Transportation Scheduling in RouteXL

Contents

RouteXL

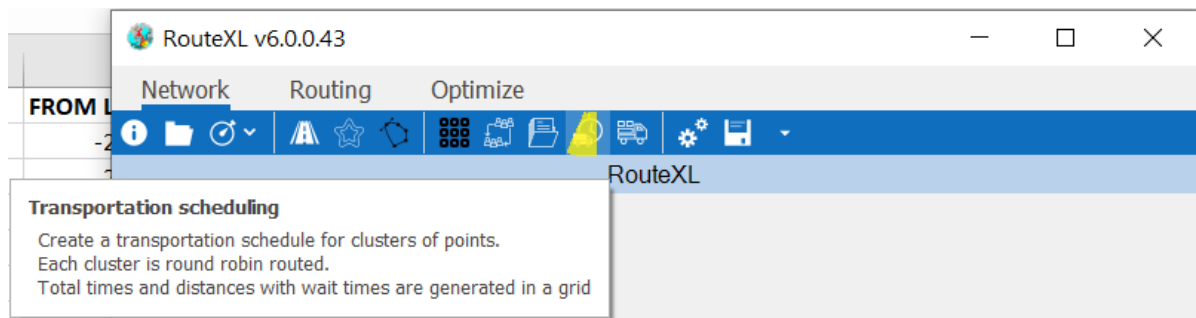RouteXL is an add-in to SpatialXL that allows optimised routing, transportation scheduling and high-speed bulk routing operations.
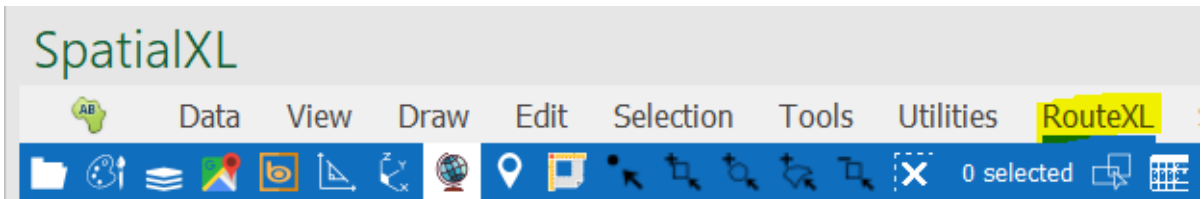

Transportation Scheduling

There is a sample Excel file available to download from our website that you can use and follow along with in the steps below: Transport-Schedule-Sample-Workbook.zip
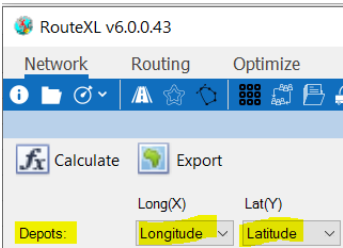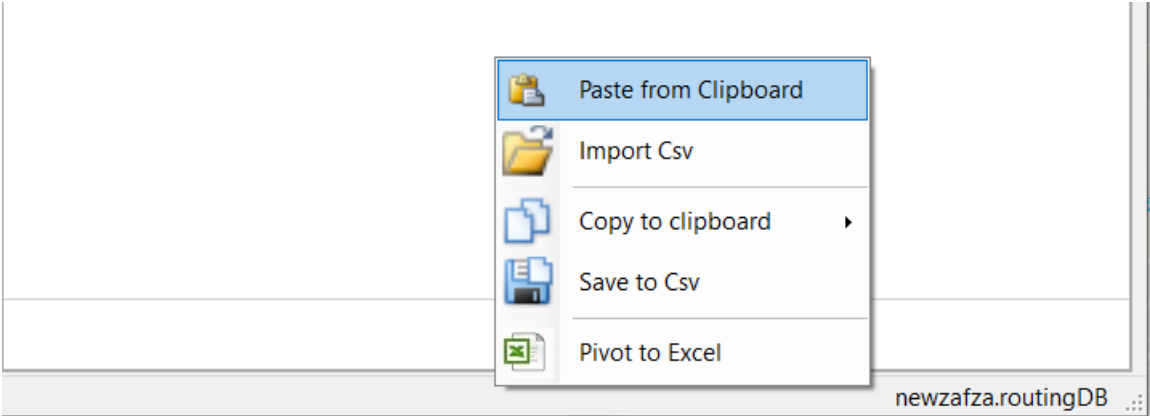
How to set up and input your data

Load your Routing Network by browsing to your .routingDB file. Your Routing Network will be displayed in the bottom right corner of your RouteXL window. I loaded **newzafza.routingDB** which is the South African Routing Network.
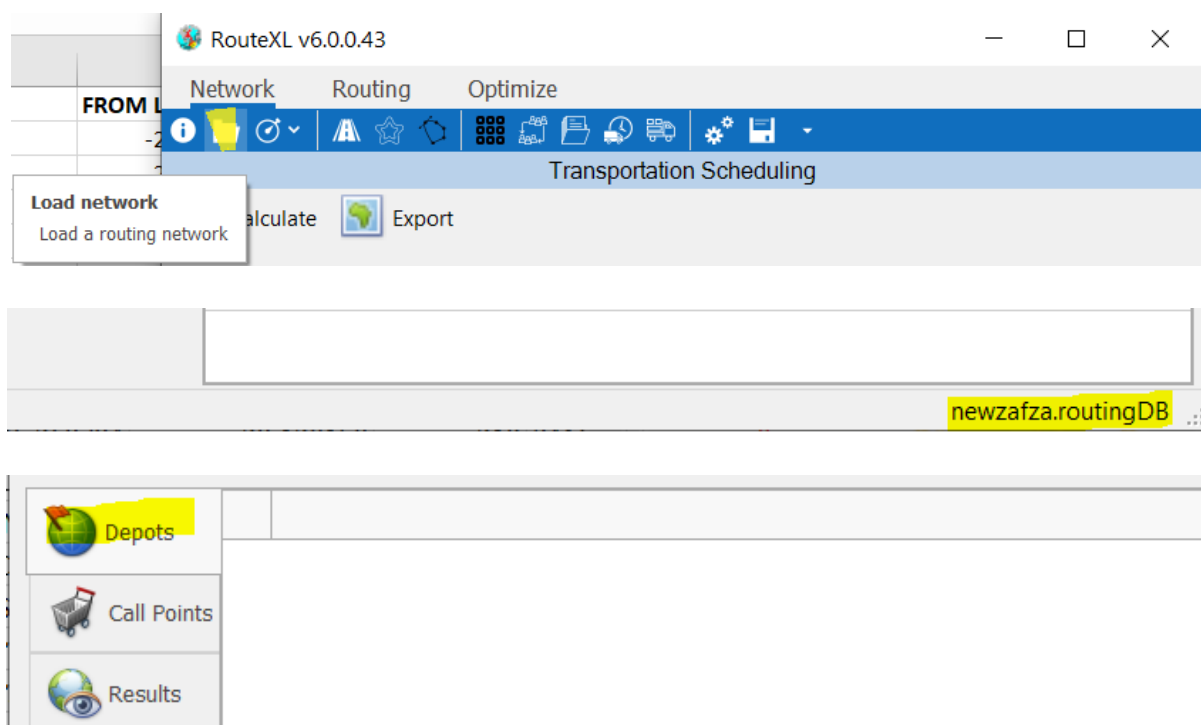
The **Depots** tab is automatically selected first by default. Copy from your Excel spreadsheet and **Paste from Clipboard** by right clicking in the **Depots** area – You can have more than one **Depot** set up. I just have one set up for my example.

| Depots	Longitude	Latitude	Stop Long	Stop Lat
Depot1	28.11069522	-26.28741964	28.11223	-26.271

Your **Longitude** and **Latitude** will now be populated for your **Depots**.
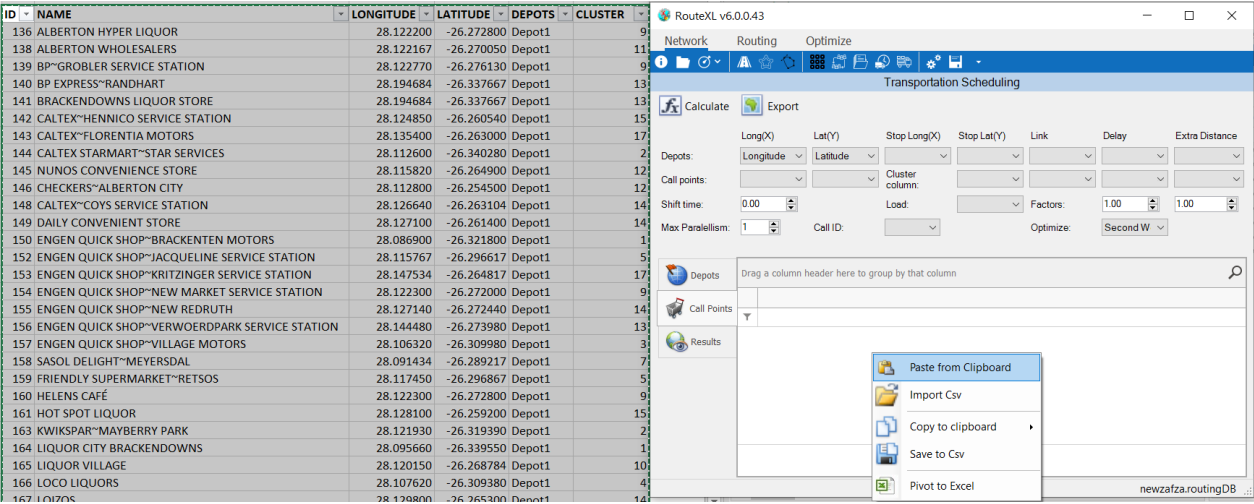
Select your **Call Points** tab now. Copy from your Excel spreadsheet and **Paste from Clipboard** by right clicking in the **Call Points** area.

(**Note**: You need to have a pre-set-up **Cluster** column in your Excel spreadsheet. I used the **Auto Cluster** tool from SpatialXL to generate these clusters in this example.)
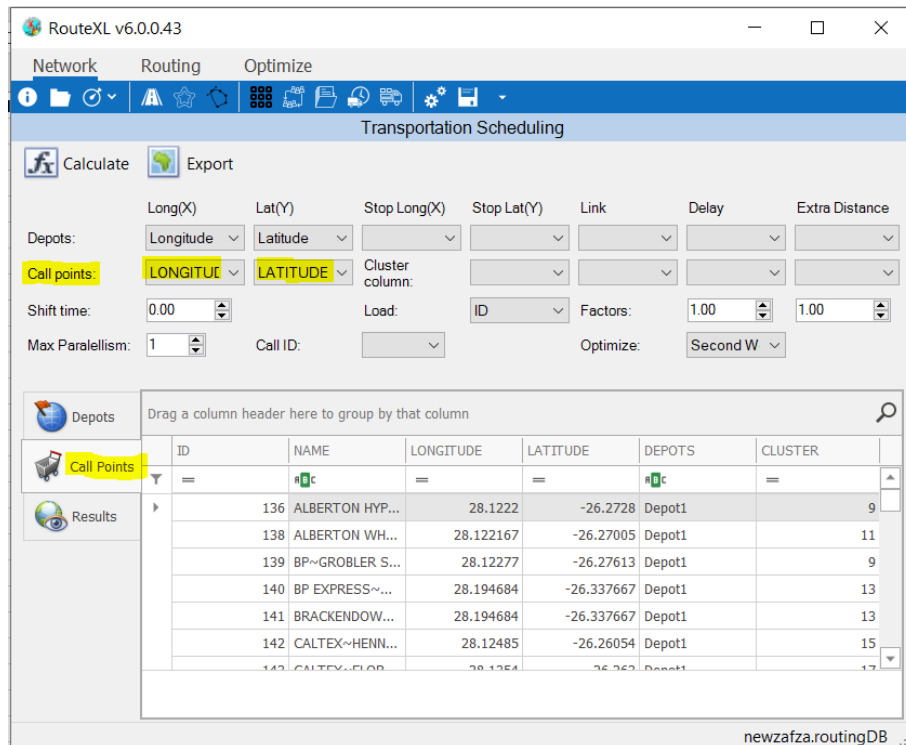
Your **Longitude** and **Latitude** will now be populated for your **Call Points**.
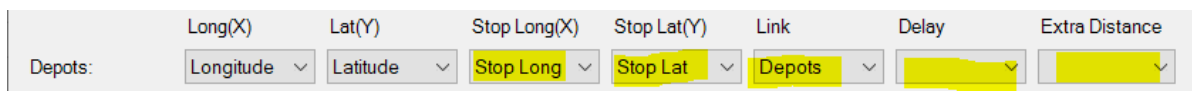
Click the dropdown arrows and select **Stop Long** and **Stop Lat**.

The purpose of these columns is for example if you have a refuse disposal company like Pikitup, after you have collected what refuse you can, you might need to dump it at a dump site which is not the same as the depot. You might do many trips to the dump site before you return at the end of the day back to the depot.

Click the dropdown arrow under **Link** and select **Depots**. (There needs to be a common column with common data between the **Depots** and **Call Points**. This will be your link and will allow the program to process your data correctly.)

You can set up **Delay** if you have a delay at your **Depot**. I don't have a delay in this example, so I just left the field blank.

You can set up **Extra Distance** if you have any extra distance to add to your **Depot**. I don't have any extra distance I would like to add to my Depot in this example, so I just left the field blank.

Click on the dropdown arrow by **Cluster column** and select **CLUSTER**.

Click on the dropdown arrow under **Link** for **Call points** and select **DEPOTS**.

You can set up **Delay** if you have a delay at your **Call points**. I don't have a delay in this example, so I just left the field blank.

You can set up **Extra Distance** if you have any extra distance to add to your **Call points**. I don't have any extra distance in this example, so I just left the field blank.

Shift time at this point is not being used as we are first scheduling the routes. The trips will be scheduled later where we can then use **Shift time**.

**Load** will be your volume. Click the dropdown arrow and select **VOLUME**.

Factors for **Delay** and **Extra Distance** are set at a default **1** which means nothing is changed. If there is a factor that is needed to be put in for this, you can adjust accordingly. A factor of 0.5 for example for **Delay** and **Extra Distance** would mean that the **Delay** and **Extra Distance** for the **Depot** or **Call point** would be half - A factor of 2 for example would mean twice as long.
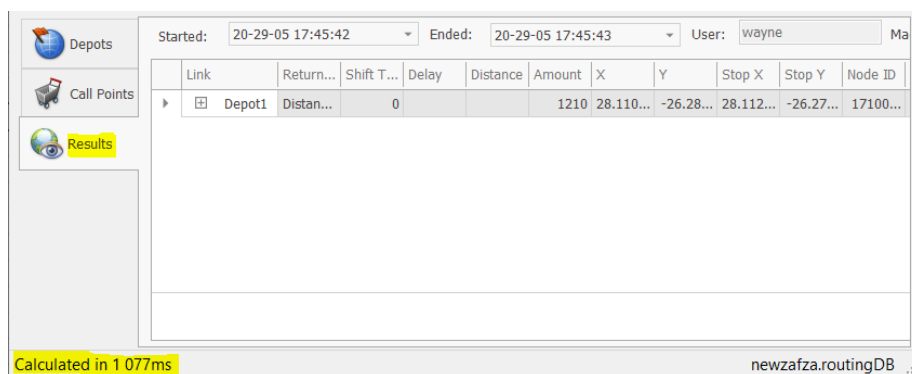
Max Parallelism is set at **1** as a default. This is the basic setting for processing your data.

Call ID is your Unique ID for your **Call points** data – this ID needs to be unique in order to do the routing correctly.

You can choose to **Optimize** by **First Weight (Meter)** or **Second Weight (Minute)**. I have chosen the latter in this example.
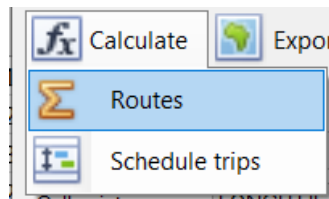
Click on **Calculate** and select **Routes**.

Your routes were **Calculated in 1077ms** which is 1077 milliseconds. The **Results** tab is now populated.

Understanding your data

Link	Return Trip	Shift Time	Delay	Distance	Amount
⊞ Depot1	Distance: 2354.85009765625, Time: 3.9449999332...	0			1210

Return Trip is populated which is the **Distance** and **Time** it takes to go back to the **Depot** from the **Stop** point which could be your dump site in this example.

Amount is your total volume or load of all your clusters together for **Depot1**.

Expand **Depot1** by clicking on the +.

You will see all your clusters there populated under **Cluster Key**.

Is Initial ticked on means it is the initial trip from the **Depot** to the **Call points** and not from the **Stop** point to the **Call points**.

Distance and **Time** is the total round trip for each cluster.

The above are the rest of the columns.

Trip contains both **Distance** and **Time** in this column which are the total round trips for each cluster.

Geometry is internal information – it is basically showing the routes for each cluster in terms of **Longitude** and **Latitude**.

Start Trip column shows the total **Distance** and **Time** from the **Depot** to the **Call points** in each cluster.

Subsequent Trip column shows the total **Distance** and **Time** from the **Stop** point set up to the **Call points** in each cluster. (If you didn't have a **Stop Long** and **Stop Lat** set up, **Subsequent Trip** column would be blank.)

You haven't scheduled your trips yet so the program in the meantime gives you a possibility of two routes your vehicle/truck could travel – per **Start Trip** and **Subsequent Trip**.

Amount is the total volume/load per each cluster.

Trip Points column is internal information and not necessary to go over in this training manual.
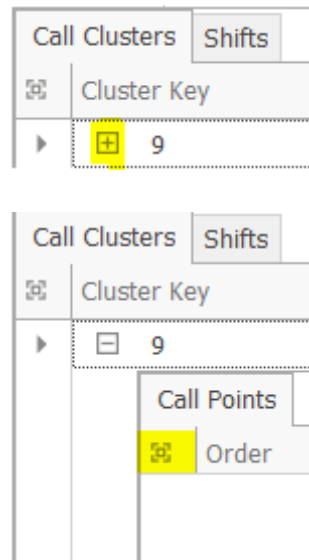
To view the information within each cluster, click on the + by the cluster number. Then click on the button highlighted above to view that information clearly.

Here are all your **Call points** for cluster **9**.

Order is the sequence the **Call Points** are to be visited optimized by time.

Amount is the volume/load per each **Call point**.

Call Delay and **Call Distance** are blank as I didn't set up any **Delay** or **Extra Distance** for my **Call points**.

User ID is the Unique ID from your **Call points** data.

Node ID are the points on your routing network relative to each **Call point**.

Time From Last1 and **Distance From Last1** are the distances and times from each **Call point** to the next, starting at the **Depot**.

Time From Last2 and **Distance From Last2** are the distances and times from each **Call point** to the next, starting from the **Stop** point which is **0**.

(**Time From Last2** and **Distance From Last2** would be unpopulated if you didn't have a **Stop** point set up.)

Go out of your **Call Clusters** tab and select **Shifts**.

Number are the different **Shifts**. Since we didn't schedule any trips yet, each cluster will be a shift, returning back to the **Depot** each time.

Time and **Distance** are the times and distances travelled for each shift.

Amount is the total volume/load for each shift.

You have an option of inserting a **Shift time**. This is in minutes.
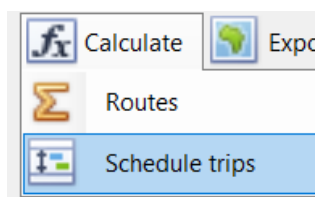
If you have a **Shift Time** set up, click on **Calculate**, then select **Schedule trips**.

You can't immediately see what has changed, but if you go to your **Call Clusters** tab you will see clusters that don't have **Is Initial** ticked on. This means that these clusters were routed from the **Stop** point to the cluster/s back and forth until the shift is up, then back to the **Depot**.
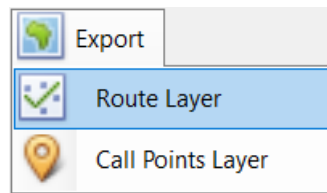

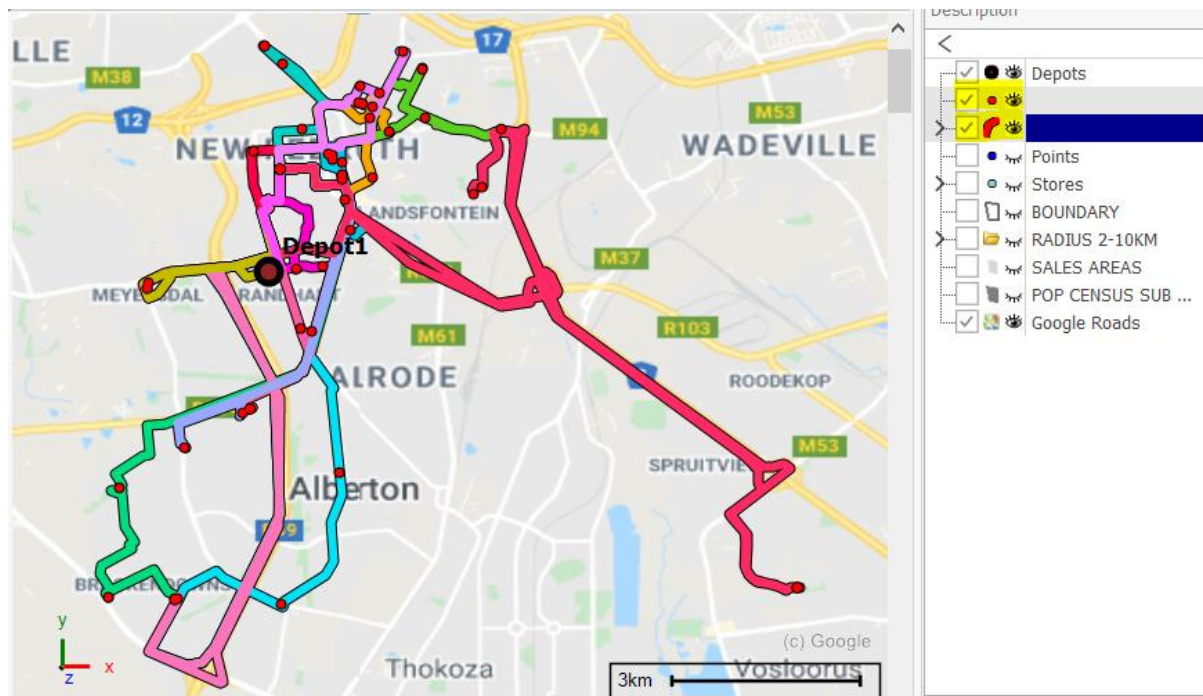Go to your **Shifts** tab. You will also notice that there are only 6 shifts now, not a shift for every cluster.

Expand one of your **Shifts** by clicking on the + symbol. I expanded **Shift 1** in this example.
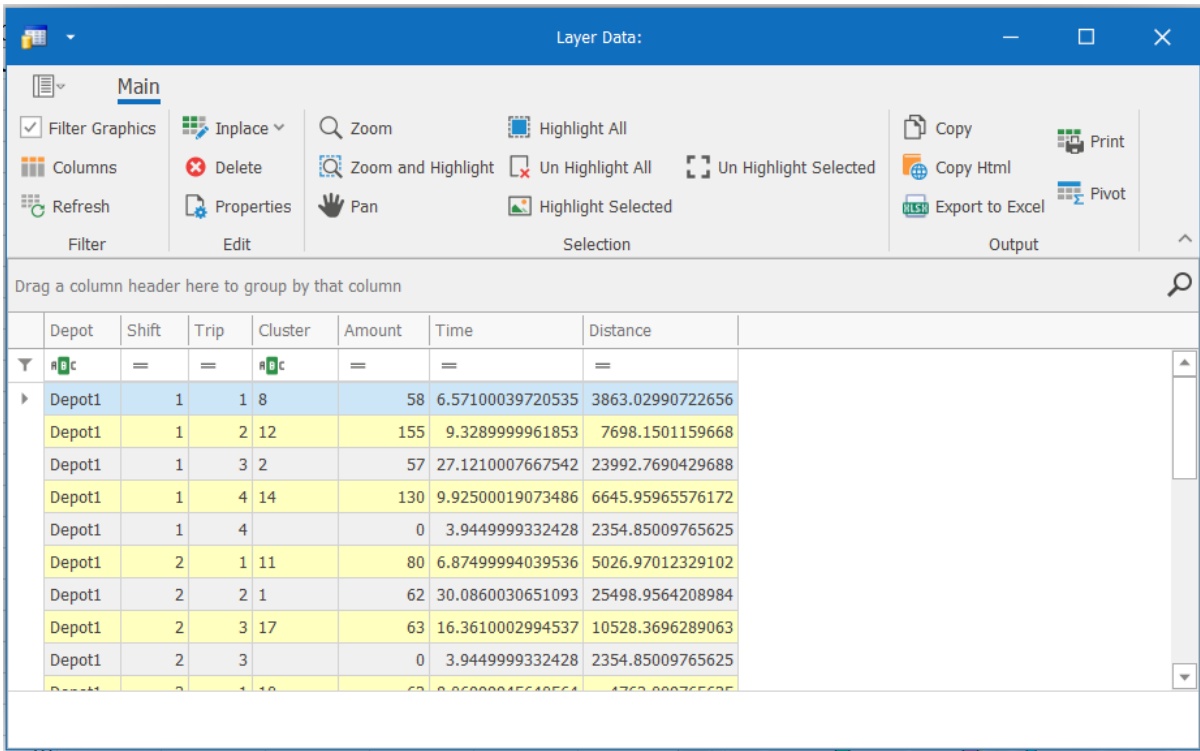
You will see that 4 clusters fit within this shift.

You can export your **Routes** and **Call Points** as a layer in SpatialXL. I exported both in this example.
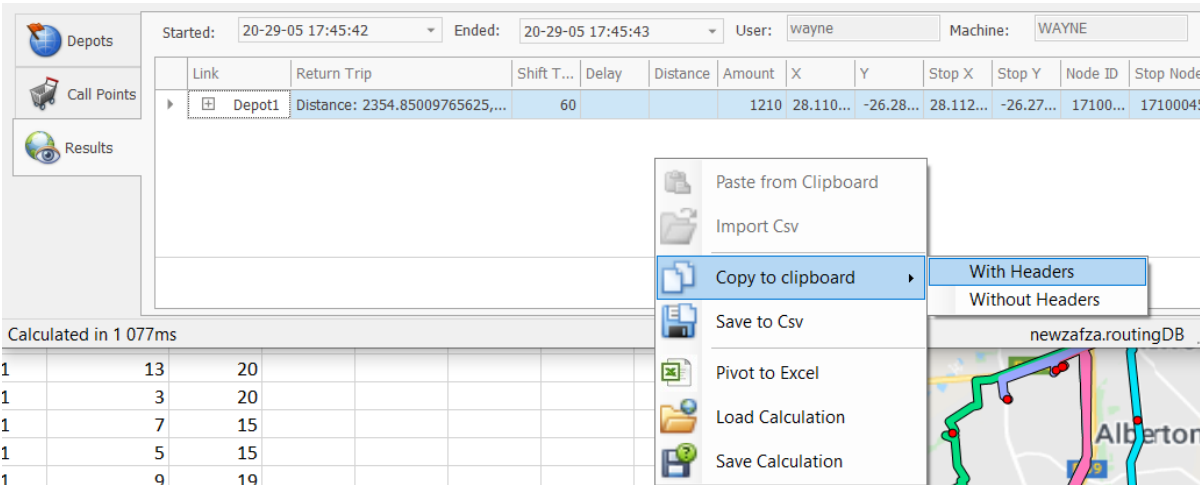

I colour themed my **Routes** by clusters.

You can view your **Route** layer data by viewing your **Layer Data** Grid.

You can copy, save, and pivot your **Results** to Excel.

Alternatively, you can **Save Calculation** and **Load Calculation** in your Results tab at a later point for further analysis.

Name	Date modified	Type	Size
pfx19-08-10_201044.tsCalc	2019/10/08 20:10	TSCALC File	1 KB
pfx19-08-10_201059.tsCalc	2019/10/08 20:10	TSCALC File	1 KB
pfx19-08-10_201217.tsCalc	2019/10/08 20:12	TSCALC File	1 KB
pfx19-08-10_201416.tsCalc	2019/10/08 20:14	TSCALC File	1 KB
pfx19-08-10_201941.tsCalc	2019/10/08 20:19	TSCALC File	936 KB

Even if you don't save you calculation, a **TS Log** will automatically be populated in the location above. You can load any of these into your **Results** tab for further analysis.

Support

T: +27871354351

support@primethought.biz - primethought.biz
Kyalami Estate, Midrand, Johannesburg, 1684, South Africa