ABBREVIATIONS

AADT	Annual Average Daily Traffic
AD	Active Directory
ADT	Average Daily Traffic
CDRC	Current Depreciated Replacement Cost
CI_{BPAVE}	Condition Index – Block Pavement Structure
CI_{BRIDGE}	Bridge Condition Index
CI_{CPAVE}	Condition Index – Concrete Pavement Structure
CI_{FPAVE}	Surfacing Condition Index
CI_{SURF}	Surfacing Condition Index
$CI_{UNPAVED}$	Condition Index – Unpaved Roads
COLTO	Committee of Land Transport Officials
COTO	National Committee of Transport Officials
CRC	Current Replacement Cost
DM	District Municipality
DMBS	Database Management System
DORA	Division of Revenue Bill
DOT	Department of Transport
ECI	Engineering Condition Indices
EVU	Equivalent Vehicle Units
FI	Functional Indices
GeoRAMS	Geographical Road Asset Management System

GIS	Geographical Information System
GPS	Global Positioning System
HV	Heavy Vehicles
KML	Keyhole Mark-up Language
LM	Local Municipality
MSSQL	Microsoft SQL Server
NCN	Network Condition Number
OGC	Open Geospatial Consortium
PI_{BRIDGE}	Priority Index for Bridge
PI_{ROAD}	Priority Index for Road
PNG	Portable Network Graphics
RAMS	Road Asset Management System
RCI	Reseal Condition Index
RISFSA	Road Infrastructure Strategic Framework for South Africa
RNI	Road Network Inventory
RRAMS	Rural Roads Asset Management System
SDI	Spatial Data Infrastructure
SHP	ESRI shapefile format
SLD	Styled Layer Descriptor
TMH	Technical Methods for Highways
TRH	Technical Recommendations for Highways
VCI	Visual Condition Index
Vkm	Vehicle Kilometres

WFS	Web Feature Service
WMS	Web Map Service
XML	Extensible Mark-up Language

2. INTRODUCTION

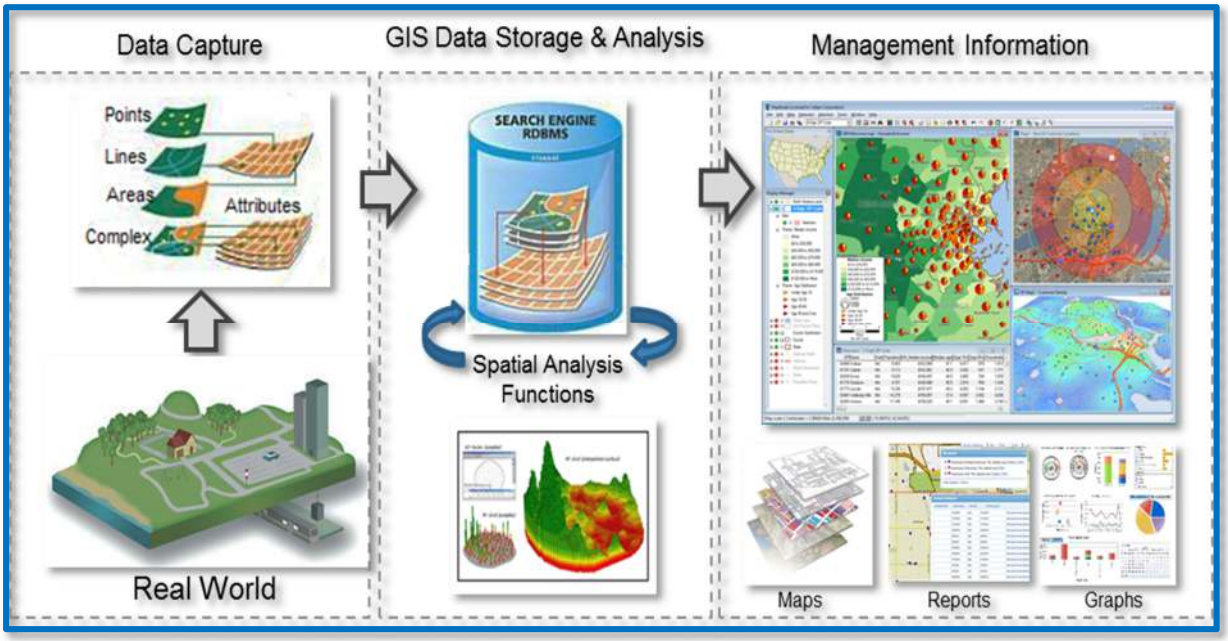
2.1 Background to RRAMS

The Rural Roads Asset Management System (RRAMS) grant has been established to ensure efficient and effective investment in rural municipal roads, through the development of a Road Asset Management Systems (RAMS). The grant is provided by National Treasury and administered by the National Department of Transport. The aim is to capacitate district municipalities to set up rural a RAMS and collect road and traffic data on municipal road networks, in line with the Road Infrastructure Strategic Framework for South Africa (RISFSA)

GeoRAMS is a web based enterprise GIS platform, that was specifically developed to store, process, analyse and present RRAMS data. This document is a guideline for users of GeoRAMS and explains the different features and functions of the platform.

2.2 What is GIS?

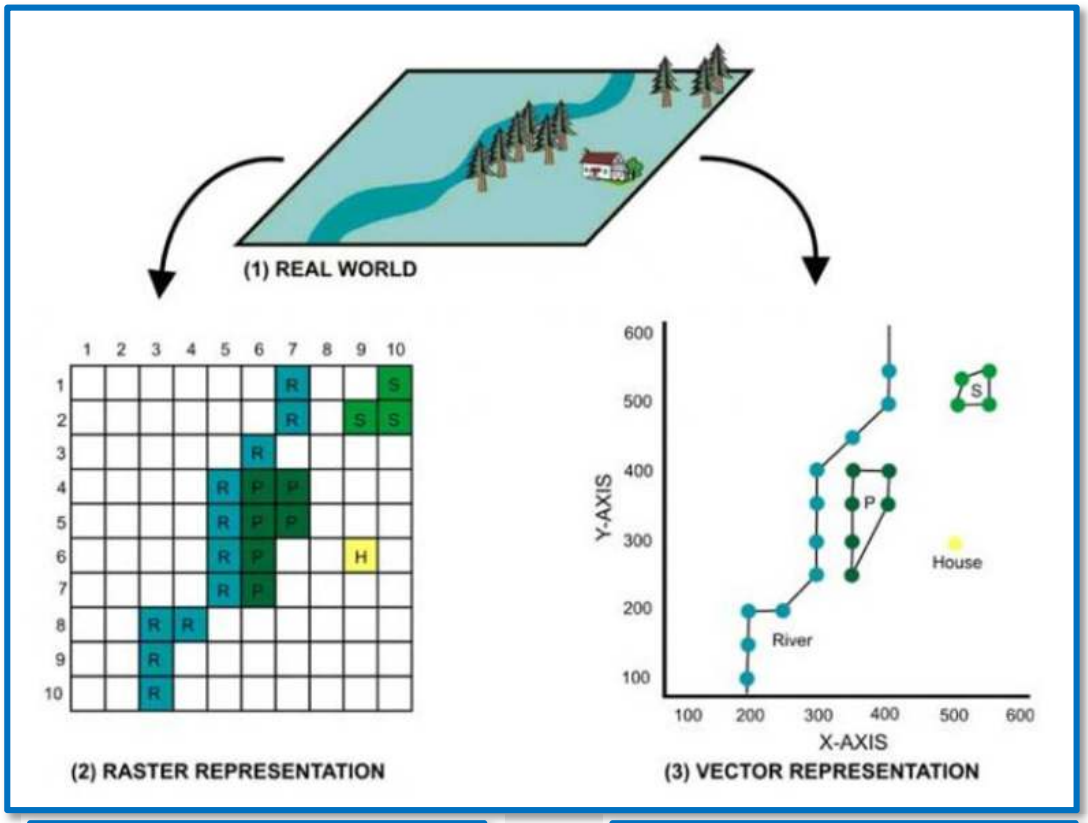
A geographic information system (GIS) is a system designed to capture, store, manipulate, analyse, manage, and present spatial or geographic data.
GIS applications are tools that allow users to create interactive queries (user-created searches), analyse spatial information, edit data in maps, and present the results of all these operations.

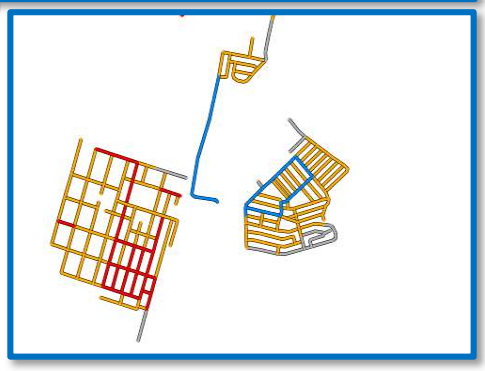


2.2.1 GIS Terminology

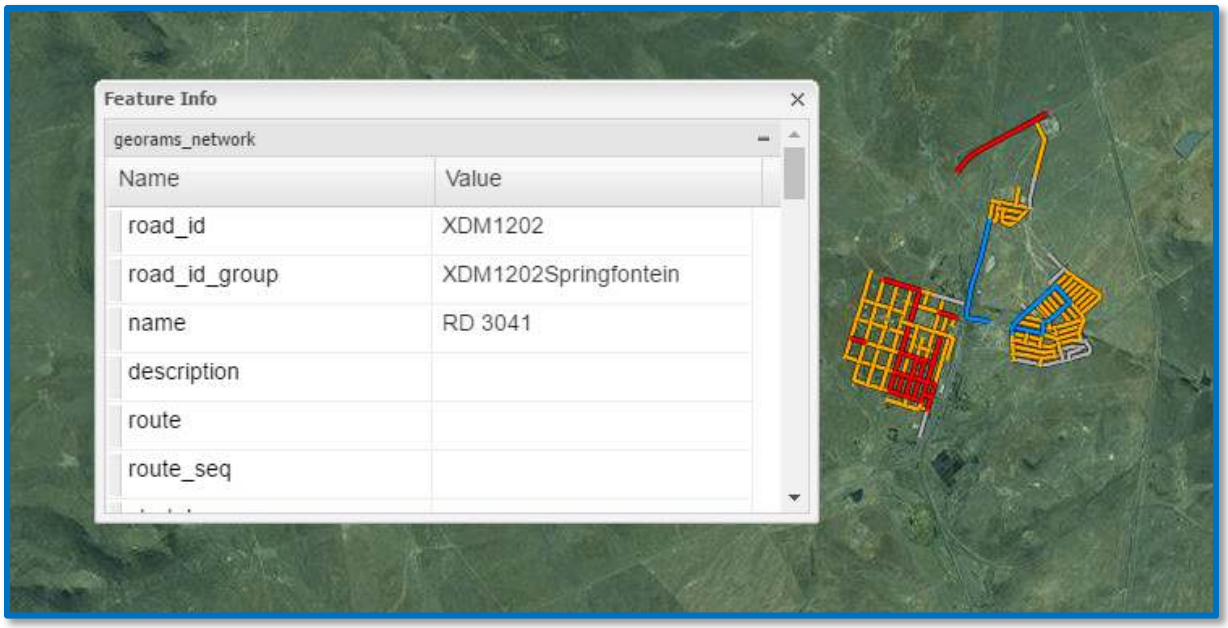
- **Raster data:** raster data is made up of pixels where each pixel value corresponds to a specific colour. The data is represented in a grid of cells (usually square). Putting these grids together allows the GIS to build a map. Examples of raster data is satellite images or aerial photographs

- **Vector data:** vector data consists of individual points that can be joined together to form lines and polygons





- **Attribute data:** attribute data is information appended in tabular format to spatial features that describes the spatial data. Spatial data represents the “where” and attribute data can contain information about the “what”, “where” and “why”.



- **Feature**: a feature is a representation of a real-world object on a map, such as a town or a road. It is a point, line or polygon object that can be used in a GIS for storage, visualization and analysis.

- **Layer:** a layer is a group of features of the same type, for example, a district boundary will have a number of line features demarcating different districts)

- **Map:** a map is an interactive presentation of different layers that is aimed at communicating a specific theme, for example, a map of all the roads in a specific municipality

3. RAMS BACKGROUND

3.1 Introduction

South Africa is highly reliant on a sufficient and effective road network, which serves as a backbone for the movement of people, goods and services. The roads infrastructure links economic hubs to each other and is vital to the economy of the country. In order to ensure that the road network is maintained at an optimal level, the South African Government, through the National Treasury, has allocated funding for the establishment of a Rural Roads Asset Management (RRAMS). The objective of this allocation is to ensure effective investment in rural and municipal roads, through the development of a Rural Roads Asset Management. This allocation is to assist district municipalities to:

- implement an RRAMS
- establish a road network inventory
- collect road condition data
- collect traffic data
- collect data on rural access bridges and culverts

According to the RRAMS grant, the system shall be utilised, in compliance with COTO, TRH and TMH standards, to identify and prioritise the maintenance requirements within the relevant budget limit, to improve condition of the roads and extend the lifespan of road infrastructure.

3.2 RRAMS Grant Requirements

The detailed requirements and conditions of the RRAMS grant, as published in the Division of Revenue Bill (DORA), is summarised below:

	Rural Roads Asset Management Systems Grant
Strategic goal	• Ensure efficient and effective investment in rural municipal roads through development of Road Asset Management Systems (RAMS) and collection of data
Grant purpose	• To assist rural district municipalities to set up rural RAMS, and collect road and traffic data on municipal road networks in line with the Road Infrastructure Strategic Framework for South Africa (RISFSA)
Outcome statements	• Improved data on municipal rural roads to guide infrastructure maintenance and investments • Reduced vehicle operating costs
Outputs	• Road inventory data • Condition assessment, traffic data and rural access bridges • Pavement and bridge management systems compatible with national standards
Priority outcome(s) of government that this grant primarily contributes to	• Outcome 6: An efficient, competitive and responsive economic infrastructure network • Outcome 7: Vibrant, equitable and sustainable rural communities with food security for all • Outcome 9: A responsive, accountable, effective and efficient local government
Details contained in the business plan	• This grant uses Road Asset Management Business Plans which contain the following details: o network data collection plan o network condition and traffic volumes o organisational and support plan o financial summary

Conditions	• For RISFSA Class R1, R2 and R3 roads, data collection requirements are:
	  ○ visual condition data not older than two years for pavements and five years for bridges
	  ○ instrumental pavement data for roughness, rut depth and macro texture not older than two years
	  ○ instrumental pavement data for structural strength not older than five years, and
	  ○ traffic data not older than three years
	• For RISFSA Class R4 and R5 roads, data requirements are:
	  ○ visual condition data not older than three years for pavements and five years for bridges
	  ○ traffic data not older than five years
	• The above condition data shall be utilised according to applicable national Committee of Transport Officials (COTO) standards, according to Technical Recommendations for Highways (TRH) and Technical Methods for Highways (TMH) to identify and prioritise the maintenance requirements within the relevant budget limit, to improve condition of the roads and extend the lifespan of road infrastructure
	• All road condition report and data collected must be submitted to the national Department of Transport (DoT), and the relevant Provincial Roads Authorities
	• Systems developed to record data must be compatible with DoT specifications (TRH26 and TMH22) for uniformity and standards

Responsibilities of the transferring national officer and receiving officer	**Responsibilities of national department** • Performance evaluation reporting • Monitoring implementation of RAMS together with provincial road authorities • Data integrity will be checked by DoT and Provincial Road Authorities • Provide guidance on sustainable RAMS operations and standards • Facilitate training to local municipalities and assist them to acquire RAMS data from DMs, provinces or DoT • Check the quality of data captured on municipalities' RAMS in collaboration with Provincial Road Authorities
	Responsibilities of municipalities • Municipalities must make provision to maintain RAMS after the lifespan of the grant • Data for all rural roads to be updated within two years • Employ unemployed youth • Ensure human capacity at municipalities for the operation of RAMS is developed • Road quality data on RAMS must be used for planning Municipal Infrastructure Grant (roads) investments as well as road maintenance funded from other sources

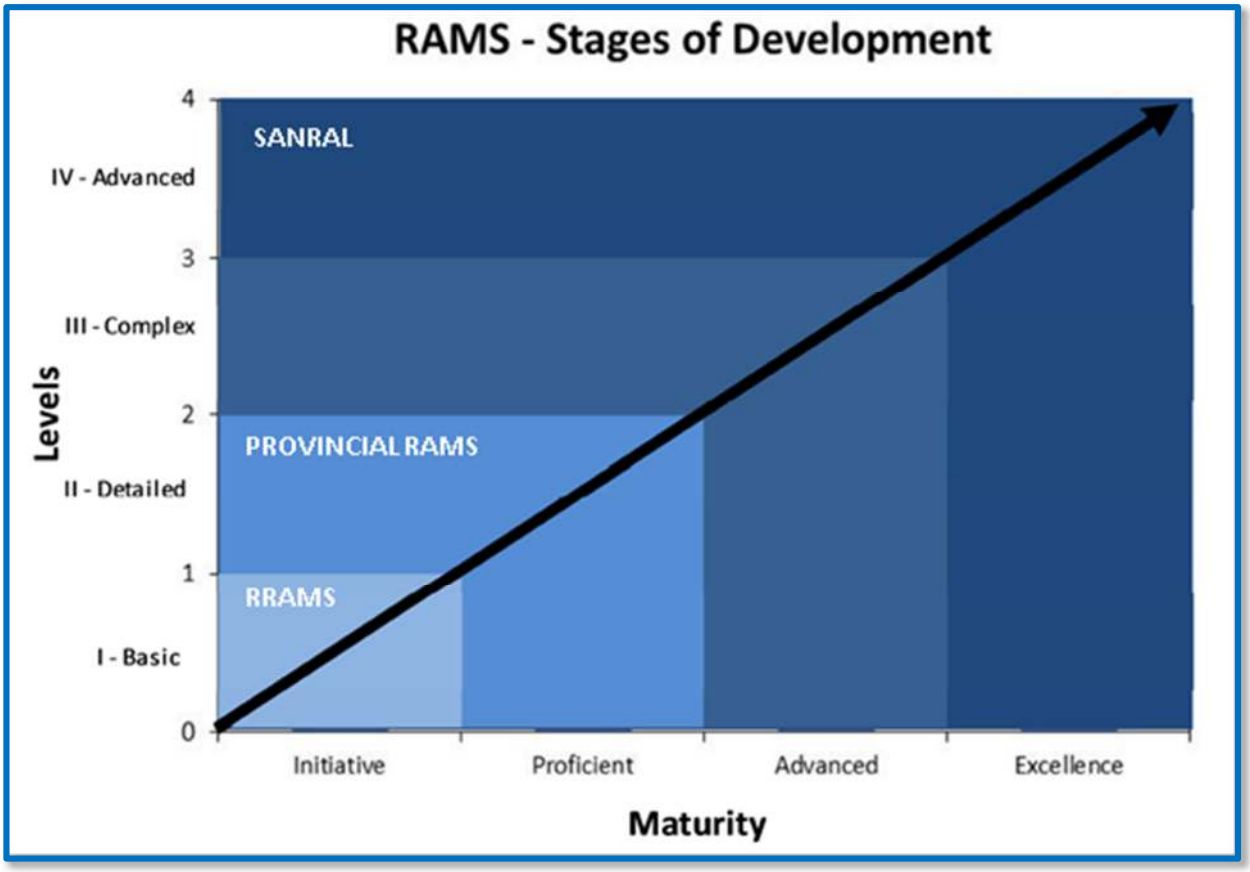
Process for approval of business plans	• DMs must submit a road conditions report for every year to DoT by 15 March of that year or the next working day
	• Road condition reports must contain the following:
	  ○ the extent of the road network in the municipality
	  ○ the condition of the network in the municipality
	  ○ the status of the municipality's RAMS
	  ○ the proportion of municipal roads with updated data captured on its RAMS
	• DoT, together with Provincial Roads Authorities will evaluate the business plans and progress reports by 30 April or the next working day of every year

The objectives of the RRAMS grant can be summarised as follow:

- improved data on rural roads to guide infrastructure investments
- efficient use can be made of available budgets in order to reduce vehicle operating costs and extend the remaining life of rural roads by means of scientific network management techniques
- creation of employment an enhancing the human capacity at municipalities for the operation of RAMS within local municipalities

3.3 RAMS Maturity Levels

RAMS operate at different maturity levels, ranging from simple systems to extremely complex integrated systems, as depicted in the diagram below. As complexity increases so does the cost, expertise and manpower to operate and maintain the system. According to TMH22, the minimum COLTO requirement is that all Provincial Authorities operate Level II RAMS and Municipal Authorities a Level I RAMS. The GeoRAMS platform is a Level 1 RAMS.



The table below describes the differences between the maturity levels, from basic (level 1) to advanced (level 4).

Section	Level I	Level II	Level III	Level IV
Inventory	Detailed listing of all roads	Integrated GIS and road and bridge inventory together with engineering details of each link	All road assets divided into components with different expected useful lives together with construction details	Inventory seamlessly integrated with planned roads, asset register, all acquisition data and related information material to performance
Valuation	Valuations per km or sq m of each road type	Valuations per sq m of road type adjusted for expected useful life	Valuation per component adjusted with estimates of remaining useful life and estimates of unit costs.	Valuation per component reliably adjusted for remaining useful life and unit costs based on detailed statistics of current construction costs.
Condition and Usage	Visual evaluations of condition of each road. Traffic counts at selected positions	Detailed, objective visual evaluations of each road and bridge with some instrument measurements. Traffic counts cover entire road network on a regular basis	Integrated visual and instrument evaluations taken at the minimum frequencies defined in Section D.5.3. Traffic count histories to reliably project future volumes	Reliable and credible condition and usage data that is used to accurately determine excess user costs and predict future excess user costs and related risks
Decision Support	Judgement of future condition and departmental priorities	Decisions based on reliable strategies and rankings based on condition and importance	Optimisation used to adapt strategies and improve returns on rehabilitation expenditure	Optimisation based on reliable performance predictions and linked to confirmation of performance based on past history
Management Plans	Minimal information on planned service levels and future expenditure forecasts	Impacts of plans shown in terms of future service levels with basic information on expenditure forecasting	Plans demonstrate achievement of objectives and likely service levels subject to budget constraints	Fully integrated with customer expectations of service levels and comprehensive risk analysis and trade-offs related to budget constraints
Feedback Loop	Anecdotal feedback of performance of actions.	Performance of actions measured as part of ongoing condition evaluation and linked to strategy	Specifically planned activities implemented to assess performance and risk and to feed into prediction models and tactics	Regular measured performance of all actions integrated into prediction models and planned actions

3.4 RRAMS Data Collection Process

The roads infrastructure is dynamic and is continuously changing; new roads are being built, roads are rehabilitated, roads deteriorate over time etc. In order to ensure that the information in RRAMS remains valid and current, data about roads infrastructure must be collected on an ongoing basis. The RRAMS grant conditions stipulate that:

- for RISFSA Class R1, R2 and R3 roads, visual condition data must not be older than two years
- for RISFSA Class R4 and R5 roads, visual condition data must not be older than three years

Given the dynamic status of the roads infrastructure and the cyclic nature of the data collection process, it is important to understand that the accuracy of the data in RRAMS improves over time (on condition that regular data collection exercises are conducted).

The type and methods used to collect data for RRAMS are briefly described below:

3.4.1 Road Network Inventory (RNI)

A road network inventory (RNI) is established by collecting the following information about roads:

- road geometry (spatial definition)
- road name
- road length
- the surface type (paved/gravel/block/concrete)
- administrative regions (such as town, district and local municipality)
- the road classification (RISFSA)

This information can either be sourced from third parties, collected in the field using GPS devices or digitised using Google Maps or ortho-imagery, for example.

Roads are segmented into discrete sections, referred to as road links and defined as follows:

- an intersection another road
- a change of surface from paved to gravel (or vice versa)
- the start or end of a roadway
- the start or end of a dual carriageway
- the start or end of a subsidy

Each road link is assigned attribution with information pertaining to the road link and its ordinal position within the road chainage. This includes:

- an incremental link identifier number
- the from_km and to_km
- the length of the road_link in km
- the from and to descriptions
- the from and to node types

3.4.2 *Road Classification*

All roads are allocated classes according to the Road Infrastructure Strategic Framework for South Africa (RISFSA) (Department of Transport, 2006), as per the table below:

Road Class	Description
1	Primary Distributors, providing high mobility with limited access for rapid movement of large volumes of people, raw materials, manufactured goods and agricultural produce of national importance.
2	Regional Distributors providing relatively high mobility with lower levels of access for the movement of large volumes of people, raw materials, manufactured goods and agricultural produce of regional importance in rural and urban areas.
3	District Distributors, providing moderate mobility with controlled higher levels of access for the movement of people, raw materials, manufactured goods, agricultural produce in rural and urban areas of regional importance.
4	District Collectors, providing high levels of access and lower levels of mobility for lower traffic volumes of people, raw materials, manufactured goods and agricultural produce in rural and urban areas of local importance.
5	Access Roads, providing high access and very low mobility routes for the movement of people and goods within urban and rural areas.

Road classification is an indication of the economic importance of a road, the lower the class the higher the importance.

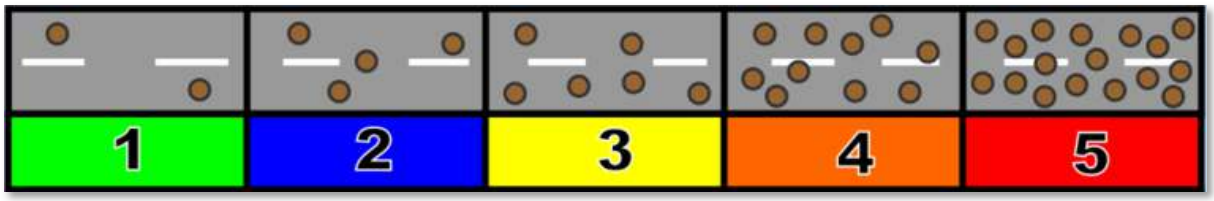
3.4.3 *Road Condition Data*

Road condition assessments are carried out by means of visual condition surveys in accordance with TMH9 (flexible roads) and TMH12 guidelines (gravel roads). Assessors assign degree and extent ratings to surfacing and structural defects (such as surface cracking and potholes) as well as functional characteristics such as riding quality and skid resistance.

The rating scores are done on a scale of 1 to 5 (4 with functional distresses) where 1: slight, 2: isolated, 3: moderate, 4: warning and 5: severe problems.

Degree

Extent



3.4.4 Traffic Data

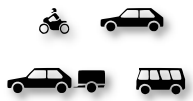
Traffic volume is one of the most important parameters in RAMS related models such as performance modelling and road deterioration, treatment selection, prioritisation and optimisation. Traffic data reflect both economic activity and factors that directly affect and accelerate pavement deterioration.

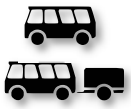
The data are normally reported by calculating the following:

- average daily traffic (ADT)
- annual average daily traffic (AADT)
- vehicle kilometres (AADT x length of the road)
- percentage heavy vehicles (as these are the vehicles that have the most adverse effect on road deterioration)

AADT is by far the most important representation of traffic on a road network and is used as a base input to many RAMS calculations and models. Calculating AADT is, however, complex as account needs to be made for seasonal, weekly and day/night distributions as well as traffic volume drift over time in relation to economic stimuli.
Gathering data on traffic is costly and needs to occur frequently in specified cycles. Due to budget constraints, it is not possible to collect 24/7/365 traffic data on all roads. For this reason, a sampling approach is typically adopted. Good results can be obtained by manually counting traffic (via 12hr (06:00 to 18:00) counts) on a third of the network nodes each year and supplementing these data with 7-day automatic temporary counts in order to calculate day/night distributions (for the calculation of ADT) and weekly distributions (for the calculation of AADT). The calculation of AADT can be greatly improved by including seasonal distribution and growth rate factors calculated from permanent count stations.

Counts are typically classified such that traffic is counted according to the five vehicle classes as indicated in the table below. To avoid pseudo growth trends, counts are typically not conducted during holiday periods (such as school and public holidays) or weekends.

Classification		Description
	**Light**	Light vehicles are motor vehicles with a gross vehicle mass of less than 3 tonnes. It includes motorcycles and motor cars with or without trailers and caravans.

	**Heavy**	The heavy vehicle class includes single-chassis or articulated heavy vehicle (truck or bus) with a gross vehicle mass of between 3 tonnes and 16 tonnes. The heavy vehicles in this class have up to 3 axles, at least one of which has more than one wheel on each side.
	**Very Heavy**	Very heavy vehicles are articulated heavy vehicles with a gross vehicle mass of greater than 16 tonnes. The heavy vehicles in this class have more than 3 axles, at least one of which has more than one wheel on each side.
	**Bus**	Buses are heavy vehicles adapted for the conveyance of groups of people with a seating capacity of 40 or more.
	**Taxi**	Taxis are light vehicles adapted for the conveyance of groups of people with a seating capacity of up to 40.

Class	Functional Classification	Description	Speed (km/h)
1	Freeway / Expressway	Freeway with no at grade intersections, regional traffic, high design speed and exclusive mobility function	120
2	Major Arterial Street Regional Distributor Road	Typically provide a link between cities / towns or a major distributor within a city, high mobility function	80 - 100
3	Arterial Street	Link between major suburbs and the CBD or between 2 suburbs, mobility function	60 - 80
4	Collector Street	Important link between class 5 and 3 roads, access function with limited mobility	60
5	Access Street	Provide access to private erven	50 -60

3.4.5 Road-side Furniture

The collection of data regarding road-side furniture is considered a lower priority for RRAMS and is typically only gathered after RNI, road condition and traffic data has been collected. Road-side furniture to be captured (as per THM22 (Committee of Transport Officials, 2013b)) include:

- Guardrails
- Road signs
- Road markings
- Bus shelters

- Minor retaining structures

3.4.6 *Bridge data collection*

Data on the condition of bridges must also be captured as part of RRAMS, however RRAMS is not a bridge management system. Condition assessment of bridge structures can only be carried out by qualified and registered bridge inspectors.

3.5 RRAMS Output

According to the RRAMS grant, the system must be utilised, to identify and prioritise the maintenance requirements within the relevant budget limit, to improve condition of the roads and extend the lifespan of road infrastructure.

3.5.1 *Calculations*

In order to determine treatment actions, the system must perform calculations from the visual condition and traffic data. Several indices are calculated from the data.

These indices, comprising engineering condition indices (ECIs) and functional indices (FIs), allow various problems on the road network to be highlighted to assist in identifying possible remedial measures and the prioritisation thereof. The EIs are based on the condition of individual components of the asset, rated from an engineering point of view with the view of maintaining the asset in an acceptable condition. The FIs are based on an appraisal of the asset in terms of functional characteristics that affect the quality of use, notably comfort (convenience) safety, congestion and operating cost (TMH22). The table below lists the items that are calculated by the system:

Calculation/Index	Description
VCI	Visual Condition Index (Aggregation method per TRH22)
RCI	Reseal Condition Index (Aggregation method per TRH22)
CI_{SURF}	Surfacing Condition Index (Deduct method per TMH22)
CI_{FPAVE}	Condition Index – Flexible Pavement Structure (Deduct method per TMH22)
CI_{CPAVE}	Condition Index – Concrete Pavement Structure (Deduct method per TMH22)
CI_{BPAVE}	Condition Index – Block Pavement Structure (Deduct method per TMH22)
$CI_{UNPAVED}$	Condition Index – Unpaved Roads (Deduct method per TMH22)
CI_{BRIDGE}	Bridge Condition Index (Struman DERU algorithm)
PI_{ROAD}	Priority Index for Road (TRH22) – uses weighting factor of the selected remedial action for each road section together with the road class
PI_{BRIDGE}	Priority Index for Bridge (Struman PI algorithm)
EVU	Equivalent Vehicle Units

V_{km}	Vehicle Kilometres
AADT	Annual Average Daily Traffic
%HV	Percentage Heavy Vehicles
Road Capacity	Equivalent Vehicle Units (EVUs) per day
CRC	Current Replacement Cost
CDRC	Current Depreciated Replacement Cost
NCN	Network Condition Number

All condition-based indices are presented in summarised form, expressed per LM, town, RISFSA class, and surface type and is presented according to the categories listed in the table below:

Condition Category	Index Range	Condition Category Description	Functional Category Description	Colour Code	Structures
Very Good	85 - 100	Asset is still like new and no problems are expected.	Good service levels at all times	Blue	Good 70 – 100 Green
Good	70 – <85	Asset is still in a condition that only requires routine maintenance to retain its condition.	Mostly good service levels with isolated problems occurring at certain times.	Green	
Fair	50 – <70	Some clearly evident deterioration and would benefit from preventative maintenance or requires renewal of isolated areas.	Reasonable service but with intermittent poor service.	Orange	Warning 50 – <70 Orange
Poor	30 – <50	Asset needs significant renewal or rehabilitation to improve its structural integrity	Generally poor service levels with occasional very poor service being provided.	Red	Critical 0 – <50 Red
Very Poor	0 - <30	Asset is in imminent danger of structural failure and requires substantial renewal or upgrading with less than 10% of EUL remaining.	Very poor service levels at most times.	Purple	

3.5.2 RRAMS Report and Data

According to the conditions of the RRAMS grant, a road condition report must be submitted to the National Department of Transport (NDoT) on an annual basis, contain the following:

- the extent of the road network in the municipality
- the condition of the network in the municipality
- the status of the municipality's RAMS
- the proportion of municipal roads with updated data captured on its RAMS

The municipality is also responsible for submitting RRAMS data to NDoT on an annual basis.

3.6 Capacity Building

One of the objectives of the RRAMS grant is to build human capacity for the operations of the system within municipalities. The grant provides opportunities for unemployed civil technicians to be employed and capacitated under the project. With the required training and support, graduates become responsible for collecting information, such as condition and traffic data, as required by the system.

4. WEB INTERFACE

Web GIS is defined as any Geographic Information System that uses Web technology to communicate between components. Web GIS is synonymous to a distributed information system. A Web GIS should at least consist of a server and a user, where the server is a Web application server, and the user is a Web browser - either through a desktop or mobile application.

The server has a URL so that users are able to find the Web Interface from the Internet. The user relies on HTTP specifications to send requests to the server (*Figure*). The server performs the requested in GIS operation and sends a response to the user via HTTP. In addition, the format of the response to the Web browser user can also be done in the following formats: HTML, binary image, XML (Extensible Markup Language), or JSON (JavaScript Object Notation) (GIS in the Web Era, n.d.).

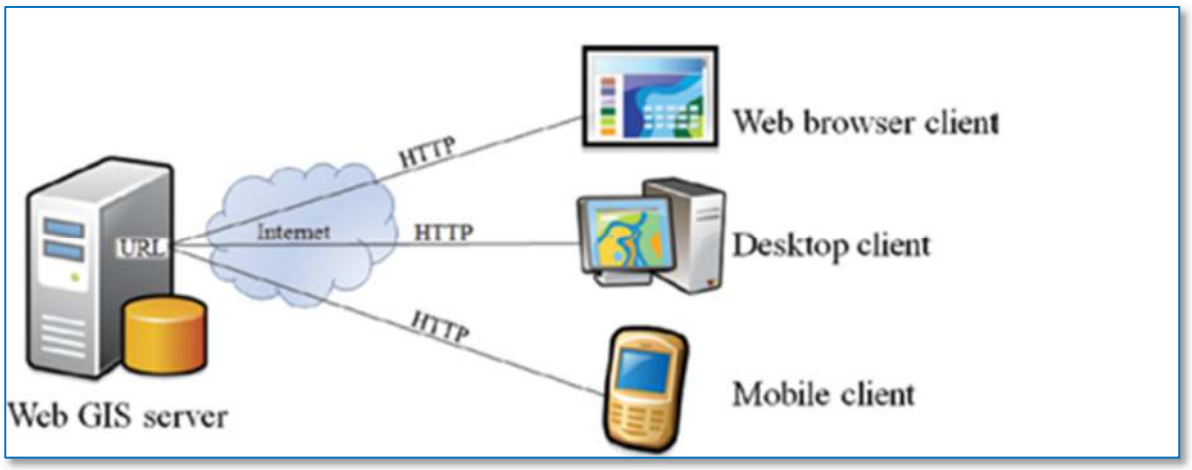


Figure 4: A Web GIS consists of a Web application server and a user, which can be a Web browser. The server and the user communicates through HTTP

However, the Department's Web GIS architecture consist of a three tier user/server Web GIS mode architecture system, which is divided into three levels of function logic. The three levels consist of the following: the first level consists of the user interface; the second level consists of GIS transaction processing business logic; and the third level consists of GIS spatial data storage (Luqun, Jian & Yu, 2002).

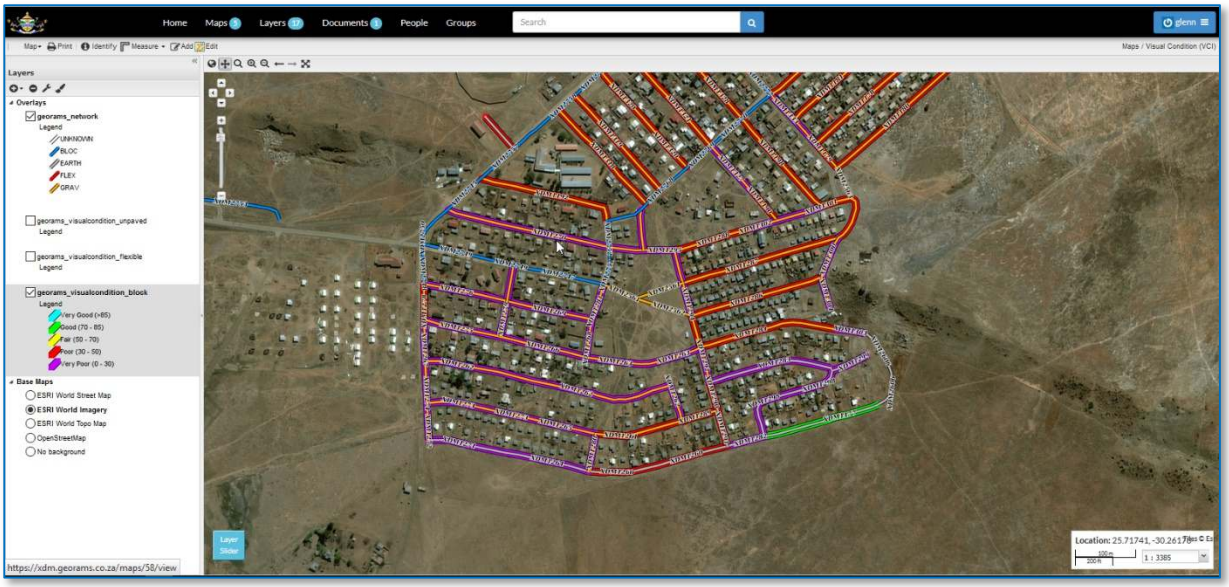
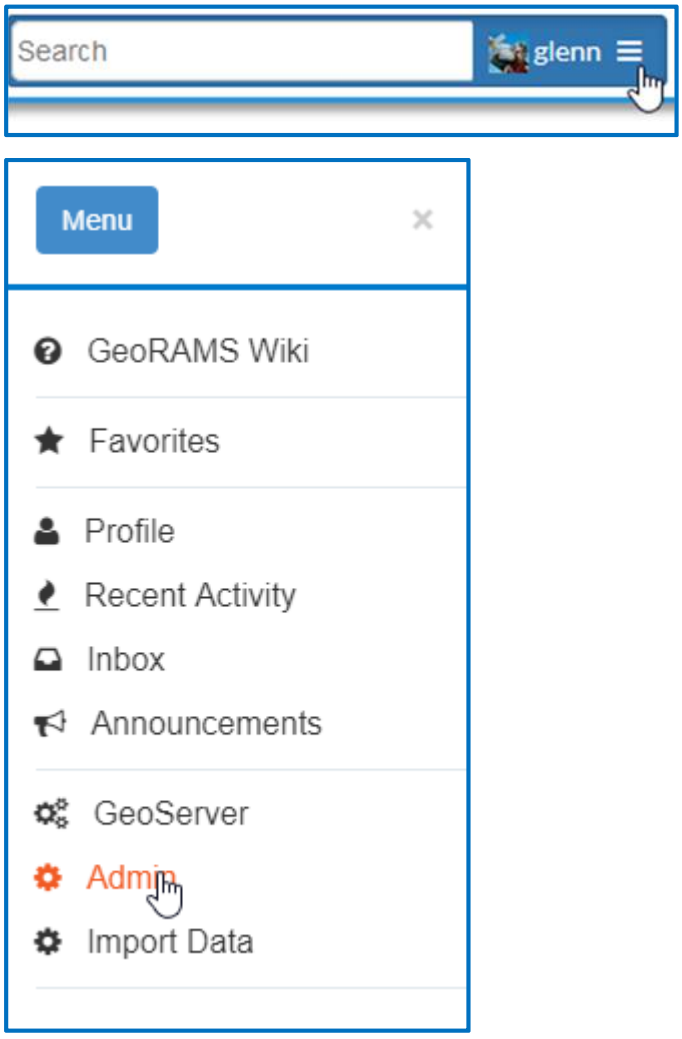


Figure 5: The Web Interface

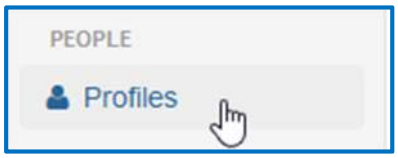
4.1 OPERATIONAL

4.1.1 Create user

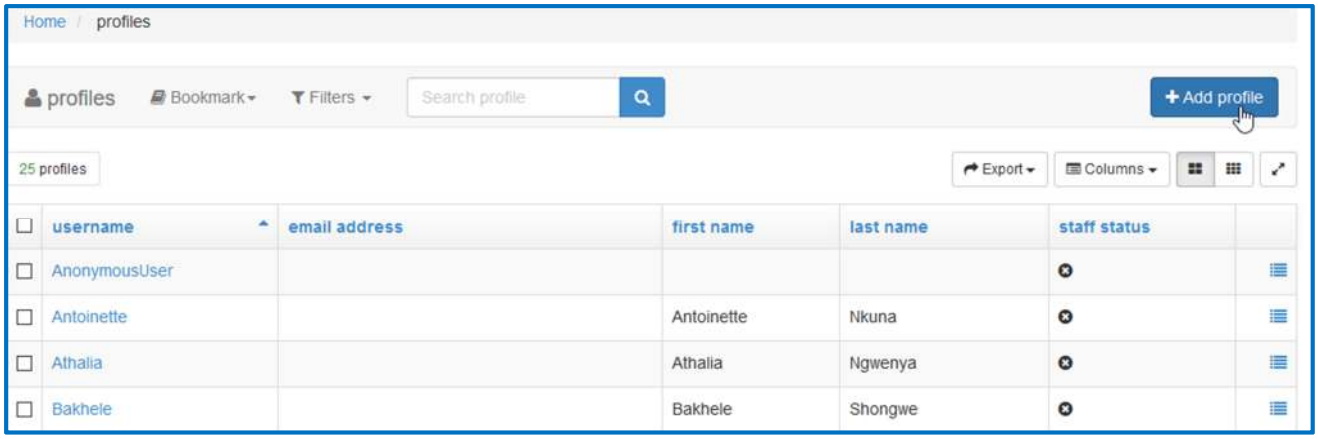
The Admin user will login to the system and use the Admin interface to create a new user and assign privileges. Go to the menu bar to get access to the admin interface. Click on **Admin.**



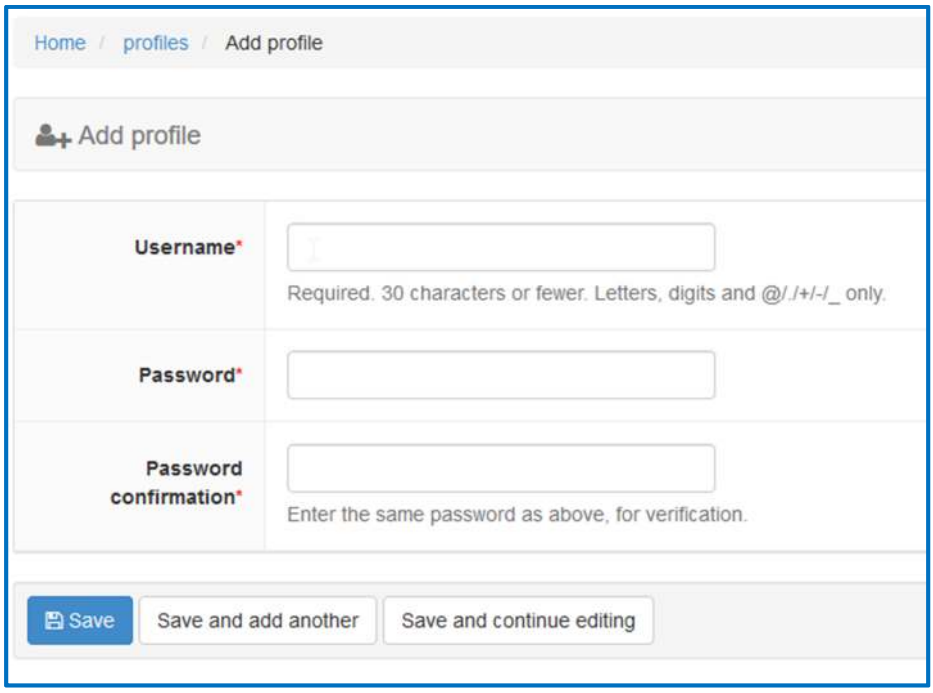
Scroll down to People and click on Profiles.



Select Add profile

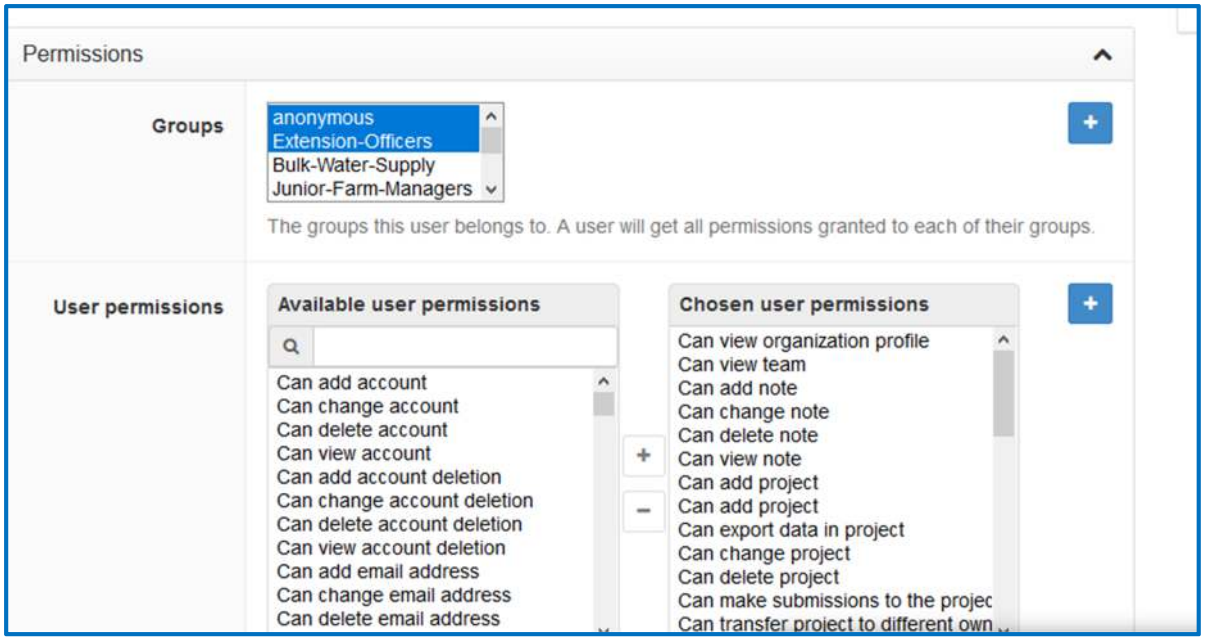


Create a username and password and save the profile.



Back in the Profile window, select the new user to set the permissions.

Select the **group** that this user belongs to and select the **User permissions**. Complete the rest of the form and **Save** all changes when done.

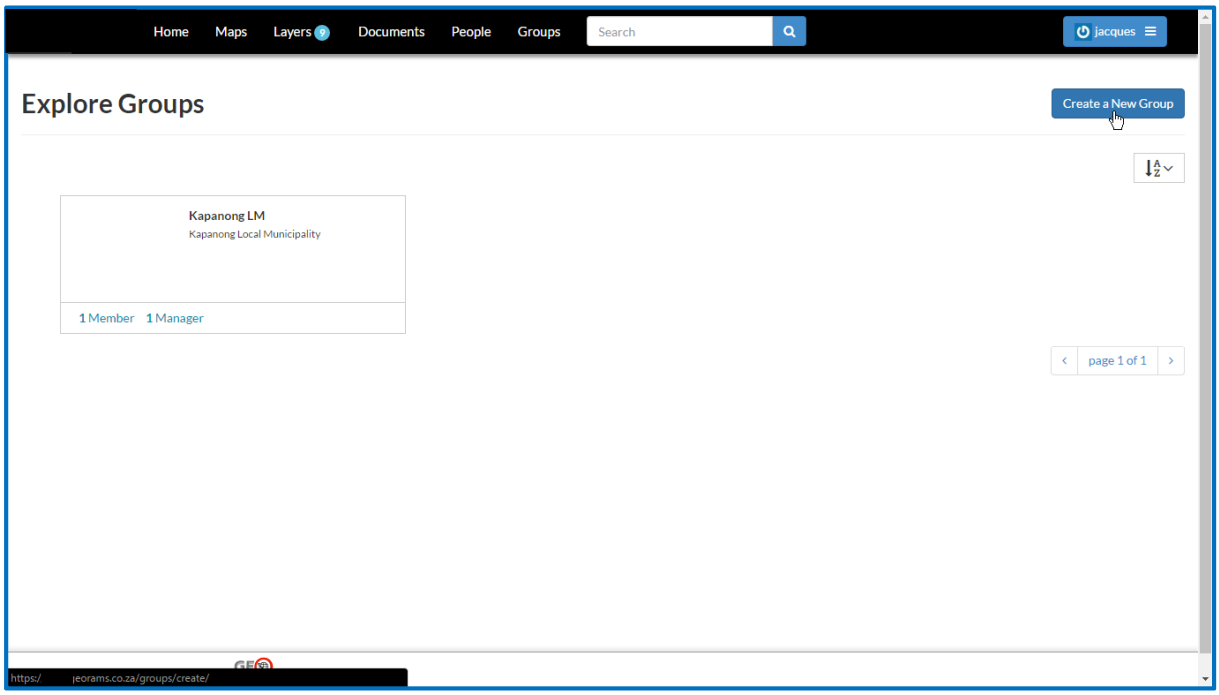

Permissions
Groups
anonymous
Extension-Officers
Bulk-Water-Supply
Junior-Farm-Managers
The groups this user belongs to. A user will get all permissions granted to each of their groups.
User permissions
Available user permissions
Can add account
Can change account
Can delete account
Can view account
Can add account deletion
Can change account deletion
Can delete account deletion
Can view account deletion
Can add email address
Can change email address
Can delete email address
Chosen user permissions
Can view organization profile
Can view team
Can add note
Can change note
Can delete note
Can view note
Can add project
Can add project
Can export data in project
Can change project
Can delete project
Can make submissions to the projec
Can transfer project to different own

4.1.2 Create GeoRAMS Group

Any user can create their own groups that can be used for collaboration - for example, the sharing of maps and documents with focus groups.

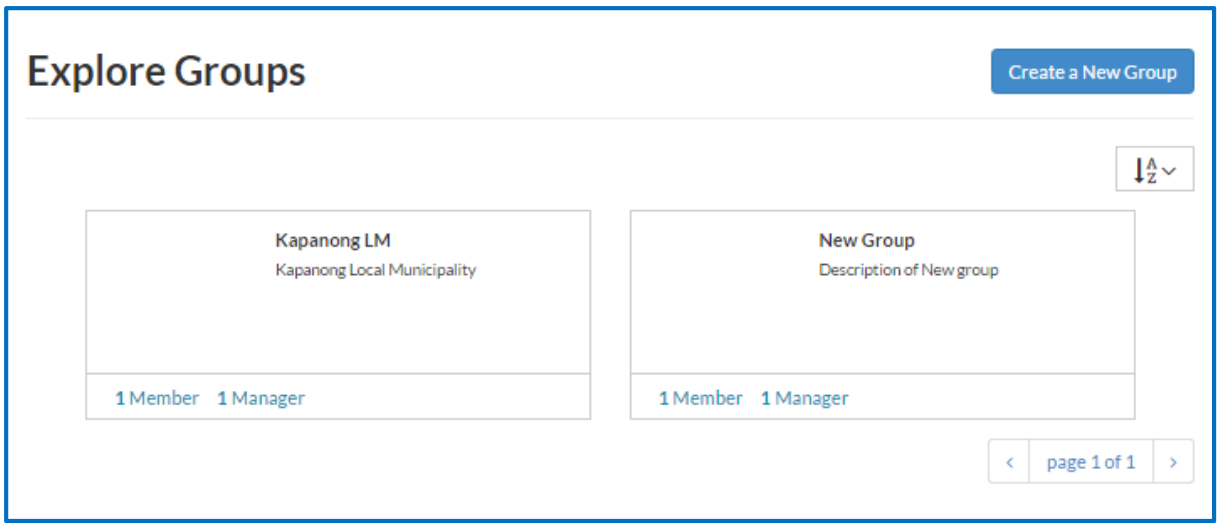
Create group

With the aim of creating a new group the following link must first be opened: http://youraddress.georams.co.za/groups. After this page opens, the **Create a New Group** option must be selected on the Web browser.



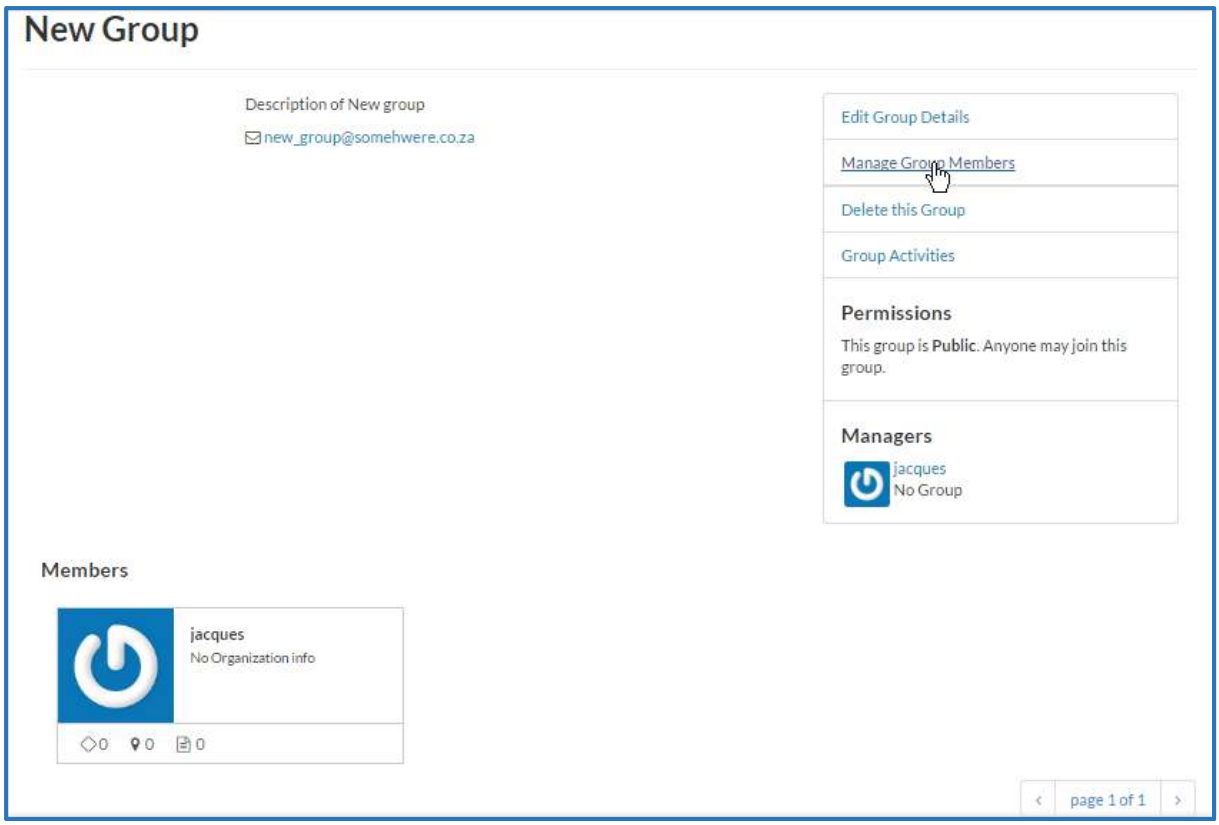
After the **Create a New Group** option has been select a **Create a Group** dialogue box will open. The various fields that are shown in the Create a Group dialogue box should then be filled in and completed, where after the **Create** option should then be selected.

After the **Create** option has been selected, the new group will then appear in the Group list.



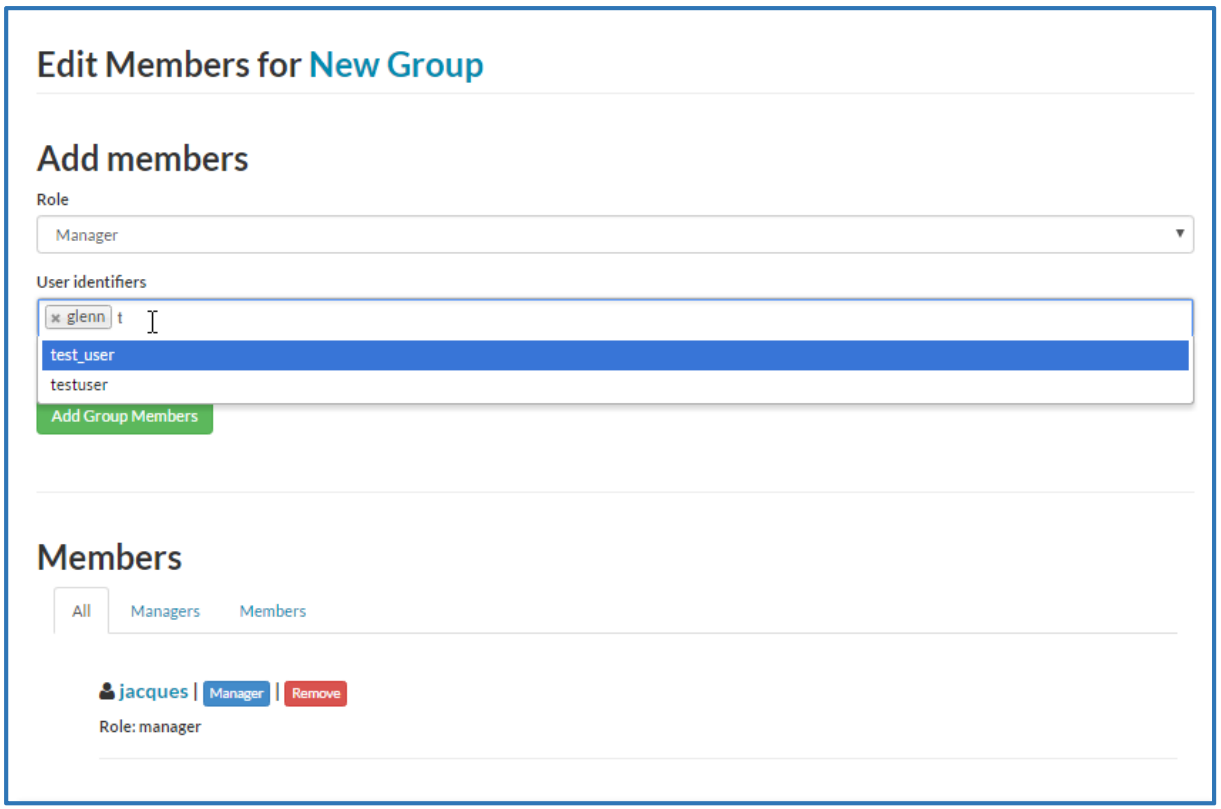
Add users

To add users to a group, a particular group must first be selected in order to enable an editing session. After a particular group has been selected (for example, New Group), the **Manage Group Members** option should then be selected.

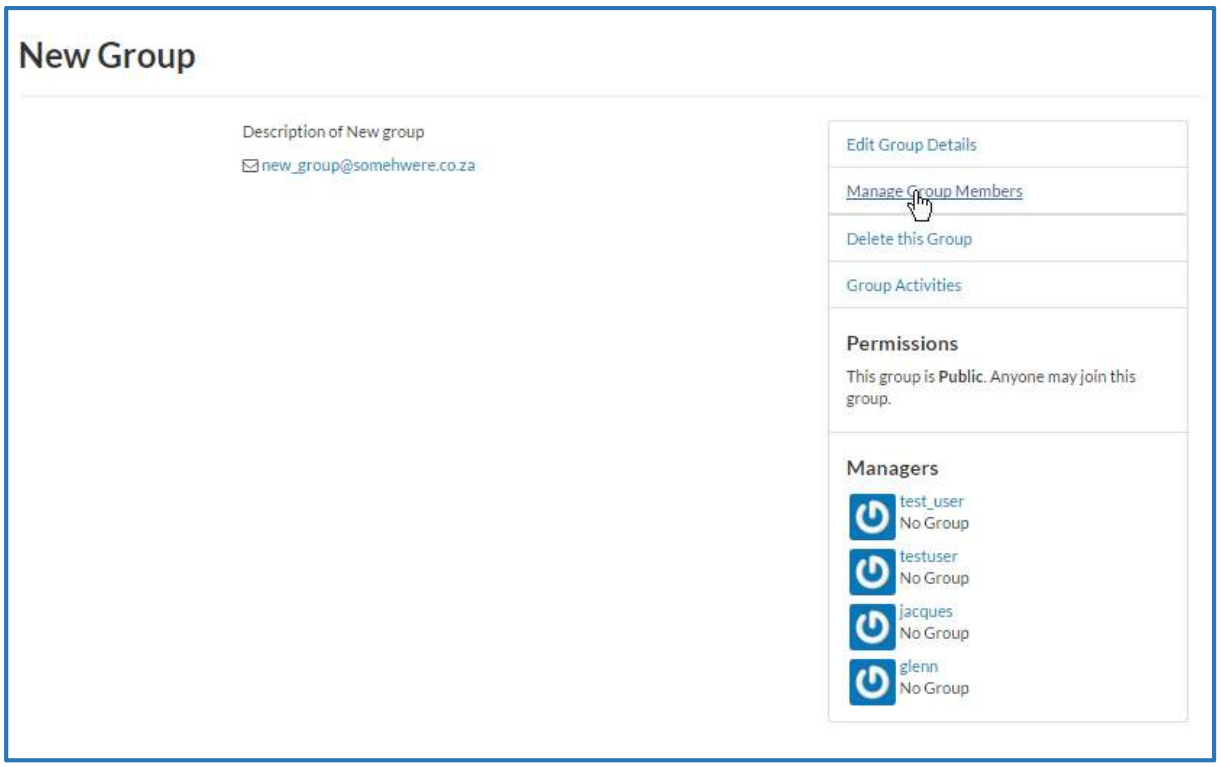


After the **Manage Group Members** option have been selected, the **Edit Members for New Group** dialogue box opens. Users with rights to manage the group should first be added. After the managers have been added the **All** tab should then be selected, where after a role should be selected for each member that have been added to the group (i.e. select Role: **Manager**).

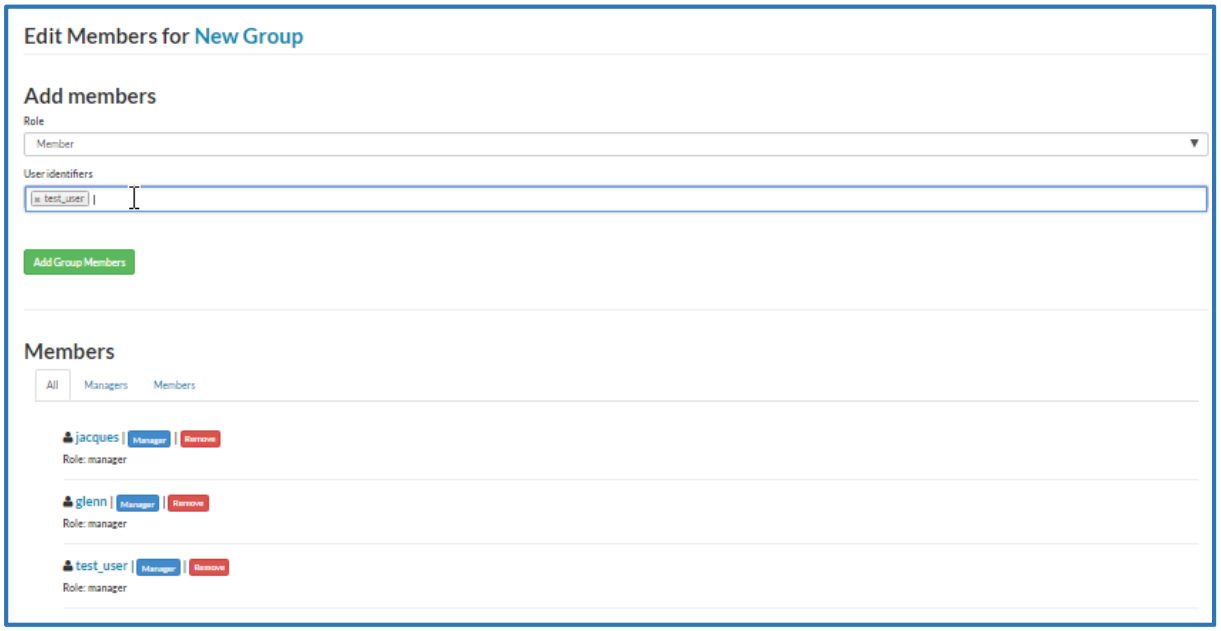
Once the roles have been allocated to each manager member added to the group, one should then start typing the **User identifiers**, which entail typing the names of the users to add. A drop down menu will appear with username matches to the characters typed. Click on a correct match to add the user to the list.



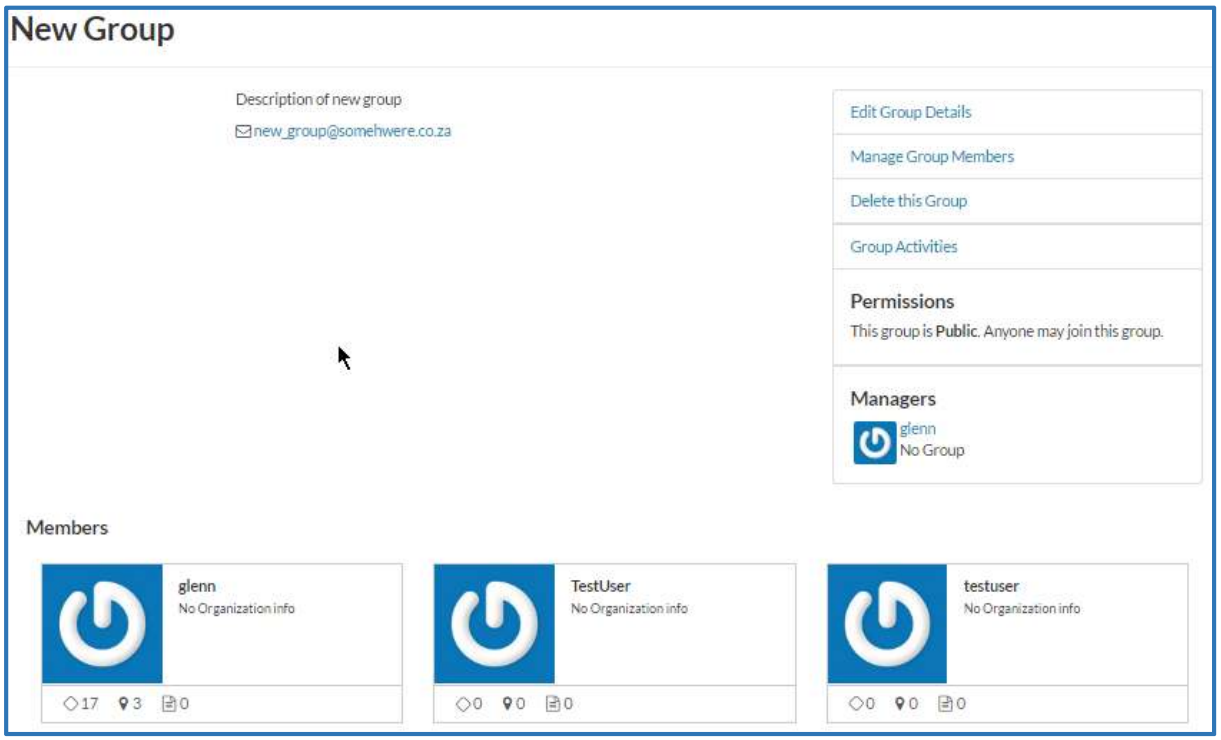
Once all group manager users have been added to **User identifiers**, click **Add Group Members**. Once the Add Group Members selection have been made, select **Manage Group Members** again.



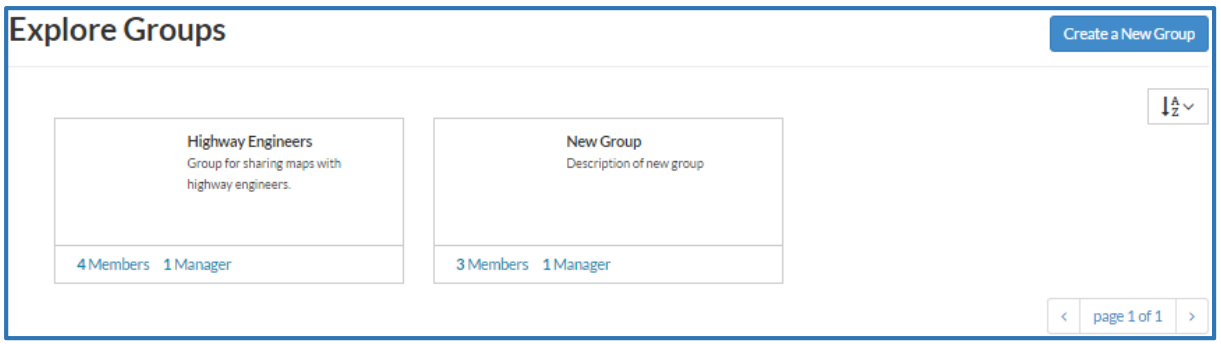
After the **Manage Group Member** selection have been made, standard members to the group can now be added. In the All tab, under add members, select Role: **Member**. In **User Identifiers** start typing the name of the users to add. A drop down menu will appear with username matches to the characters typed. Click on a correct match to add the user to the list.



Once all the standard users have been added to User Identifiers, click **Add Group Members**.



The edited group will appear in the Groups list with updated Members and Manager counts.


Explore Groups
Create a New Group
Highway Engineers
Group for sharing maps with highway engineers.
4 Members 1 Manager
New Group
Description of new group
3 Members 1 Manager
page 1 of 1

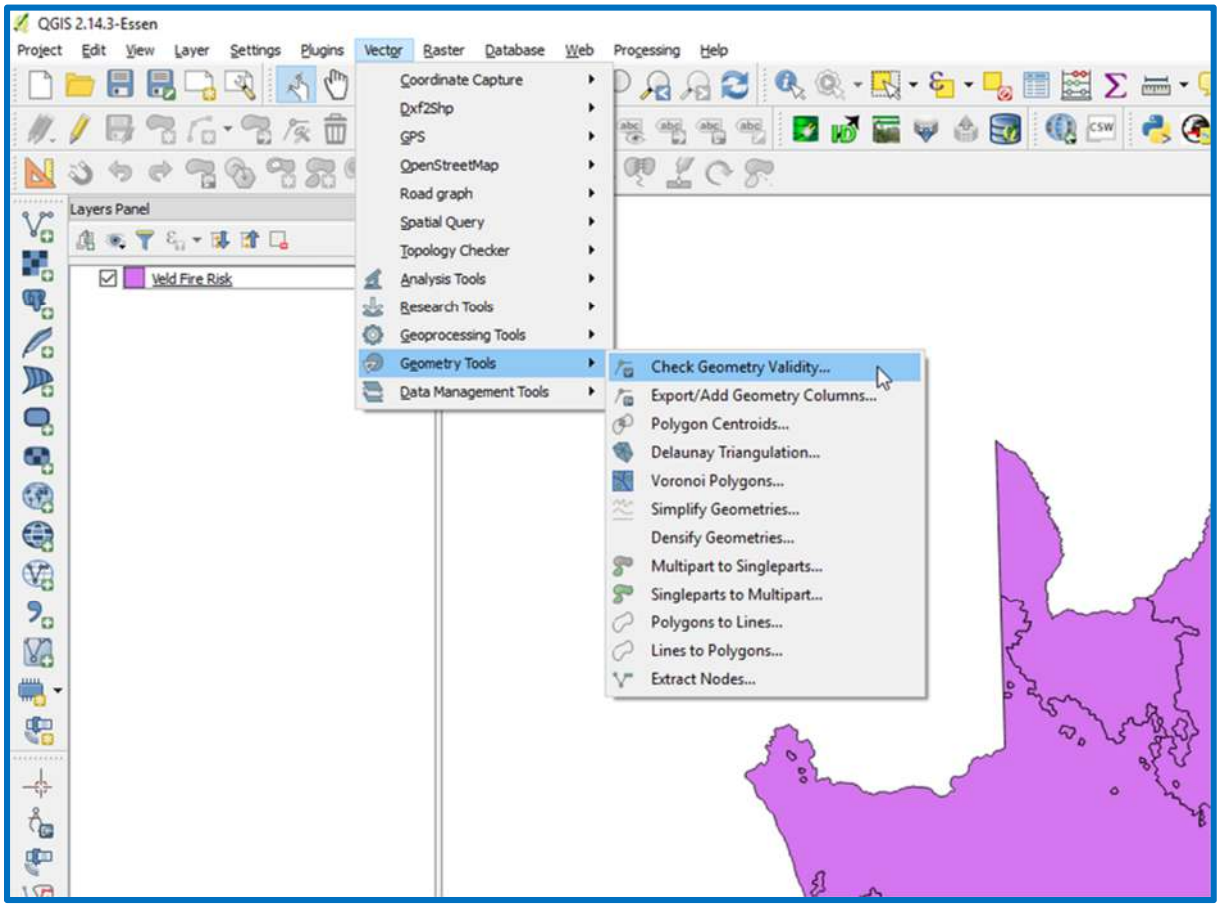
4.1.3 Import layer into GeoRAMS

Spatial data are available in many different formats both as raster and vector data. GeoRAMS can connect to many spatial data formats (all those supported by GDAL – see http://www.gdal.org/ogr_formats.html and http://www.gdal.org/formats_list.html, provided the relevant dependencies have been configured). GeoRAMS is currently configured to use PostgreSql to manage the various vector datasets and, as such, if datasets are to be incorporated into the GIS, they need to be converted and imported into PostgreSql. This section provides several methods for conducting such data conversion and import.

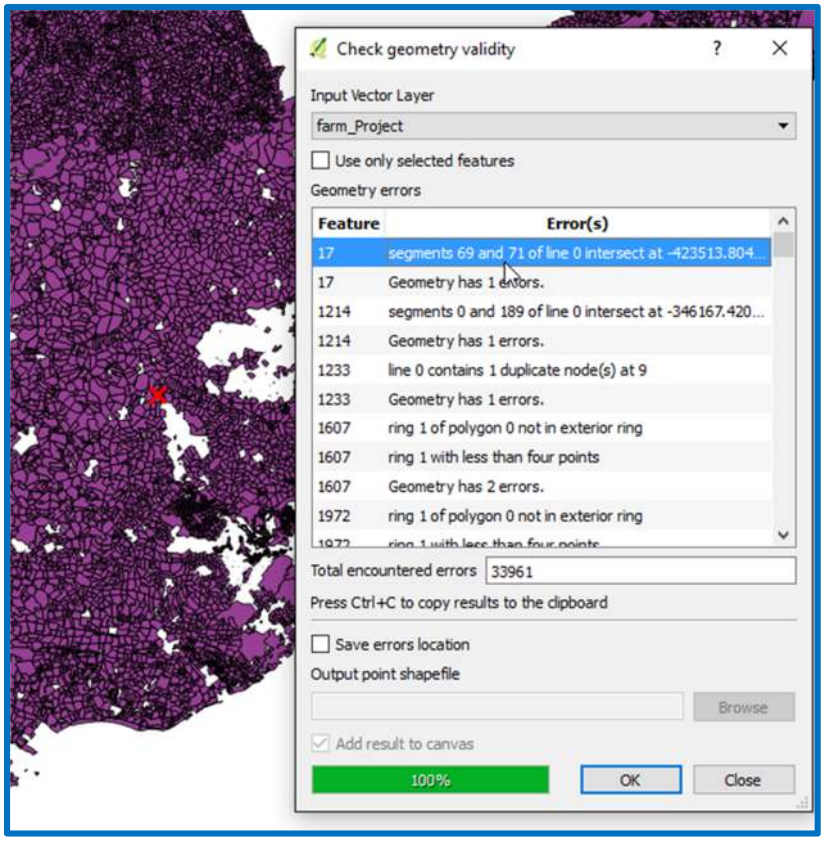
Import to SQL Server

Using the Upload Layer utility in GeoRAMS. This utility currently only supports importing **shp** files and **GeoTiff** images. It uses Geoserver's Import Data feature in the backend. As such, if errors are encountered, the detailed messages can be accessed via that interface (see the next section).

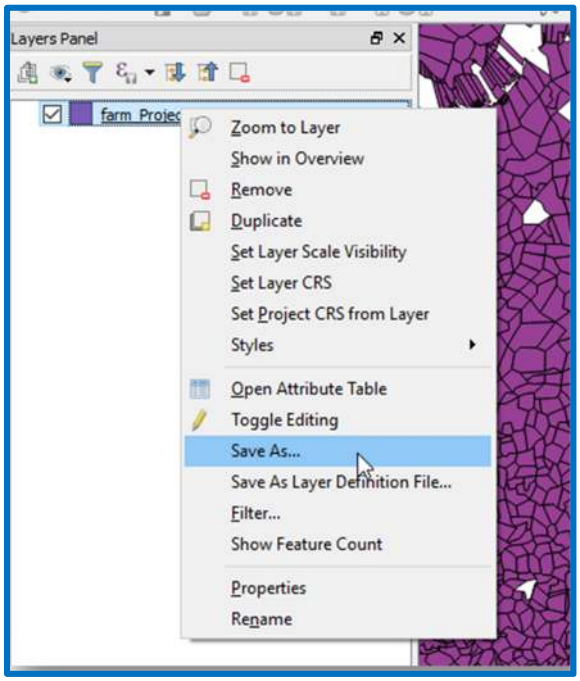
Data conversion/import between disparate formats and systems can often be tricky as several issues can arise. To avoid possible complications during the data import, ensure that the shp file is free of topological errors – you can use the Geometry Validity tool in QGIS to test this:



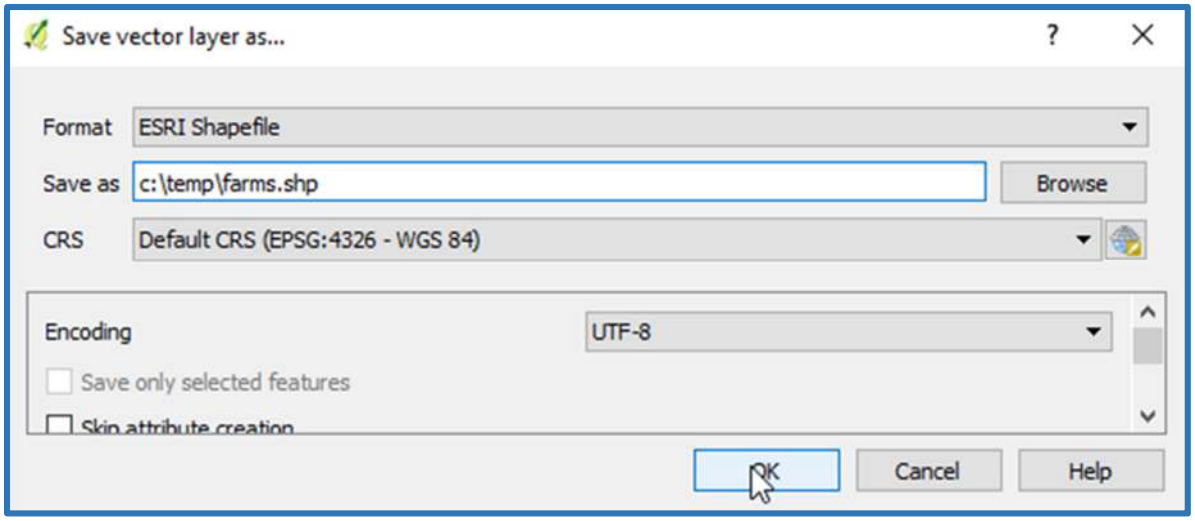
The tool will report all encountered errors and will highlight/zoom to the selected issue. Edit the shp file and resolve the reported issues.



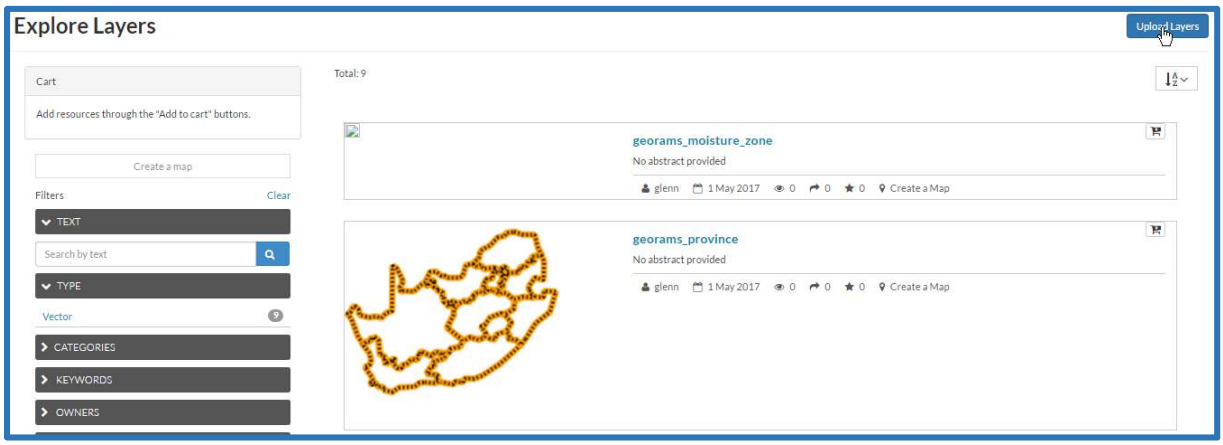
It also helps to unproject the data to **EPSG:4326** (WGS84). You can do this from QGIS by selecting **Save As** (from the right-click context menu on the layer in question):



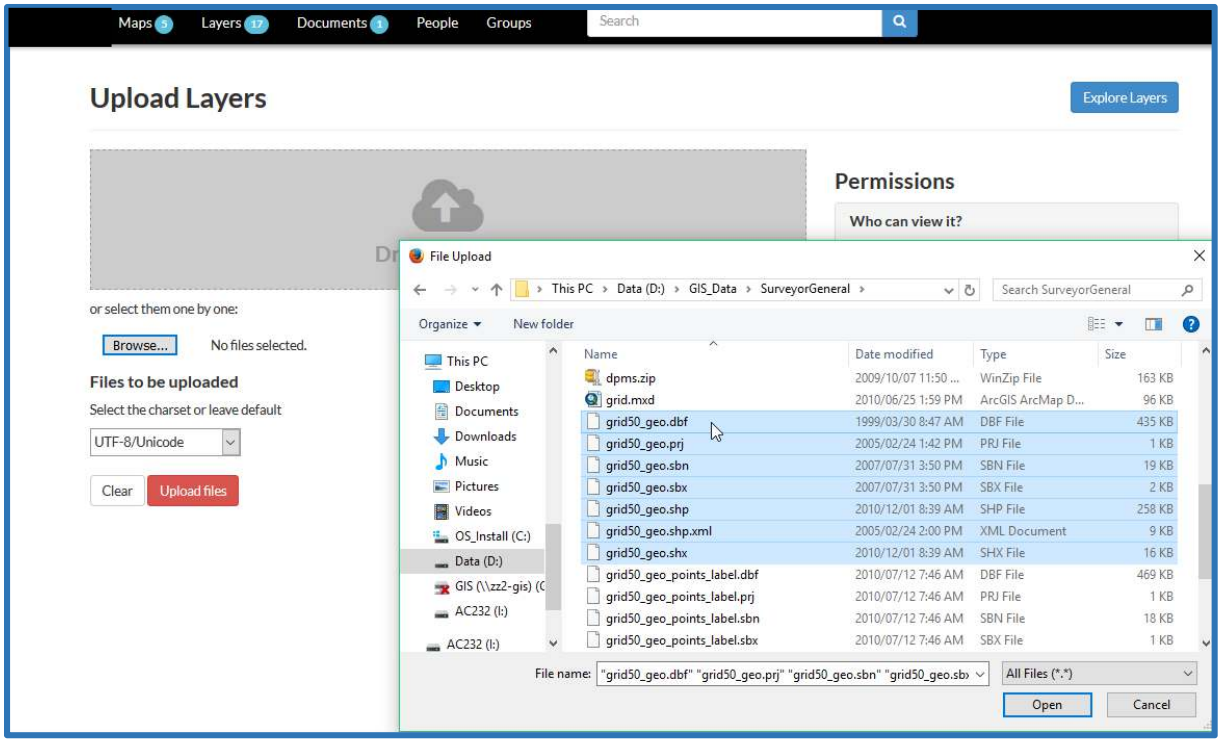
In the **Save As** dialogue, select **EPSG:4326 – WGS 84** as the output CRS:



Now we are ready to import the data. In http://*youraddress*.georams.co.za/layers, click on the **Upload Layers** button.

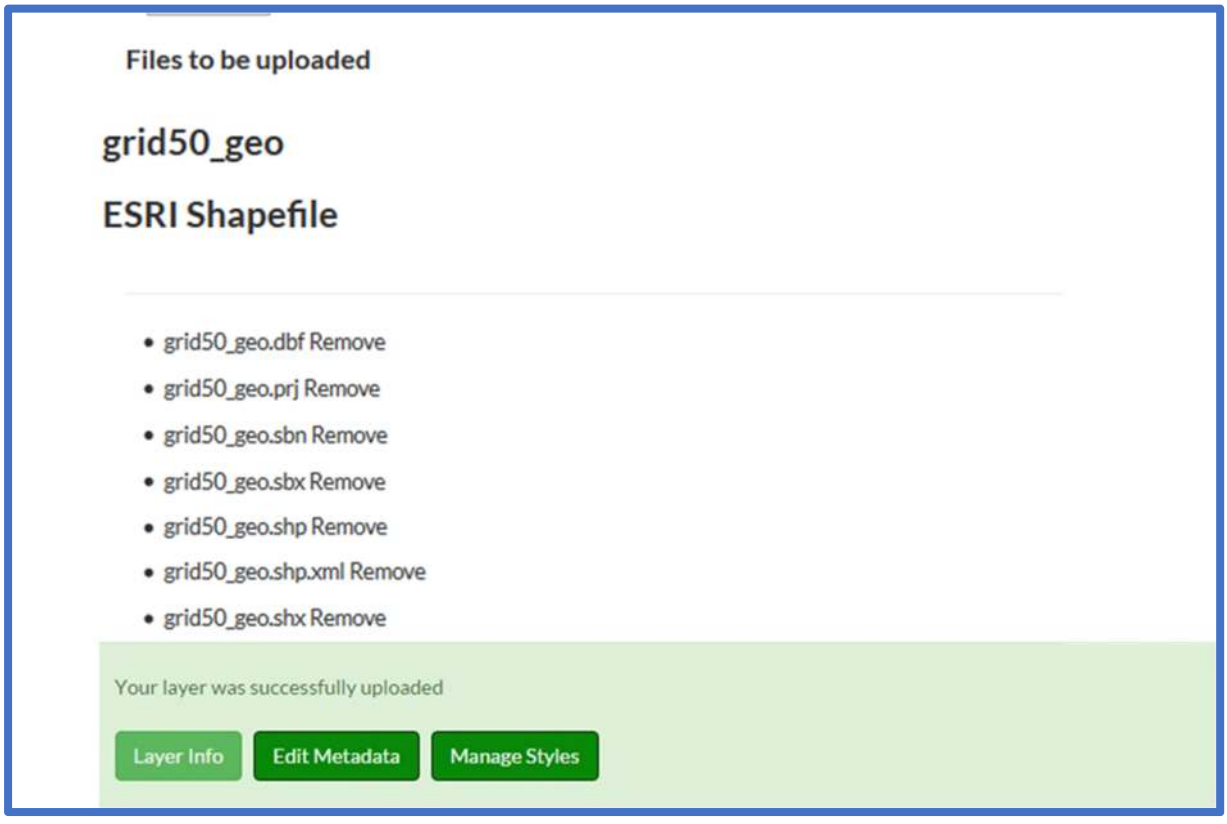


Drag and drop shp file members to the grey block (or use the file browse). You need to add the main files from the shp file: **.shp, .dbf, .shx, .prj**



Click on **Upload Files.**

On a successful upload, you should be greeted with the following:



With a successful upload, the tool has:

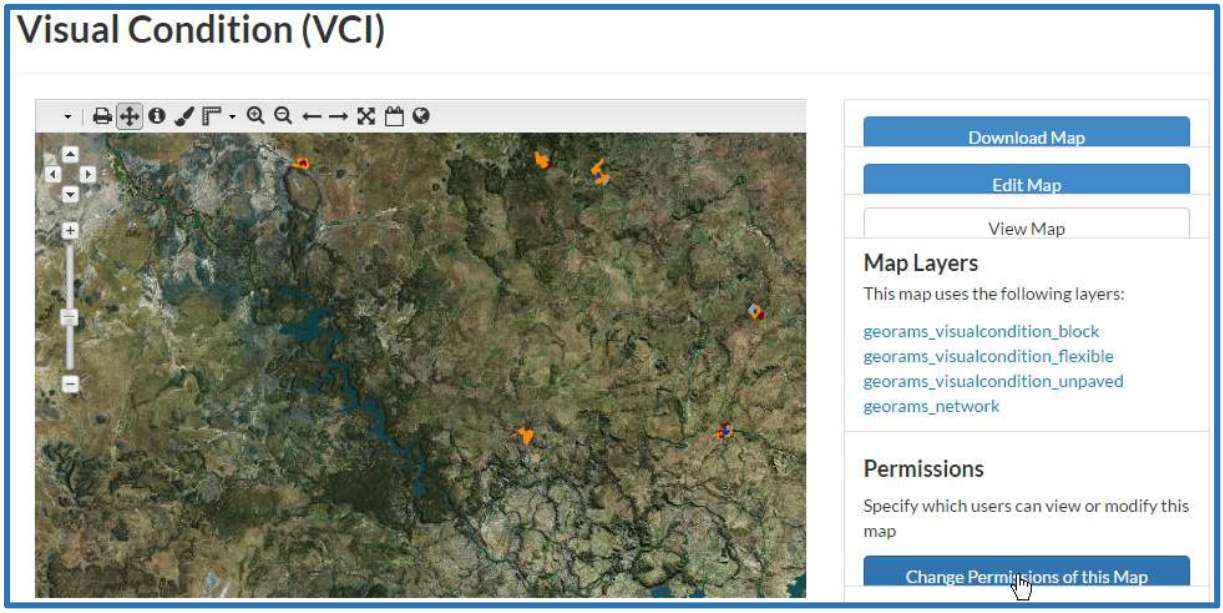
- created a new table in PostgreSql
- converted and inserted the data from the shp file into the table
- published the table as a new Geoserver layer
- assigned a default style to the layer
- synchronised the new layer with GeoRAMS

You can now capture metadata for the layer and manage the layer's styles.

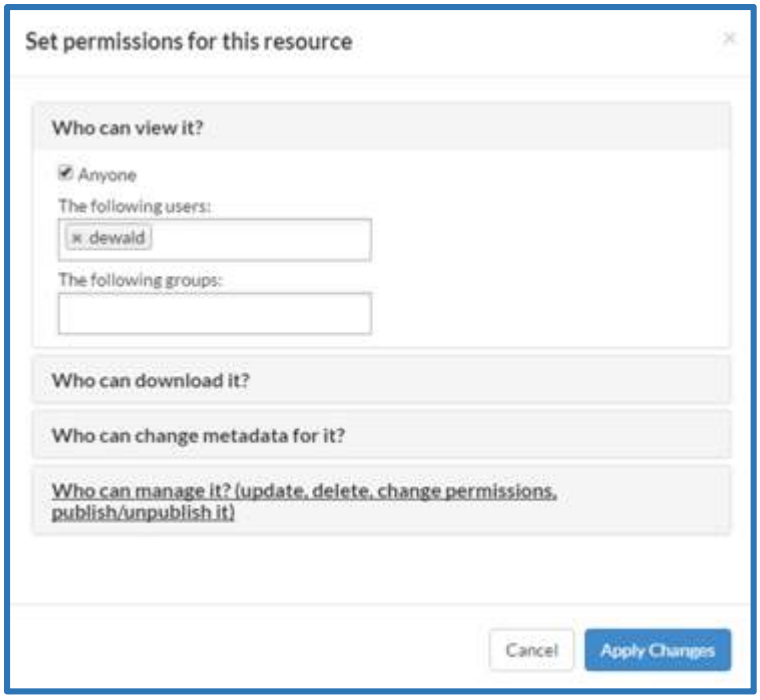
If it looks like it gets stuck, or returns an error, check the messages in Geoserver's Import Data utility.

4.1.4 *Set permissions*

All resources in the GIS can be assigned permissions in terms of who can view, edit and download what resource. These permissions can be assigned by a user or group (or both). In a Detail view, click on the **Change Permissions** button.

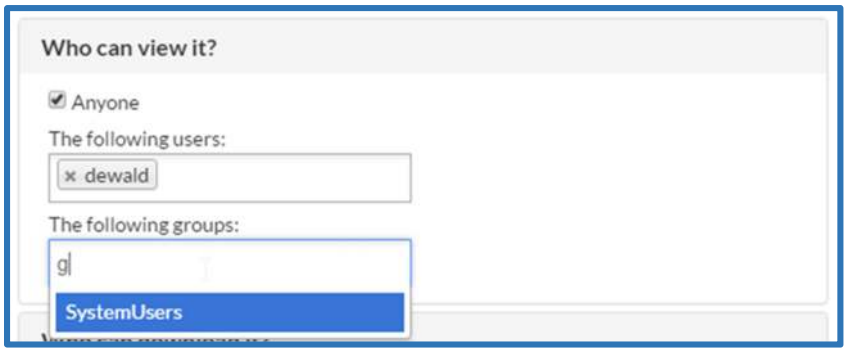


In the **Set permissions for this resource** popup window, click on the grey bar titles. Clicking on each of the grey bar titles will open each item.



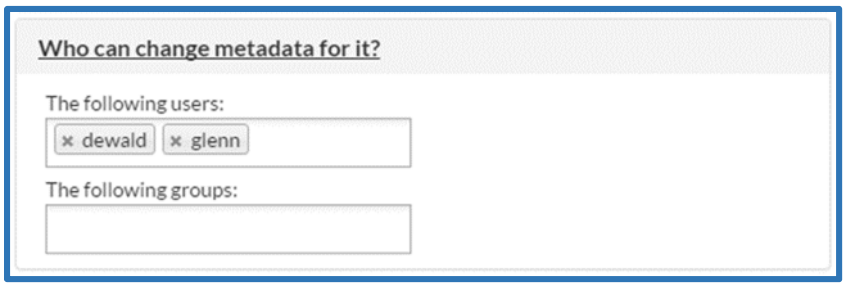
The following steps should be followed in setting up who can view or read the content of the GIS. Read permission are set up as follows:

- First, start typing the name of the users to add.
- A drop down will appear with username/groupname matches to the characters typed.
- Click on a correct match to add the user/group to the list.

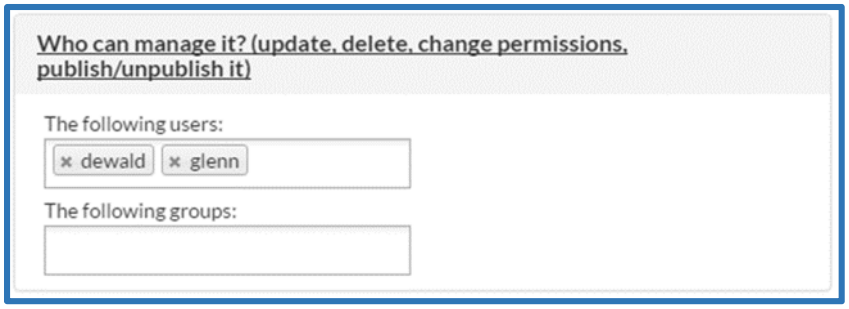


The following steps should be followed in setting up who can download the content of the GIS. **Download permission** are set up as follows:

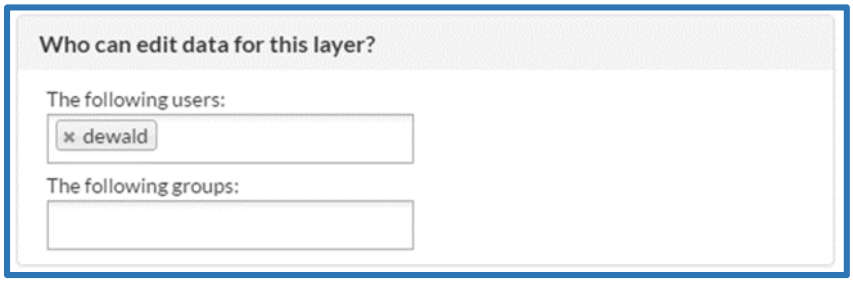
The following steps should be followed in setting up who can edit the metadata of the content of the GIS. **Metadata edition permission** are set up as follows:



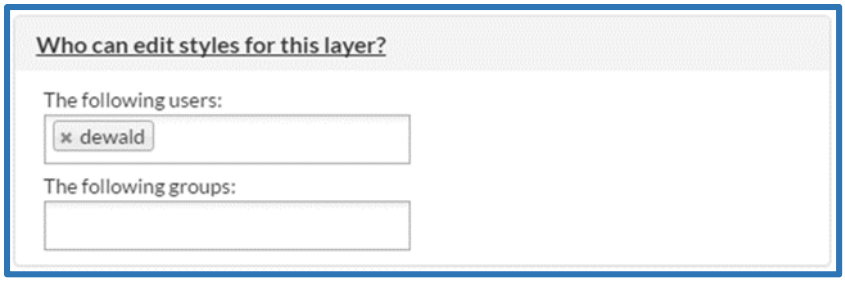
The following steps should be followed in setting up who can manage the content of the GIS. **Management permission** are set up as follows:



The following steps should be followed in setting up who can add, edit or manage the data of the GIS. **Data edition/ management permission** are set up as follows (**Layers** only):

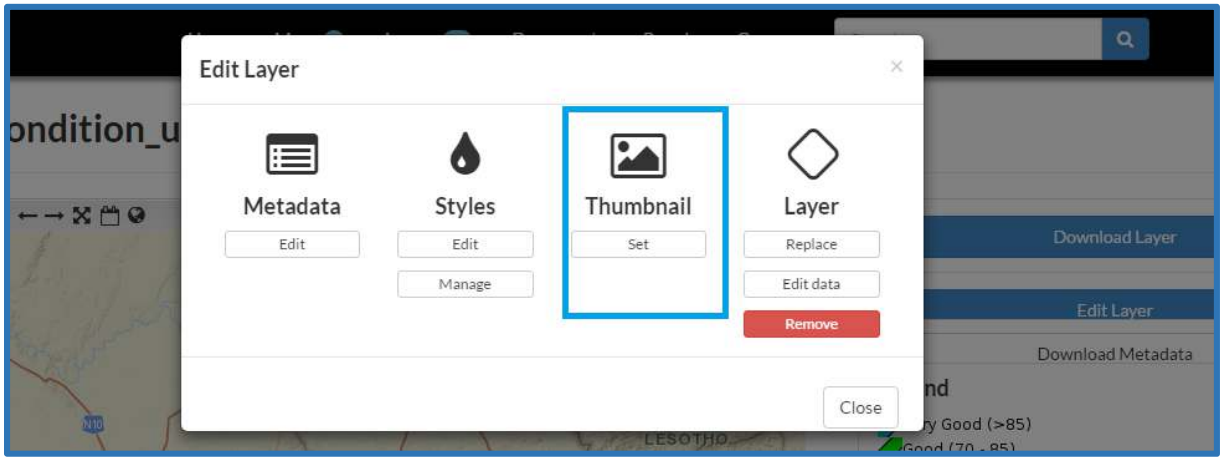


The following steps should be followed in setting up who is responsible for styling the layers of the GIS. **Style management permission** (**Layers** only) are set up as follows:

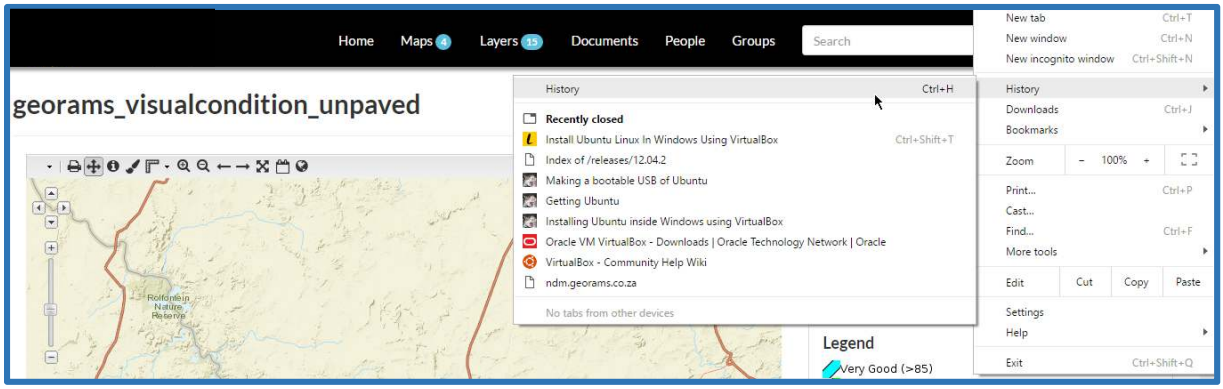


4.1.5 *Thumbnails*

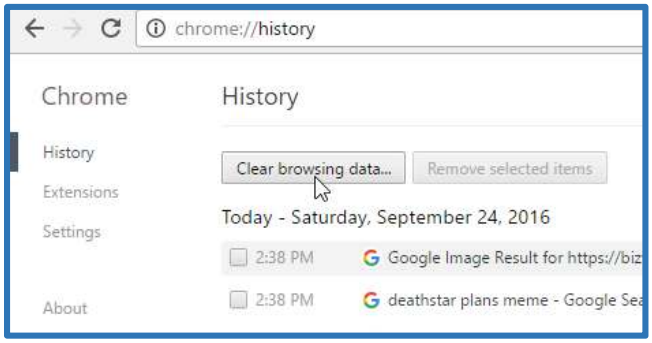
Thumbnails should automatically be generated. You can force the recreation of a thumbnail -from a resource **Detail view**, click on **Edit Map/Layer**. Click on **Edit** under Set Thumbnail in the popup window.



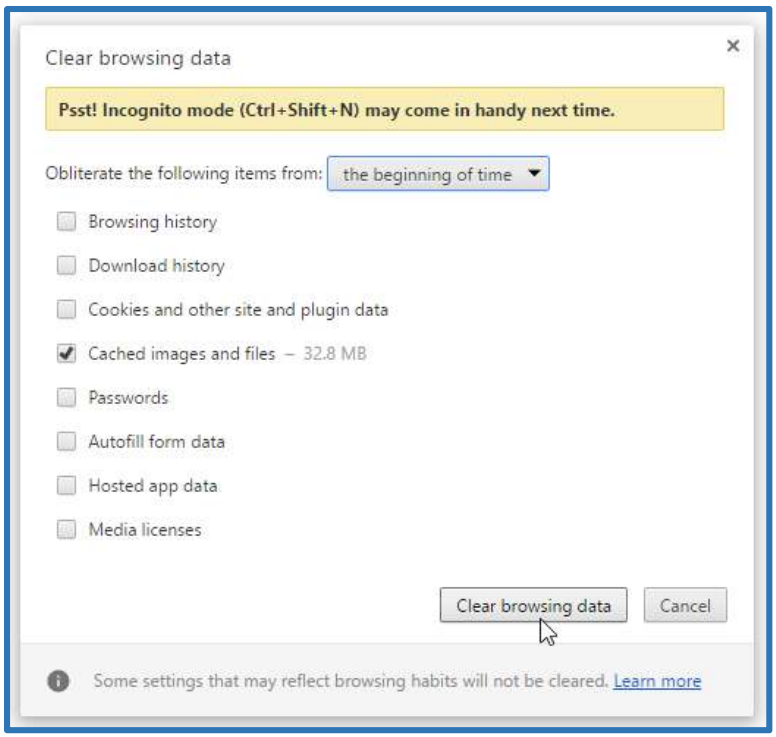
You may need to clear the browser cache for the new thumbnail to show. In **Chrome**, open the History window (Ctrl + H).



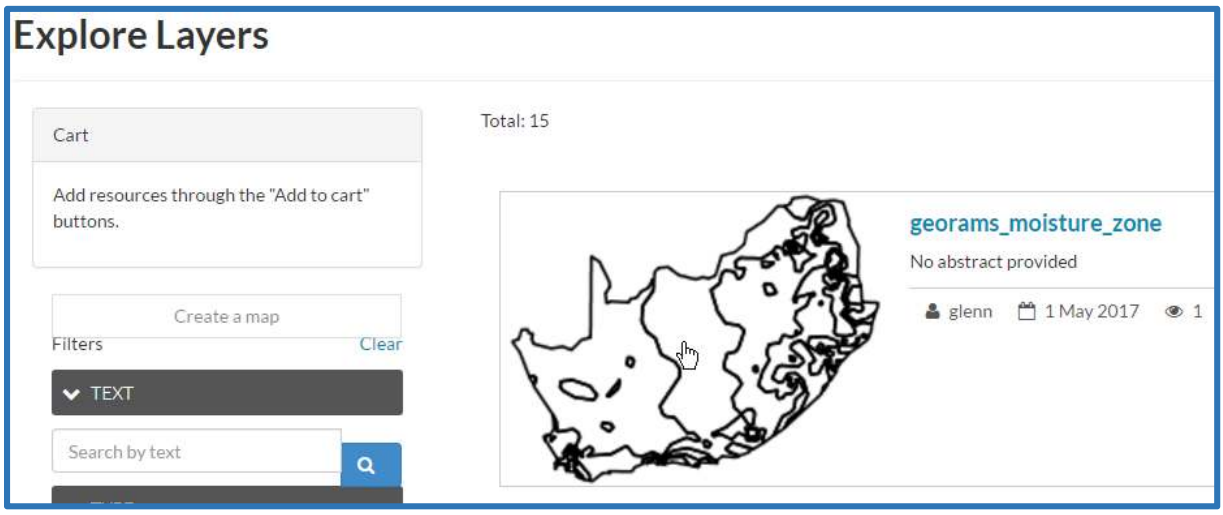
Click on Clear browsing data:



Select from **the beginning of time** and ensure **Cache images and files** is selected:



The updated thumbnail should now show:

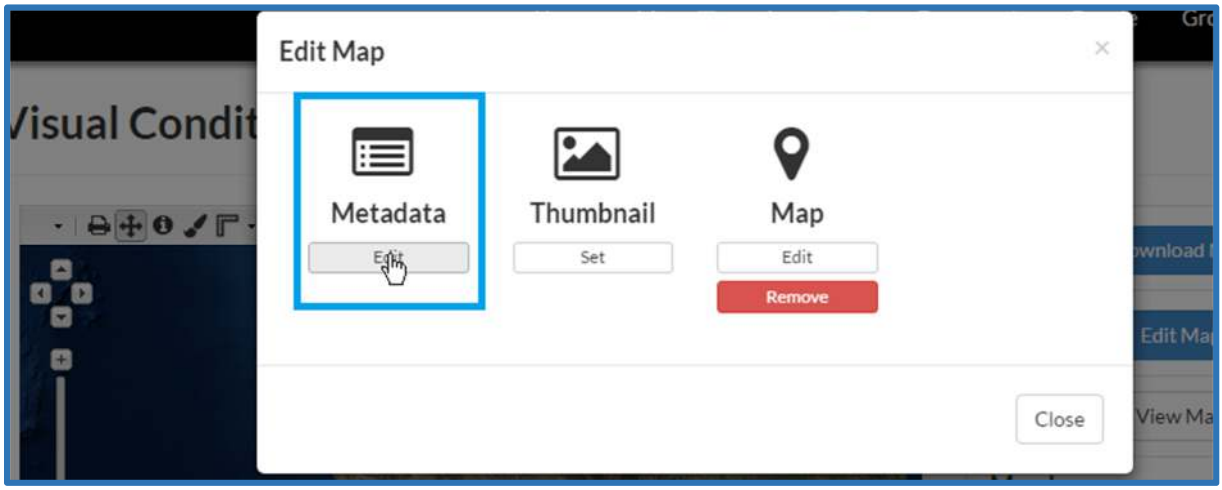


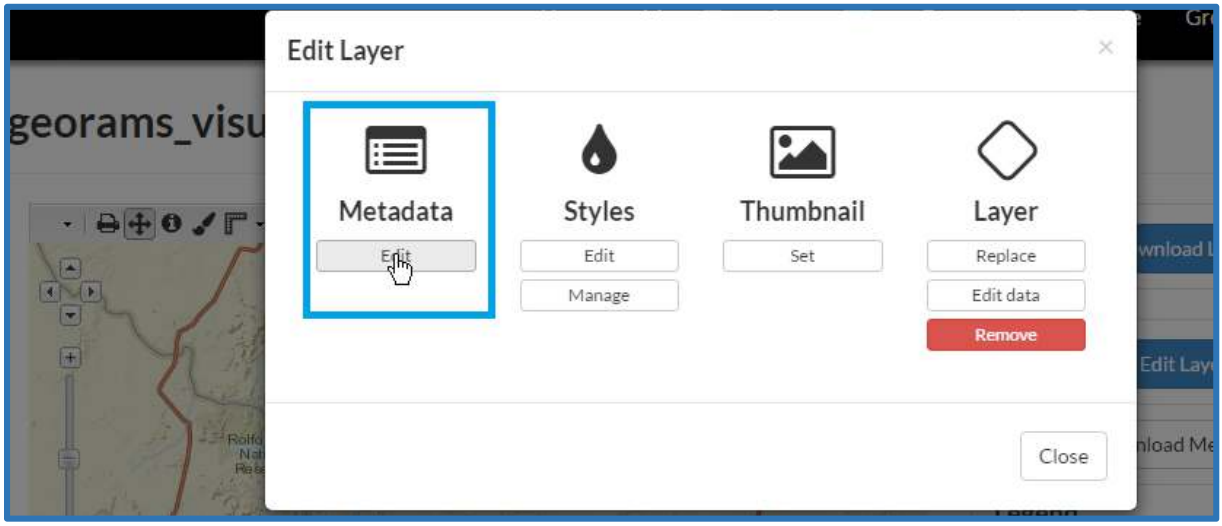
4.1.6 *Resource metadata*

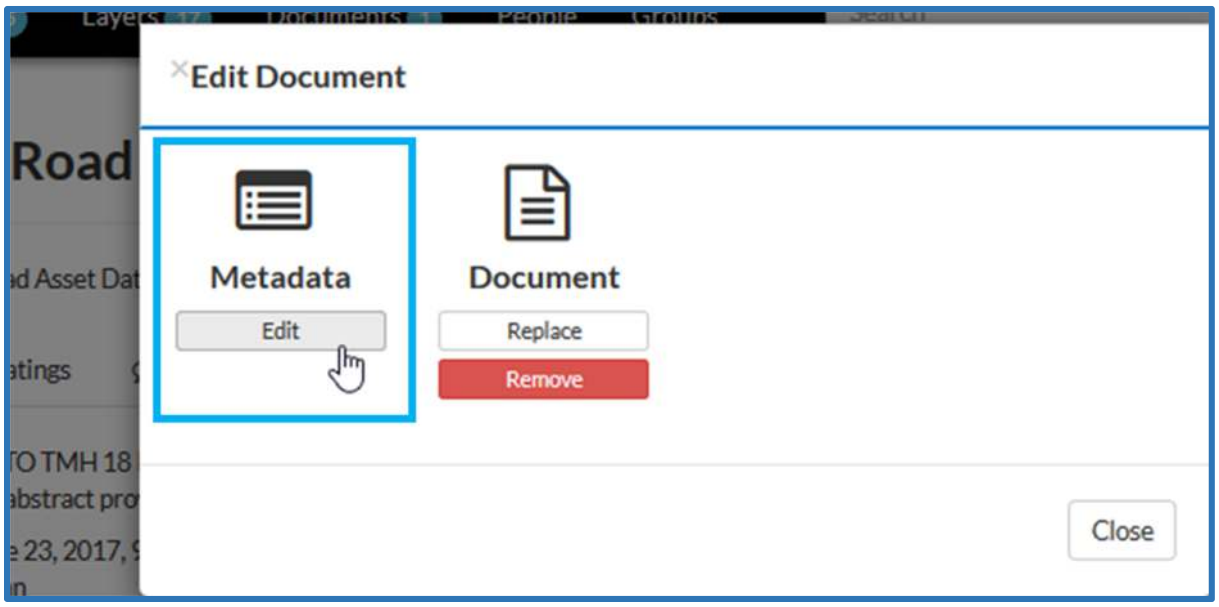
Metadata needs to be captured for every resource loaded into the GIS, be it a layer, map or document. The metadata facilitates quick searching and filtering of information, allowing users to find datasets that closely meet their needs. Metadata also provides the ability to evaluate identified resources according to fitness for purpose as each dataset will have information about temporal extent (time period the dataset is applicable to or its recentness) and a measure of data accuracy.

Edit Metadata

From a resource **Detail view**, click on **Edit Map/Layer/Document**. Click on **Edit** under Metadata in the popup window.







Populate the various metadata fields. Fields denoted with **NB!** must be populated.

1. **NB!** Resource Title

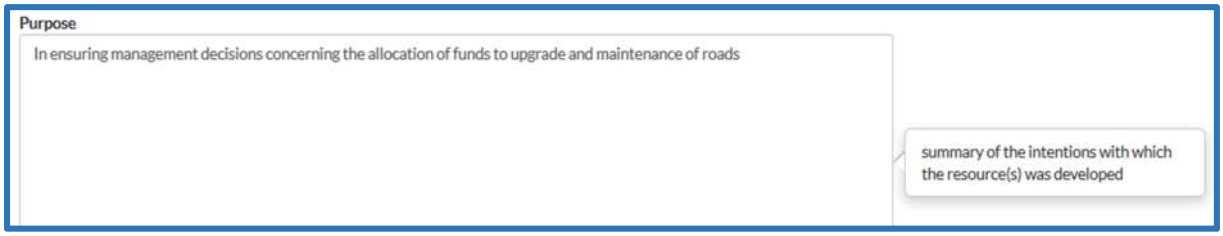
2. **NB!** Resource Date

3. **NB!** Date Type

4. **NB!** Edition

5. **NB!** Abstract (Description)

6. **NB!** Purpose



7. **NB!** Maintenance Frequency

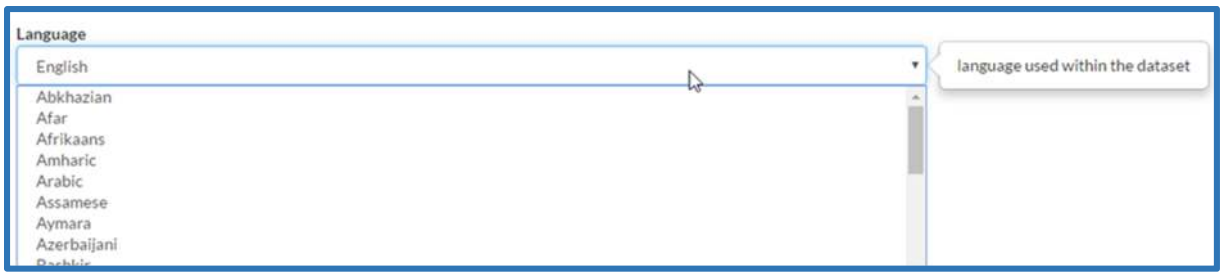
8. **NB!** Region(s)

9. Restrictions

10. Restrictions (Other)

11. License

12. Language



13. Spatial Representation

14. **NB!** Temporal extent (Date range to which the resource applies e.g. yield stats for 2014)

15. Supplemental Information

16. Distribution URL

17. Distribution Description

18. **NB!** Data Quality Statement

19. Feature Resource on Home Page?

20. **NB!** Is the resource published in the GIS Interface?

21. Thumbnail URL

22. Site URL

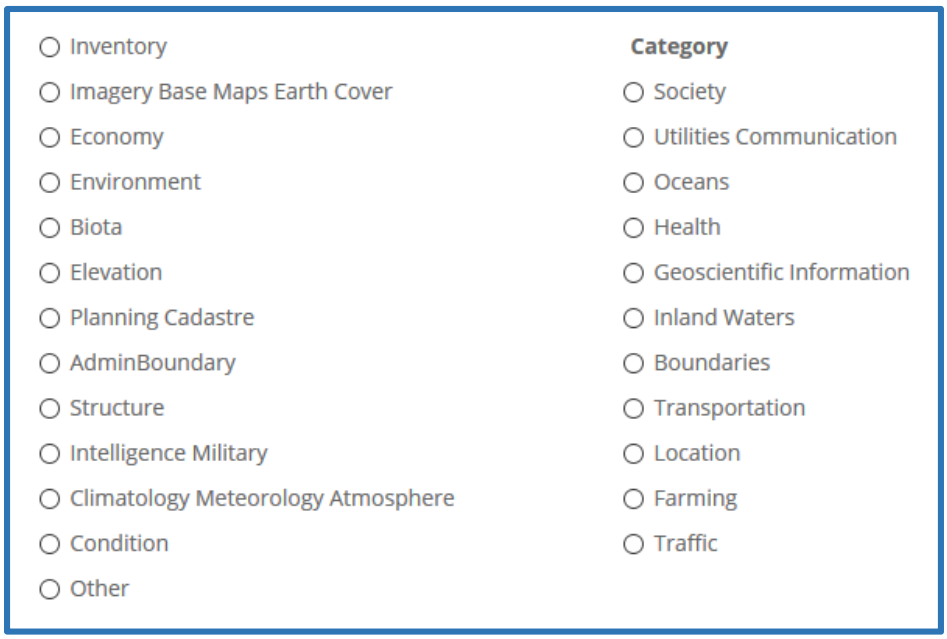
23. Featured Map URL

24. **NB!** Keywords

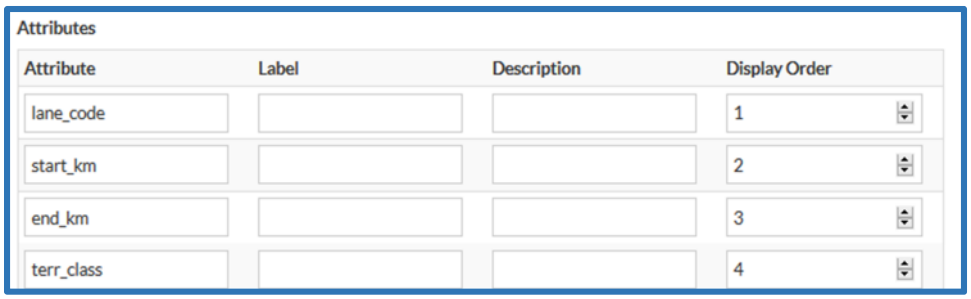
25. **NB!** Contact person for the resource

26. Author/ Maintainer of the resource's metadata

27. **NB!** Resource category

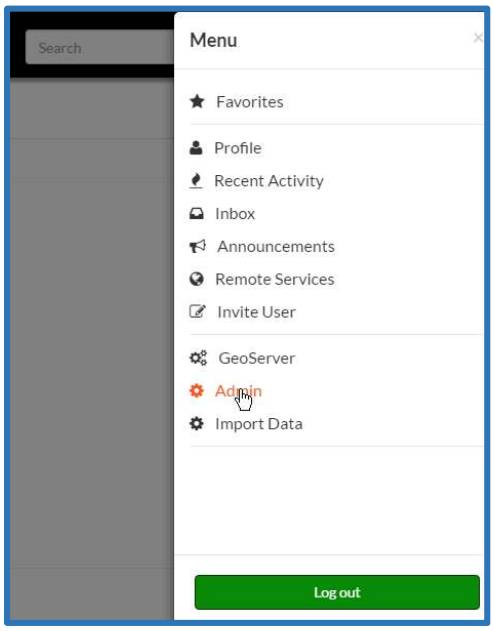


28. Layer attributes (**Layers** only)

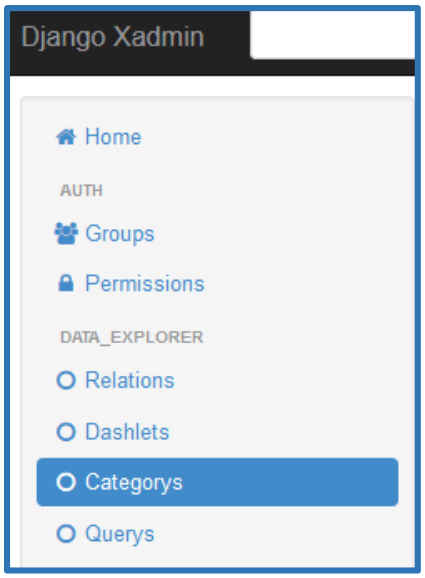


Add Metadata Topic Categories

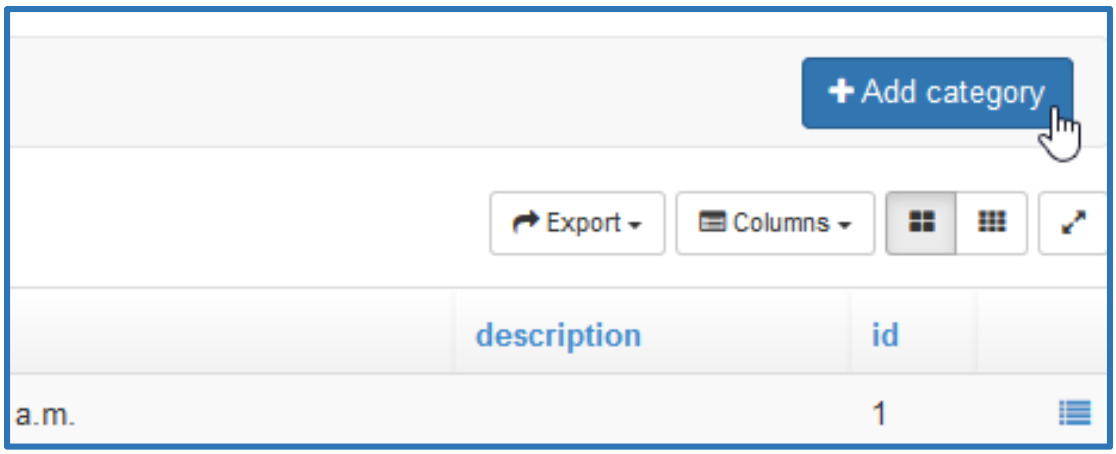
In order to Add Metadata Regions, the **Admin Interface** must first be opened.



In the Admin Interface, select **Categorys**.



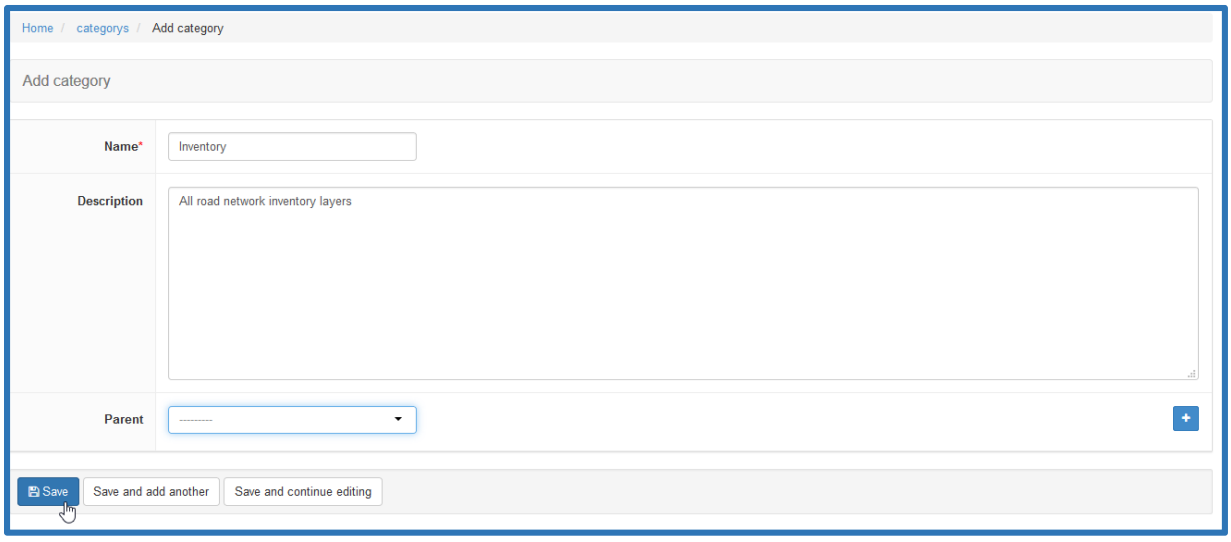
Click **Add category** in the Metadata Categories window.



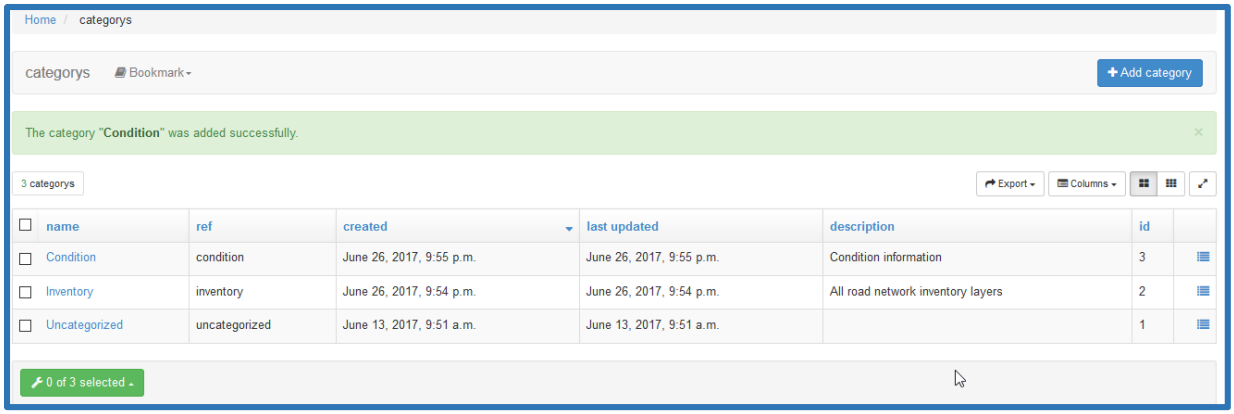
The add category window will open, wherein the following fields will need to be populated:

- Name (must be one word),
- Description, and
- Parent

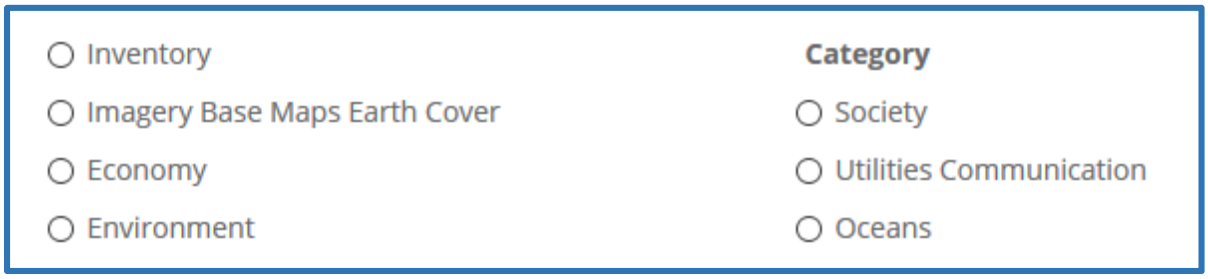
After these fields have been populated, you can click **Save**.



The new category will be added to the list of Metadata Topics.



When **editing** a resource's metadata, the new category will appear as a radio button.

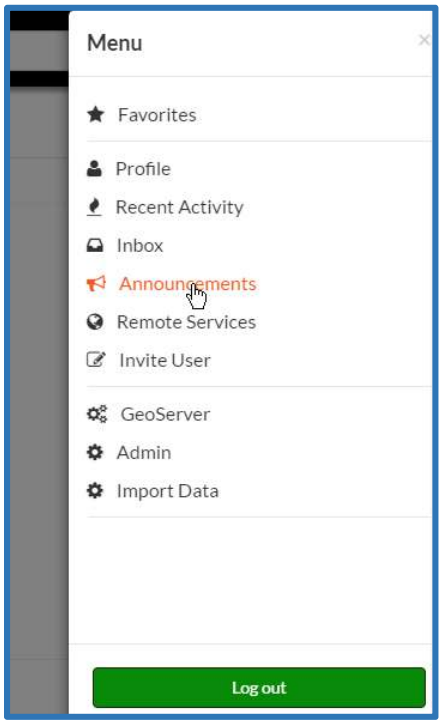


4.1.7 GeoRAMS Announcements

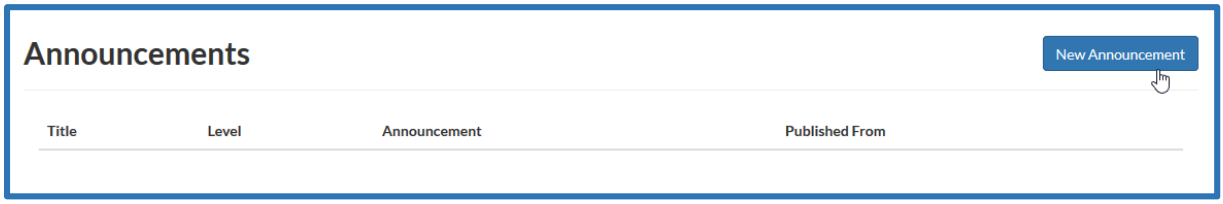
GeoRAMS has an announcements mechanism that allows system administrators to communicate information to the system users. Communications could include a notification of system downtime due to scheduled maintenance, or notification regarding a new feature that has been added.

Creating an announcement

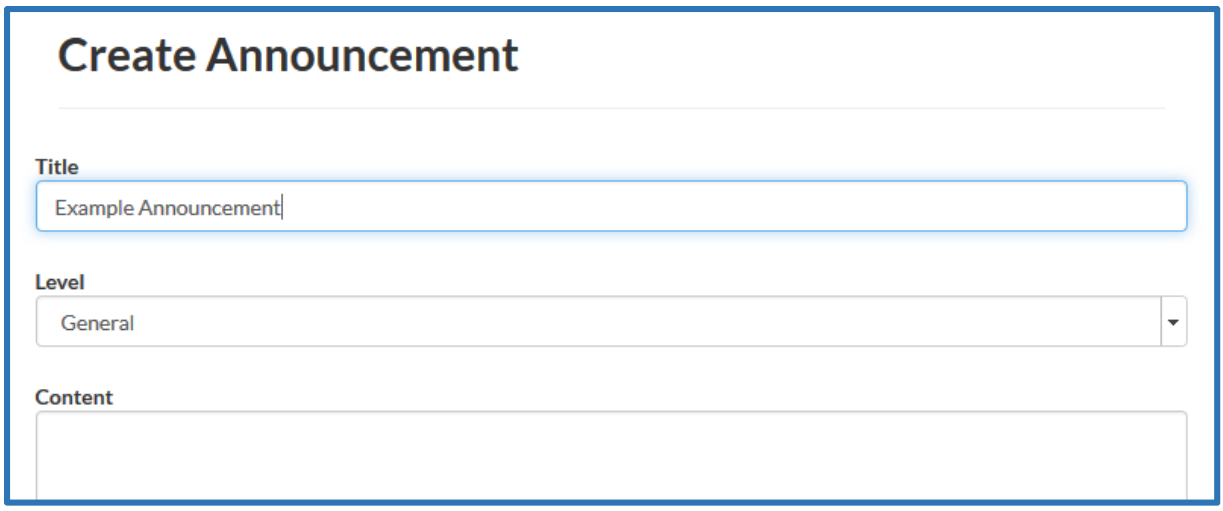
To create an announcement, choose the Announcements item on the user menu.



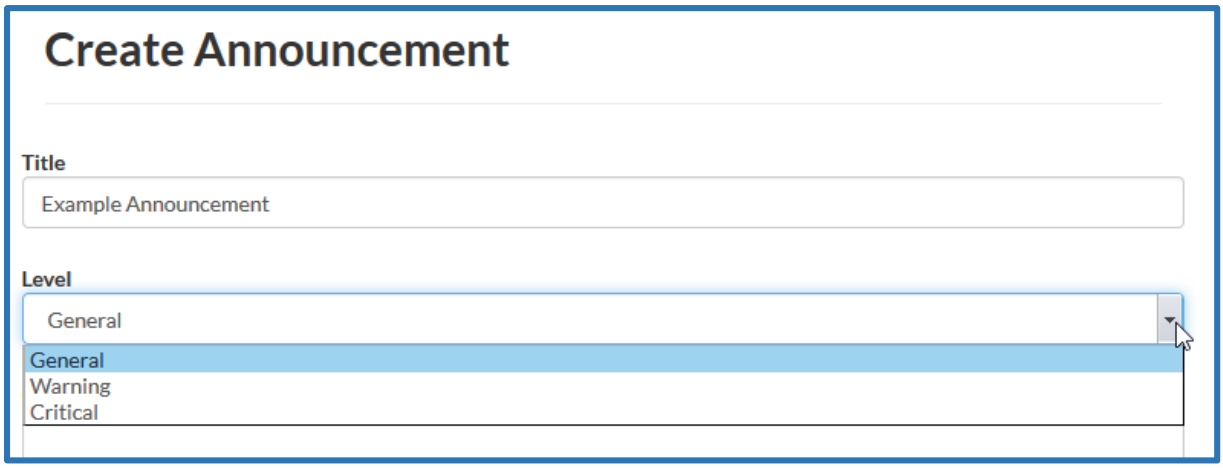
On the Announcements page, click the New Announcement button.



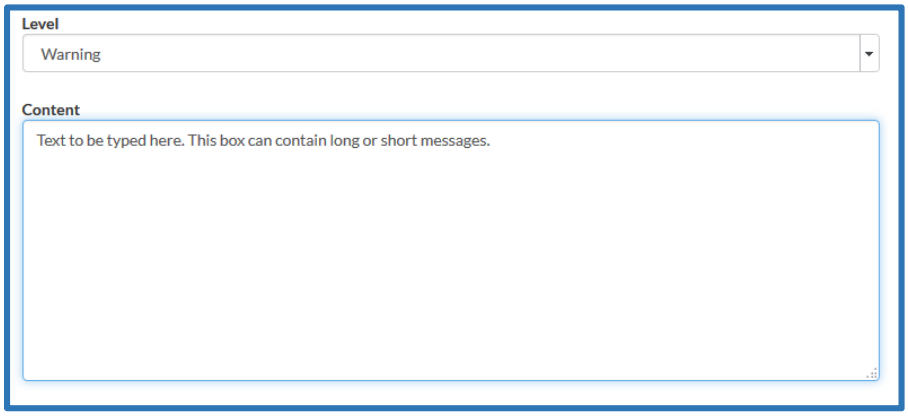
On the Create Announcement page, first fill in a title for your announcement. This will be displayed as a heading for the announcement.



Next, choose the level of the announcement. The levels refer to the urgency of the announcement. The announcement background colour will change according to the level. General is white, Warning is orange, and Critical is red.



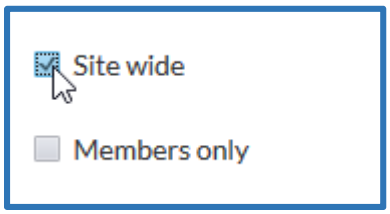
Now type in the text of your announcement into the Content box. Content is compulsory, you cannot leave this empty.



The next two options determine where and to whom the announcement will be displayed.

If Site Wide is ticked, the announcement will be shown at the top of every page; otherwise it will only be shown on the Home page.

If Members only is ticked, the announcement will only be shown to logged in users; otherwise it will be shown to all visitors to the site.

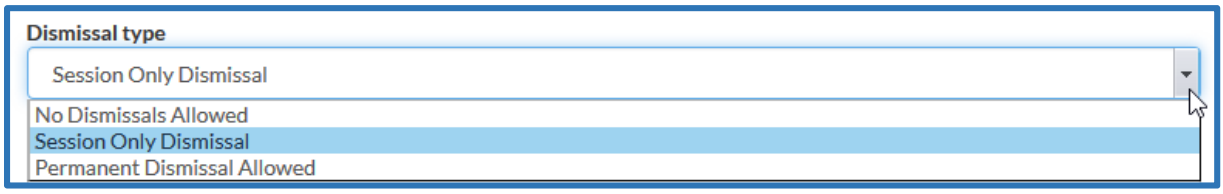


The Dismissal type sets whether a user can dismiss the announcement or not.

No Dismissals Allowed means that the user can not close / dismiss the announcement.

Session Only Dismissal means that the user can close the announcement, but it will be shown again when the user logs in at another time.

Permanent Dismissal Allowed means that the user can permanently close the announcement. It will not be shown again to that user.



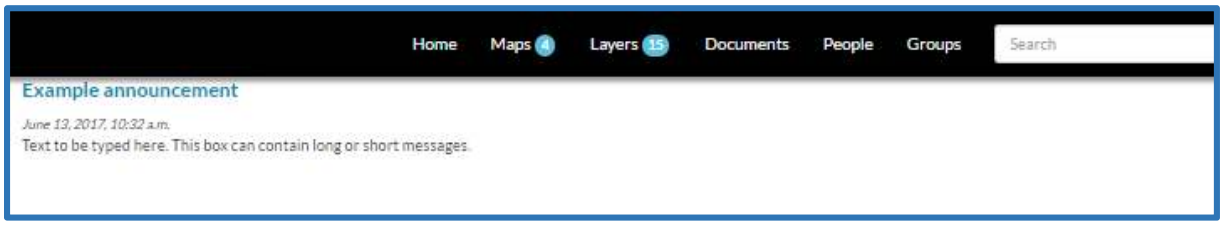
Publish Start defines the date and time that the announcement will start showing. The system fills in the current date and time for you, but you can edit this if you want to have the announcement show at some other date and time in future. You can therefore schedule the publication date and time for each announcement.

Please note that there is no date and time picker yet, you have to type the value into the box in the correct format: **yyyy-mm-dd hh:mm:ss**

Publish End defines the time that the announcement will stop showing. You have to type in the date and time at which the announcement expires. As above you will have to type in the value into the box in the correct format.

Finally click the Save button to create the announcement.

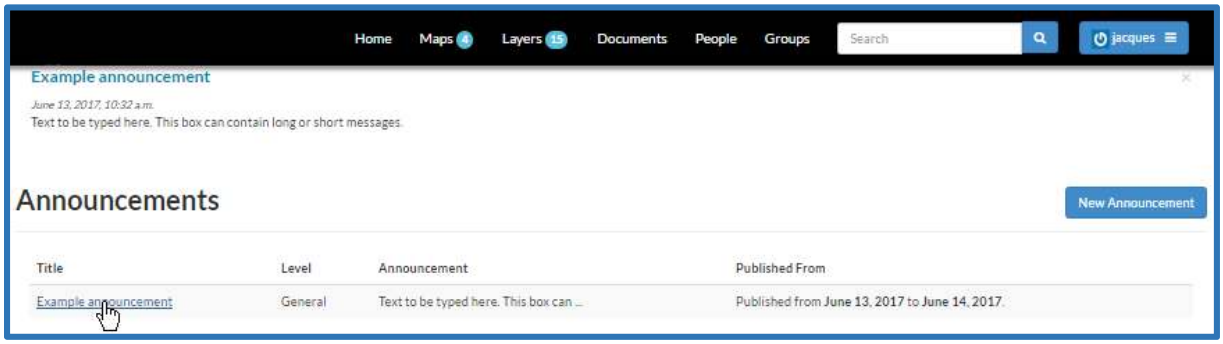
The main announcements page will load. Because we have chosen a site wide announcement, you can now see the orange announcement at the top of the page.



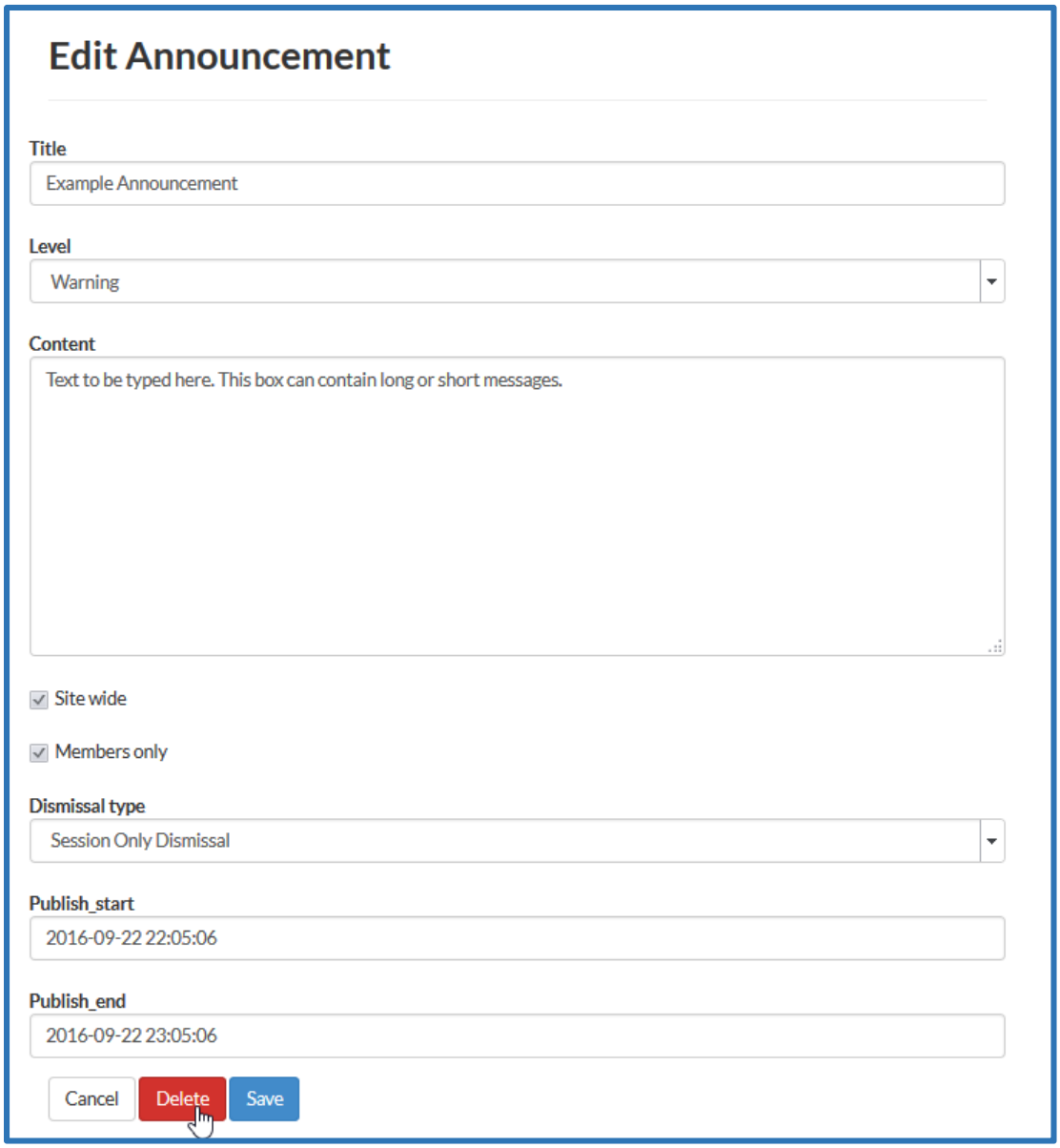
You can click the cross in the top right corner of the announcement to dismiss it if dismissals are allowed.

Editing an announcement

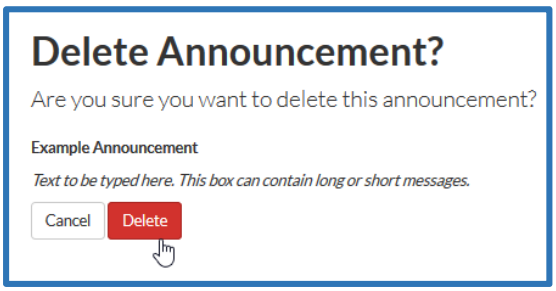
The main announcements page contains a listing of current announcements. You can click the blue announcement title to enter the Edit Announcement screen.



On the Edit Announcement screen, you can change any of the settings or content as discussed above. You can then Save the edited announcement, or you can choose to Delete the announcement by clicking the red Delete button.

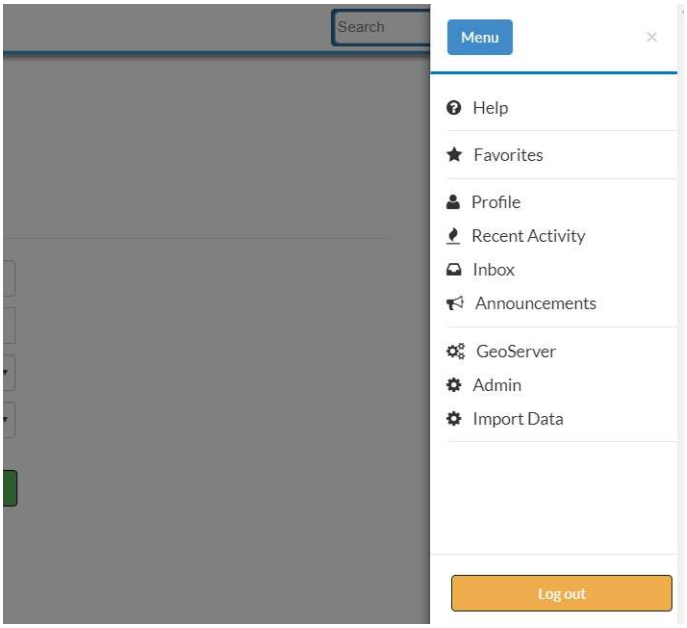


A confirmation page will open. If you are sure you want to delete the announcement, click Delete, otherwise click Cancel.

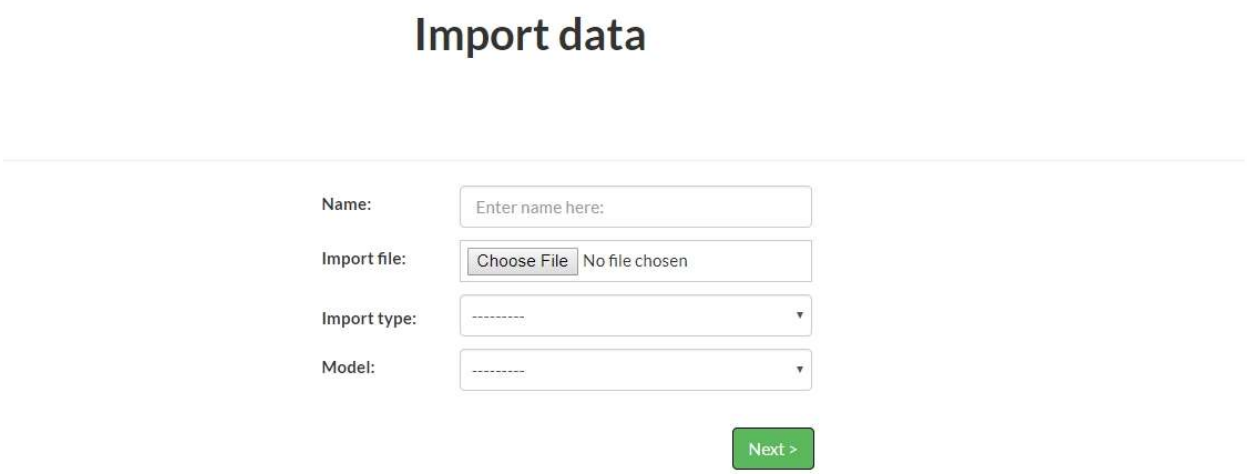


IMPORTING DATA INTO GEORAMS DATABASE

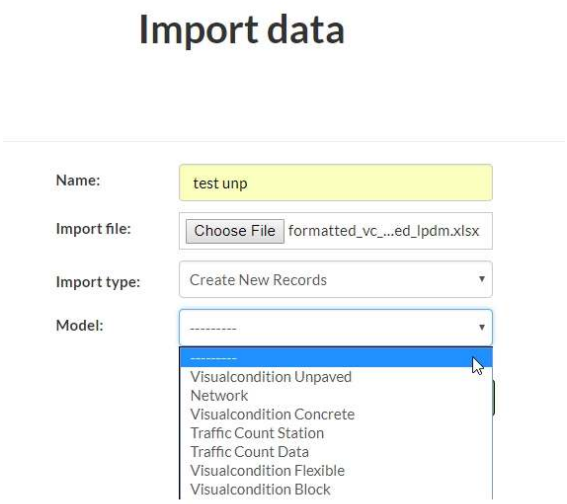
Log in to georams and navigate to main menu. Click on import data.



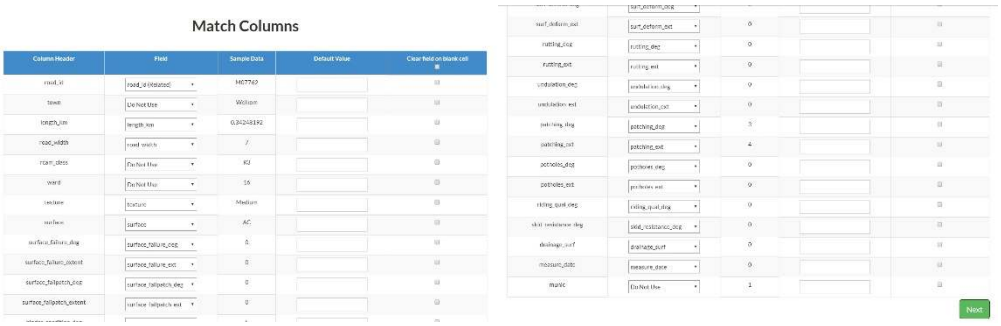
On Import data page, fill in required fields:



Name - Give a name for your import
Import file – navigate to the file and select it
Import type – Select whether to create new records, create and update records or update records only
Model – select relevant model(type of data) as per data set
Click next



On the match columns page, verify that all columns are mapped to the correct table fields. **Ensure road_id is mapped to 'road_id(related)'.** Click next.



On the match relations page open the drop down list that's besides road_id. Select **Road ID** from the dropdown list.

Click simulate import or run actual import as desired.
The importer will display number of failed and created records.

The image below shows results of running the actually import.

There is an option to undo the import or download failed records.

The image below shows results of simulating the import.

There is an option to run the actual import or download failed records.
The failed records file lists the errors in the data. The errors can be fixed and the data imported again.

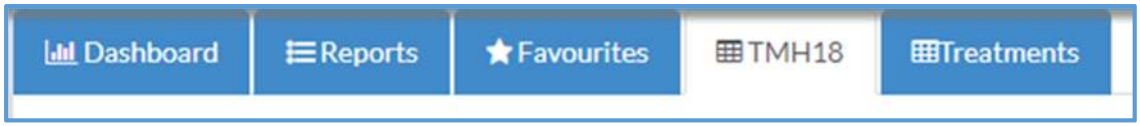
The image below shows results of undoing an import.

The image below is an example of errors in an error file that was downloaded.

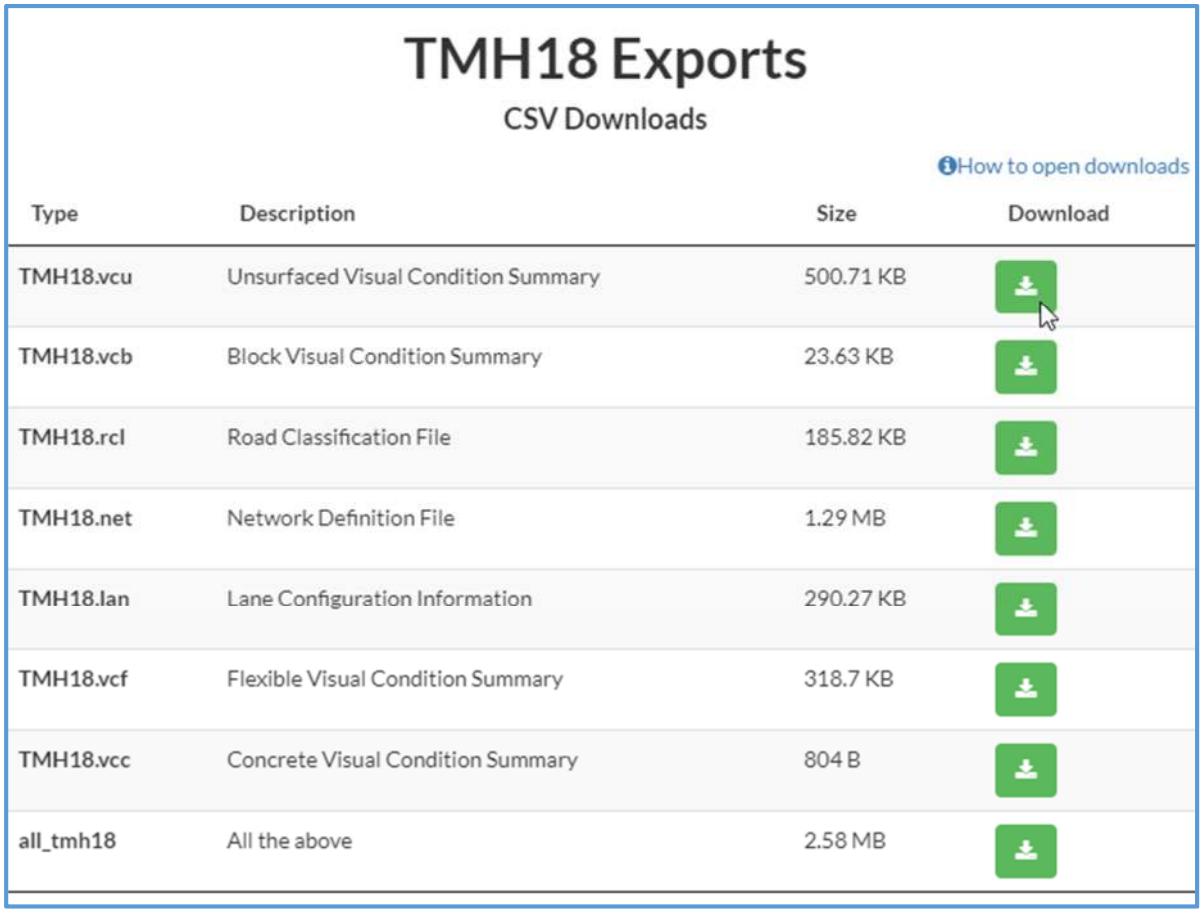
U	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG
erosion_l	Error Type	Error Details									
	Conflict Error	['Error(10): texture(coarse) conflicts with bleeding(4)']									
	Conflict Error	['Error(11): texture(coarse) conflicts with skid resistance(3)']									
	Conflict Error	['Error(11): texture(fine) conflicts with skid resistance(0)']									
	Conflict Error	['Error(12): voids(none) conflicts with skid resistance(0)']									
	Conflict Error	['Error(13): voids(many) conflicts with bleeding(2)']									
	Conflict Error	['Error(12): voids(many) conflicts with skid resistance(4)']									
	Conflict Error	['Error(14): patching(4) conflicts with riding quality(0)']									
	Conflict Error	['Error(15): binder(4) conflicts with bleeding(4)']									
	Conflict Error	['Error(16): bleeding(3) conflicts with skid resistance(1)']									
	Conflict Error	['Error(20): crocodile cracking(4) conflicts with riding quality(0)']									
	Conflict Error	['Error(21): pumping(4) conflicts with cracking(0)']									
	Conflict Error	['Error(23): rutting(4) conflicts with surface drainage(adequate)']									
	Conflict Error	['Error(24): rutting(4) conflicts with riding quality(0)']									
	Conflict Error	['Error(25): undulation(3) conflicts with riding quality(1)']									
	Conflict Error	['Error(26): undulation(5) conflicts with surface drainage(adequate)']									
	Conflict Error	['Error(27): patching(4) conflicts with riding quality(2)']									
	Conflict Error	['Error(28): potholing(failures)(3) conflict with riding quality(2)']									
0	Value Error	stoniness_loose_deg, loose_material_ext, potholes_ext out of range:[0, 1, 2, 3, 4, 5].voids not in ['none', 'few', 'many', 'varying', 'none-few', 'few-many'].texture not in ['coarse', 'medium'									
	Value Error	loose_material_ext, potholes_ext must be a number									
	Integrity Error	visual assessment fields can not all be empty									
0	Integrity Error	visual assessment fields can not all be 0									
c	Value Error	stoniness_loose_ext, loose_material_ext, loose_material_deg, rutting_ext, rutting_deg, erosion_long_ext, stoniness_fix_ext, erosion_long_deg must be a number									
	Conflict Error	['Error(10): texture(coarse) conflicts with bleeding(4)Error(23): rutting(4) conflicts with surface drainage(adequate)']									

4.1.9 TMH18

TMH18 export sheets are generated by the GeoRAMS system. These reports can easily be exported from the system in the required formats. Click on the landing page the TMH18 tab.



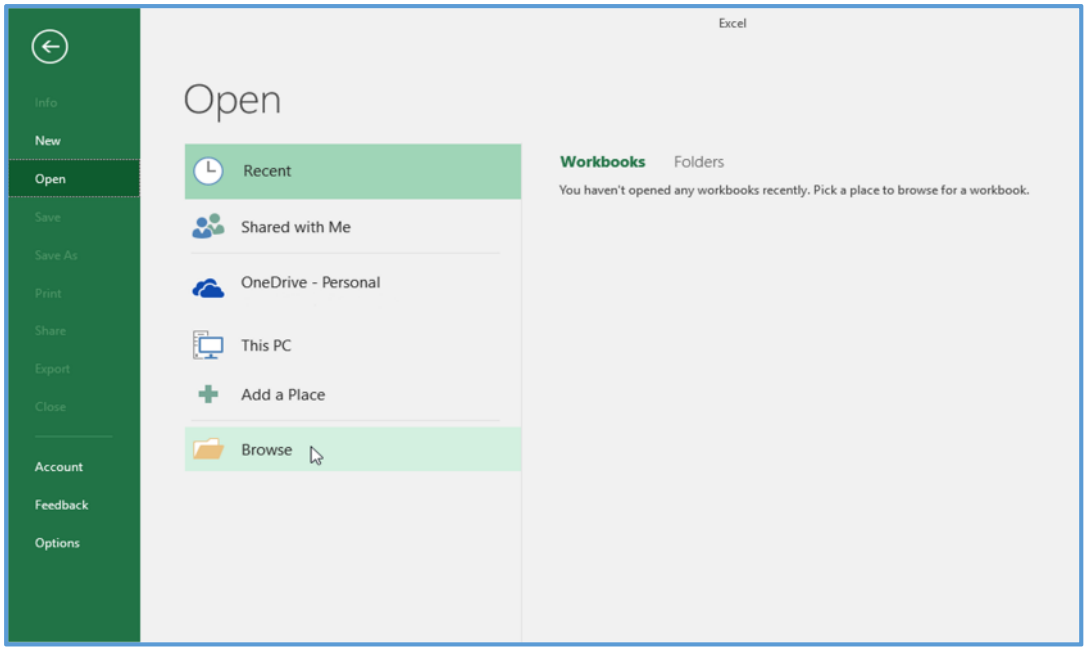
Click on the green Download tab to download the .csv files



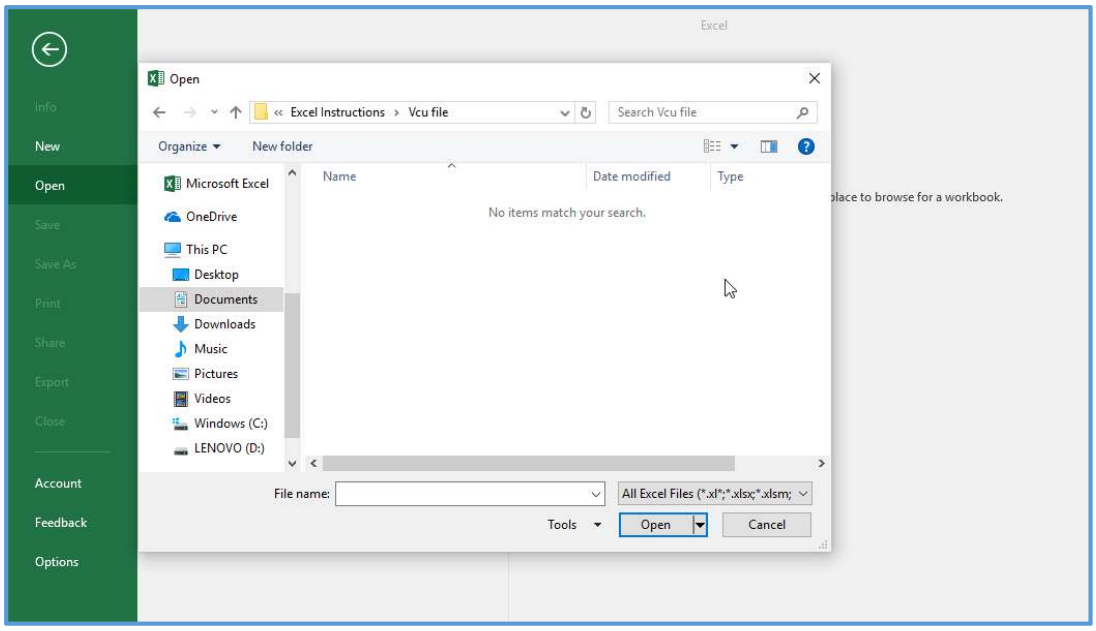
How to import a TMH CSV file in MS Excel

In MS Excel, click on the **File** tab in the menu bar.

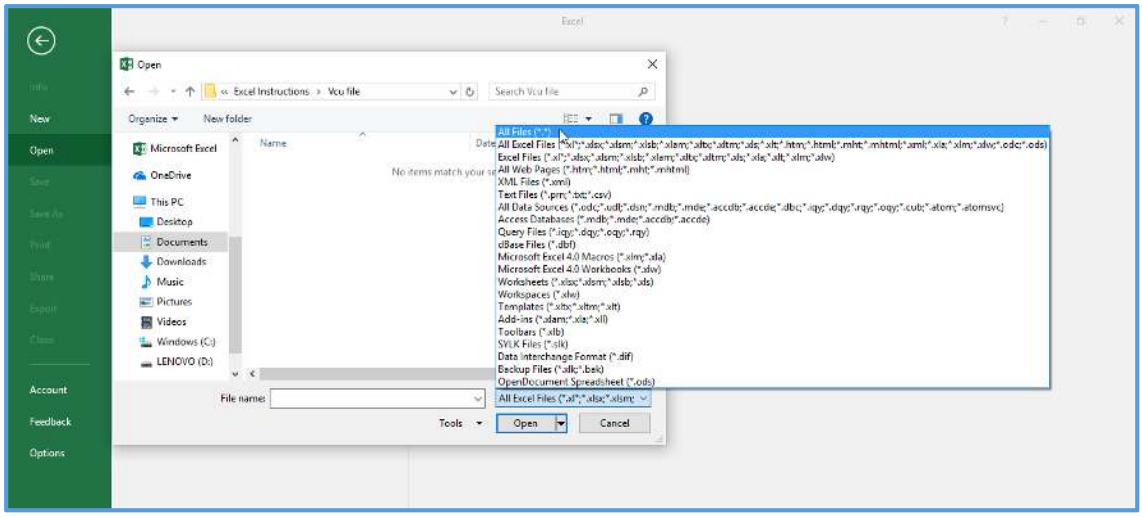
A new window will open. Click on the **Browse** tab at the bottom of the screen.



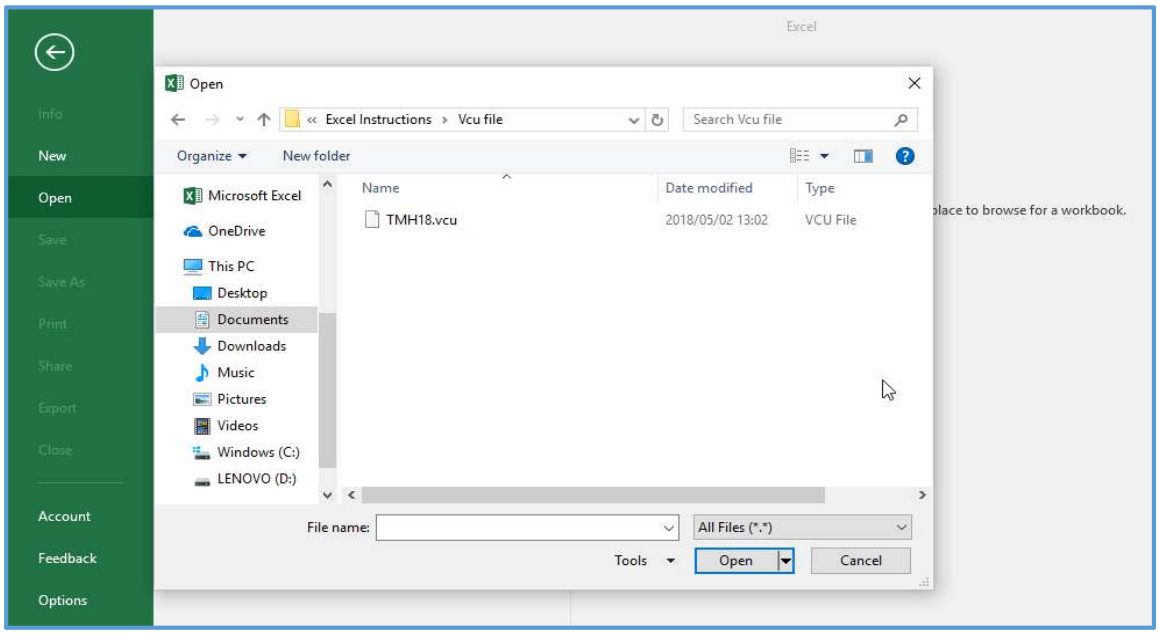
A new window will open where you can navigate to the specified file, you will notice that it will display **No items**.



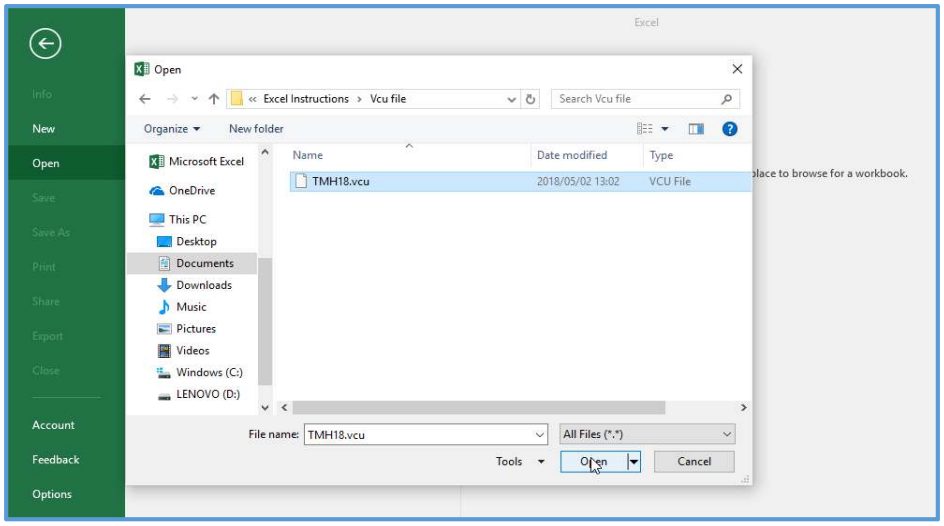
To resolve this, click on the “All Excel Files” dialog box and select the **All Files** option.



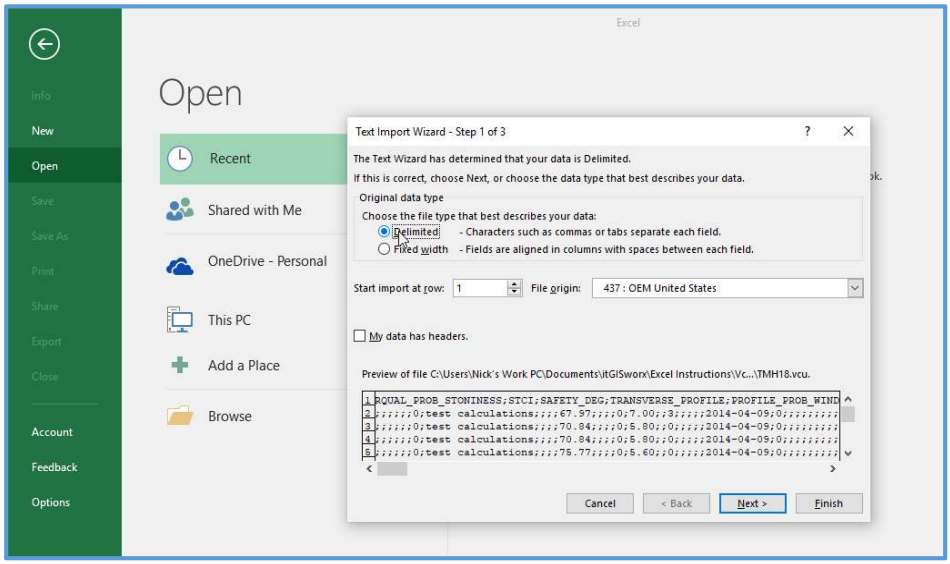
Navigate to the folder where you downloaded the TMH18 file. You should see your file.



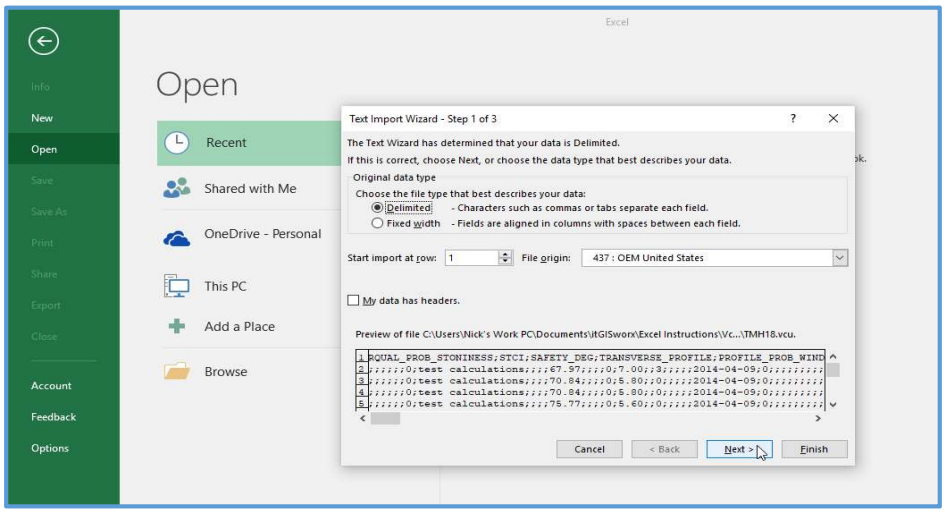
Select and open the file.



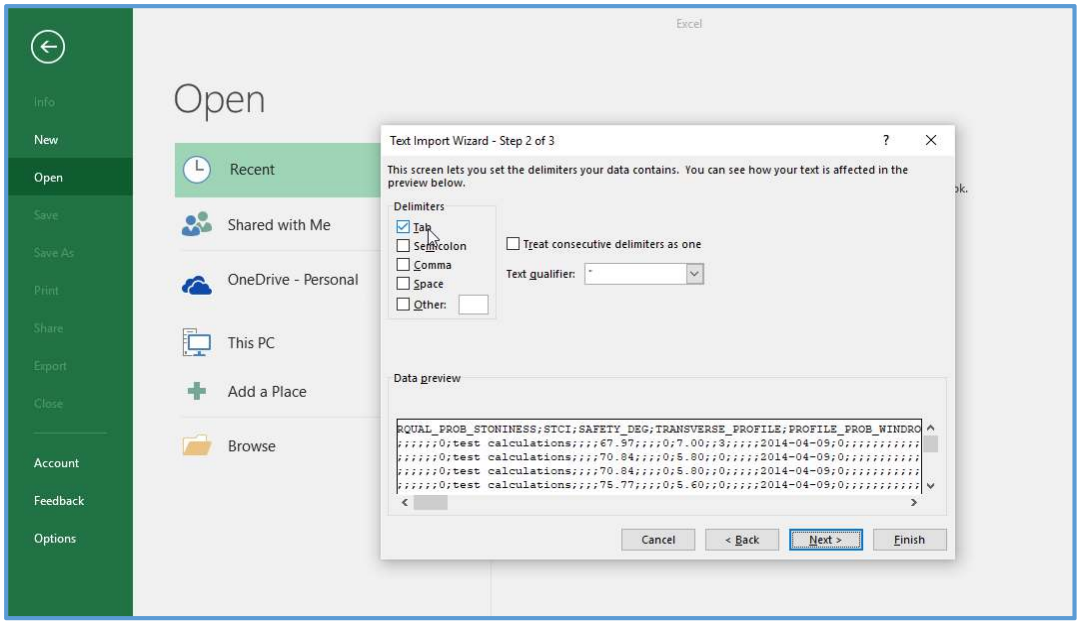
A Text Import Wizard (Step 1 of 3) window will be displayed, select the **Delimited** option.



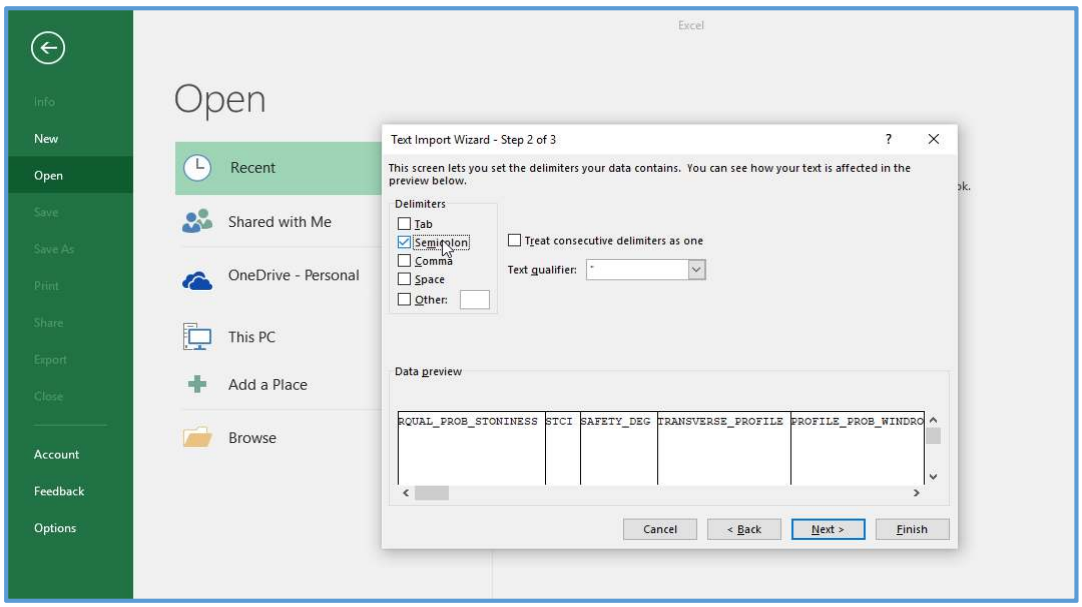
Navigate to the bottom of the window and click on **Next**.



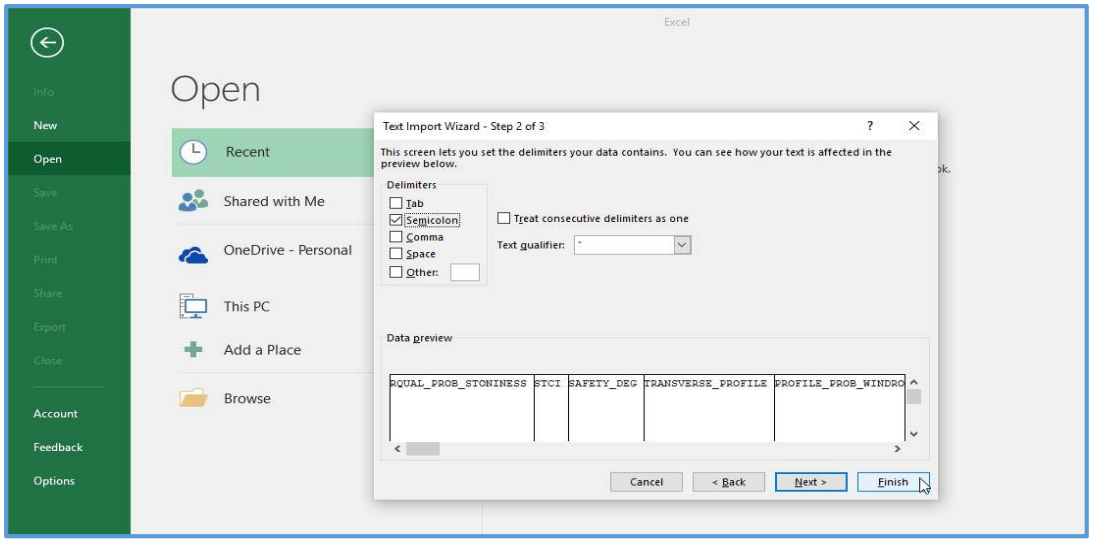
The next page of the Text Import Wizard (Step 2 of 3) will be shown. You will notice that under the Delimiters heading, **Tab** is selected by default.



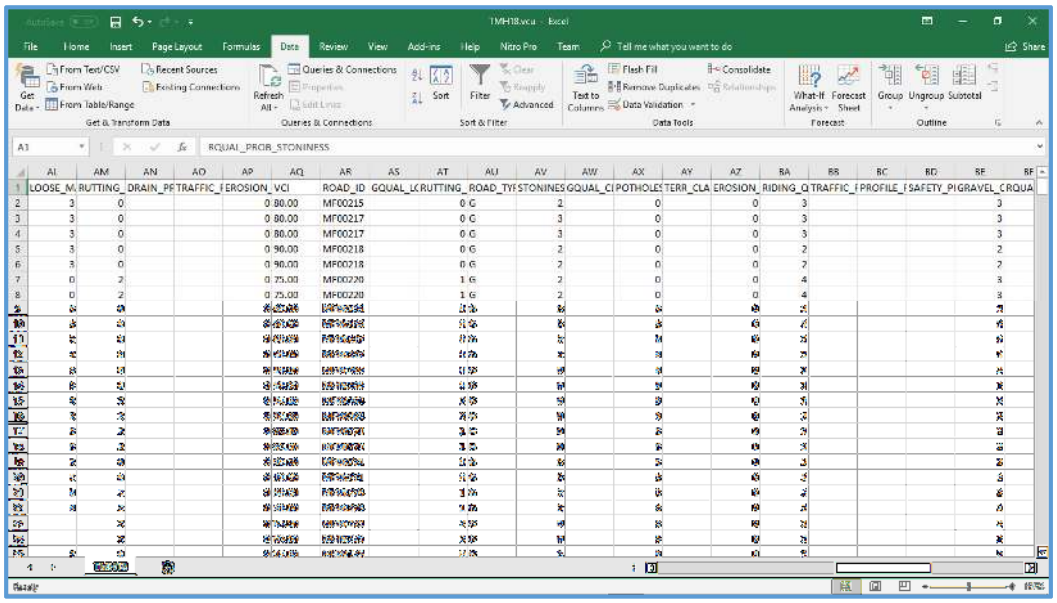
Uncheck the **Tab** option and check **Semicolon**.



Click on the **Finish** button at the bottom right of the screen to import the file into Excel.

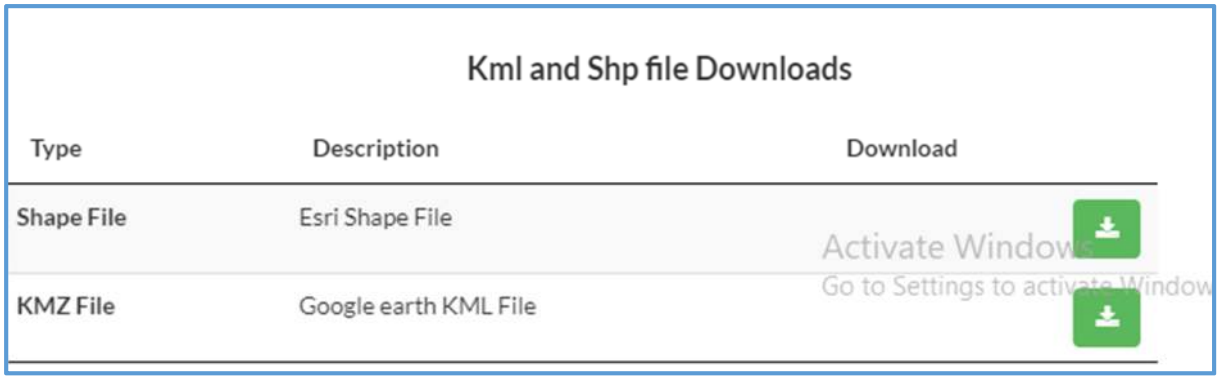


The CSV file will now be converted correctly into Excel and the date presented under column headers



Download a shapefile or KML file.

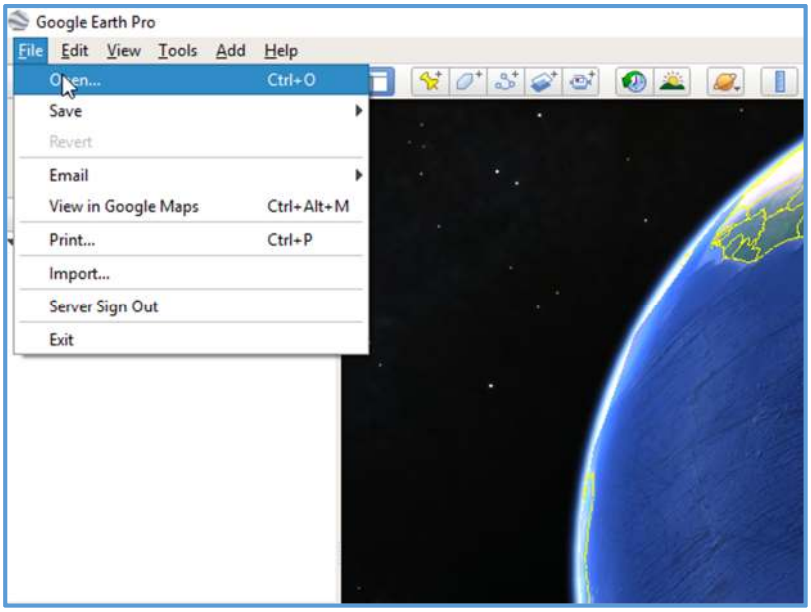
Click on the TMH10 tab on the landing page and scroll down to the Kml and Shp file Downloads list. Click on the green download button.



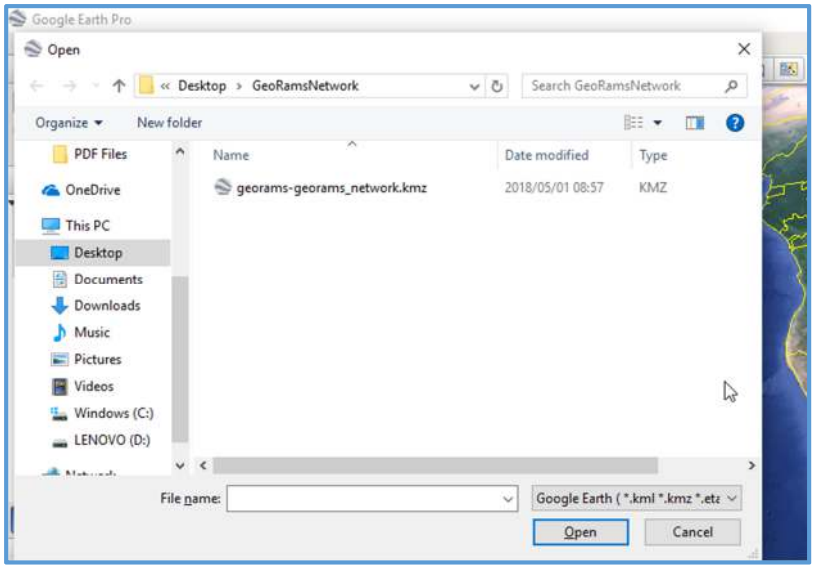
How to open KMZ file in Google Earth

Open Google Earth program (install from https://www.google.com/earth)

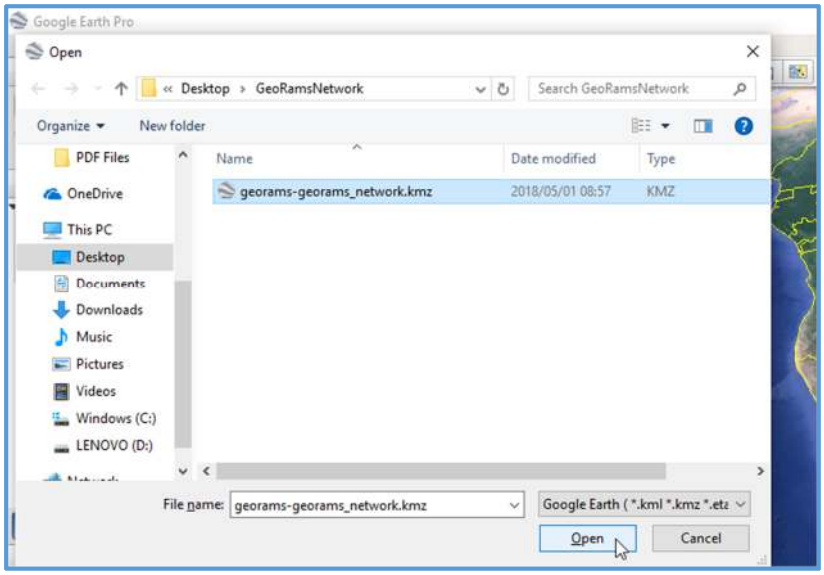
When you are on the landing page click on **File** in the top left corner, and **Open**.



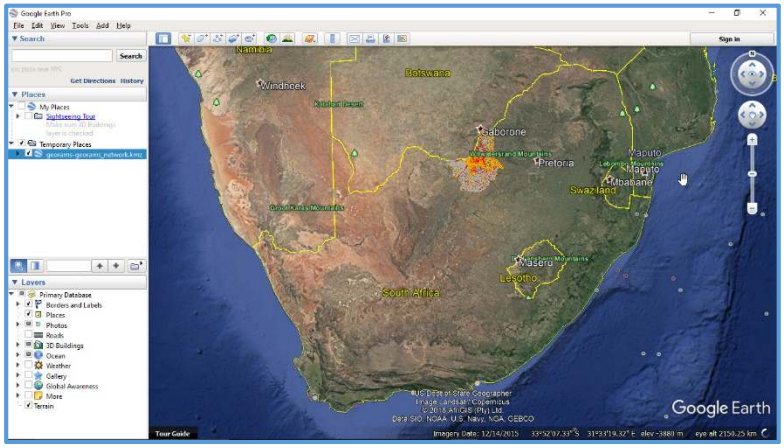
Navigate to the to the folder where you have downloaded the kmz file (normally this will be in the **Downloads** folder)



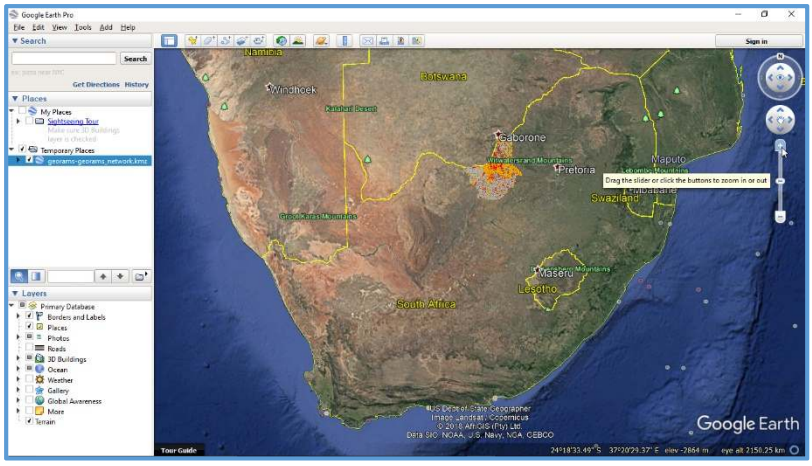
Select the file and click on the **Open** button in the bottom right of the screen.



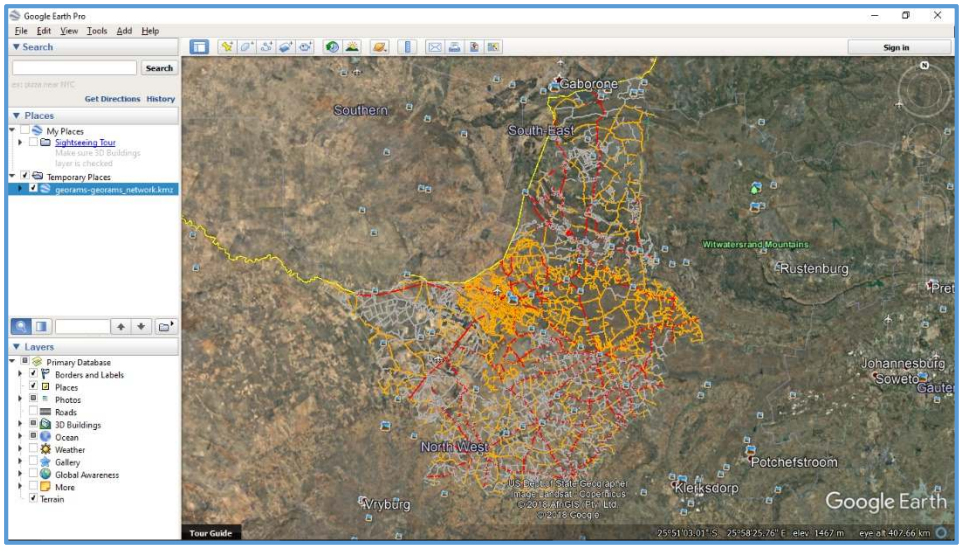
This will load the road network in Google Earth



You can get a better look by zooming in using the mouse wheel or by using the plus at the top right.



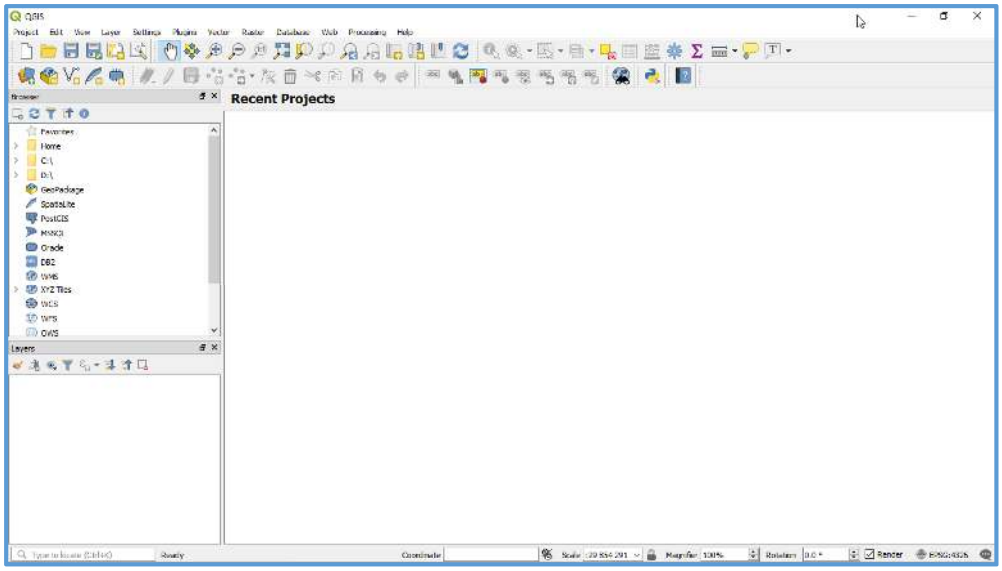
When you zoomed enough you should be able to see the location clearly.



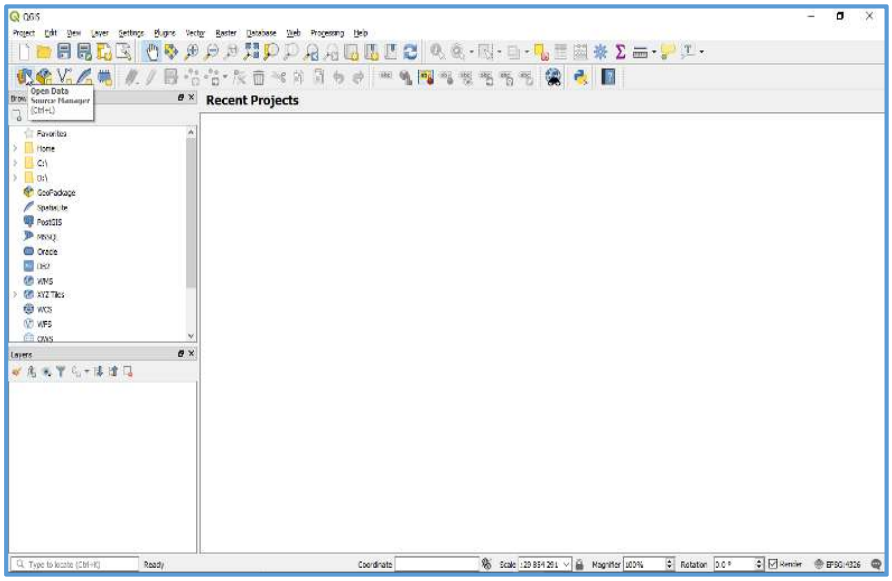
How to open a SHP file in QGIS

Open the QGIS program (install from https://download.qgis.org/)

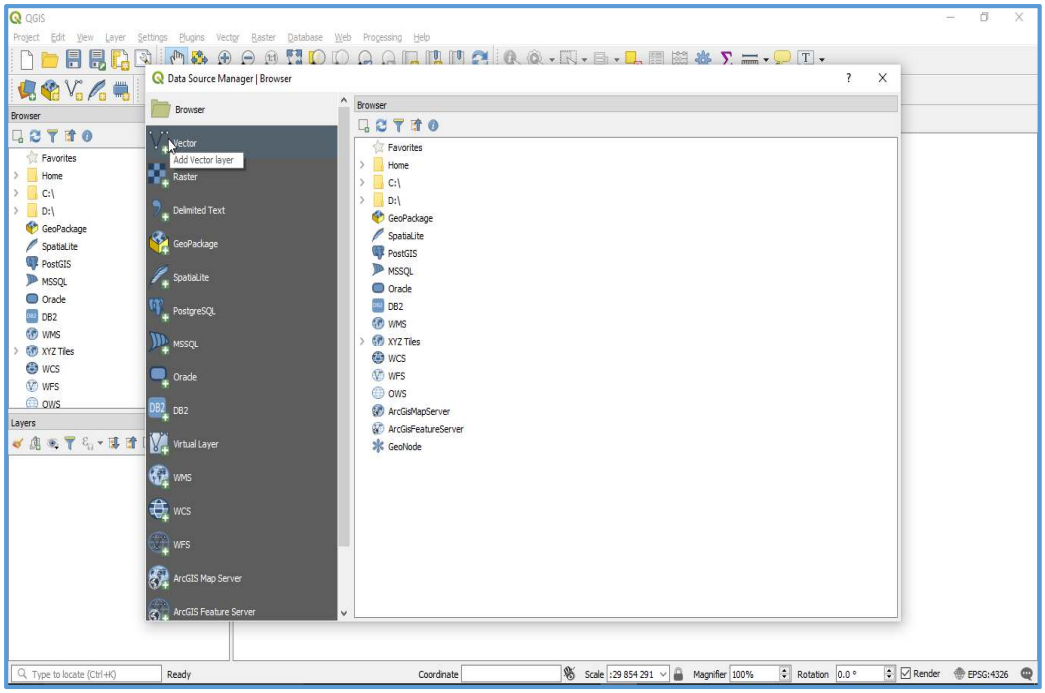
After the program loads you will reach a landing page.



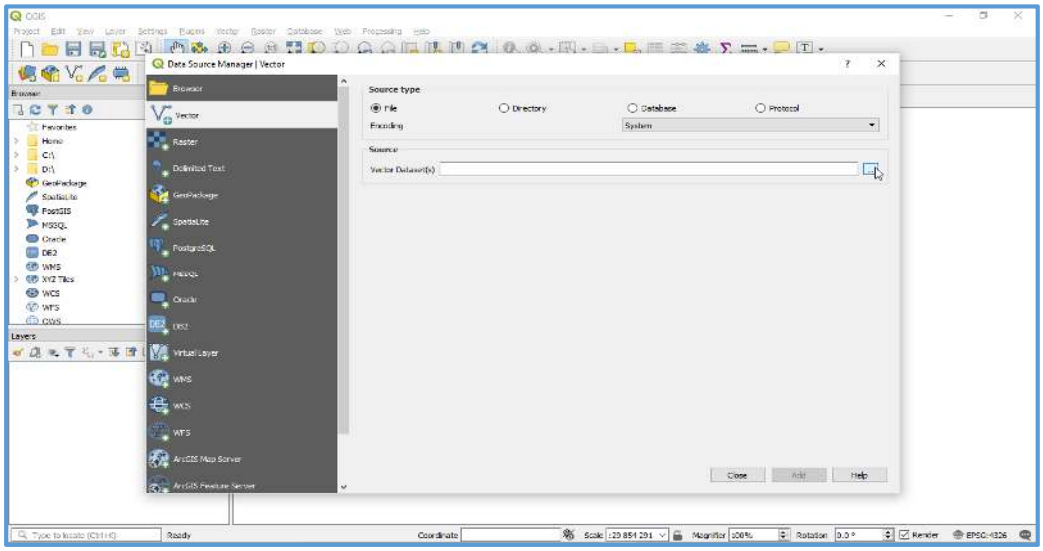
On the landing page, click on **Open Data Source Manager** in the data source manager toolbar



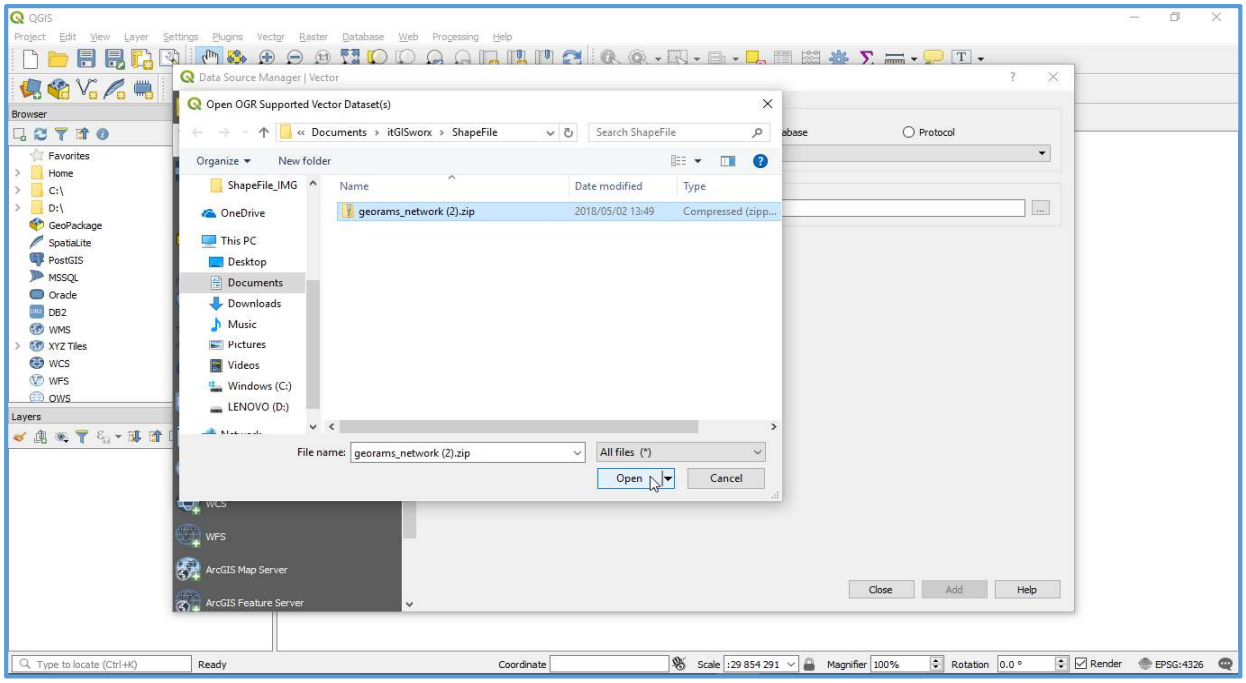
You will see a new window with more options, click on **Vector**.



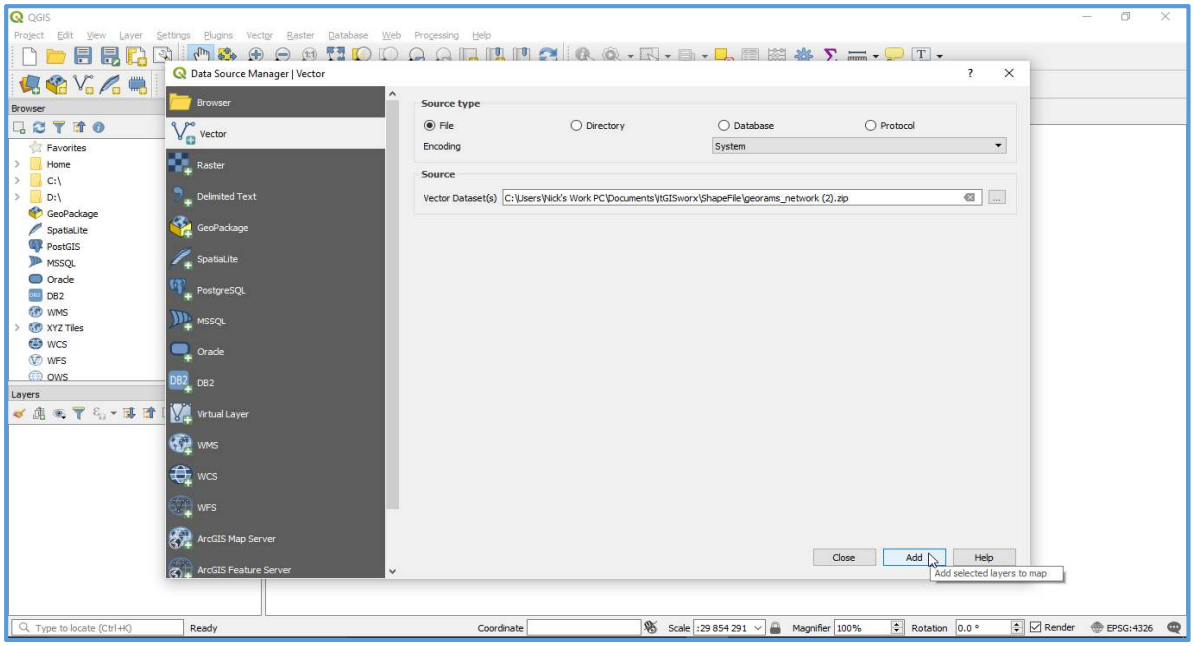
Navigate to the right of the window and click on the browse more (…) button.



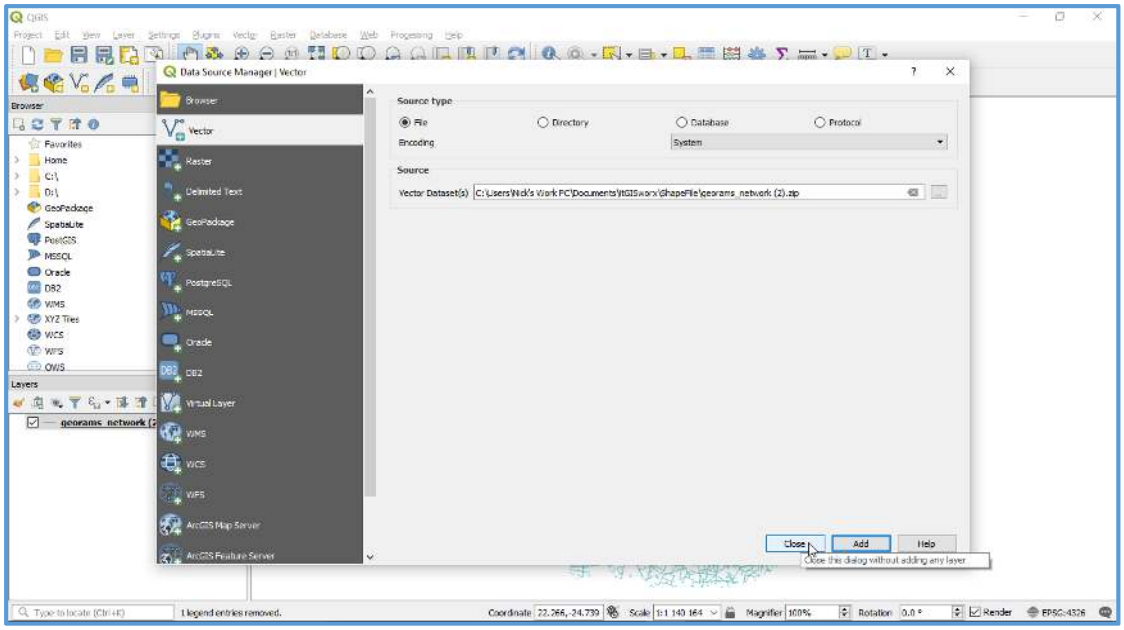
Navigate to where the zip file was downloaded (normally **Downloads** folder), select the file and click on **Open** at the bottom right of the window



You will notice that the file's location will be displayed in the Vector Dataset(s) dialog box. Click on the **Add** button at the bottom of the window.



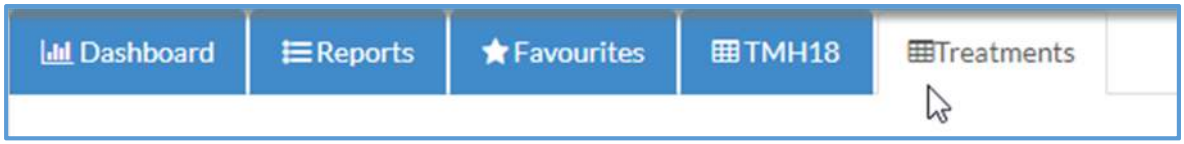
Then click on the **Close** button at the bottom of the window.



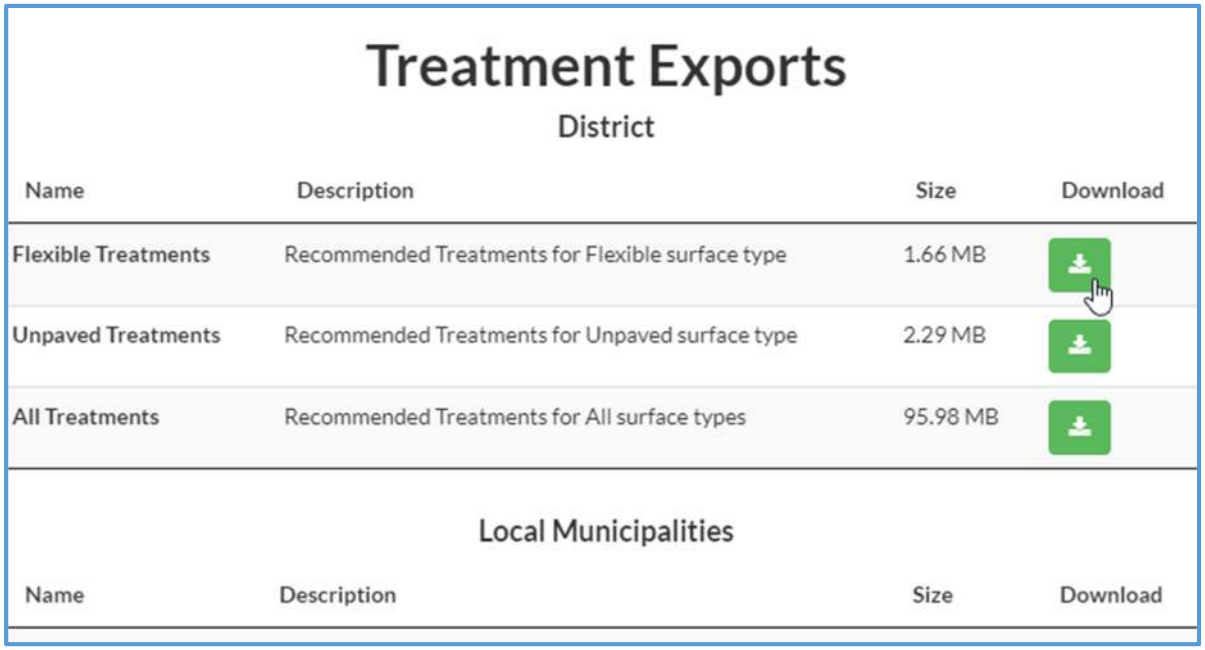
The SHP file will now be loaded in QGIS, ready for editing.

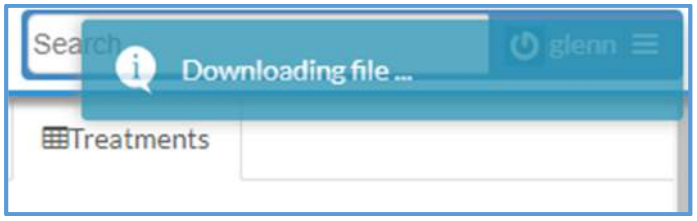
4.1.10 *Treatments*

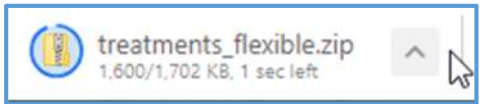
The treatment programs are generated from the system and can be downloaded from this page as an excel spreadsheet. Click on the Treatments tab.



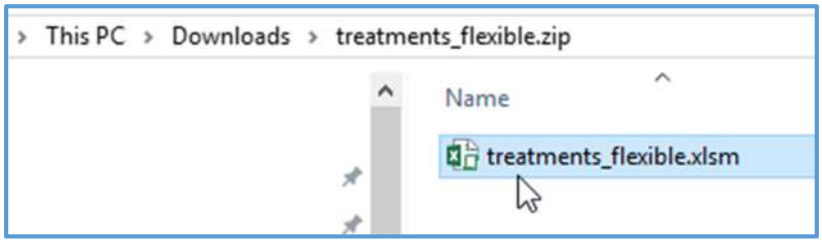
Click on the green Download tab to download, which will download a .zip file.







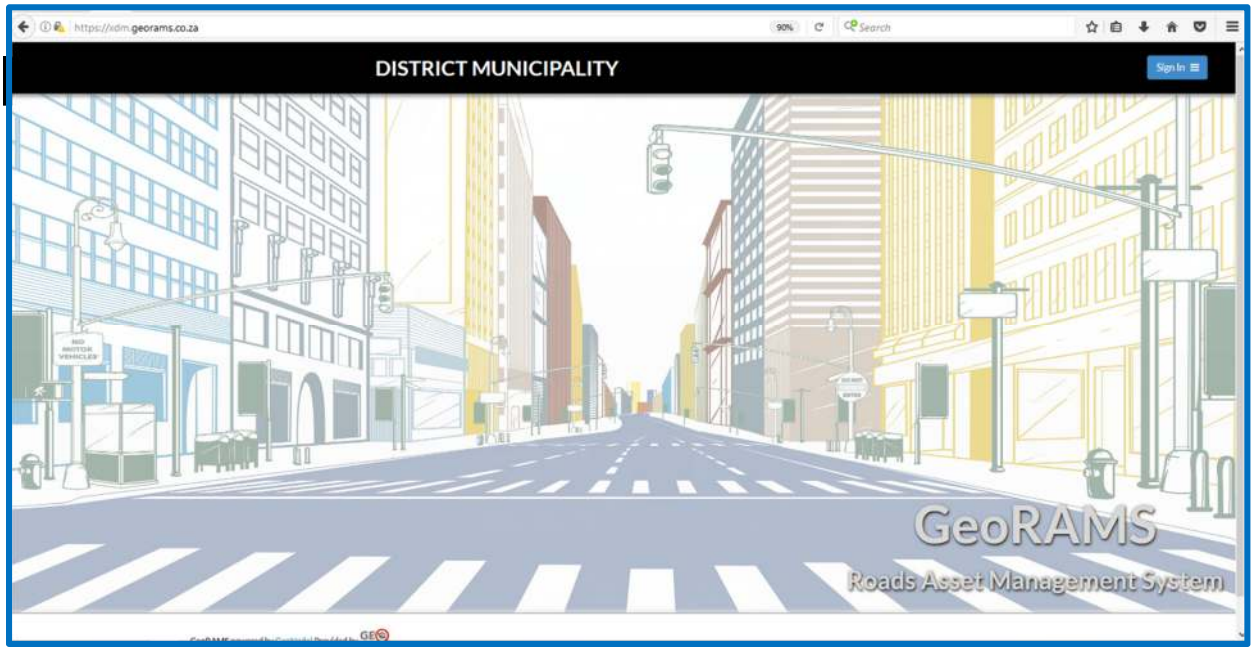
Unzip the file and open it in Microsoft Excel.



4.2 INTERFACE COMPONENTS

The GIS web interface offers a comprehensive set of functionalities and tools to find, filter and interact with the information stored in the GIS database. The interface also offers tools facilitating collaboration and information sharing. This section provides a brief overview of the various screens and functions available therein

4.2.1 *Landing page*



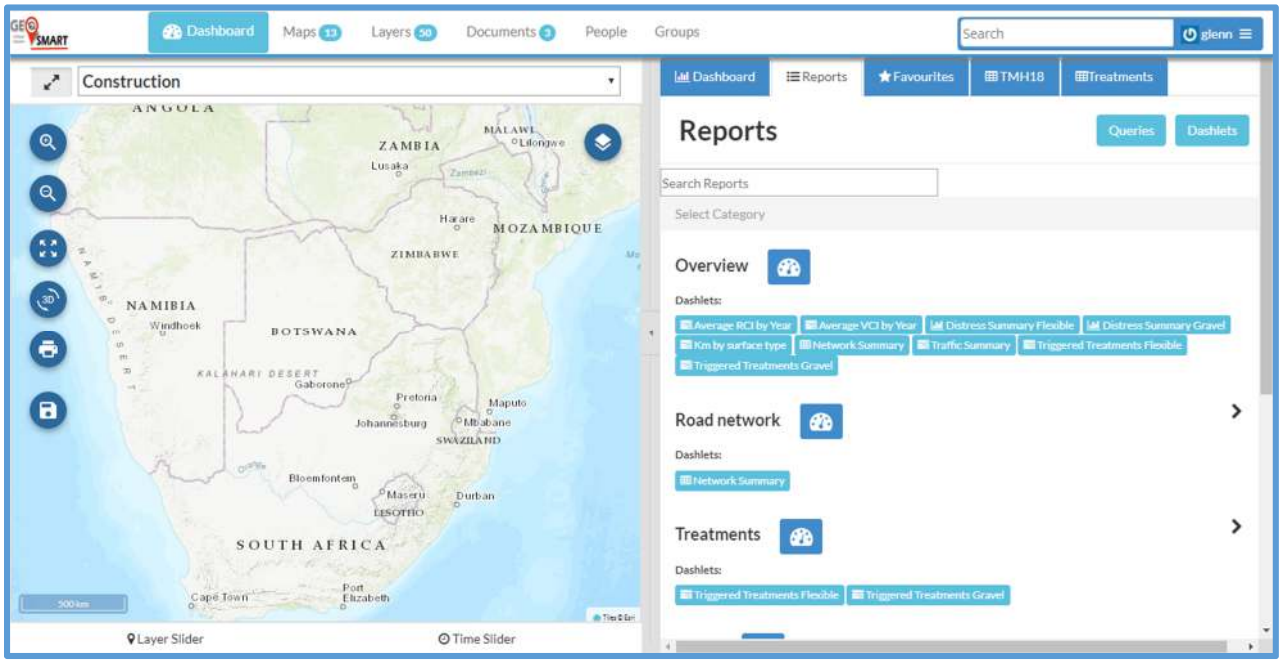
Sign in to use the District Municipality's GeoRAMS interface.

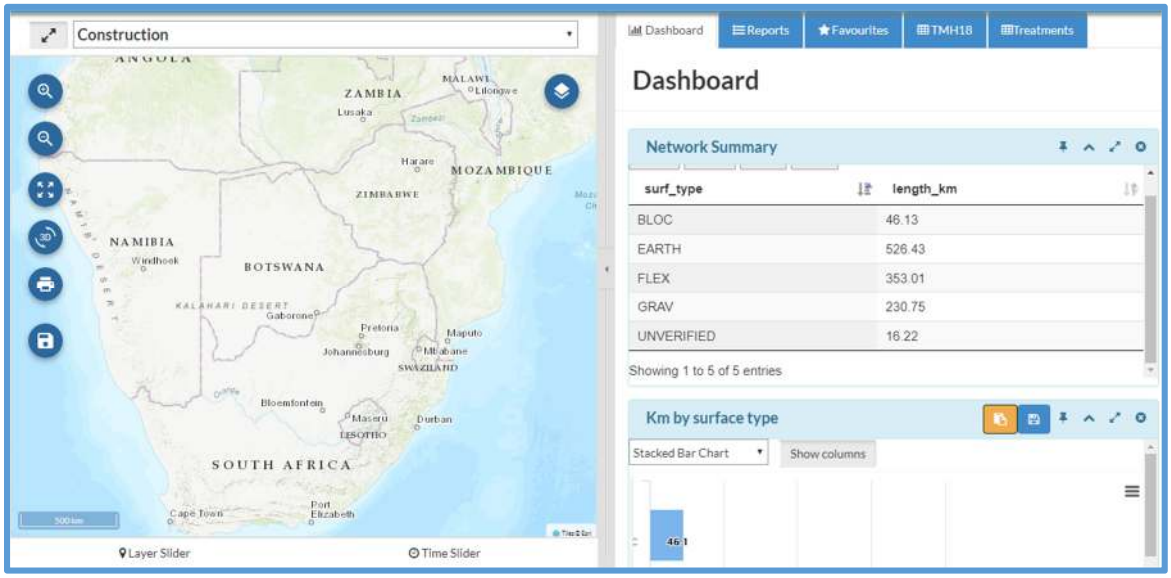
4.2.2 Dashboard

Reports

Log in to see the dashboard items.

Click on **Reports** to see all existing Dashlets and Queries.



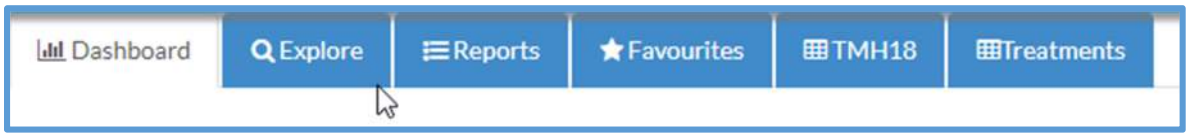


Click on **Reports** to go back to the Dashlet Category list.

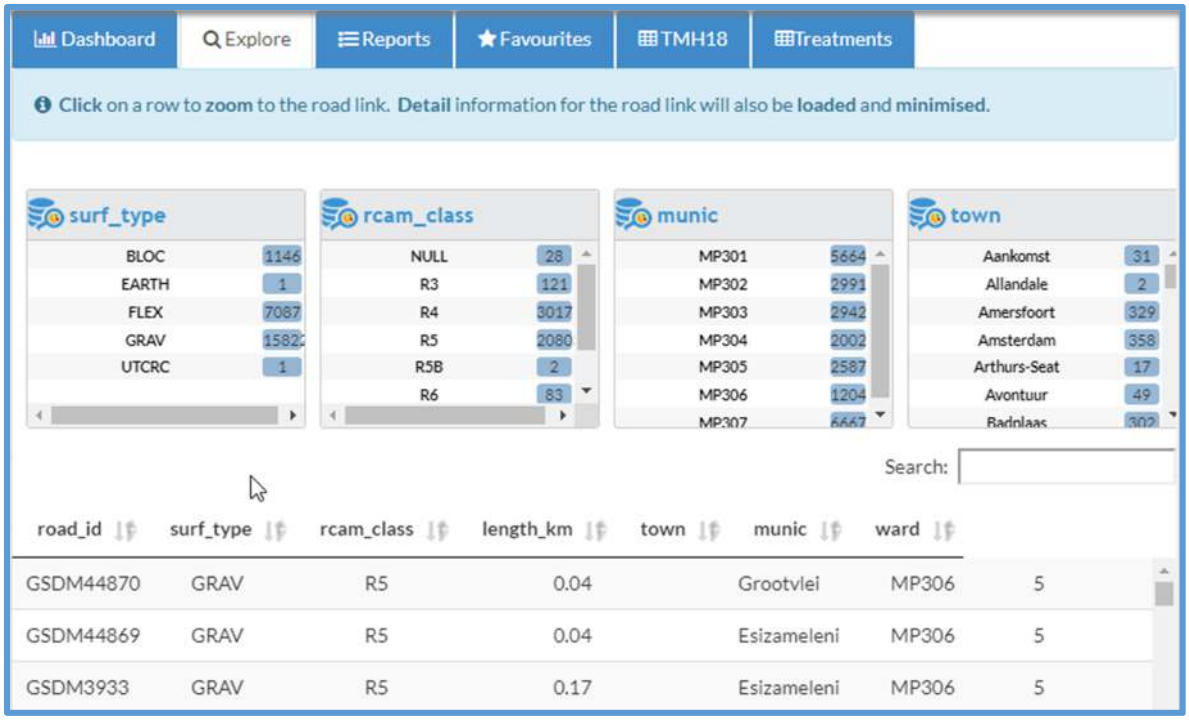
You can create your own **Queries** and **Dashlets** for quick access. These **Dashlets** created from queries can be pinned and unpinned as per the user's preference.

To have a new **Dashlet** pinned on the dashboard the user first need to create a query. The **queries** created can then be displayed as **Dashlets** on the **Dashboard**. When the Dashlet is saved a category can be allocated which will add it to the category list under reports.

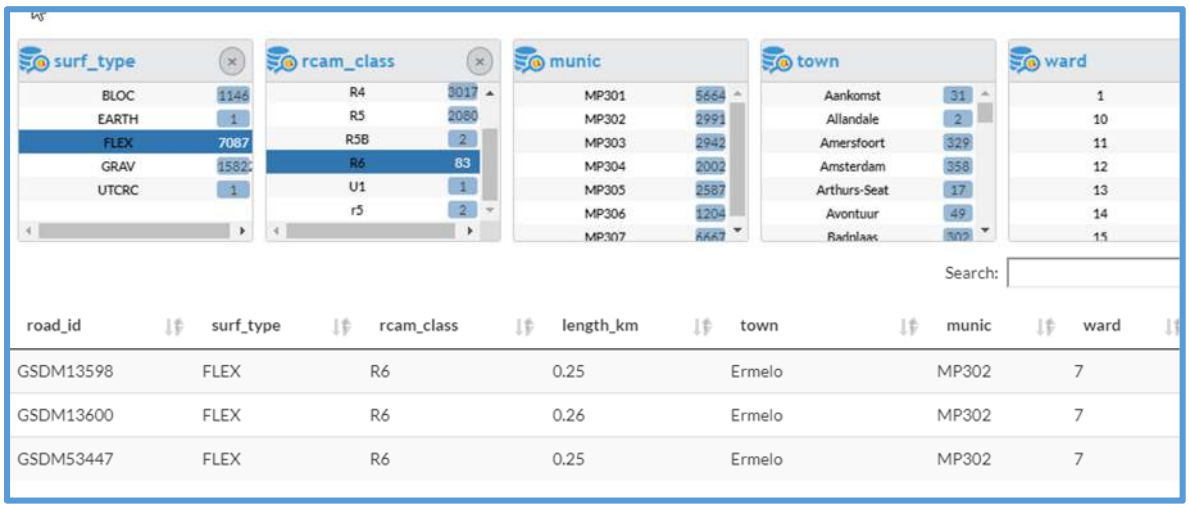
Road Explorer



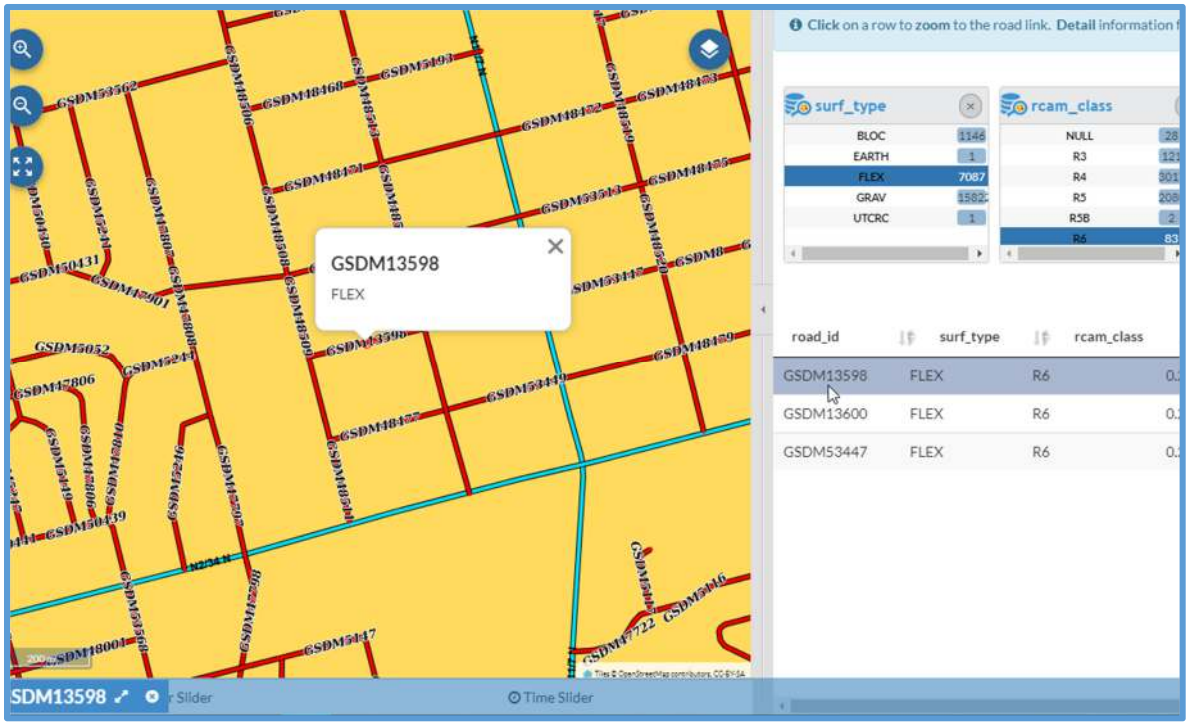
Click on the **Road Explore** button to go to the road network data list where you'll be able to filter and zoom to a record in the list. This function also enables a detail view of the selected road link feature.

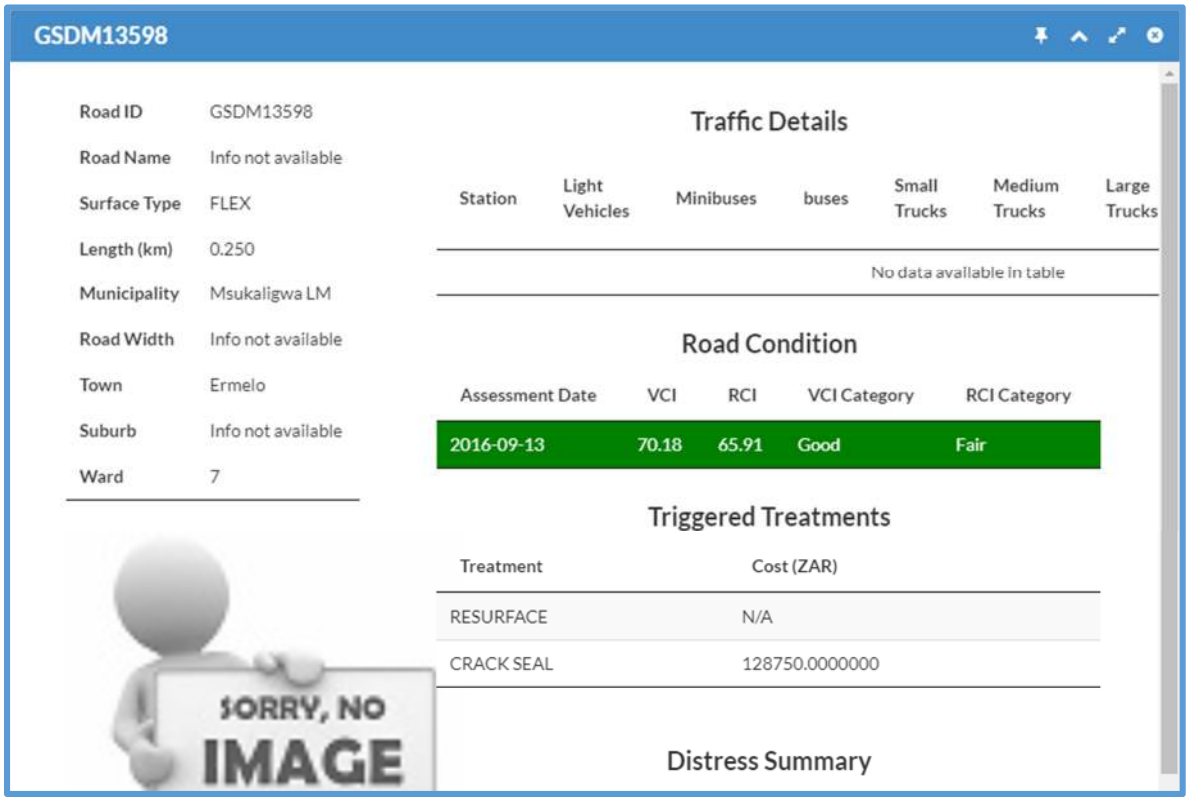


Use the column filter panes at the top of the view to filter the records. You might want to see all the **FLEX** roads of RCAM class R6. Click on **FLEX** in the **Surf_type** block, then click on **R6** in the **rcab_class** block. This will give you a list of the filtered records.



Now if you select one of these roads it will zoom to the Dashboard map in the lefthand side and create a detail information view of the selected road link.

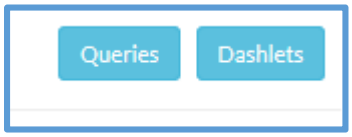

Click on a row to zoom to the road link. Detail information
surf_type
BLOC 1146
EARTH 1
FLEX 7087
GRAV 1582
UTCRC 1
rcam_class
NULL 28
R3 121
R4 901
R5 208
R5B 2
R6 83
GSDM13598
FLEX
road_id surf_type rcam_class
GSDM13598 FLEX R6
GSDM13600 FLEX R6
GSDM53447 FLEX R6
SDM13598
Time Slider


GSDM13598
Road ID GSDM13598
Road Name Info not available
Surface Type FLEX
Length (km) 0.250
Municipality Msukaligwa LM
Road Width Info not available
Town Ermelo
Suburb Info not available
Ward 7
SORRY, NO IMAGE
Traffic Details
Station
Light Vehicles
Minibuses
buses
Small Trucks
Medium Trucks
Large Trucks
No data available in table
Road Condition
Assessment Date VCI RCI VCI Category RCI Category
2016-09-13 70.18 65.91 Good Fair
Triggered Treatments
Treatment Cost (ZAR)
RESURFACE N/A
CRACK SEAL 128750.0000000
Distress Summary

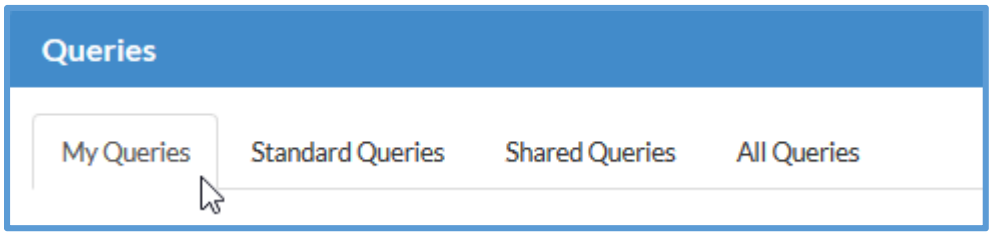
4.2.3 How to build and work with Queries

To have a new **Dashlet** pinned on the dashboard the user first need to create a query. The **queries** created can then be displayed as **Dashlets** on the **Dashboard**.

Click on **Queries** to see a list of existing queries or create new queries**.**



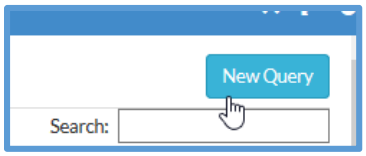
In the query window, the user will see a list of existing queries under:



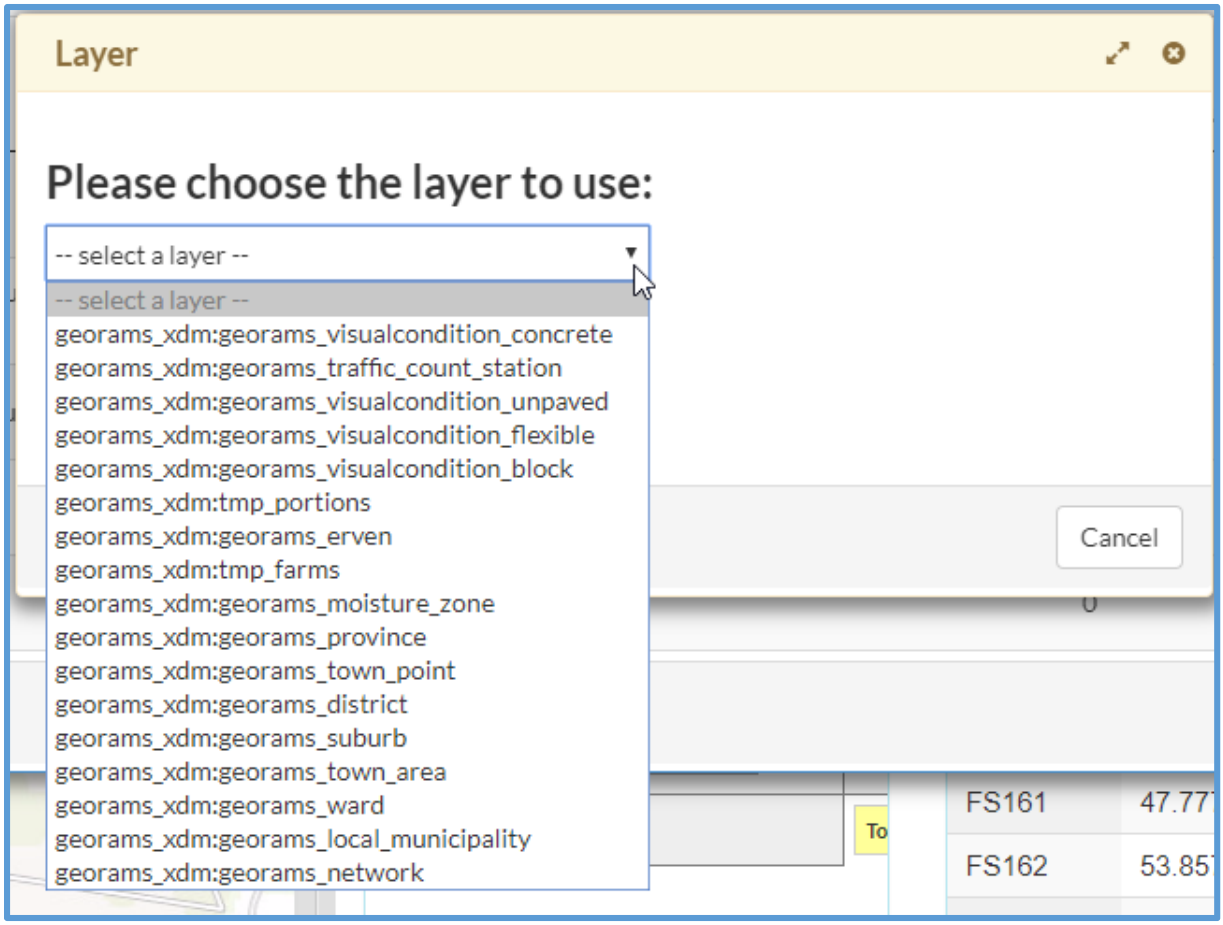
My Queries - All the queries created by the logged in user,
Standard Queries - Queries created by any user, set to standard, these queries can be accessed by all users but only be modified or deleted by the user that created it.
Shared Queries - Queries shared by the user, can be accessed by all users.
All Queries - Lists all queries

The query: Show the total length in km of the road network inventory per surface type.

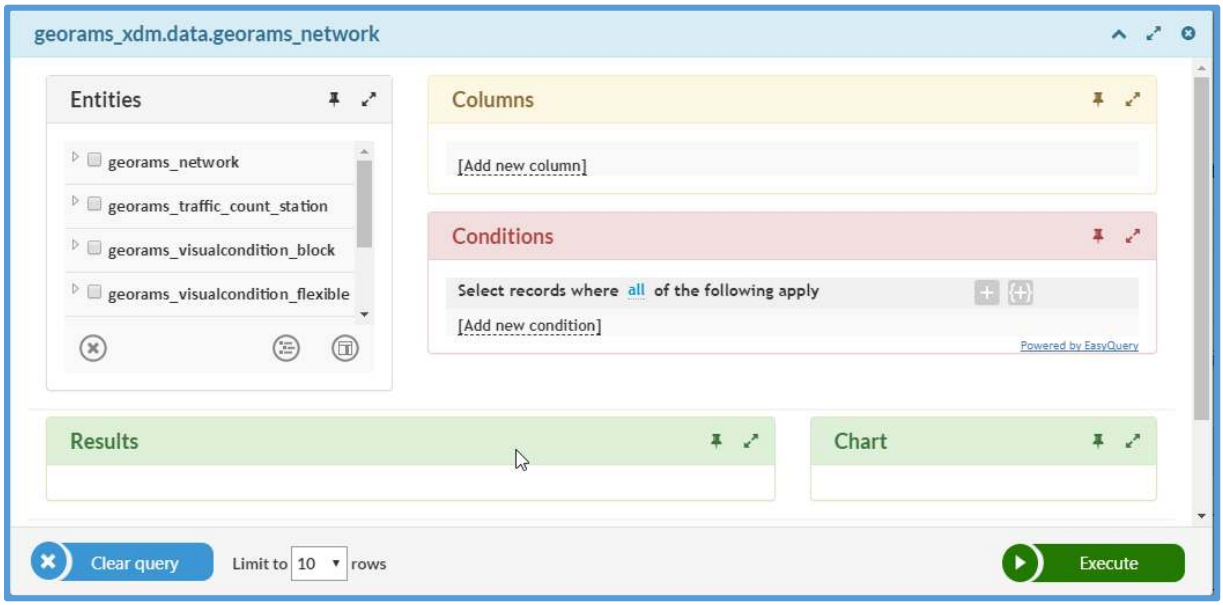
To Create a new query, click on **New Query**



Choose the layer to use for your query. The query window will open listing the selected layer and all other layers linked to the selected layer.



The query window will open listing the network layer and all other layers linked to it.

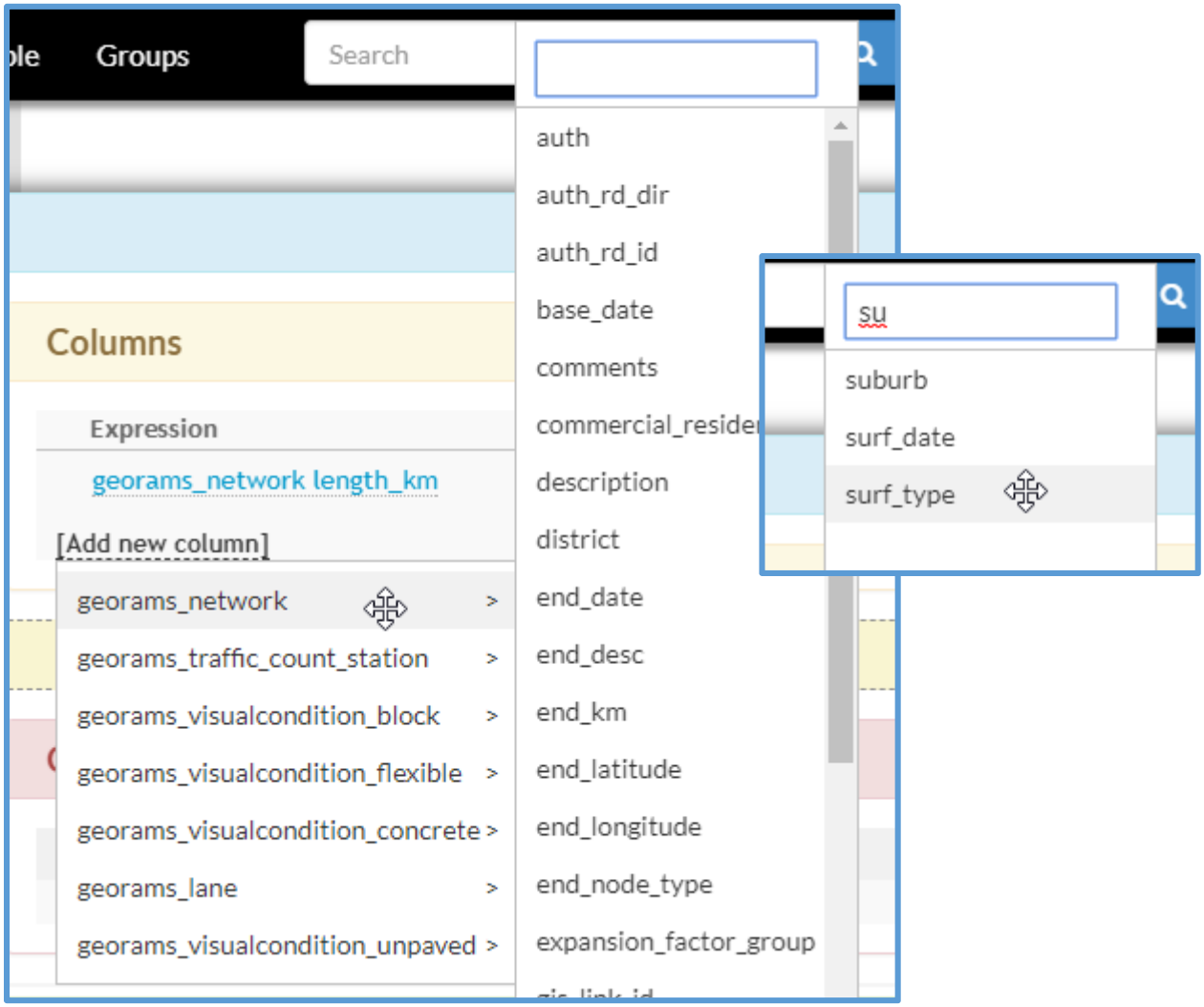


Entities - this is the window that list the layers and linked/joined layers.
Columns - here the user will list the columns from the database table query from and to view in the Dashlet on the dashboard.

Condition - In this area the user can set the condition of the query, like eg. Show all the values where the Municipality is equal to “the Municipality name”

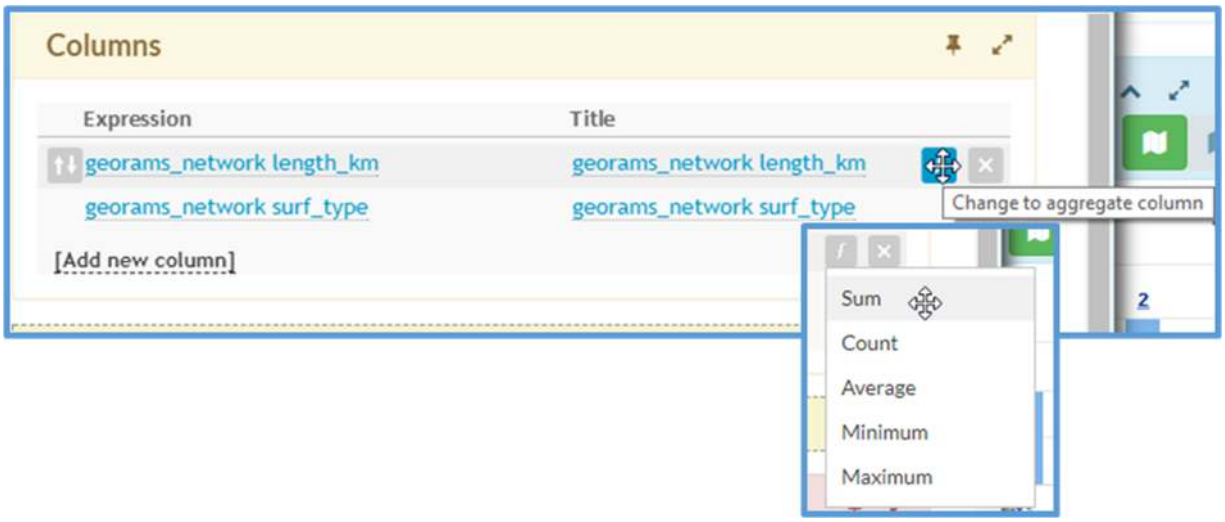
Selecting query columns

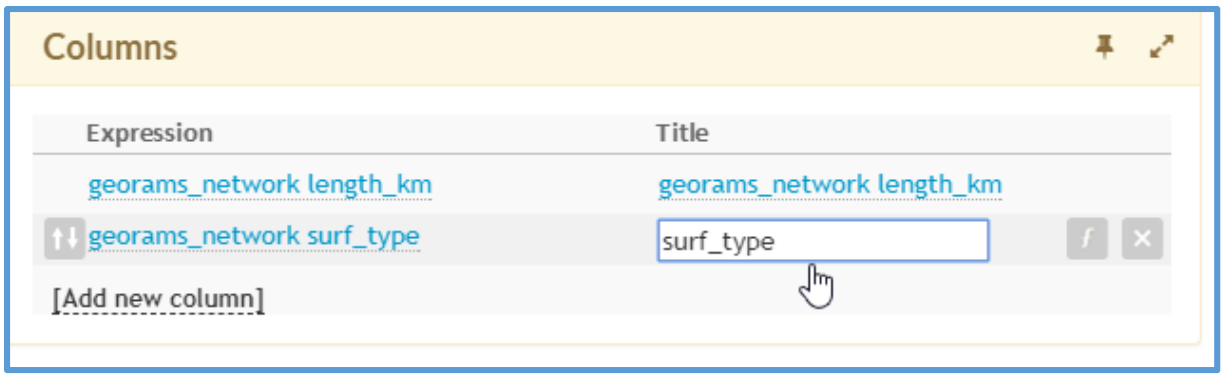
To start creating query click on **Add new column** in the Columns block and select a database table and column you would like to be included in your query. ***Tip:*** *to quickly find a column you can type the name of the column in the search dialog box. The list will be filtered as you type.*



Now we have 2 columns listed for the query. To calculate the total length per km of the road length we need to **sum** the values.

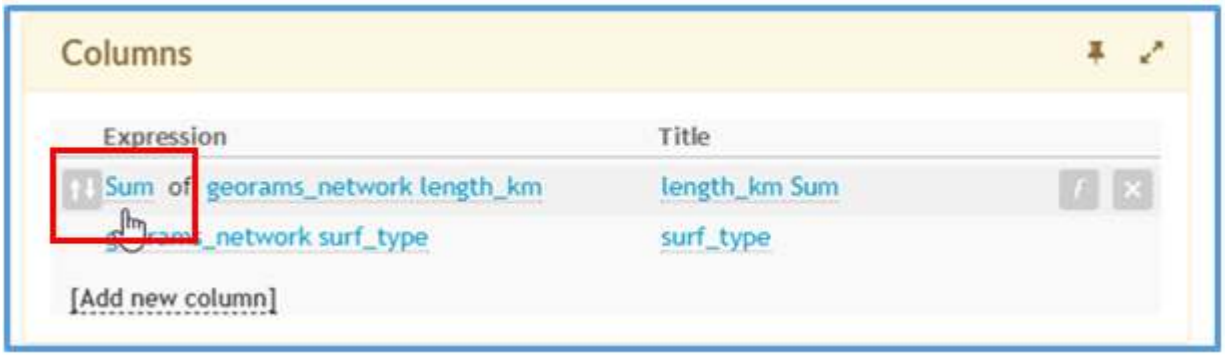
The function symbol at the end of each row, allows you to perform a list of mathematical functions for the data in the selected column.





The selected column will be listed in the columns window. You can change the title of the column by clicking on it. The information you type under the title heading will be displayed on charts, tables and pivot tables, so make it short and descriptive. Follow the same steps to add more columns.

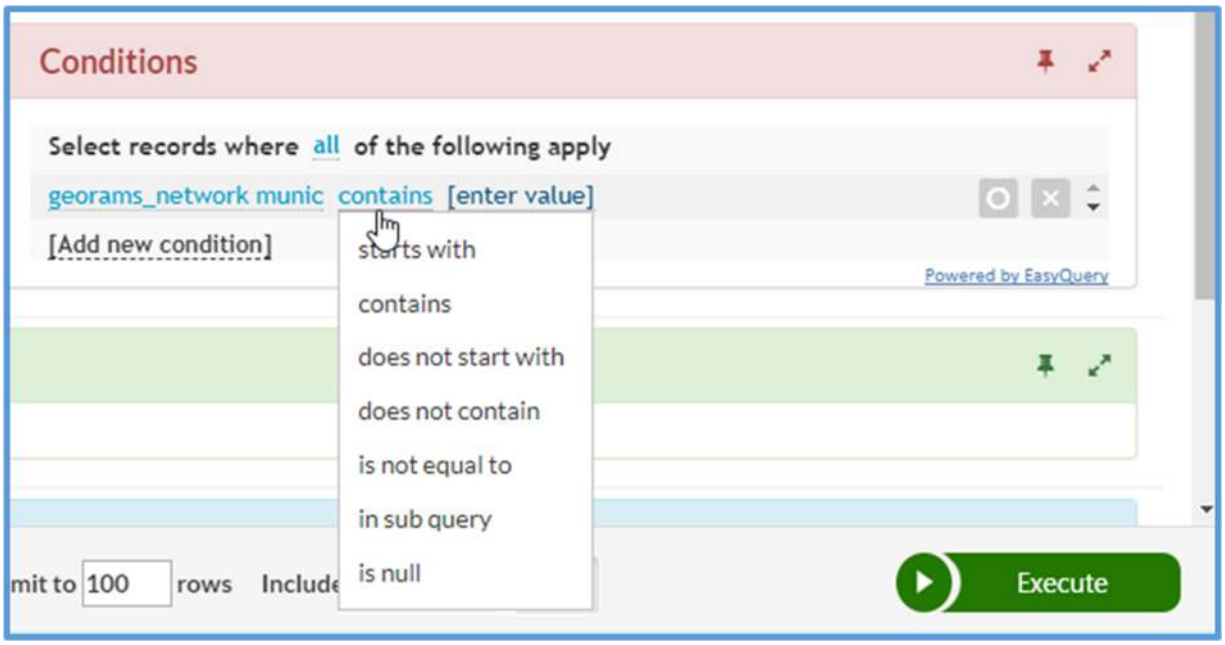
Please note that the functions available are dependent on the data type of the column e.g. a text data type cannot be summed.
Functions are useful if you have time series data (i.e. yield results taken over a period of time) that you would like to summarise, for example, the average yield per borehole. If you do not use the function feature, you will get a list of all the yield results for a borehole collected over time.

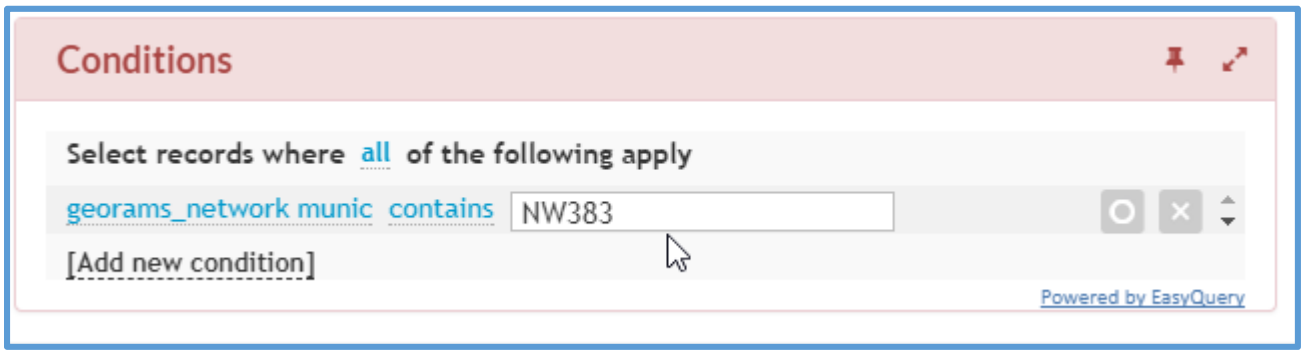


If a function has been used, you will see a description of the type of function appended to the description as shown above. Cancel the function by clicking on the function button.

Adding conditions to your query

You can add multiple conditions to your query. This filters the results to only the records matching your query condition(s). Click on **Add new condition** and select a database table and column you would like to set a condition for. Once a field has been added, you can select a condition and enter a value.

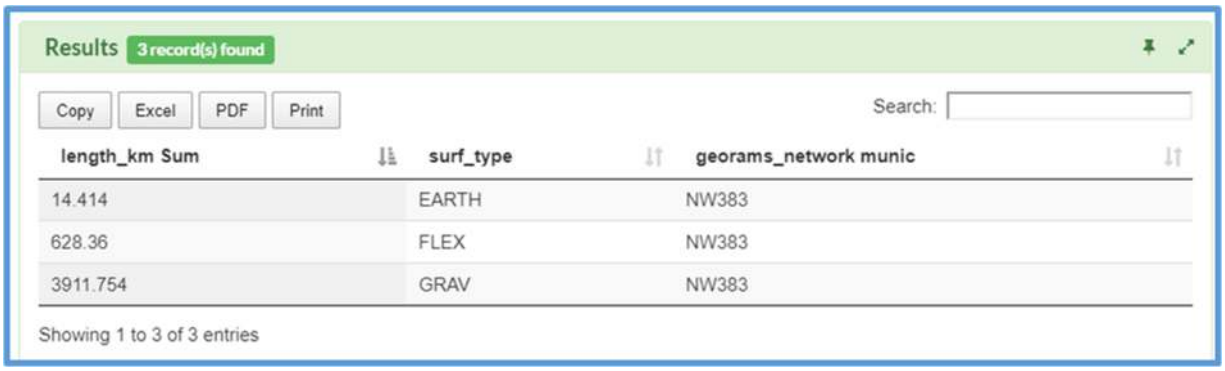




You can add more conditions in the same way. Click on **Add new condition** to add more conditions or filters.

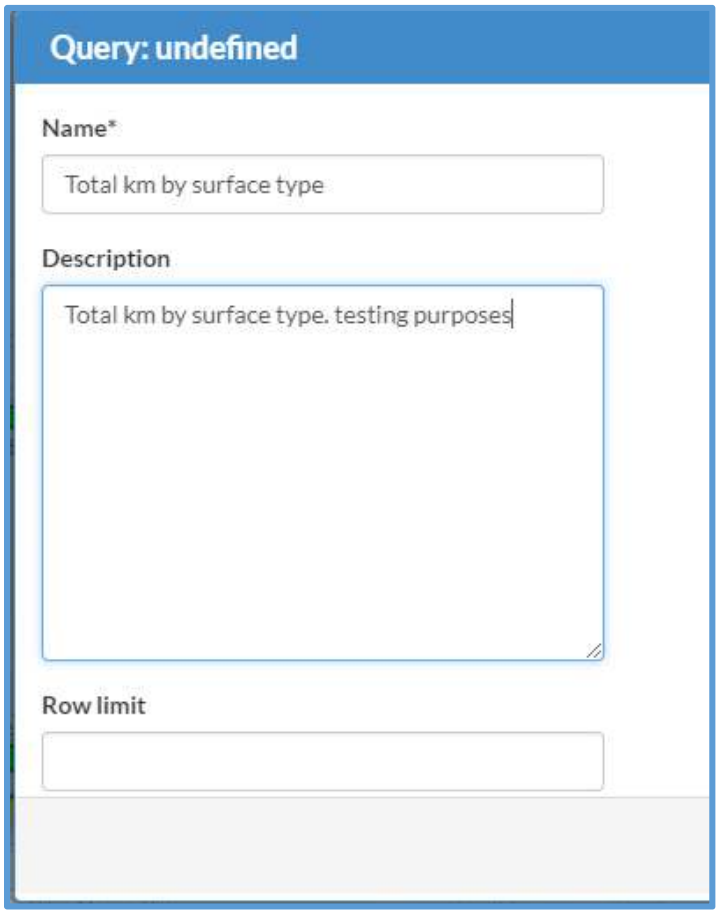
Executing the query

If you are satisfied with your query you can click on the **Execute** button
The query will run and return three types of results:



Once the query is created it can now be saved. Click on **Save query.**

Type a name and description for the query and configure the rest of the properties as indicated below. Ignore the properties not shown in this document (for admin users).



Row limit – this setting limits the number of rows the query returns. Leave blank unless you want to override the settings when you ran the query.

Is active – this is a setting to enable or disable a query. Make inactive if you do not want users to use the query.

Is shared – The query is shared and can be used by all users. Don't select if you want this query only to be visible to you.

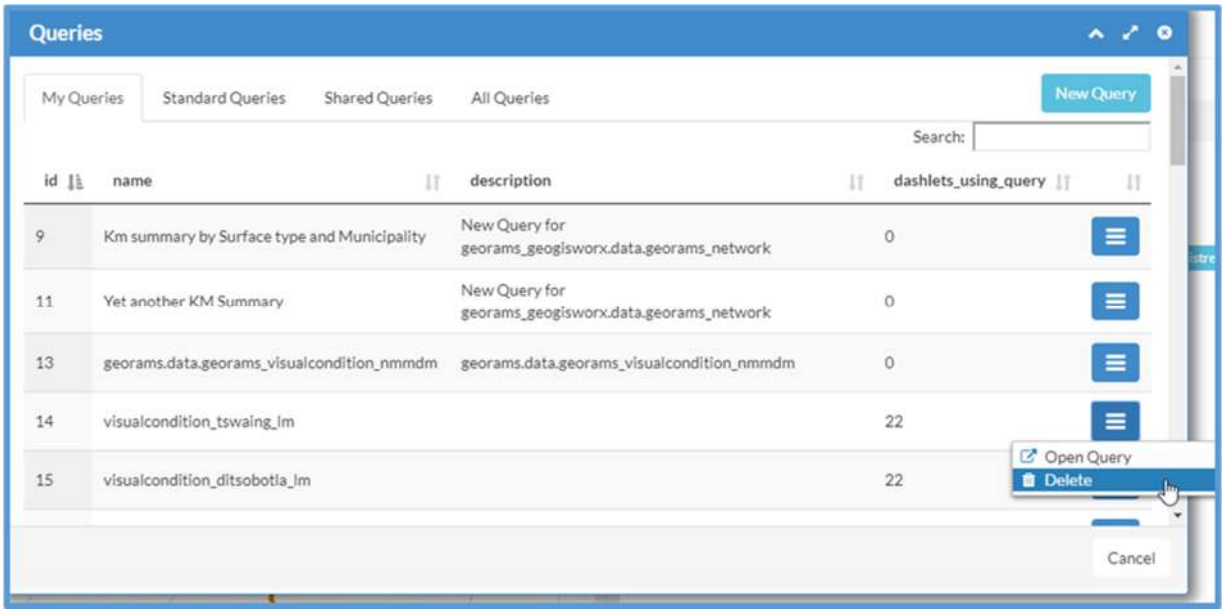
Is standard - The query is listed under standard, can only be modified or deleted by the user that created is. This is typically used by the administrator of the system to create standard queries for all to use.

Click on **SAVE** to and close the query window.

Editing or deleting a query

To view the saved query, go to **Dashboards** and click the **Queries** button

The new query is appended to the bottom of the query list. If you click on the menu button, you will be able to delete the query or open the query for editing.

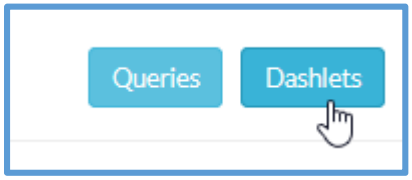


4.2.4 *Dashlets*

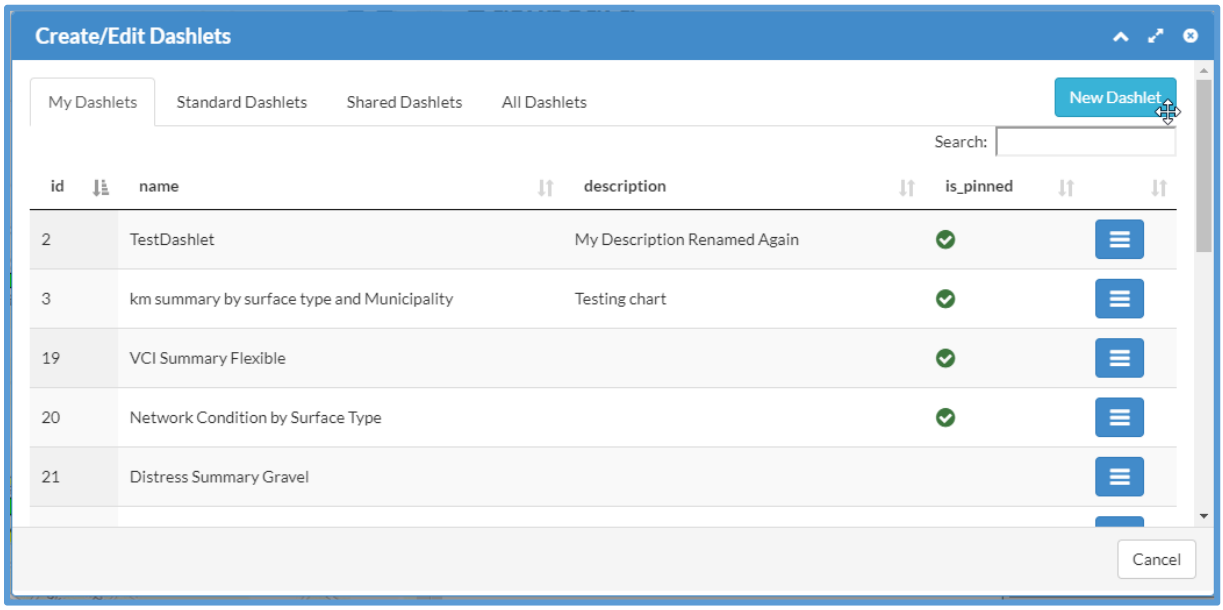
Dashlets allow users to display query results on their **Dashboard** in four ways:

- Charts
- Tables
- Pivot tables
- Maps (future)

To be able to see the query on the Dashboard, a Dashlet needs to be created and pinned to the dashboard. In the **Dashboard**, click on **Dashlets.**



The Dashlet window lists the Dashlets in the same way as the queries with **My Dashlets, Standard Dashlets, Shared Dashlets** and **All Dashlets.** Click on **New Dashlet.**



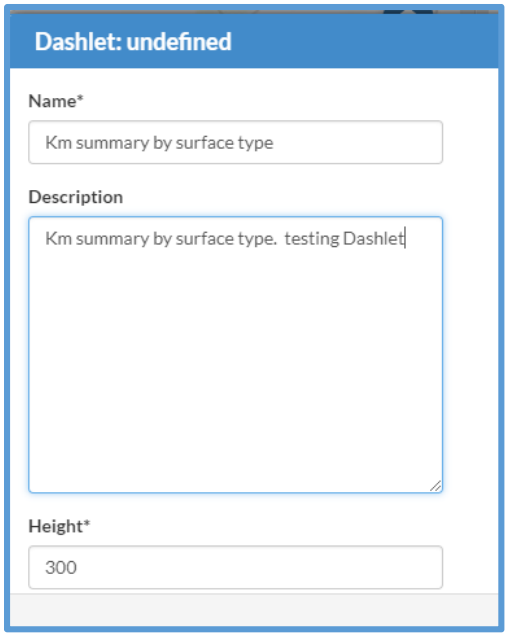
The Dashlet window lists the Dashlets in the same way as the queries. There are four tabs:

- **My Dashlets –** list of dashlets that you have created
- **Standard Dashlets** – standard dashlets that the administrator has created for all users
- **Shared Dashlets** – dashlets that has been shared by other users
- **All Dashlets** – all dashlets available to you

Creating a new Dashlet

To create a new dashlet click on **New Dashlet** button. A dialog box will appear where you can give your new dashlet a name and add a description.

Give the new Dashlet a name and configure properties. Set the height to 300, width to 10.

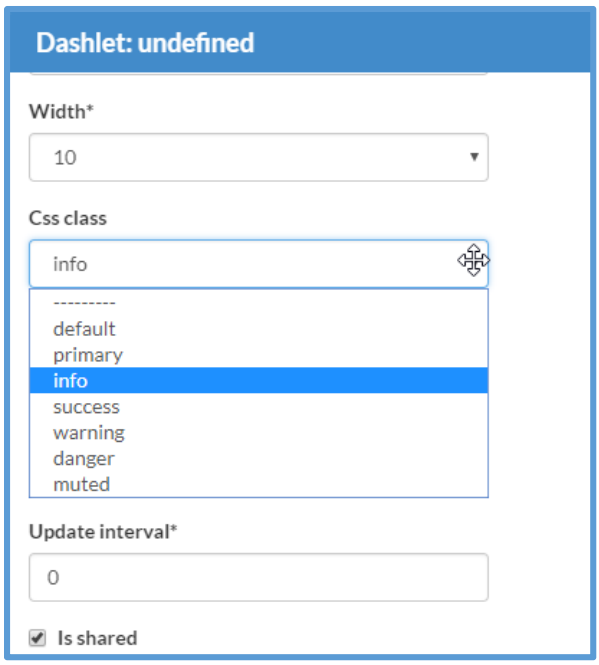


Height setting – the height of the dashlet as it appears on the dashboard. Increase the height by increasing the height value.

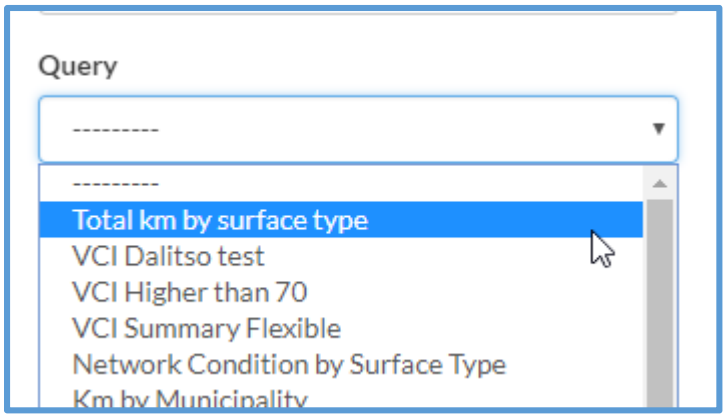
Width setting – the width of the dashlet as it appears on the dashboard. Set the width to 12 if you want you dashlet to take up the full width of the dashboard.

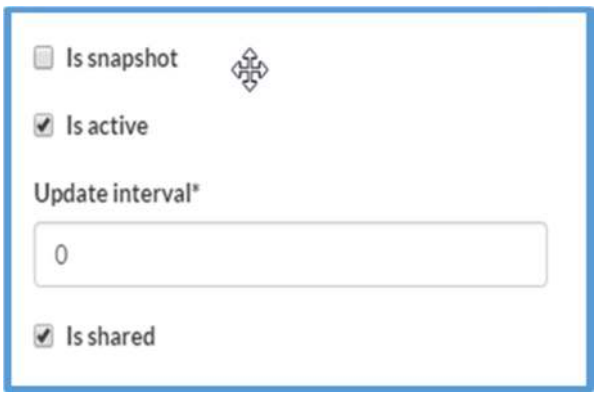
Css class - this displays the dashlet in different colours:

- Default = light grey
- Primary = dark blue
- Info = light blue
- Success = light green
- Warning = light red
- Danger = darker red
- Muted = white, no colour

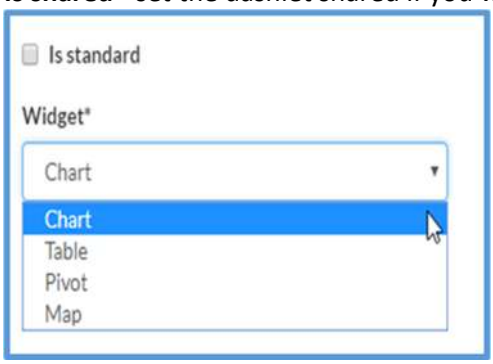


Query - select the query you would like the dashboard to use from the drop-down list. You will see all queries that has been created in the system, to which you have access. Typing the name of the query filters the list of queries for easier selection.



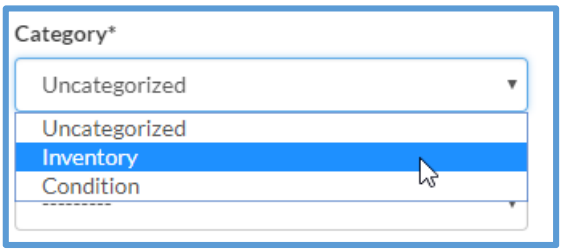


Is snapshot - this setting makes the dashlet either dynamic or static. When you select snapshot, the query will be fixed in time and not update as data is updated in the database.
Is active - this setting enables or disables the dashlet.
Update interval - set the interval (in seconds) to update the data in the dashlet if snapshot is not selected.
Is shared - set the dashlet shared if you want other users to have access to it.



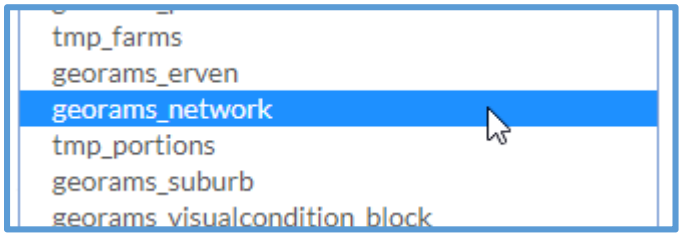
Is standard – Keep this un-ticked
Widget – select what format you would like the dashlet to appear on the dashboard

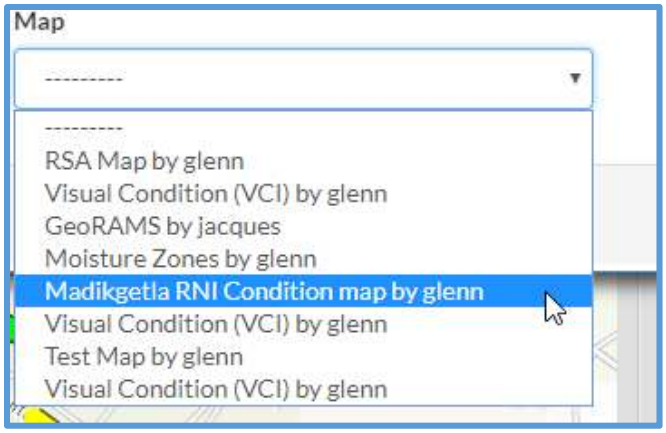
Select Category as **Inventory.**



The new Dashlet can be linked to a map and/or layer. Whith this option the selected layer and map will have the Dashlet linked/reference to it.

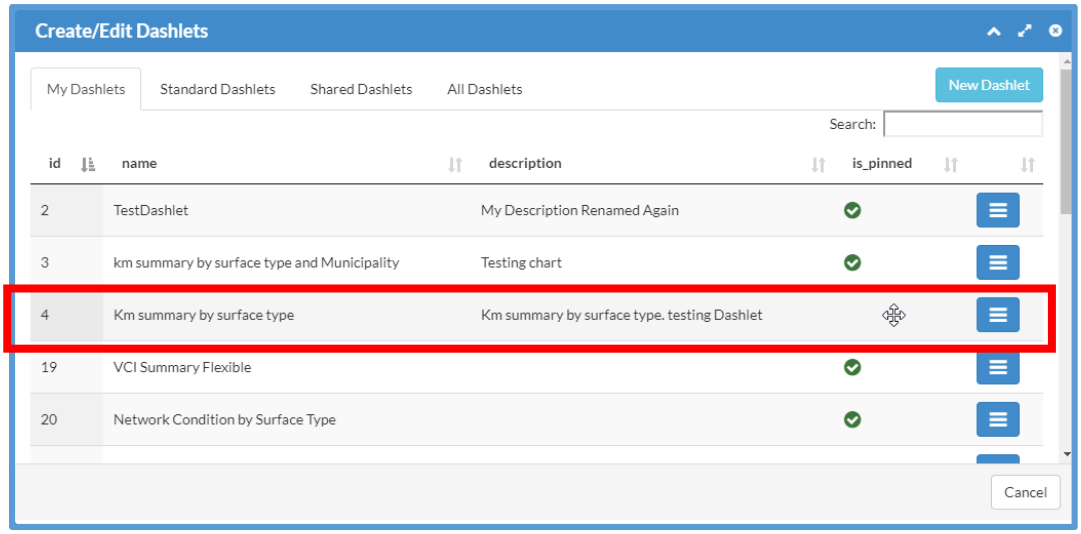
For this exercise, we will select **georams_network** as the **Layer,** and **Madikgetla RNI Condition map** as the **Map**.





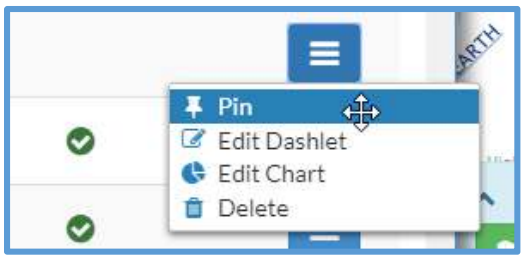
Click on **SAVE**, when done.

Refresh the Dashlet window to list the newly created Dashlet by closing the window, then Open the Dashlet window again. Click on **My Dashlets.** The new Dashlet is listed as **id 4.**

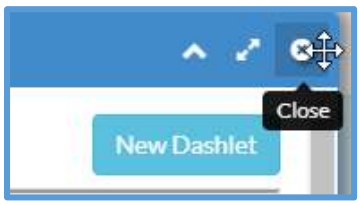


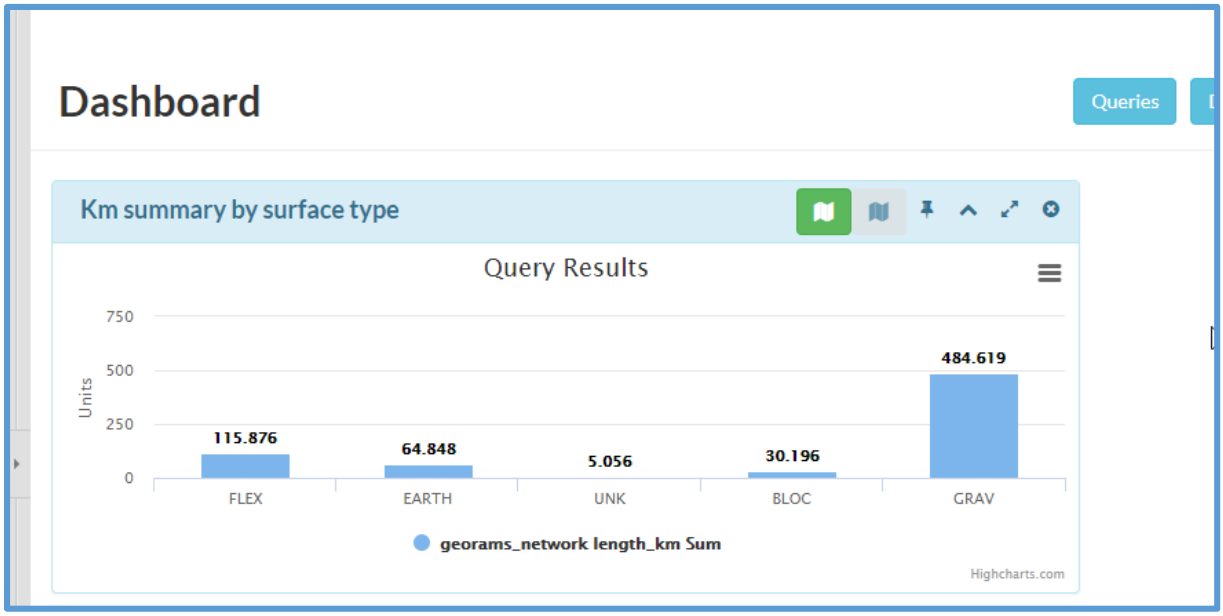
You will see that it does not have a **is pinned** mark.

To **Pin** this Dashlet to the dashboard, click on the blue button on the right-hand side, and select **Pin.**



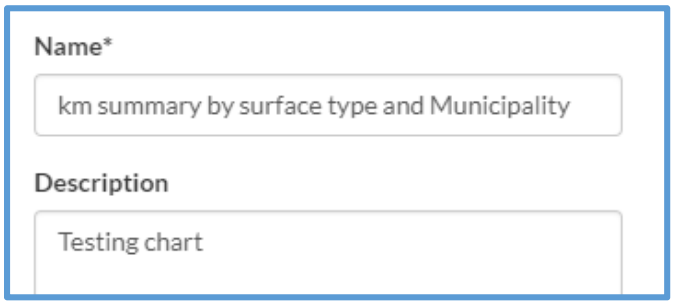
This is also the place where you can **Unpin, Edit Dashlet**, **Edit Chart** or **Delete** it. If this Dashlet is set to **Standard** when it was created, only the user that created it will have these options. Close the Dashlet window and reload the browser to see the updated Dashboard.

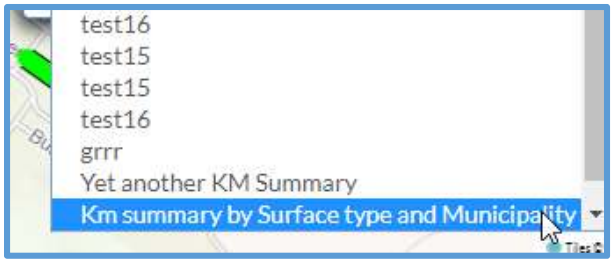




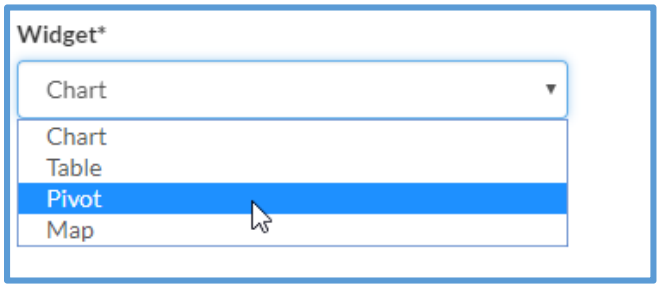
Create a Pivot

Click on Dashlets, Create Dashlet and select a query to use as a Pivot table. For the purpose of this exercise we will use "**Km summary by Surface type and Municipality**" as the query.



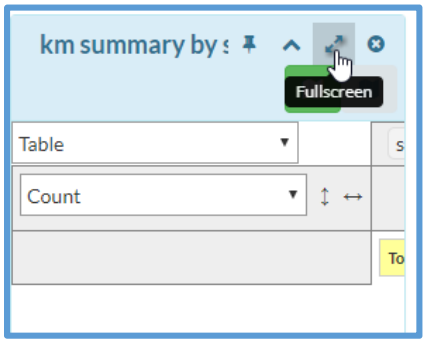


Select **Pivot** as the Widget option

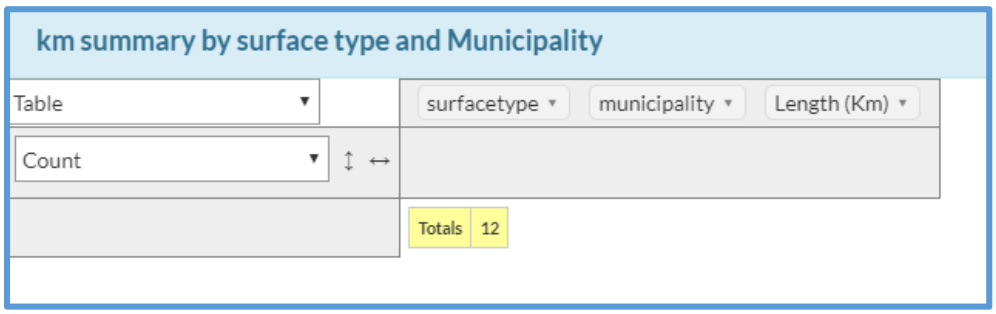


Close the Dashlet window and open it again to reload the newly created Dashlet. Click on **Pin** to add it to the Dashboard.

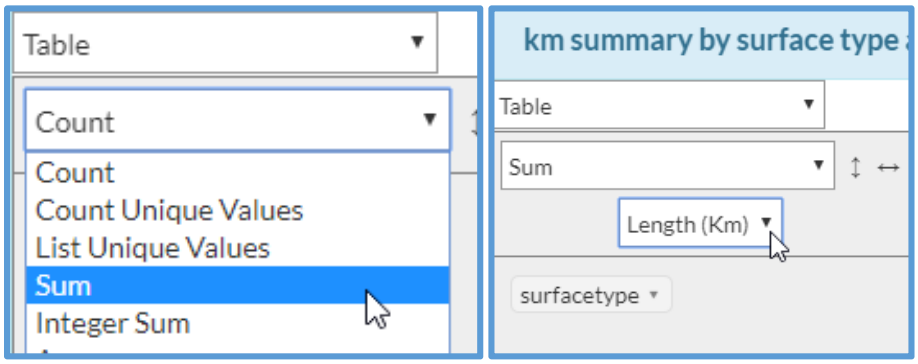
Reload the Browser to load the newly created Pivot Dashlet. Click on **FullScreen** to see the columns.



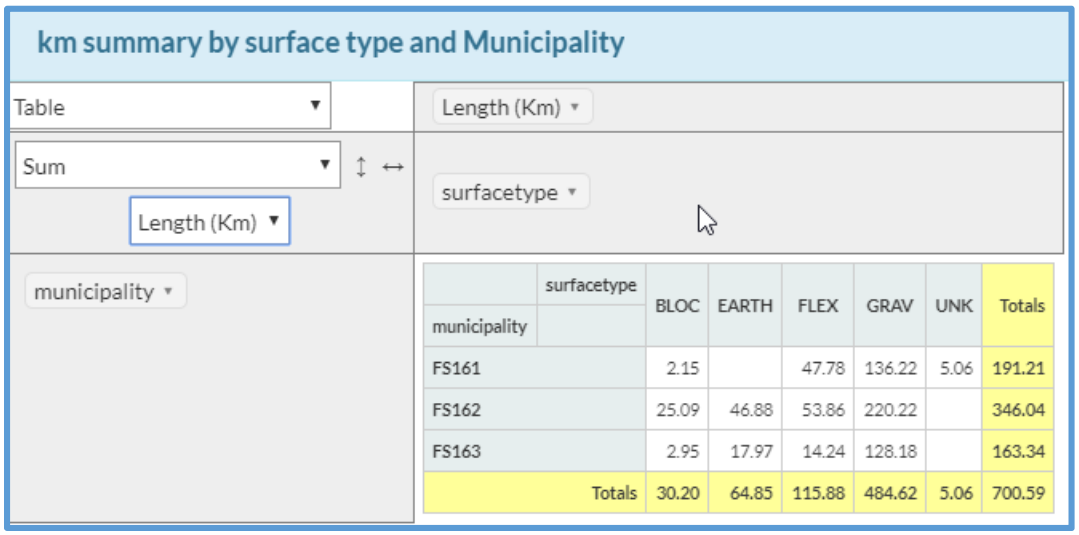
Click and drag the columns around to display the results.



We need to see the total sum of the length in km. Select **Sum** in the dropdown list. Click below **Sum,** the column to sum, in this case **Length(Km)**

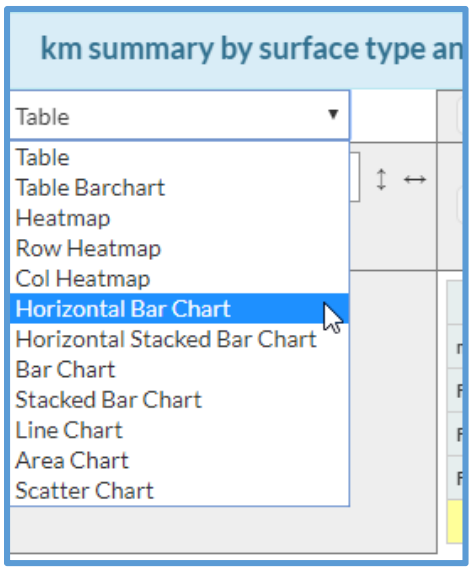


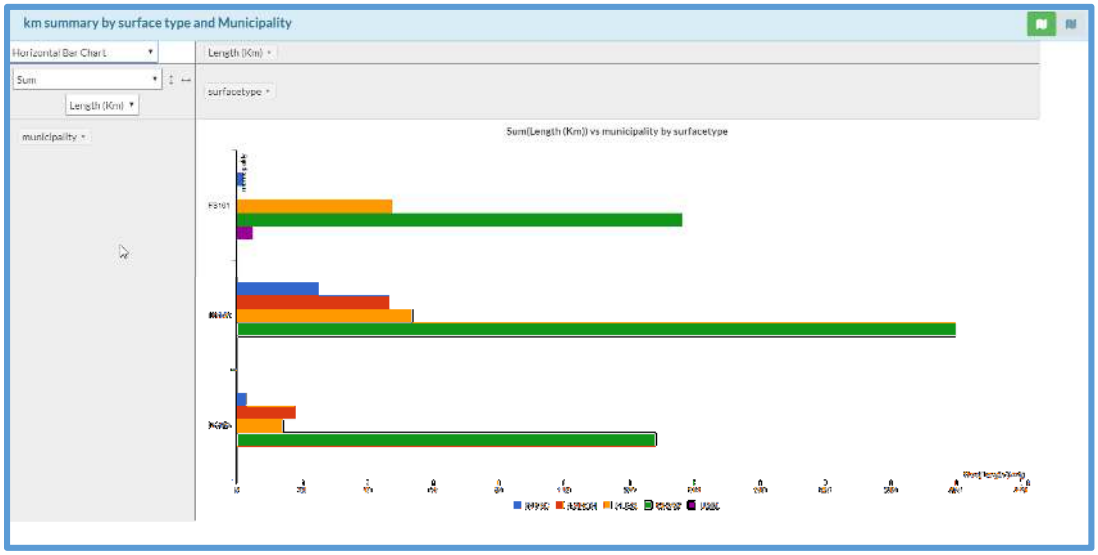
Drag the column name **municipality** to the left and **surfacetype** to the bottom. This will give the result for total km of road per surface type and Municipality.



municipality \ surfacetype	BLOC	EARTH	FLEX	GRAV	UNK	Totals
FS161	2.15		47.78	136.22	5.06	191.21
FS162	25.09	46.88	53.86	220.22		346.04
FS163	2.95	17.97	14.24	128.18		163.34
Totals	30.20	64.85	115.88	484.62	5.06	700.59

This can now be viewed in many different ways. Click on the **Table** drop down to select one of the options.





Click on the **minimize** button to close the **full screen** view or Click on the **Pin** button to pin it back to the Dashboard

Dashlet navigation bar

Pin or unpin the dashlet from the dashboards. When unpinned the dashlet window can be moved anywhere on the screen

Minimises the dashlet so that just the dashboard title bas is visible. This reduces clutter on the dashboard

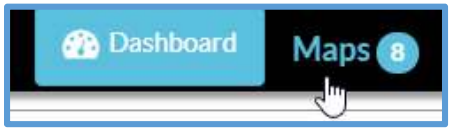
Resizes the dashlet into a full screen window

Closes the dashlet window. The dashlet will reload when the screen is refreshed.

Shows the geometries of the features listed in the dashlet on the dashboard map

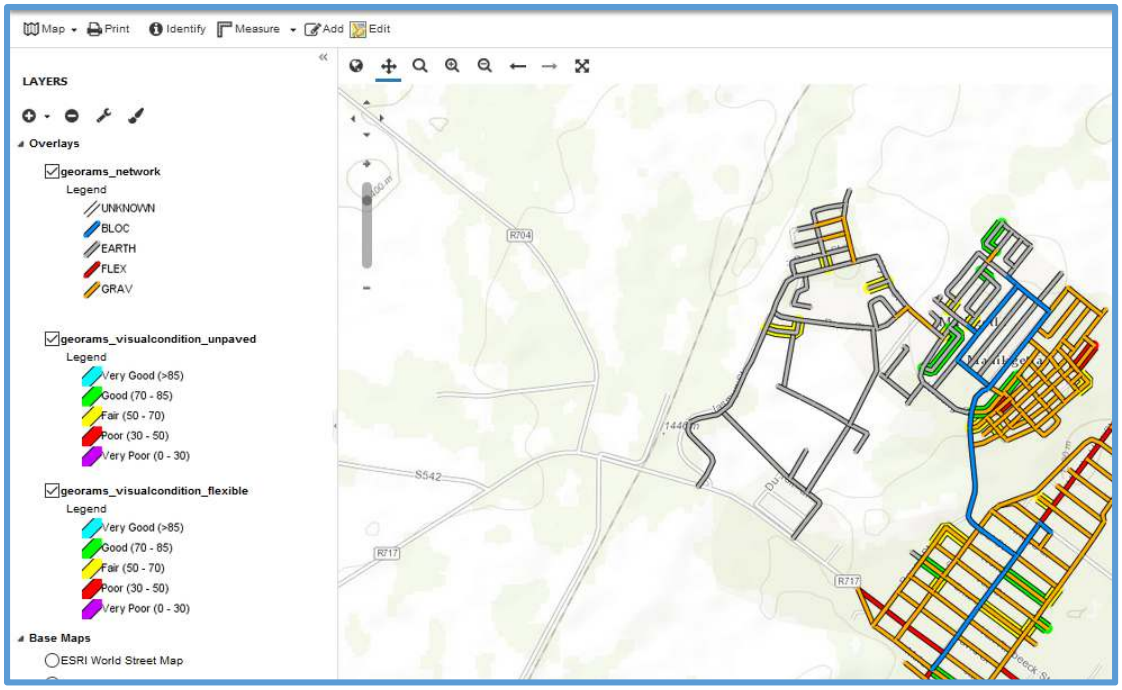
Dashlets that are linked to Layers and/or Maps

Click on **Maps** to open the map that you want to work with

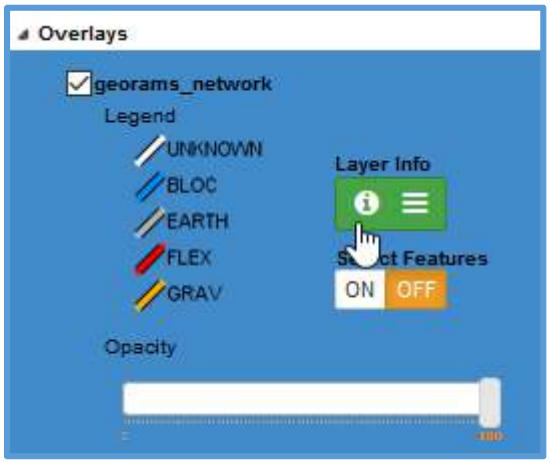


Select **View Map** of the Map that we linked to the Dashlet. "**Madikgetla RNI Condition map".**

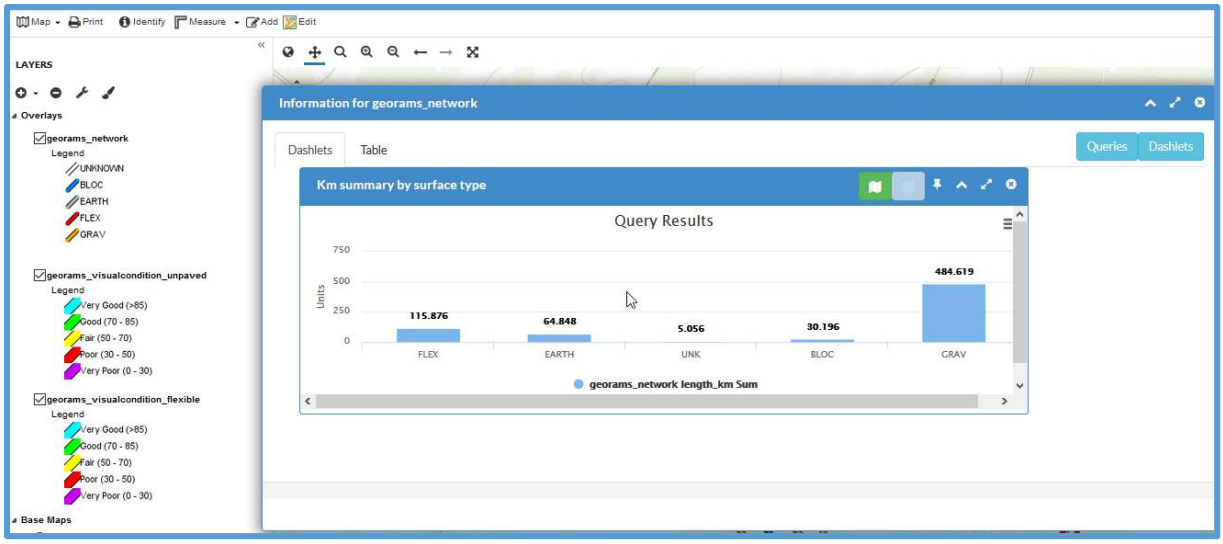
In the Map window, the left hand side indicates the layers that are loaded in the map, and the right hand side displays the map.



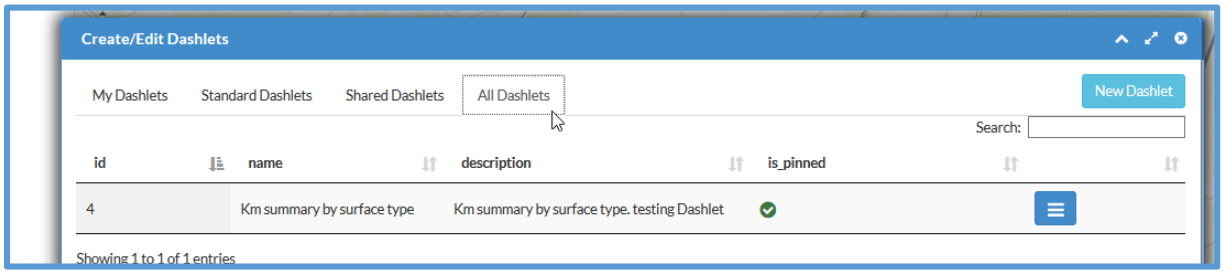
Click on the **georams_network** layer. The layer will highlight. Click on **Layer Info** to see the Dashlets that are linked to the layer in the map.



In this layer information window click on **Queries** and **Dashlets** to see a list of queries and Dashlets that are linked to this layer.



In this case only one Dashlet is linked. New Dashlets can also be created in this view/window.



4.2.5 *Dashboard map*

The map on the left-hand side of the screen, indicates the last map that was created by the user or admin person. This map can be used to view and identify information, add layers, and change styles.

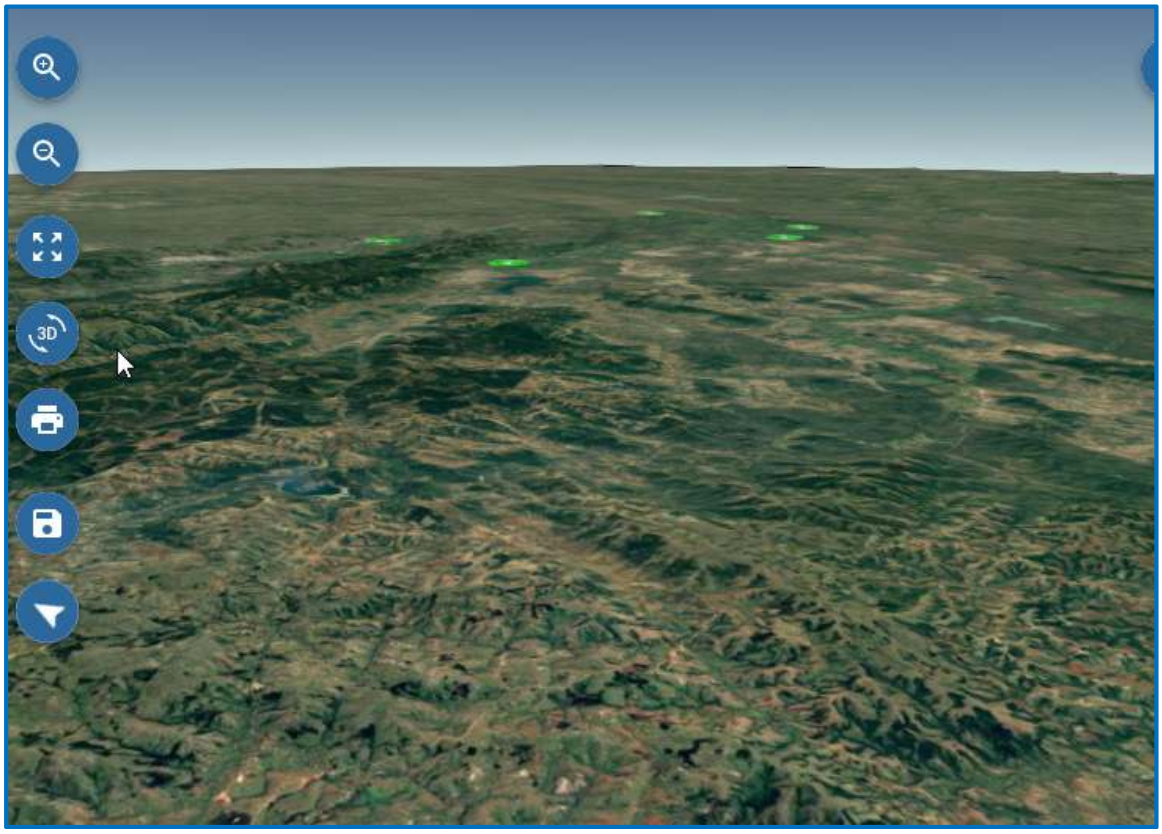
Map tools

Use this tool to zoom in to the map. Press the tool more than once to zoom in more.

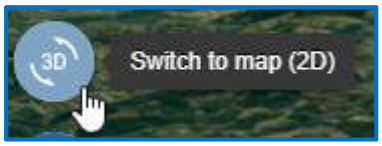
Use this too to zoom out of the map. Press the tool to zoom out more.

Use this tool to zoom back to the extent of the layer.

This tool switches to 3D view. Use your shift key and mouse scroll button to navigate in this view.



Click on the North arrow to turn the map back to its original position. North facing up.

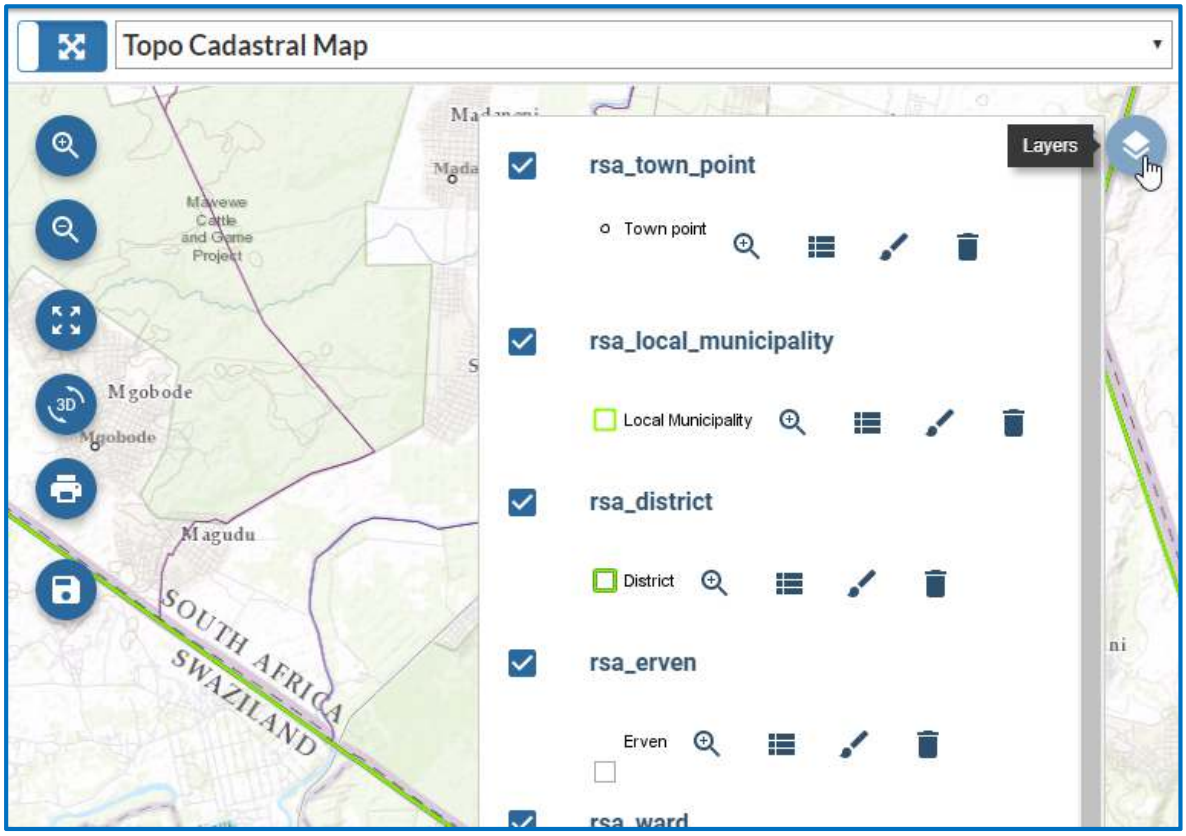


Switch the map back to 2D view with this tool.

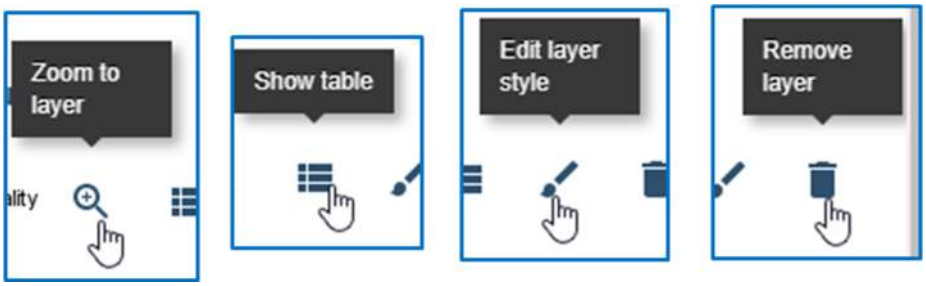
Print your map as a Pdf file.

The user can add other layers to the map and save it.

Add or manage layers.

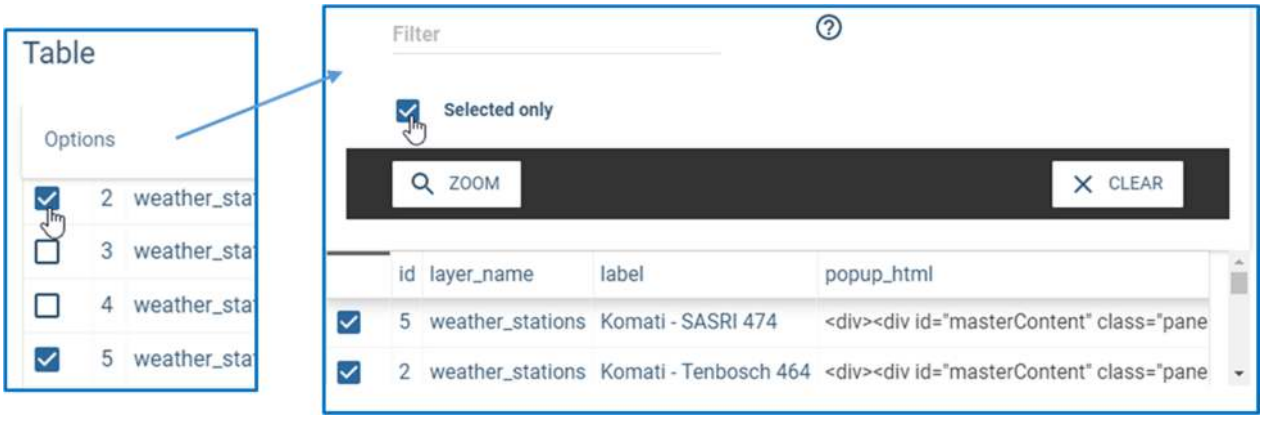


Click on the **Layers tool** to select the layers to be on or off, zoom to the layer, delete the layer from your map. In this map the user can also view the attributes in the database table.

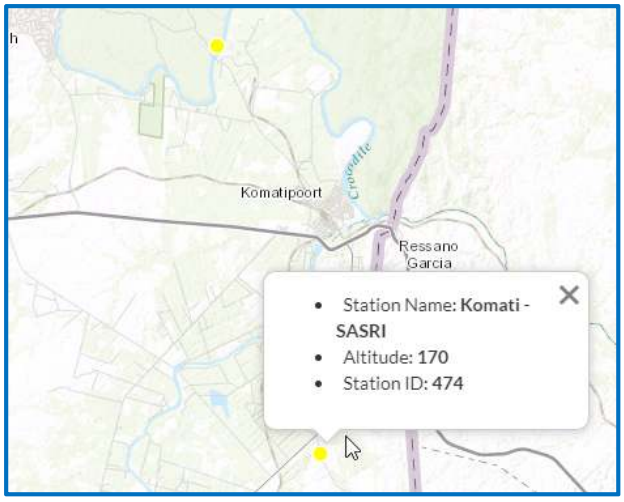


Click on **Show table** to look at the attribute data/records in the database

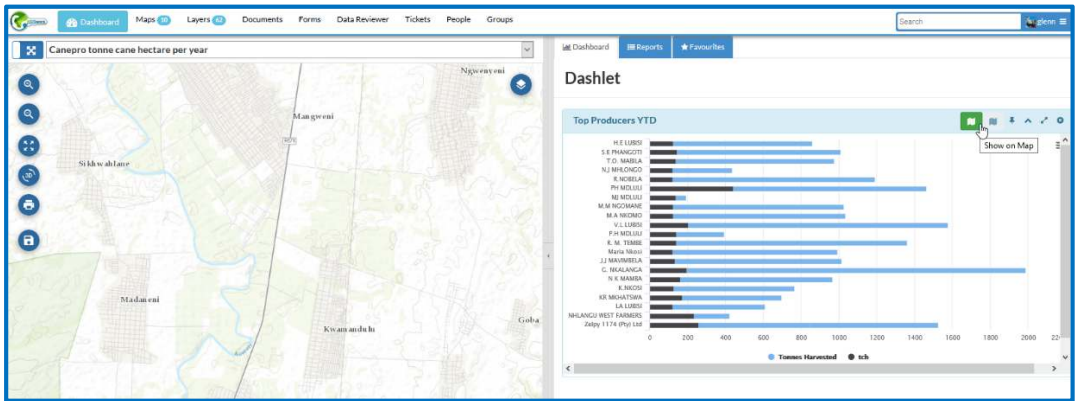
Select the records that you want to see on the map. Click on **Options**, then on **Selected only**.

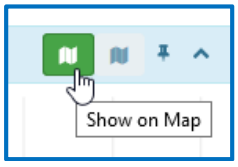


Click on **Zoom** to display the selected records on the map. Click on **Close** to close the **Table Option** view. Click on the **Layer** tool in the map to close the layer list. Now you will see the selected records in the map.

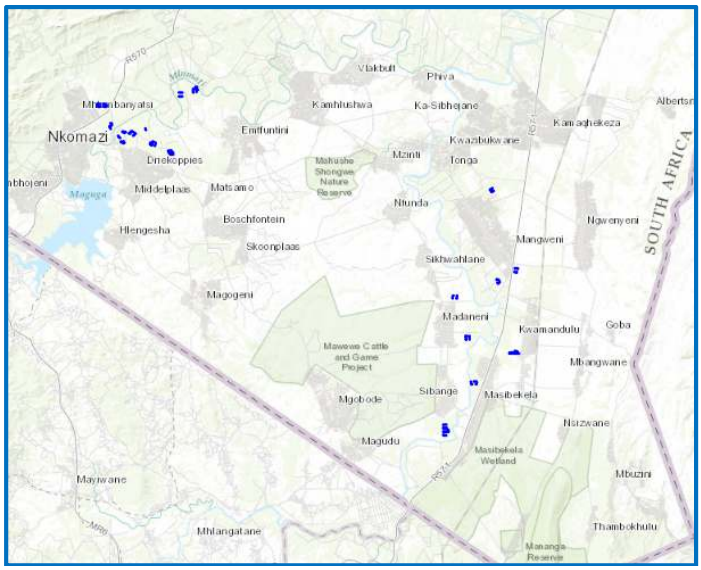


This map is also interactive with the **Dashlets** from queries that was saved with **geometries**





Click on **Show on Map** to display the records from the query/Dashlet on the map

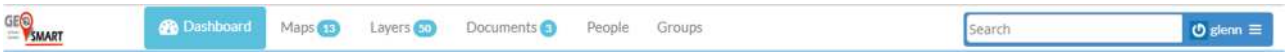


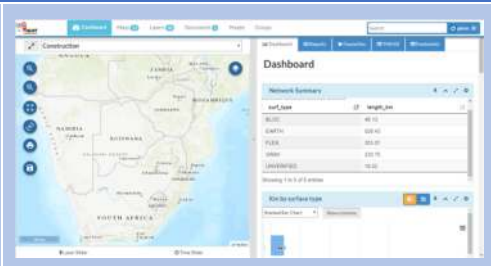
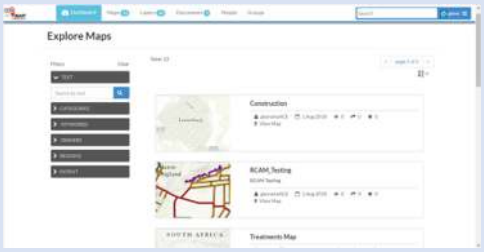
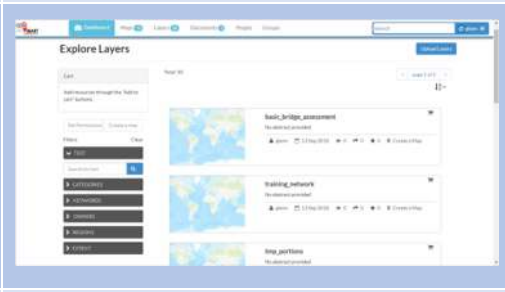
Click on the **Layer** tool to show the layers. Here the selection can be turned off and on

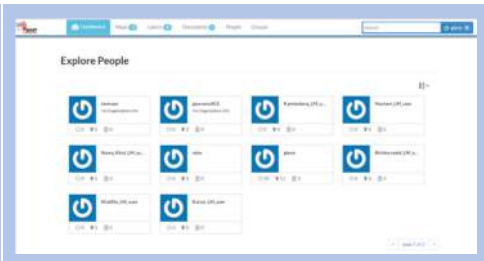
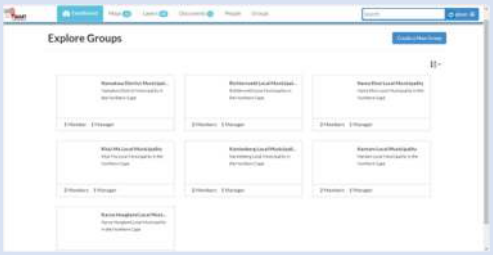
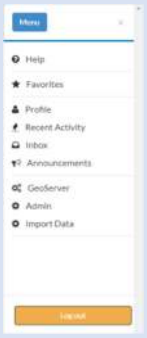
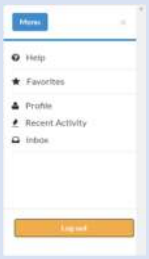
Click on the **View Table** tool to go through the attribute list.

4.2.6 *List pages*

The menu at the top of the interface page lists the GIS layers, Documents, compiled interactive maps that are visible to the user and users and groups that have permission to use the system. Each list page has comprehensive functionality to search/filter/sort the list to find resources of interest.

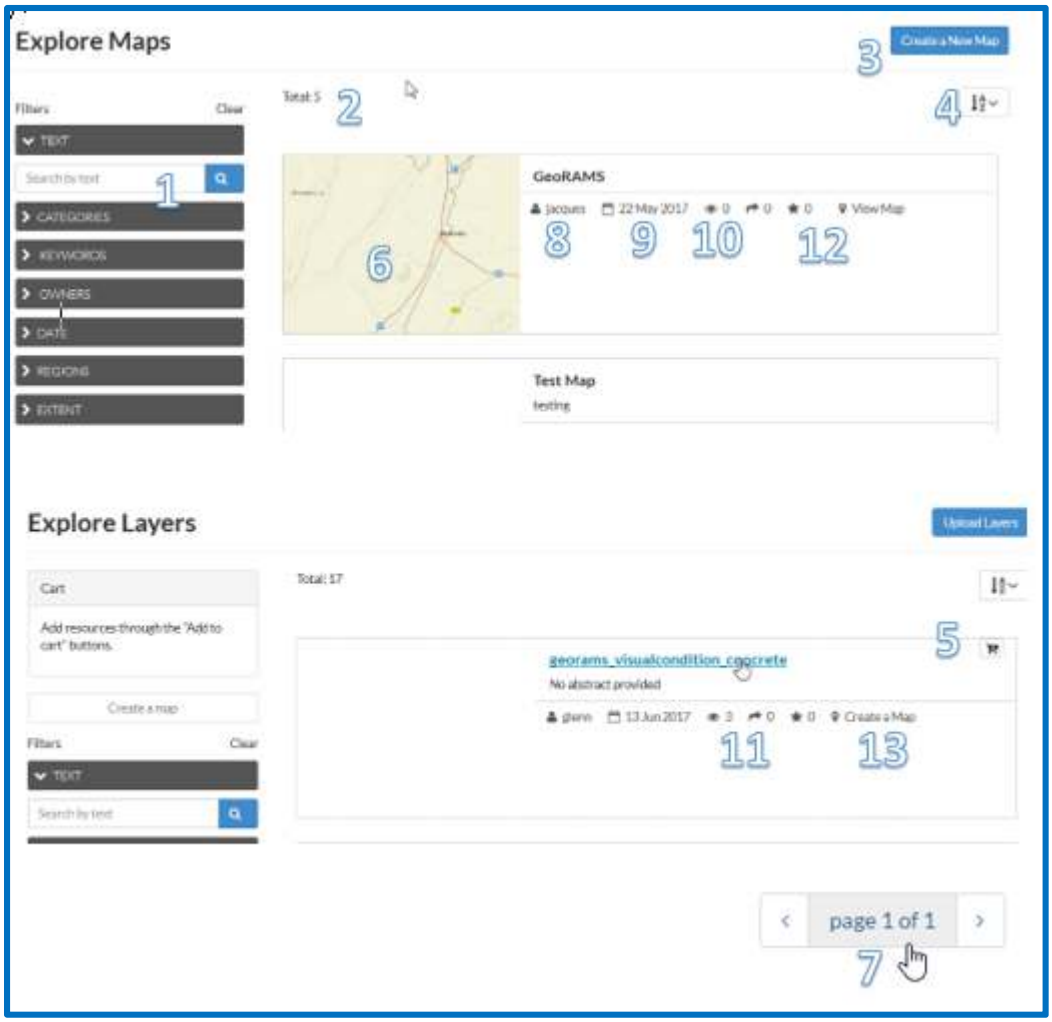


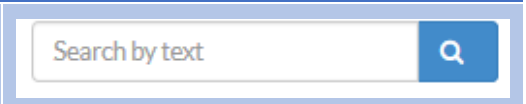
#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**Dashboard**	Back to Dashboard	
2	**Maps**	Page listing the available interactive maps	
3	**Layers**	Page listing the available GIS layers.	
4	**Documents**	Page listing the available documents	

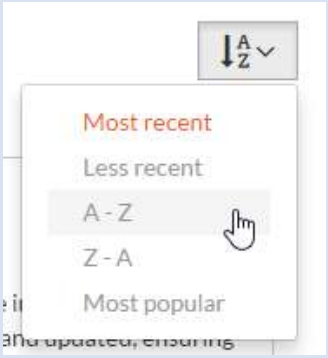
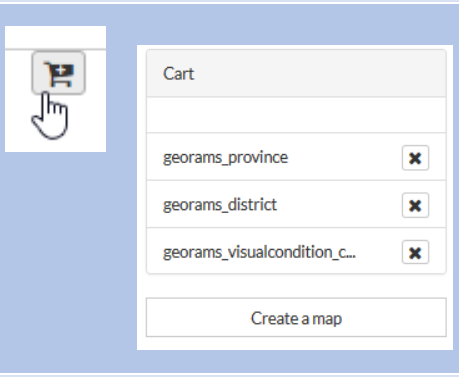
5	**People**	Page listing user accounts (people) active in the system.	
6	**Groups**	Page listing user/collaboration groups active in the system.	
7	**Search Bar**	Typing in the search bar will list layers/maps/documents matching the search term. Clicking on the search icon will open a page listing the layers/maps/documents found.	 
8	**User Menu**	Items in the menu will depend on the user permissions level. A standard user has the ability to update their profile, see a log of their recent activities and access their GIS system mailbox.	 

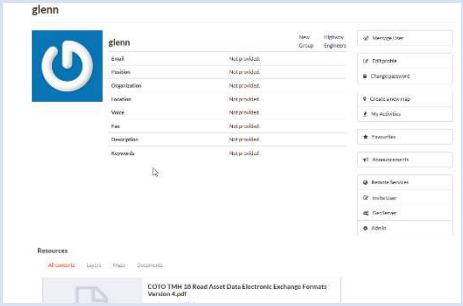
4.2.7 *Explore pages*

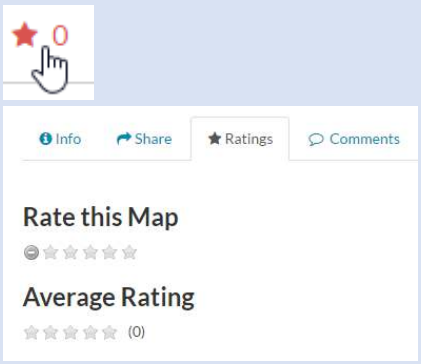
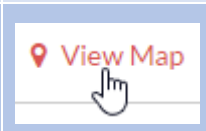
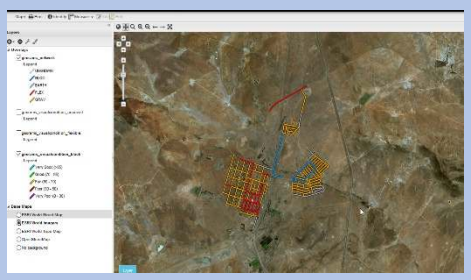
These Maps, Layers and Documents pages (http://clientpage/maps, http://clientpage/layers, and http://clientpage/documents) list GIS layers, Documents and compiled interactive maps that are visible to the user. Each list/Explore page has comprehensive functionality to search/filter/sort the list to find resources of interest.



#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**Search / Filter Panel**	See section: *4.2.4. LEFT SEARCH PANEL*	
2	**Item Count**	Count of the resources in the list. The count number is updated as filters are applied to the list.	

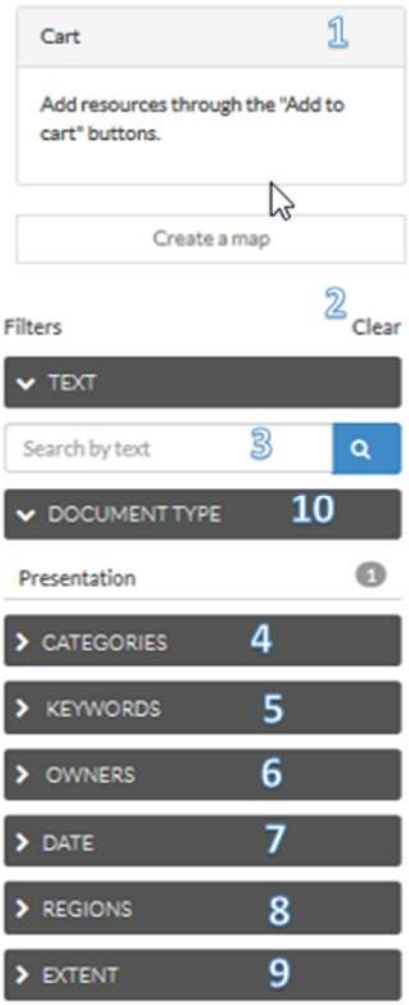
3	**Upload/New**	Depending on the list page, upload Layer/Document or Create a New Map.	
4	**List Sort**	Sort the resource list alphabetically, popularity or recentness.	
5	**Cart button**	Add the resource to the Cart section.	
6	**Resource Item**	Shows the resource's Category, Name, Description and loaded Thumbnail. Clicking on the Thumbnail or Name open's the resource's detail view.	
7	**List Pager**	Moves on to the next page of listed resources.	

8	**Owner / Originator**	Opens the profile page of the resource originator/owner	 
9	**Publication Date**	The resource's date of publication. Clicking the link opens the resource detail view with the Info tab activated	 
10	**Popularity**	Shows the resource popularity/views. Clicking the link opens the resource detail view.	 
11	**Sharing**	Shows the number of times the resource has been shared. Clicking the link opens the resource detail view with the Sharing tab activated.	 

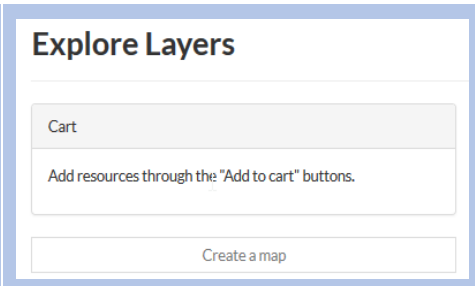
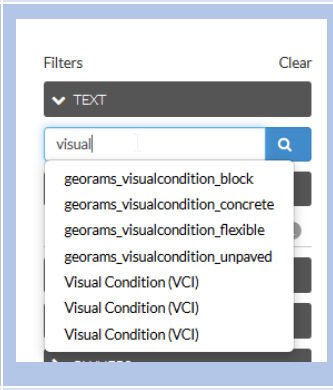
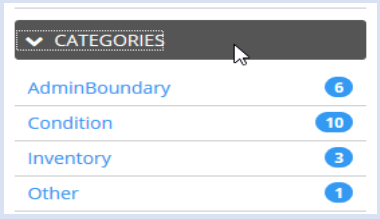
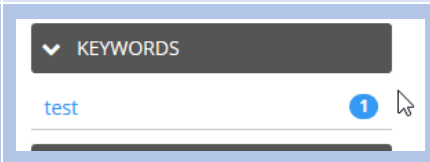
12	**Rating**	Shows the user rating of the resource. Clicking the link opens the resource detail view with the Rating tab activated.	
13	**View**	Clicking the link opens an interactive map.	 

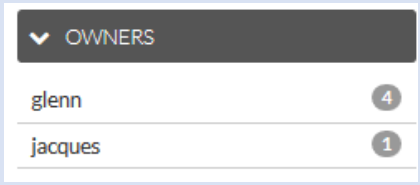
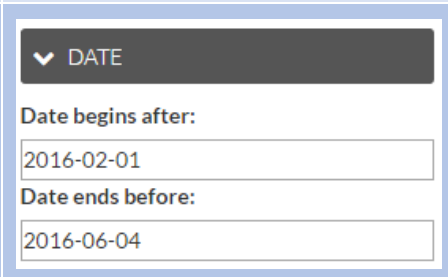
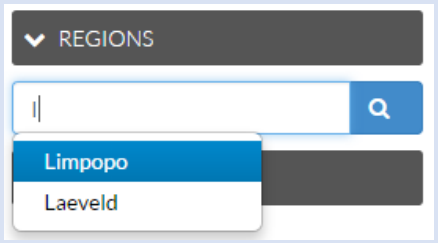
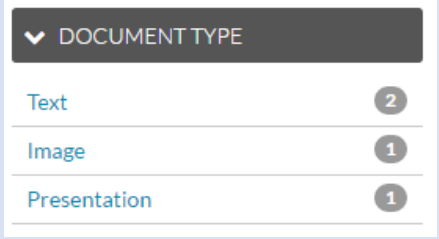
4.2.8 *Left search panel*

This panel allows for searching and filtering of Layers/Maps/Documents according to their metadata entries, such as Description, Category, Date, Keywords, Date, Region and Bounding Box.



#	ELEMENT	DESCRIPTION	SCREENSHOT

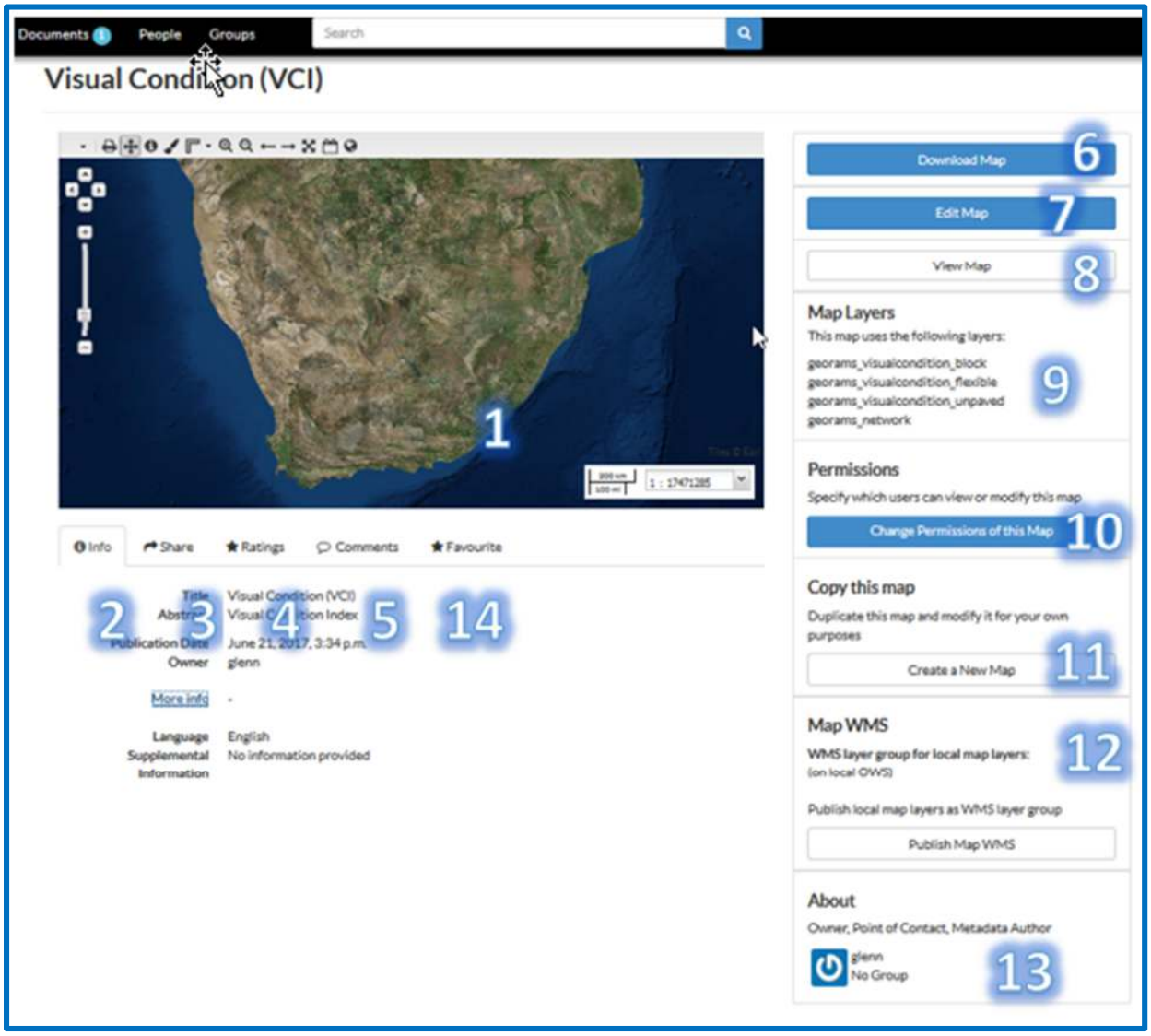
1	**Cart**	Allows for doing operations on multiple resources. These are added to the list by clicking the cart button In Maps and Documents, the Cart can be used to set permissions for all selected resources. In Layers, there is an additional option to create a new map with the selected layers.	
2	**Clear**	Clear any filters currently applied.	
3	**Filter - Text**	Search for Layers/Maps/Documents with the entered text in the Title or Description	
4	**Filter - Category**	List of Categories showing counts of Layers/Maps/Documents assigned to each category (in the resource's metadata)	
5	**Filter - Keywords**	List of Keywords showing counts of Layers/Maps/Documents assigned to each keyword (in the resource's metadata)	

6	**Filter - Owners**	List of Layers/Maps/Documents owners	
7	**Filter - Date**	Filter Layers/Maps/Documents by date published	
8	**Filter - Regions**	Search for and filter Layers/Maps/Documents according to selected Region	
9	**Filter - Extent**	Filter the Layers/Maps/Documents list according to the extent shown in the map widget. Double clicking on the Map or Mouse Wheel up/down will zoom the map in or out. Clicking and dragging will pan the map.	
10	**Filter – Document Type (Documents)**	Filter Documents by type	

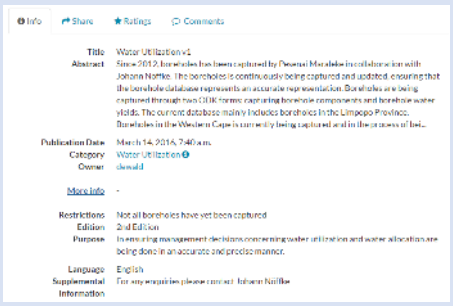
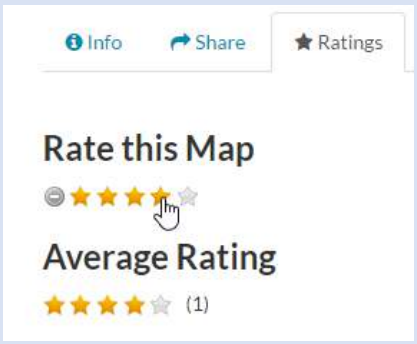
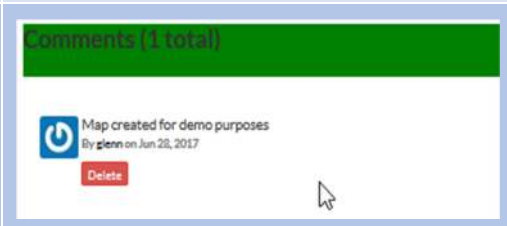
4.2.9 *Detail Pages*

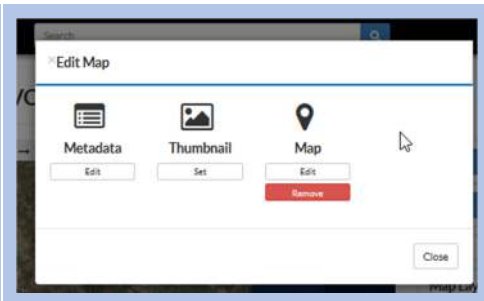
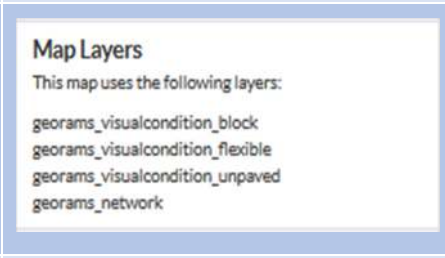
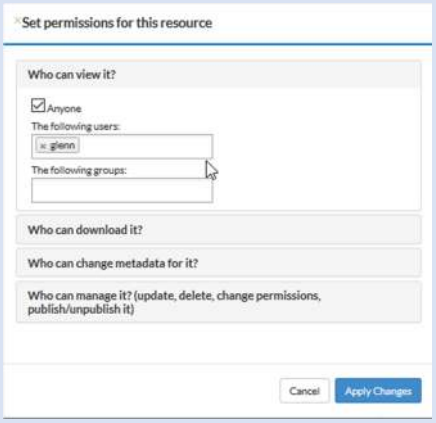
The detail pages comprise overview information such as an embedded interactive map and resource metadata. They also provide collaboration functionality for sharing and commenting as well as functions to download the resource and set permissions.

Map Detail View



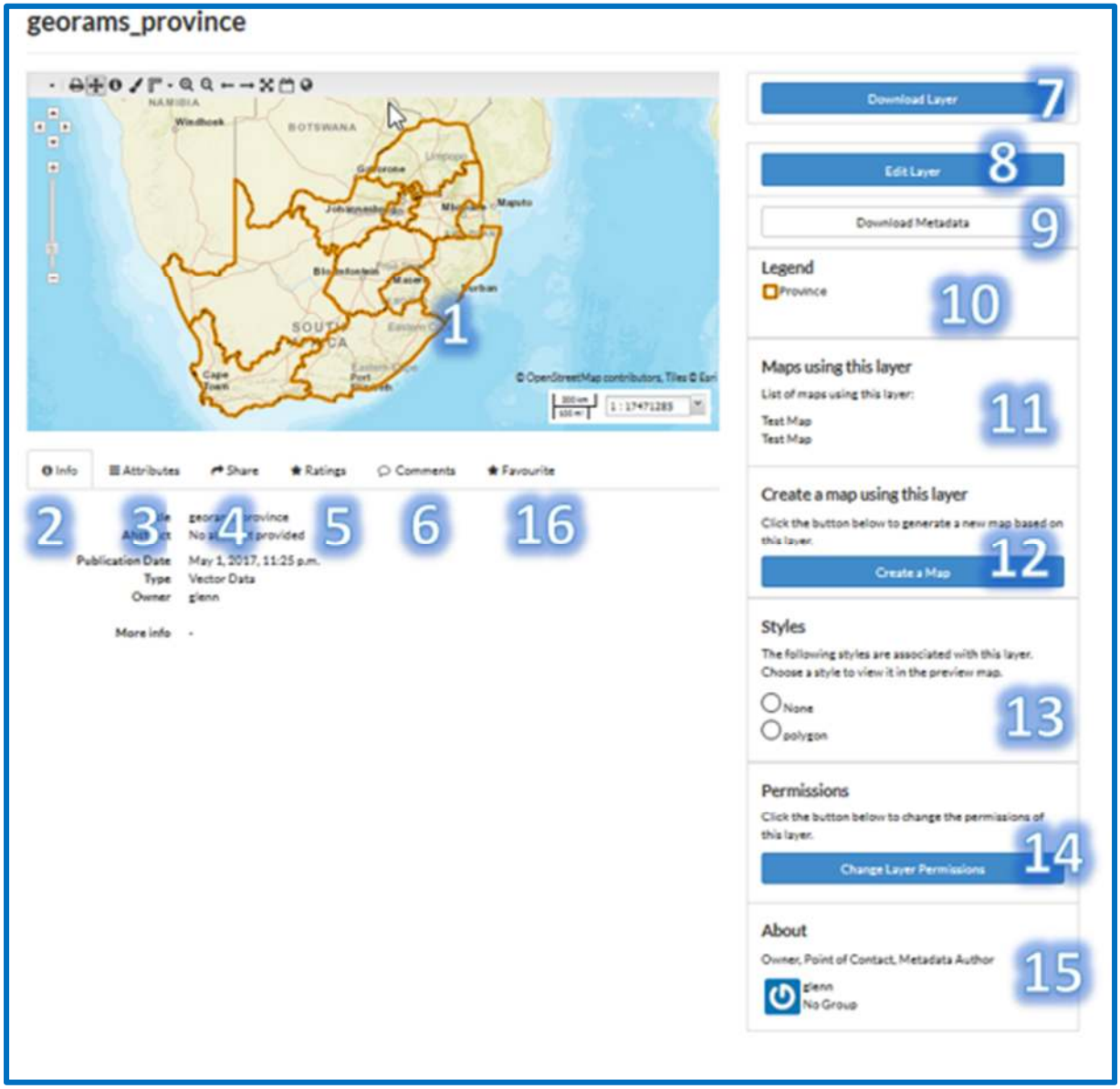
#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**Interactive Embedded Map**	See section *4.2.7 DETAIL PAGE EMBEDDED MAP*	

2	**Map Information**	Provides detail information about the map.	
3	**Sharing**	Has various options for sharing the map, such as sharing the map URL via email.	
4	**Ratings**	Set a rating (5-point scale) for the map. See section *4.3.9. RATINGS*	
5	**Comments**	Add comments to the map, such as corrections that the need to be made. See section *4.3.8. COMMENTING*	
6	**Download Map**	Download the map's comprising layers as ESRI shp files. See section *4.3.12. DOWNLOAD MAP*	

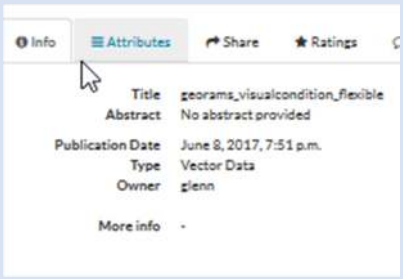
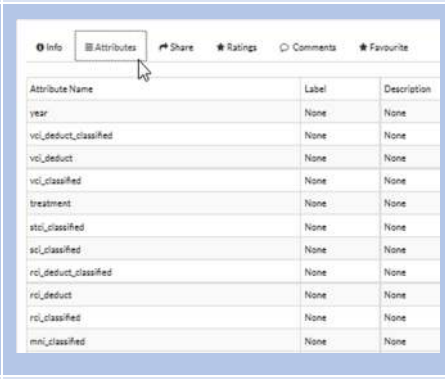
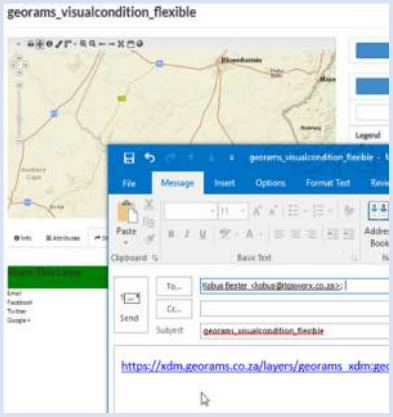
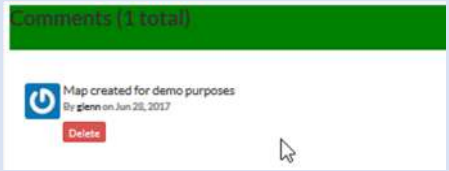
7	**Edit Map**	Opens a window presenting various actions that can be done on the map: • Edit the map's metadata • Edit the map configuration • Remove the map	
8	**View Map**	Open the map in view-only mode. Changes made can be saved to a new map.	
9	**Layers**	Lists the map's comprising layers, with a link to each one.	
10	**Permissions**	Set the map's permissions.	
11	**Copy Map**	Make a copy of the map and save to a new map.	
12	**Publish as WMS**	Create a Geoserver group WMS from the map.	**TODO:** Feature not implemented in GGW core yet.

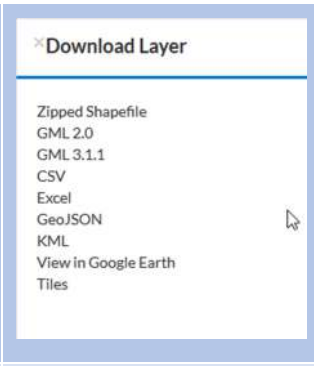
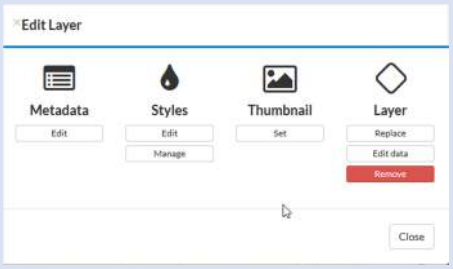
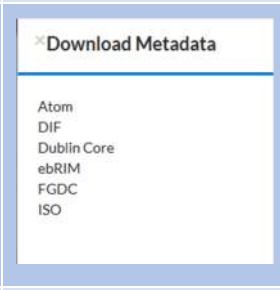
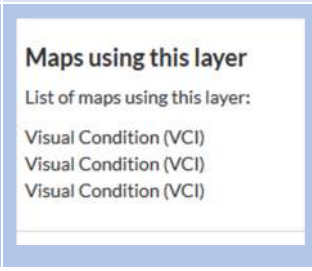
			 **TODO** A bug was encountered with this function. It is has been added to the list of defects to be resolved. After resolution, this section of the manual will be updated.
13	**About Map**	General information about the map such as the originator and maintainer (i.e. point of contact)	
14	**Favourite**	Set a map, Layer or Document as your favourite. This will display in the landing page for quick access.	

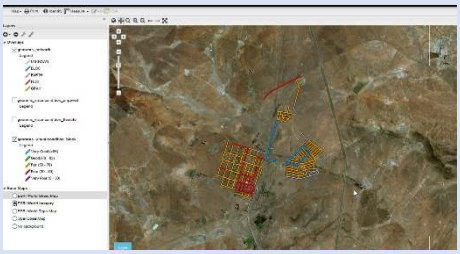
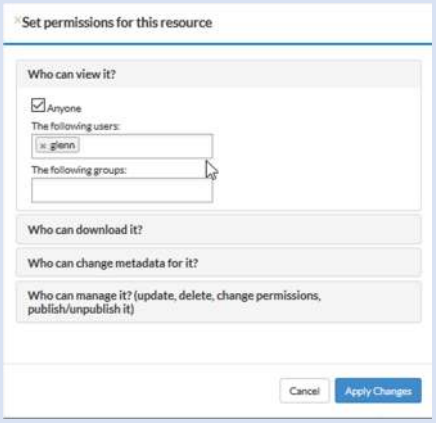
Layer Detail View



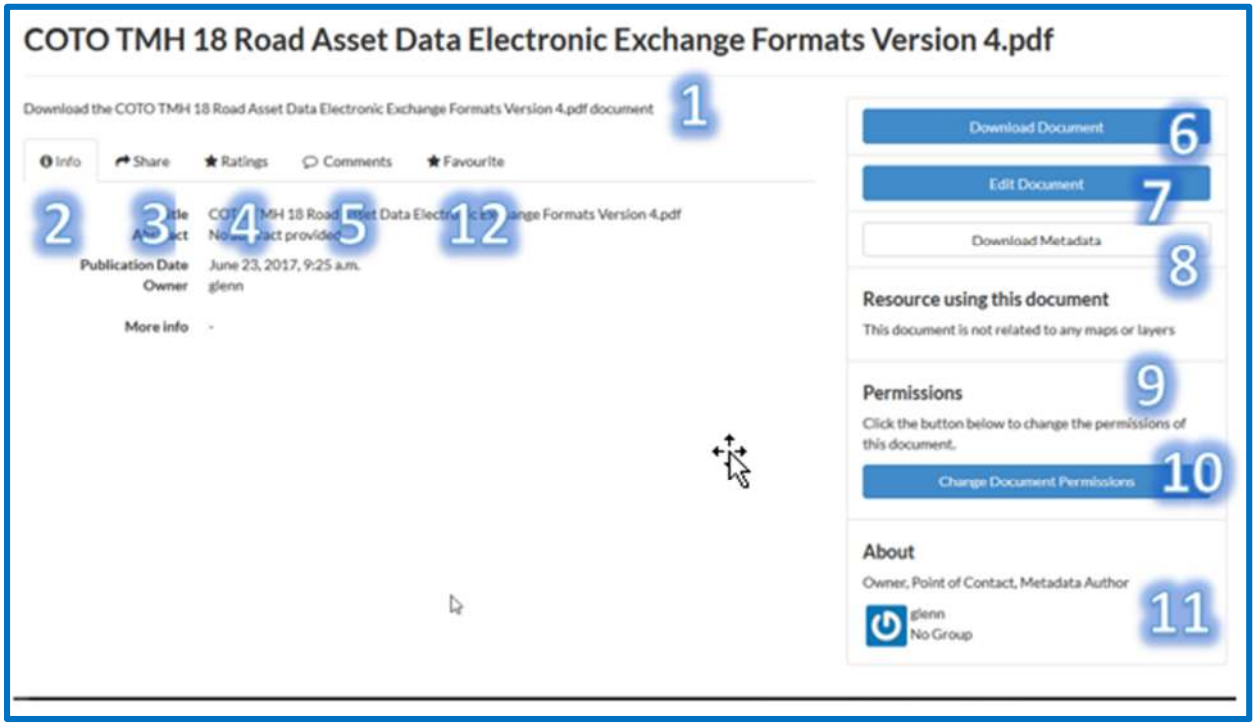
#	Element	Description	Screenshot
1	**Interactive Embedded Map showing layer**	See section *4.2.7. DETAIL PAGE EMBEDDED MAP*	

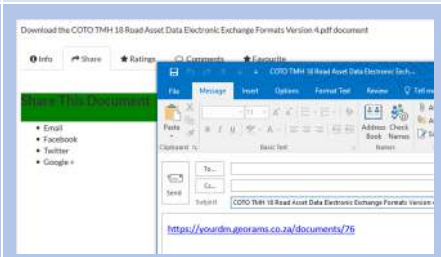
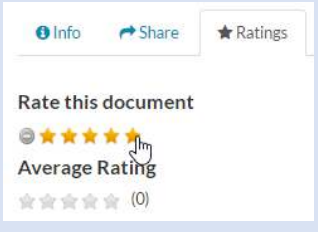
2	**Map Information**	Provides detail information about the map.	
3	**Attributes**	Lists the Layer's attributes along with any metrics such as standard deviation	
4	**Sharing**	Has various options for sharing the layer, such as sharing the layer URL via email.	
5	**Ratings**	Set a rating (5-point scale) for the layer. See section *4.3.9. RATINGS*	
6	**Comments**	Add comments to the layer, such as corrections that the need to be made. See section *4.3.8. COMMENTING*	

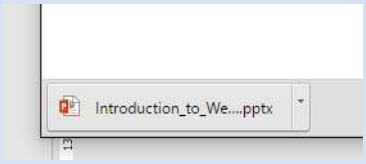
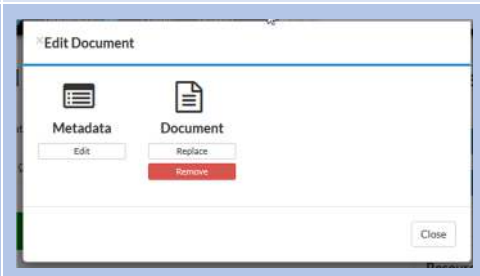
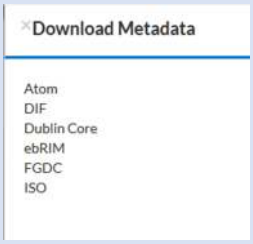
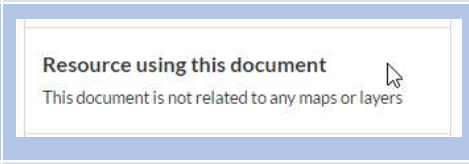
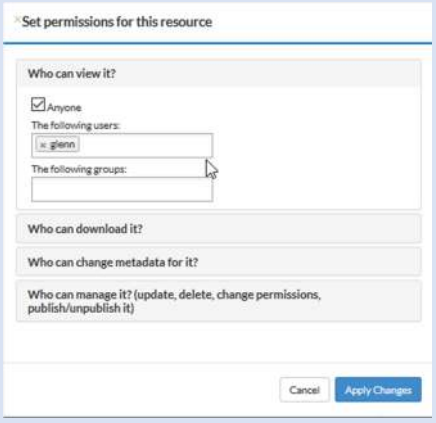
7	**Download Layer**	Download the layer in various supported formats such as ESRI shp and Google Earth KML. See section *4.3.13. GOOGLE EARTH*	
8	**Edit Layer**	Opens a window presenting various actions that can be done on the layer: - Edit the layer's metadata - Edit/manage the layer's styles - Set a Thumbnail - Replace the layer - Edit the Layer's data (both spatial and attributes) - Remove the layer	
9	**Download Metadata**	Download the layer's metadata in the six most common international metadata formats.	
10	**Legend**	The layer's legend (using its default style)	
11	**Maps**	List of maps in the system that are using this layer	

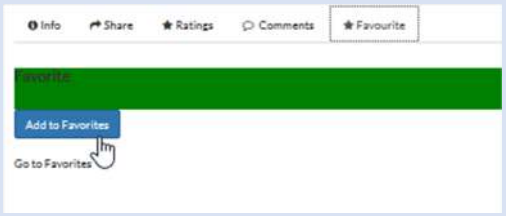
12	**Create Map**	Opens a new map window with the layer added to the TOC.	
13	**Styles**	The styles that are available for the layer.	
14	**Permissions**	Set the layer's permissions.	
15	**About Map**	General information about the map such as the originator and maintainer (i.e. point of contact)	
16	**Favourites**	Create favourite layer to view in the landing page	

Document Detail View

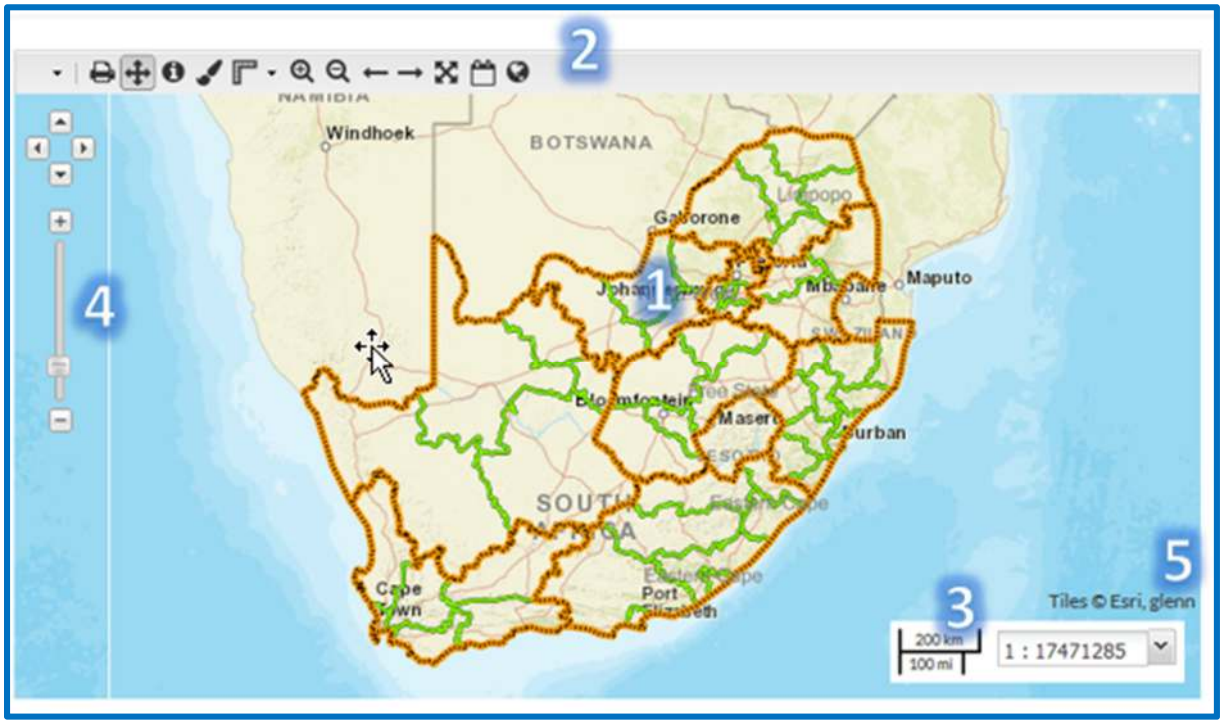


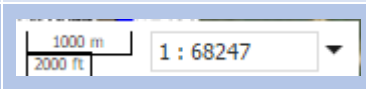
#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**File preview**	Document preview. If no preview is available, a download link is provided.	
2	**Document Information**	Provides detail information about the document.	
3	**Sharing**	Has various options for sharing the document, such as sharing the file URL via email.	
4	**Ratings**	Set a rating (5-point scale) for the document. See section *4.3.10. FAVOURITING*	

5	**Comments**	Add comments to the document, such as corrections that the need to be made. See section *4.3.8. COMMENTING*	
6	**Download Document**	Download the file	
7	**Edit Document**	Opens a window presenting various actions that can be done on the map: - Edit the document's metadata - Replace the document - Remove the document	
8	**Download Metadata**	Download the document's metadata in the six most common international metadata formats.	
9	**Resources**	List of resources in the system that are linked to this document	
10	**Permissions**	Set the document's permissions.	

11	**About Document**	General information about the document such as the originator and maintainer (i.e. point of contact)	
12	**Favourite**	Set your document as favourite to view on the landing page for easy and quick access.	

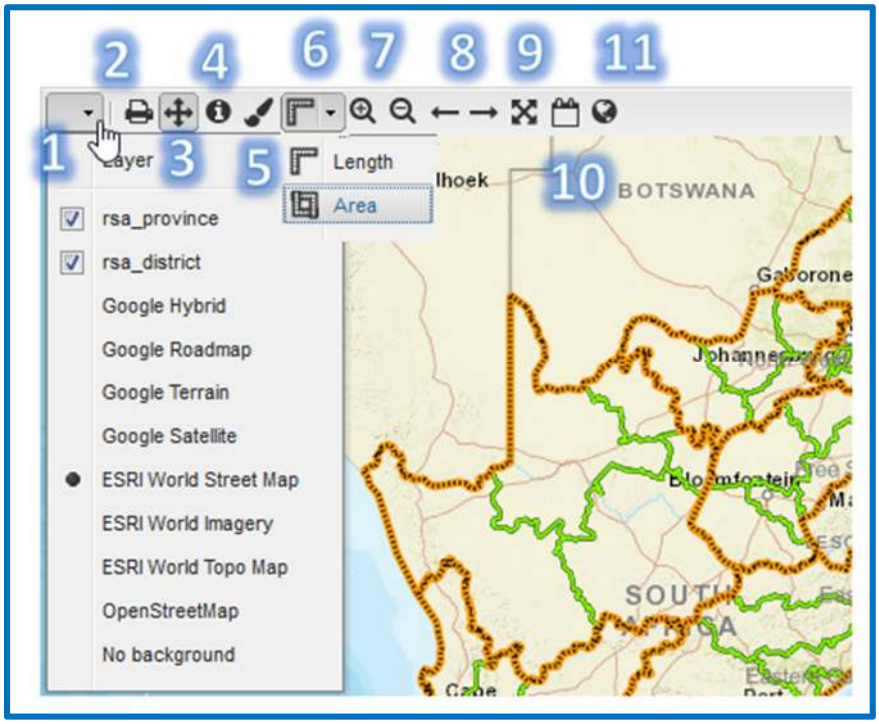
4.2.10 *Detail page embedded map*

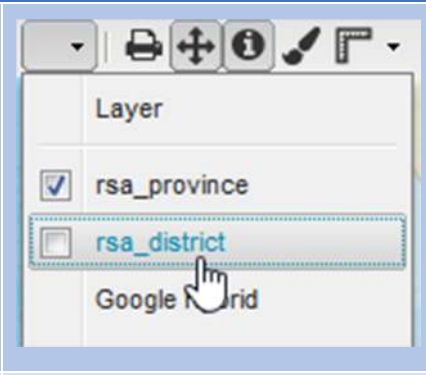
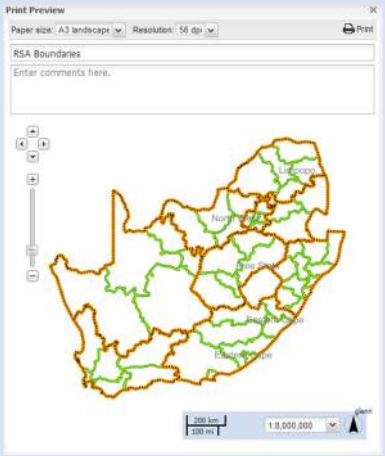


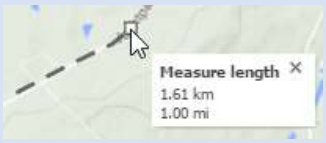
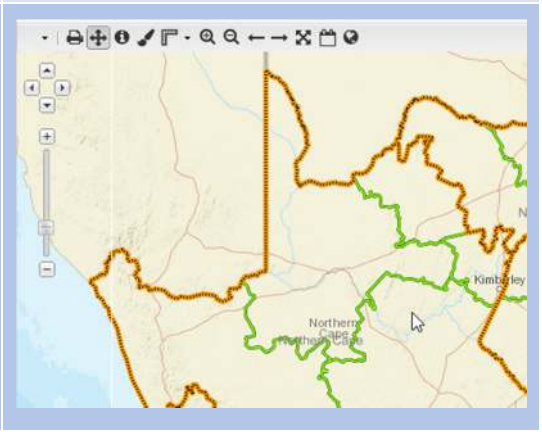
#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**Interactive Map**	• If the pan tool is active, clicking and dragging on the canvas will pan the map • Double clicking on the canvas will zoom in • Mouse wheel in/out will zoom in/out	
2	**Main Toolbar**	• Toolbar for navigating on map • Set styles • Identify features • Measure area and length	
3	**Scale bar**	• The current map scale	

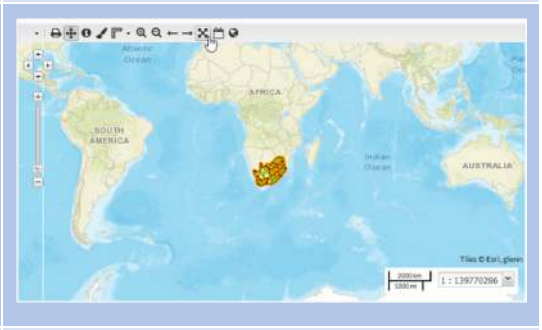
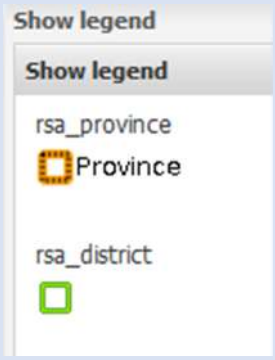
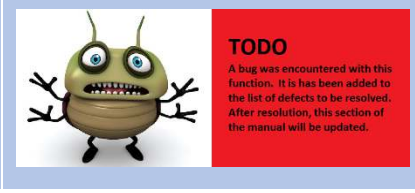
4	**Map Scale and navigation arrows**	Scale map and use arrows to pan in map	
5	**Map Attribution**	Attribution passed through from web GIS servers where such attribution has been configured. Attribution usually details relevant copyright and terms of usage.	

4.2.11 Main Toolbar



#	ELEMENT	DESCRIPTION	SCREENSHOT
1	**Layers**	• Turn component map layers on and off • Switch between different base layers	
2	**Print**	Print the map to PDF **Due to EULA, widget cannot print Google Layers.**	

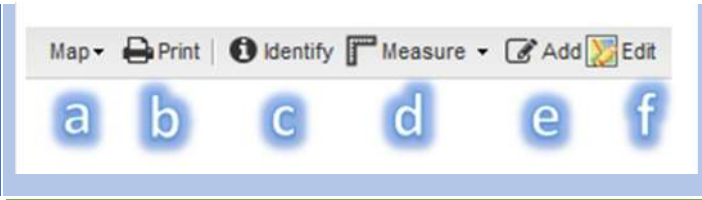
3	**Drag / Pan**	When active, click and drag on the map to pan	
4	**Feature Info**	When active, clicking on a feature on the map will return information. 4.2.10 FEATURE INFO	
5	**Layer Style**	Allows switching between different available styles and adjusting styles	
6	**Measure**	Measure 2D length and area. Double click when at last point to end the measurement.	 
7	**Zoom in / out**	Clicking on the icon will zoom the map canvas un / out	

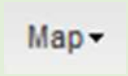
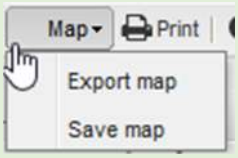
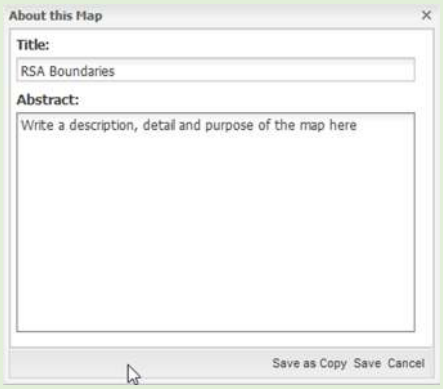
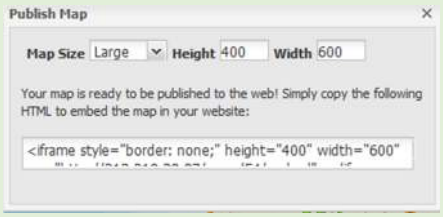
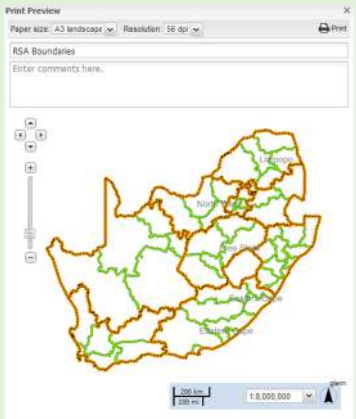
			
8	**Previous / Next**	Similar to the back and forward buttons of a web browser. This tool pans/zooms the map canvas back / forward to the previous extent.	
9	**Zoom to Max Extent**	Zoom to the farthest extent of all layers.	
10	**Legend**	Show a legend panel	
11	**3D viewer**	Change the 2D map canvas	**TODO: Google Earth Plugin has been discontinued. Need to rewrite widget.** 

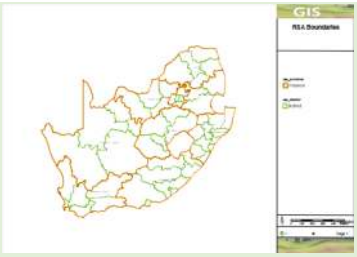
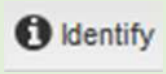
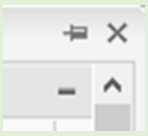
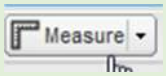
4.2.12 Interactive map

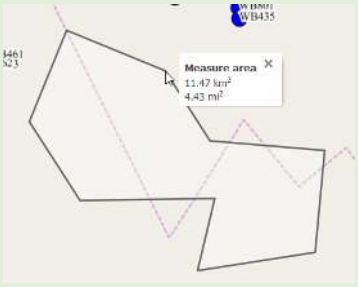
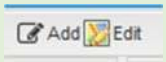
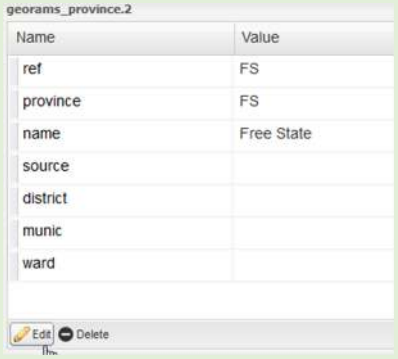
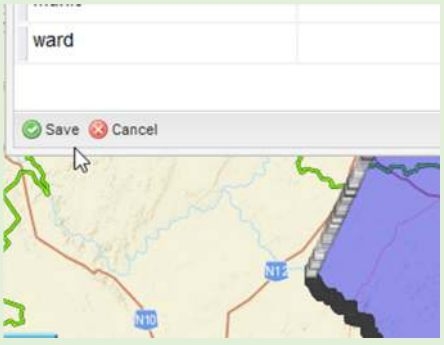
To access the full-screen interactive map, click the View Map button om the map screen:

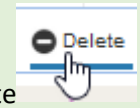
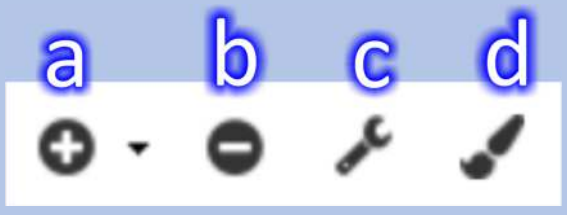
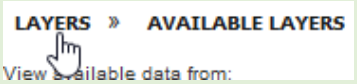
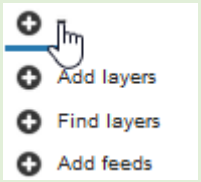
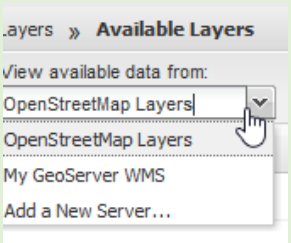
#	ELEMENT	DESCRIPTION	SCREENSHOT
1	Main Toolbar		

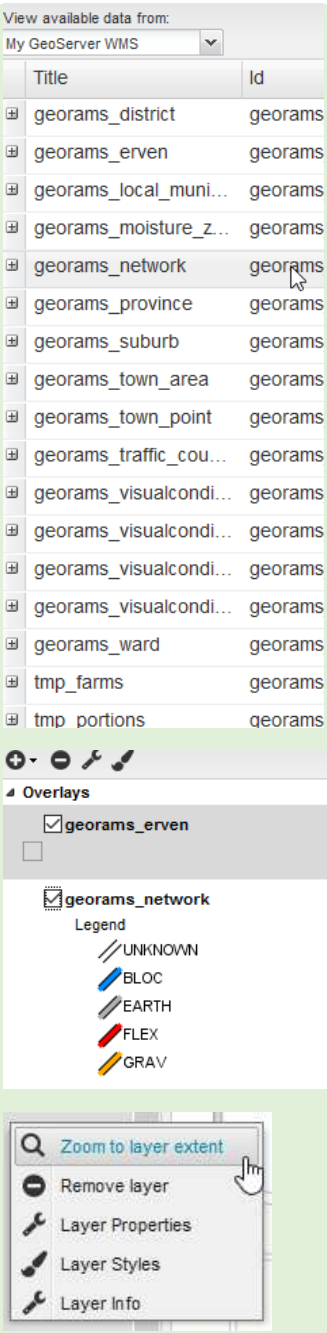


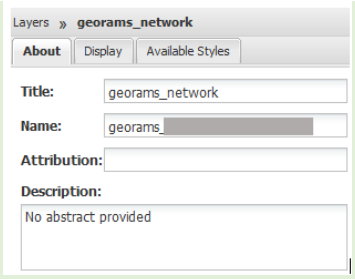
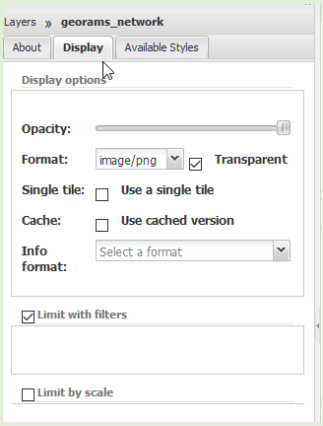
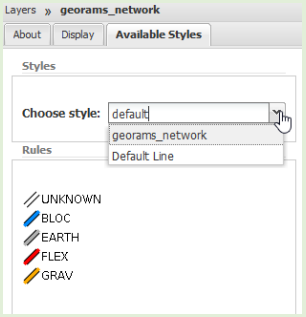
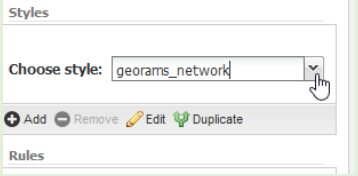
#	Element	Description	Screenshot
a	Map 	• The Map button gives you the option to either export or save the map. • Export map is used to create an embedded version of the map for use on other web pages. "Save as copy" and "Save" does the same thing. The Publish Map dialog opens with the HTML code to embed in another web page. You have the option to change the map size. • Save Map will save any changes you have made to the map back to the system. "Save as copy" in this case makes a new version of the map and preserves the original, while "Save" will overwrite the original with the new version.	  
b	**Print** 	• Print the map to PDF • The Print Map dialog allows you to choose a paper size and print resolution. • You can edit the title and description of the map and choose to include the legend or not.	

		▯ You can change the scale of the map in the Scale widget at the bottom. ▯ When you are satisfied with the map setup, click the Print button.  ▯ Then choose a location to save the resulting PDF file to your computer.	
c	**Identify** 	▯ Click the Identify button to view information about selected features. ▯ Click on a feature on the map and the Feature Info dialog will open. ▯ Click on the **pin** to unpin the information window. This will enable you to move the window around on the screen. ▯ When you click on more than one feature, all elements will be listed in the identify window. Click on the to minimise the items in the list. ▯ Click on the **X** to close the window	 
d	**Measure** 	▯ The measure button lets you measure either length or area on the map. ▯ Choose the desired tool from the dropdown. ▯ To measure length, click on the start point of the line you want to	 

		measure. Move the mouse to the end point. Click on each turn or corner. The length is shown in km and miles. • End measuring by double-clicking. • The measuring line will stay there until you click the Measure button again. • To measure area, click around the area to build op a polygon. The area is displayed in km^2 and mi^2. • Click the Measure button again to remove the polygon.	
f	**Edit** 	• The Edit button allows you to modify existing features on the map. • Click on the feature you want to modify. • A dialog opens with the feature's information. Click Save when done or Cancel to exit without saving. • To create a feature, click on the **Add** tool. The mouse pointer on the map will change to show a small blue circle  . • Move the mouse pointer to the desired location and click there. • A dialog opens where you can type in the data associated with the feature. Click Save when	 

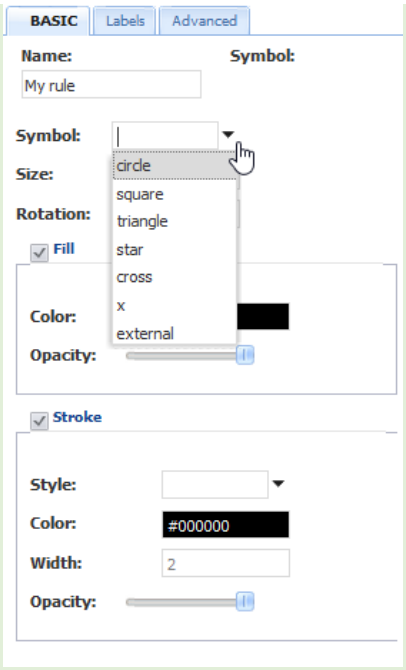
		done or Cancel to exit without saving. □ feature by clicking and dragging it to a new location. □ Click Save when done. □ Alternatively, you can click Delete  to delete the feature.	
2	**Layers Toolbar** 		
#	**Element**	**Description**	**Screenshot**
a	**Add Layers** 	□ The Add Layers button allows you to add layers from different data sources to your map. □ Double-click a layer to add it to the map. □ Click the “Layers” breadcrumb to navigate back to the main Layers area.  □ The new layer will now be shown under Overlays. □ You can un-tick it if you want to hide the features, or right-click to access the layer menu	 

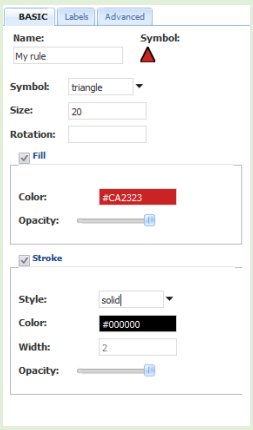
		where you can remove it. This also gives you access to Layer Properties, Layer Styles and Layer Info, discussed below.	
b	**Remove Layer** 	Removes the currently selected layer from the map.	
c	**Layer Properties**	Opens the Layer Properties dialog. On the About tab you can see general	

		information about the layer. • On the Display tab you can edit certain options to fine-tune how the layer should be displayed. • Drag the Opacity slider to adjust the layer opacity. • Untick the Cache option to force the system to load the layer fresh. • The two format dropdowns can be used to specify the type of data format to be used. • You can filter your layer by adding conditions similarly to the Query conditions discussed before. • You can also limit the layer display to a range or scales, outside of which the layer will not be shown. • Available Styles tab shows a dropdown of styles for this layer. You can create new styles using the Layer Styles button discussed next.	   
d	**Layer Styles** 	• The Layer Styles button opens the Styles dialog. Here you can choose an existing style, edit it, duplicate it, remove it or add a new style. • You can also create rules that allows conditional	

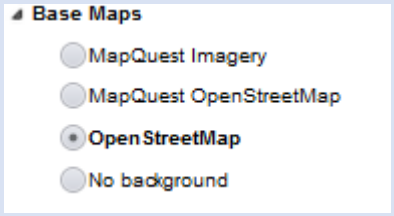
formatting of your style depending on attribute values. A style can have many rules.

- Add a style: This allows you to create a new style. Choose a title and description and click Save at the bottom of the screen.
- Edit a style: This allows you to change the title and description of the selected style. Click Save at the bottom when done.
- Duplicate lets you make a copy of the selected style, giving it a new name.





- When you add a new rule, it is added as “untitled 1”, but then you have to Edit it to give it a name and set all the options.
- On the Basic tab, set the name, choose a symbol, set the symbol size and colours as desired.
- On the Labels tab you can set which attribute to use as label, as well as the formatting of the label.
- On the Advanced tab you can set the conditions for your rule to apply. This can be used to format different

			subsets of data in different ways on the map. Click Save at the bottom of the screen when done.	
3	**Overlays**	Overlays refer to the layers you have added to the map. Right-click an overlay for specific options, or click to select it and use the Layers toolbar options discussed previously.		
4	**Base Maps**	Base maps refer to the background imagery of the map. You can choose not to have a background by selecting “No background” in this list. Right-click these items for options to remove and zoom to extent.		
5	**Map Toolbar**			
6	**Interactive Map**			

#	Element	Description	Screenshot
a	**Switch to 3D viewer** 	This will be implemented as a WebGL viewer.	
b	**Pan Map** 	Click this button and then click and drag the map to pan.	
c	**Zoom by dragging box** 	Click this button to zoom by drawing a box on the map.	
d	**Zoom in** 	Click to zoom into the map incrementally.	

e	**Zoom out** 	Click to zoom out of the map incrementally.	
f	**Zoom to previous extent** 	This zooms back to whatever the previous view was.	
g	**Zoom to next extent** 	This zooms to the next extent, if you have already zoomed back to the previous extent.	
h	**Zoom to max extent** 	This zooms out to fit the entire data set.	
7		The map area has three controls that allow you to open and close sections on the screen. The one to the left closes the Layers area. The one on the right closes the Bookmarks.	

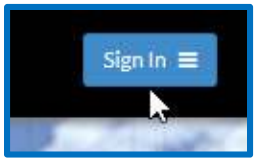
8	**Map Scale**	▫ Use the map Scale widget to change the scale.	

4.3 USAGE

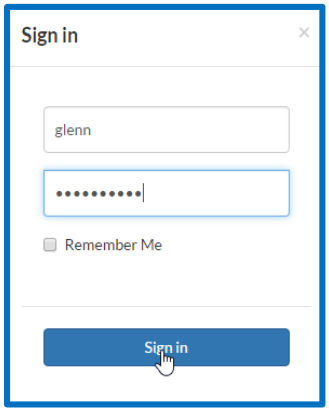
4.3.1 *Logging in*

Open *http://yourdm.georams.co.za* in your web browser (works best in Chrome and Firefox web browsers):

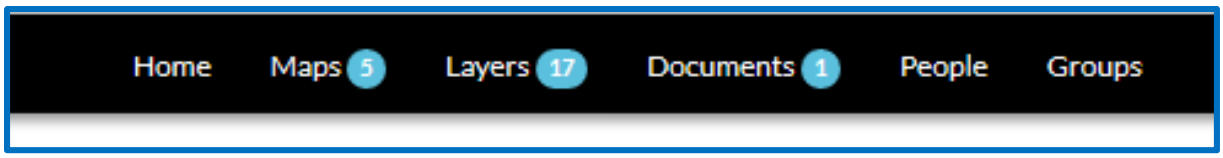
Click on the **Sign In** link on the right:



A login window will appear. Enter your **Windows Username** and **Password**:

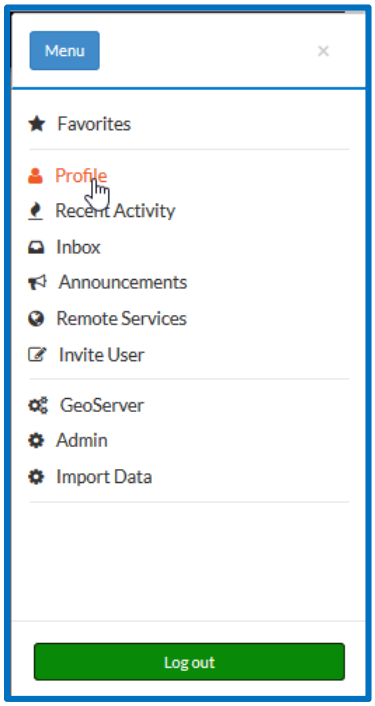


Once logged in, you'll be redirected to the home page. The green buttons will be updated with counts of the **GIS Layers**, **Maps** and **Documents** that your user account has been given access to:


Home
Maps 5
Layers 17
Documents 1
People
Groups

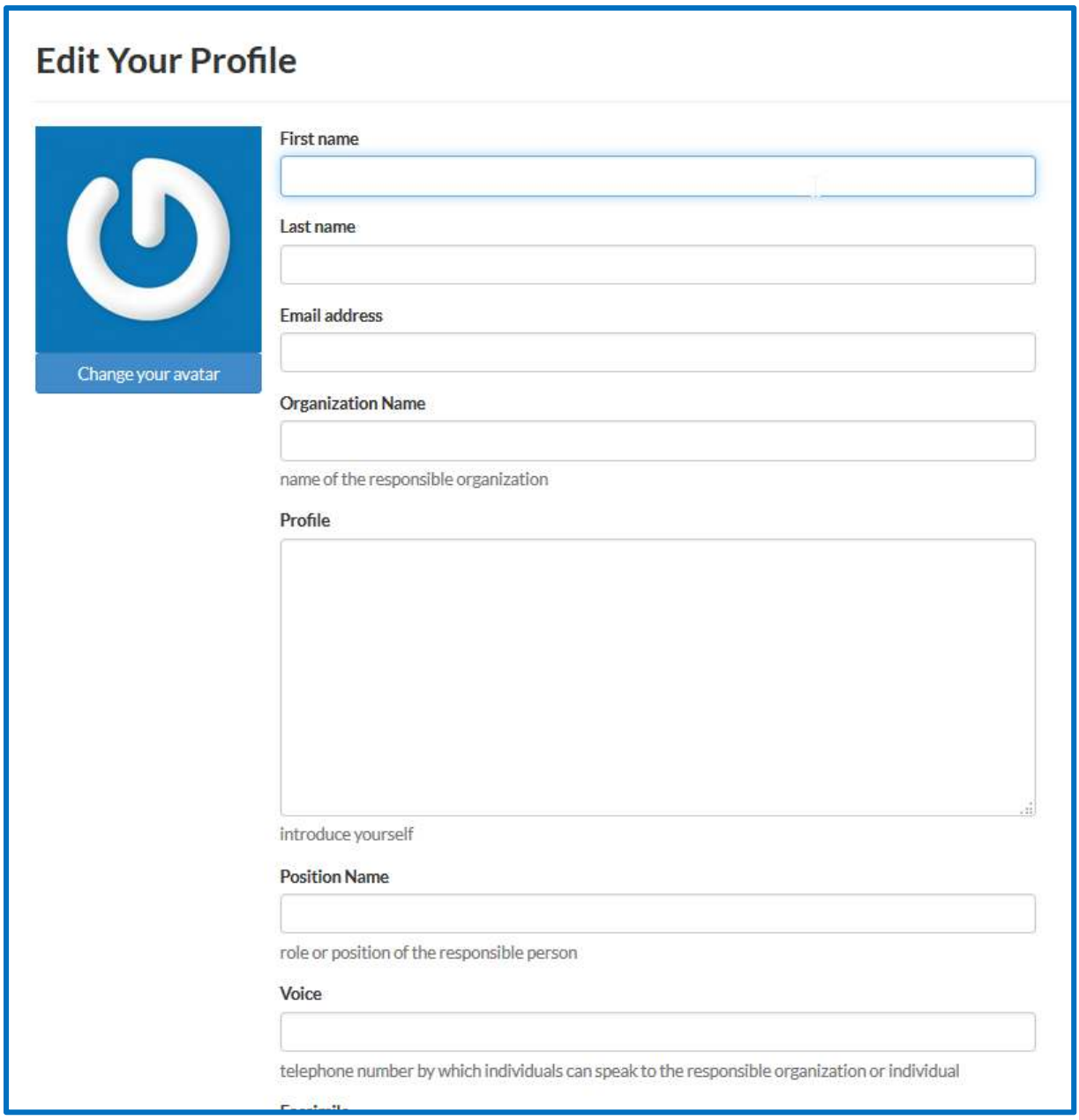
4.3.2 *Editing user profile*

You can access and edit your user profile from the Profile option on the user menu.

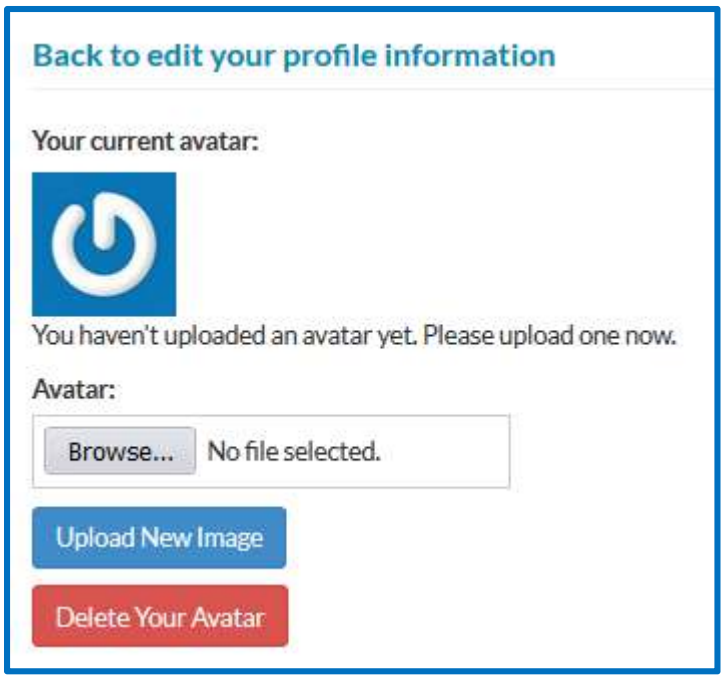


Click Edit profile on the right to fill in all your relevant information.

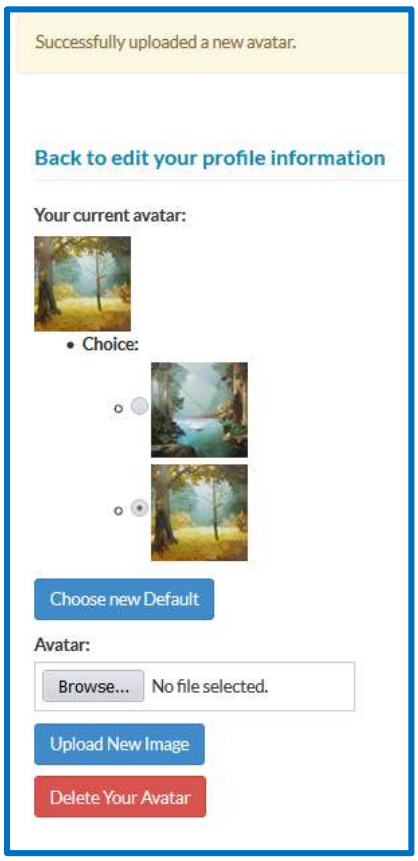
On the Edit Profile screen, you can fill in all the relevant fields. Each field has a description of the type of information it requires.



You can change your Avatar (your user picture) by clicking on the Change your avatar option on the picture. You can upload a picture by browsing to it and then clicking the Upload New Image button. You can also delete your avatar by clicking the Delete Your Avatar button.

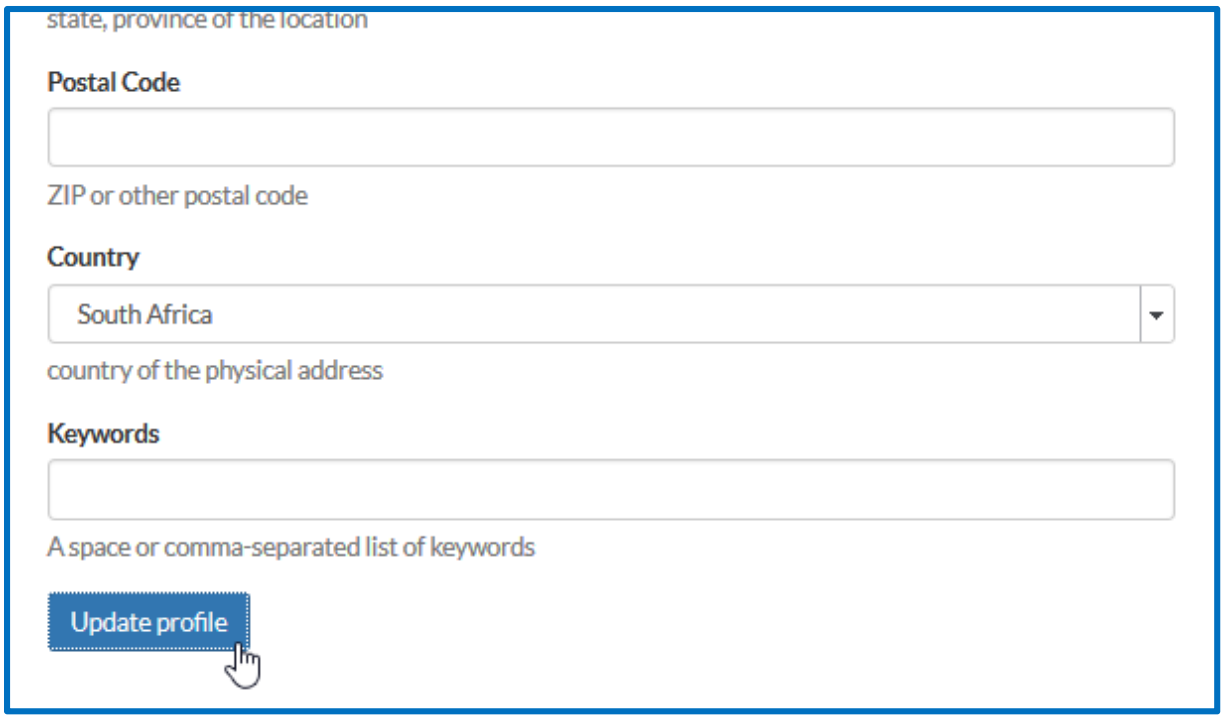


You can upload multiple pictures. The system will store them and you can choose which one to use as your avatar.



Once you have chosen your avatar, go back to Edit your profile information.

When you have entered all the relevant information, click Update profile to save your changes.

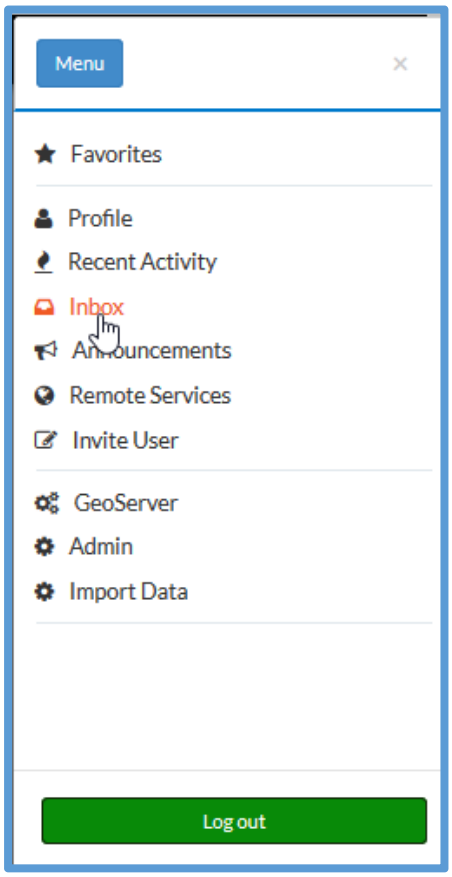


Your updated profile will be displayed.

Note: Password change is not possible from this screen because authentication is being handled by Active Directory. The link will be removed in the next update.

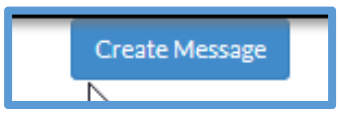
4.3.3 *Sending messages (inbox)*

Messages are created and read in the Inbox on the user menu.

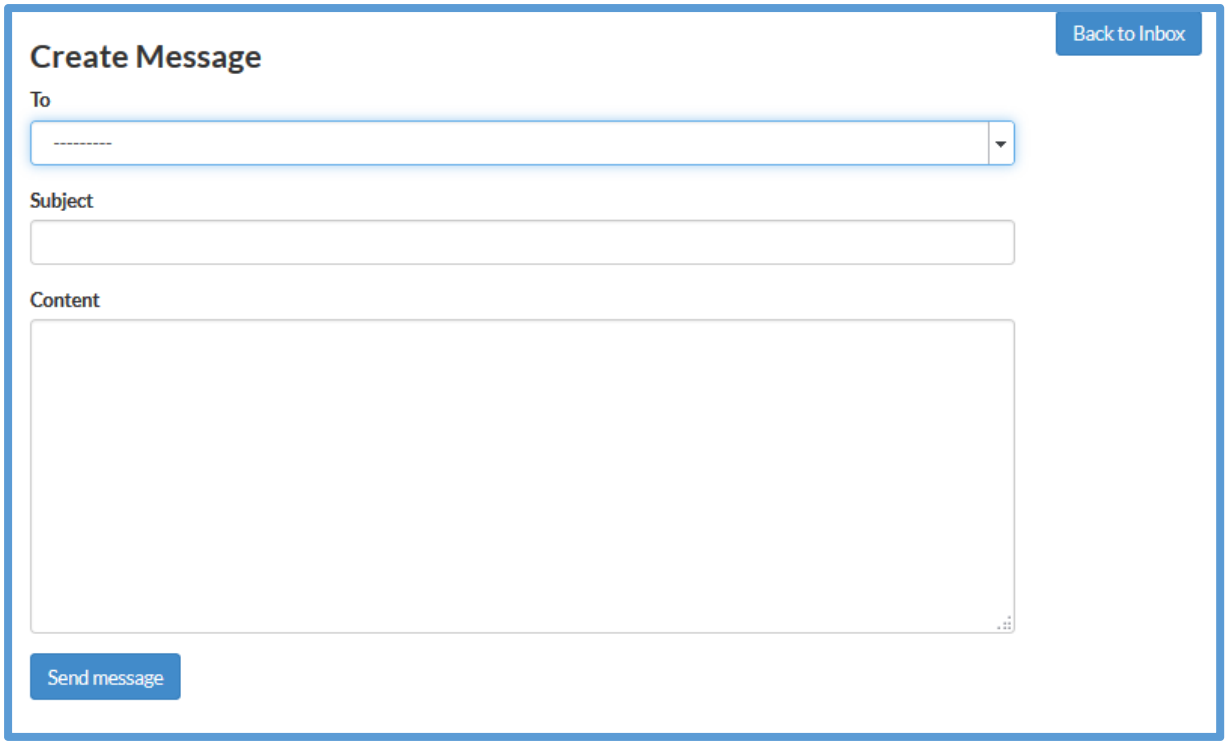


Creating a message

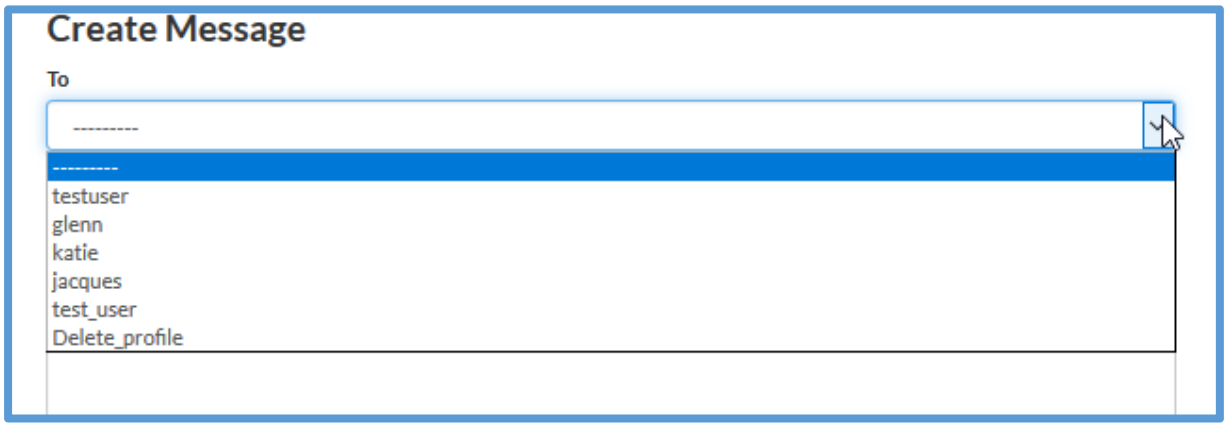
On the Inbox screen, click the Create Message button.



The Create Message screen opens. You can now choose to go back to the Inbox using the button in the top right corner, or you can fill in the various fields to create your message.

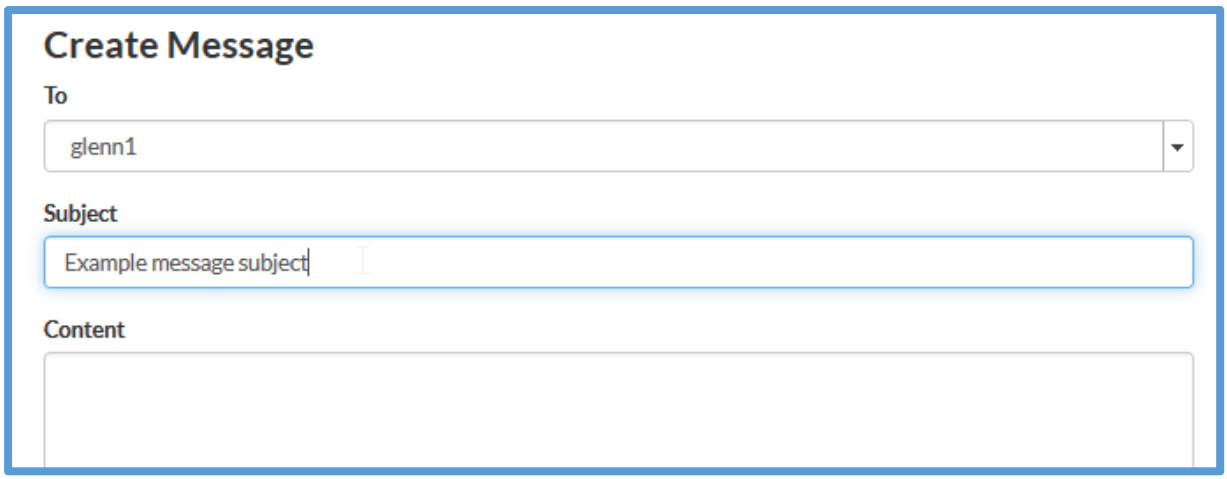


The **To field** is used to choose the user to whom you are sending the message. It is a dropdown box so if you click on the down arrow you will get a list of users to choose from.

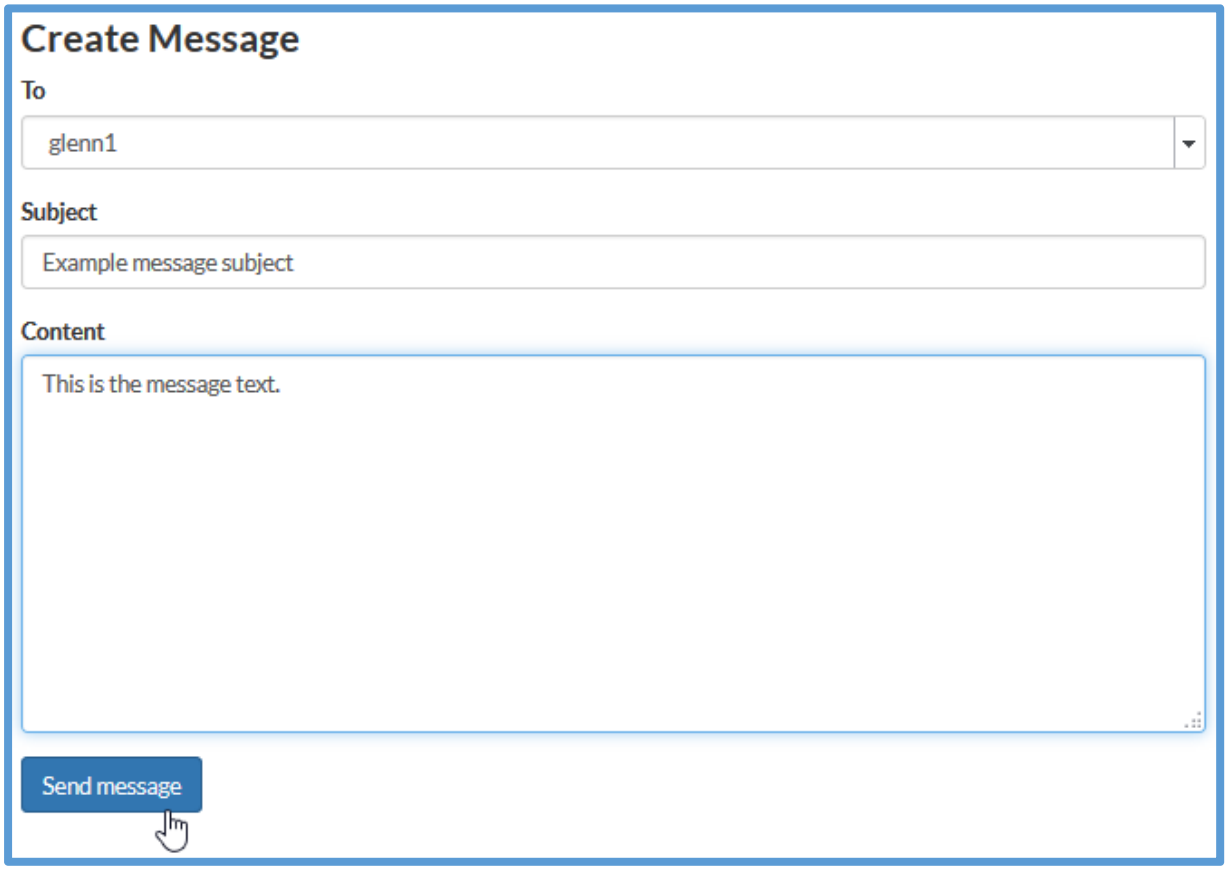


You can only choose one user to send each message to. If you need to reach many users, it may be better to use an announcement instead.

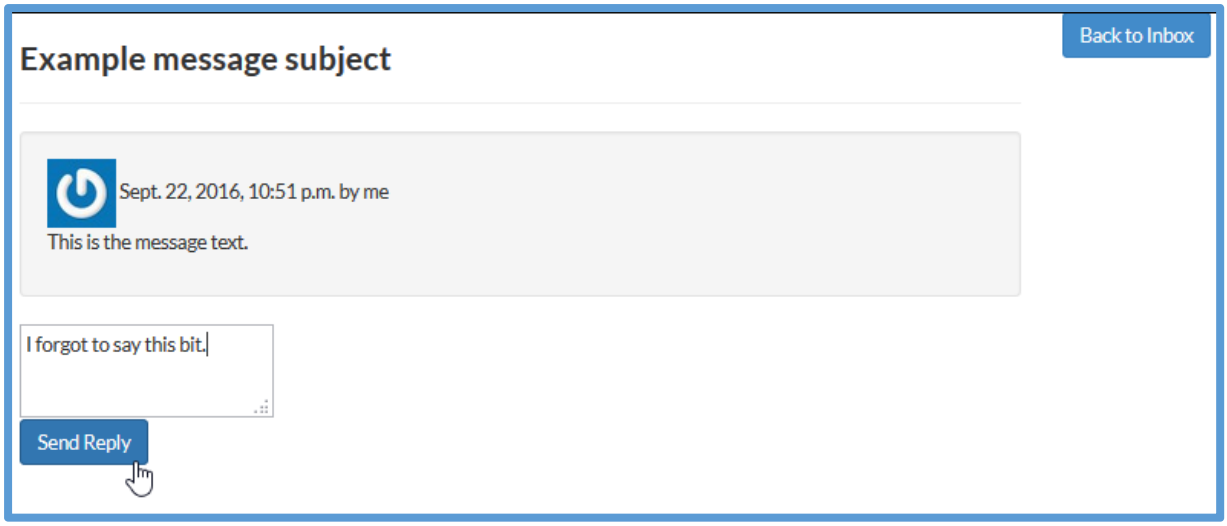
Next type in a subject line for your message.



Next, type the message into the Content box. This field is required so you cannot send an empty message.



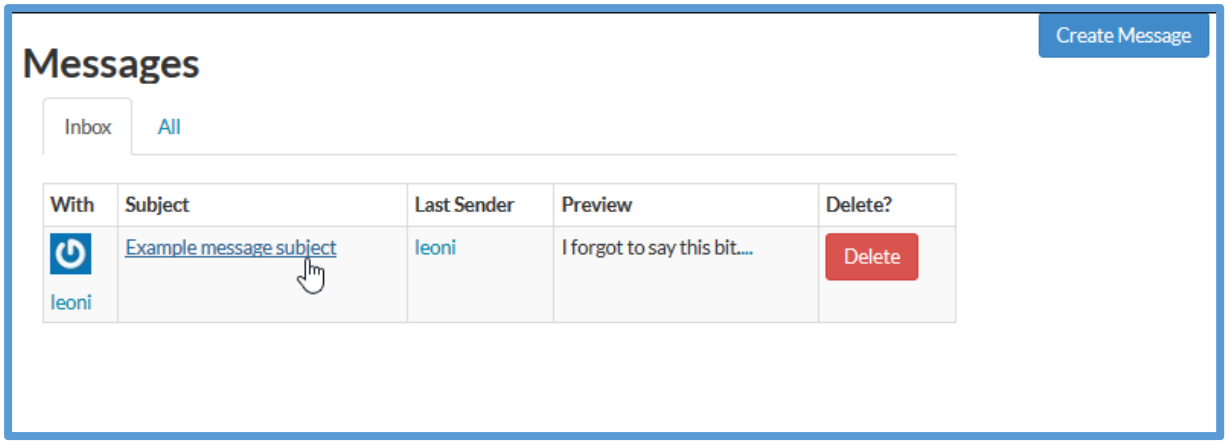
Finally send the message by clicking the Send message button. You will be taken to the message, where you have the opportunity to immediately send another by using the Reply box. Or you can just go back to the Inbox using the button in the top right corner.



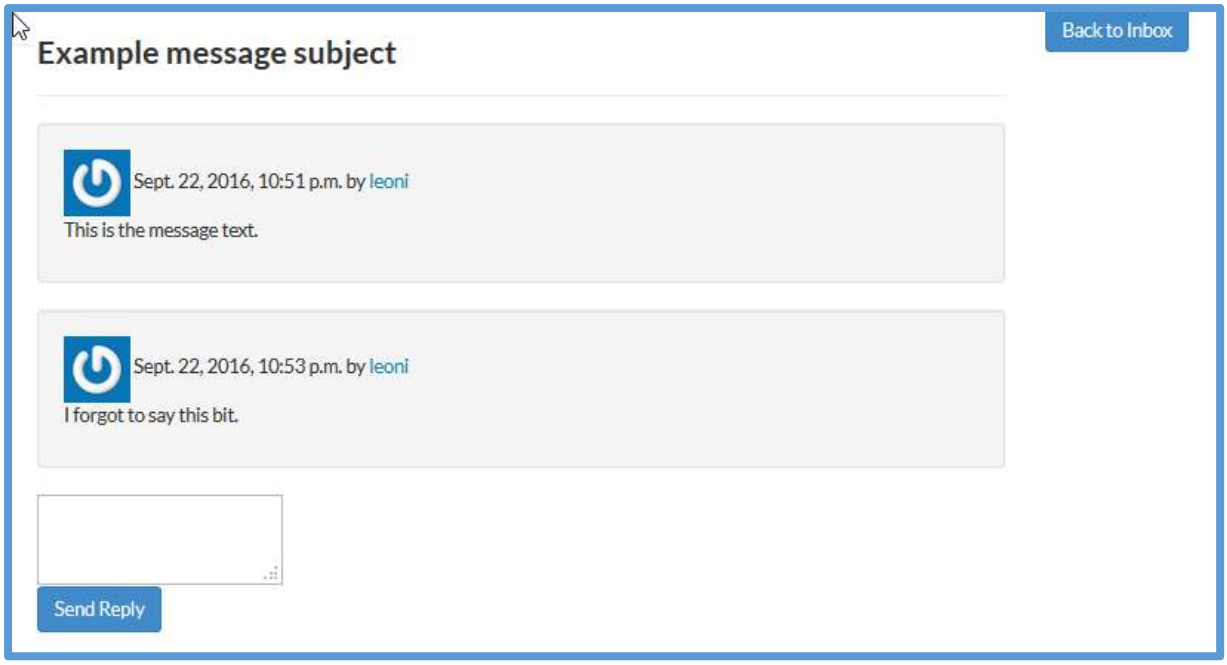
Reading messages

Access your Inbox from the user menu. The Inbox tab shows messages that you have not read yet. It shows each message with Sender, Subject and Preview. You can open the message by clicking the subject line, or you can delete the message by clicking the Delete button.

If you have read all your messages the Inbox will show nothing. You can access your previous messages by clicking the All tab.



When you open the message you will see the message as well as any replies that have been made. You have an opportunity to send a reply back to the sender.


Back to Inbox
Example message subject
Sept. 22, 2016, 10:51 p.m. by leoni
This is the message text.
Sept. 22, 2016, 10:53 p.m. by leoni
I forgot to say this bit.
Send Reply

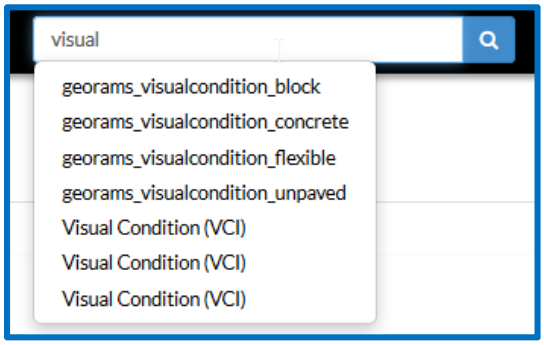
4.3.4 *Searching (metadata)*

Various functions are available in the web interface to allow for quick filtering and searching for required information. Some of these features have already been introduced, but are included here again for further clarity.

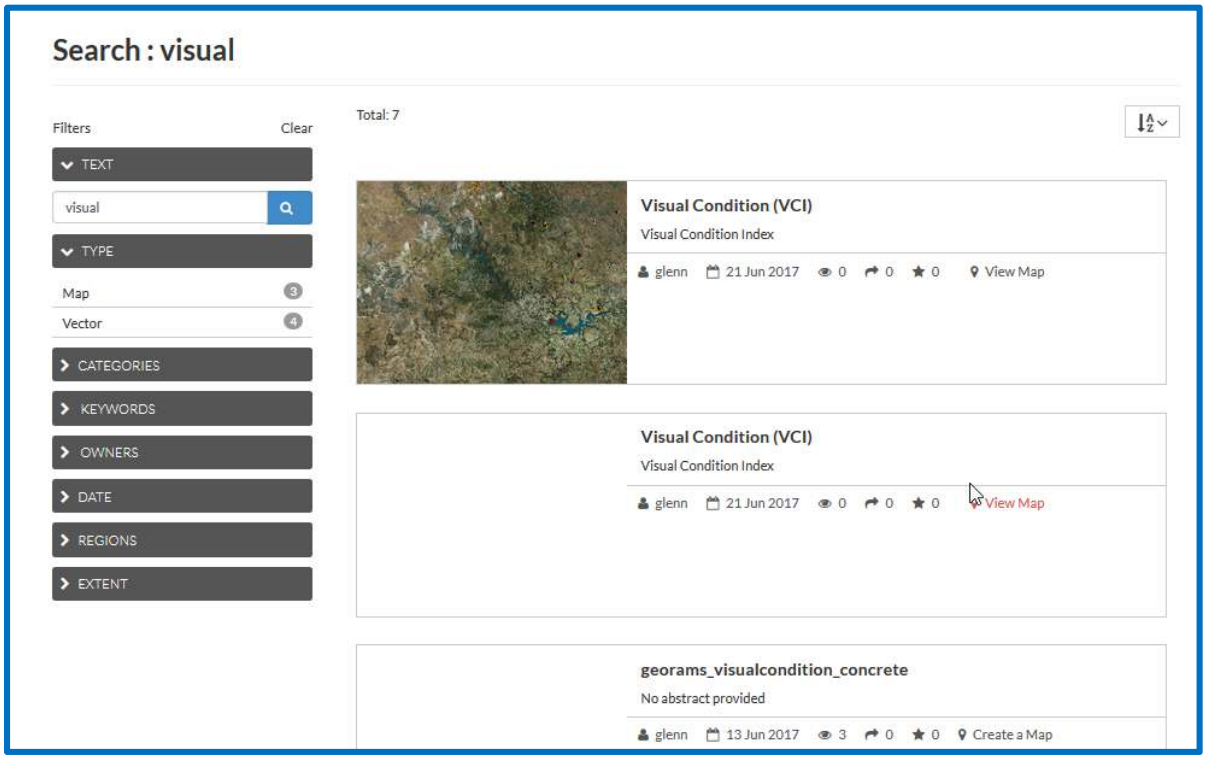
Searching from the Search bar

You can access the Search bar at the top of every page.

As you type your search topic, the bar will display a drop-down list with matching items. You can choose to click any of these items directly and will be taken to the resource.



Alternatively, you can click the blue  button to be taken to a page with the search results.



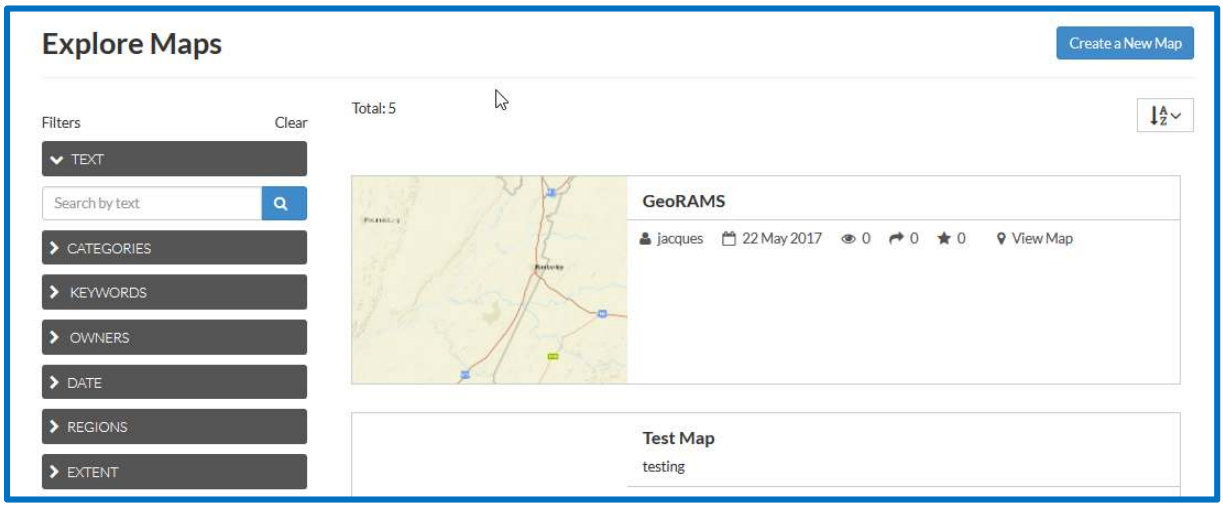
You can click the title or thumbnail of any result to go to that resource.

Searching by filtering metadata

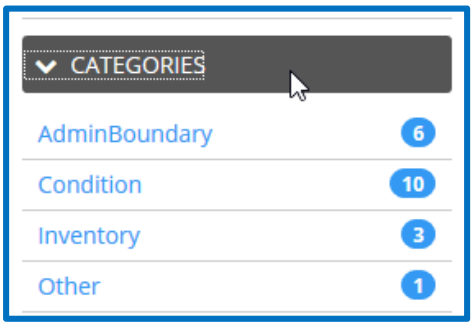
You can search for resources on any page with a listing such as maps or layers, using the Filters on the left.

These allow you to define metadata search criteria such as owner, keywords, date and region to specify the type of results to be displayed.

The different pages have slightly different lists of filters depending on what metadata is available, however they all work in similar fashion.



- **Text**
  - Text search gives the same results as typing a search topic into the top Search bar. It will return resources that contain the word you typed in the title
- **Type**
  - Type allows you to choose either Vector or Raster data if there are resources of each type.
- **Categories**

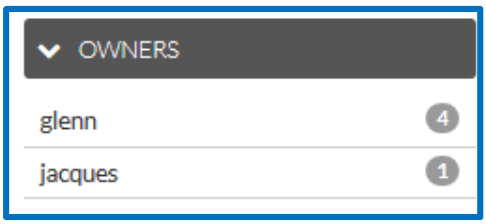


  - Categories will give you a list of defined categories. Click on the desired category to see all resources assigned to it.

- **Keywords**

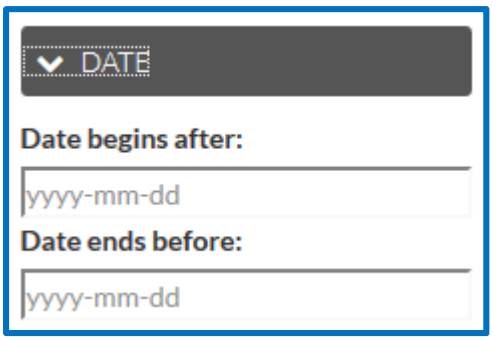
- Resources can be assigned keywords that can then be selected here.

- **Owners**



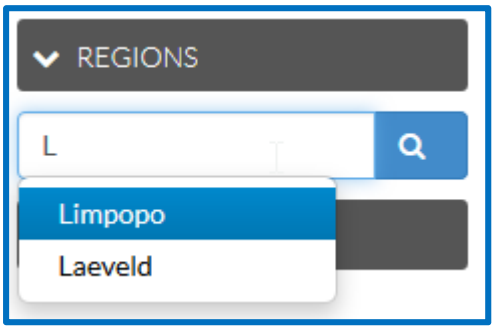
  - Here you can choose to see all resources owned by a specific user.

- **Date**



  - You can specify a date range to find al resources uploaded in a certain time period.

- **Regions**



  - You can type the name of a region to search for. The dropdown will give you a list of all matching items.

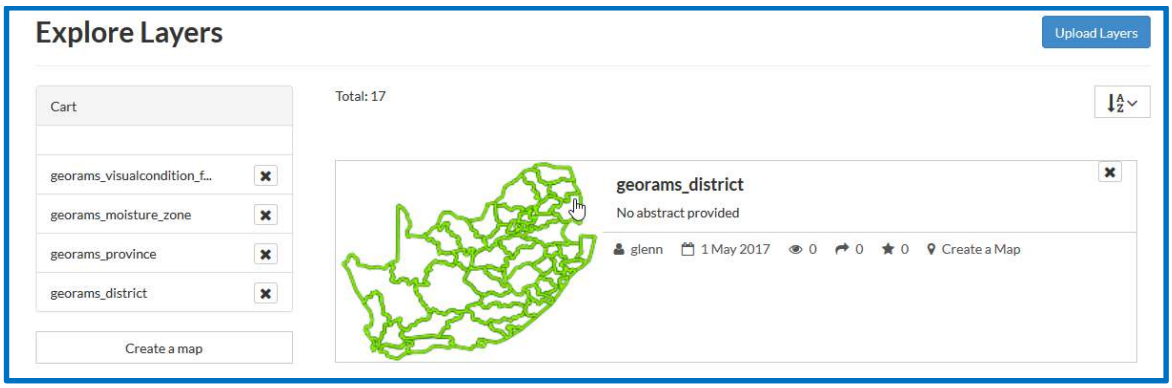
- **Extent**

Extent allows you to narrow your search by zooming into a map. Only resources that fall within the visible zoomed area will be displayed in the results list. You zoom in and out using the scroll wheel of your mouse, and move the view by clicking and holding the left mouse button while moving the mouse. If you are using a tablet or touch screen, you can zoon in and out by pinching (two-finger move) or pan across by touching and dragging across the map.

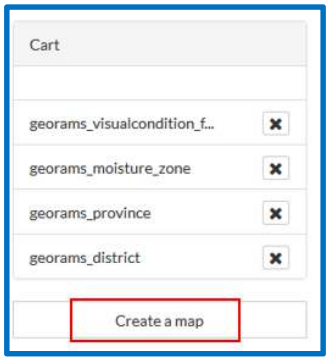
4.3.5 Create map

Method 1 – Using the layer cart

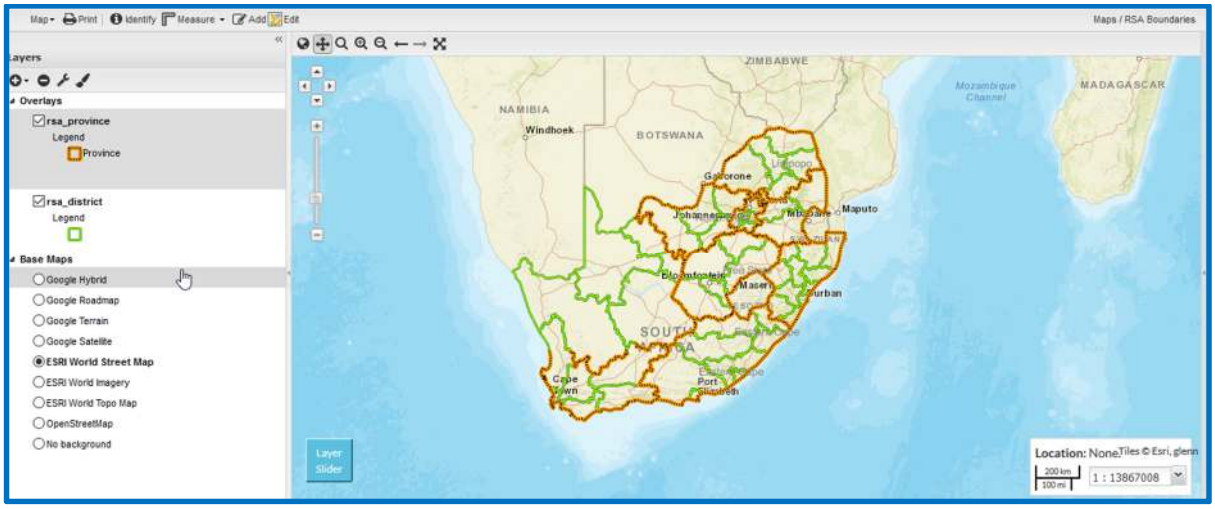
In the **Layers List** page, add layers to the cart using the cart button. You can use the filter/searcher to find specific layers.



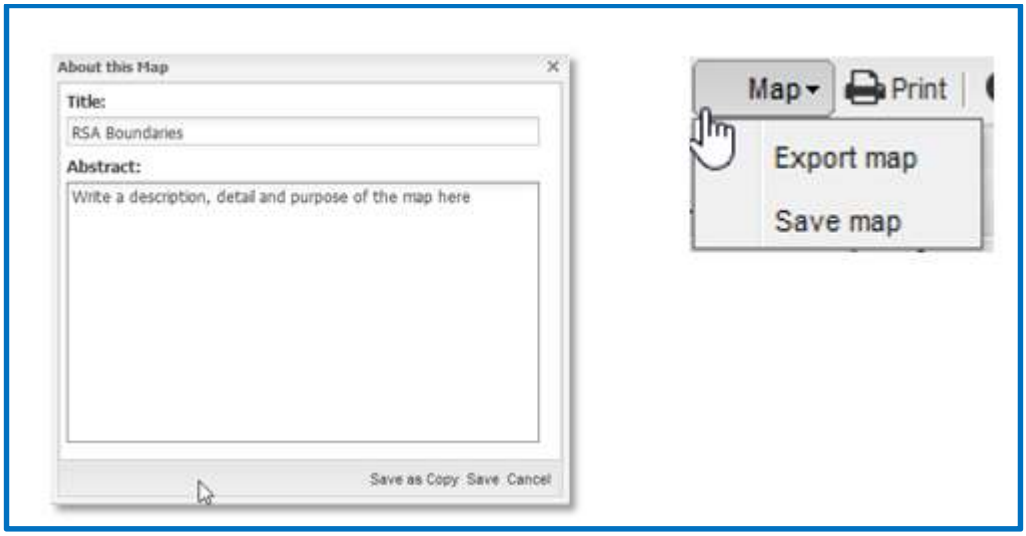
Click on **Create Map**



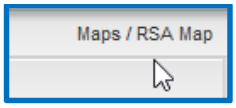
If required, re-organise layers, zoom into your area of choice or apply layer filters/style adjustments.



Save the map, adding a **name** to identify it by, as well as a **description**.



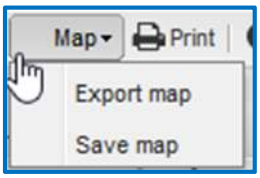
On successful save, a hyperlink to the map will appear at the top right-hand corner of the map.



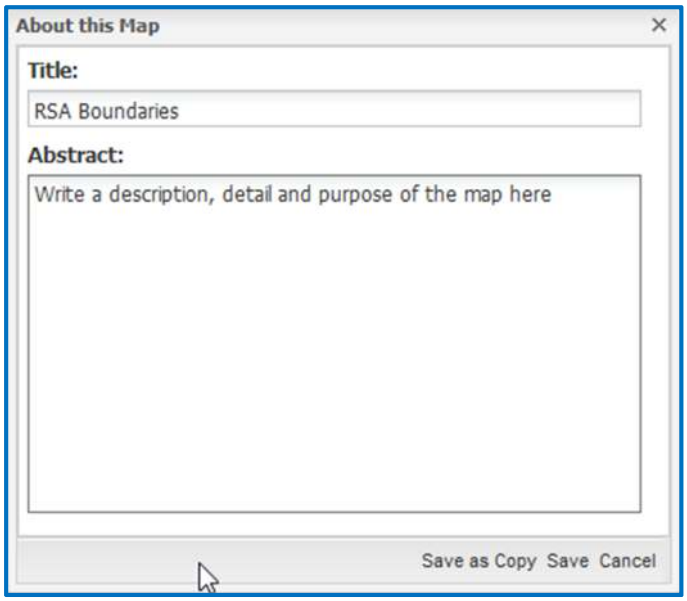
The new map will appear in the map list:

4.3.6 *Publish Map to Microsoft Word*

Same steps as previous, except select **Export Map**

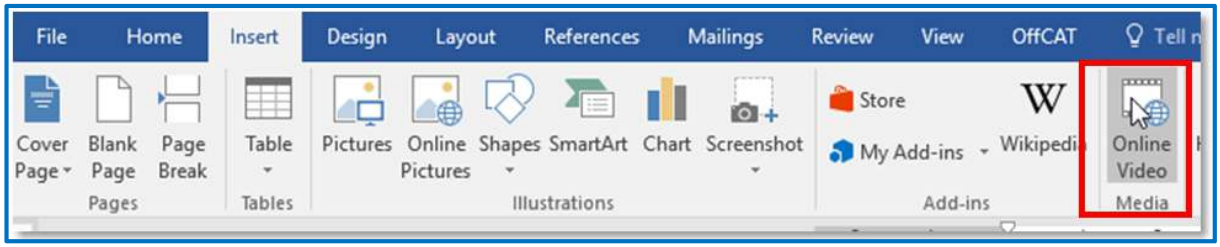


Fill in the map name and description and click on Save.

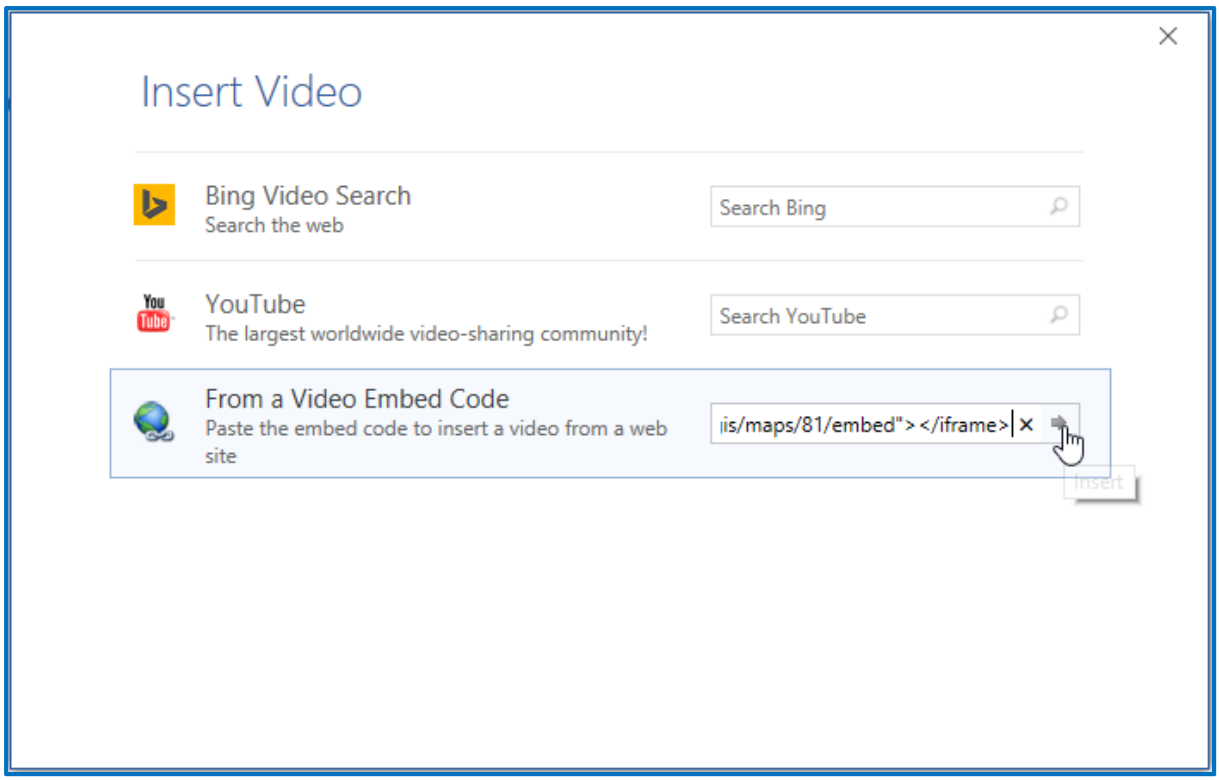


Copy the text in the textbox to the clipboard. Press **<Ctrl + c>**

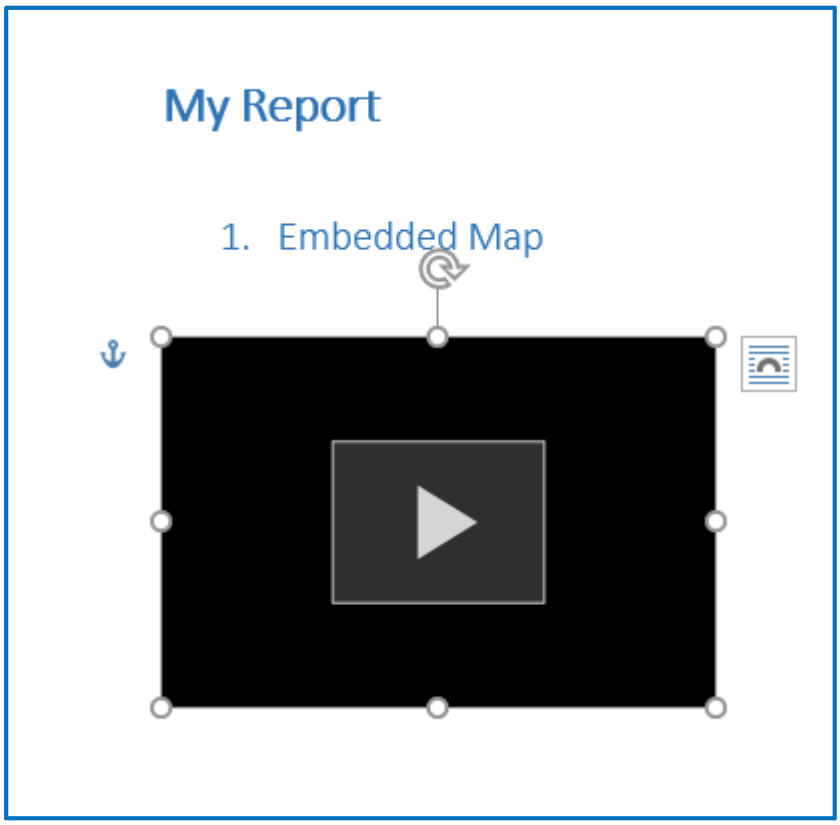
Open a Word document and select **Insert**→ Online Video



Paste the copied text in **from a Video Embed Code**



An object with a **Play** button will be added to the document.

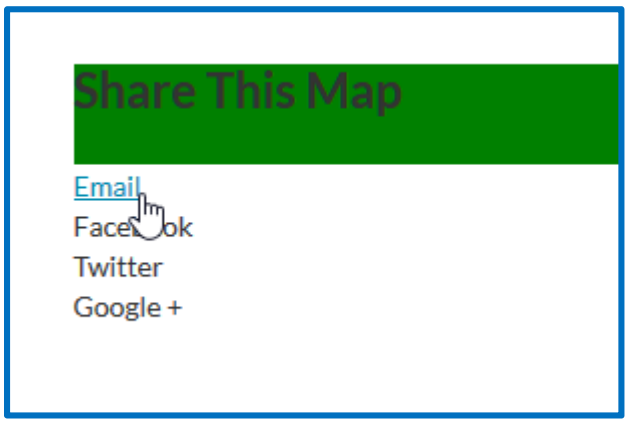


Clicking on the **Play** button will open an interactive embedded map.

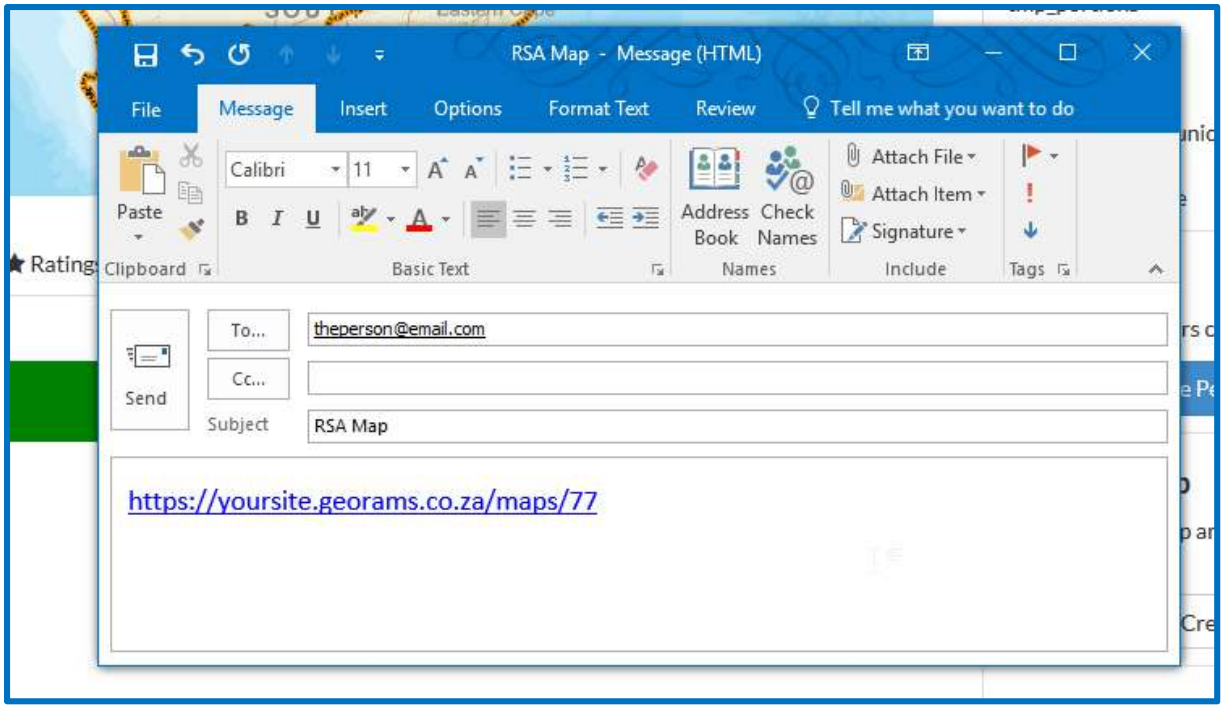
4.3.7 *Map sharing*

Underneath each map there is a Share button that you can use to send a link of the map to someone by email.

Share your map

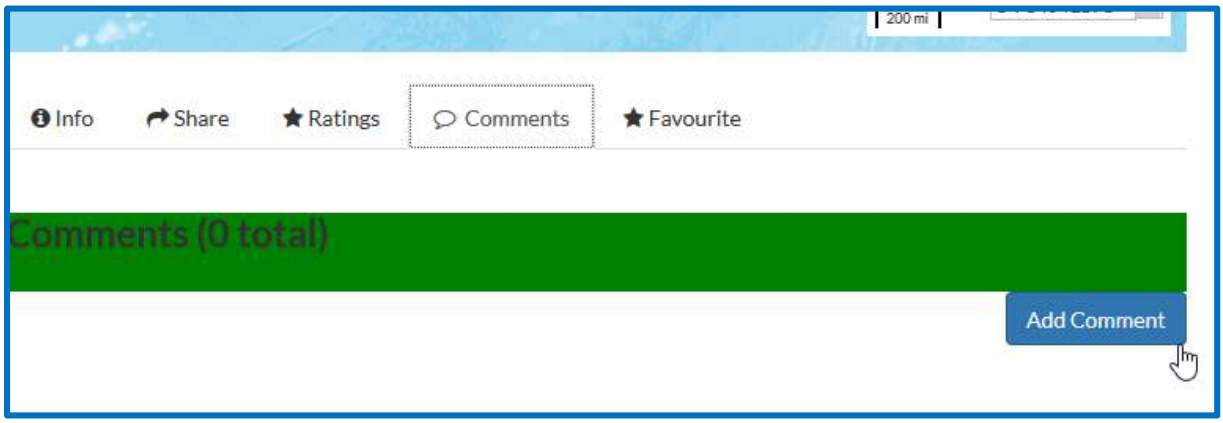


When you click on the blue “Email” link, your default email client will open a new message with the map’s URL in the message body.

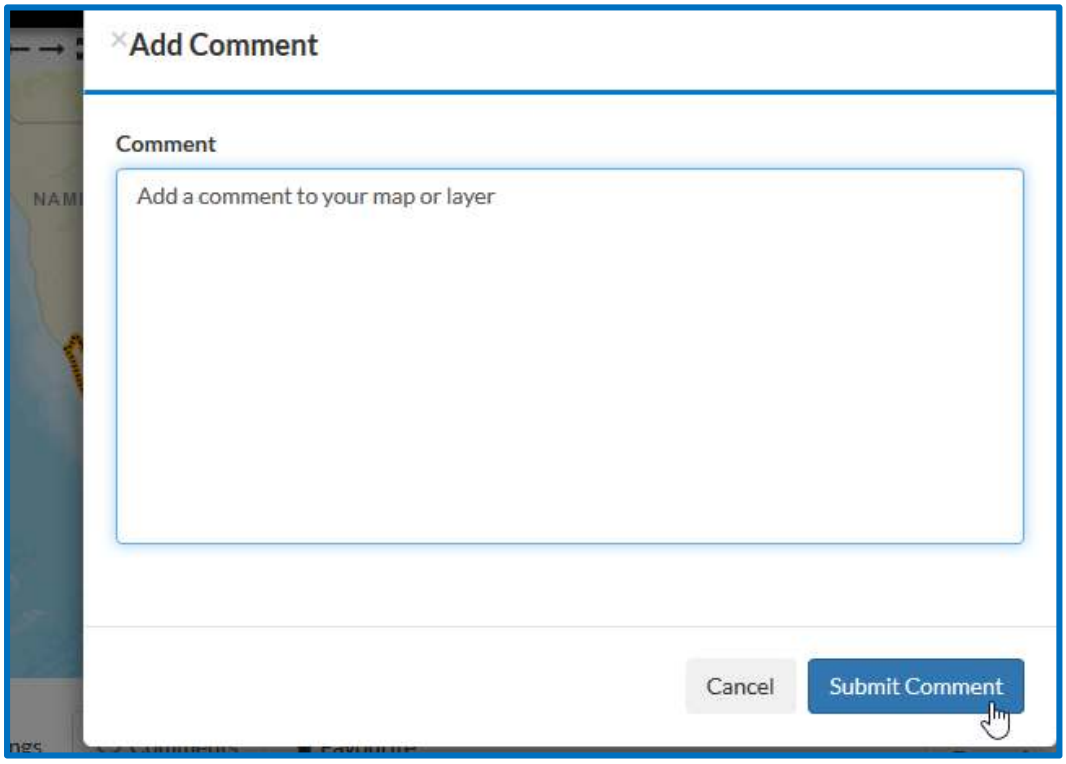

RSA Map - Message (HTML)
File
Message
Insert
Options
Format Text
Review
Tell me what you want to do
Paste
Clipboard
Calibri
11
Basic Text
Address Book
Check Names
Names
Attach File
Attach Item
Signature
Include
Tags
Send
To...
theperson@email.com
Cc...
Subject
RSA Map
https://yoursite.georams.co.za/maps/77

4.3.8 *Commenting*

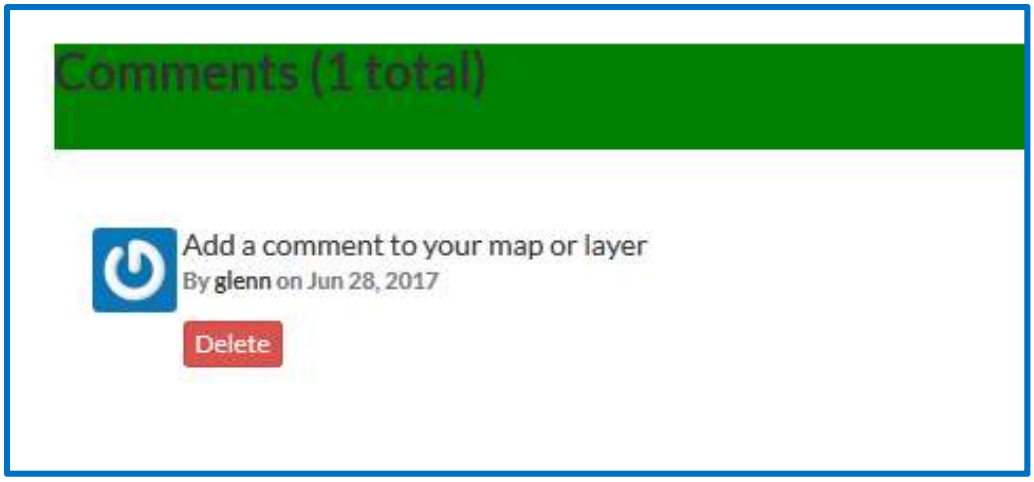
In the **Comments** section of a detail page, click on **Add Comment**.



Enter a comment and select **Submit Comment**

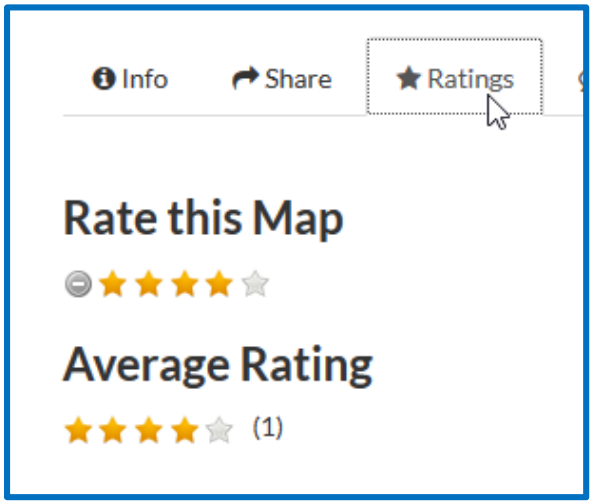


The entered comment will now show in the resource's comments section. The comment entry shows the comment author as well as the date the comment was submitted. Click on the Delete button to remove the comment from the layer or map.

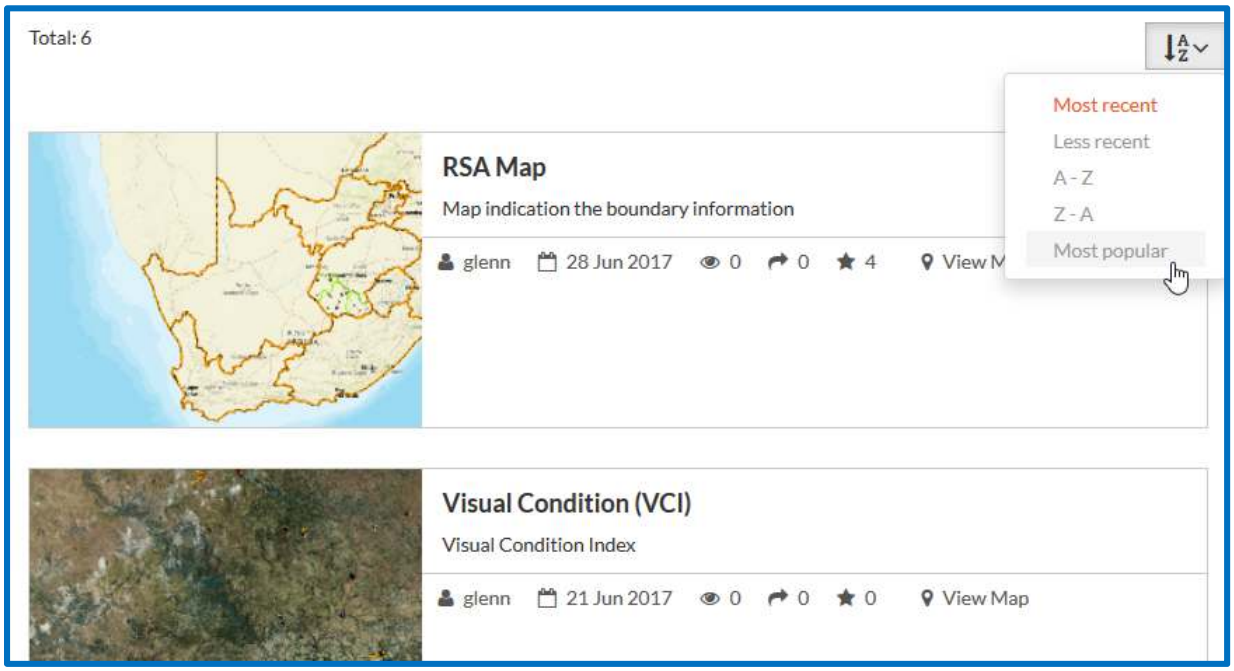

Comments (1 total)
Add a comment to your map or layer
By glenn on Jun 28, 2017
Delete

4.3.9 Ratings

In the Ratings section of a detail page, select a star rating



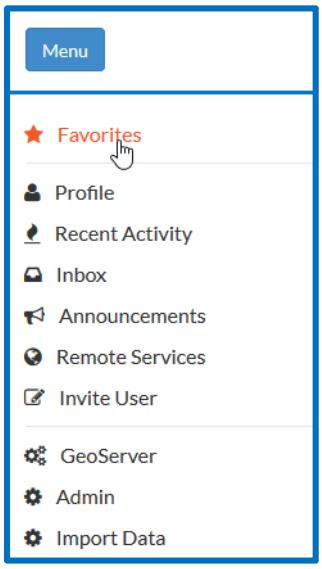
The resources' star ratings can be used in the list pages' sorting options to sort by popularity



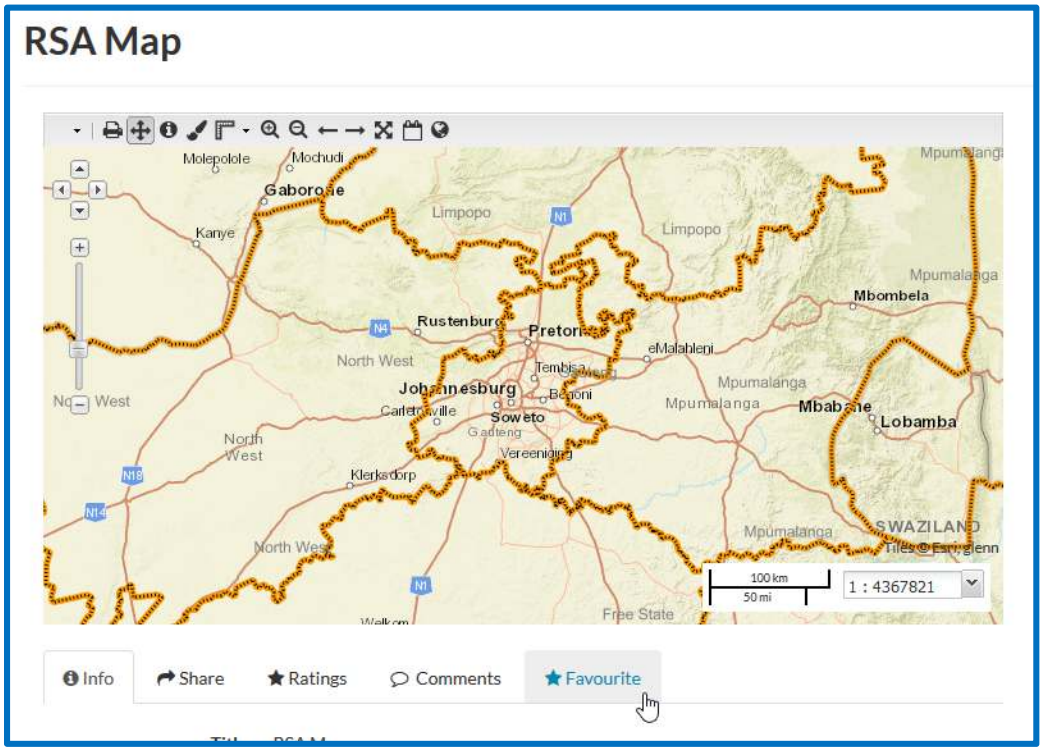
4.3.10 Favourites

Your Home page will have a list of favourites if you have any, otherwise it will show No favourites.

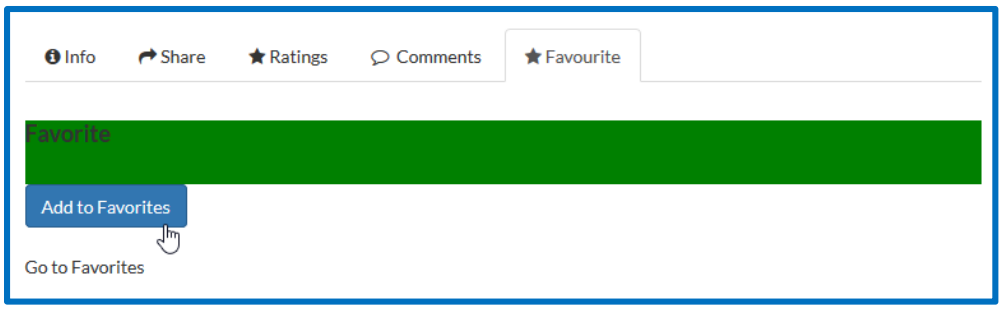
You can access your Favourites from the user menu or on any map or layer page.



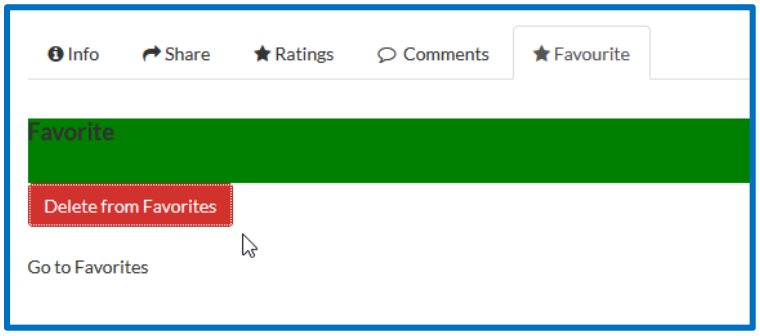
You can add favourite maps and layers. Navigate to the resource, for example, a map. Click on the Favourite link below the map.



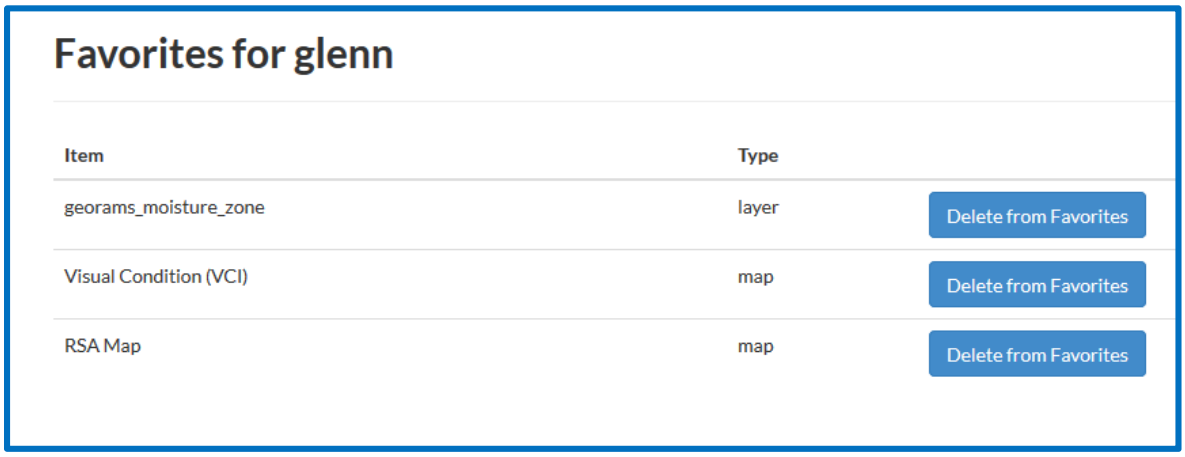
Then click on the Add to Favourites.



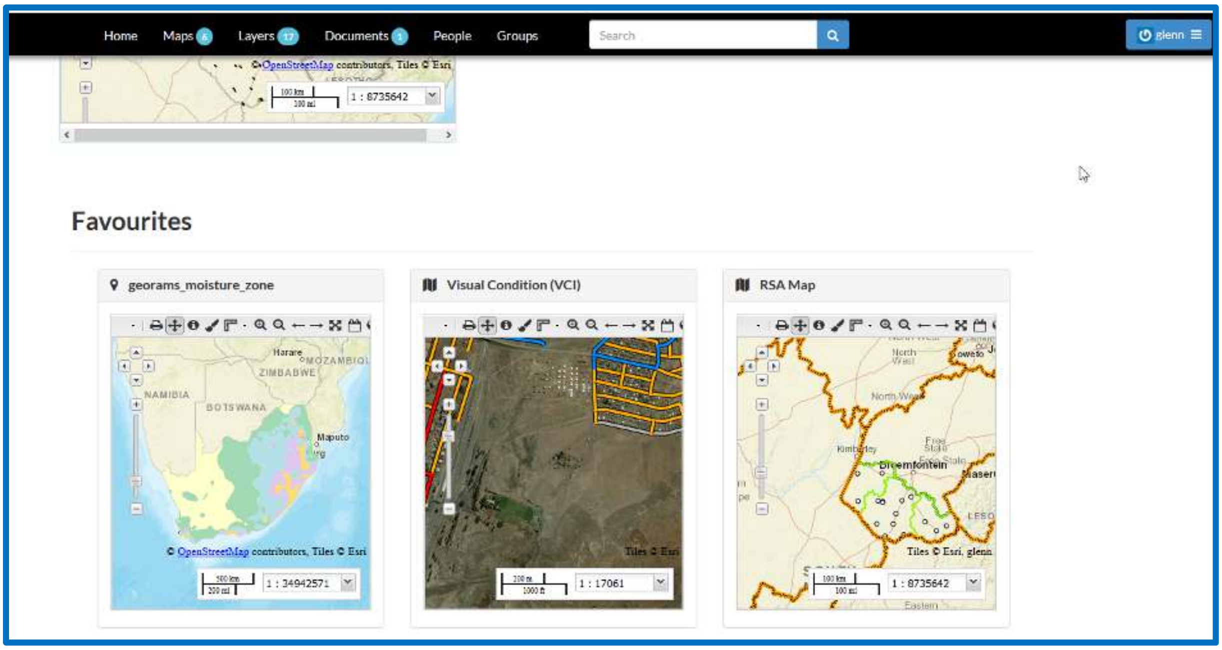
Any resource that has already been added to Favourites will have a red Delete from Favourites button instead.



If you click on Go to Favourites the Favourites screen will open with all the resources that you have added. You can easily remove items by clicking Delete from Favourites here.

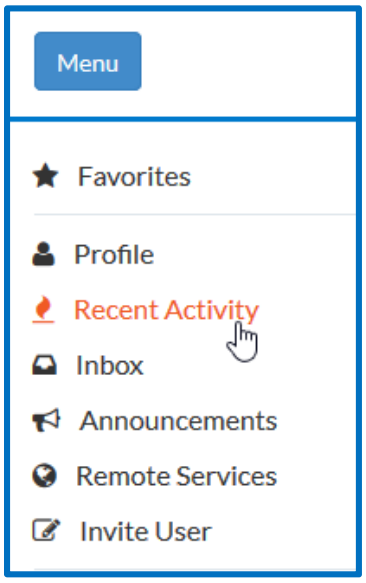


And your Home screen will now have your favourites tiled for easy access.

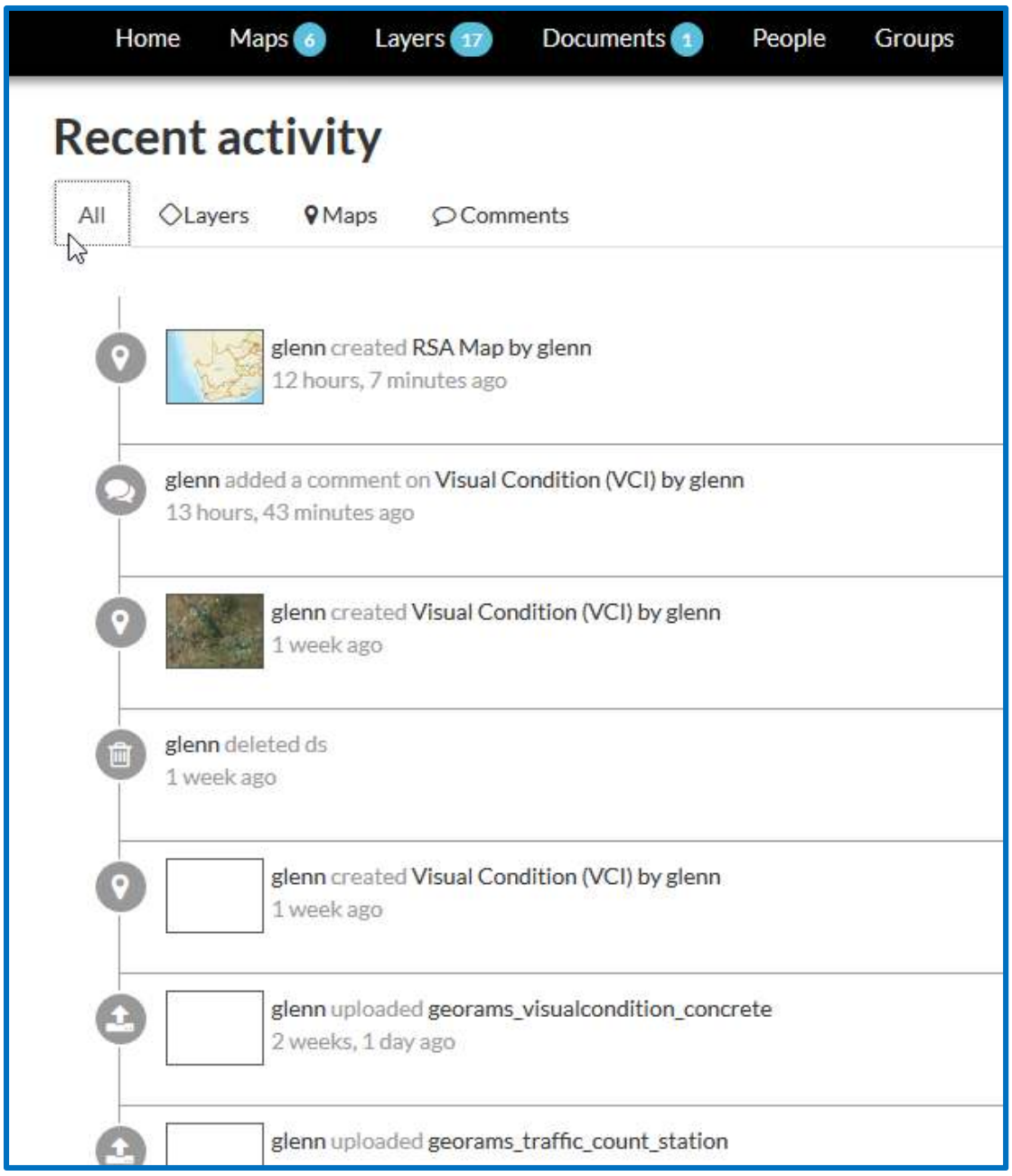

Home
Maps
Layers
Documents
People
Groups
Search
glenn
Favourites
georams_moisture_zone
Visual Condition (VCI)
RSA Map
1 : 34942571
1 : 17061
1 : 8735642

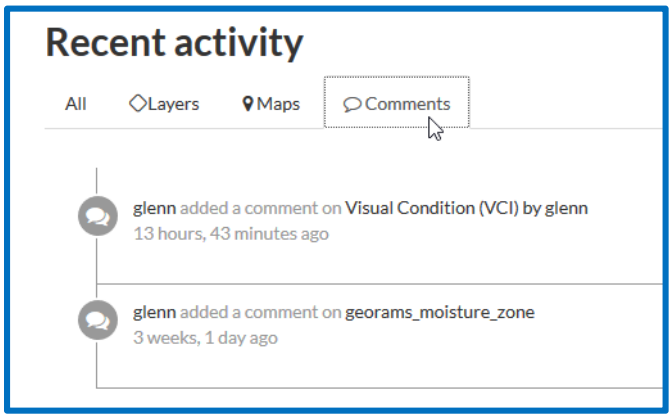
4.3.11 Recent activity

You can access a listing of all recent activities on the system through the Recent Activity item on the user menu.



You can either see the full list of activity on the **All** tab, or narrow it down to see only **map**, **layer** or **comment** activity by choosing any of the other tabs.

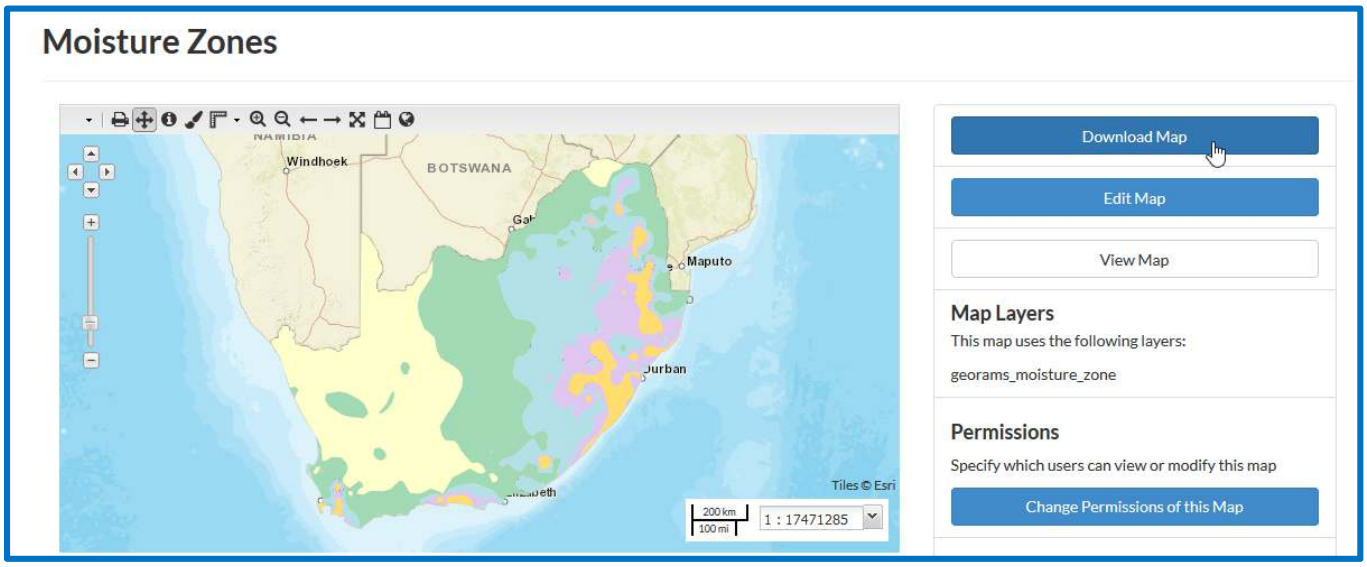




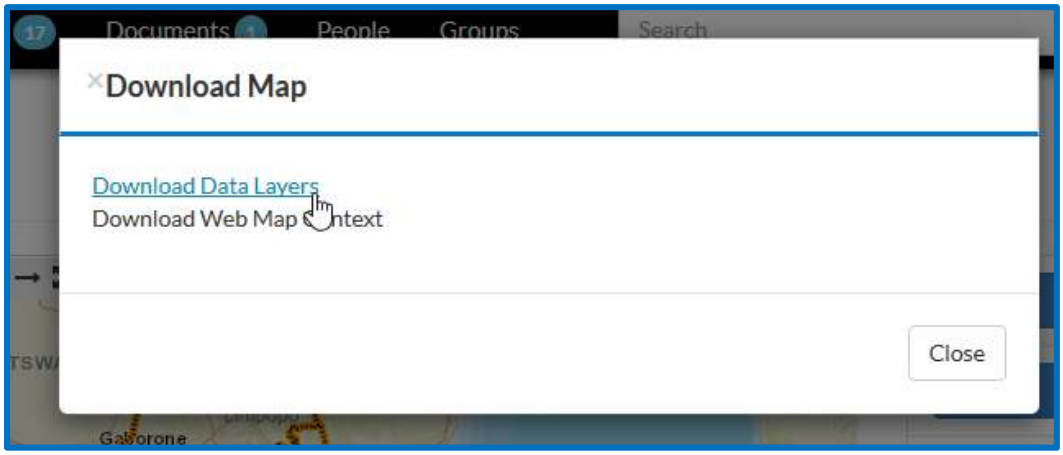
You can click on any of the **blue usernames** to see the user profile, or on the **blue resource** names to be taken to that resource or comment.

4.3.12 Download map

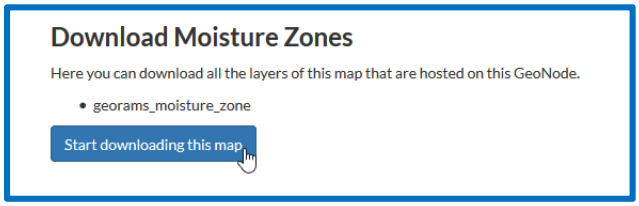
In the Map detail view, select **Download Map**.



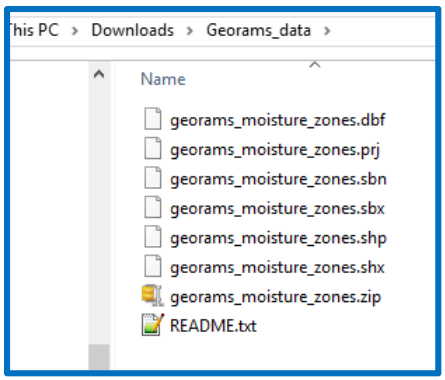
A window will open, displaying the various download options. Select **Download Data Layers**.



A page will open listing the map's comprising layers that will be downloaded. Click on **Start downloading this map**



A zip file will be downloaded that contains shapefiles of all the map's downloadable component layers. The README.txt file contains a description of the layer(s).

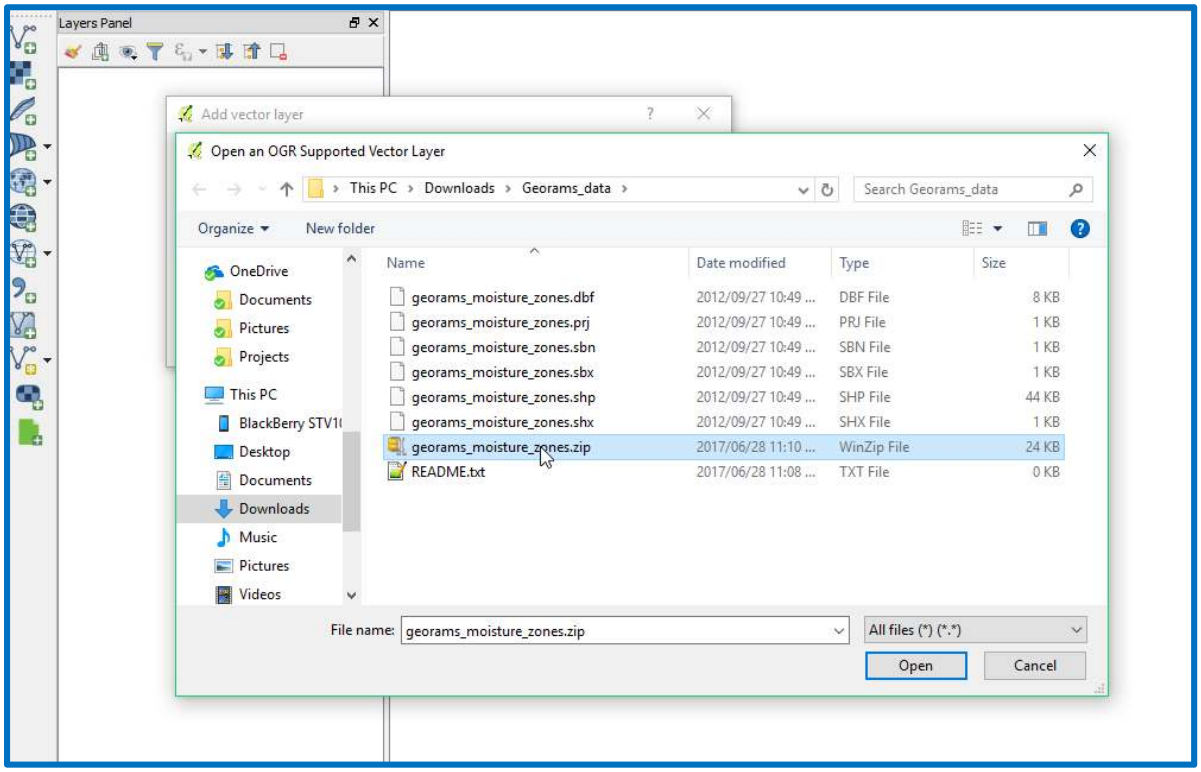


Open the zip file in QGIS (Add Vector Layer)

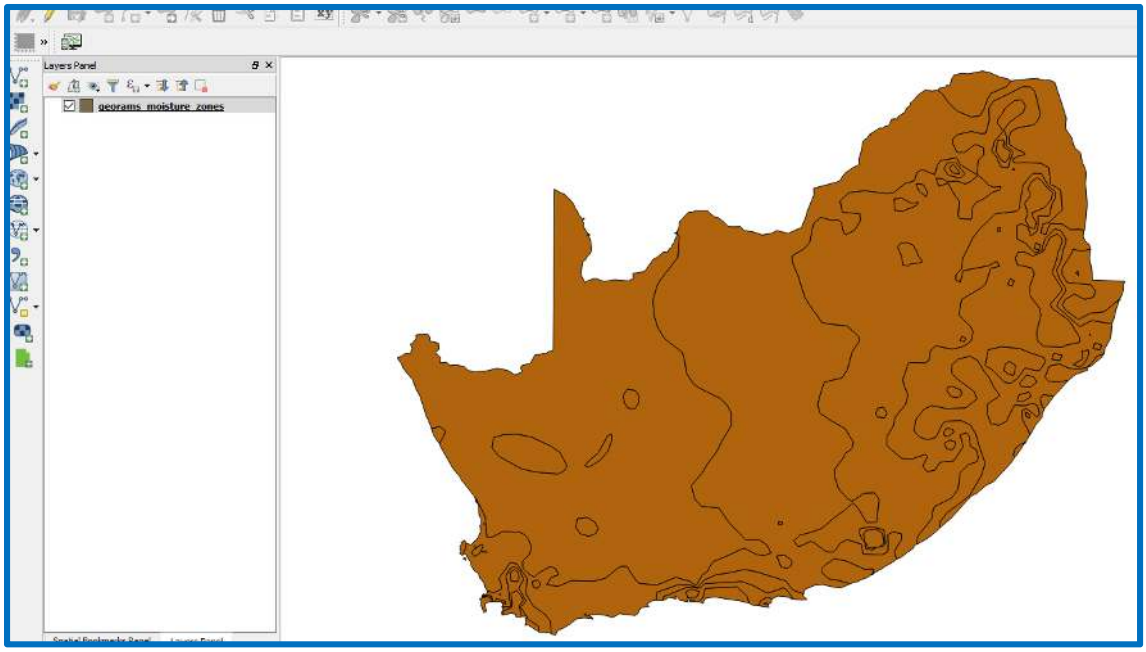
Select **File**

Select **Browse**

Select downloaded zip file.

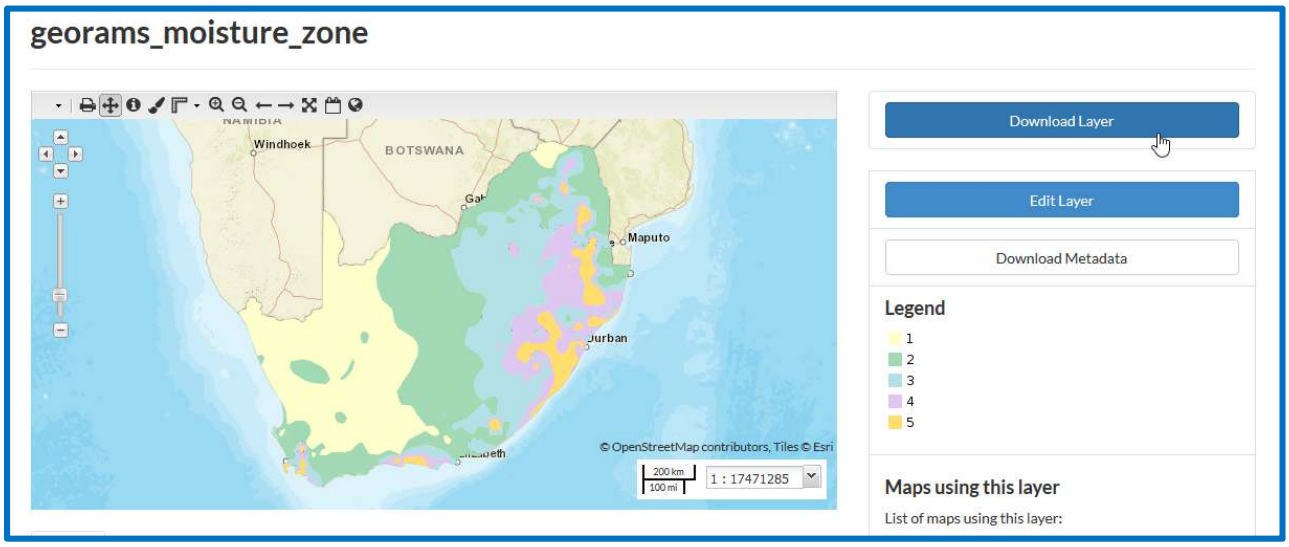


QGIS will automatically read the zip file and add the comprising shapefiles to the map canvas.

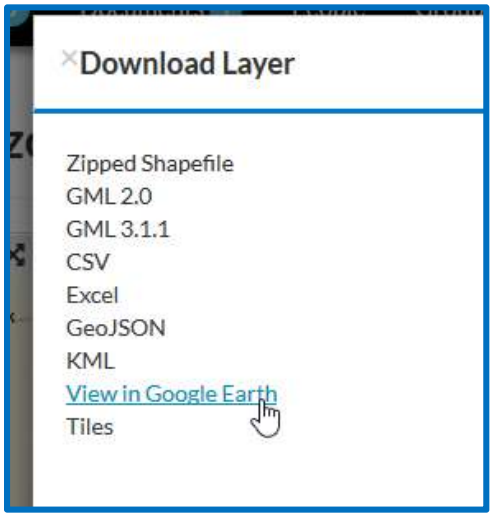

Layers Panel
geograms_moisture_zones

4.3.13 Google Earth

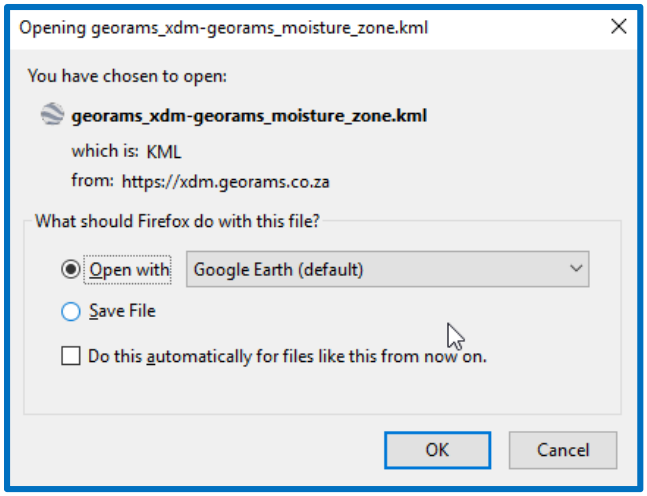
In the **Layer Detail** view, click on **Download Layer**



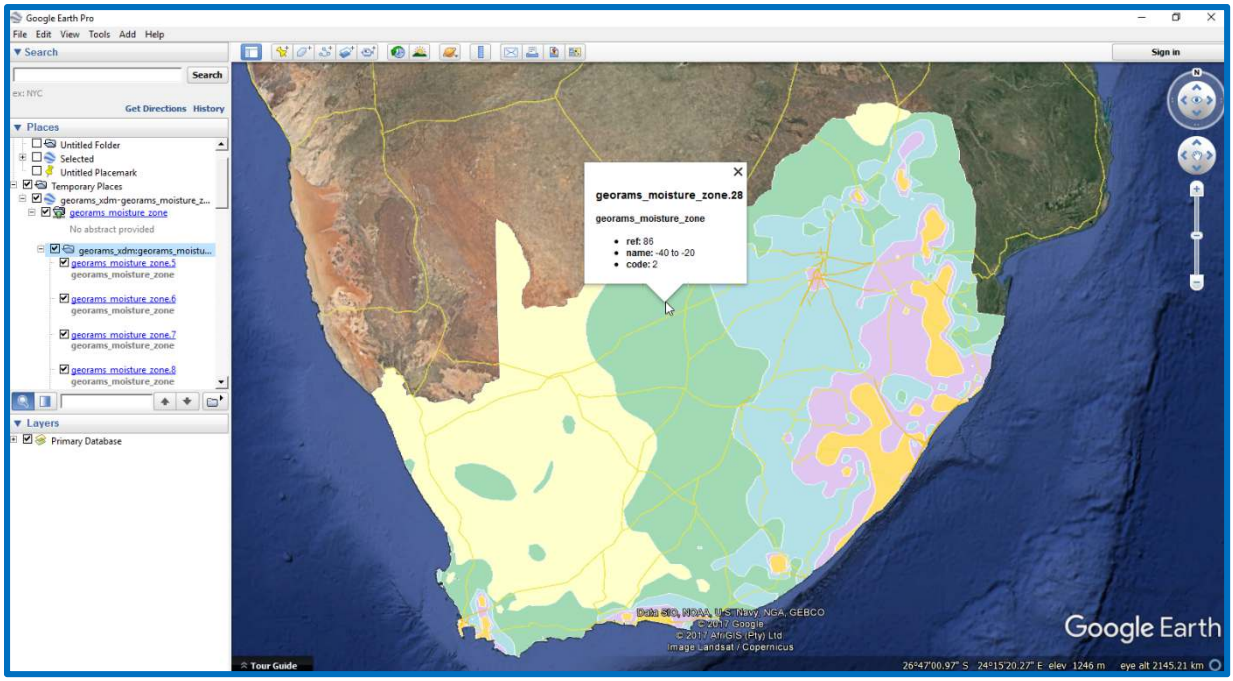
Select **View in Google Earth**



Open the downloaded file in Google Earth or save the **kml** file to your data directory.

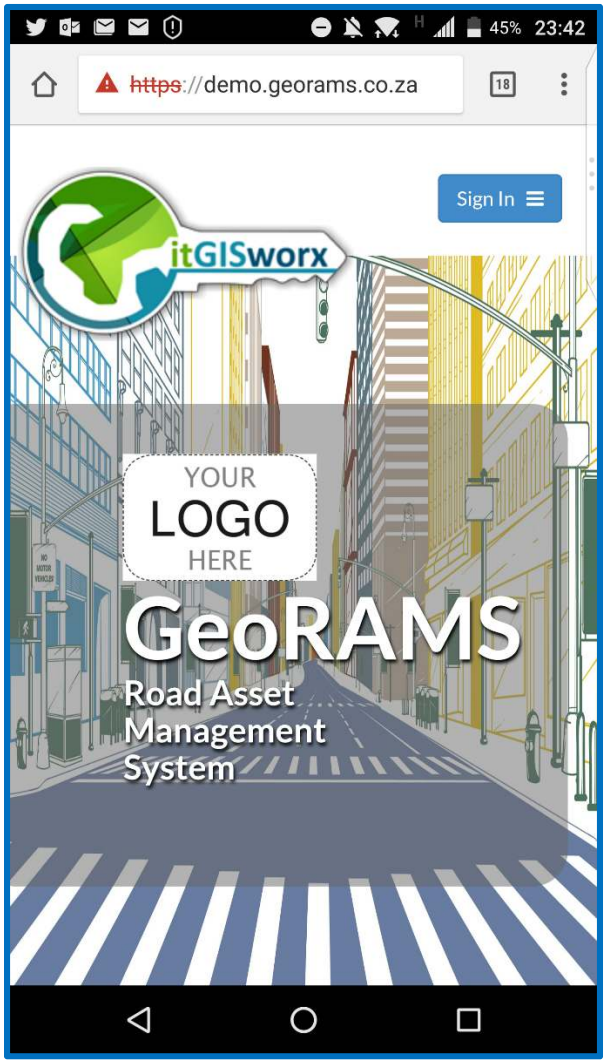


Google Earth view.

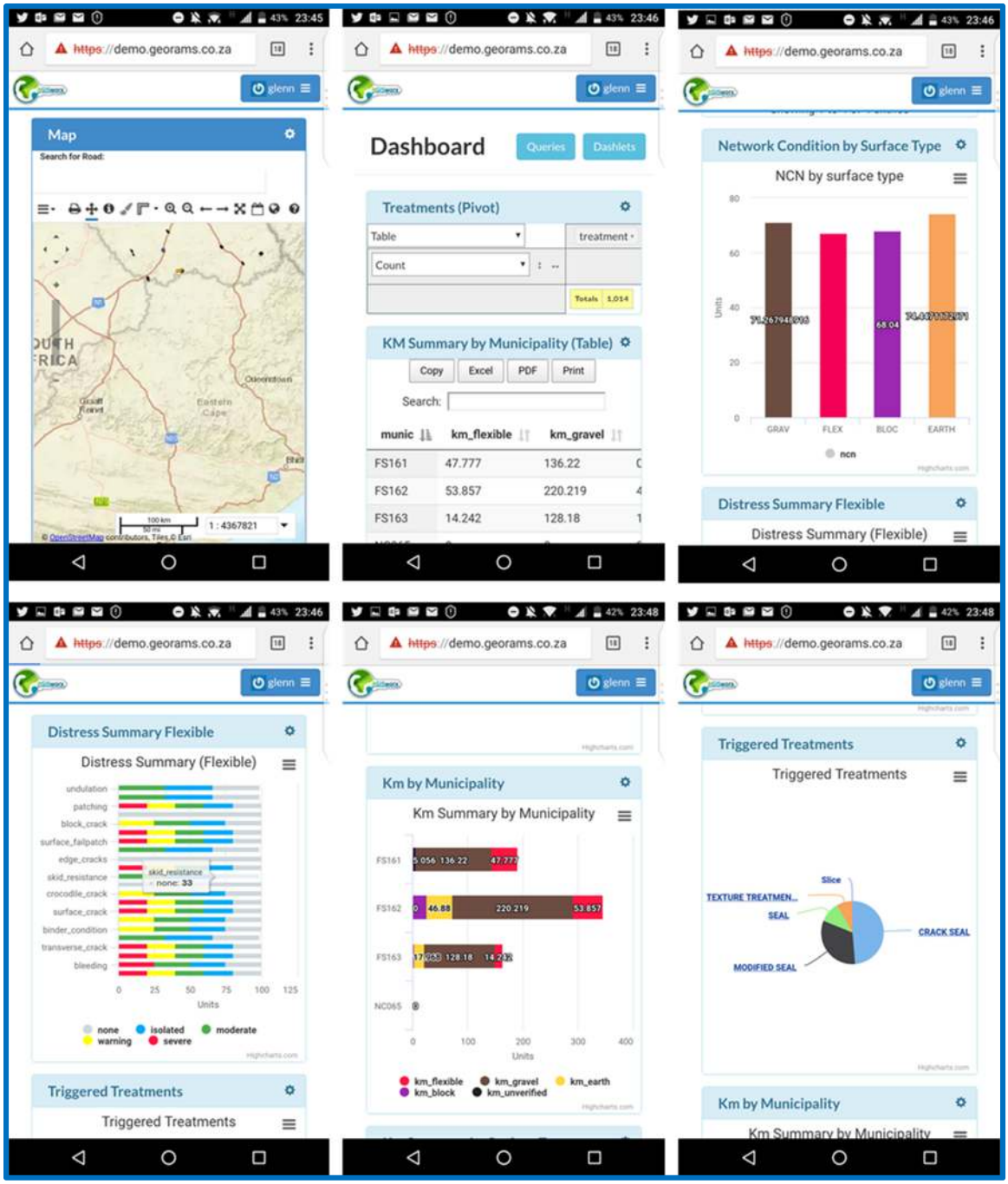


5. MOBILE INTERFACE

The GeoRams can also be accessed on a mobile device. Use the mobile browser and go to http://yourdm.georams.co.za



Sign in with your user name and password. This will take you to your dashboard showing your pre-setup charts and queries, favourite maps and documents.


https://demo.georams.co.za
glenn
Map
Search for Road:
Dashboard
Queries
Dashlets
Treatments (Pivot)
Table
treatment
Count
Totals 1,014
KM Summary by Municipality (Table)
Copy
Excel
PDF
Print
Search:
munic
km_flexible
km_gravel
FS161 47.777 136.22
FS162 53.857 220.219
FS163 14.242 128.18
Network Condition by Surface Type
NCN by surface type
Units
GRAV
FLEX
BLOC
EARTH
ncn
Distress Summary Flexible
Distress Summary (Flexible)
undulation
patching
block_crack
surface_failpatch
edge_cracks
skid_resistance
crocodile_crack
surface_crack
binder_condition
transverse_crack
bleeding
none: 33
none
isolated
moderate
warning
severe
Triggered Treatments
Km by Municipality
Km Summary by Municipality
FS161
FS162
FS163
NC065
km_flexible
km_gravel
km_earth
km_block
km_unverified
Slice
TEXTURE TREATMEN...
SEAL
CRACK SEAL
MODIFIED SEAL

6. MOBILE APP

The **GeoForm** mobile app allows for data collection in the field, using tablets and smartphones. Forms are designed with content logic for any business requirement and are downloaded to mobile devices in the field. Completed forms are automatically uploaded to the platform in near real-time. The mobile app supports multimedia and can be used to collect photos, video clips, signatures, bar codes, points, lines and polygons in the field. Any of these can be included into a form, so that, for example, a report could require the user to take a geo-location, capture information about a feature at the location and take a photo of the feature.

The application supports the collection of various types of data such as:

- Text and numbers
- Photos
- Videos
- Sound clips
- Bar codes
- Points, lines and polygons

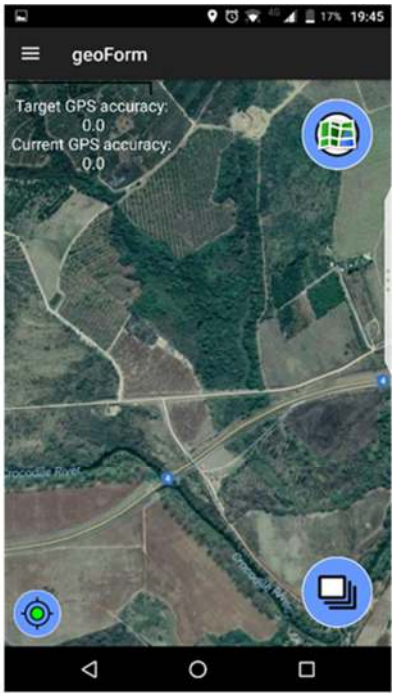
The application can be installed on any Android device that supports location services (i.e. GPS receiver). The application connects to the server via a WiFi or GSM network to:

- Authenticate a user
- Download layers and forms
- Upload completed forms

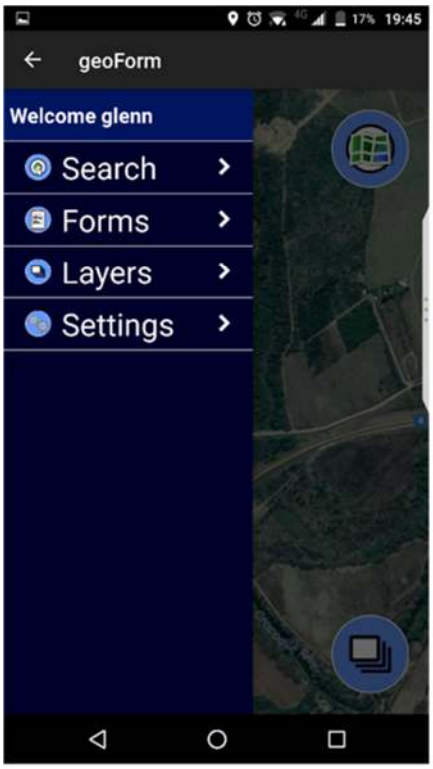
The off-line view function allows the user to download and manage maps and features on a mobile device, whilst not connected to a WiFi or GSM network. Detailed information about features on the map can be presented in graphical and tabular formats. This is useful when you need to access information on a map when in the field and not connected to a network. The application supports a user-friendly and easy to use synchronisation function, that allows the off-line data (maps and features) to be refreshed on the mobile device when back at the office, ensuring that off-line information is always up to date. The advanced off-line function provides the ability to edit and capture new data in the field in off-line mode. New features or changes to features are stored on the device until a network is available to upload the information to the server. The benefit of this function is that users can edit, update or capture new spatial features (such as points, lines and polygons) while off-line. Changes made are directly uploaded into the system without any time-consuming and costly post-processing by the GIS office.

6.1 GeoForm

When opening the application, you will be required to enter your username and password. If you are not authenticated, you will not be able to connect to the server to download or submit forms. You will still be able to use all the functions of the application. This will allow you to work in off-line mode (see description of layers section below). Once you have logged in, you will see the main screen of the application.



After tapping on the menu bar (or sliding your finger left to right, starting from the left edge of the screen) you will have access to the following:



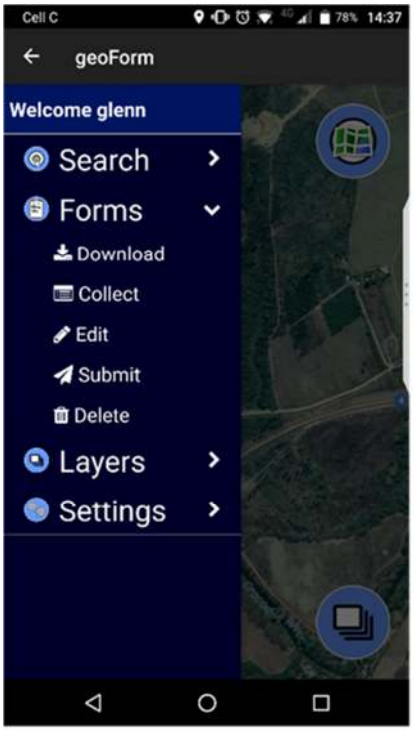
Search – opens a pop-up dialog you can type in a feature to search for. The search looks for any feature with the same label as your search term. Only active feature layers are considered. The map will centre on the feature if found.

Forms – Opens a window to download a list of forms to collect or edit data

Layers – Opens a window to download a list of available layers on the server that can be downloaded as off-line layers.

Settings -Opens a window to change app settings

6.1.1 Forms menu



Download – list of forms that are available to download from from the server. You need to download a form in order to collect information.

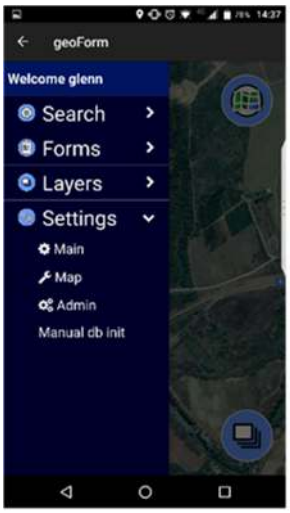
Collect – list of form downloaded from the server. If you select a form, it will open the form for you to start collecting information.

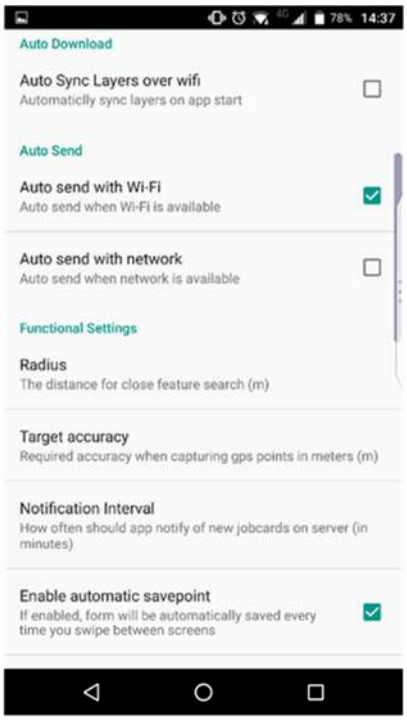
Edit – you can edit forms that you have captured but not submitted to the server yet.

Submit – allows you to select forms to be submitted to the server. When the auto send option is selected (settings, Main) formas will automatically be submitted to the server.

Delete – delete either saved or blank forms from your device.

6.1.2 Settings menu (main)





Auto sync layers – allows the application to automatically update off-line layers on start-up

Auto send WiFi – will automatically send forms when connected to a WiFi network.

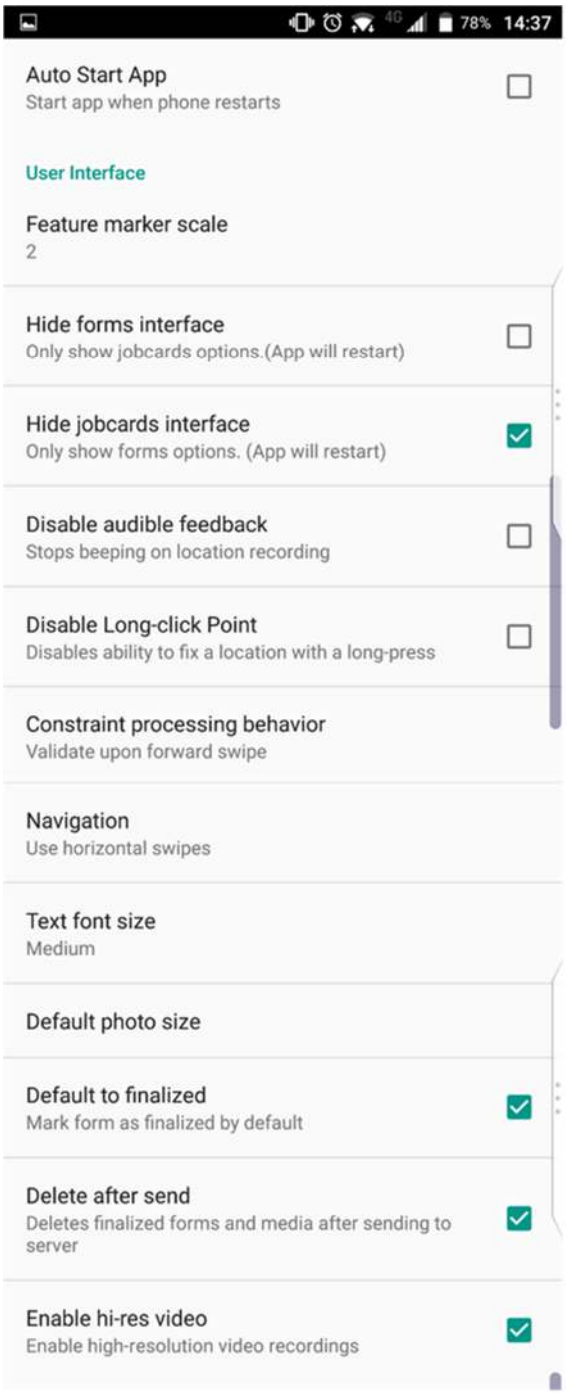
Auto send network – will automatically send forms when cannected to a GSM network.

Radius – set the feature edit radius meters. You will not be allowed to edit features dalling outside tha radius.

Target accuracy – The GPS accuracy when capturing a point.

Notification interval – How often the a notification comes through for new jobcards. (in minutes)

Enable automatic save point – if enabled, form will automatically be saved every time you swipe between screens



Auto start App – Start app when phone restarts

Feature marker scale – set the size of the feature marker based on the screen resolution of your device. The larger the number the bigger the feature marker.

Hide forms interface – hides the form functions from the main screen when selected.

Hide jobcards interface – hides the jobcard functions from the main screen when selected.

Disable audible feedback – The app provides an audible beep when recording location. This can be disabled

Disable long-click Point – disable the ability to record location anywhere on the map with a long press.

Constraint processing behavior – defines how the appmust handel constraints within forms. i.e. cannot complete forms until cartain mandatory information has been captured.

Navigation – defines how the user can page through the form, horizontal swipes, buttons or both.

Text font size – size of the text within a form

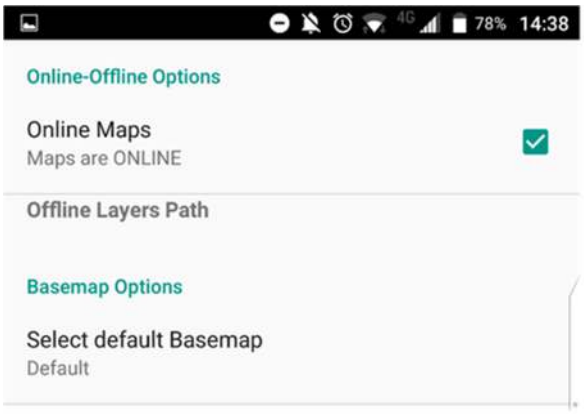
Default photo size – defines the resolution of the photo that is captured in a form.

Default to finalize – automatically marks the form as finalised. If disabled the user must manually mark the form as finalised. The form can be partially done in field and then completed at a later stage.

Delete after send – thes will delete the form from the mobile device after it has been sent the server.

Enable hi-res video – allows user to capture high resolution video recording when enabled in a form.

6.1.3 Settings menu (map)

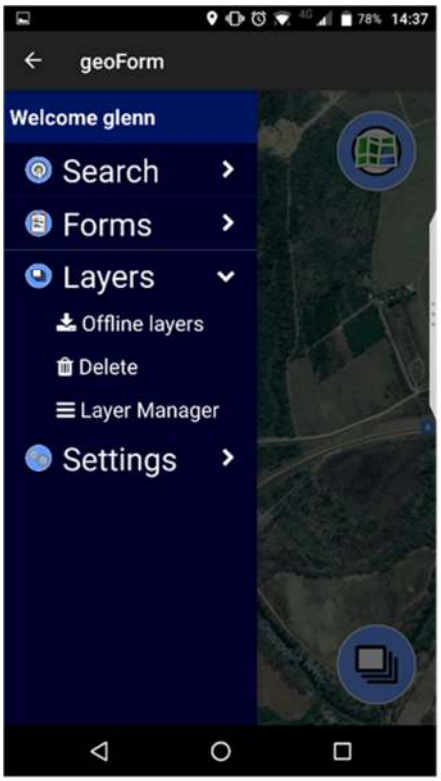


Online maps – This setting allows you to turn the loading of the basemap off even when youe are online.

Off-line layer path – path where off-line layers are stored on your device. You can choose an external storage device if internal storage capacity is limited.

Select default basemap – You can choose from a list of basemaps to be displayed as backdrop on the main screen.

6.1.4 Layers menu



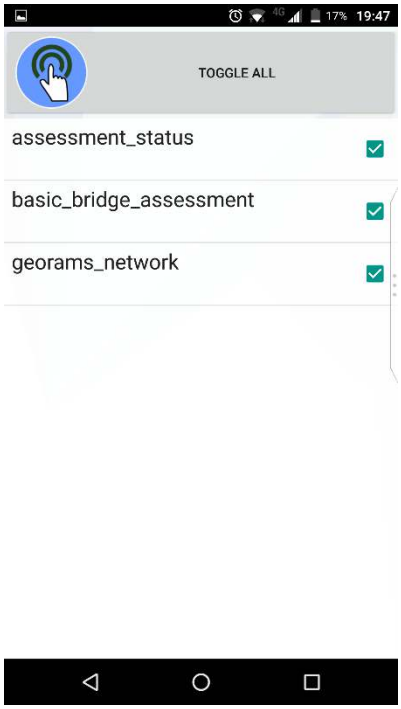
Off-line layers – tap to see a list of off-line layers available on the server for downloading to the device. You must download an off-line layer to view a map on the main screen when your device is not connected to a WiFi or GSM network.

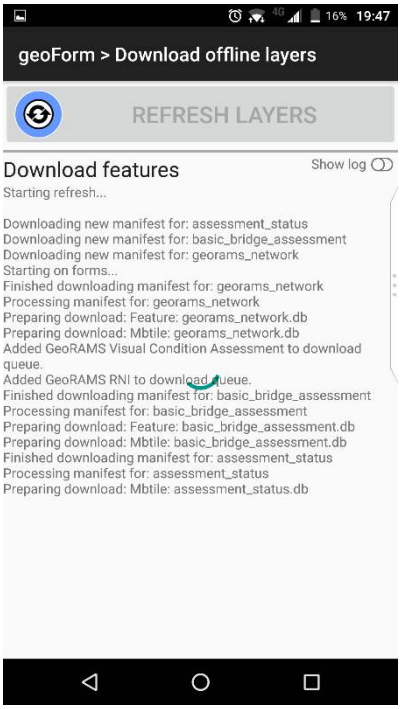
Delete – tap on delete to delete offline layers from your device.

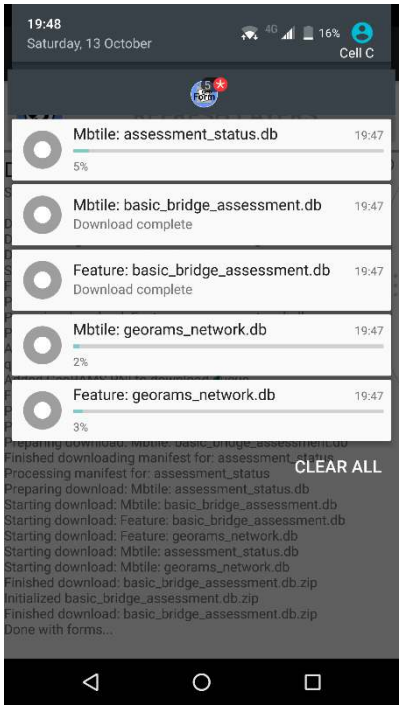
Layer Manager – Utility for managing off-line layers and features downloaded to the devices.

Off-line layers

Tap on Offline layes of the Layers menu to see the available layers that can be downloaded from the server. Tick the layers that you need and press on the back button. The download log will list the process.



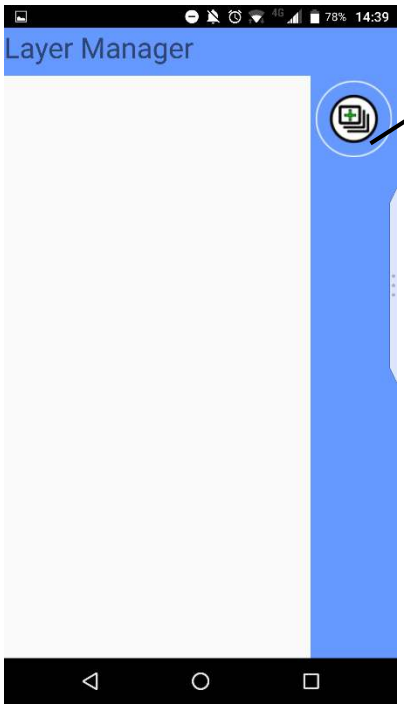




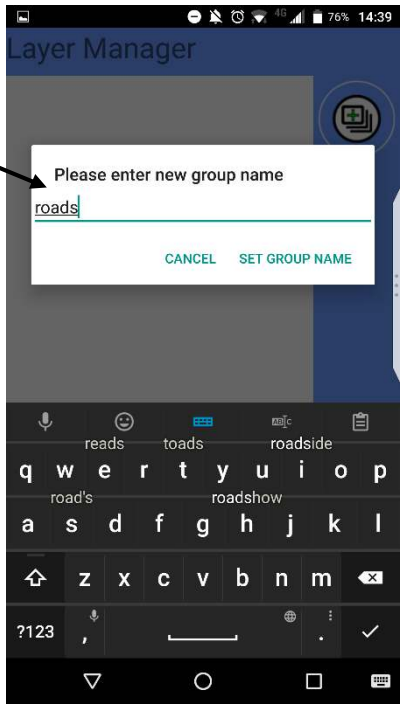
Layers menu (layer manager):

Use the layer manager to add, delete and manage layer groups. A layer typically includes:

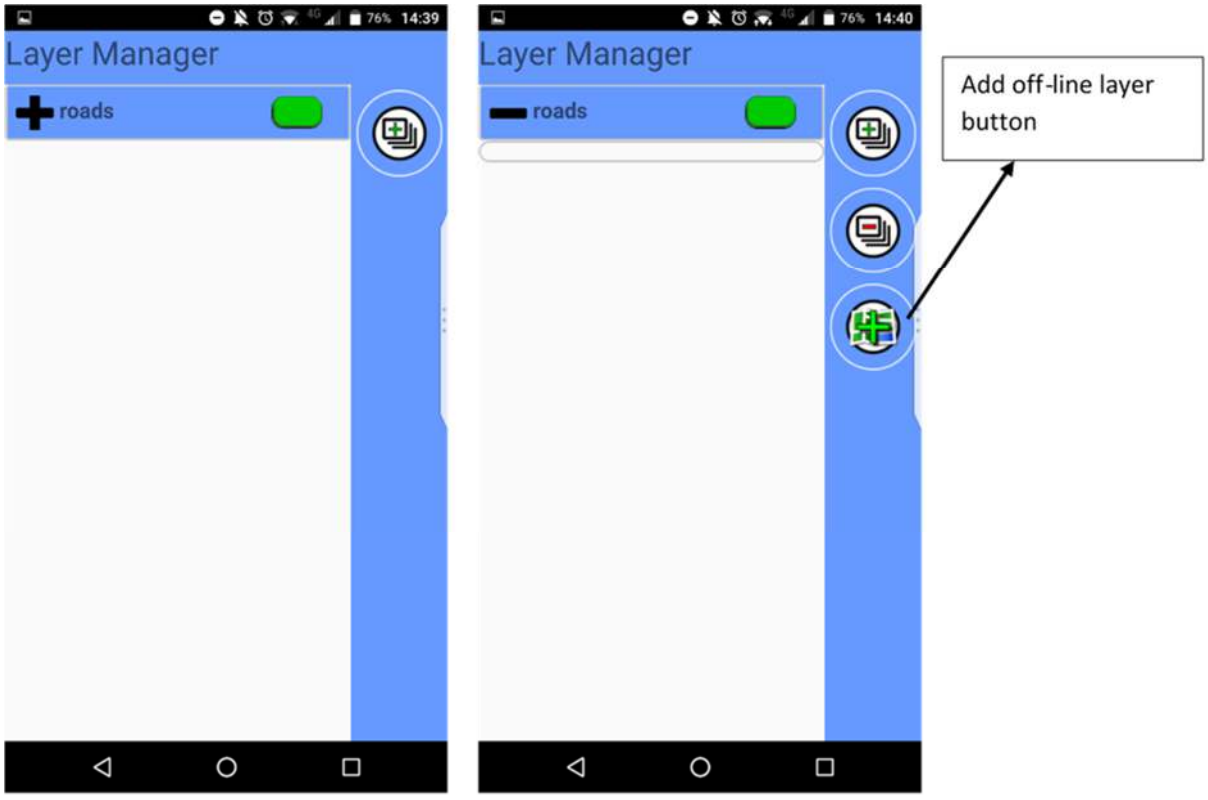
- raster map – image tiles (raster) that provides a backdrop map in the main screen. This map will only be available if you are connected to a network.
- Off-line features - features (vectors) that can be viewed and edited e.g. a building.
- Forms – forms associated (or linked) with features that allow you to update existing features or capture new features.

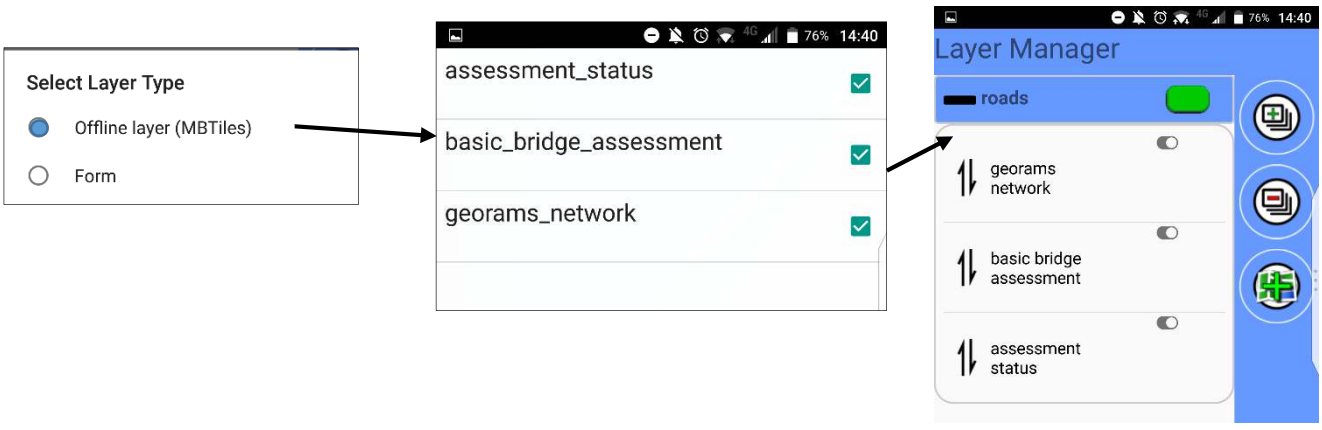


Tap on the L**ayer group create** button. Enter the group name where the off-line layers will be loaded



Once the layer group has been created you can add an off-line layer (map and associated features) and associated form that has been downloaded from the server. Tap on the **plus (+)** button to open the layer group. Tap on the add off-line layer button, to list the downloaded off-line layers that needs to be added to the layer group. The layers need to be added to a group to be visible in the map view. Note that you can have any number of layers in a layer group. Swipe to the right to delete an off-line layer map or form from your layer group.

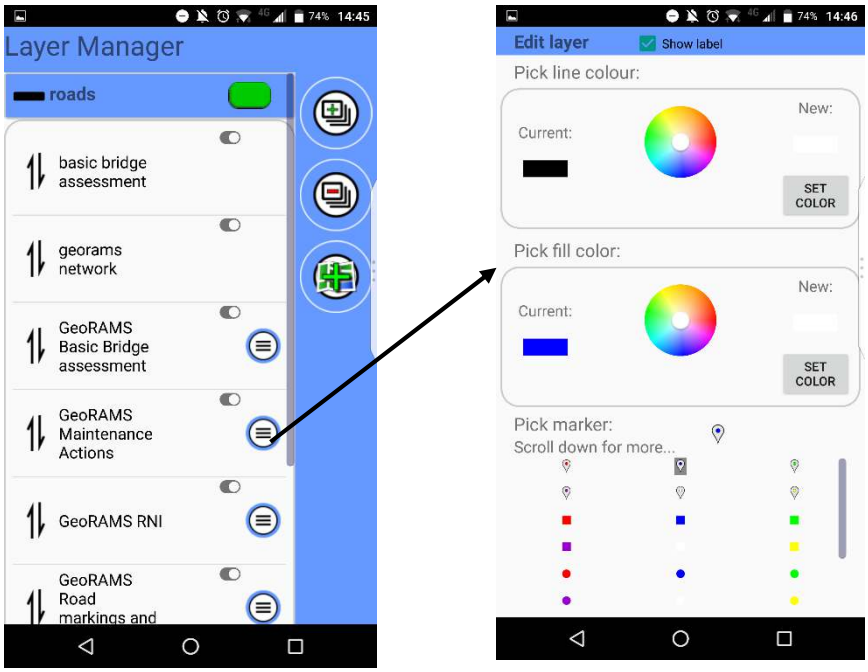




You can change the format of the feature markers in forms by tapping on the menu tab and selecting your preferred marker. Just press the back button to save your changes.

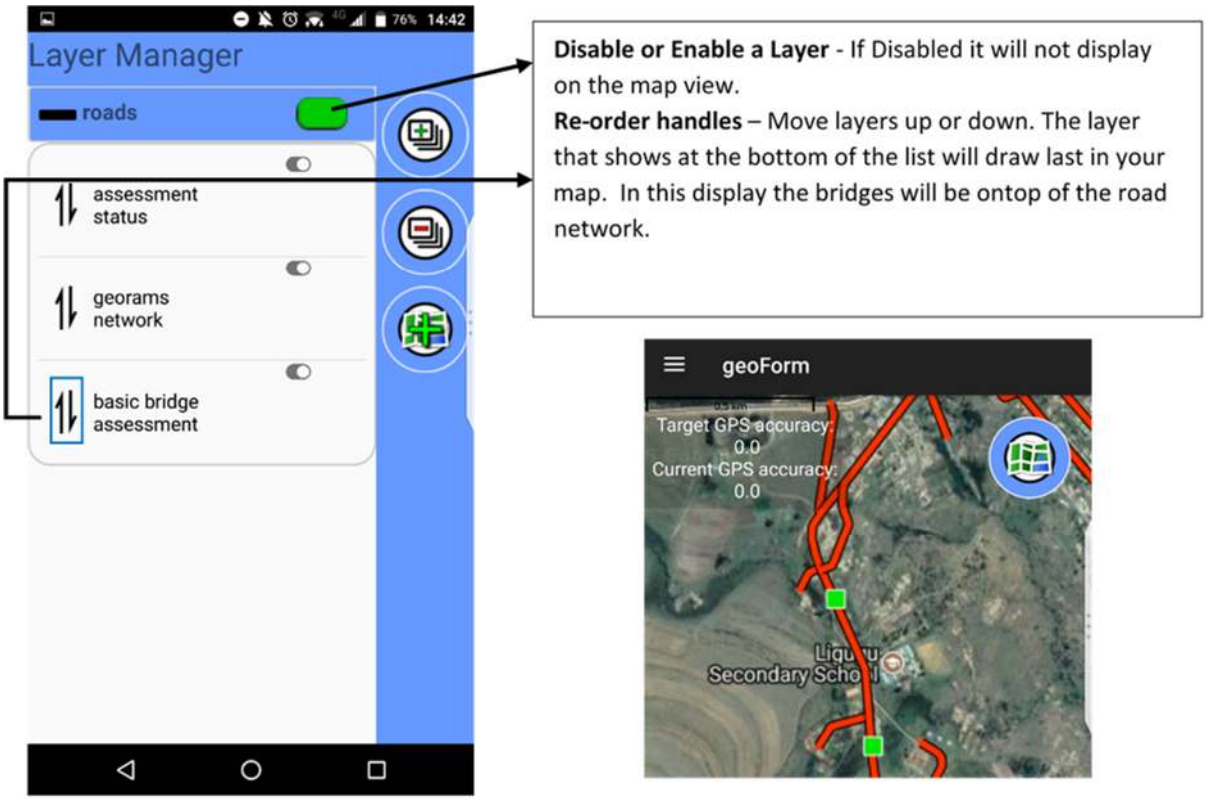
At the top of the Edit Layer screen are two checkboxes.
Layer visible: Untick to hide the layer on the map but keep it active for searches. This can help to

unclutter your map.
Show label: Untick to hide the label but still show the marker on the map.



Layer groups can be disabled or enabled by tapping on the green button next to the layer group name. Disabled layer groups will not show on the main map or be used in searches. (All forms will still show if you go to the Forms -> Collect option in the side menu.)

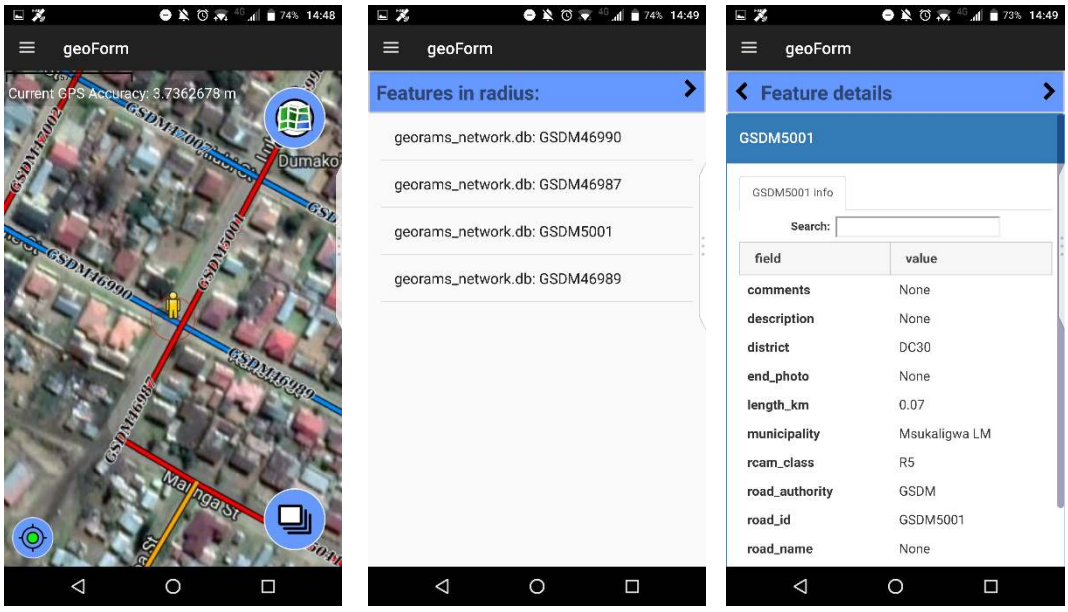
Within a layer group, you can re-order the layers by dragging them by the re-order handles. In this way you can ensure that your features appear on top of your off-line map on the mains screen of the app.



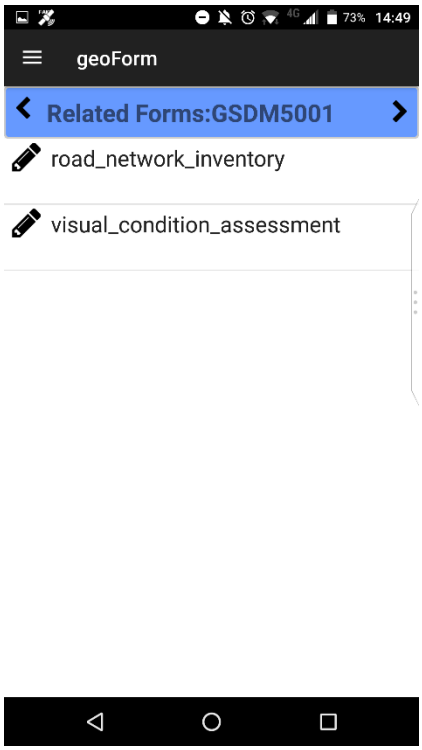
6.1.5 *Feature information*

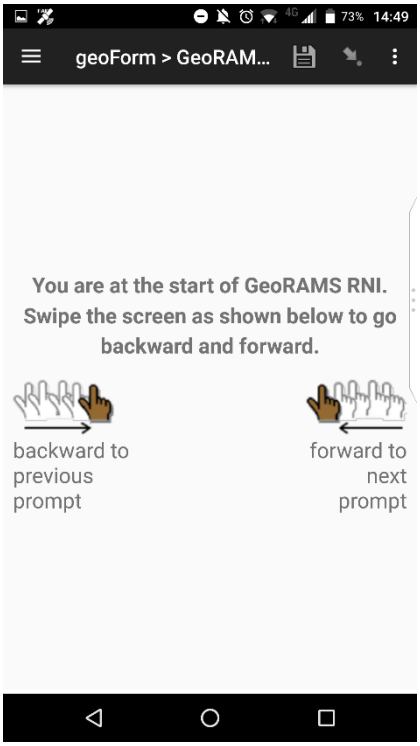
Once the layer manager has been configured, the features will appear on the main screen. Tapping on the feature will open a detailed view, showing attribute information about the feature.

When tapping inside the feature search radius, the app looks for any active features in that radius. If more that one record is found the app will list all the features in the radius. Tap on a feature to see the detail information.

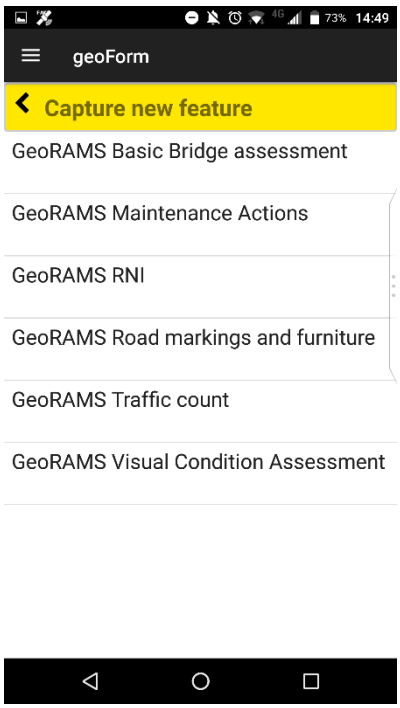


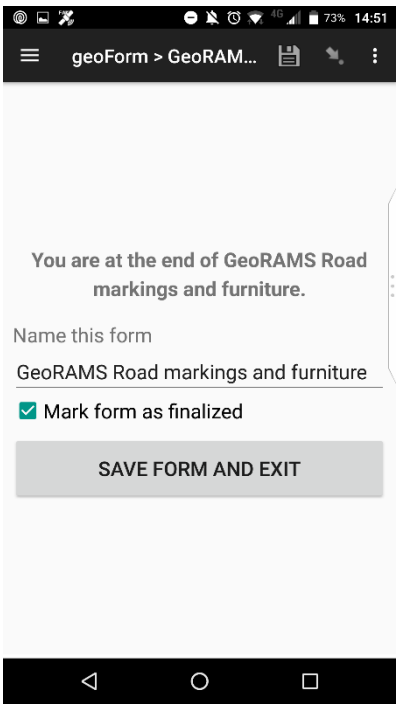
Swipe screen to the left to see the edit data forms. Tap on the information that needs to be edited, and continue to update the information in the form. These forms will be pre-filled with information existing in the database



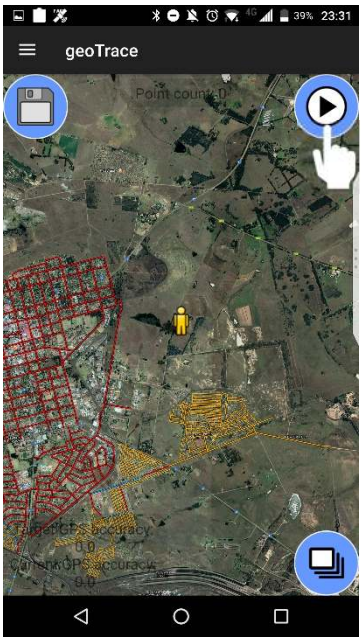


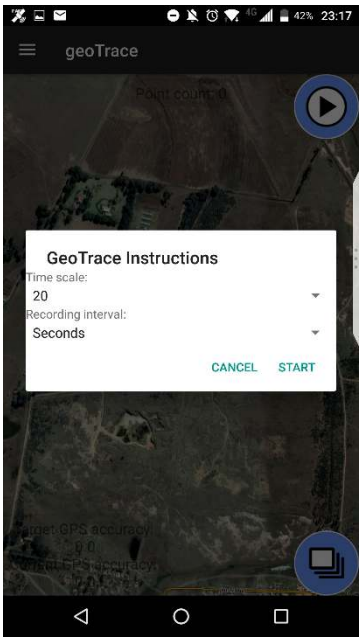
If none are found, the capture new feature screen will open with all forms tagged as capture new feature forms in the list. Tap on the form that needs to be captured. Move screen from right to left to continue on the next page until you get to the end of the form. Click on Save Form when data has been captured. The information will be sent/submitted to the database once the device is connected to a network.



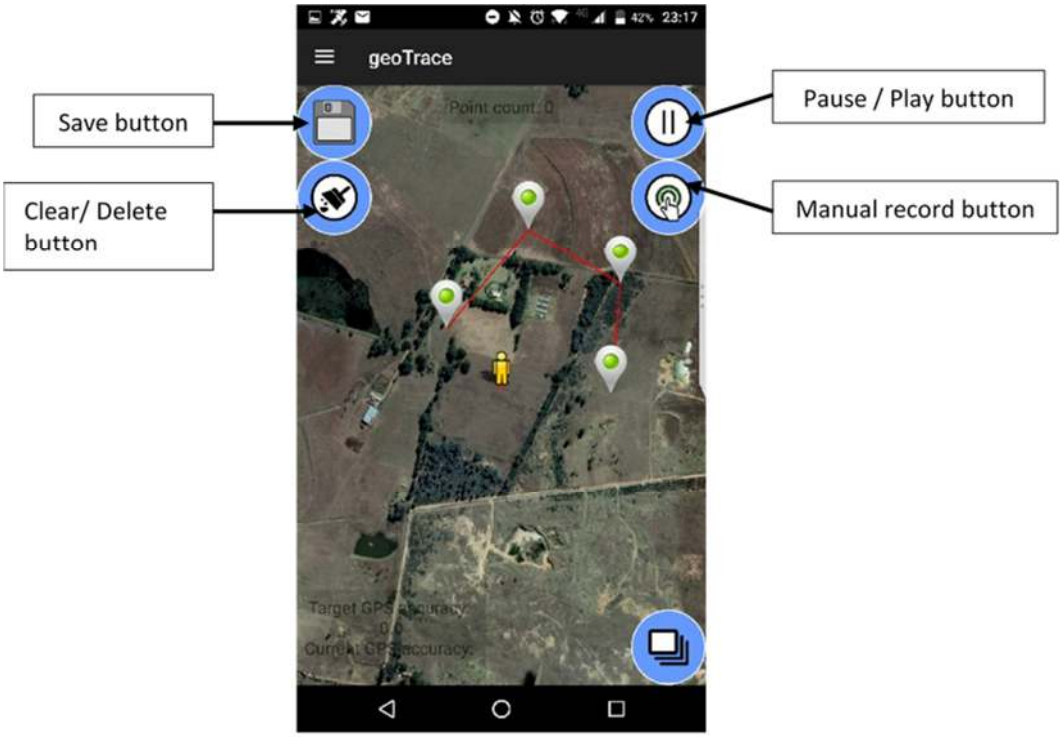


The mobile application supports the ability to capture a location (point) or a geometry (line or polygon with many points) within a form. When configured in a form, you will see the following screen appear within the form. Tap the “Play” button at the top right of the screen to enable auto-recording of points. The GeoTrace Instructions dialog opens. Here you can set the recording interval and frequency as you desire.





Once the recording has started, a point is recorded (while walking or driving) every so many seconds with a beep sound. (you can disable the sound in Settings). You can pause the recording by tapping on the “Pause” button. To save your line, point or shape you must first pause your recording.



While Paused, there are a few options available to you:

- **Save** – this exits the map and returns to the form.
- **Resume** - Resume recording using the Play button.
- **Select** – touch a marker to select it.

Once a marker is selected, you can :

- **Delete** – Click the Marker delete button to remove the selected marker

To deselect a marker, just touch it again.

A manual recording can also be done by tapping on the **manual record button. L**ong-press on the map (if enabled in Settings). This is useful if you are tracing features from a satellite basemap instead of walking or driving around them. When adding points like this, the Clear button appears. This deletes the points one-by-one from the last one added, backwards. To change your basemap, tap on the Layers button in the bottom right corner. Be aware that you will need a network connection (GSM or WiFi) for basemaps to load.

6.2 Form Management

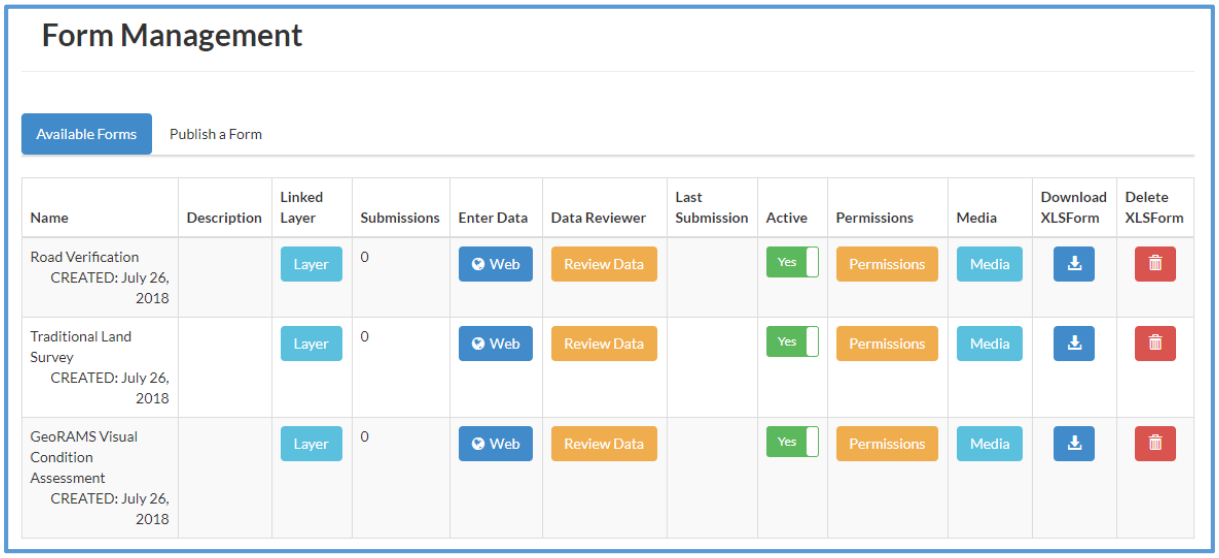
The form management module allows the GIS system administrator to create, publish and manage GeoForms. When downloaded to mobile devices, these forms are used to collect data in the field. The form management module supports the following functionality:

- Upload and publish XLS forms
- Manage form sharing
- Manage form permissions
- Downloading forms

When uploading a form, a database table and layer is automatically created by the system. Data collected in the field using this form are then automatically loaded into the database and available for viewing/editing within the web server.

6.2.1 Available forms

Click on **Forms** in the menu bar to go to the Forms Modal.



Under the available forms tab, you will see a list of published forms with the following headings:

- **Name** - the name of the form and the creation date. The shared indicator shows that the form is shared with other users and they can use the form to capture and submit data to the server.
- **Linked Layer** – Redirects to a layer that is linked to the XLS form.
- **Submissions** – number of submissions received by the server for this form since date of creation
- **Enter data** – this opens a link to a web version of the form that can be completed using a web browser.
- **Last submission** – date of last submission

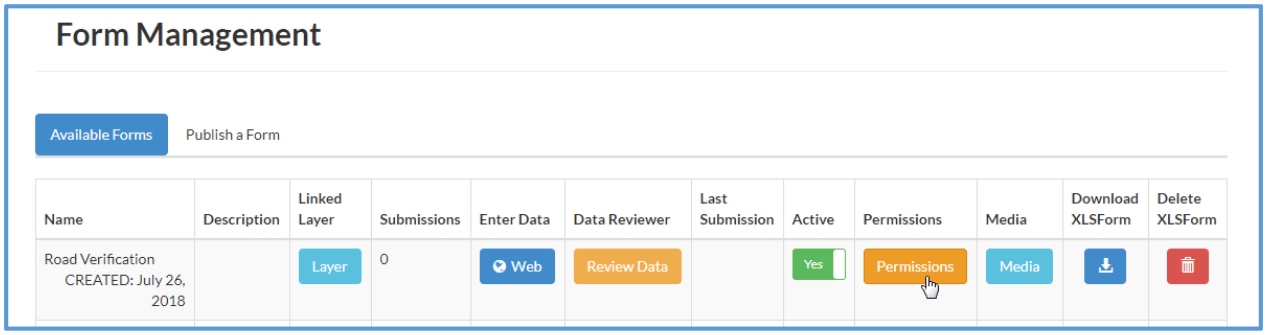
- **Data Reviewer** - Will take you to the data Review page. Review, accept or reject captured data before it uploads to the database.
- **Active** – the form is active and can receive submissions. You can deactivate the form if you do not want users to download or submit data using the form.
- **Permissions** – sets the permissions for the form. This allows the administrator to configure who can view, download and use the form.
- **Media** – view, upload or delete the media files associated with the form
- **Download** – download the XLS form
- **Delete** – delete the XLS form

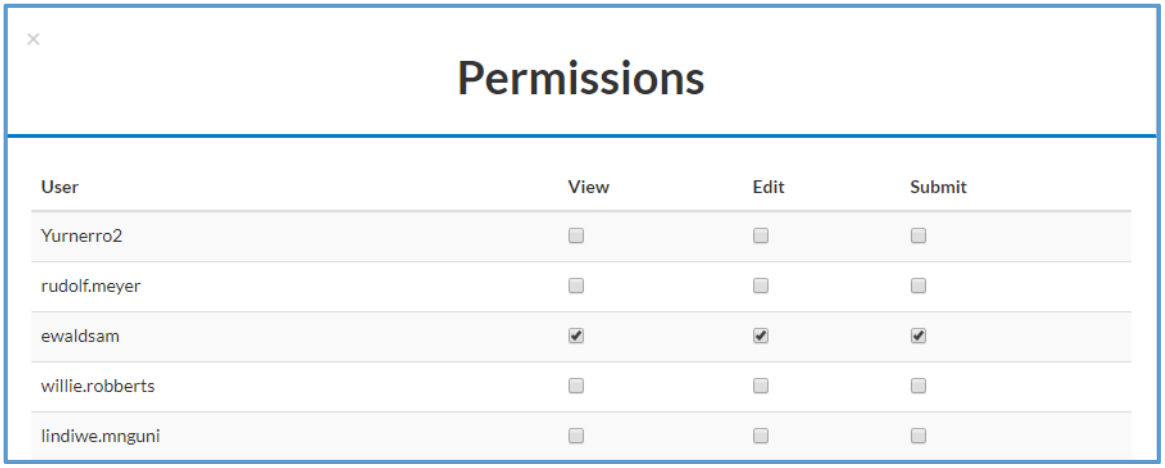
On this page the Forms can be managed by doing the following:

- Activate or deactivate a form
- Delete a form
- Set permissions for a form
- Download the XLS version of the form
- Manage media associated with the form

6.2.2 *Form permissions*

Click on Permissions to manage user permissions on Forms.

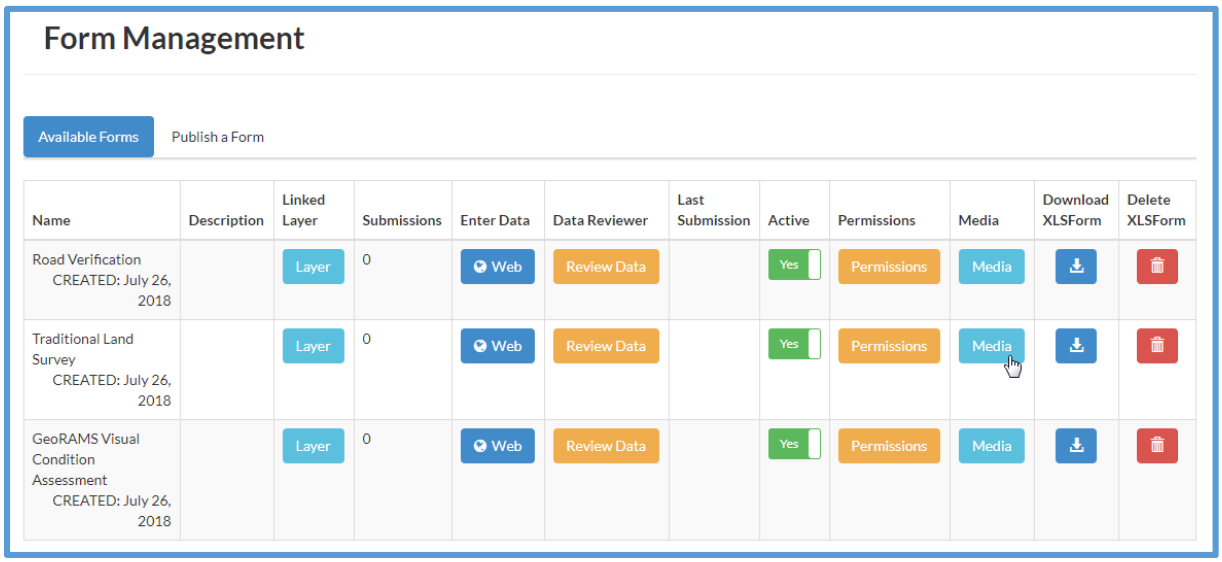


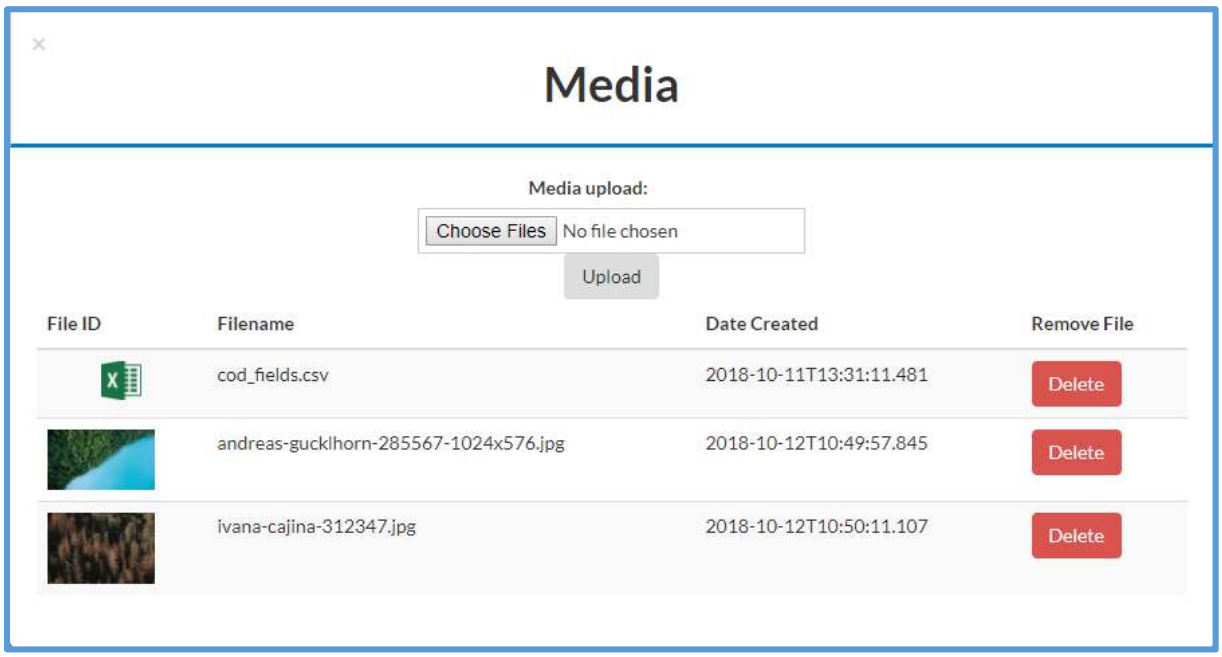


Thie Permissions window displays a list of all the users. Click on a checkbox to apply or revoke permissions. Once clicked, the permissions are updated immediately.

6.2.3 *Form media*

Click on the Media button to view, upload and manage media files associated with a form.





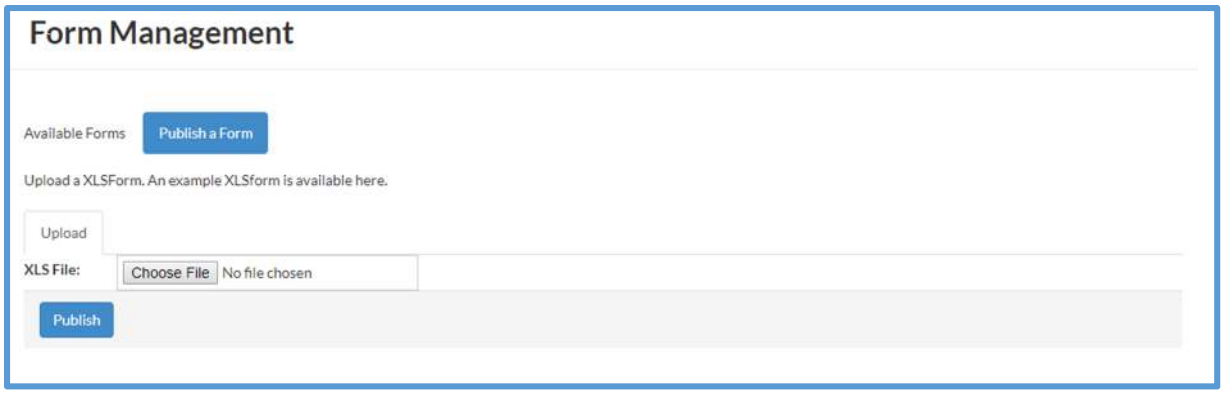
GeoForm supports multi-media files i.e. you can embed pictures, video clips and sound clips within a form. Media files associated with a form are stored as separate files. Browse to the file that needs to be uploaded. Click on **Upload.**

If you would like to download specific related media, click on the preview of the file. Media files will be downloaded to a mobile device with the associated form when selected for download by a user.

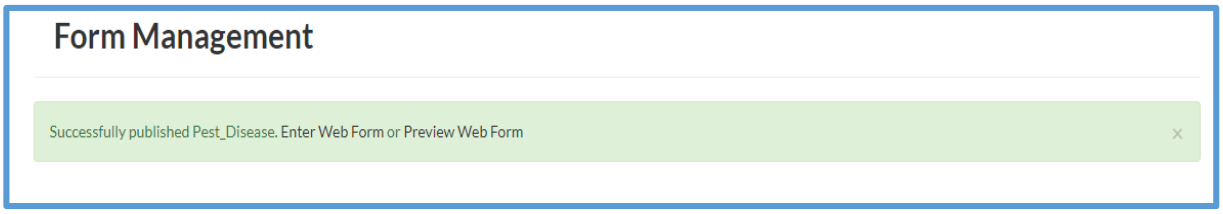
Click on the **Delete** button to remove the a specific multi-media file embedded in a form. Note: This action will only remove the multi-media and will not delete the form.

6.3 Publish a Form

Click on the Publish a Form tab to upload and publish forms to the server.



When you click on Choose File, a dialog box will open for you to select an XLS file to upload to the server. The system will validate the syntax of the form and give an error if there are syntax problems.



A successfully published message will appear when the form has successfully been published to the server.
Once the form has been published, it will appear in the available forms list. You must then go to the form settings menu to:

- activate the form
- set permissions
- upload media files (if applicable)

6.4 XLS Forms

XLS Form is a standard form created to simplify the authoring of forms in Excel in a readable format. They are simple to get started with but also allow for complex XForms by someone familiar with the syntax. You need to understand how XLS Forms work, in order to create a form that can be used by the form management module. This manual covers the very basics of XLS Forms, for further information, visit http://xlsform.org/.

Basic Format

Each Excel workbook usually has three worksheets:

- survey
- choices
- settings

Survey sheet

This worksheet gives the form its overall structure and contains most of the content of the form. It contains the full list of questions and information about how they should appear in the form. Each row usually represents one question; however, there are certain other features described below that one can add to the form which enables the user to incorporate complex questions (tables, ranking questions).

The survey worksheet has 3 mandatory columns: **type**, **name**, and **label**. The type column specifies the type of entry you are adding. The name column specifies the unique variable name for that entry. No two entries can have the same name. The label column contains the actual text you see in the XLSForm.

A	B	C
type	**name**	**label**
begin group	structure_info	Structure Info
select_one structure	structure	Select Structure
text	structure_name	Structure Name

Choices sheet

This worksheet is used to specify the choices for multiple choice questions. Each row represents an answer choice. Answer choices with the same list name are considered part of a related set of choices and will appear together for a question. This also allows a set of choices to be reused for multiple questions (for example, yes/no questions).

The choices worksheet has 3 mandatory columns: **list name**, **name**, and **label**. The list name column lets you group together a set of related answer choices, i.e., answer choices that should appear together under a question. The name column specifies the unique variable name for that answer choice. The label column shows the answer choice exactly as one want it to appear on the form. This choices sheet corresponds to the survey sheet mentioned above.

A	B	C
list_name	name	label
bridge	general	General
culvert	Culvert Major	Major
culvert	Culvert Lesser	Lesser
type	precast_portal_frame	Precast Portal Frame
type	concrete_pipe	Concrete Pipe
type	other	Other
feature	river	River
feature	railway line	Railway Line
feature	road	Road
feature	other	Other
feature	canal	Canal
structure	Bridge	Bridge
structure	Culvert	Culvert
structure	Retaining Wall	Retaining Wall
yes_no	Y	Yes
yes_no	N	No
defect	Scouring	1. Scouring
defect	Settlement of approach fill	2. Settlement of approach f

Keep in mind that the syntax used must be precise. For example, if you write Choices or choice instead of choices, the form won't work.

Setting sheet

This worksheet allows one to further customize the form. An example of settings worksheet is below. The column headings in this example settings worksheet do the following:

A	B	C	D	E	F	G
form_title	form_id	is_moderate	db_table_name	db_name	use_app_label	db_schema_name
GeoRAMS Basic Bridge assessment	basic_bridge_assessment	yes	bridge_assessment	georams_xxxx	no	data

- **form_title** - the title of the form that is shown to users. The form title is pulled from form_id if form_title is blank or missing.
- **form_id** - the name used to identify the form submission. The form id is pulled from the XLS file name if form_id is blank or missing.
- **is_moderated** – if yes, submissions made on this form will undergo a review process (data handler) prior to being committed to the database. If no, submissions will bypass the review process and be directly loaded in the database.
- **db_table_name** – the name of the database table that will automatically be generated by the system when the form is published by the administrator for the first time.
- **db_name** – this is the name of the existing database in which the above table will be created. To be provided by the database administrator
- **db_schema_name** – only used for PostgresSQL database. Default must be set to data
- **use_app_label** – used in labelling of tables. Must always be set to no.

Question types

XLS Form supports different data types that can be used to to develop a form for capturing data. Below are a few simple question types. These questions are used in the survey sheet of the XLS Form.

integer	Integer (i.e., whole number) input.
decimal	Decimal input.
text	Free text response.
string	Under this input words, numbers, decimals all are allowed.
select_one [options]	Multiple choice question; only one answer can be selected.
select_multiple [options]	Multiple choice question; multiple answers can be selected.
note	Display a note on the screen, takes no input.
date	Date input.
time	Time input.
today	Automatically captures date and time of the day of survey from android.

Numbers

Use the "Integer" type when the response to the question is a whole number i.e. 1,2,3 etc. Use the "Decimal" type for decimal numbers like 1,2. Use the "String" type if the response is both decimal and integer.

Multiple choice questions

The following multiple-choice questions are supported:

- **select_one** – provide a list of choices but you can select only one answer
- **select_multiple** – provide a list of choices but you can select multiple answers

With this type of question you need to specify the available options for that particular multiple choice question in the **choices** worksheet.

Here is an example of a **select_one** question:

	A	B	C	D
1	type	name	label	appearance
2	select_one wall_defect	wall_defect	Defect name or type	minimal
3	select_one culvert_defect	culvert_defect	Defect name or type	minimal
4	text	defect_descr	Description and location of defect	

	A	B	C
1	list_name	name	label
2	culvert_defect	Scouring	4. Scouring
3	culvert_defect	Shrinkage and restraint cracks including AA	5. Shrinkage and restraint cracks including AAR
4	culvert_defect	Lack of cover to reinforcement	6. Lack of cover to reinforcement
5	culvert_defect	Flood debris accumulation	7. Flood debris accumulation
6	culvert_defect	Defective scour protection works	8. Defective scour protection works
7	culvert_defect	kerbs, berms and/or down chutes	9. kerbs, berms and/or down chutes
8	culvert_defect	Trees and vegetation	10. Trees and vegetation
9	culvert_defect	Siltation	11. Siltation
10	culvert_defect	Spalling	12. Spalling
11	culvert_defect	Cracking	13. Cracking

Notes that “culvert_defect” in the survey sheet must match the “culvert_defect” in the list name column of the choices worksheet i.e. options written after **select_one** under survey sheet and list name under **choices** sheet both must be same. This ensures that the form displays the correct list of answer choices for a particular question.

Display of a note

Use the “note” type if you would like to display text to the user and don’t need a response.

type	name	label
end group		
begin group	defects_landing	
note	bridge_photo	Bridge Defects

Grouping questions

If multiple questions are related to one particular category, then you can add them to a group, for example:

type	name	label
begin group	bridge_info	Bridges
begin group	bridge_info_basic	Basic Bridge Info
select_one bridge	bridge_type	Select Bridge type
integer	spans	No. of Spans
select_one feature	feat_crossed	Feature Crossed
text	feat_name_id	Feature Name/ID
text	bridge_comment	Comment
end group		
end group		

Make sure that each group has a “begin group” and “end group” statement.

6.4.1 XLS Forms Functions

There are additional functions in the XLS Form that can determine aspects such as; how the information in the form is presented, form logic, calculations, constraints etc.

Hints

If you want to add an instruction or hint in a form to guide the user in answering the question you can use the "hint" column. In the example below, the hint provides more information about what is required by the user.

A	B	C	D	
type	**name**	**label**	**appearance**	**hint**
text	inspect_type	Inspection Type		
text	assessor	Inspector Name		
date	measure_date	Inspection Date		
text	road_id	Road_ID		
text	munic	Local Municipality		
geopoint	the_geom	Location		
select_one orient	orientation	Structure Orientation	minimal	
decimal	length	Overall Length (m)		
decimal	width	Overall Width (m)		
decimal	cell_length	Cell Length (m)		
decimal	height_fill	Height Fill (m)		
decimal	height	Min height (m)		Road-over-road Structures only
date	year_construct	Year Constructed	year	
photo	photo_aprch	Photo	annotate	Angle: Approach
text	photo_desc_aprch	Comment		
photo	photo_side1	Photo	annotate	Angle: Side 1
text	photo_desc_side1	Comment		
photo	photo_side2	Photo	annotate	Angle: Side 2
text	photo_desc_side2	Comment		
photo	photo_side3	Photo	annotate	Angle: Other

Skip logic

It is possible to skip a group of questions based on the result of the selection made by the user from a select one question, by using a function (in the case the "relevant" function). In the example below, the result of the selection is tested and the group of questions only processed if the result is true.

type	**name**	**label**	**appearance**	**relevant**	**required**
select_one wall	wall_type	Select Retaining Wall type			
decimal	max_height	Maximum height			
decimal	area	Total area of wall in elevation (m2)			
text	wall_comment	Comment			
end group					
end group					
begin group	culvert_info	Culverts		${structure}='culvert'	
begin group	culverts	Culvert Info	field-list		
select_one culvert	struct_class	Select Structure Class	compact-2		
select_one type	culvert_type	Select Culvert type			
text	culvert_comment	Comment			
end group					
end group					
begin group	defects_landing			${structure}='bridge'	
note	bridge_photo	Bridge Defects			

If the user selects "culvert" on the question "What type of structure", the "bridge" group is skipped.

Required

The “required‟ column is used to restrict the user from moving to next question if he/she tries to skip any question. If required is set to “yes”, the user will be unable to move on to the next question or submit the form without entering an answer for that question.

Appearance

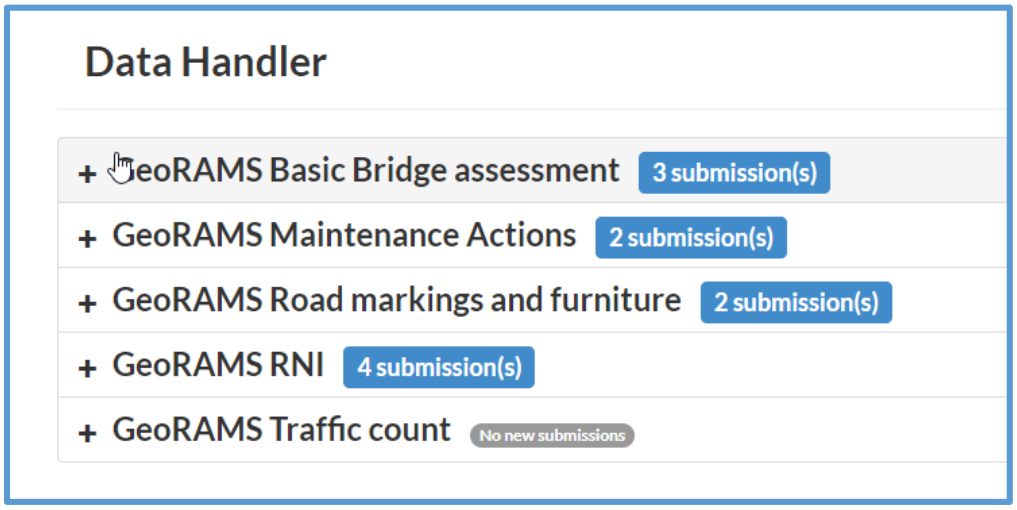
The “appearance” column allows you to change the appearance of questions in the form. The following table lists the possible appearance attributes and how the question appears in the form.

Appearance attribute	Question type	Description
Minimal	select_one, select_multiple	Answer choices appear in a pull-down menu.
field-list	Groups	Entire group of questions appear on one screen (for mobile clients only).

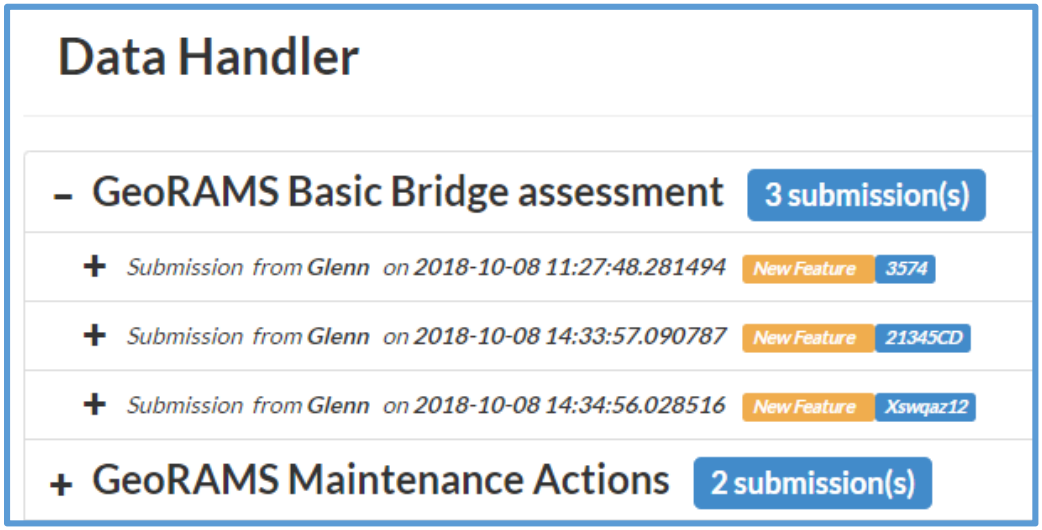
7. DATA MANAGEMENT

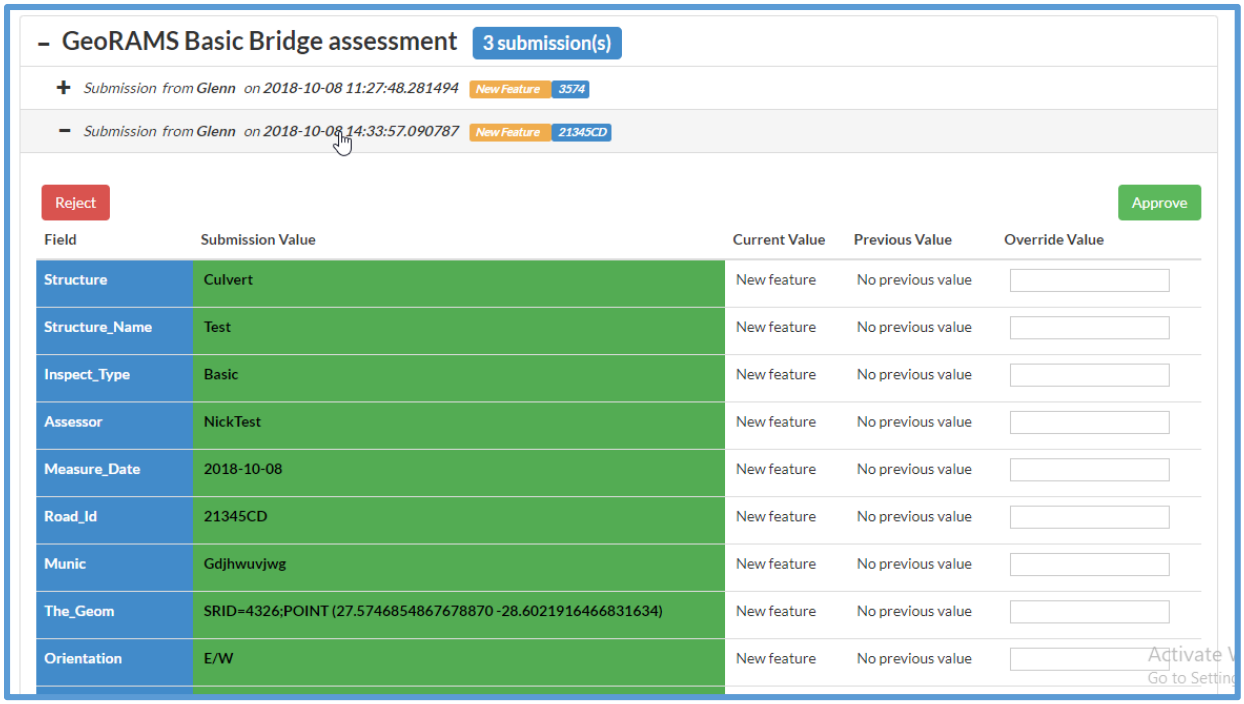
The Data Reviewer is a function build into the system for approving data submissions that comes in from GeoForm data capturing. The Data Handler lists the forms that's available for data capture and indicated and highlighted in blue are the number of submissions that needs to be reviewed.

7.1 Data Handler



Click on the blue button next to each form. This wil give a list of the submissions, indicating the person that did the survey and also the data it was submitted. Click on each item individually to aprove the submission.





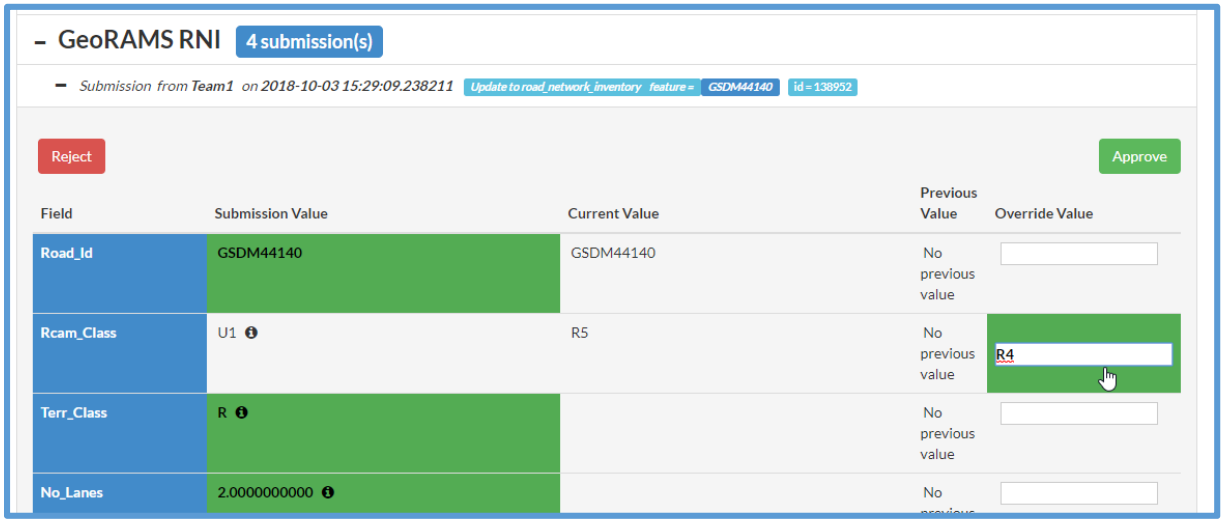
Field = column name in the database

Submission Value = The information submitted/captured in the form.

Current value = This will be the value if it already exists in the database. For new captured data it will show “New Feature”.

Previous Value = If it is an existing record in the database and has a previous value, it will be shown here.

Overide Value = This is the space where you can overide values, if you don’t agree with the data that was captured.



Click on Approve (right hand side of the window) to accept the data and this will then be loaded into the database.

Click on Reject (left hand side of the window) if you don’t want the data to be loaded into the database.

5. REFERENCES

Esri (n.d.). GIS in the Web Era. Retrieved July 21, 2016 from http://esripress.esri.com/storage/esripress/images/188/115391_webgis_chapter01.pdf

Esri (n.d.1). Esri Support GIS Dictionary. Retrieved July 22, 2016 from http://support.esri.com/other-resources/gis-dictionary

Geoserver (n.d.). SLD Reference. Retrieved July 21, 2016 from http://docs.geoserver.org/latest/en/user/styling/sld-reference/

Luqun, L., Jian, L., & Yu, T. (2002). The Study on Web GIS Architecture Based on JNLP. Symposium on Geospatial Theory, Processing and Applications. Retrieved July 21, 2017 from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.123.6596&rep=rep1&type=pdf