



SCC Training: Point Cloud Module

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1 Point Cloud Module

The following outlines some of the tools and functionality available within SCC Point Cloud Module.

To start using this functionality the user must have the point cloud module licensed.

Tutorials are based on sample files available within the SCC folder.

Point cloud functionality is accessed in the model via the CLOUD tab.



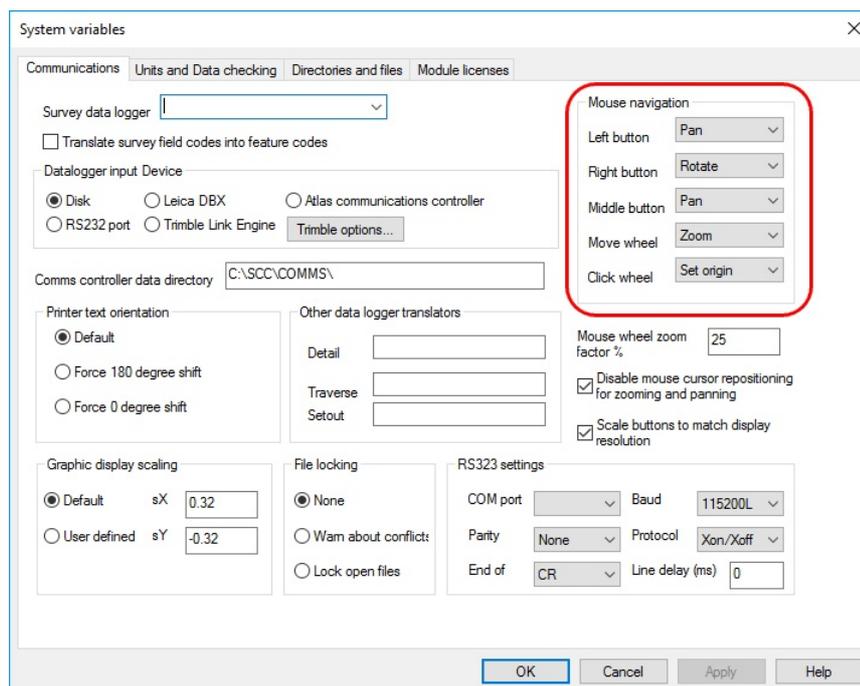
1.1 Cloud Mouse Navigation & Settings

The mouse can be used to navigate the cloud data. Such options are controlled within the General Options

General Options

Go to 'DATA tab > Settings drop down > General Options > Communications'

Review 'Mouse Navigation' options



For example, to rotate data using the mouse, simply

Press Mouse Wheel at rotate origin point

Press Right Mouse Button down and move cursor to pivot model

Note the cursor is moved around in the cloud, either in plan or another view, the x,y,z position of the cursor in the cloud is shown, and the user can snap to cloud positions.

Keyboard Shortcuts

In addition to mouse controls, keyboard shortcuts can be used, such as 'P' and 'E' when

moving between plan and elevation view.

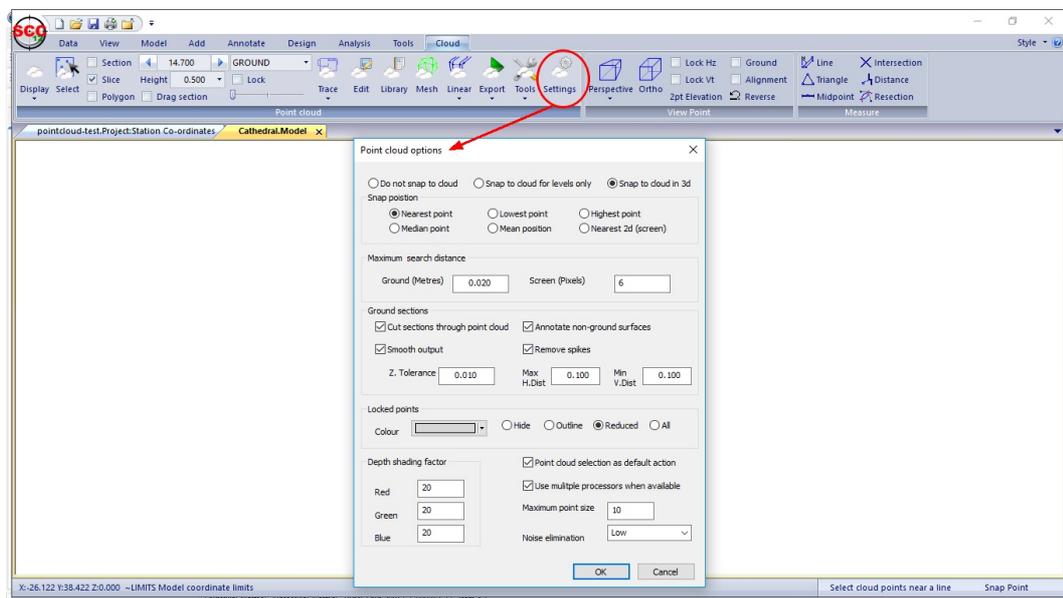
This coincides with other general SCC keyboard zoom controls such as Home (Zoom Extent), Page Up/ Page Down (Zoom In/Zoom Out), Space Bar (Pan).

Other keyboard options are + and – to widen or narrow the area of interest, and L and X to move between long section and cross section related view when selection a sectional area relative to an alignment.

When a horizontal section / area of interest is in use the arrow keys may be used to raise or low the elevation of the section.

Settings

The control settings are available within '**Cloud tab > Settings**' and controls how the cloud is treated as a surface for section and volume analysis.



Note that only active points are used for snapping, and other operations such as data selection, and export. This allows the user to first select an area of interest for analysis purposes and hide all other parts of the cloud, and then select further points from that area of interest for editing.

Using The Cloud with other SCC Model Options

Most SCC options can interact with the cloud in a similar manner to the TIN surface generated from a traditional total station or GPS survey. This is largely controlled by use of the point snapping and sections mechanisms in '**Cloud tab > Setting**'. The following snaps are available;

- Do not snap to cloud – The cloud is not used with other SCC string creation functions.
- Snap to cloud for levels only – The cloud is used in plan view for interpolating elevations only.
- Snap to cloud in 3d – The cloud is snapped to in full 3d, regardless of the viewpoint.

When using could snaps, and interpolating from the cloud as a surface in general, a search radius is used. If a cloud point is not found within this radius, the cloud snap fails. When interpolating levels, the underlying TIN is used in place of the cloud in this circumstance. This allows us to seamlessly mix TIN and cloud interpolation in a single model.

Given that we're searching for cloud points in a given radius, we can also control how the selected point or points are determined and used as follows;

- Nearest point – The nearest point to the desired position, e.g. mouse cursor position, is used

- Lowest point – The point with the lowest elevation of the points in range is used. This can be very useful for manually tracing lines such as bottom of kerb, where bottom of kerb and top of kerb are very close and difficult to distinguish. It is also very useful for extracting grids of elevations over ground that may include vegetation and other spurious high points on the ground such as lamp posts. Note that this option is best selected with small search radii, and used judiciously.
- High point - The point with the highest elevation of the points in range is used. This can be very useful for manually tracing lines such as top of kerb.
- Median point – The point nearest the mean position of all the points in the selection radius is picked. This can be useful for drawing strings represented by dense linear groups of points in the cloud, such as walls shown in the slice taken from the cathedral model previously.
- Mean point - The mean position of all the points in the selection radius is picked. This will not correspond to any one point.
- Nearest 2d (Screen) – The point drawn on screen nearest the mouse cursor is picked.

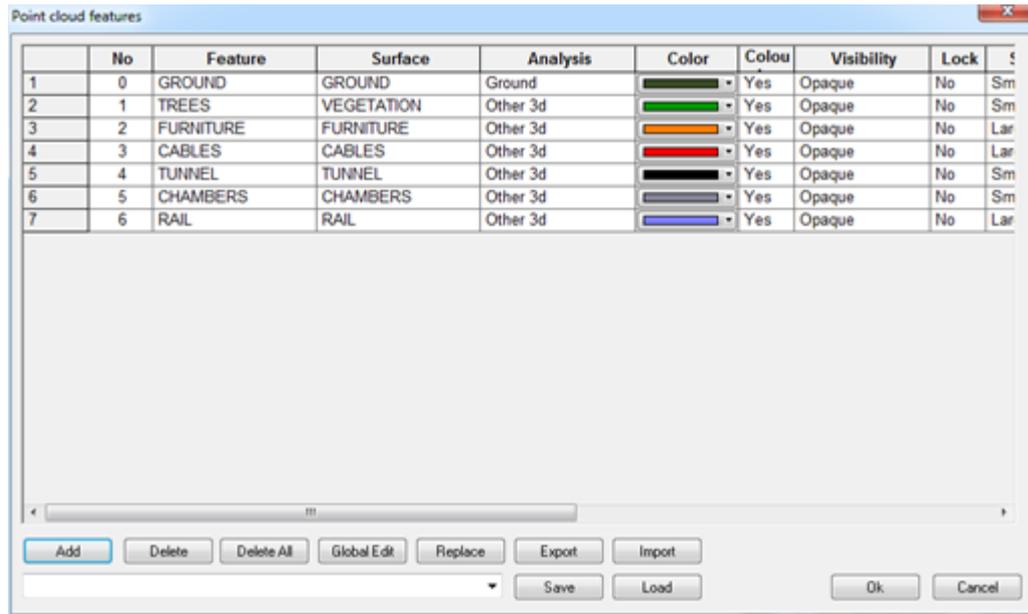
For options such as sectioning, volumes, extraction of grids, draping of 2d data to extract levels, etc... the option to **Cut sections through the point cloud** must be selected. This allows the cloud to be used in a similar manner to a TIN surface for most SCC surface analysis operations. Interpolation is limited to points with a feature **Analysis** set to **Ground**, so it is very important to change the feature of all other cloud data, such as vegetation, buildings and overhead lines, prior to interpolating from the cloud in this manner.

For sectional analysis, we can also specify a level tolerance for smoothing, and horizontal and vertical tolerances for removing spikes from the section. This is necessary as cloud data is far denser than conventional survey data and is prone to include a significant amount of noise. Smoothing and spike removal also greatly reduces the size of the data extracted, which is also typically beneficial.

Other options on the same dialog control how the point cloud is visualized. These control whether the display is clipped behind and in front of the viewing plane, typically when using two point elevations, and how isolated points are displayed. Note that clipping the view has no effect on point selection in the way that isolating or disabling points would. Displaying Inactive points allows you to see where your active points are in relation to the rest of the cloud. Inactive points are always transparent and typically drawn in a lighter colour. Displaying a reduced number or outline of isolated points will reduce display clutter and improve display speed on larger clouds.

1.2 Point Cloud Feature Library

The point cloud feature library is used to break down the cloud into groups of points on similar feature, for example, all points corresponding to vegetation, all points corresponding to the road surface. This allows the user to fine tune how analysis operations work, as this will change significantly based on the type of feature. For instance, how sections are cut through the ground will be different to how sections are cut through more complex 3d features such as buildings.



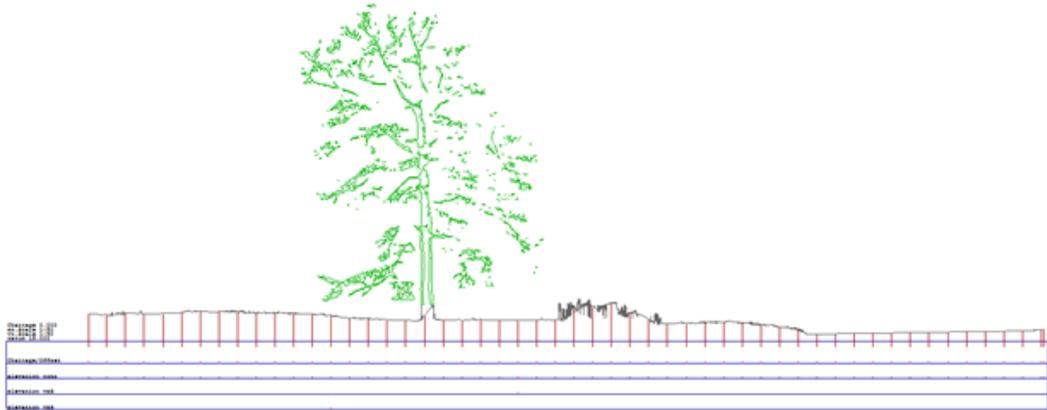
The point cloud feature fields are as follows;

- Feature – The name of the feature
- Surface – The surface on which the feature is placed. Note that you can have multiple features placed on the same surface, e.g. trees and bushes might both go on a vegetation surface
- Analysis – This controls how SCC interprets these points for surface analysis purposes. Options are
 - Display only – The points are displayed only, but not subject to analysis
 - Ground – The points are treated in the same way as the triangulation surface in a normal SCC model, from the point of view of sections, volumes, draping points, extracting levels, etc...
 - Other surface – The points are treated in a similar manner as an additional triangular surface, such as a reference model.
 - Other 3d – The points are treated as a non-mappable 3d surface, not suitable for surface analysis operations. Sectioning through 3d surfaces will be considerably slower than ground / mappable surfaces.
- Colour – The default colour of this feature when not coloured by point
- Colour by point – Whether points on this feature have individual colours or the same colour
- Visibility – Controls whether or not these points are displayed, and if they are displayed whether they are considered opaque or transparent.
- Lock – Whether or not these points are included in analysis
- Size – The size of displayed points
- Sect. Width – The search corridor width used when cutting sections through this feature. Note this will typically be small for ground surfaces, e.g. 10mm, and larger for 3d surfaces, e.g. 100mm – 500mm. The larger this value, the more 3d data will get projected onto a section and analysed. This in turn can slow down processing and significantly increase the size of sections produced.
- Max Dist. – For 3d features, the maximum distance to which points will be connected.

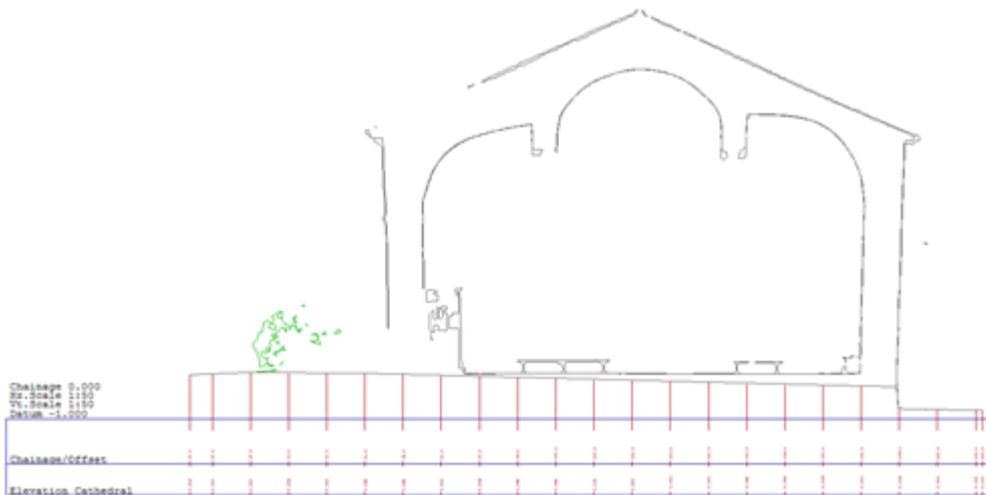
- Trace Dist. – For 2d features extracted by tracing selected points, the maximum distance between adjacent points
- Min. Length – For all traced output, the minimum total string length allowed for a string to be included in the output.

The cathedral and topo models (from the SCC tutorials folder) already have some features applied. Thus if a section is cut through the data, the various features will appear.

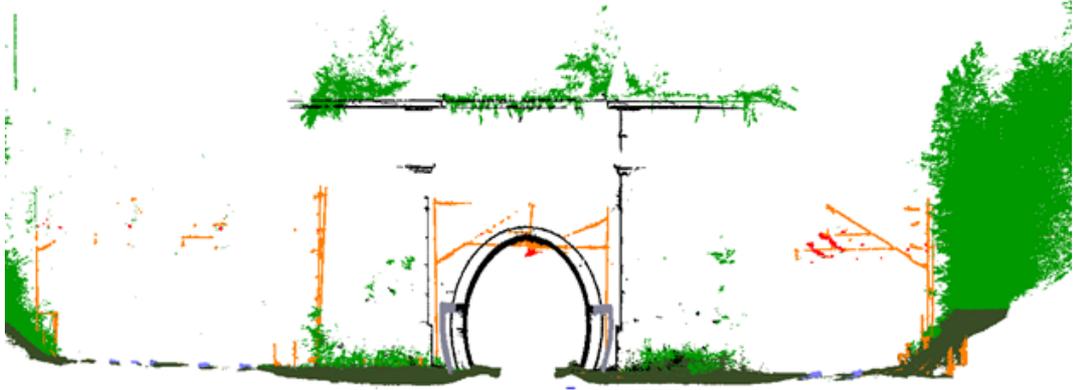
. For example, select '**ANALYSIS tab > L.Sect**' and generate a section through 'Topo.Model' taking in the tree:



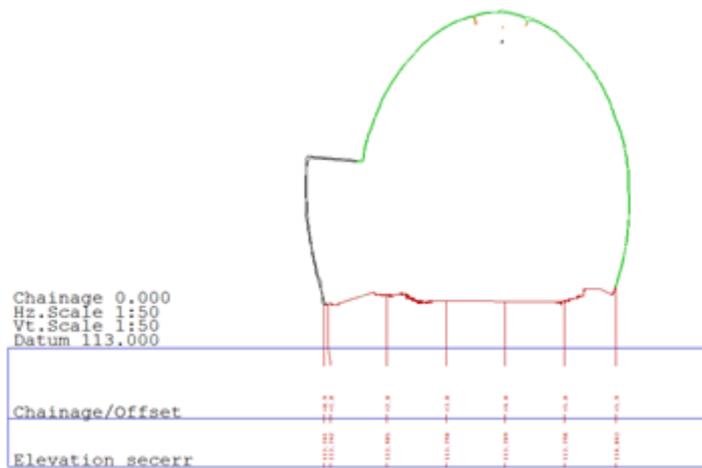
And similarly for the Cathedral.Model;



The feature library is also very useful for quickly colouring and analysing monochrome point clouds, as shown in the model below (Tunnel 950-1050 (edited).Model)



By selecting and isolating appropriate elevation and sectional areas, the user can quickly differentiate the tunnel, cabling, rails, and foliage. This in turn allows the user to cut complex sections, develop a ground surface and isolate features of interest.



1.3 Selecting And Isolating Parts of the Cloud

Data Selection Dialog

The most commonly used option will be data selection, which shows the point cloud selection dialog. This allows the user to control how data is selected (i.e. points in a window, points in a polygon, using a horizontal or vertical section / slice, relative to an alignment, points similar to a given reference point, points close to another SCC surface) and what to do with picked data.

Point cloud data selection

All points in the cloud
 All points in a window
 All similar points

Max 3d distance 20.000
 Max height difference 0.000
 Max %color difference 20
 Max %intensity difference 0

Reference point

E/X: 514124.28 Colour:
 N/Y: 104938.13 Intensity: 81.25
 Ht/Z: 15.848 Pick>>

All points in a feature range
 From: To:

All points in a polygon Select polygon
 All points in a given radius or design distance
 From: 0.000 To: 0.000

Radius relative to picked string
 Radius relative to alignment
 Computed design difference

All points close to an alignment
 Alignment range

	Chainage	Offset	Design/dZ
Minimum	0.000	-1.000	-1.000
Maximum	1000.000	1.000	1.000

All All All

All points close to a line (Vertical section)
 Min. Offset: -10.000 Max. Offset: 10.000
 Show selected section in elevation

All points in a height range (Horizontal section)
 Min. Z: 22.699 Max. Z: 22.709

Point cloud height
 Height relative to reference surface
 Stored object height

All points close to a plane (Oblique section)
 Min. Offset: -0.100 Max. Offset: 0.100

Oblique Vertical Horizontal Surface
 Rotate view normal to plane
 Section offset increment: 20.000

Deselect points
Select points
Enable points
Disable points
Isolate points
Refine isolate
Close

This includes selecting and deselecting data as per typical SCC usage, locking and unlocking data which hides the data and prohibits it from being used in future operations, and isolating data which is the same as locking everything except the picked points.

This option is available by Right Clicking mouse within a point cloud or within 'Cloud tab > Select' button

Additional Tools can be used to control selected data from the Cloud Toolbar



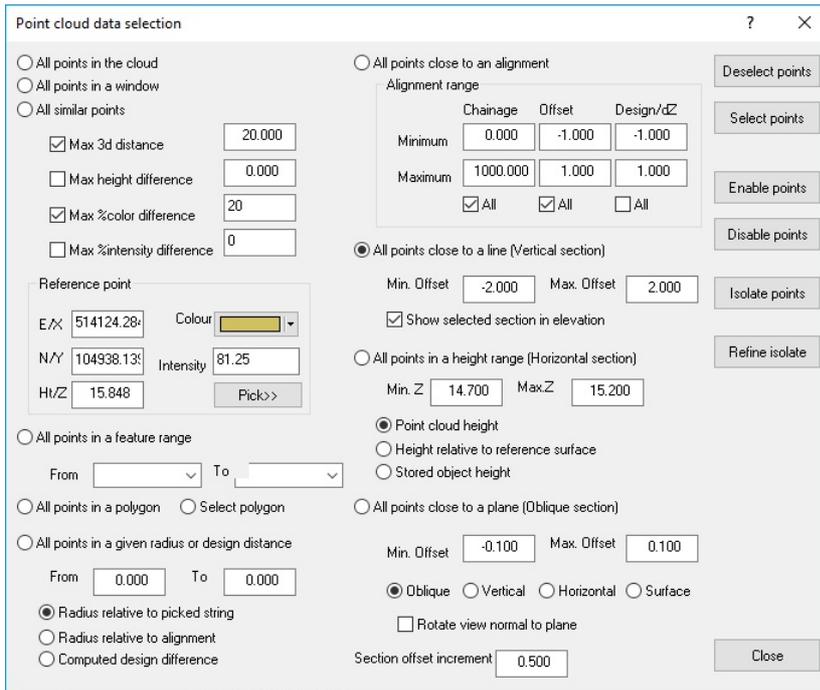
Isolating Data

Open Sample file 'Cathedral. Model' from tutorials folder

Right click mouse to bring up 'Data Selection Dialog'

Select 'All points close to a line (Vertical section), set Min Offset -2 and Max Offset 2

Tick 'Show selected section in elevation'



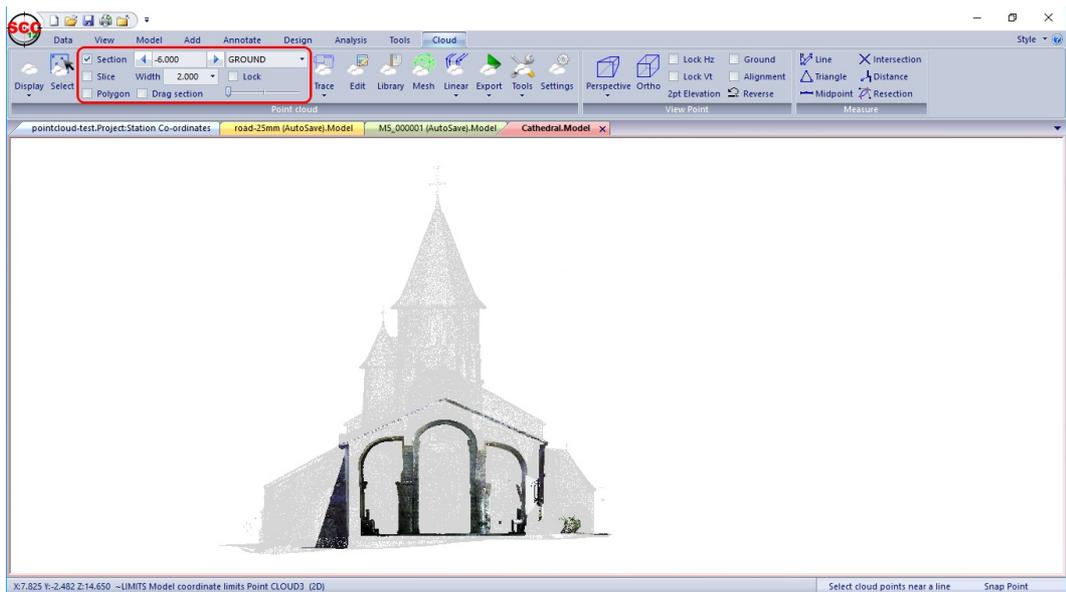
Pick 'Isolate Data' and the dialog closes

Left click on model to pick first point on centreline and a second time to pick last point

This highlights the area of interest as an elevation and switches the colour of all the locked points to light gray.

Pressing 'P' and 'E' we can move between plan and elevation view to get a better idea of what has just happened.

Alternatively use the toolbar to change selection as shown below:

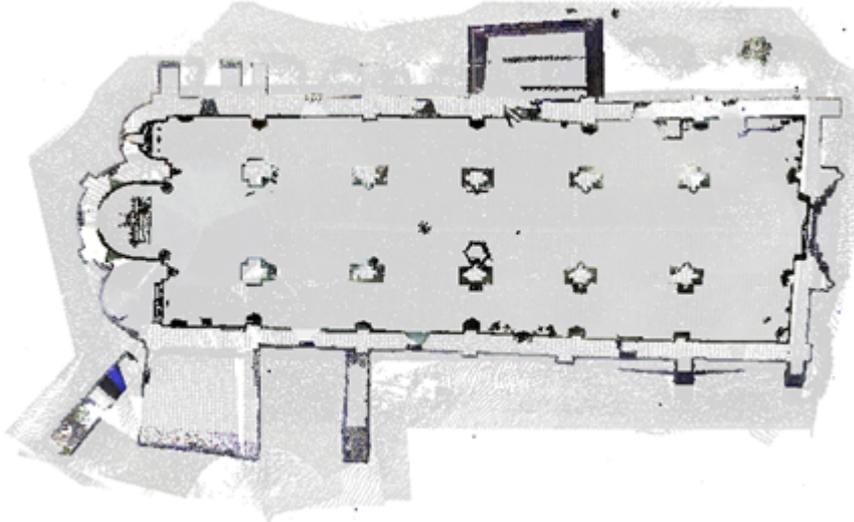




The up, down, left and right arrows to advance and move the section relative to the direction of view.

The distance here is based on the Section offset increment in the data selection dialog, which can also be brought up using the right mouse button.

From plan view use the mouse at any stage to pick an alternate section as shown below;



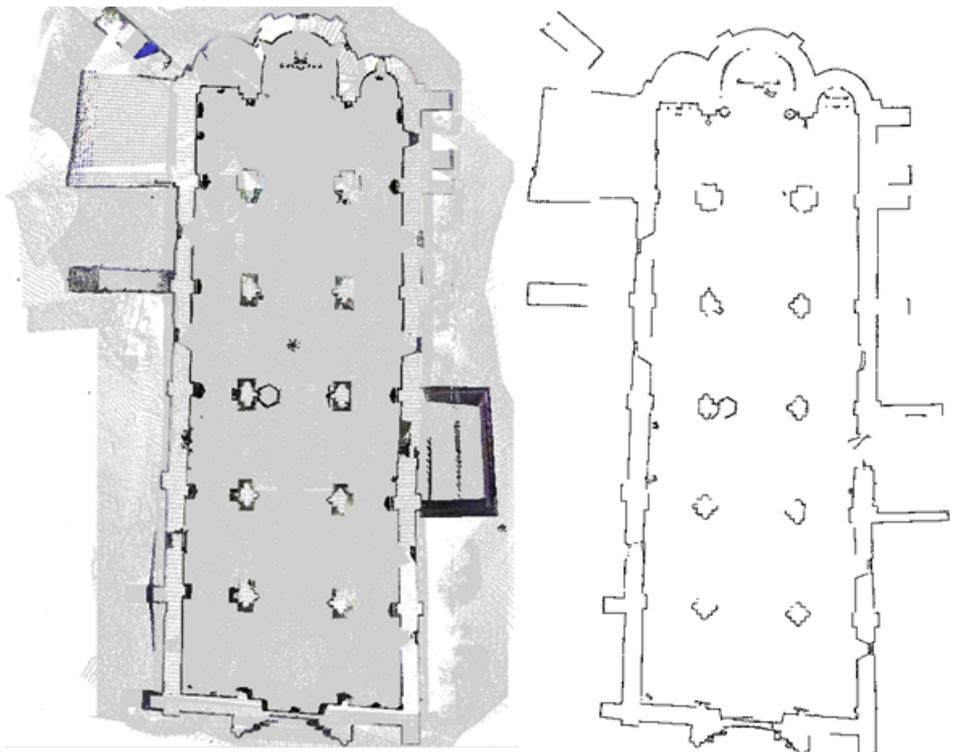


Other keyboard options are + and – to widen or narrow the area of interest, and L and X to move between long section and cross section related view when selection a sectional area relative to an alignment.

When a horizontal section / area of interest is in use the arrow keys may be used to raise or low the elevation of the section.

1.4 Tracing Sections and Slices

In addition to cutting sections there are a number of other ways to extract linear data and analyse cloud surfaces. The simplest of these is via '**CLOUD tab > Trace drop down > Trace outlines from slice**', which will draw outlines based on an isolated sectional area. This can be either from plan, elevation or based on an oblique viewpoint.



The results can then be exported to other packages, such as CAD, in 2d or 3d, and multiple slices can be used to build-up a wire frame model from your cloud. The cloud feature library determines how the data is analysed, where the centre of the displayed section or slice is used as the centre-line for sectioning.

1.5 Extracting A TIN Surface From The Cloud

Within 'Topo.Model' available from SCC\Tutorials directory, a selected area can be triangulated for further analysis and export to a software that does not support point clouds.

In this case, a small alignment is created and selected points in an area 7.4m either side of the centre line is isolated and used to generate a TIN, as shown below.

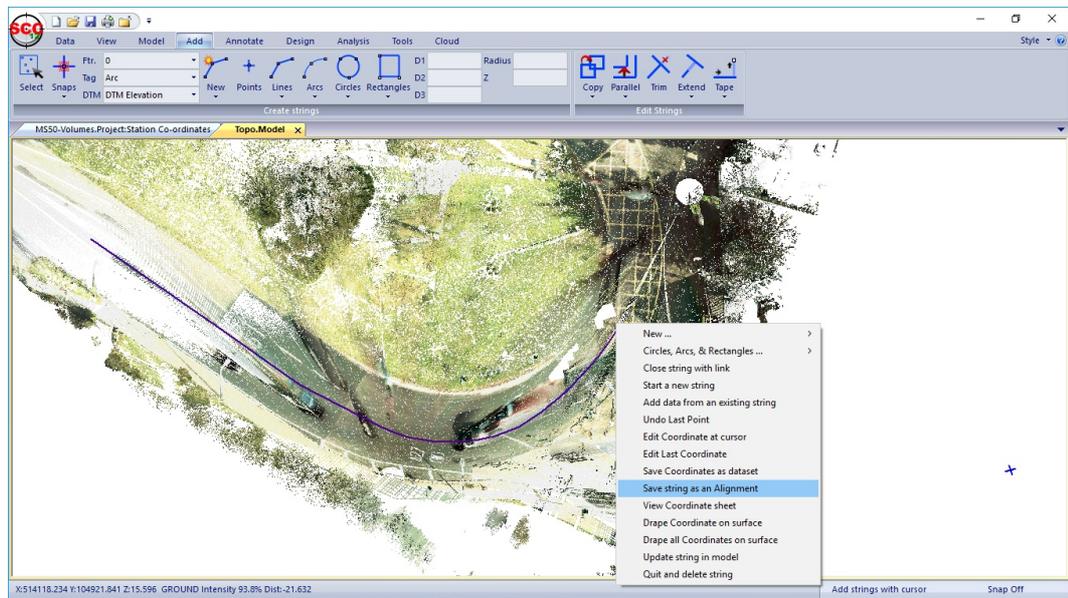
Set up Project

Open 'Topo.Model' from SCC\Tutorials folder

Go to 'ADD tab > New'

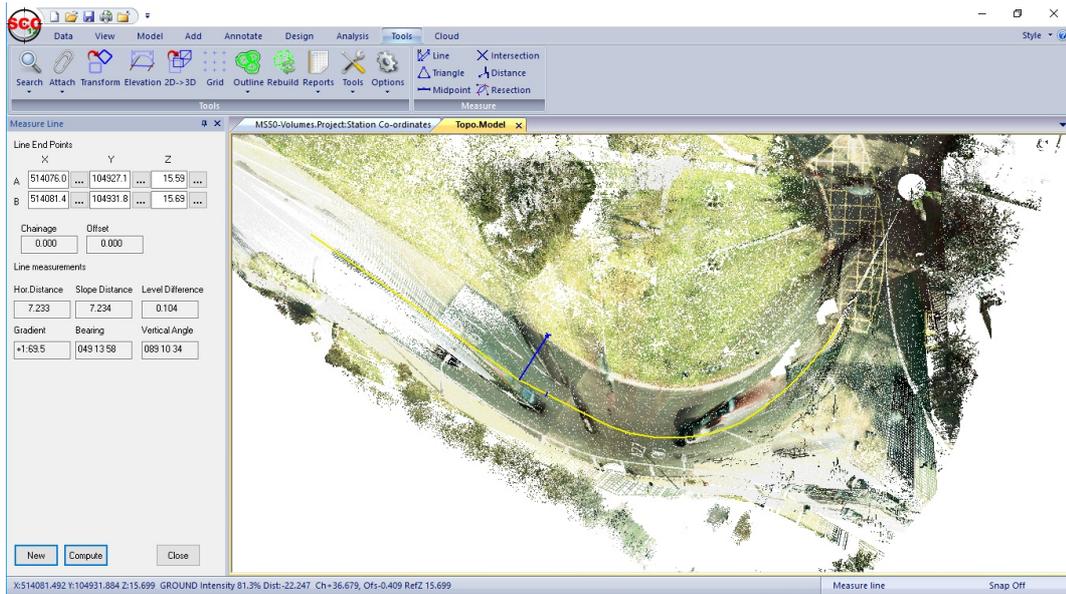
Left click mouse on screen to begin centre line, change the geometry as the line process to Arc tag and then finishing with Straight

Right click mouse on screen, select 'Save string as an Alignment'



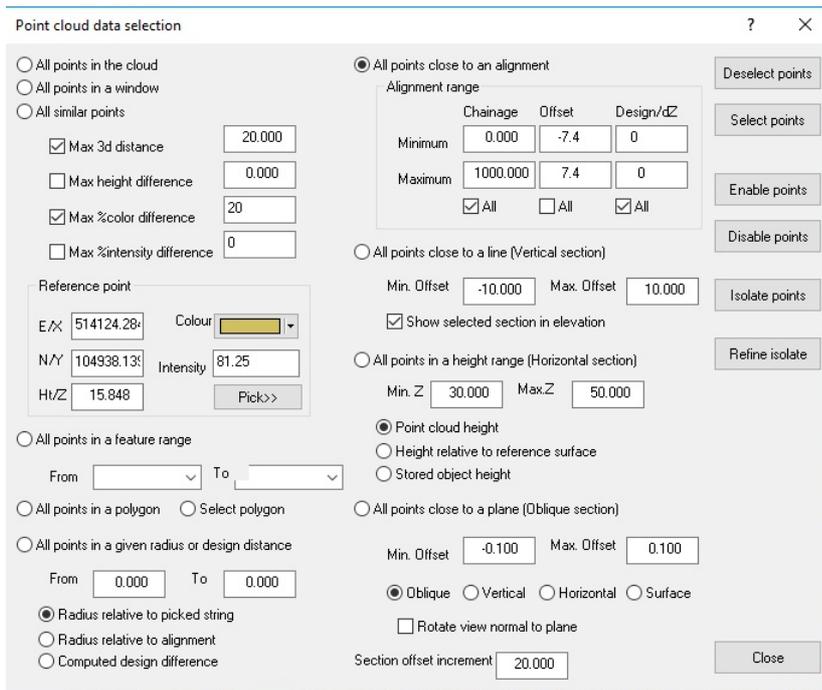
Select 'TOOLS tab > Line' button and measure from centreline to edge of road

Approx 7.233m

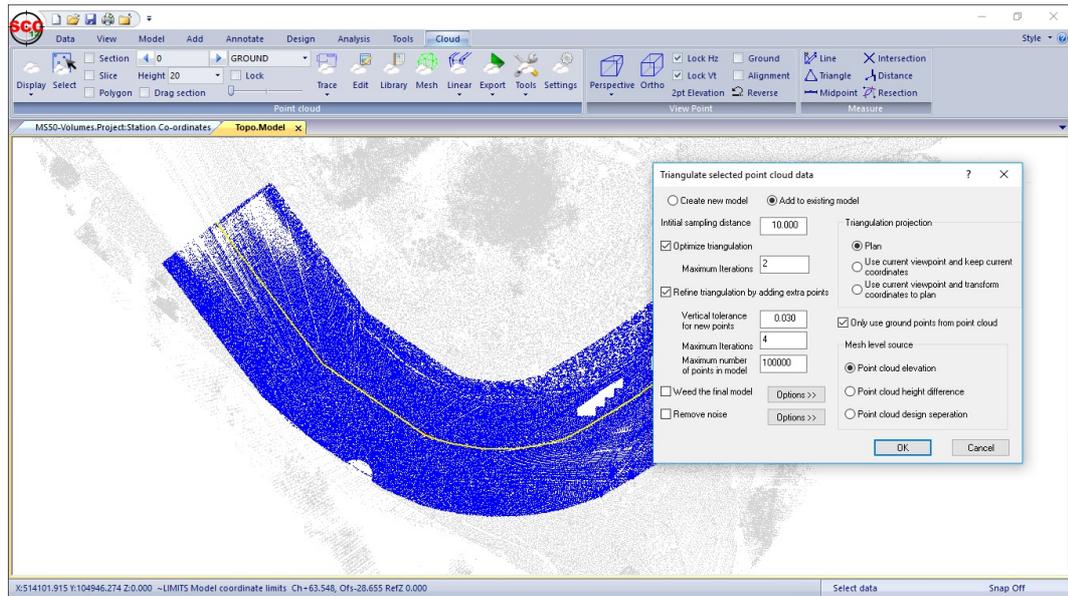


Right click mouse to bring up 'Data Selection Dialog' set up the following 'All point close to an alignment', then select 'Isolate Points'

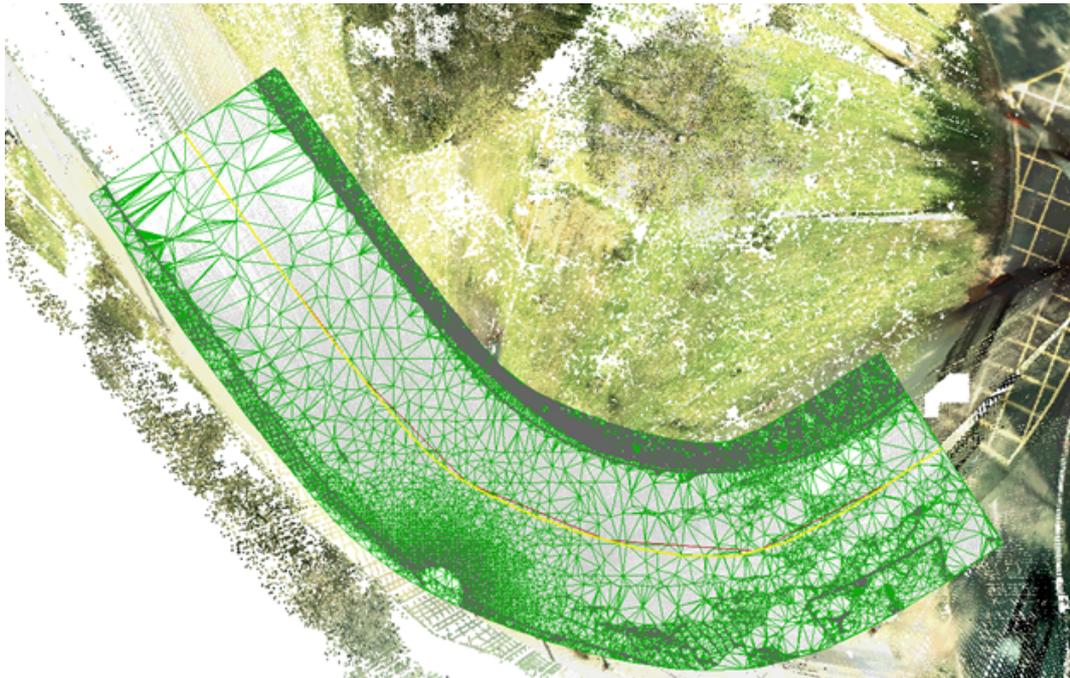
Re-enter and then, select 'Select Points'



To triangulate, select 'CLOUD tab > Mesh' button and set up the following:



Note, this option can be slow depending on the parameters and the number of points selected. To improve performance and final result remove or isolate noisy features such as grass, trees, cars, street furniture and overhead cables prior to running this option. Only selected points whose features have an analysis type of Ground are considered when running this option, so simply changing the feature of such points to any other feature will accomplish this.



Other options relating to point cloud processing include linear feature extraction, density based feature extraction (stringing clumps of points), tracing string manually in conjunction with cloud snap, and use of other surface based tools in conjunction with the point cloud ground surface rather than the TIN.

To add further information to our TIN model, from coarser areas of the model that may have lower accuracy requirements, Extract a grid of levels can be used, and add the generated data to the TIN created above, along with traced linear features such as kerbs described earlier. Note that when extracting a grid of levels, it is best to select the option to snap to the level of lowest point in the defined snap search radius, as this will tend to generate a more uniform surface, skipping small vegetation and similar items.

1.6 Tracing 2D Features Such As Road Markings

SCC point cloud module can be used to trace outlines of features using a combination of colour / intensity difference, height difference and distance from a reference point. For example, road markings.

Open 'Topo.Model' from SCC\Tutorials folder

Zoom to Road Markings of interest

Right click mouse to bring up 'Data Selection Dialog'

Select 'All similar points' set up the following:

The screenshot shows the 'Point cloud data selection' dialog box with the following settings:

- All similar points
 - Max 3d distance: 20.000
 - Max height difference: 0.500
 - Max %color difference: 10
 - Max %intensity difference: 0
- Reference point:
 - E/X: 514087.58, Colour: [Yellow]
 - N/Y: 104913.556, Intensity: 93.75
 - Ht/Z: 15.520, Pick>>
- All points in a feature range
- All points in a polygon
- All points in a given radius or design distance
 - From: 0.000, To: 0.000
 - Radius relative to picked string
 - Radius relative to alignment
 - Computed design difference
- All points close to an alignment
 - Alignment range:

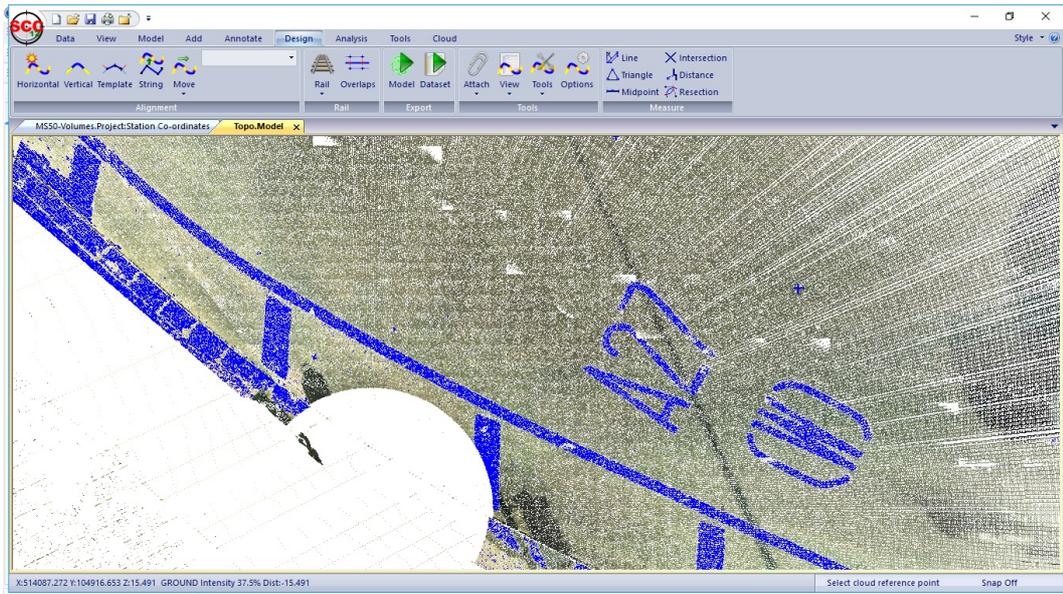
	Chainage	Offset	Design/dZ
Minimum	0.000	-7.400	0.000
Maximum	1000.000	7.400	0.000
 - All, All, All
- All points close to a line (Vertical section)
 - Min. Offset: -10.000, Max. Offset: 10.000
 - Show selected section in elevation
- All points in a height range (Horizontal section)
 - Min. Z: 30.000, Max. Z: 50.000
 - Point cloud height
 - Height relative to reference surface
 - Stored object height
- All points close to a plane (Oblique section)
 - Min. Offset: -0.100, Max. Offset: 0.100
 - Oblique, Vertical, Horizontal, Surface
 - Rotate view normal to plane
 - Section offset increment: 20.000

Press 'Pick>>' button and then left click on select a reference point for colour and position

Within the 'Data Selection Dialog' pick 'Select points' to highlight all the points that are similar to that reference point.

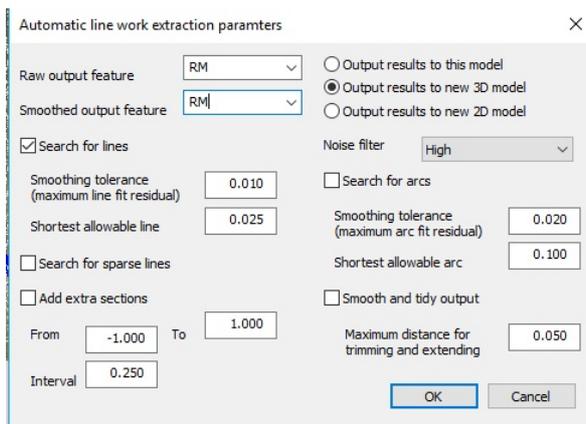
Note that if we were trying to pick up road markings we could first isolate the road area using a chainage / offset or polygon selection first.

The selected data will appear as shown below

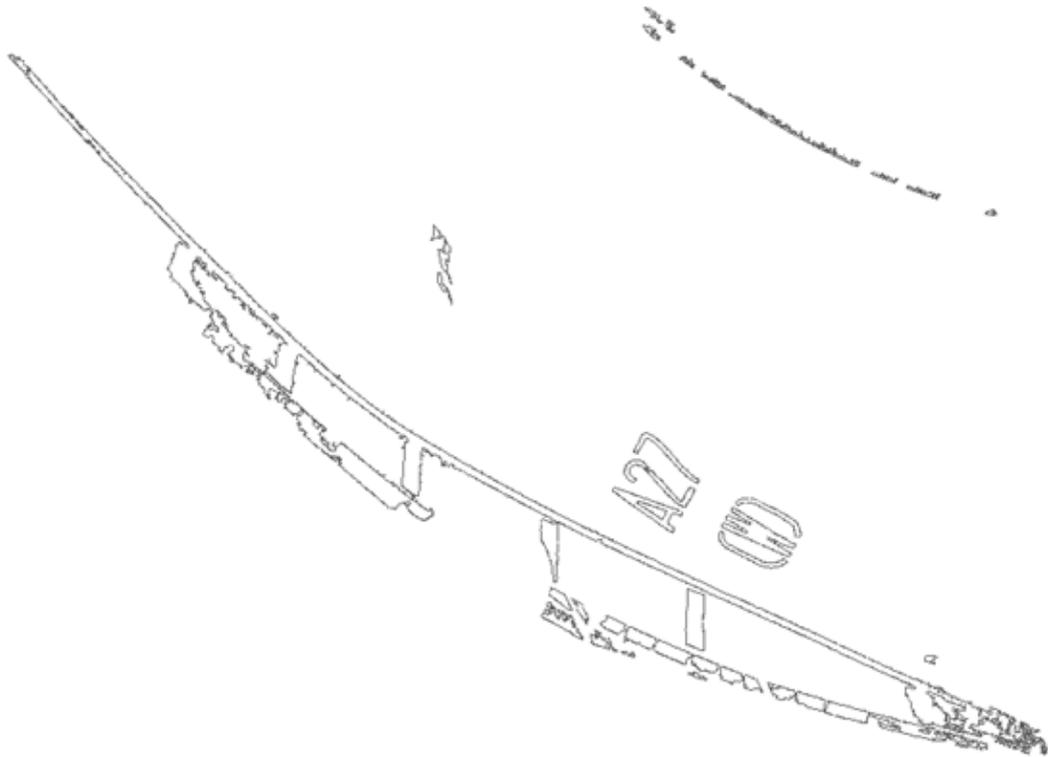


Additional reference points can be selected to add more data, and polygon based de-selection of any areas that were included but not required. Removing points in this many will also speed up the tracing process, and reduce the size of the output model.

Selecting 'CLOUD tab > Trace drop down menu > Trace selected points' set the following;



Which produces:



1.7 Extracting Line Work & DTM from Mobile Lidar Data

The following tutorial explores the extract of linear features from Mobile Lidar Data using an alignment and the generation of a TIN. Tools to highlight non ground points by Height are examined and finally, addition of point features are created in the model.

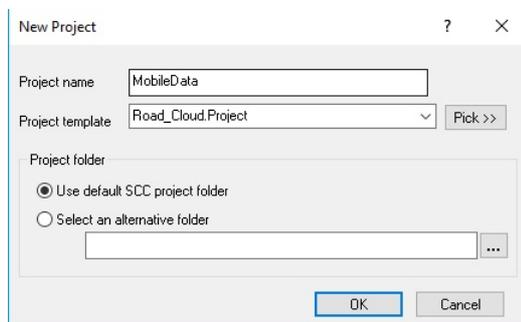
1.7.1 Create New Project

From the Main Screen, select 'DATA tab > New'

Enter in a Project/Job name 'MobileData'

Select a Project Template from the list 'Road_Cloud.Project'

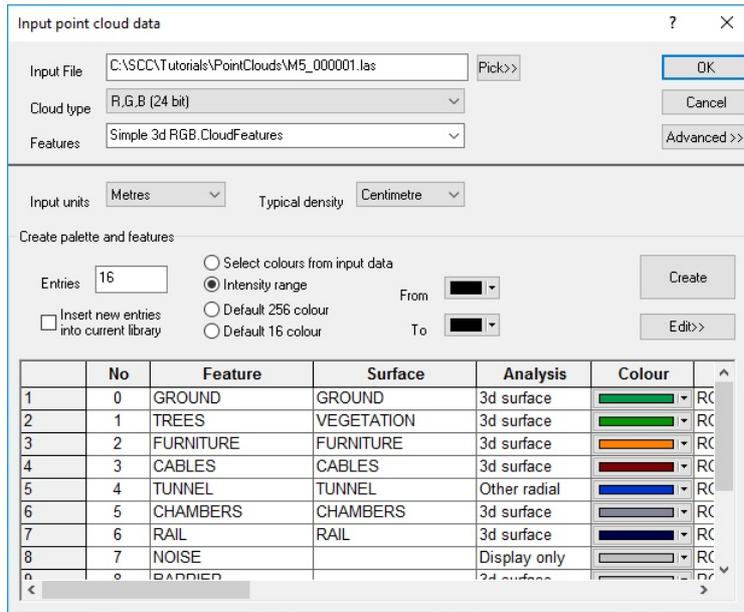
Select 'OK'



1.7.2 Importing Sample Data

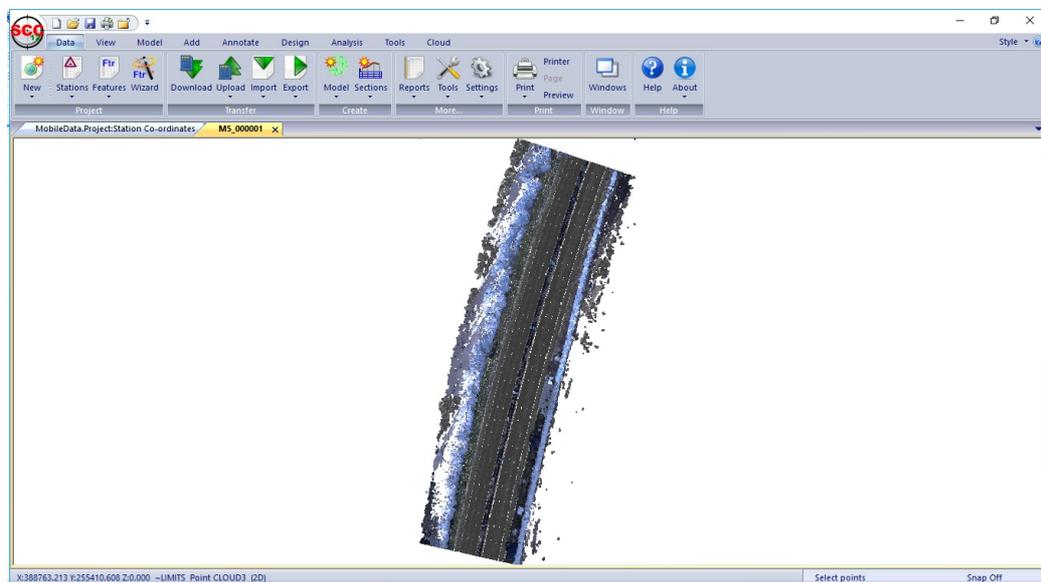
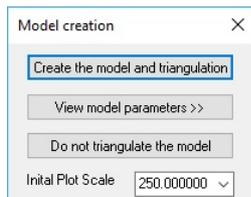
To start, select 'Model Tab > Point clouds and LIDAR > LAS or LAZ file' and pick the appropriate input format.

Pick 'M5_000001.las' from Tutorials directory and set up the following;



Press 'Ok'

Select 'Ok' to Model Creation and Raw cloud creation dialog

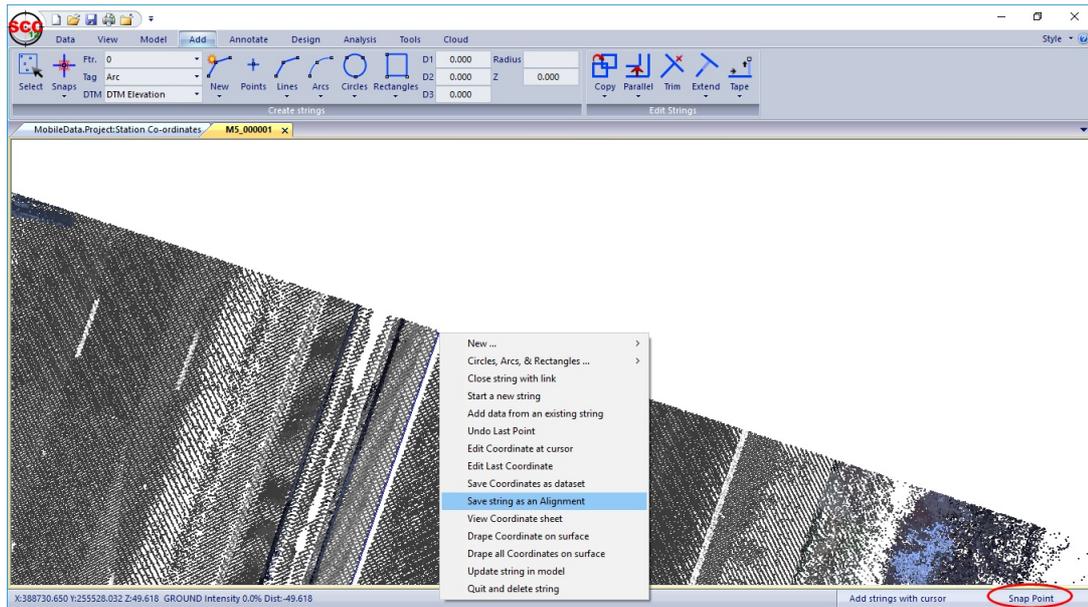


1.7.3 Create A Simple Alignment

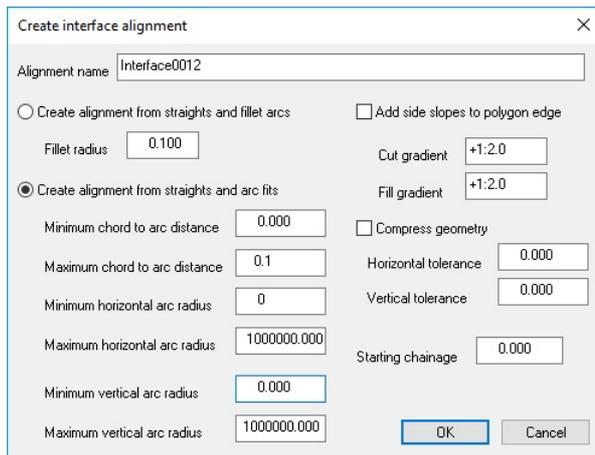
Go to 'ADD tab > New > Arc'

Left click mouse on screen to begin centre line, change the geometry as the line process to Arc tag and then finishing with Straight

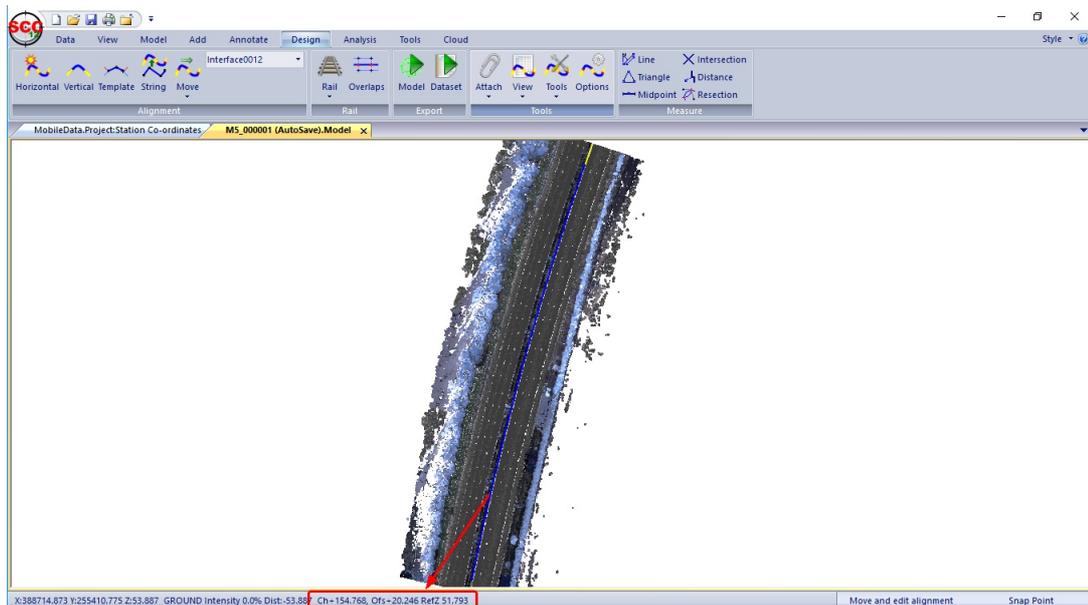
Right click mouse on screen, select 'Save string as an Alignment'



Set up the following and press 'Ok'



An alignment is now present, note Chainage/Offset system



1.7.4 Settings

Go to 'Cloud tab > Settings', set up the following and press 'Ok'

1.7.5 Trace Linear Features: Road Edge, Batter Rail and Channel

First pick template points: Road Edge, Batter Rail and Channel

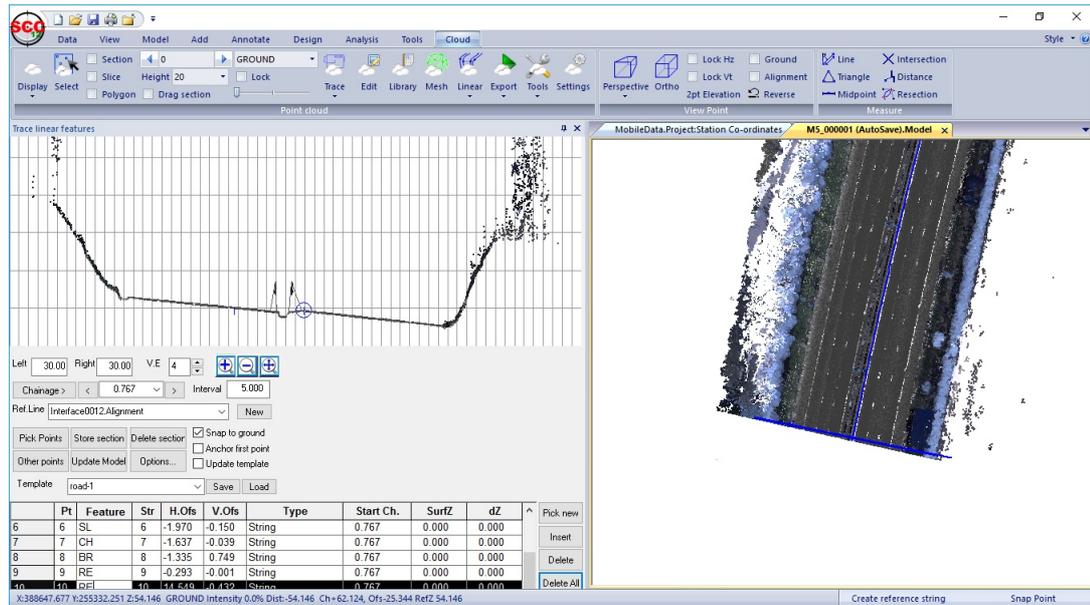
Left click on model to position at a given chainage, for example 0.767

Pick first point RE on Trace Linear Feature screen by left clicking on section

New Pt is listed below. Change Feature to RE and then continue to pick additional points on section

Set up the following: RE, RE, BR, CH, SL, SL, CH, BR, RE, RE as shown below

Click 'Store Section'

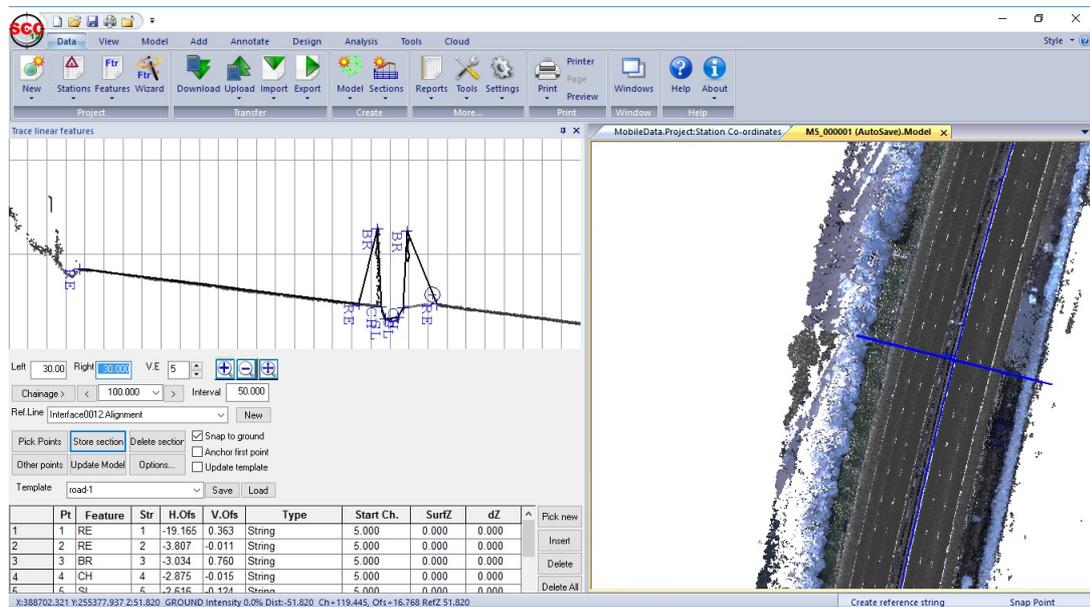


Set the chainage interval to 50

Select Chainage '>' button to move to chainage 50

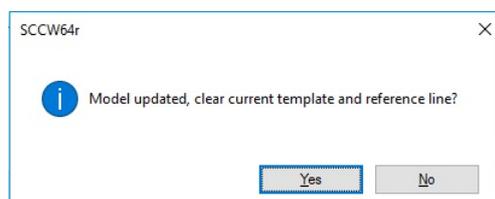
Begin to pick points at chainage 50 by left clicking on section at the position of each feature

Each time select 'Store Section' to save and then move to the next chainage interval



The user can pan back through the model using the chainage button to check if additional points are required

Select 'Update Model' and pick 'No' to 'Model updated, clear current template and reference line'



Enter Template Name 'RD' and pick 'Save'

Then press 'Delete All'

1.7.6 Trace Linear Features: White Lines

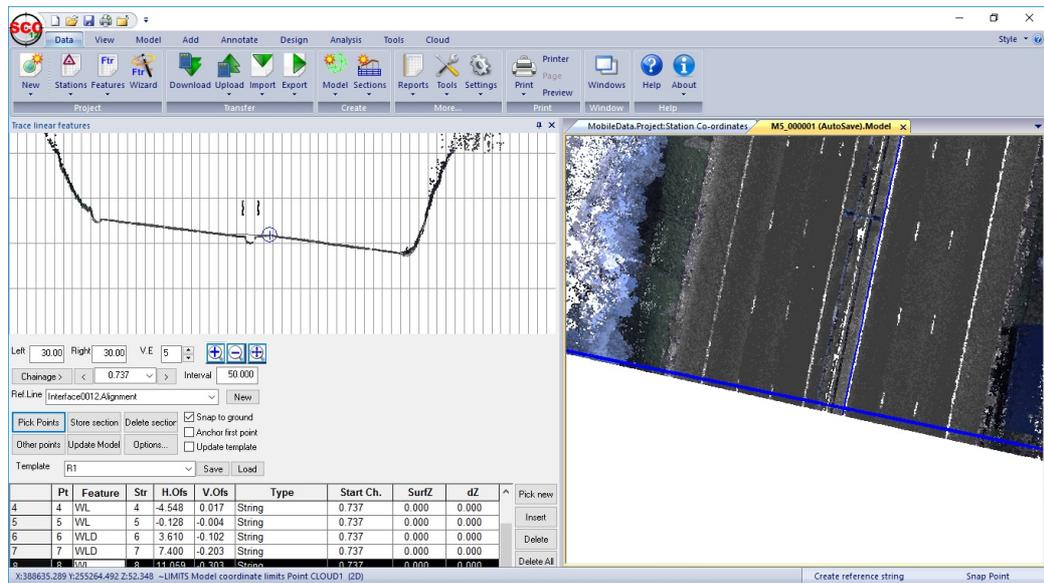
Left click on model to position at a given chainage, for example 0.767

Pick first point WL on Model by left clicking on section

New Pt is listed below. Change Feature to WLD and then continue to pick additional points on section

Set up the following: WL, WLD, WLD, WL, WL, WLD, WLD, WL as shown below

Click 'Store Section'

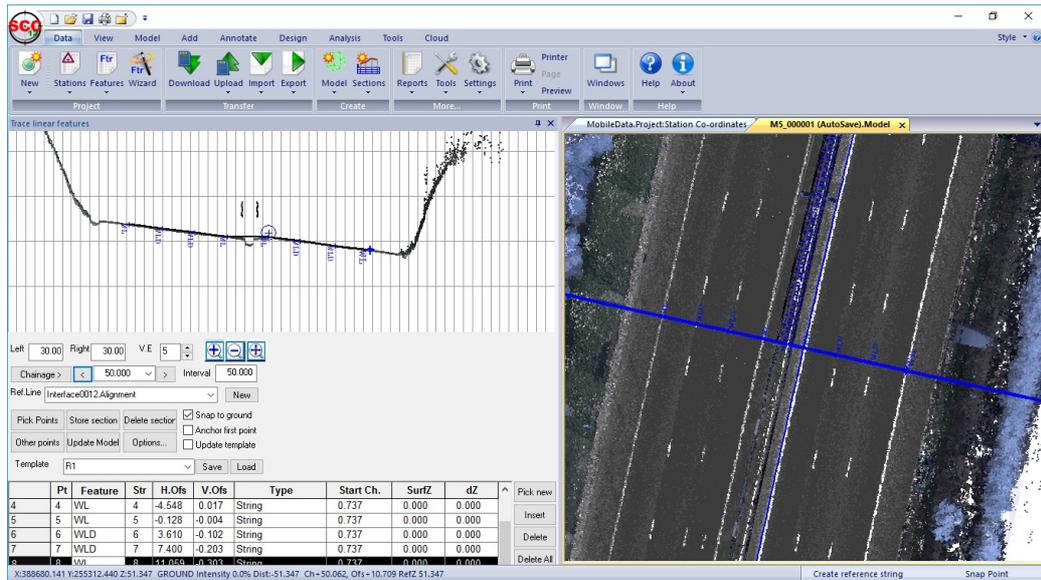


Set the chainage interval to 50

Select Chainage '>' button to move to chainage 50

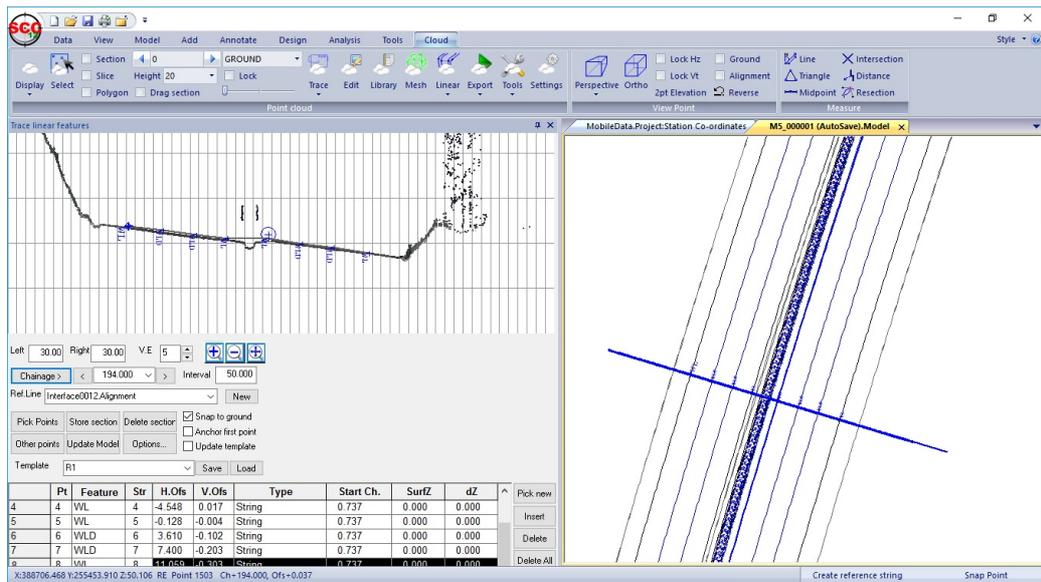
Begin to pick points at chainage 50 by left clicking on Model at the position of each feature

Each time select 'Store Section' to save and then move to the next chainage interval



The user can pan back through the model using the change button to check if additional points are required

Within the 'CLOUD tab > Display'



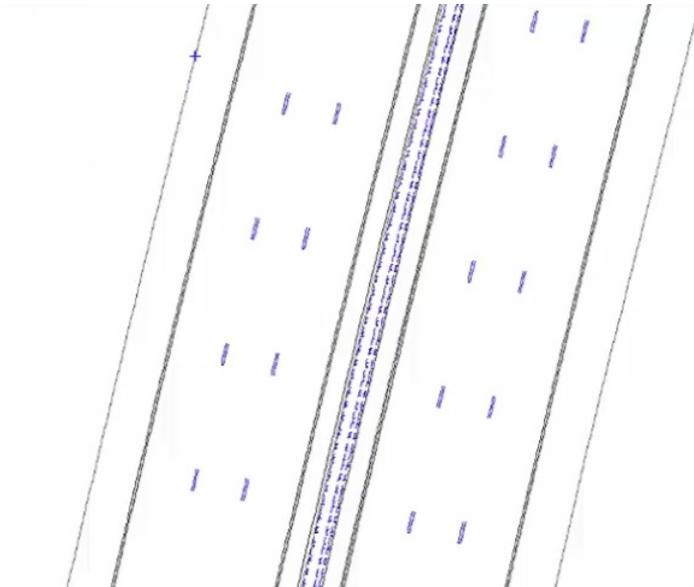
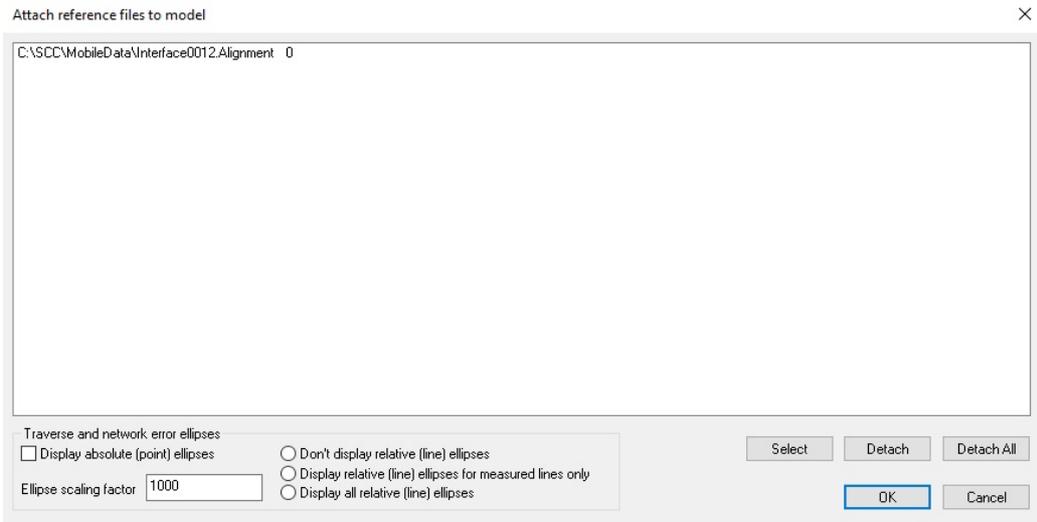
Select 'Update Model' and pick 'Yes' to 'Model updated, clear current template and reference line'

Select 'Close' on the Trace Linear Feature dialog

1.7.7 Detach Alignment

Go to 'DESIGN tab > Attach button'

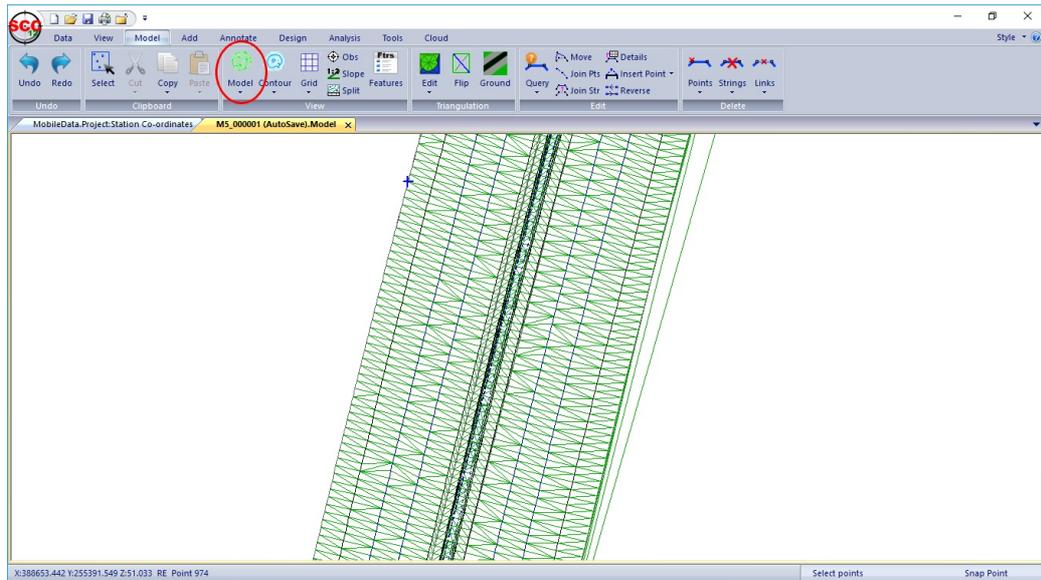
Select 'Detach All' and 'Ok'



1.7.8 Check Model

Go to 'MODEL tab > Model Button'

Check Triangulation



1.7.9 Rotate Model

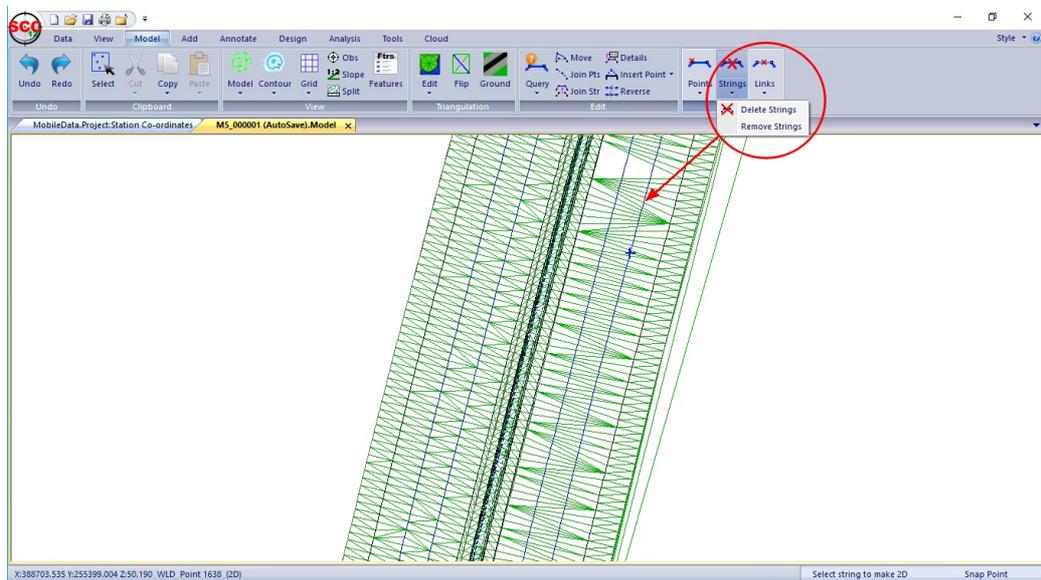
Rotate model, press Mouse Wheel at rotate origin point

Press Right Mouse Button down and move cursor to pivot model

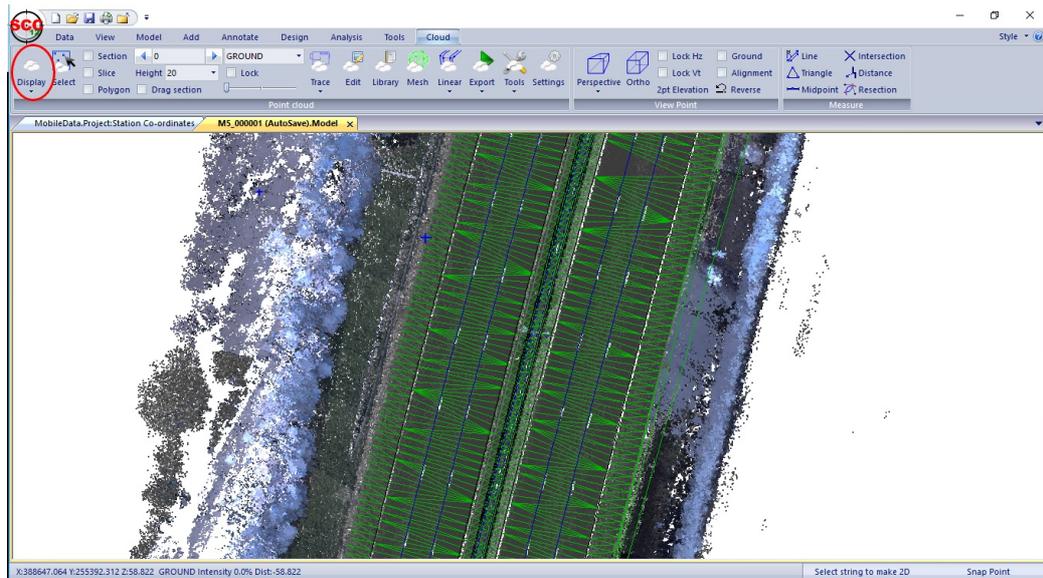
1.7.10 Remove White Lines From TIN

Go to 'MODEL tab > String > Remove Strings'

Left click mouse on WL and WLD strings to remove from TIN



Having remove strings from TIN, select 'Display' from 'CLOUD tab'



1.7.11 Filter the Ground to Identify Lamp Posts , Trees etc. from Main Ground

Go to 'CLOUD tab > Tools > Filter Ground' set up the following and pick 'OK'

Filter ground points ✕

Scan line width	0.050	Ground point feature	GROUND
Scan line length	50.000	Other point feature	OBJ]
Maximum spike width	0.100	Noise reduction factor	Medium ▾

Store object heights

Go to 'CLOUD tab > Library' button

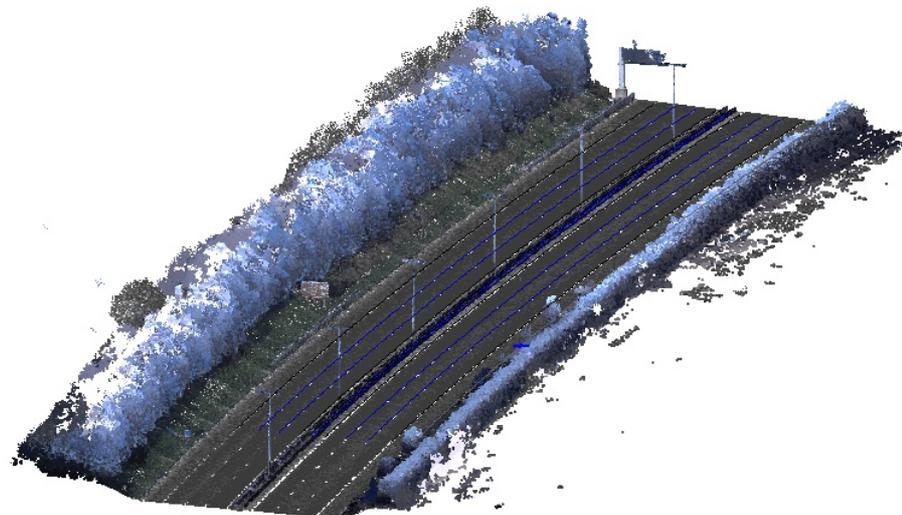
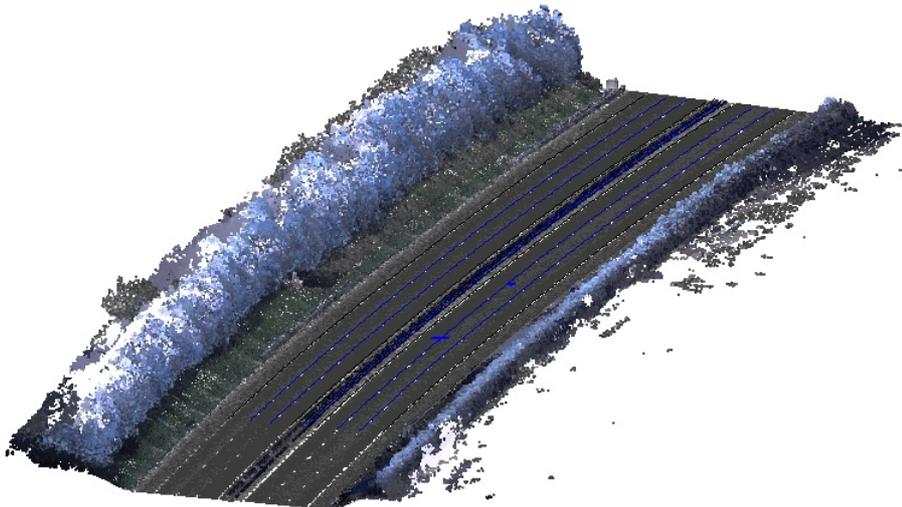
Set 'OBJ' visibility to 'Hidden' and pick 'OK'

Point cloud features									
	No	Feature	Surface	Analysis	Colour	By	Visibility	Lock	
1	0	GROUND	GROUND	Ground		RGB	Opaque	No	
2	1	TREES	VEGETATION	3d surface		RGB	Opaque	No	
3	2	FURNITURE	FURNITURE	3d surface		RGB	Opaque	No	
4	3	CABLES	CABLES	3d surface		RGB	Opaque	No	
5	4	TUNNEL	TUNNEL	Other radial		RGB	Opaque	No	
6	5	CHAMBERS	CHAMBERS	3d surface		RGB	Opaque	No	
7	6	RAIL	RAIL	3d surface		RGB	Opaque	No	
8	7	NOISE		Display only		RGB	Opaque	No	
9	8	BARRIER		3d surface		RGB	Opaque	No	
10	9	PYLON		Display only		RGB	Opaque	No	
11	10	OTHER		Display only		RGB	Opaque	No	
12	11	S1		Ground		RGB	Opaque	No	
13	12	BUILDING		3d surface		RGB	Opaque	No	
14	13	HIGH		Other ground surface		RGB	Opaque	No	
15	14	OBJ		3d outline		RGB	Opaque	No	

Relief colour palettes: Elevation Intensity Height Separation

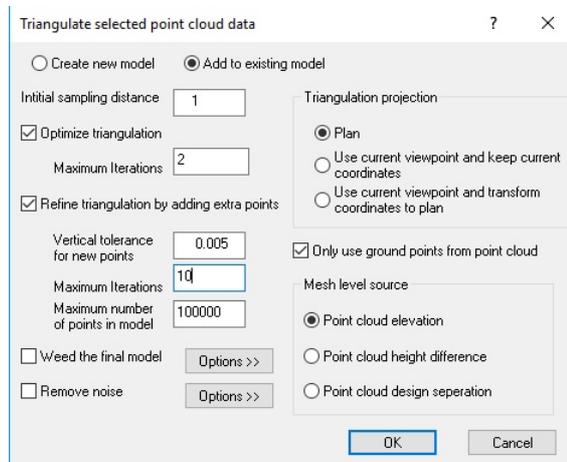
Buttons: Add, Delete, Delete All, Global Edit, Replace, Export, Import, Save, Load, Ok, Cancel

Notice the difference when OBJ is set to Opaque and Hidden



1.7.12 Create TIN

To triangulate, select 'CLOUD tab > Mesh' button and set up the following:



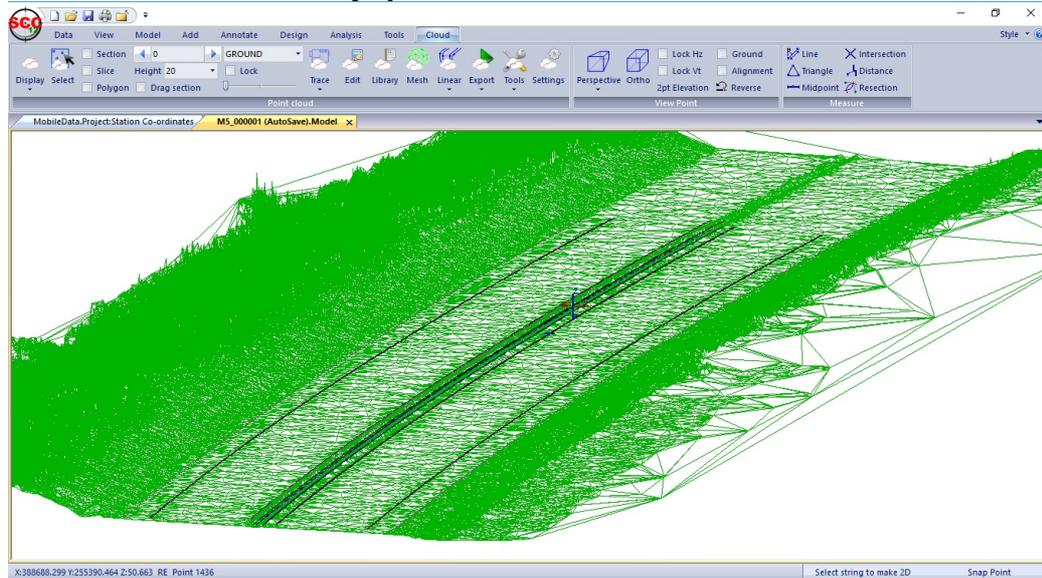
Press 'Ok'

Go to 'MODEL tab > Model button' to turn on TIN

Rotate model, press Mouse Wheel at rotate origin point

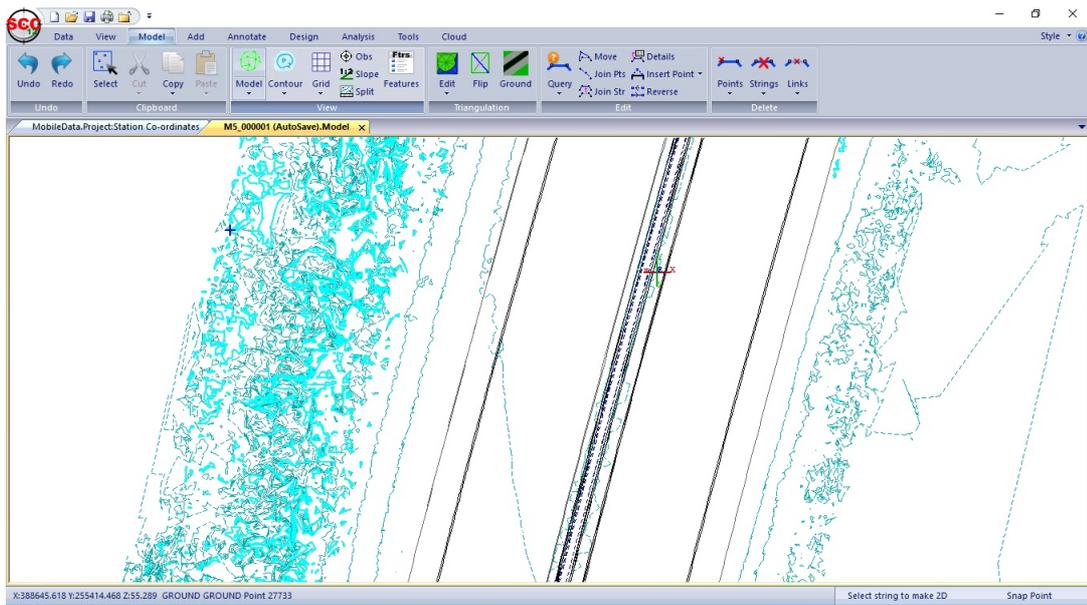
Press Right Mouse Button down and move cursor to pivot model

Within the 'CLOUD tab > Display' to turn off cloud data



Go to 'MODEL tab > Model button' to turn off TIN

Go to 'MODEL tab > Contour button' to turn on contours



1.7.13 Highlight Non-Ground Points By Height

Go to 'CLOUD tab > Library' button

Pick 'Height' as the Relief Colour Palettes

Set up the following 'Add Elevation/color range' for 0 -5 range

Point cloud features

No	Feature	Surface	Analysis	Colour	By	Visibility	Lock
1	0	GROUND	GROUND	Ground	RGB	Opaque	No
2	1	TREES				Opaque	No
3	2	FURNITURE				Opaque	No
4	3	CABLES				Opaque	No
5	4	TUNNEL				Opaque	No
6	5	CHAMBERS				Opaque	No
7	6	RAIL				Opaque	No
8	7	NOISE				Opaque	No
9	8	BARRIER				Opaque	No
10	9	PYLON				Opaque	No
11	10	OTHER				Opaque	No
12	11	S1				Opaque	No
13	12	BUILDING				Opaque	No
14	13	HIGH				Opaque	No
15	14	OBJ				Hidden	No

User specified relief contours

Contour colour relief scheme

File name: Save New

From Z	Colour
1 0.000	
2 1.000	
3 2.000	
4 3.000	
5 4.000	

Add elevation / color range

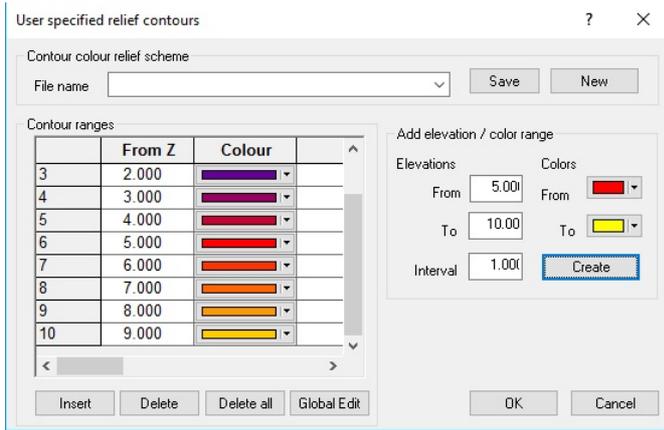
Elevations From: 0.000 To: 5.000 Interval: 1.000

Colors From: To:

Create

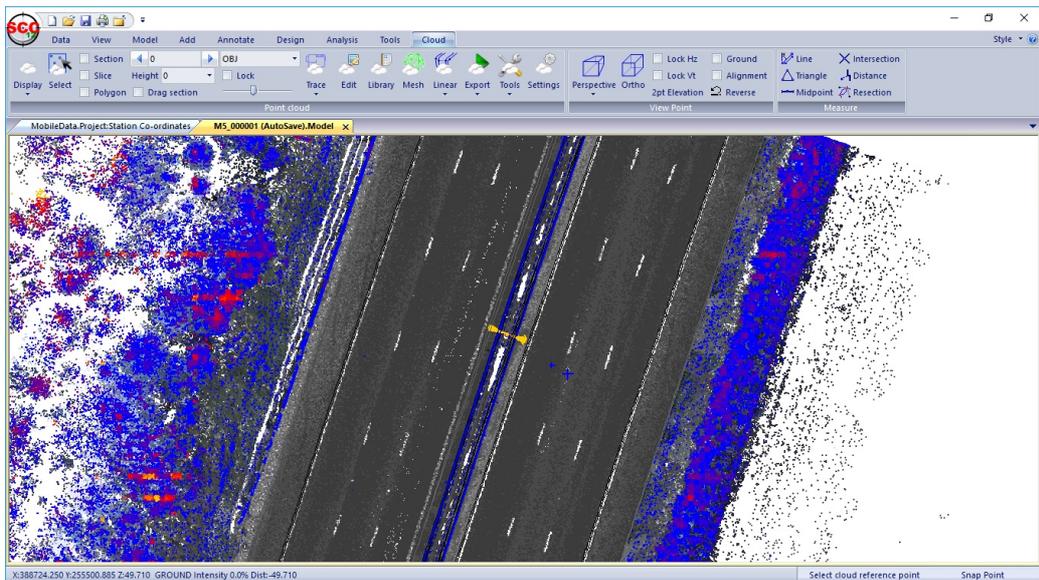
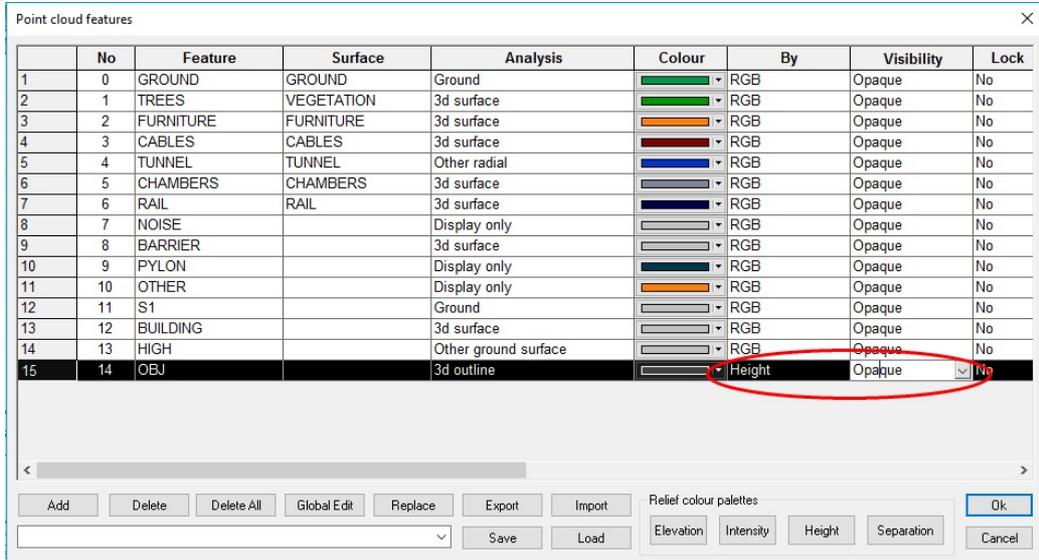
Relief colour palettes: Elevation Intensity Height Separation

Set up the following 'Add Elevation/color range' for 5-10 range



Select 'OK'

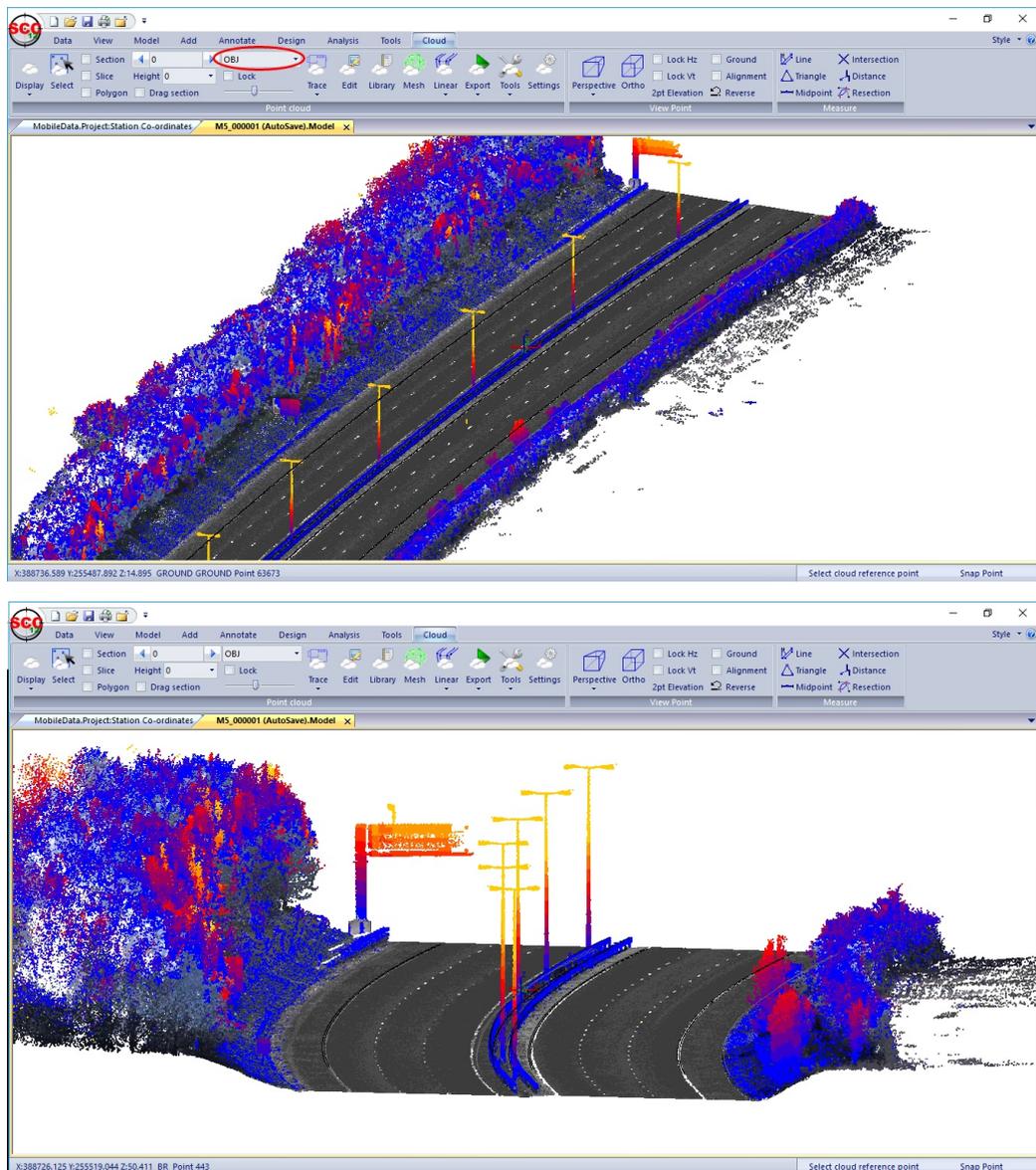
Set By as 'Height' for OBJ and Visibility to 'Opaque', then press 'OK'



Rotate model, press Mouse Wheel at rotate origin point

Press Right Mouse Button down and move cursor to pivot model

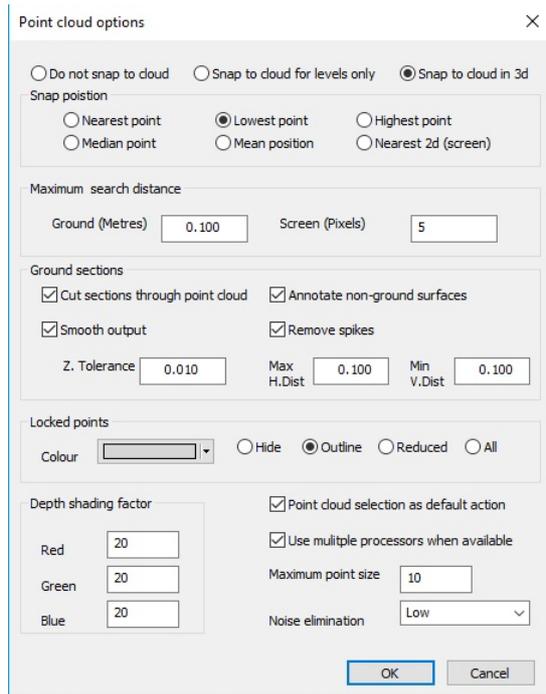
Pick 'OBJ' within Selection toolbar from 'CLOUD tab'



1.7.14 Add Features

Go to 'Cloud tab > Settings', set up the following and press 'Ok'

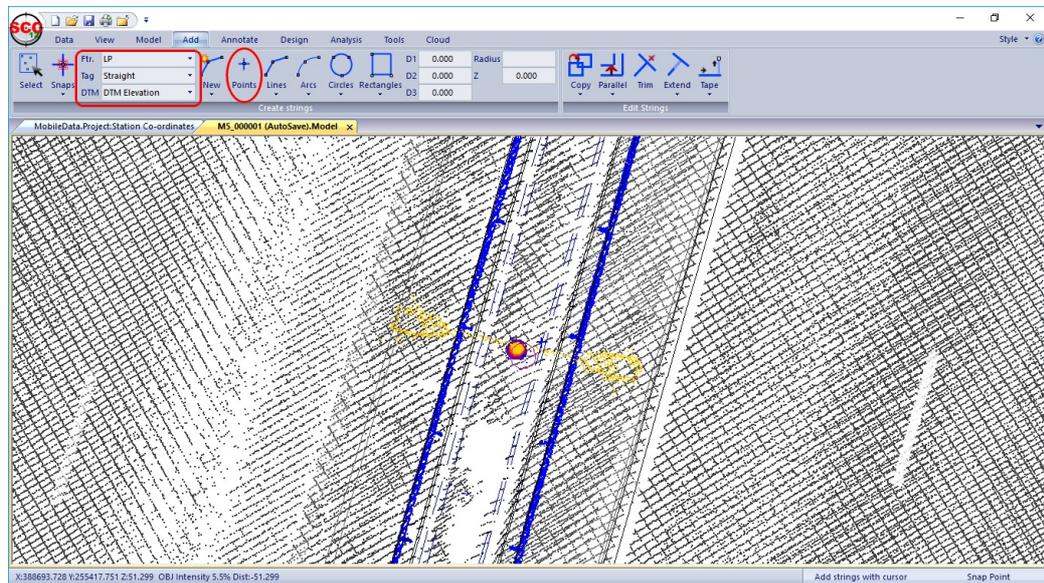
Ensure that 'Lowest point' is selected



Go to 'ADD tab' set LP as feature and pick 'Point'

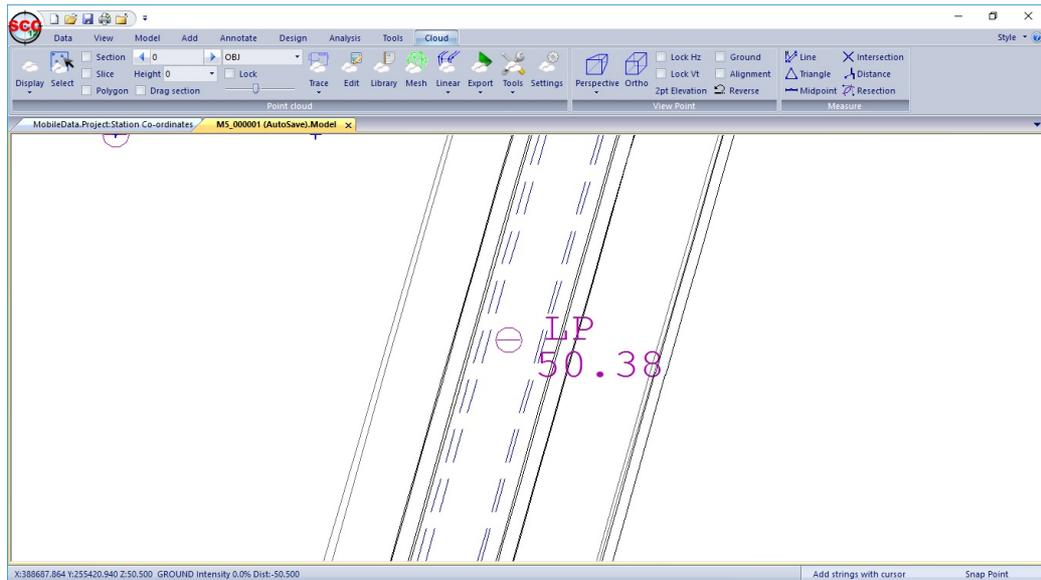
Left click on model, to place lamp post

Right click mouse and select 'Update string in model'



Select 'CLOUD tab > Display' to turn on cloud

LP is visible



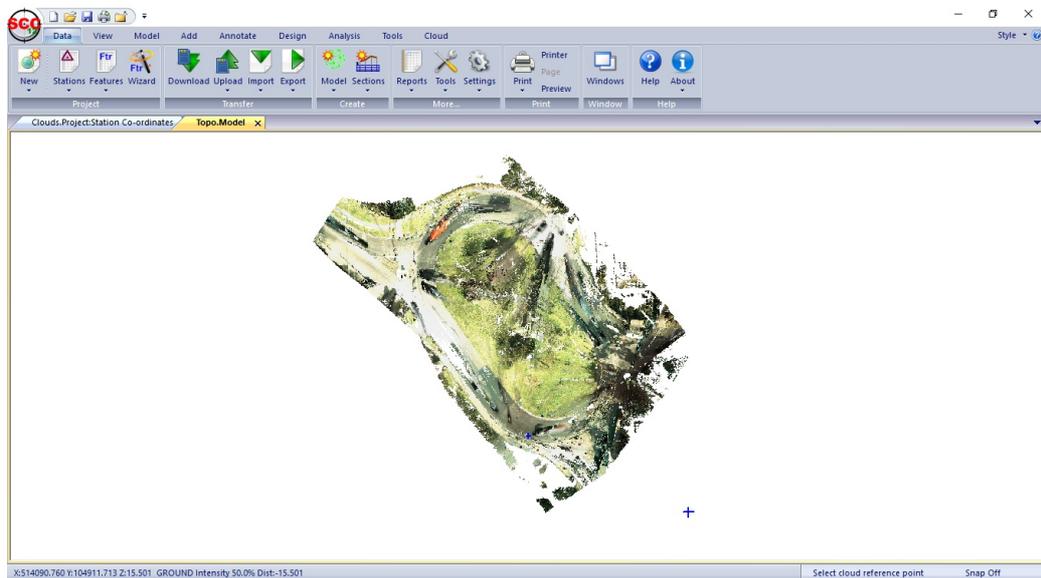
1.8 Cloud Volumes

This tutorial examines sample data 'Topo.Model' in order to calculate volumes of the roundabout island.

1.8.1 Open Existing Project & Model

Open 'Cloud.Project' from SCC\Tutorials\PointClouds folder

Open 'Topo.Model' from SCC\Tutorials\PointClouds folder



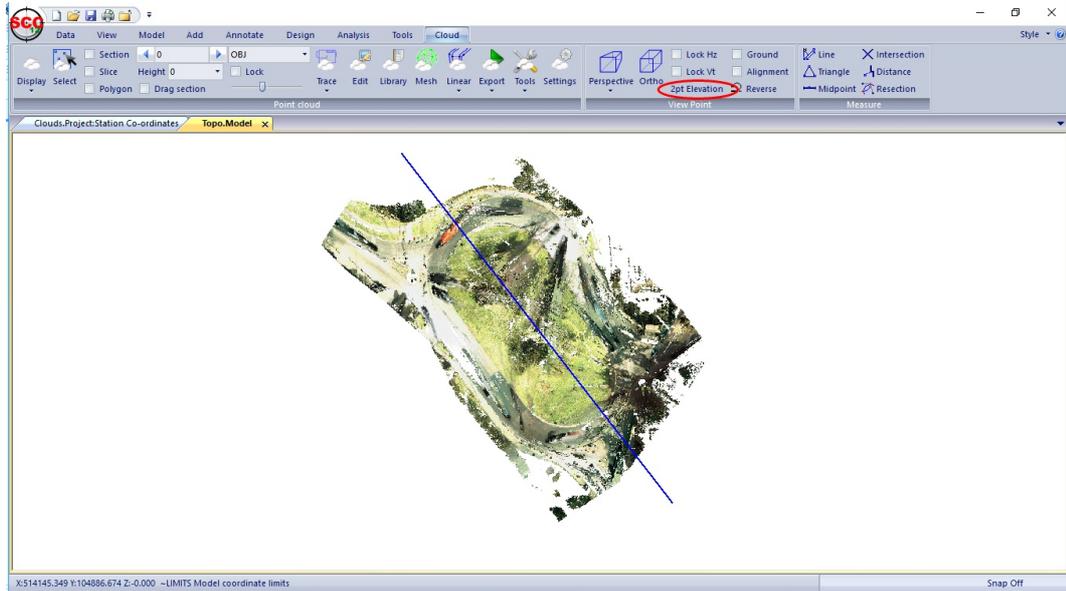
1.8.2 Rotating Viewpoints

The most important step computing volumes from point clouds is to ensure the cloud model is free from data not related to the measurement such as vegetation, street furniture, etc..

Select such data en-masse and change its feature.

Go to 'CLOUD tab > 2pt Elevation'

Select a line running through the area of interest, left click mouse on screen to pick first point and then left click on last point to finish



1.8.3 Cloud Data Selection & Editing

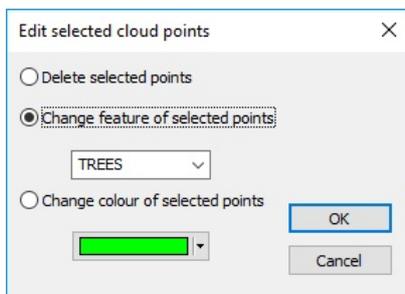
To select data, right click to bring up the Data selection dialog, followed by picking 'All points in a polygon' and press Select data

On the model to select points for exclusion from the measure, press left click on mouse to pick points on the polygon followed by right click to close it.



Go to 'CLOUD tab > Edit'

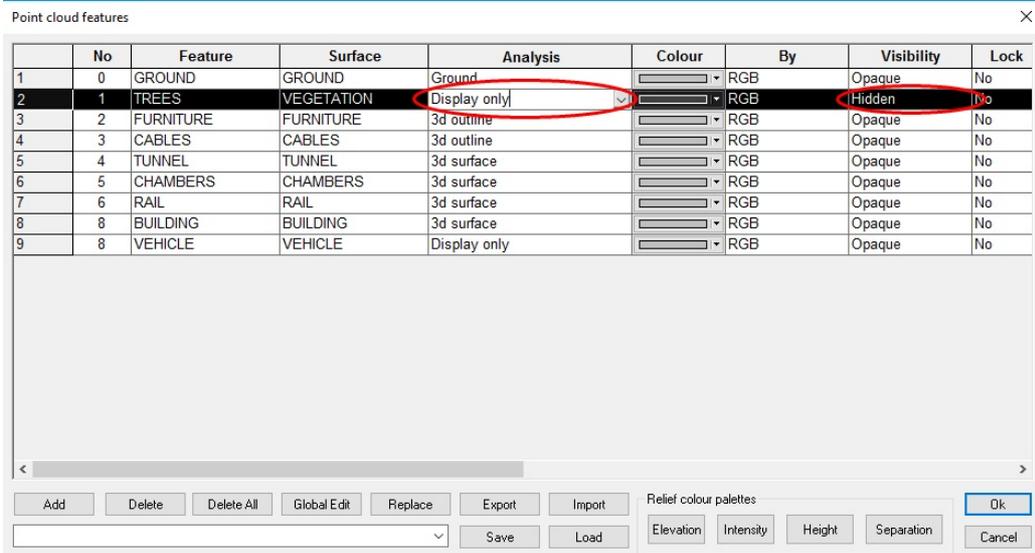
Set up the following and press 'Ok'



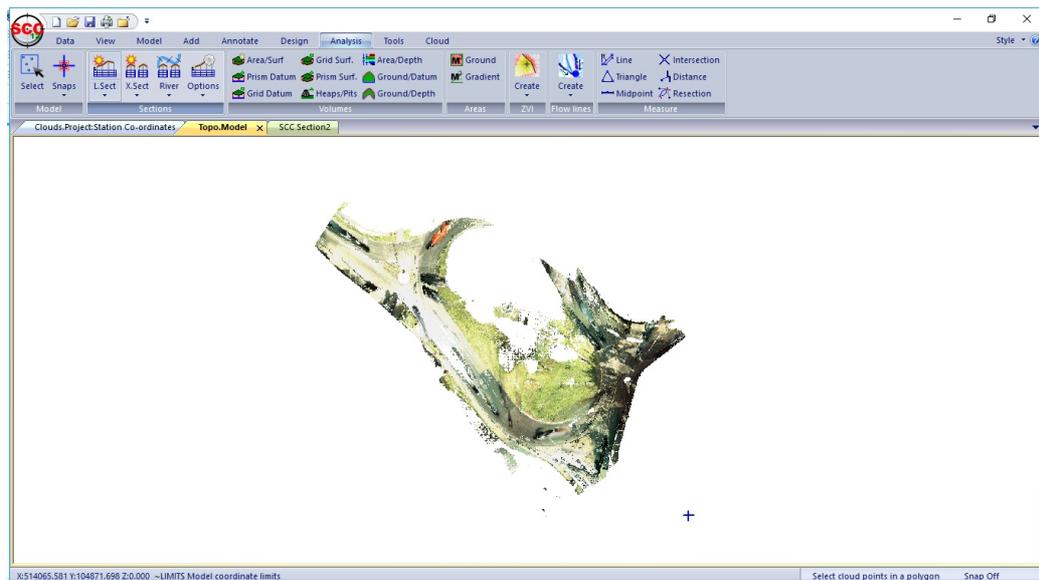
For volumes one feature in addition to GROUND will suffice. For more complex analysis this method can be use in conjunction with the isolate points option to break a model down into multiple features as has been done on the TOPO model.

1.8.4 Check Cloud Surface Data

Select 'CLOUD tab > Library button', and change the analysis type for excluded features TREE to 'Display only', and the Visibility to 'Hidden'.

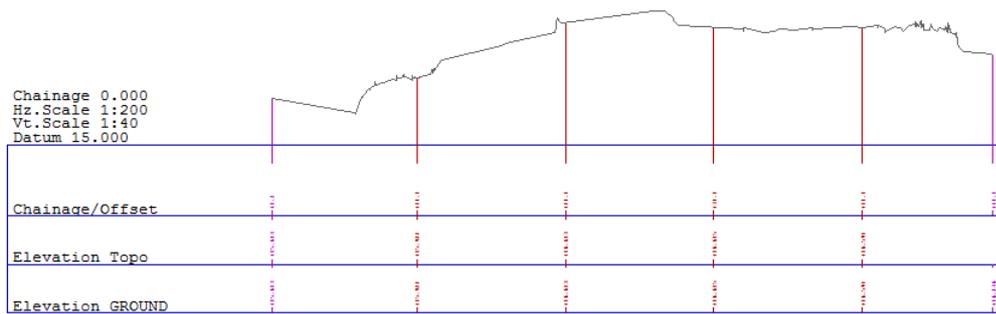


Select 'P' to change to Plan view



To check the surface is as intend, select ' ANALYSIS tab > L. Section button' and take a section through a vegetated area of the traffic island

Left click mouse on model for first point, then again for second and right click to finish



Use 'FILE > Save As' to save a copy of our edited model.

1.8.5 Creating Base Model

On order to compute volumes, a base model is needed. The easiest way to create one is to simply draw a polygon around the area of interest, interpolating levels from the cloud, and saving it as a new surface. This can be done as follows;

'CLOUD tab > Settings' set up the following

Ensure 'Lowest point' is selected.

This has the effect that levels will be taken based on the lowest point within the given radius of the plan point, thus avoiding any noise than may have been left in the model during the editing process.

Go to 'ADD tab > New > Lines'

Left click mouse on screen to begin line and continue to place points

Change geometry from Straights to Arc when required

Finish by using Link tag to join end to start point

Right click mouse on screen select 'Drape All points on surface'

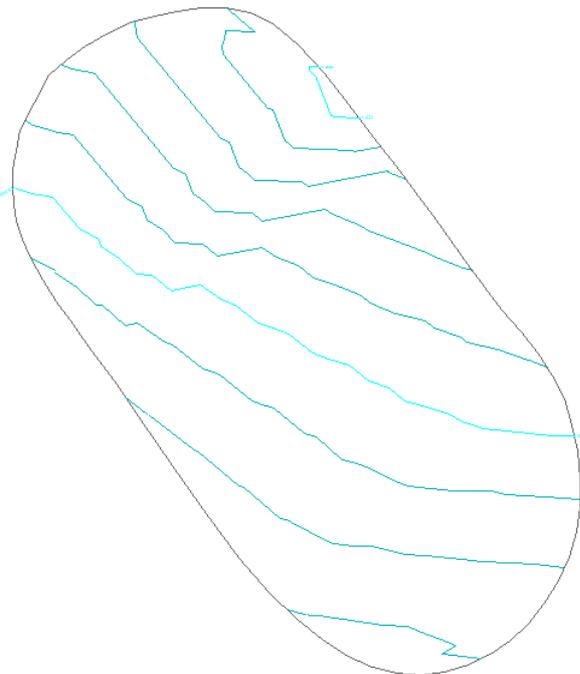
Right click mouse on screen select 'Save coordinates as dataset' to save the 3d outline of the base model

Save Dataset as 'TOPO_Base.Survey'



Go to 'MODEL tab > Model button' pick 'TOPO_Base.Survey'

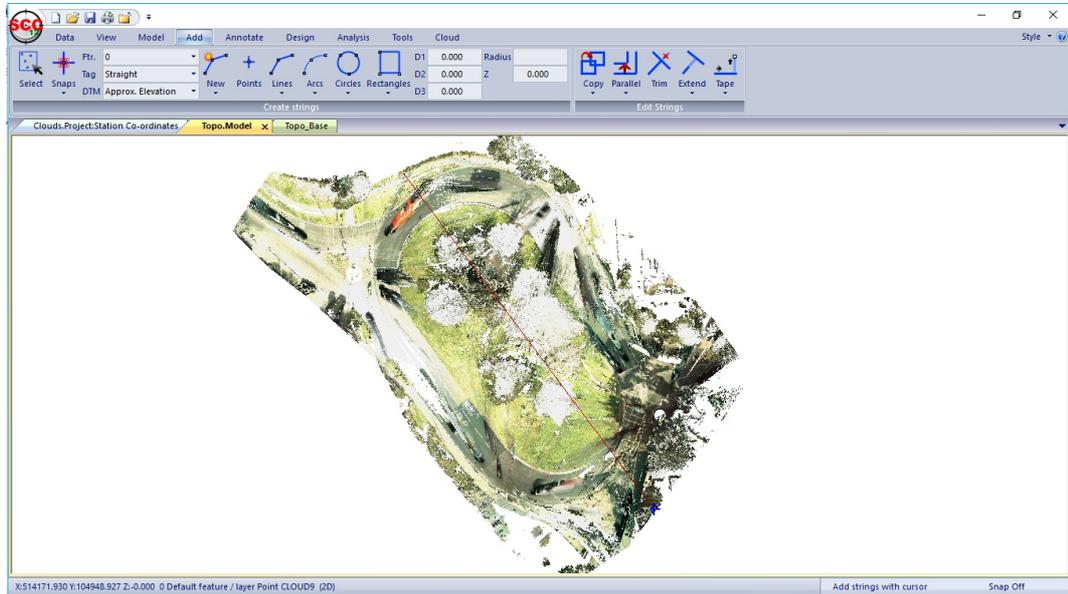
Model at 1:250



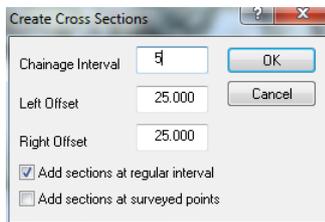
1.8.6 Volumes By Average End Method

Go to 'ADD tab > New > Lines'

Create a new string along the centre of the traffic island with a DTM code of Approximate that can be used as a base line.



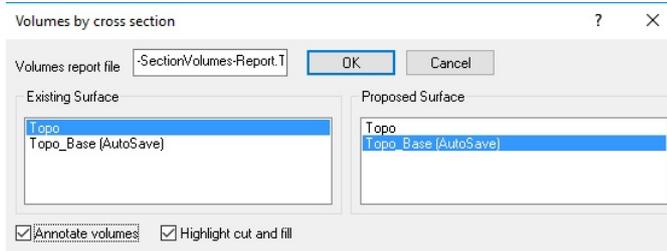
Select 'ANALYSIS tab > X.Sect button, set up the following and press 'Ok'

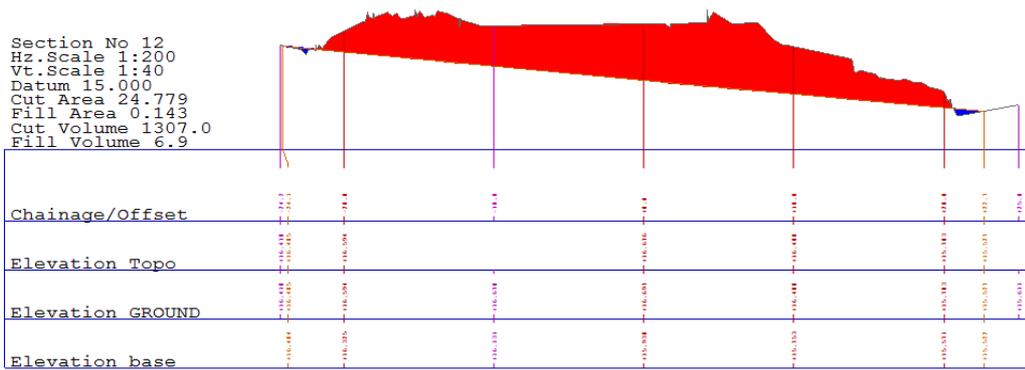


Pick the selected centre line

In the sections, select 'EDIT tab > Append button' and pick the base model

Select 'EDIT tab > Append drop down > Volumes' to compute the volumes





SCC_Section5-SectionVolumes-Report.Txt - WordPad

File Edit View Insert Format Help

Existing surface : Topo
 Proposed surface : Topo_Base (AutoSave)

Chainage	Cut Area	Fill Area	Cut Volume	Fill Volume	Cut w/Corr	Fill w/Corr	Inst Radius	Cut C
+000000000.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
+000000010.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
+000000020.0	9.432	0.001	47.159	0.003	47.159	0.003	0.000	
+000000030.0	3.195	0.000	110.290	0.007	110.290	0.007	0.000	
+000000040.0	5.333	0.000	152.928	0.007	152.928	0.007	0.000	
+000000050.0	20.634	0.000	282.764	0.007	282.764	0.007	0.000	
+000000060.0	23.068	0.000	501.274	0.007	501.274	0.007	0.000	
+000000070.0	23.414	0.039	733.680	0.203	733.680	0.203	0.000	
+000000080.0	23.717	0.000	969.330	0.399	969.330	0.399	0.000	
+000000090.0	16.310	0.000	1169.461	0.399	1169.461	0.399	0.000	
+000000100.0	10.740	0.000	1304.709	0.399	1304.709	0.399	0.000	
+000000110.0	0.000	0.000	1358.408	0.399	1358.408	0.399	0.000	
+000000120.0	0.000	0.000	1358.408	0.399	1358.408	0.399	0.000	
+000000130.0	0.000	0.000	1358.408	0.399	1358.408	0.399	0.000	

For Help, press F1

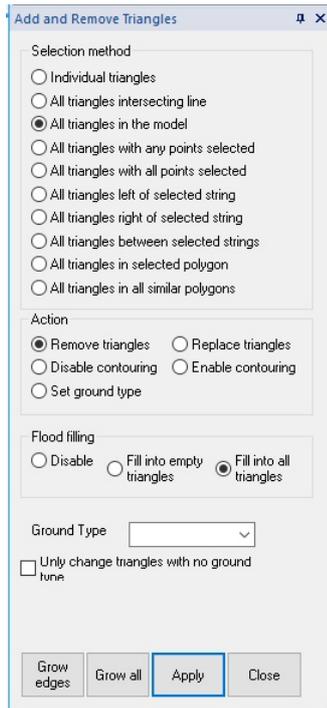
1.8.7 Volumes By Prismoidal Method

To compute the volume using an isopachyte method, do the following;

Go to 'MODEL tab > Edit button' to turn off any triangles in the TOPO model.

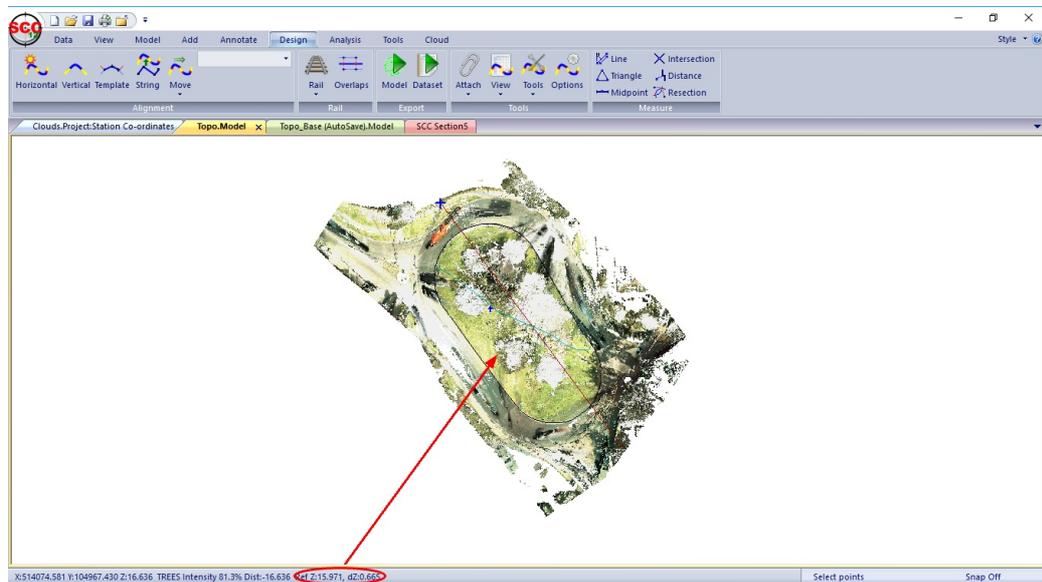
Select 'No' to Store Model Boundary

The reason for this is that SCC allows combined TIN and point cloud surface models, where levels will be interpolated from the TIN model if they are not found in the point cloud.

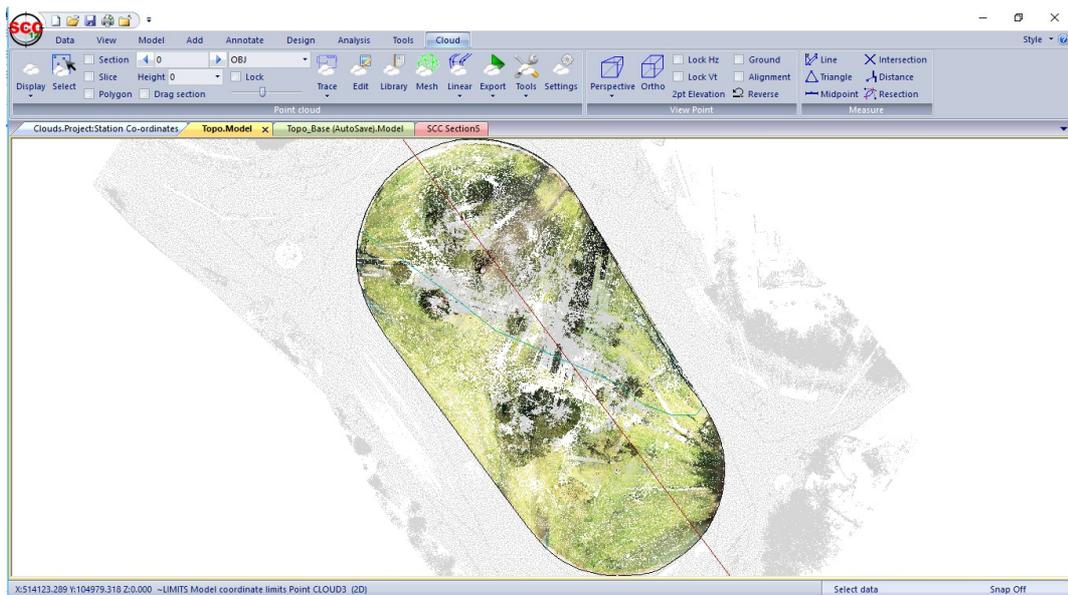
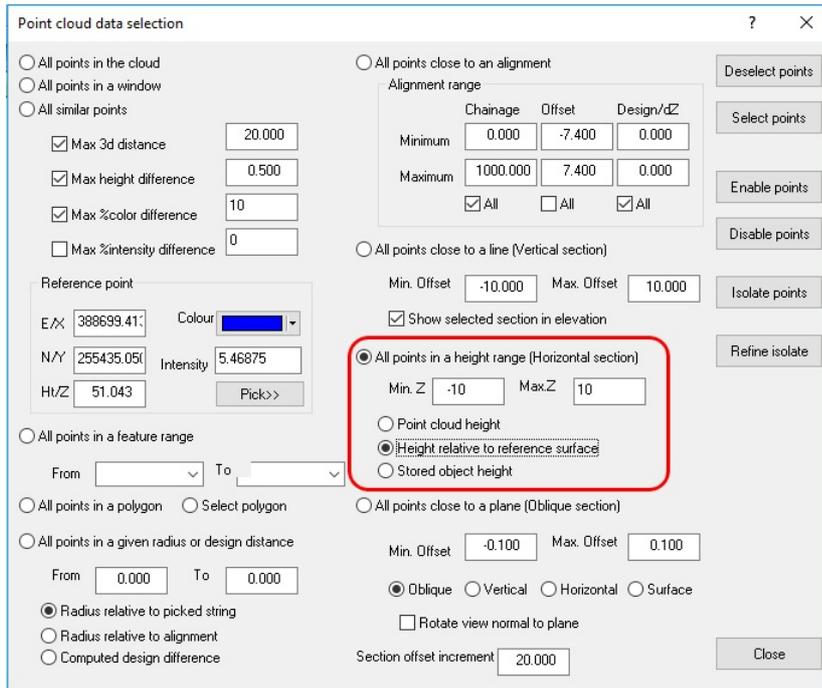


Select 'DESIGN tab > Attach button > Model', and attach the base model to the point cloud.

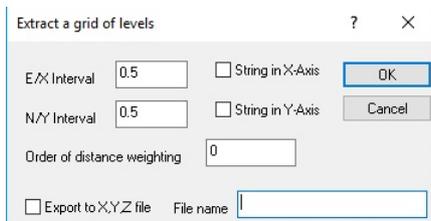
As the cursor is moved over the traffic island, x,Y,Z and dZ can be seen to the base surface.



Right click to bring up the data selection dialog and isolate all the points in the cloud relative to the base model as shown;



Select 'TOOLS tab > Tools drop down > Extract a grid of levels' to take a 0.5m grid across the island, and save the resultant data set.

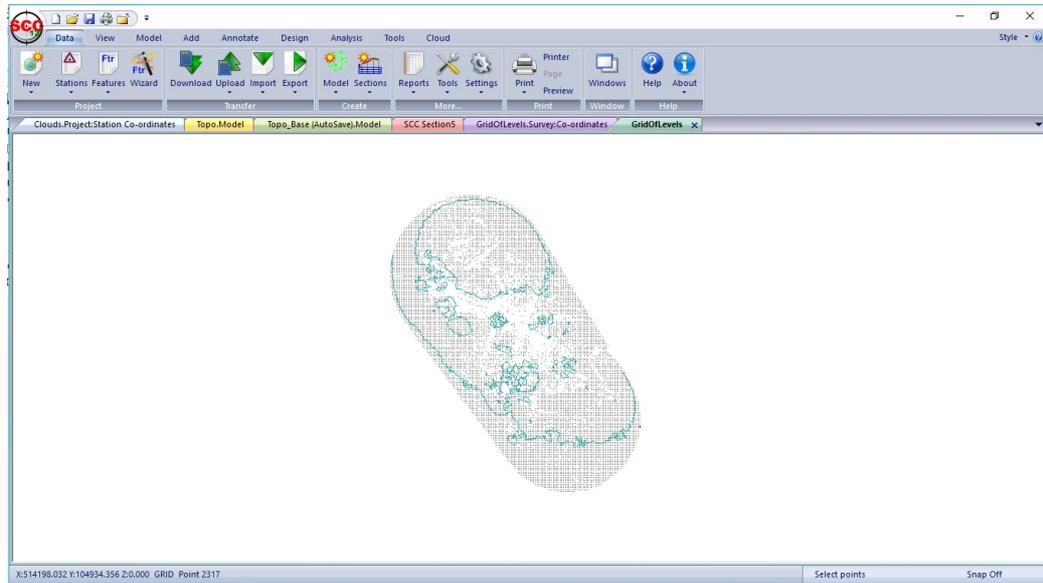


Save Dataset 'GRID.Survey'

Go to 'MODEL tab > Model button' pick 'GRID.Survey'

Model at 1:250

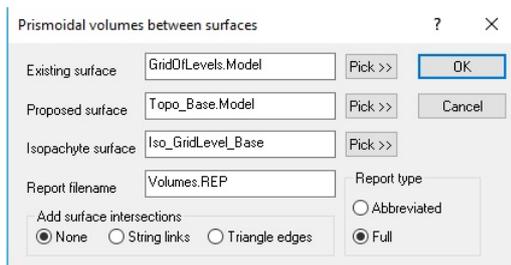
Save Model



Save Model

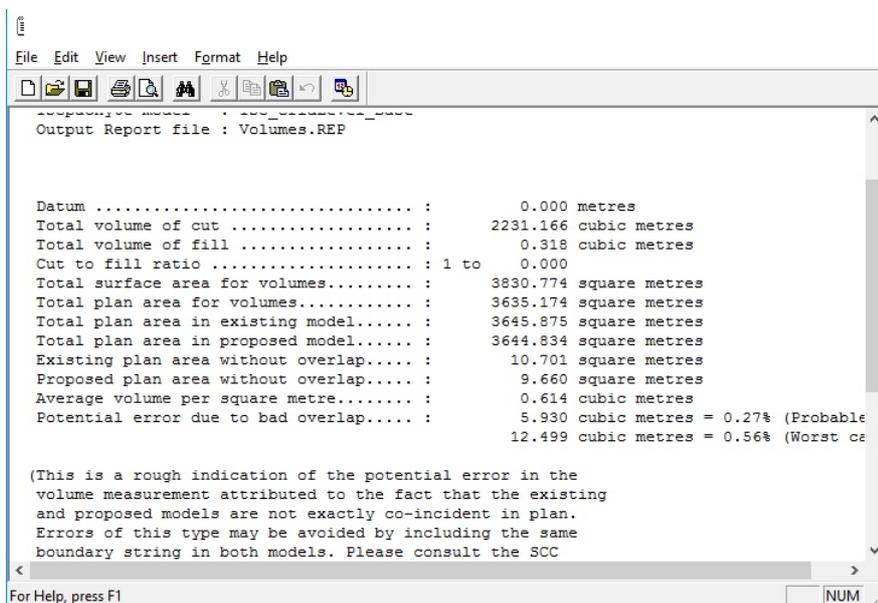
Select 'ANALYSIS tab > Prism Surf.' to compute the volume between the base and island

Set up the following and press 'Ok'

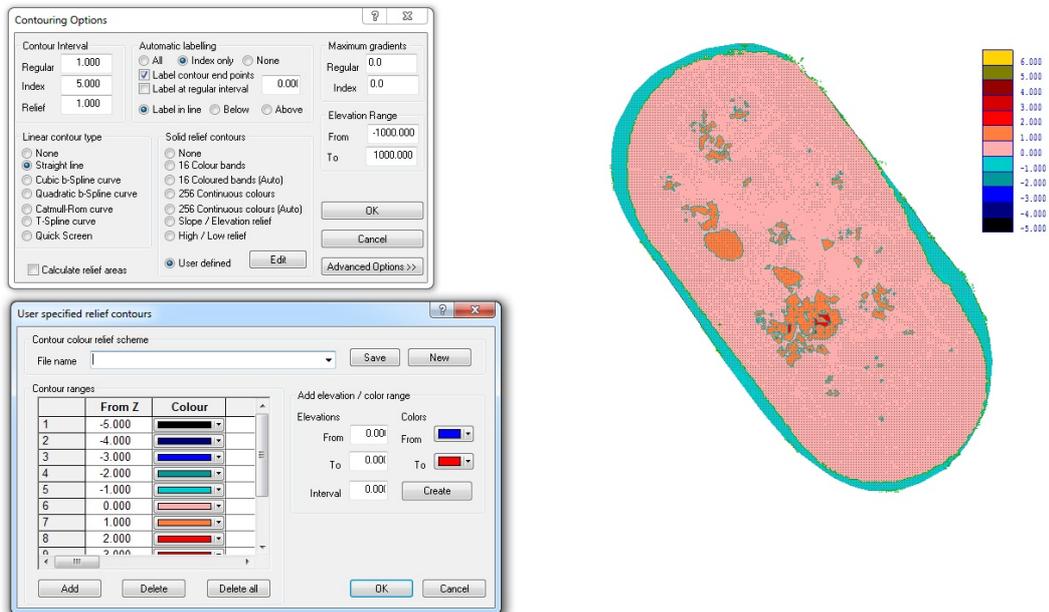


Model at 1:250

Review Report

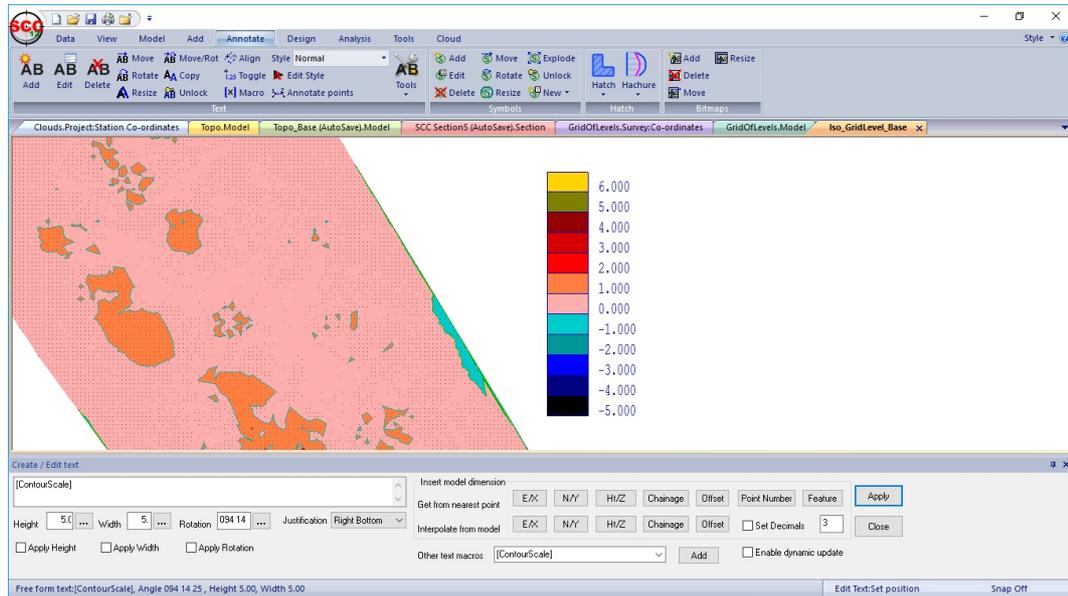


By applying a relief scheme in plan via our contouring options the cut and fill can be visualised.



Using 'ANNOTATION tab > Add button' set up the following:

A scale to the relief scheme can be added to show how depths are coloured.



1.8.8 Export To Google Earth

If the model is in national grid, which will typically be the case using the MS50 with GPS, a quick visualise of result can be viewed in Google earth by selecting 'DATA tab > Export > Google Earth KML'

