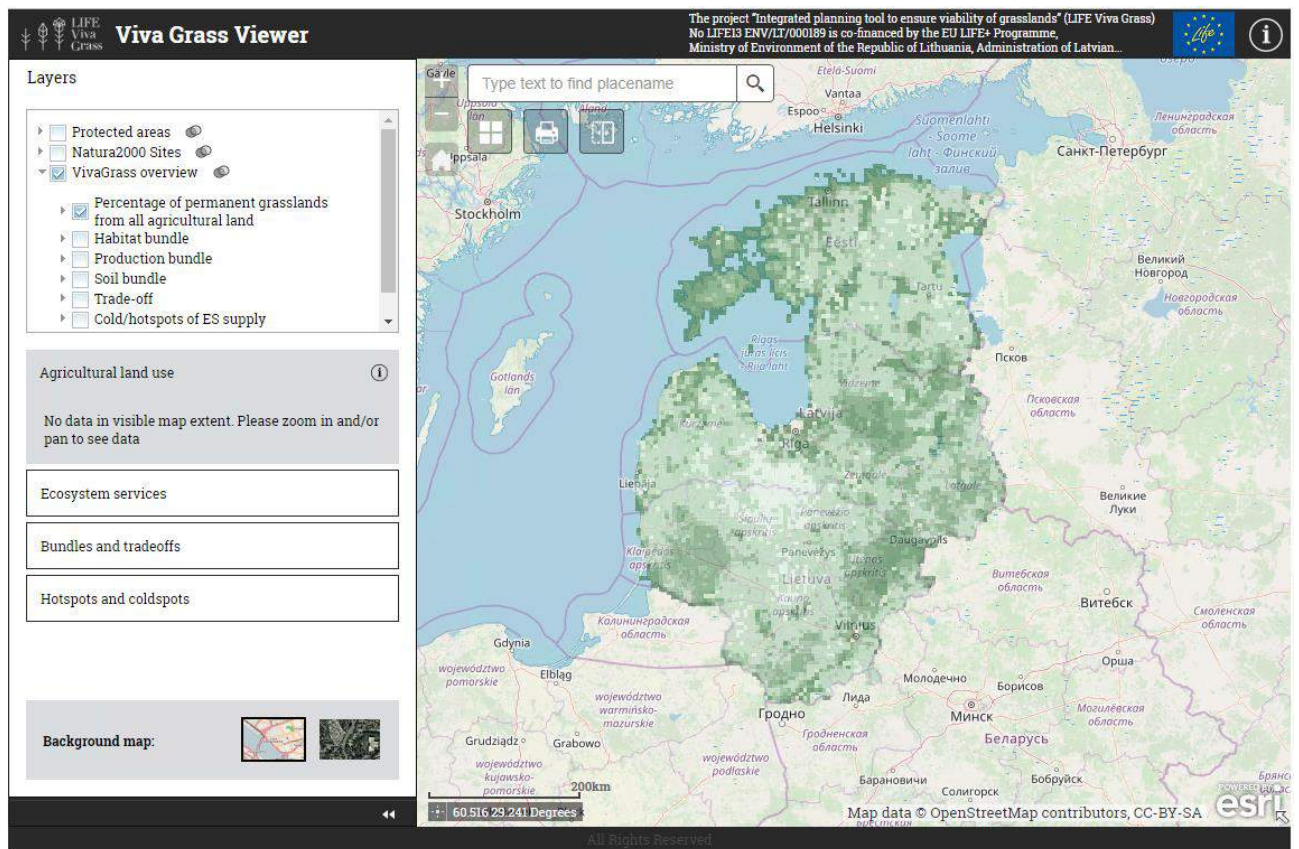
<b>Acronym, Definition,</b>	<b>Explanation</b>
Bundles	Bundles of ecosystem services are defined as a set of associated ecosystem services that are linked to a given ecosystem and usually appear together repeatedly in time and/or space.
Classification	The Classification widget is a specially dedicated functionality in the Planner module of the “Viva Grass tool”. It allows the user to classify selected agricultural land use blocks or user uploaded data, using selected attributes and their values.
Cold spots	“Cold-spots” are fields with low or very low (below 3) values at majority of ecosystem services provided and designate degrading/inappropriate management of agricultural land.
Ecosystem service, ES	Ecosystem services (further - ES) are all benefits that an ecosystem provides to humans.
GIS	Geographic Information System
Hot spots	“Hot-spots” are fields with great variety of ecosystem services provided at values above average (from 3 to 5), possible synergies between “Habitats” and “Production” bundles occur.
Prioritization	The Prioritization widget is a specially dedicated functionality in the “Viva Grass Planner” module of the “Viva Grass tool”. It allows the user to prioritize selected agricultural land use blocks or user uploaded data, using selected attributes and defining weight of each attribute.
Recommendation	Short overall information of suggestions for management options which highlight important ecosystem services based on their values and bundle information
Trade-offs	Tradeoff is the situation when values of ecosystem services in one bundle negatively impact values of ecosystem services in another bundle.

## 2. Viva Grass Viewer

Viva Grass Viewer is a public map application oriented to display general information about grasslands type, ecosystem services and bundles.



<https://tool.vivagrass.eu/vgsites/viewer/>

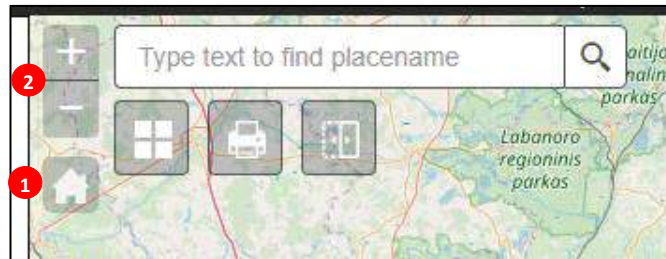
In initial extent there are 3 Baltic countries displayed and contextual overview layers provided. Navigate and zoom in to specific territory to display land use (grassland) information.



### 2.1. Navigation

Common navigation functions are provided to change map extent and zoom level.

- To move the map, click and hold the left mouse button and drag the map to a new place.
- To zoom the map to its initial extent, click the *Default extent (1)* button.
- To zoom, use the **Zoom in**  button or the **Zoom out**  button (2).
- The map can be zoomed in and out by scrolling or double click of the left mouse button.



## 2.2. Find location

Use search functionality to find and locate place name on the map.

Workflow steps:

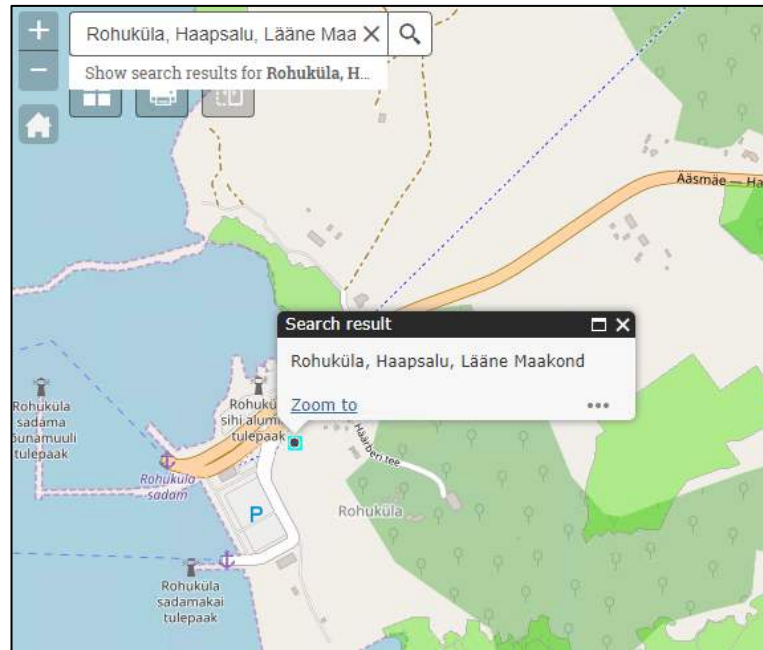
1. Use *the search box* at the top left of the map.



2. Start *typing* location name. Suggestions will appear in the drop-down window.



3. Select the appropriate place name from the list.
4. Map will be zoomed to selected location.



### 2.3. Layers

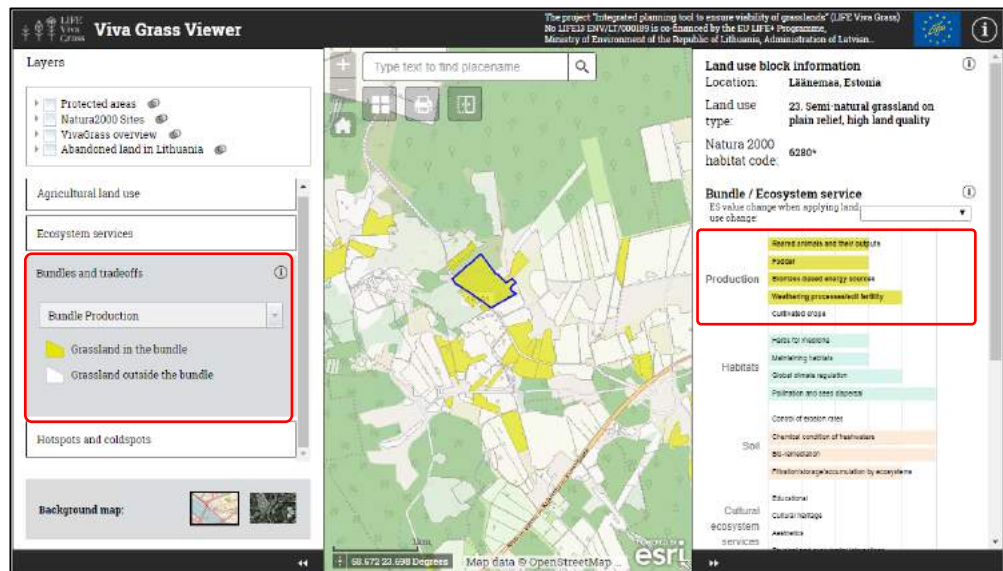
Use widget “Layers” on the left side to control layer visibility. At the same time, only one layer, representing specific parameters, is shown on the map. Four base *layer groups* are available in the Viewer: *Contextual layers*, *Land use blocks*, *Bundles* and *Ecosystem services*.



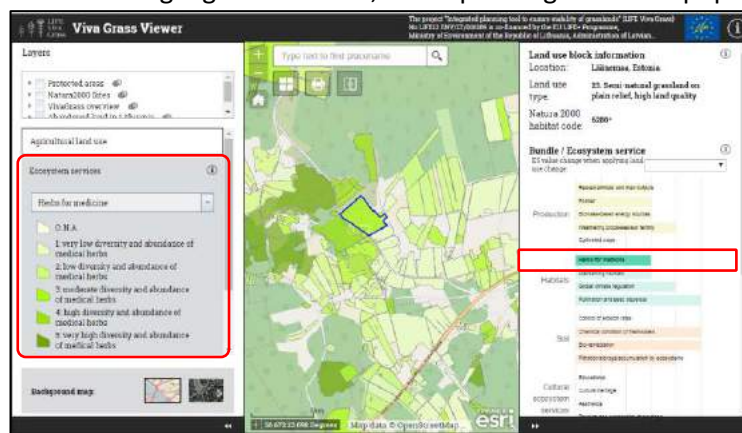
- *Contextual layer group* – additional layers relevant to grasslands. Contains Viva Grass and external maps. Layers are displayed on top of Viva Grass content. Layers can be turned on/off, expanded to display legend, layer transparency can be changed.
- *Agricultural land use layer* represents land type and grassland naturality category. After clicking, layer is turned on, legend displayed.
- *Bundles layer group* contains land blocks categorized by assignment to specific bundle. After clicking on bundle group, user selects from dropdown list one ecosystem service bundle, which is displayed



on the map. Note, that change of the displayed bundle also affects highlight of particular bars in pop-up panel.

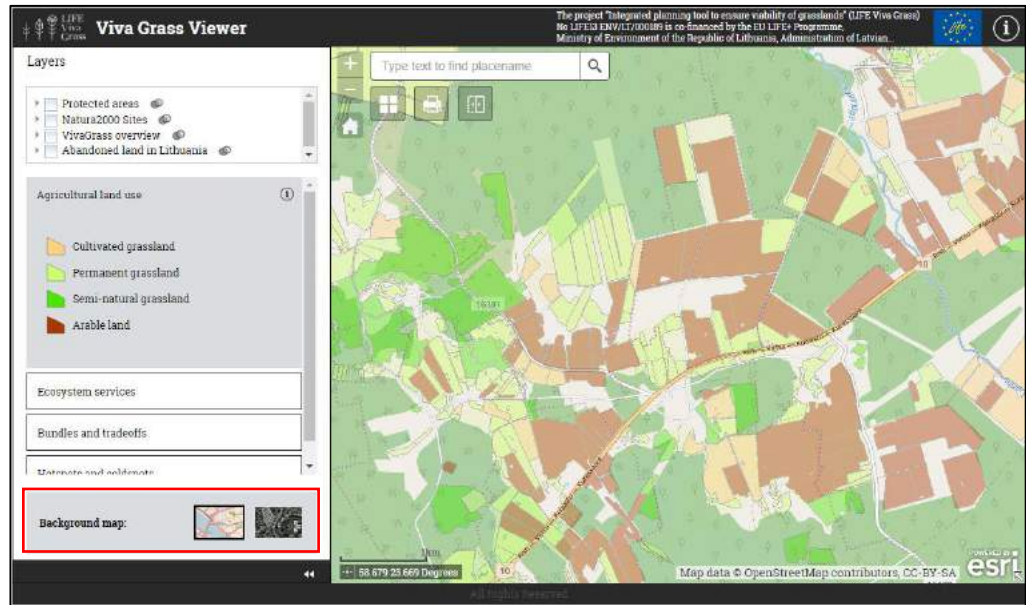


Ecosystem services layer group contains detailed information about each ecosystem service. Select group “Ecosystem services”, then ecosystems service. Services are categorized using 5 levels, representing grassland/land capability to provide ecosystem service. Note, that change of the displayed bundle also affects highlight of one bar, corresponding service in pop-up panel.



**Background maps:**

Here are two types of background maps: topographic (Open Street map) and imagery map. *Buttons on the bottom of layer list*, activate selected background map. Note, that all layers drawn over background map are transparent.

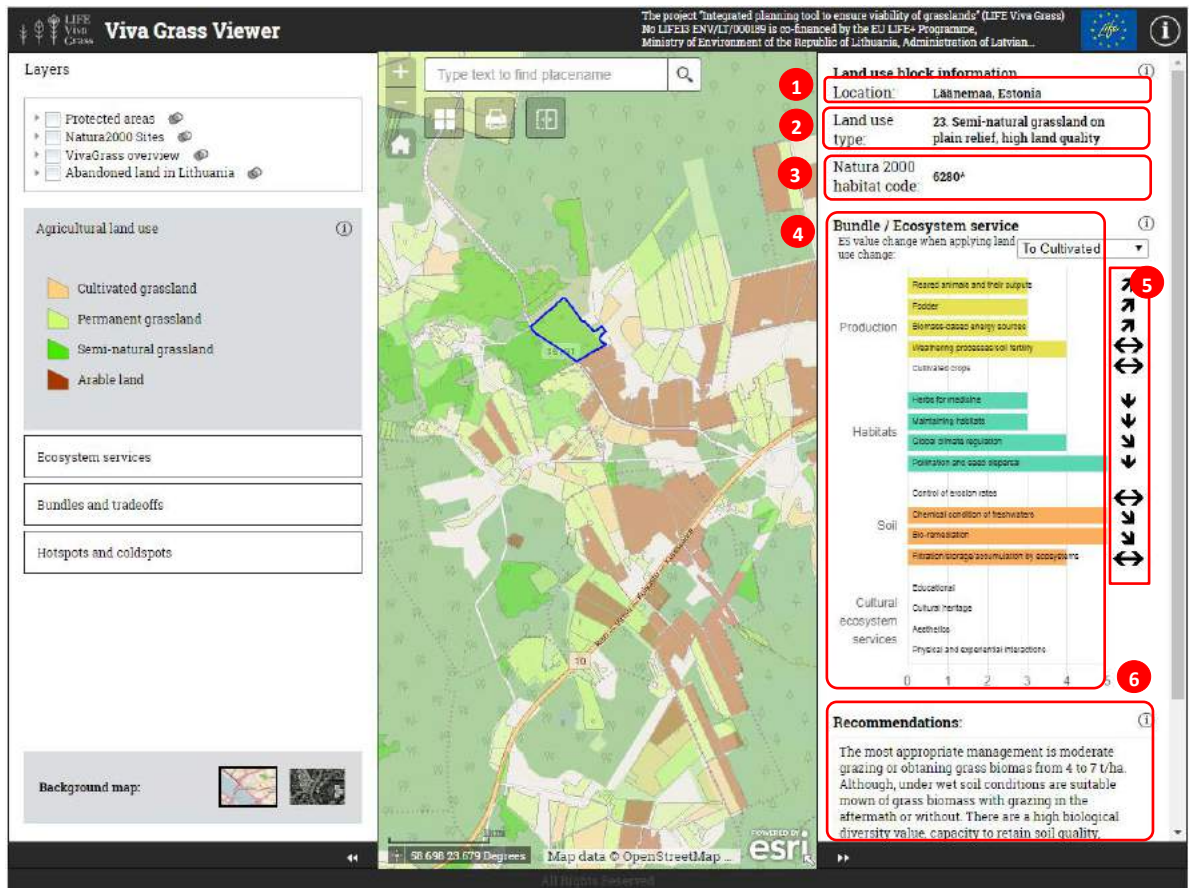


## 2.4. Pop-up information

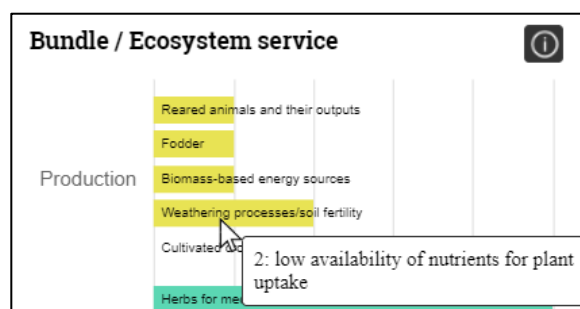
When user clicks on land block, contour is highlighted (blue line) and pop-up window displayed on the right side of application. Pop-up contains location, type and ES value information.

No.	Information	Explanation
1.	Location	Textual description of grassland location – country and municipality.
2.	Land use type	Grassland/land type code and textual explanation.
3.	Natura 2000 habitat code	Code, representing Natura 2000 habitat.
4.	Graph	Visual representation of each ecosystem service value in graph.
5.	Land use change scenarios	Next to each graph value displayed arrows of ecosystem service value change trend in case of user-applied land management practice.
6.	Recommendations	Textual recommendations related to grassland type and ecosystem service values.



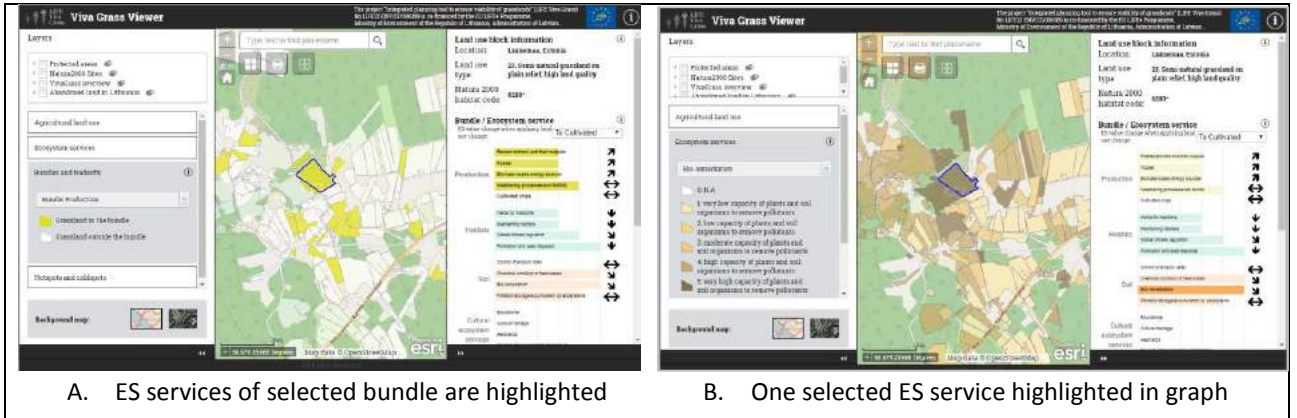


Ecosystem service values graph represents each ecosystem service value in selected polygon. Values are distributed in interval from 0 (no ES service), to 5 (maximal suitability for ES service). When covering graph with mouse, label with ES value explanation is provided. This explanation text corresponds to explanation in map legend. Items in graph grouped by service bundle.

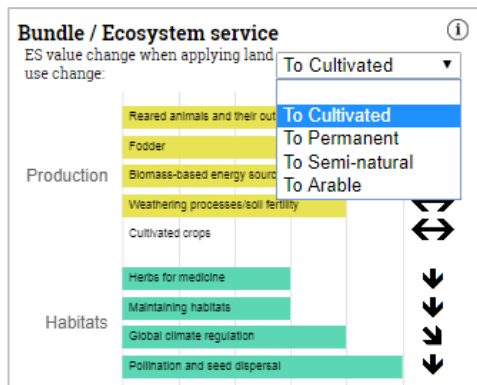


Graph bars are highlighted depending on selected layer:

- “Land use blocks” – ecosystem services in graph are displayed without bar highlighting effect (all highlighted).
- “Bundles” – selecting one of production/habitats/soil bundle influences highlighting of appropriate bar group in ecosystem services graph.
- “Ecosystem services” – one graph bar, corresponding selected ecosystem service is highlighted.



Ecosystem change scenarios display trend of ES change when applying different land management practice, land use change. Next to each graph value is displayed arrow, showing ES change trend (increase, decrease, no change).



Recommendations related to land management practice in textual form are displayed at the bottom of grassland popup window.

**Recommendations:**

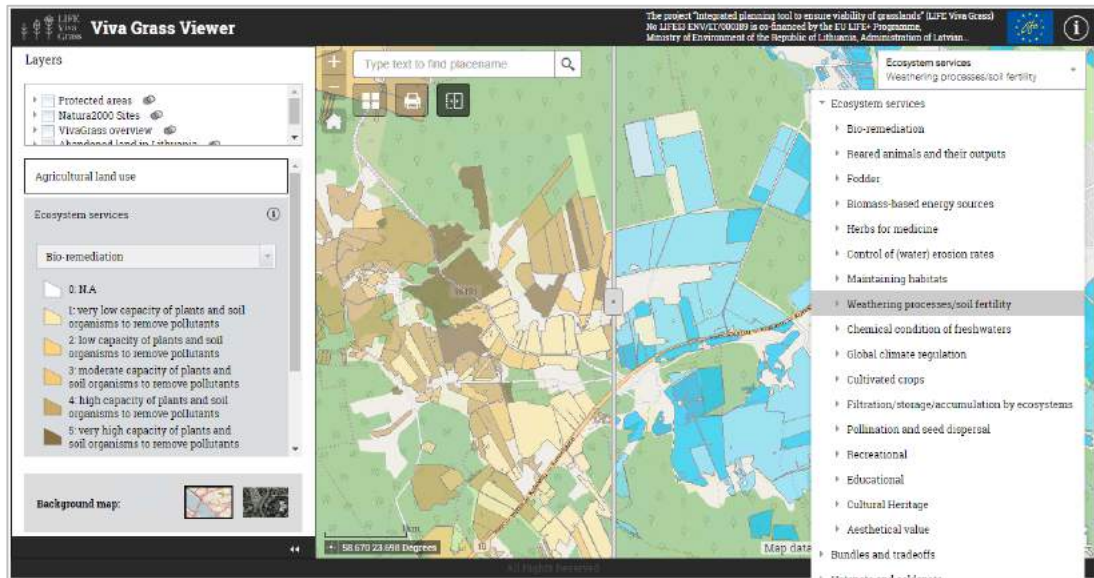
The most appropriate management is moderate grazing or obtaining grass biomass from 4 to 7 t/ha. Although, under wet soil conditions are suitable mown of grass biomass with grazing in the aftermath or without. There are a high biological diversity value, capacity to retain soil quality, potential of carbon sequestration and very high potential of chemical absorption. No soil erosion risk.

The most appropriate management method is grazing. If possible, it is recommended to switch between of livestock, as well as grazing intensity every few years. This allows species with different needs to settle in the areas.

## 2.5. Swipe tool

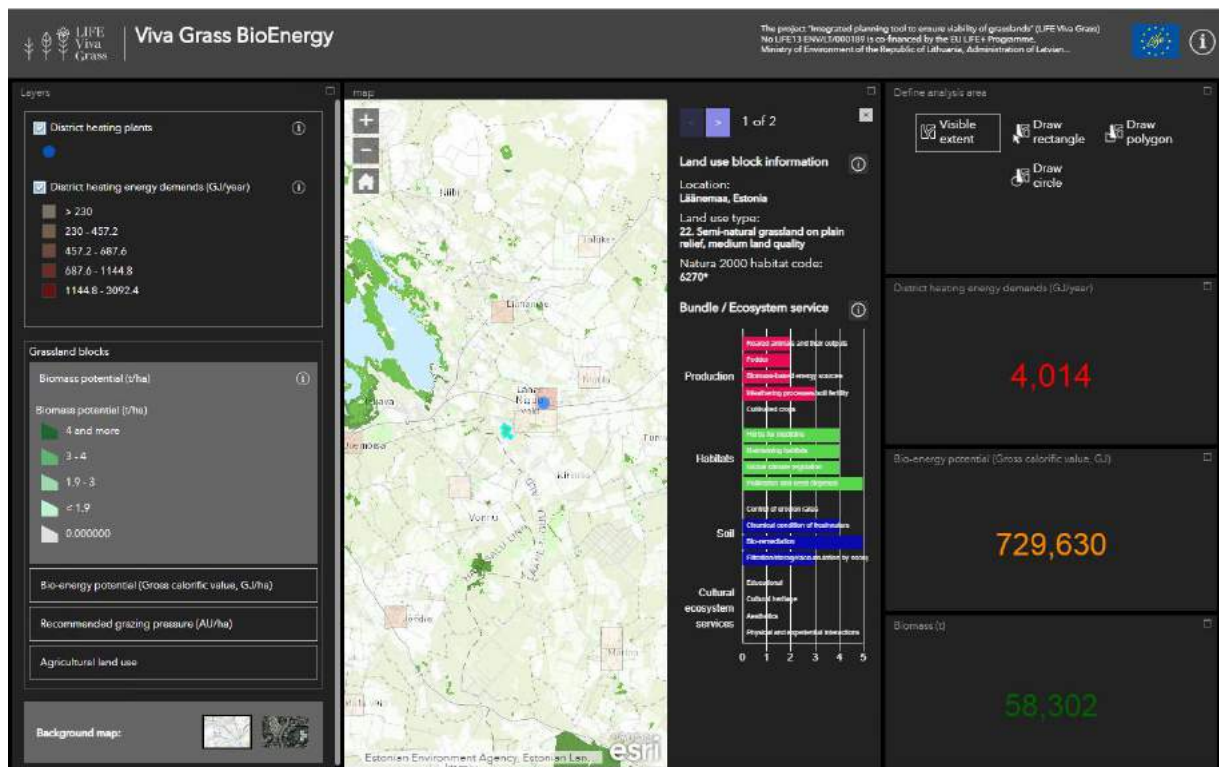
Swipe tool is designed for comparison of different ecosystem services. When tool is active, map is divided into two parts. On the left side is displayed layer, selected in layers control, on the right side is displayed layer selected by user.

User can move handle to “swipe” layers and compare information.



### 3. Viva Grass Bio Energy tool

Viva Grass Bio Energy map application is designated to evaluate grasslands possibility to produce biomass, required for energy production. Additional use of energy demands layer and heating plant places allows to define territories with highest energy needs. Surrounding grasslands in energy demand places can be analyzed in user-defined area and summary indices displayed on the map.



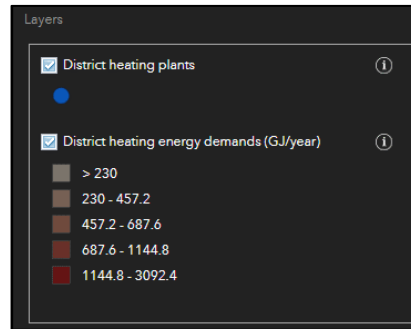
Available at: <https://tool.vivagrass.eu/vgsites/bioenergy/>

#### 3.1. Layers management

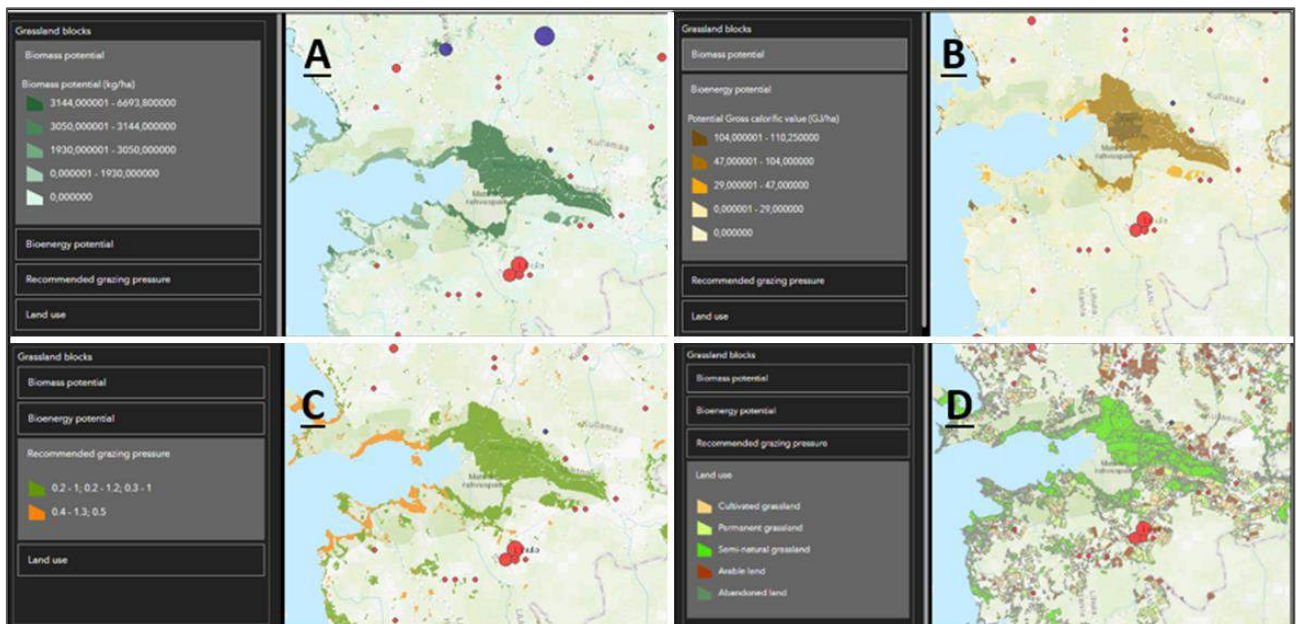
Use “Layers” widget to manage layer visibility on the map. There are two types of layers: grassland blocks, displayed by thematic colors and contextual layers, related to bioenergy theme.

Visibility of top layers can be managed individually. Change layer visibility by turning layers on or off using check boxes.





Grassland blocks group contains layers with different information about blocks: *Biomass potential (A)*, *Bioenergy potential (B)*, *Recommended grazing pressure (C)* and *Land use (D)*. Click layer buttons to select layer – active layer’s legend is displayed, and layer information provided on the map. Only one layer in “Grassland blocks” group can be displayed at a time.

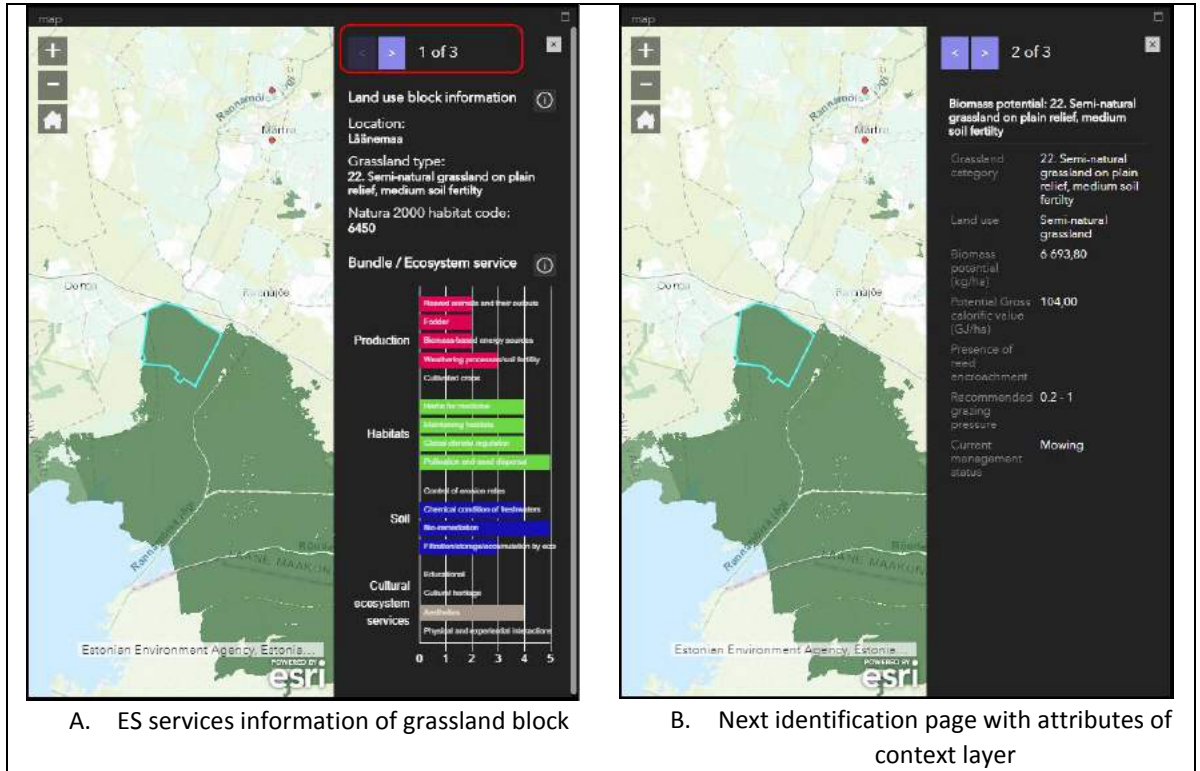


### 3.2. Identification

Objects are identified by clicking on the map. Identification information is displayed in the new pop-up tab at the right of the map.

- When the grassland block is selected, first identification page displays ecosystems service information layers.
- The next identification pages provide attribute information of visible layers on the map. There is an option *to switch pages (1)* and be acquainted with more information of all identified custom layer objects.



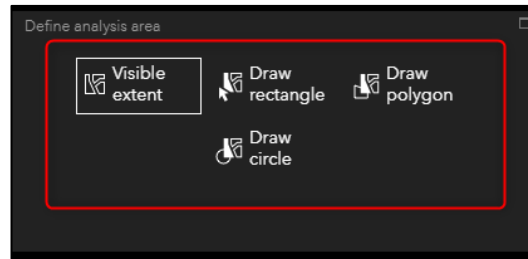


### 3.3. BioEnergy Indicators

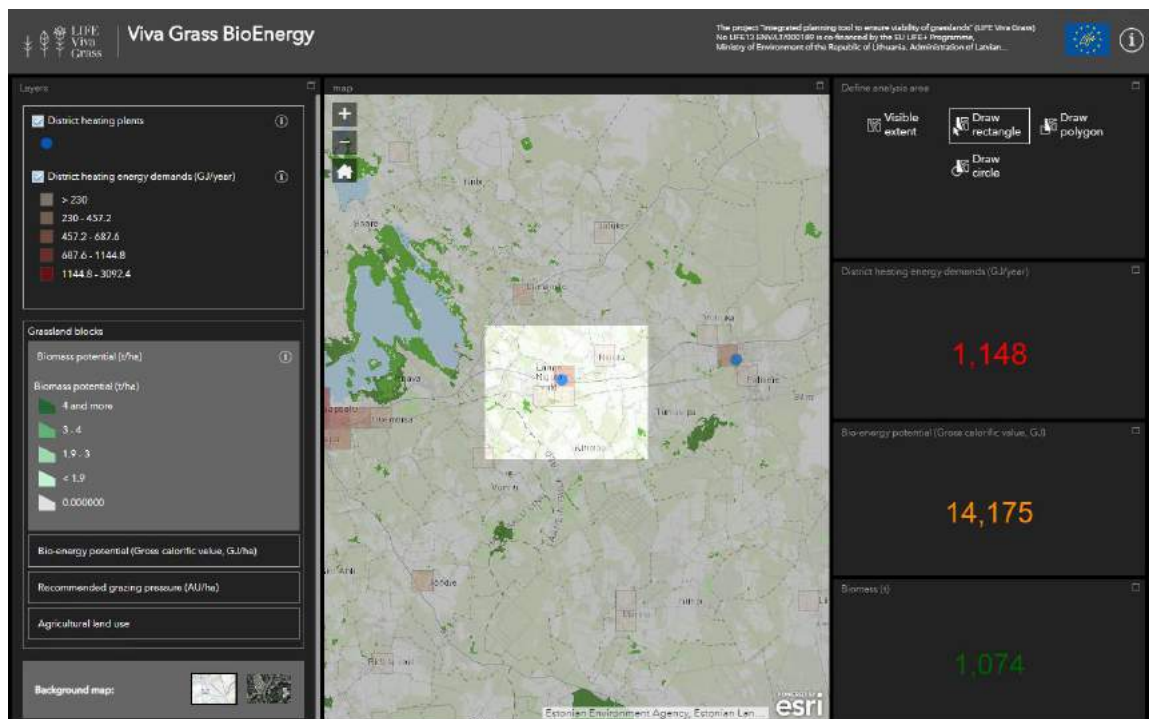
Bioenergy indicators show numerical summary information about bioenergy characteristics in analysis area. They are displayed on the right side of the map application.

Index	Explanation
District heating energy demands (GJ per year)	Total sum of energy demands. Depends on “District heating energy demands” layer attributes.
Bio-energy potential (Gross calorific value, GJ)	Total sum of calorific potential. Depends on particular grassland potential and size.
Biomass (t)	Total sum of biomass potential. Depends on particular grassland potential and size.

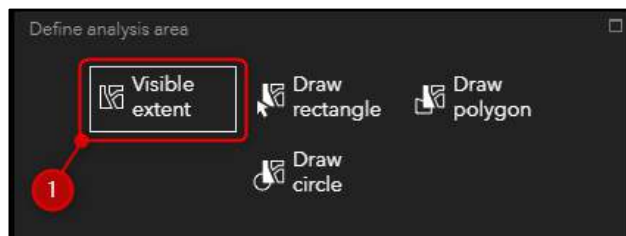
To see numerical information of exact area there is tool to define analysis area. Summary information displayed only of grassland blocks and objects that completely falls into a certain extent. By default, visible extent is used as analysis area and indices are changing during navigation on the map. There is an option for user to define exact analysis area by drawing rectangle, polygon or circle.



- To draw rectangle, select the tool “Draw rectangle” define top left point on the area of interest on the map and stretch rectangle.
- To draw custom polygon, select the tool “Draw polygon” and define each vertex of the polygon by clicking on the map. To close the polygon, use double click.
- To draw circle, select the tool “Draw circle” click the center of interest area and stretch it.



- *Visible extent (1)* mode turns off determined desired territories to see indicators from the map visible extent.

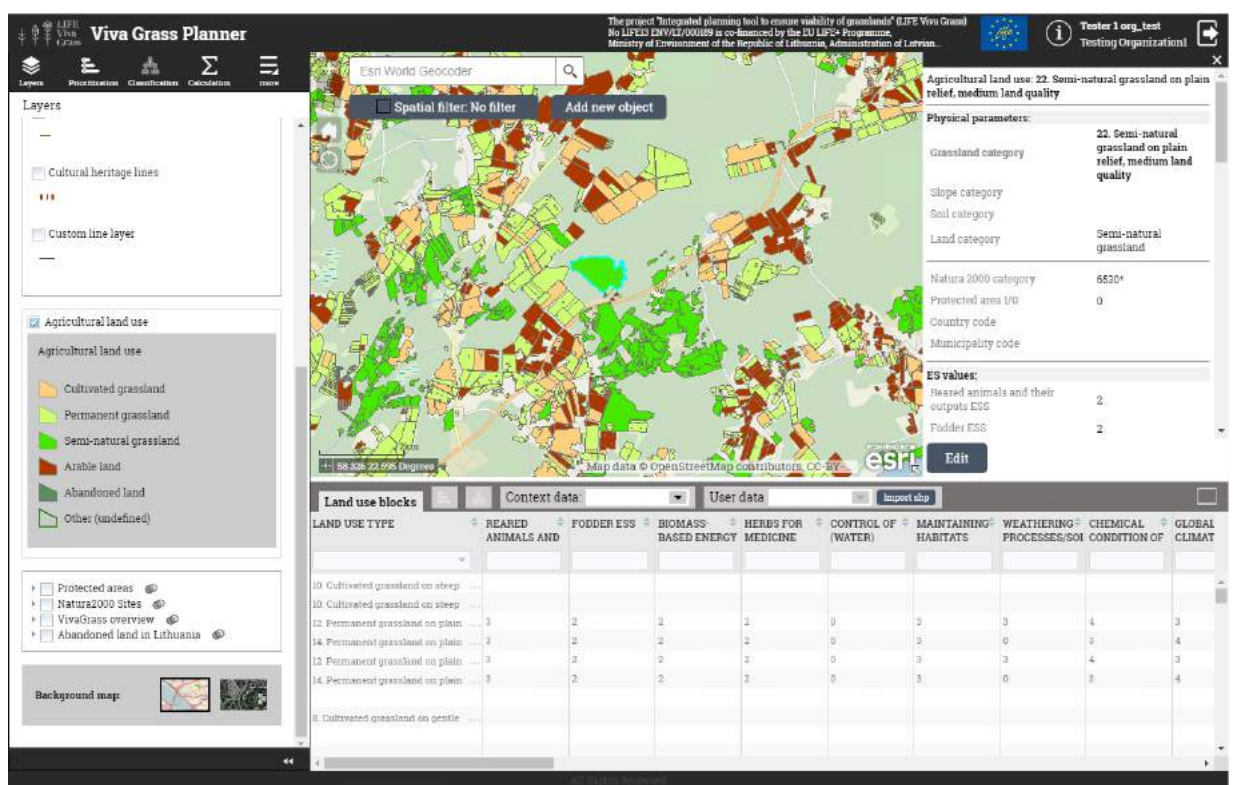


## 4. Viva Grass Planner tool

Viva Grass Planner tool allows users to collect and edit custom grassland data and data in grassland related layers. Tool is recommended for organizations, which have detailed information about grassland information need to store, manage information and make decisions based on that.

Viva Grass Planner data is managed and visible by users of one organization.

Available at: <https://tool.vivagrass.eu/vgsites/planner/>



On the center of the tool is map with user, contextual and analysis result layers. At the upper part of the map there are controls for place search, spatial filter definition, new object creation. Mouse position and map scale provided at the bottom part of the map.

On the left side of the tool there are placed widgets: layer control, prioritization, calculation, classification, organization settings. Widget controls are activated by clicking on the icon related to widget (tool).

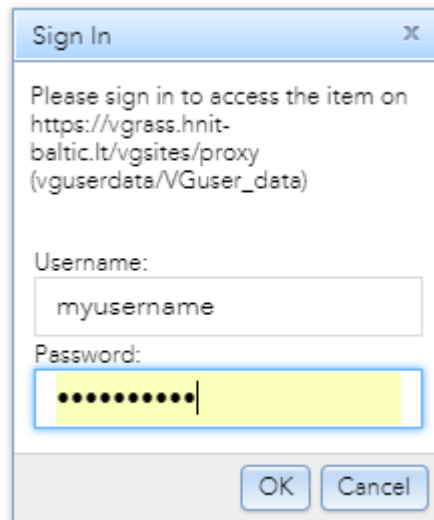
At the bottom is attribute table, where grassland attributes and analysis calculation results are displayed.

On the right side there is identification popup of the grassland, where attribute information of selected user object is displayed and edit mode for the object can be activated.

#### 4.1. Login to system

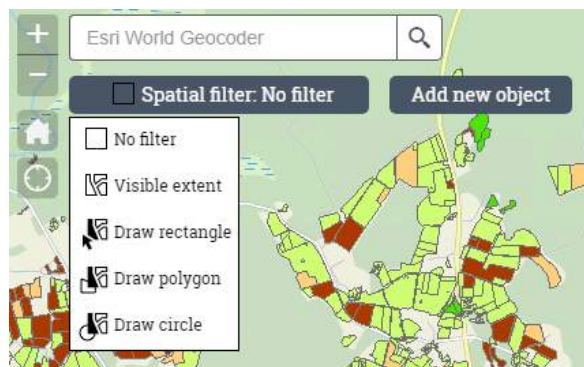
Planner application is not public. Users should login by providing username and password. Successfully logged users will access their grasslands data and prioritization functionality.

If you do not have login information and are interested in grassland management, please contact Viva Grass project team: <https://vivagrass.eu/contacts/>



#### 4.2. Spatial filter

Spatial filter reduces amount of analyzed features and displayed attributes in attribute table. User can configure filter by clicking on the button “Spatial filter” top left on the map.



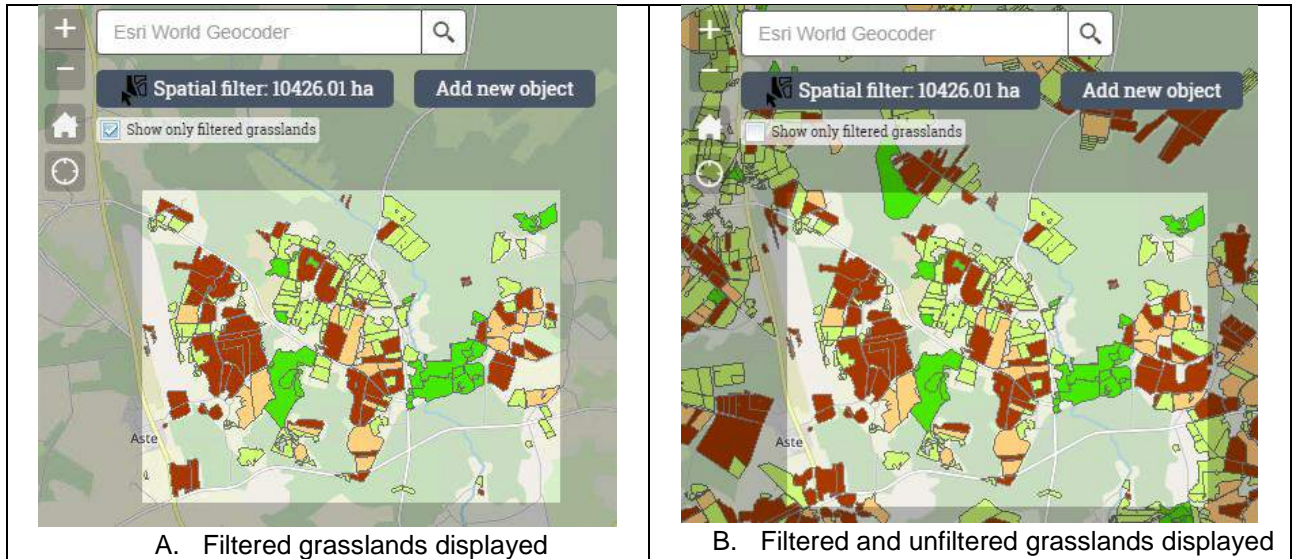
Options of spatial filtering:

- No filter – No spatial filtering applied. This is default. Removes spatial filter if applied.
- Visible extent – features in visible extent. Filter rectangle of visible extent is built.
- Draw rectangle – draw rectangle on the map, specifying top left and bottom right point of the area.
- Draw polygon – draw polygon on the map defining each vertex. Double click to finish.
- Draw circle – define center and stretch area increasing radius.



When spatial filter is defined, button caption displays area of the filter (“Spatial filter: 705.5 ha”), map area outside filter is grayed out. Only features fully contained by user-defined analysis area are displayed in attribute table and used in prioritization, classification tools.

There is option “Show only filtered grasslands” – by turning this on and off you can see filtered/all objects.



### 4.3. Attribute table

Attribute table provides attributes of all layers displayed in the map. Attribute table is displayed below the map and can be activated by clicking header or any tab name.

Layers are organized into tabs by categories:

- Grasslands – grassland information, containing ES services, custom user attributes.
- Prioritization button – table of grassland objects and attributes participating in prioritization. Disabled if there are no prioritization results on the map.
- Classification button – table of grassland objects and attributes participating in classification. Disabled if there are no prioritization results on the map.
- Context data – Grassland-related context layers. These are additional layers where organization users can collect data.
- User data - Import and display attributes of supportive shapefiles provided by user (see more in “Import user’s data”).



LAND USE TYPE	REARED ANIMALS AND	FO	HERBS FOR MEDICINE	CONTROL OF (WATER)	MAINTAINING HABITATS	WEATHERING PROCESSES/SOI	CHEMICAL CONDITION OF	GLOBAL CLIMAT
14. Permanent grassland on plain ...	3	2		0	3	0	3	4
11. Permanent grassland on plain ...	2	1		0	4	2	3	3
12. Permanent grassland on plain ...	3	2		0	3	3	4	3
12. Permanent grassland on plain ...	3	2		0	3	3	4	3
12. Permanent grassland on plain ...	3	2		0	3	3	4	3
11. Permanent grassland on plain ...	2	1	1	3	0	4	2	3
12. Permanent grassland on plain ...	3	2	2	2	0	3	3	4
12. Permanent grassland on plain ...	3	2	2	2	0	3	3	4
12. Permanent grassland on plain ...	3	2	2	2	0	3	3	4
12. Permanent grassland on plain ...	3	2	2	2	0	3	3	4

Single click table row to center selected feature on the map. Double click to center selected feature on the map and initialize edit session.

Sort records – use arrows in the column name or simply click column header to sort records by column values.

You can filter records in table by using one or more conditions. If you need to filter exact value (equals) write it to the field. Each numeric attribute column allows enter one expression using signs >, <, >=, <= and numeric value. For some columns where classification values (domain) is used you can check exact filtering values in list. Note, that if you applied condition on more columns, only records matching all conditions are displayed; additionally, to table filter spatial filter can be applied.

LAND USE TYPE	REARED ANIMALS AND	FODDER ESS	BIOMASS-BASED ENERGY	HERBS FOR MEDICINE	CONTROL OF (WATER)	MAINTAINING HABITATS
14. Permanent grassland on plain ...		3				
14. Permanent grassland on plain ...	3	3	2	2	0	3
14. Permanent grassland on plain ...	3	3	2	2	0	3
14. Permanent grassland on plain ...	3	3	2	2	0	3
14. Permanent grassland on plain ...	3	3	2	2	0	3
14. Permanent grassland on plain ...	3	3	2	2	0	3
14. Permanent grassland on plain ...	3	3	2	2	0	3

If you need to remove filter condition, click (X) button near the condition.

#### 4.4. Identify objects on the map

Click visible object on the map. Popup window with attributes of the object will be displayed on the right side of the map.

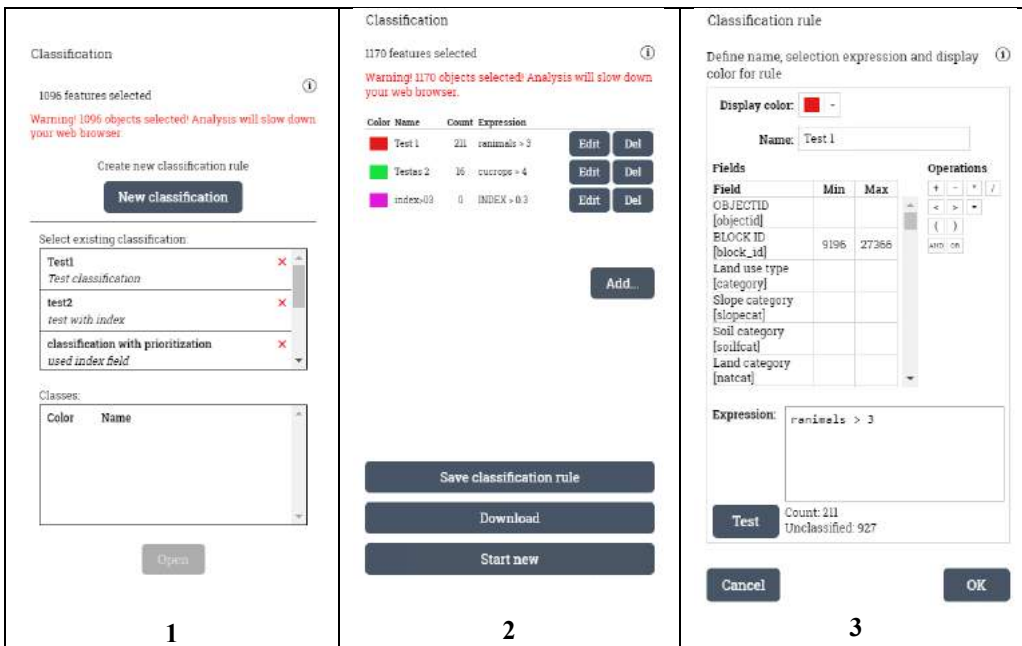
If there is more than one object identified, object count on top of identification panel is displayed and arrows for object listing provided.

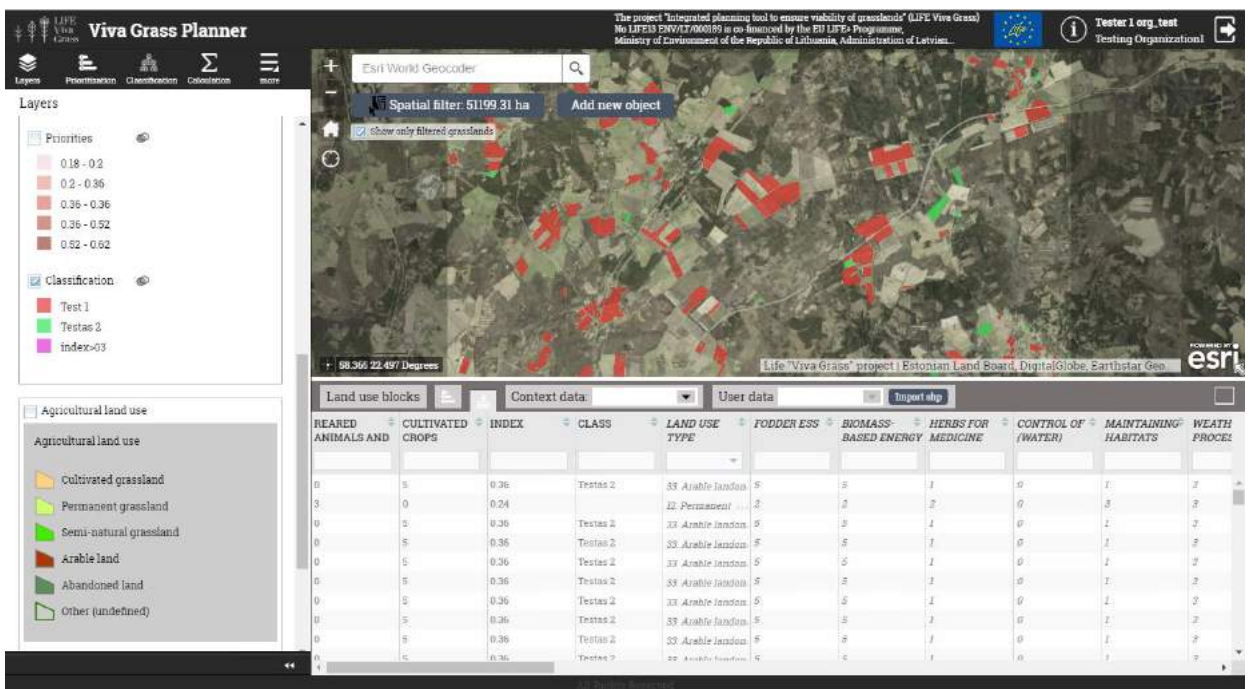
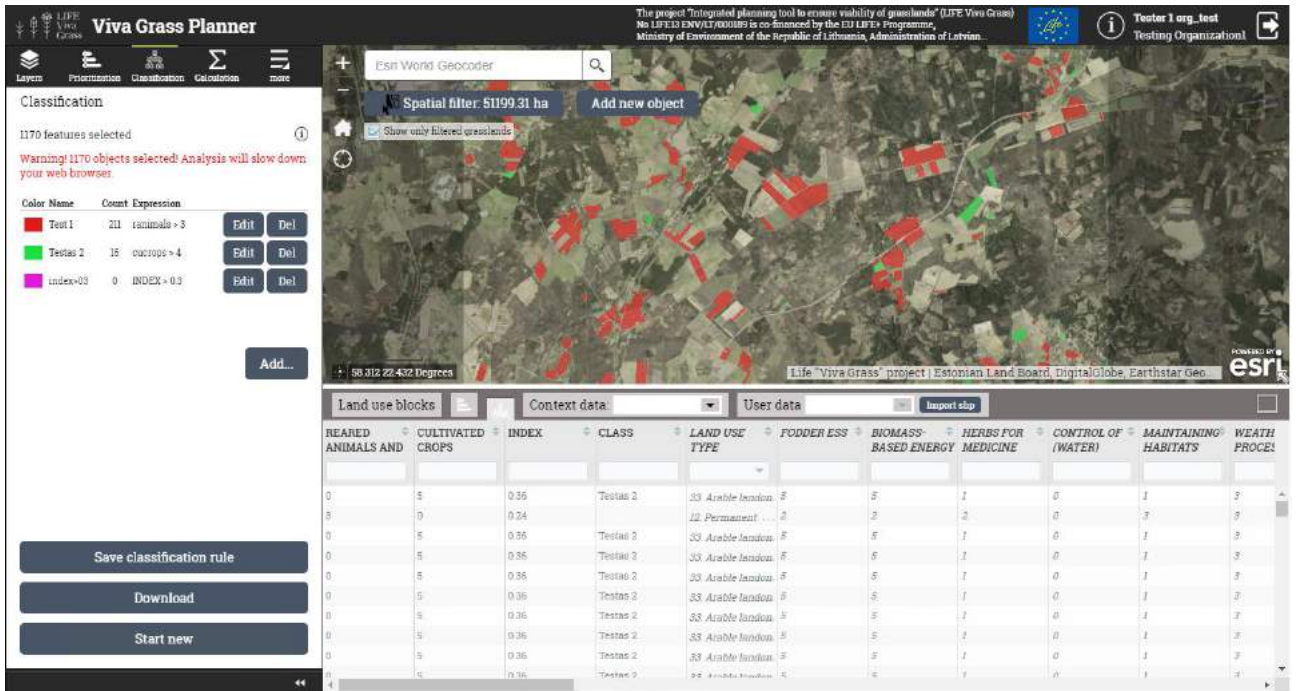
You can scroll down to review all attributes. Attributes are grouped in groups: Physical parameters, ES Values and bundles, Custom organization attributes, Owner information and Notes. “Notes” is list of multiple values. Grassland can have associated files – “Attachments”.

4.5. If you need to change attributes or object geometry, start editing session by clicking “Edit” (see more on “Classification workflow

Classification functionality allows to group (classify) grassland objects into classes by applying selection condition.

Features, matching user-defined selection condition are grouped in the same class. Decision tree classification principle is used: if the objects meet condition, they are classified and not included into further classification.





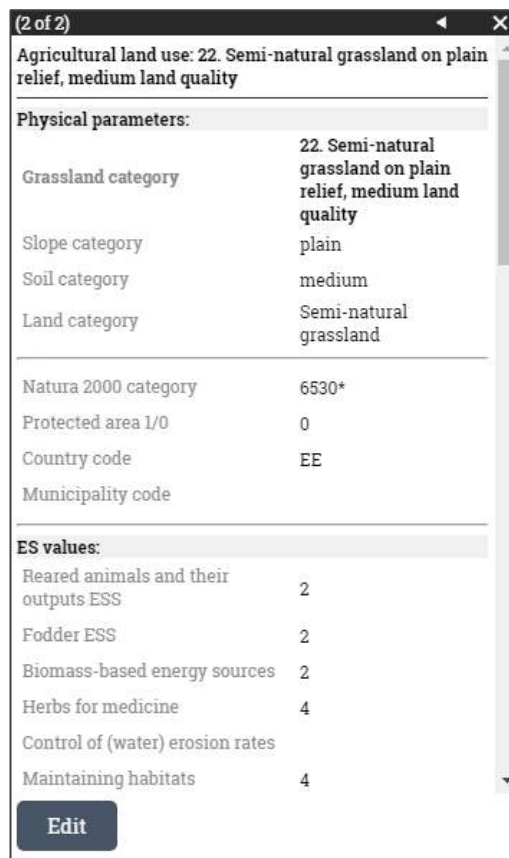
### Configure classification rule

1. Click Add... (In case if you modifying rule click "Edit")
2. Choose Display color. Classified polygons will be displayed by using this color.
3. Define class name. Class name will be displayed and stored in classification attribute table as attribute CLASS.
4. Write classification condition. This is SQL expression using field names, comparison operators ()

5. Test condition. By clicking “Test” button you will get classified by this rule count and unclassified left object count.
 

<b>Test</b>	Count: 16
	Unclassified: 927
6. Click “OK”.
7. Created rule is displayed at the bottom of rule list. Note, that order of rules is important. First are applied top classification rules. Objects, matching selection condition of higher class, will be not displayed in lower classes even if they meet selection condition.

Editing workflow”).



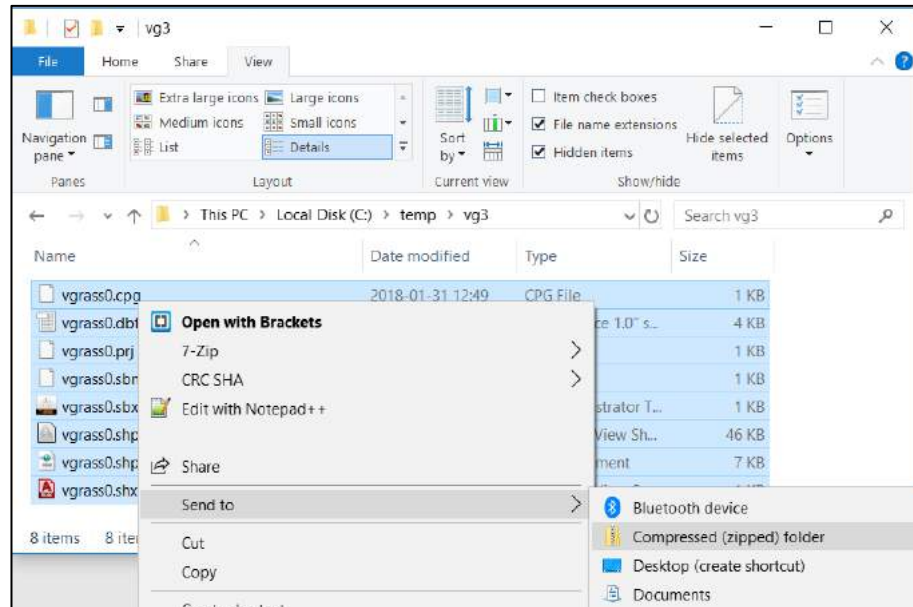
#### 4.6. Import user’s data

In attribute table there is tab “User data”. Using button “Import” user can upload his own shapefile. There are no requirements for data structure. Shape file (\*.shp file and corresponding files) must be provided zipped in “ZIP” archive without adding to sub-folders.

Added user’s data is temporary and will disappear from map after reloading application.

Data upload steps:

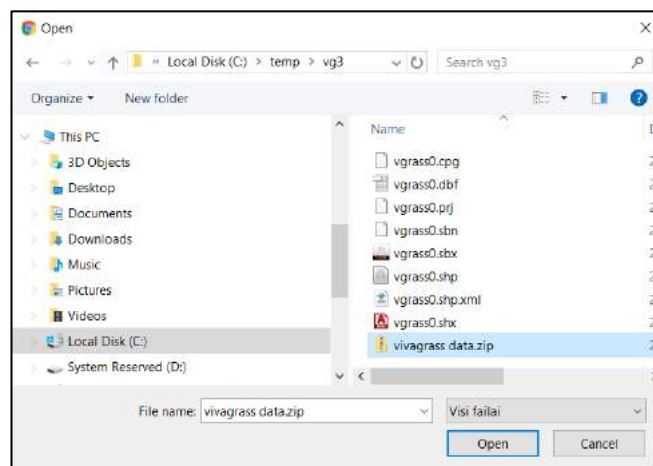
1. Select shape file and corresponding files in your file explorer (desktop).
2. Right click and select Send to > Compressed (zipped) folder



3. Open prioritization application. Select “User data” tab in table, click “Import shp”.



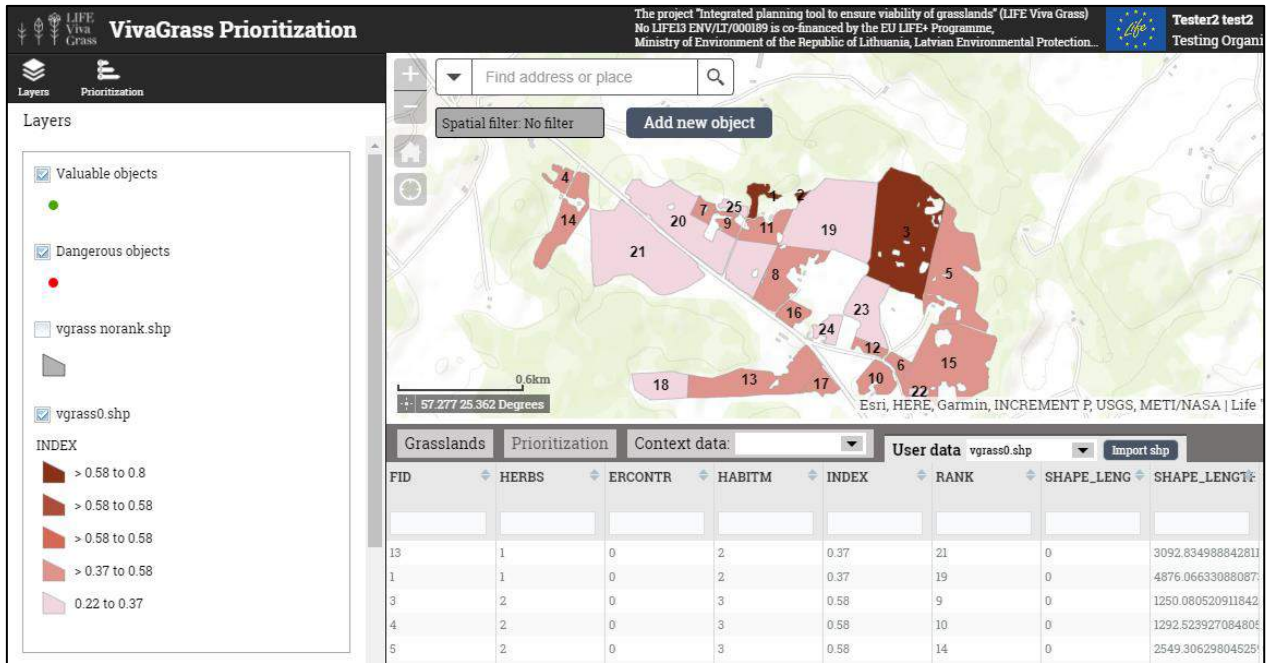
4. Select ZIP file and upload it to the tool.



5. After successful import, data is added to the map and attribute table displayed in “User data” tab.

If user data is polygon layer, containing attribute “index”, it will be displayed on the map, visualizing data divided into 5 intervals (quantiles), label is added using attribute “Rank”. If uploaded shapefile has no expected attributes, it will be visualized using gray outlines.

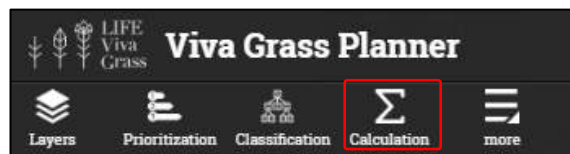




#### 4.7. Calculation of spatial relationships

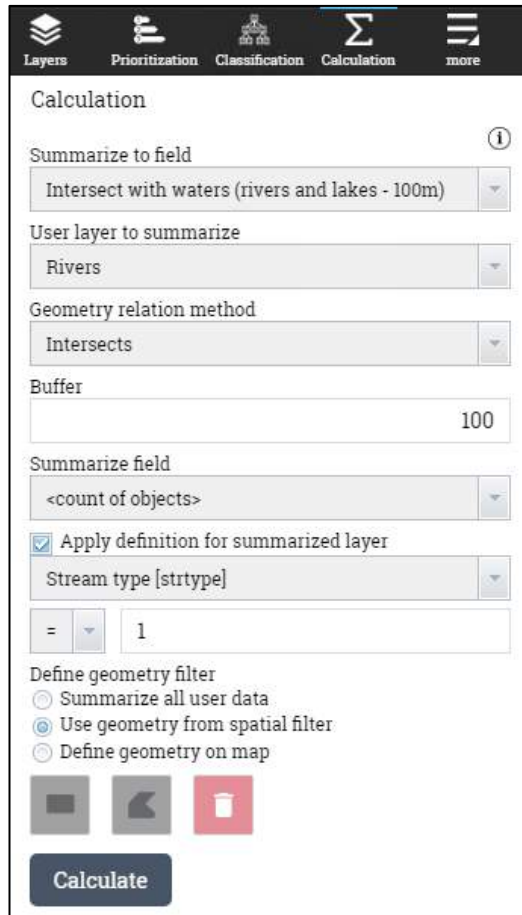
Calculation of spatial relationships allows to summarize thematic data collected by organization and stored in contextual thematic layers to one attribute field of the grassland polygon. Calculation is based on intersections between grassland polygon (or buffered grassland polygon) and specific contextual objects (rivers, roads, nature objects etc.). Number of intersecting objects or selected numeric attribute can be calculated and stored to custom grassland attribute field.

Calculation tool is initialized from tools menu by clicking button “Calculation”.



Preconditions:

1. At least one custom numeric grassland field for organization should be configured (see “Managing custom land use attributes for organization”).
2. At least one additional (contextual) organization’s layer should be configured (see “Setting additional organization layers”).



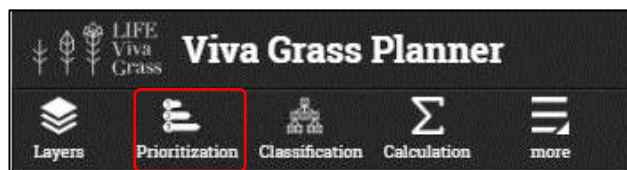
To use tool click initialize tool “Calculation” define parameters and click “Calculate”. During calculation there will be dialog box with progress displayed. When calculation is finished, you can examine calculated values in attribute table or by identifying grassland polygons.

No.	Parameter	Description
1.	Summarize to field	User defined numeric attribute field of grassland layer where the result will be stored.
2.	User layer to summarize	Organization’s layer to summarize.
3.	Geometry relation method	Intersecting geometry relation method. Intersects – if user layer object intersects with grassland polygon, they are counted. Contains - only objects, which contain grassland polygon (or buffered polygon) will be counted. This option is valid only when related layer is polygon. Within – only objects, which are fully inside grassland polygon (or buffered polygon) will be counted.
4.	Buffer	Numeric value of buffer. Buffer is generated around grassland area and increases it. Buffer can be used to summarize objects at specific distance from grassland.
5.	Summarize field	Numeric field from user’s layer to summarize. If field is not selected, count of intersecting objects will be calculated.
6.	Definition	Additional filtering expression to be used for user’s data layer. If this option is selected, valid attribute filter condition must be defined. Use field, operator and value controls to construct filter condition.
7.	Geometry filter	Additional geometry filter for grassland polygons. <ul style="list-style-type: none"> <li>Summarize all user data – filter not applied.</li> </ul>

		<ul style="list-style-type: none"> <li>• Use geometry from spatial filter – this option is available if there is spatial filter used on the map.</li> <li>• Define geometry on map – allows to select rectangle or polygon drawing tool and draw polygon on the map. Only objects inside polygon are analyzed.</li> </ul>
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#### 4.8. Prioritization workflow

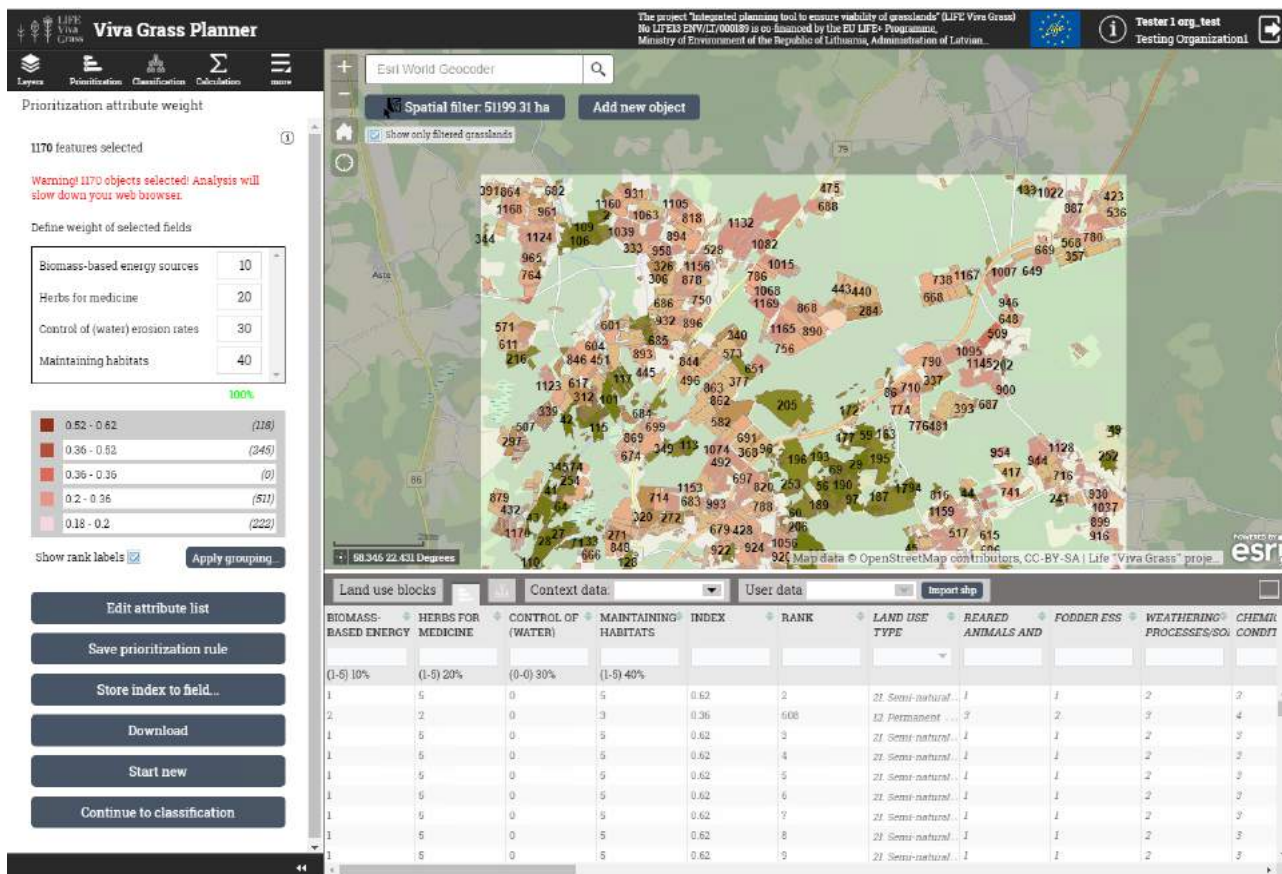
Prioritization tool activation button is available at top left of the application. Prioritization panel will appear on the left side of the map. Before prioritization start, we recommend to define spatial filter and draw analysis area. This will reduce unwanted calculations and improve performance.



In case of new prioritization:

1. Click “New prioritization”.
2. Select numeric attributes, participating in ranking and click “Next”.
3. Define weight of each attribute, while total sum of weights is equal to 100.
4. Weight indices and ranks are calculated automatically, when weight sum is equal to 100. Prioritization results divided into groups are displayed on the map. Rank label displayed on each ranked polygon.

<p><b>Prioritization</b></p> <p>1096 features selected</p> <p>Warning! 1096 objects selected! Analysis will slow down your web browser.</p> <p>Create new prioritization rule</p> <p><b>New prioritization</b></p> <p>Select existing rule</p> <p>Test analysis <i>This is a test analysis configuration</i></p> <p>Test_area_length</p> <p>Testas</p> <p>Attribute weights</p> <table border="1"> <tr><td>Biomass-based energy sources</td><td>10</td></tr> <tr><td>Herbs for medicine</td><td>20</td></tr> <tr><td>Control of (water) erosion rates</td><td>30</td></tr> <tr><td>Maintaining habitats</td><td>40</td></tr> </table> <p><b>Open</b></p> <p style="text-align: center;"><b>1</b></p>	Biomass-based energy sources	10	Herbs for medicine	20	Control of (water) erosion rates	30	Maintaining habitats	40	<p><b>Prioritization attribute selector</b></p> <p>1170 features selected</p> <p>Warning! 1170 objects selected! Analysis will slow down your web browser.</p> <p>Select fields to use for analysis</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> BLOCK ID</li> <li><input type="checkbox"/> Reared animals and their outputs ESS</li> <li><input type="checkbox"/> Fodder ESS</li> <li><input checked="" type="checkbox"/> Biomass-based energy sources</li> <li><input checked="" type="checkbox"/> Herbs for medicine</li> <li><input checked="" type="checkbox"/> Control of (water) erosion rates</li> <li><input checked="" type="checkbox"/> Maintaining habitats</li> <li><input type="checkbox"/> Weathering processes/soil fertility</li> <li><input type="checkbox"/> Chemical condition of freshwaters</li> <li><input type="checkbox"/> Global climate regulation</li> <li><input type="checkbox"/> Cultivated crops</li> <li><input type="checkbox"/> Bio-remediation by micro-organisms</li> <li><input type="checkbox"/> Filtration/storage/accumulation by ecosystems</li> <li><input type="checkbox"/> Pollination and seed dispersal</li> </ul> <p><b>Next</b> <b>Cancel</b></p> <p style="text-align: center;"><b>2</b></p>	<p><b>Prioritization attribute weight</b></p> <p>1170 features selected</p> <p>Warning! 1170 objects selected! Analysis will slow down your web browser.</p> <p>Define weight of selected fields:</p> <table border="1"> <tr><td>Biomass-based energy sources</td><td>10</td></tr> <tr><td>Herbs for medicine</td><td>20</td></tr> <tr><td>Control of (water) erosion rates</td><td>40</td></tr> <tr><td>Maintaining habitats</td><td>40</td></tr> <tr><td colspan="2" style="text-align: right;"><b>100%</b></td></tr> </table> <p><b>Edit attribute list</b></p> <p><b>Save prioritization rule</b></p> <p><b>Show index to field</b></p> <p><b>Download</b></p> <p><b>Start new</b></p> <p><b>Continue to classification</b></p> <p style="text-align: center;"><b>3</b></p>	Biomass-based energy sources	10	Herbs for medicine	20	Control of (water) erosion rates	40	Maintaining habitats	40	<b>100%</b>		<p><b>Prioritization attribute weight</b></p> <p>1170 features selected</p> <p>Warning! 1170 objects selected! Analysis will slow down your web browser.</p> <p>Define weight of selected fields:</p> <table border="1"> <tr><td>Biomass-based energy sources</td><td>10</td></tr> <tr><td>Herbs for medicine</td><td>20</td></tr> <tr><td>Control of (water) erosion rates</td><td>30</td></tr> <tr><td>Maintaining habitats</td><td>40</td></tr> </table> <p><b>0.01 - 0.02</b> (118)</p> <p><b>0.06 - 0.02</b> (248)</p> <p><b>0.00 - 0.30</b> (0)</p> <p><b>0.2 - 0.08</b> (92)</p> <p><b>0.08 - 0.2</b> (220)</p> <p><b>Show rank labels</b> <b>Apply groups</b></p> <p><b>Edit attribute list</b></p> <p><b>Save prioritization rule</b></p> <p><b>Show index to field</b></p> <p><b>Download</b></p> <p><b>Start new</b></p> <p><b>Continue to classification</b></p> <p style="text-align: center;"><b>4</b></p>	Biomass-based energy sources	10	Herbs for medicine	20	Control of (water) erosion rates	30	Maintaining habitats	40
Biomass-based energy sources	10																												
Herbs for medicine	20																												
Control of (water) erosion rates	30																												
Maintaining habitats	40																												
Biomass-based energy sources	10																												
Herbs for medicine	20																												
Control of (water) erosion rates	40																												
Maintaining habitats	40																												
<b>100%</b>																													
Biomass-based energy sources	10																												
Herbs for medicine	20																												
Control of (water) erosion rates	30																												
Maintaining habitats	40																												



When you are done with prioritization, you can download results as zipped shapefile (“Download”). Polygon shapefile with selected weighting attributes, additional “RANK” and “INDEX” attributes will be generated.

You can change weighted attributes, weights and territory (spatial filter), save and update already saved analysis. Note, that saved analysis is displayed for all members of your organization. Saved analysis includes only attribute weight configuration, it does not include real data or territory definition (spatial filter).

If you or other member of organization have already configured prioritization weights and saved prioritization rule, you can select this configuration from the list in first step. Configured prioritization weights will be provided. When you click “Open”, you will be directed to prioritization results page (step 4) with applied weights to your territory (spatial filter).

### Save prioritization rule

**Save analysis parameters**

Update existing

Save as new

Analysis name:  
My first prioritization

Description:  
Important territories for habitats and bio energy

Attribute weights:

Biomass-based energy sources	30
Control of (water) erosion rates	30
Maintaining habitats	40

### Prioritization

18 features selected

Create new prioritization rule

New prioritization

---

Select existing rule:

**My first prioritization** ✕

*Important territories for habitats and bio ...*

Attribute weights:

Biomass-based energy sources	30
Control of (water) erosion rates	30
Maintaining habitats	40

Land use blocks		Context data:		User data		Import shp				
BIOMASS-BASED ENERGY	HERBS FOR MEDICINE	CONTROL OF (WATER)	MAINTAINING HABITATS	INDEX	RANK	LAND USE TYPE	REARED ANIMALS AND	FODDER ESS	WEATHERING PROCESSES/SO	CHEMICAL CONDIT
(1-5) 10%	(1-5) 20%	(0-0) 30%	(1-5) 40%							
1	5	0	5	0.62	2	21 Semi-natural..	1	1	2	3
2	2	0	3	0.36	608	12 Permanent ...	3	2	3	4
1	5	0	5	0.62	3	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	4	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	5	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	6	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	7	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	8	21 Semi-natural..	1	1	2	3
1	5	0	5	0.62	9	21 Semi-natural..	1	1	2	3

### Explanation of weighting

Total weight index for object is sum of weighted normalized attribute values.

Weight value of one component (attribute) is calculated using formula:

$$\sum_{i=0}^n \frac{Value_i}{\max(Value) * n} Weight/100$$



Value – value of attribute.

Max (Value) – maximum value of selected attribute. Maximum value is used to normalize index. Dividing each attribute value by maximum available value, ensures, that value is in range between 0 and 1. It allows to compare and weight different attributes, having different value ranges.

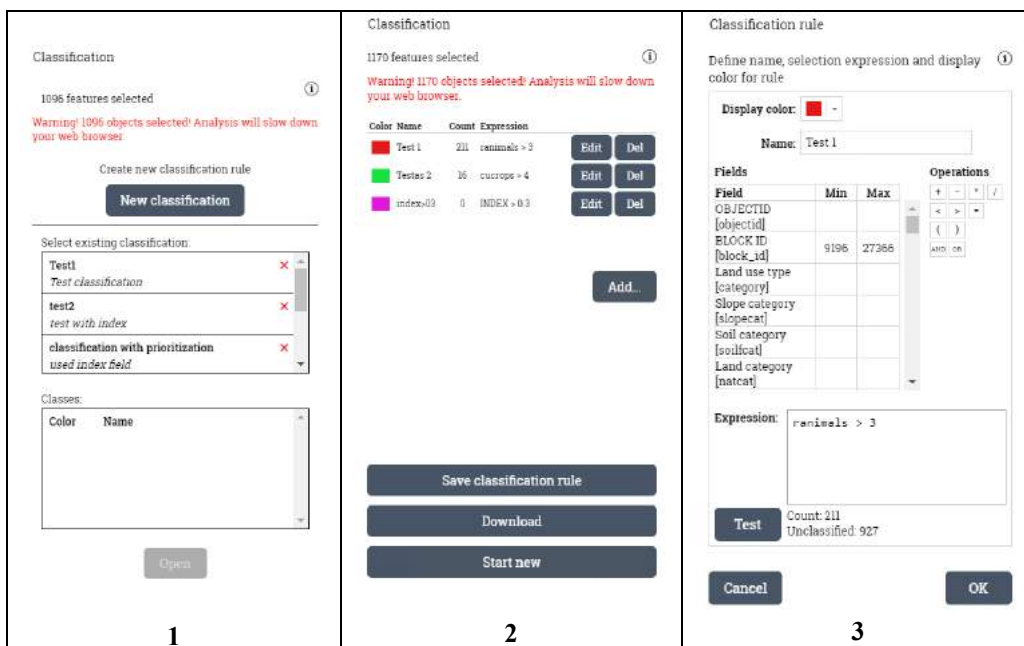
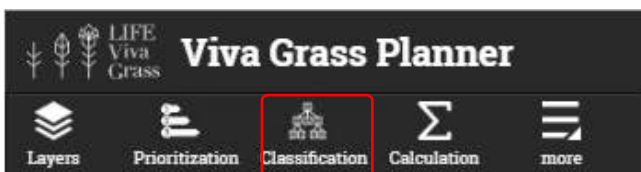
Weight – user-defined weight for the component. Total sum of weights is equal to 100.

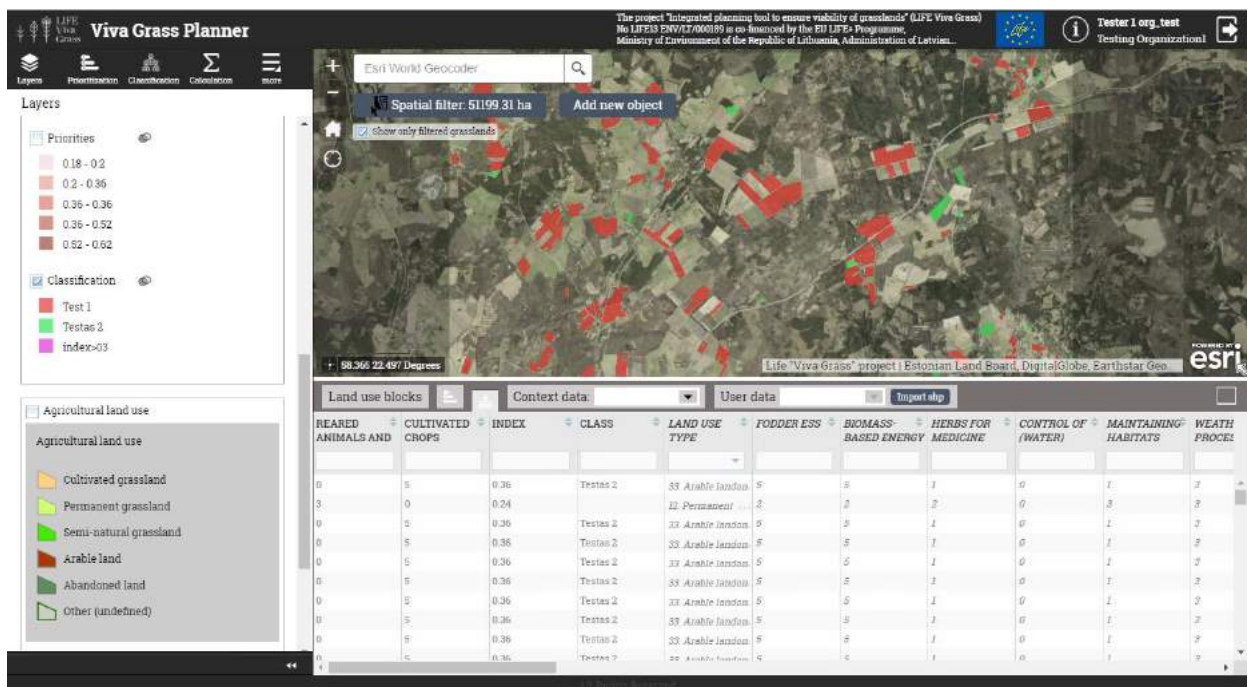
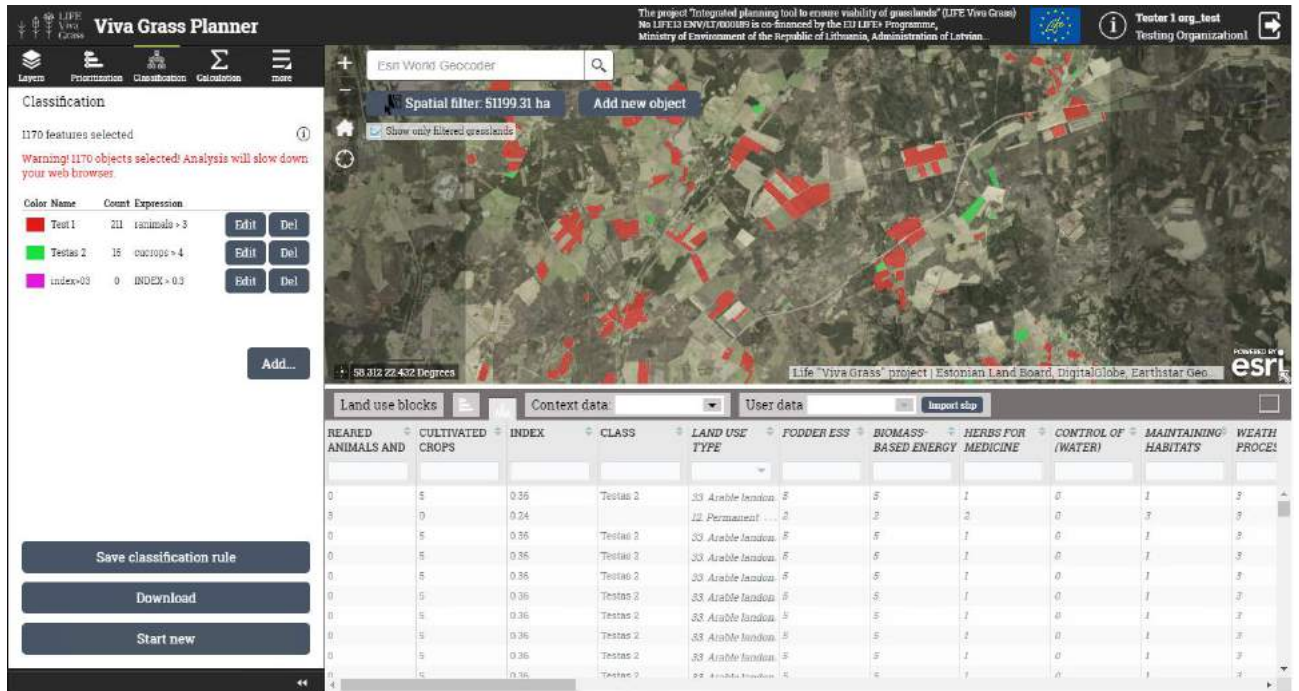
Weight of one component is calculated by calculating average value of normalized values and multiplying by user defined weight. Total weight of components should be 100%.

#### 4.9. Classification workflow

Classification functionality allows to group (classify) grassland objects into classes by applying selection condition.

Features, matching user-defined selection condition are grouped in the same class. Decision tree classification principle is used: if the objects meet condition, they are classified and not included into further classification.





### Configure classification rule

8. Click Add... (In case if you modifying rule click "Edit")
9. Choose Display color. Classified polygons will be displayed by using this color.
10. Define class name. Class name will be displayed and stored in classification attribute table as attribute CLASS.
11. Write classification condition. This is SQL expression using field names, comparison operators ()

12. Test condition. By clicking “Test” button you will get classified by this rule count and unclassified left object count.



13. Click “OK”.
14. Created rule is displayed at the bottom of rule list. Note, that order of rules is important. First are applied top classification rules. Objects, matching selection condition of higher class, will be not displayed in lower classes even if they meet selection condition.

#### 4.10. Editing workflow

Users can edit object geometries and attributes of their organization.

##### Editing geometry and attributes

To create new object:

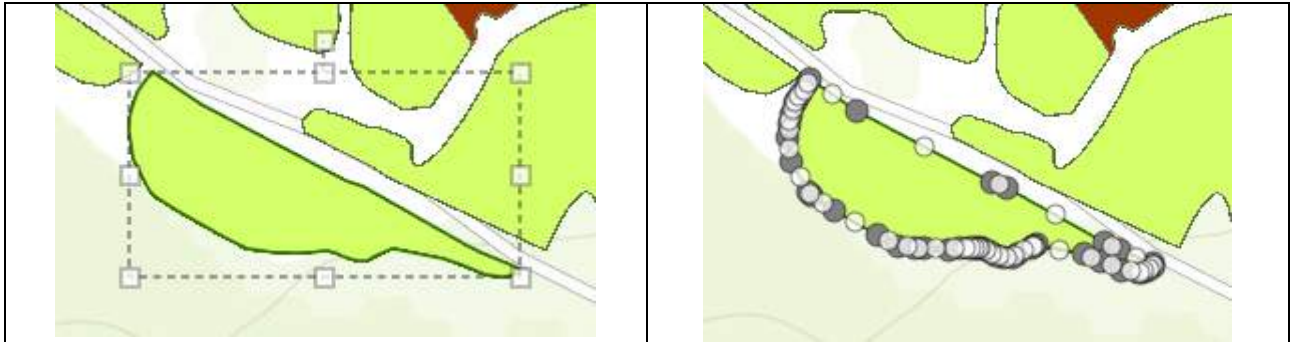
1. Click button “Add new object”.
2. Select object type to add. Land use (grassland) polygons and configured organization’s layer object types are available.
3. Draw object geometry on the map.
4. Attribute table will be displayed in edit mode. Edit attributes and click “Save”



To edit existing object:

1. Identify object on the map.
2. Click “Edit” in attribute popup window.
3. You can change values of attributes in popup window.

- Geometry of the object is highlighted on the map showing rectangle. Clicking object on the map in edit mode changes the way it is displayed – all object geometry vertices are highlighted. You can drag gray markers to move vertex of the shape or drag white markers to create new vertex. If you need to delete vertex, right click it and choose “Delete” in dialog box.
- Click “Save”.



Calculate grassland type and ES service attributes.

Calculate grassland type and ecosystem service values functionality is available in attribute editing mode.

There are expert-defined initial ES service values, dependent on grassland category. Once you have defined grassland category, you can click “Calculate ES values” - attributes “Slope category”, “Soil category”, “Land category” will be updated and default ecosystem service categories calculated.

**Agricultural land use**

Slope category	<input type="text"/>
Soil category	<input type="text"/>
Land category	Permanent gras
Land use type	<input type="text"/>

**Calculate ES Values**

In some places, where relief and soil information are available, grassland category might be determined automatically by using block area intersection with boundaries of soil, slope and land category regions. In this case, you should leave “grassland category” and other unknown fields empty. Calculation algorithm will try to determine undefined values for slope, soil, land then define grassland category and calculate default ES service values.

## Editing related records: Notes

One grassland object can have many related note records. Notes are used to store land management records and notes. Note contains date and description text.

Notes	
Date	Note
5/30/2019	Birdwathing
7/14/2019	Haymaking.

For note management in edit mode in attribute popup there is “Notes” button available. By clicking this button, you will get manageable list of all grassland-related notes.

Notes	
Date	Note
5/30/2019	Birdwathing
7/14/2019	Haymaking.

Buttons: Add..., Finish

To add new note:

1. Click “Edit” next to note.
2. Define date and write note text.
3. Click “Save”.

Notes > Add

Date: 5/30/2019

Note: Birdwathing

Buttons: Save, Cancel

To edit existing note:

4. Click “Edit” next to note.
5. Change date and note as required.
6. Click “Save”.



## Editing Owners

Attribute “Owners” allows you to select land owner from list. There is displayed owner list, managed by your organization. Only one owner at time is related to grassland.



To add new owner:

1. Open owners list by clicking button next to owner attribute.
2. Click “Add”.
3. Fill required fields.
4. Click “Save”.
5. Click “Finish” to exit from owner list.

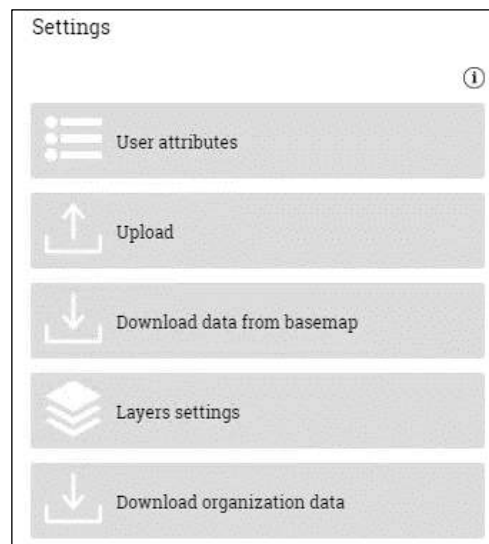


To edit existing owner:

1. Click “Edit” next to Owner record.
2. Change date and note as required.
3. Click “Save”.

## 5. Settings and organization's data management tools

“Settings” widget is collection of tools for preparation and management of organization layers and attributes available for organization data administrators. Organization data administrator role is assigned to user by main Viva Grass administrator.



### 5.1. Preparing data for new organization.

When starting new organization's account, there is no data included.

Easiest way to prepare data for newly created organization is to reuse Viva Grass basemap data.

1. Download data for territory. (Settings > Download data from basemap).
2. Upload data to organizations account. Use downloaded file. (Settings > Upload).

You can prepare custom data layers for organization. In such case you can prepare data outside tool using GIS desktop programs. You should follow data structure requirements. To get data of required structure, you can use “Download organization data” – you will get empty Shape file layers meeting structure requirements.

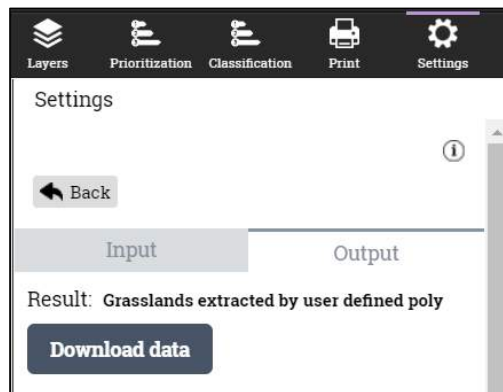
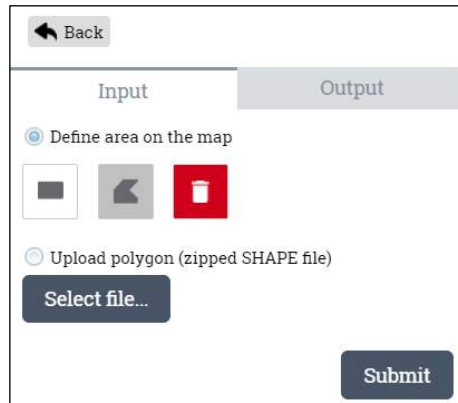
### 5.2. Download data from basemap

Organizations can reuse already prepared Viva Grass basemap data, containing main land use information and ecosystem assessment information. Viva Grass basemap is managed by main Viva Grass administrator.

To download basemap data:

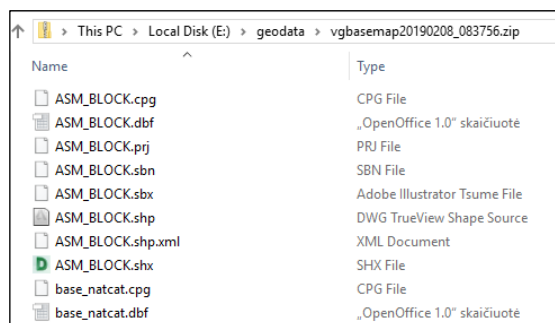
1. Open „Settings“ menu. (Settings are available for organization users with „orgadmin“ role)

2. Select “Download data from basemap”.
3. Define territory for which you want to download data. Define area by drawing polygon on the map. You can upload zipped shape file containing desired territory. (shape containing one polygon in layer “user\_area.shp”. Don’t forget to define coordinate system for data – Web Mercator Auxillary sphere is system default.).
4. Click “Submit”.



Downloaded zip file contains data from Viva Grass basemap. The file can be used to upload data to system without changing it. Shapefile named ASM\_BLOCK.shp will be uploaded and used as grasslands managed by organization.

If there is need to upload additional organization layers, see “Prepare additional layers”.



### 5.3. Download organization's data

This functionality allows to download all data collected by your organization using Viva Grass Planer application. Functionality can be used to store historical data, to backup data and to get files of required structure. All organization's data is provided as zipped shape file.

Data download steps:

1. Open Settings > "Download organization data"
2. Click "Download organization data" in dialog.
3. Wait while data is prepared on the server.
4. Follow file download steps in your web browser (define download directory etc.).












### 5.4. Setting additional organization layers

There is pre-defined number of additional layers available for collecting grassland - related information. You can use them for collect data related to grassland inventory information, calculate amounts of objects near grassland polygons using calculator tool.

To enable additional contextual organization layers:

1. Open Settings > Layer settings.
2. Selects layers to be used by organization.
3. Click "Back".

Settings	Layers
<div style="text-align: right;">(i)</div> <p><a href="#">← Back</a></p> <p>Select visible layers for organization's users:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Valuable objects</li> <li><input type="checkbox"/> Dangerous objects</li> <li><input type="checkbox"/> Custom point layer</li> <li><input type="checkbox"/> Protected species</li> <li><input type="checkbox"/> Tourism infrastructure</li> <li><input checked="" type="checkbox"/> Cultural heritage points</li> <li><input checked="" type="checkbox"/> Farms</li> <li><input checked="" type="checkbox"/> Invasive species</li> <li><input checked="" type="checkbox"/> Nature objects</li> <li><input checked="" type="checkbox"/> Rivers</li> <li><input checked="" type="checkbox"/> Roads</li> <li><input checked="" type="checkbox"/> Tourism infrastructure lines</li> <li><input checked="" type="checkbox"/> Cultural heritage lines</li> <li><input checked="" type="checkbox"/> Custom line layer</li> <li><input type="checkbox"/> Nature objects line</li> <li><input type="checkbox"/> Protected areas</li> <li><input type="checkbox"/> Custom polygon layer</li> <li><input type="checkbox"/> Protected species (areas)</li> <li><input type="checkbox"/> Risk of abandonment zones</li> <li><input type="checkbox"/> Rivers (polygons)</li> <li><input type="checkbox"/> Roads (polygons)</li> <li><input type="checkbox"/> Tourism infrastructure polygons</li> <li><input type="checkbox"/> Cultural heritage polygons</li> <li><input type="checkbox"/> Flood zones</li> <li><input type="checkbox"/> Green network</li> <li><input type="checkbox"/> Habitats</li> <li><input type="checkbox"/> Invasive species polygons</li> <li><input type="checkbox"/> Natura 2000</li> <li><input type="checkbox"/> Nature objects polygon</li> </ul> <p style="text-align: center;">Configuration of layers</p>	<div style="border: 1px solid #ccc; padding: 10px;"> <ul style="list-style-type: none"> <li><input type="checkbox"/> Cultural heritage points </li> <li><input type="checkbox"/> Farms </li> <li><input type="checkbox"/> Invasive species </li> <li><input type="checkbox"/> Nature objects </li> <li><input type="checkbox"/> Rivers </li> <li><input type="checkbox"/> Roads </li> <li><input type="checkbox"/> Tourism infrastructure lines </li> <li><input type="checkbox"/> Cultural heritage lines </li> <li><input type="checkbox"/> Custom line layer </li> </ul> </div> <p style="text-align: center;">Organizations layers displayed in layer list</p>

Note, that you can enable and disable contextual layers, data will not be deleted.

### 5.5. Prepare additional layers outside the tool

Use GIS desktop program to prepare data and then upload to your organizations account. Data should meet data structure requirements. Data should be prepared in ESRI Shape file format, placed in zipped folder (do not place data into subfolders).

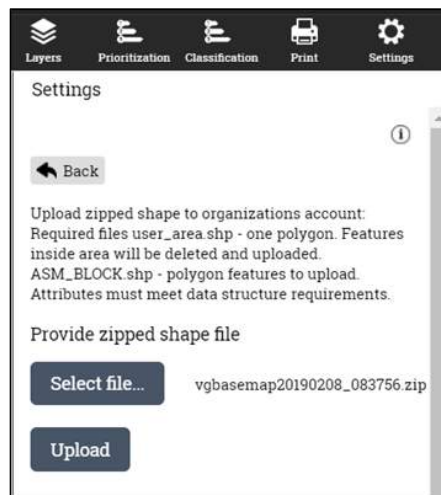


Recommendation: you can download empty structure (template) of the layers using functionality “Download organization’s data”.

## 5.6. Upload organization data

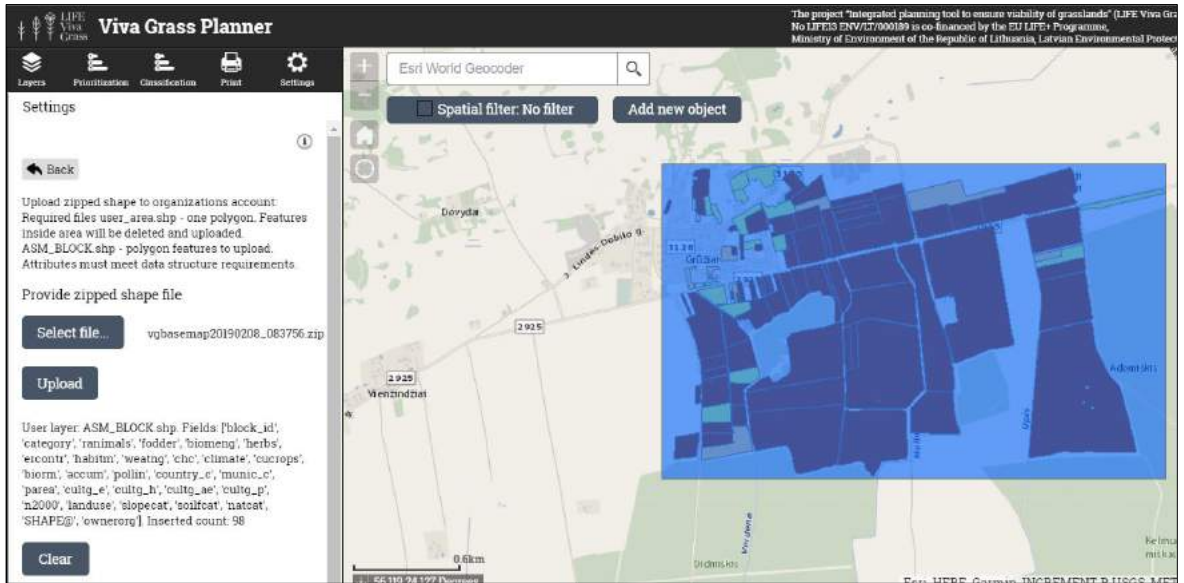
Functionality allows to upload data for organization. There is possibility to upload grassland and contextual layers as zipped shape file.

1. Open Settings > Upload data.
2. Select zip file containing grassland and area shape files (button “Select file...”). You can reuse downloaded data from basemap.
3. Click “Upload”. After successful upload data will be displayed on the map.



Requirements:

1. Data should have defined coordinate system.
2. User\_area.shp – polygon shape file (one polygon).
3. ASM\_BLOCK.shp – grassland blocks.
4. If you upload additional contextual organization layers information, you should follow requirements for data structure.



## 5.7. Managing custom land use attributes for organization

Organization users have capability to add and manage 20 custom numeric attributes and 20 custom textual attributes. You can enable these attributes and name them by the needs of your organization.

To add new custom attribute:

1. Open Settings > “User attributes”.
2. Click “Add attribute”.
3. Define attribute name.
4. Define attribute type. “String” is recommended for descriptions, classification of objects, Integer and Double for number storage.
5. Click save.

On the first column is technical attribute name displayed. This name is used when data is downloaded as shape file or by defining selection condition in classification tool.

To delete custom attribute, click **✖** (X) next to attribute.

### Manage grassland block attributes

owneruser	owneruser	text	
globalid	globalid	esriFieldTypeGlobalID	
slopecat	Slope category	Text	
soilfcacat	Soil category	Text	
natcat	Land category	Text	
ownergid	Owner	GUID	
tprod	Tradeoff in benefit of production	Small Integer	
thab	Tradeoff in benefit of habitats	Small Integer	
hotcold	Hotspot-coldspot ES	Small Integer	
ua1	Intersect with roads (60m)	Integer	✗
ua2	Intersect with waters (rivers and lakes - 100m)	Integer	✗
ua5	Hogweed plot is in Upstream	Integer	✗
ua7	Hogweed plot is in Downstream	Integer	✗
ua4	Distance to adjacent Hogweed plot	Double	✗

**Add attribute**

*8 of 20 custom numeric attributes available  
19 of 20 custom text attributes available*

Attribute name:

Type:

**Save**

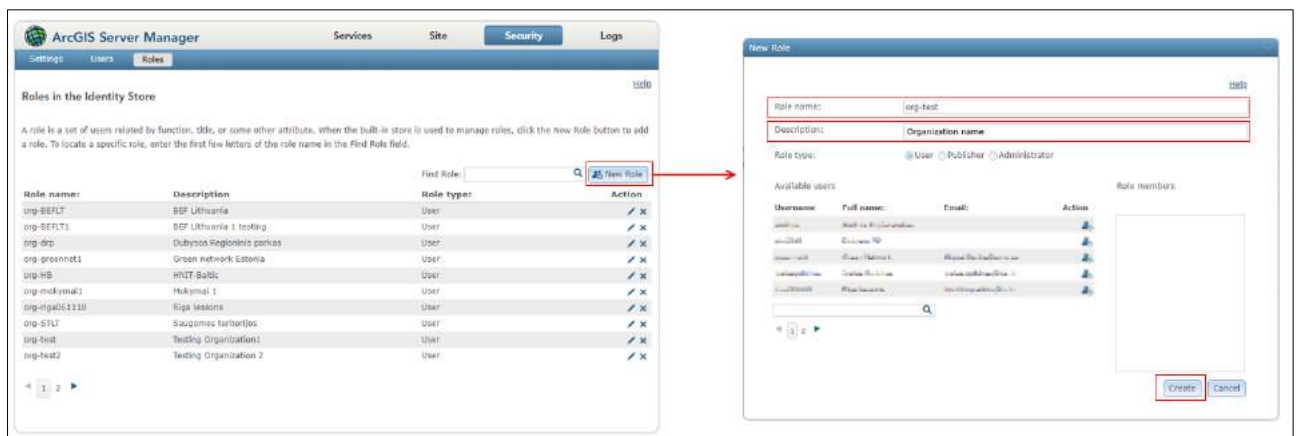
**Return to planner**

## 6. Management and configuration (for admins)

### 6.1. Creating organizations

Viva Grass Planner organizations are managed as user roles. ArcGIS Server roles, starting with prefix “org-“ are treated as organizations.

1. Open ArcGIS Server Manager, login as user with administrative privileges.
2. Go to Roles site (Security > Roles <https://arcgis.vivagrass.eu/server/manager/roles.html>)
3. Click New Role.
4. In “New Role” window fill role name and description, click “Create”
  - a. Role name: should start with „org-“, and have no spaces in name.
  - b. Description: The name of organization, displayed in Viva Grass Planner.
  - c. *Role type: ensure, that role type “User” is selected (for security reasons).*



### 6.2. Adding users

Users are managed using standard ArcGIS Server Manager interface. Users assigned to organization’s role can login to Viva Grass Planner and access data managed by organization.

1. Open ArcGIS Server Manager, login as user with administrative privileges.
2. Go to Users site (Security > Users <https://arcgis.vivagrass.eu/server/manager/users.html>)
3. Click New User.
4. In “New User” window, fill user information fields and click “Create”.
  - a. Username – user name
  - b. Password – password. Only administrators can change user’s password. Don’t
  - c. Repeat password – repeat password, passwords must match.
  - d. Email – user’s mail. Not displayed in Viva Grass applications, can be left blank.
  - e. Full name – First and last
  - f. Description – user’s description. Not displayed in Viva Grass applications, can be left blank.



### 6.3. Assigning users to organization

Users are recognized as members of organization, when they have organization role assigned.

Organization roles can be assigned to many users, but user can be representative of only one organization.

Users, who are primary organization data administrators (use Viva Grass Planner “Settings” tools) should have role “orgadmin”.

1. Open ArcGIS Server Manager, login as user with administrative privileges.
2. Go to Users site (Security > Users <https://arcgis.vivagrass.eu/server/manager/users.html>)
3. Find user in list.
4. Click “Edit” icon (✎). “Edit user” window will appear.
5. Find organization role in “Available roles”.
6. Click add role button (➕). Organization role will appear in the list “Member of”.
7. For users, who will administer organization’s data (upload, download, change attributes), add role “orgadmin”.
8. Roles appear in “Member of”. When finished, click “Save”.

