PaveState Web Tutorial

Revision	Issue Date	Purpose	Author	Reviewed
A	12/10/2021	Support client in using PaveState	LG	SMW
B	2/11/2021	Updates to data definitions	LG	SMW
C	15/06/2022	Major PaveState User Interface Changes	PK	LG
D	22/07/2022	Data Field Name Changes	PK	
E	31/08/2022	Data Field Name Changes	LG	
F	27/09/2022	Updated Documentation	LG	GAS

GEOTECHNICAL WATER RESOURCES PAVEMENTS

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1 Accessing the Web Site

Go to: https://pavestate.com/

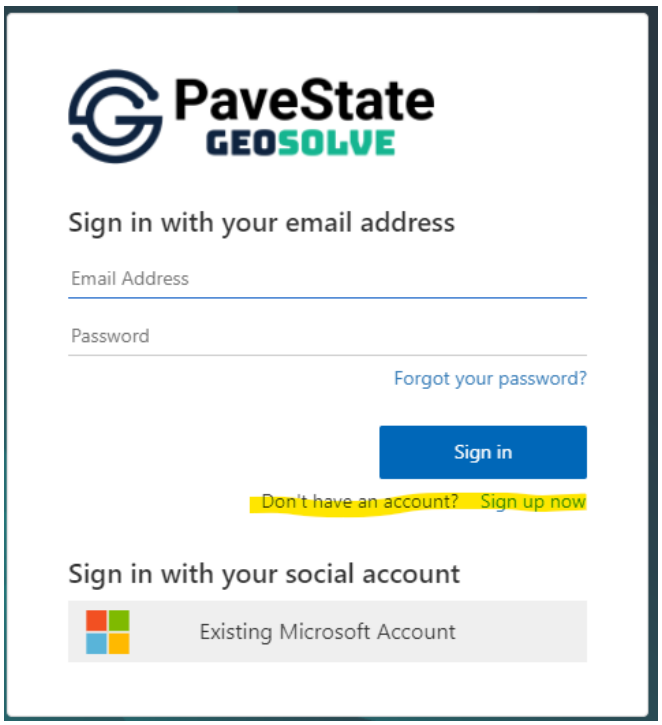

Figure 1 PaveState Sign In form

If you have not created a log in username and password, you will need to create one.

Enter your email address and password to access the PaveState system. If you don't have an account yet, click the Sign up now link.

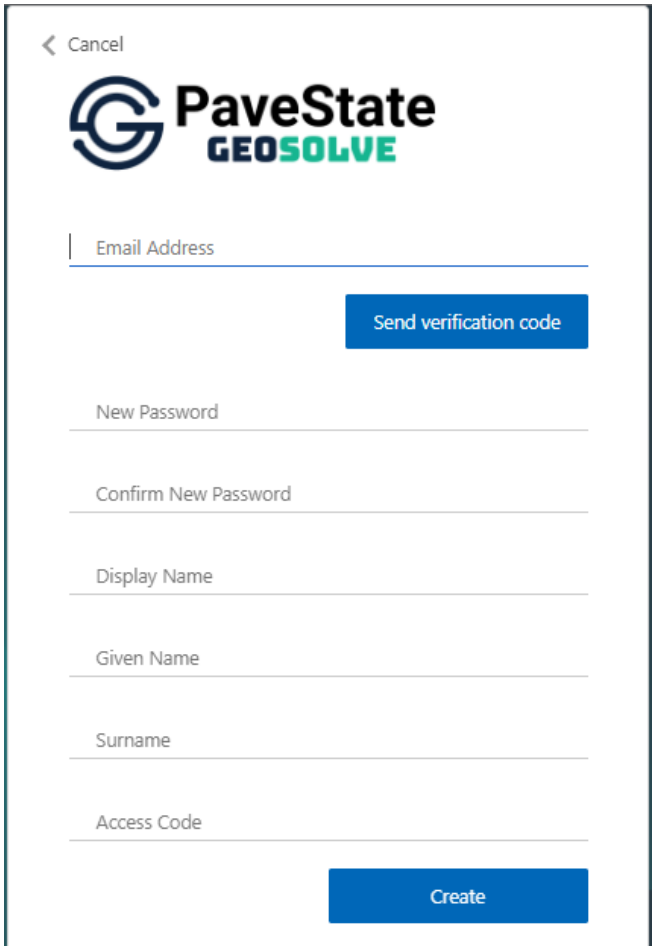

Figure 2 New user Sign Up form

Enter your email address and confirm its existence by sending yourself a verification code. Then enter your details. Access code, the final field, represents the organisation you are associated with and should have been provided to you by either your GeoSolve Point of Contact or the admin user for your organisation.

Once you have created an account, allow some time for your account to be approved. Note that your account can be approved by a Geosolve Admin User or your organization's client admin user. You should receive a confirmation email once it has been approved and your data is ready to be viewed.

2 Viewing Datasets

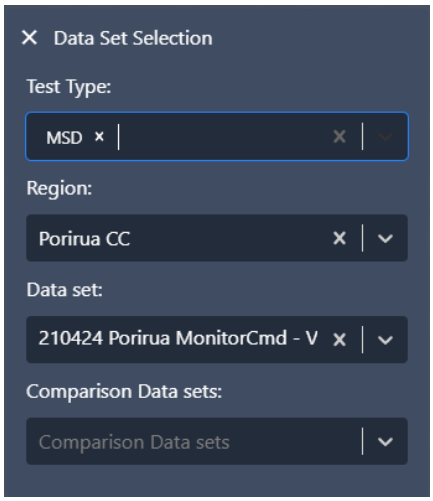

Figure 3 Data Set Selection

Select first the Test Type (MSD, FWD or TSD), then the Region or governing body, and then the Data set.

You can select more than one Test Type by adding them one after another. They will show as chips in the Test Type field, and if you wish to remove one, just click the x next to it.

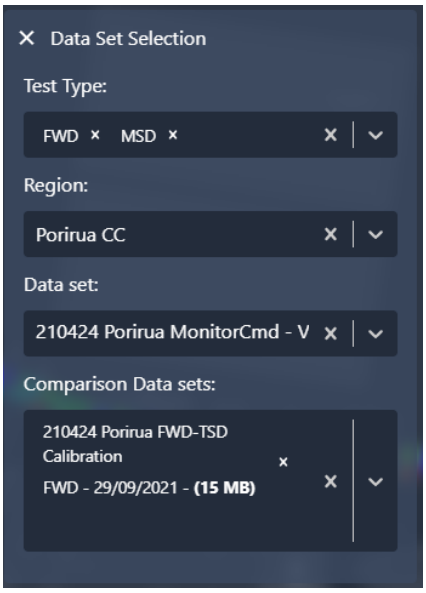

Figure 4 Choose Comparison Data Sets

Comparison Data Sets can be selected in the field shown. You can select more than one Data Set for comparison, which will be shown in separate chips one below the other. If you would like to remove any previously selected Comparison Data Sets, just click the x next to the chip.

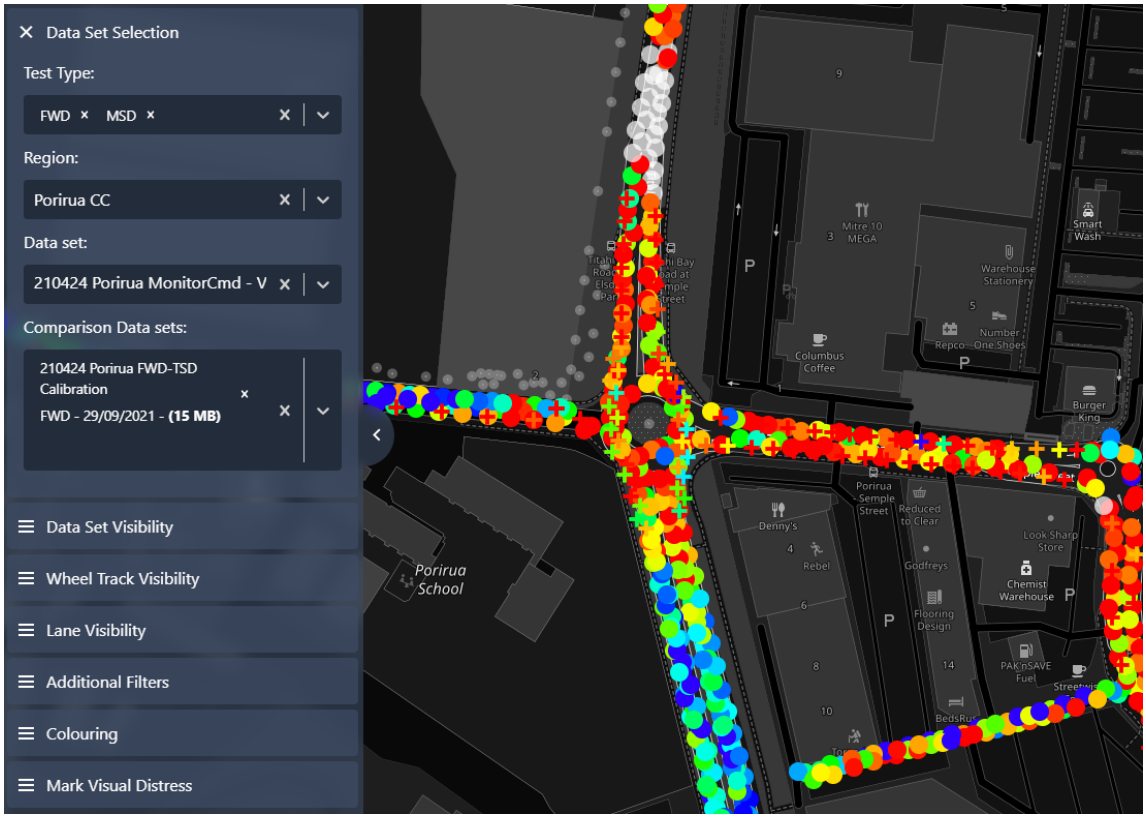

Figure 5 Both Main and Comparison Networks are Displayed

Comparison Data Sets should load and overlap main Data Set as crosses rather than dots as shown. If it is from a different Test Type (FWD in this example), the Test Type chip should be added first, so the relevant Data sets are available for selection.

2.1 Isolating datasets

It is possible to view the main or comparison network in isolation.

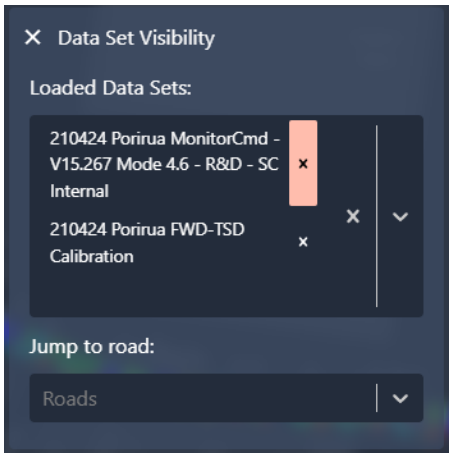

Figure 6 Hiding a dataset

Simply click the cross on the right of the Data Set chip you wish to hide in the Data Set Visibility section as shown below.

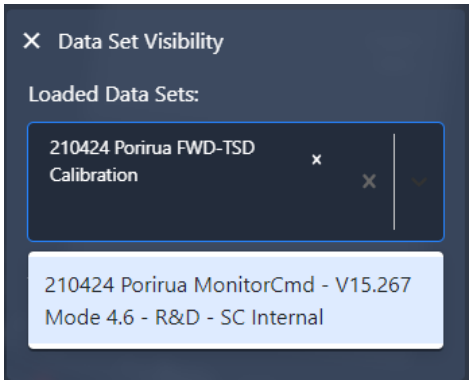

Figure 7 Reshow a hidden Data Set

To reshow a hidden Data Set just click the downward chevron on Loaded Data Sets to see the list of hidden Data Sets and select the one required.

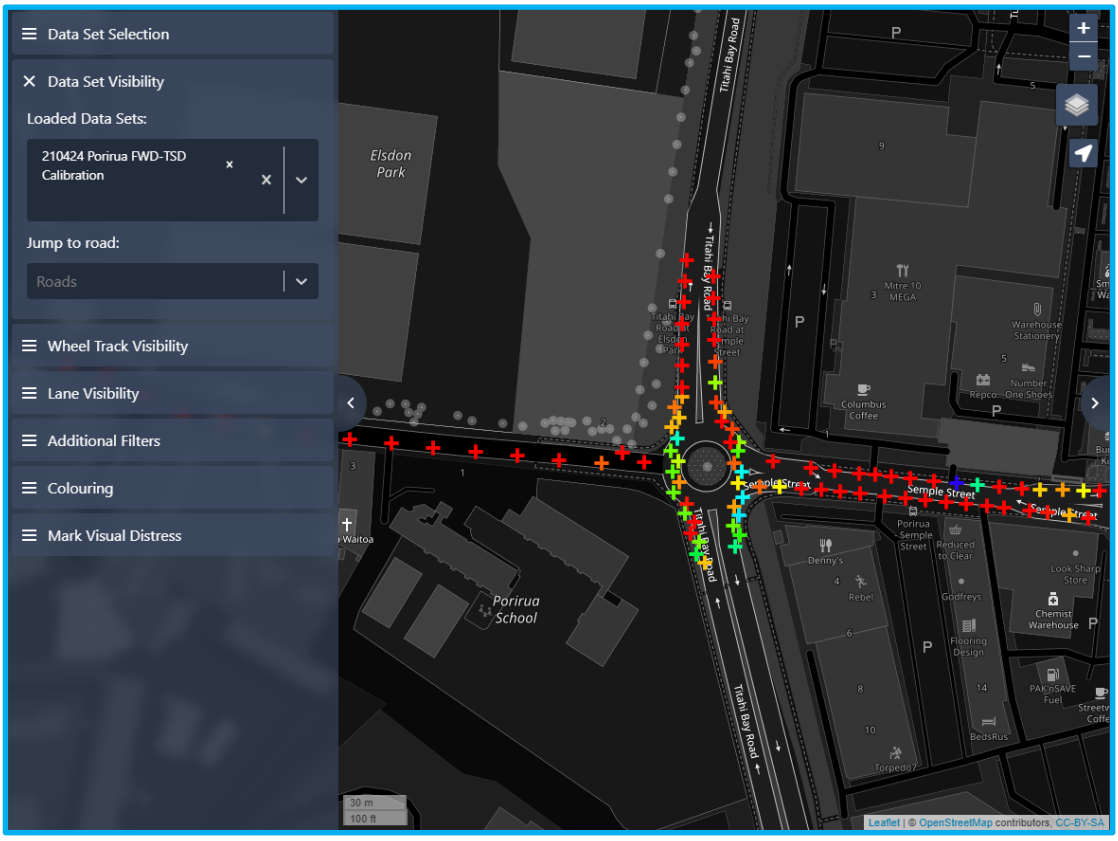

Figure 8 Showing comparison (FWD) dataset only

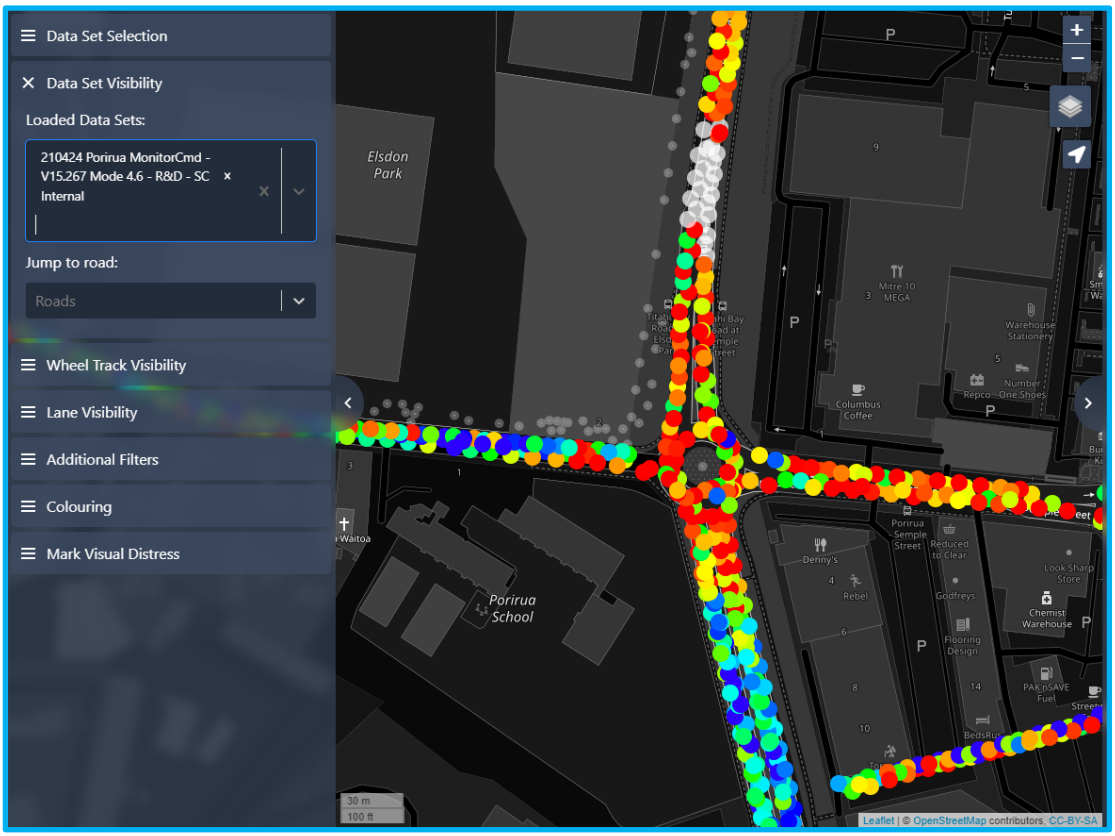

Figure 9 Showing main (MSD) dataset only

2.2 Viewing a particular wheel track or lane

By default, all lanes and wheel tracks are displayed. To isolate a particular wheel track or lane use the toggles on the left side of the window for wheel track and lane visibility.

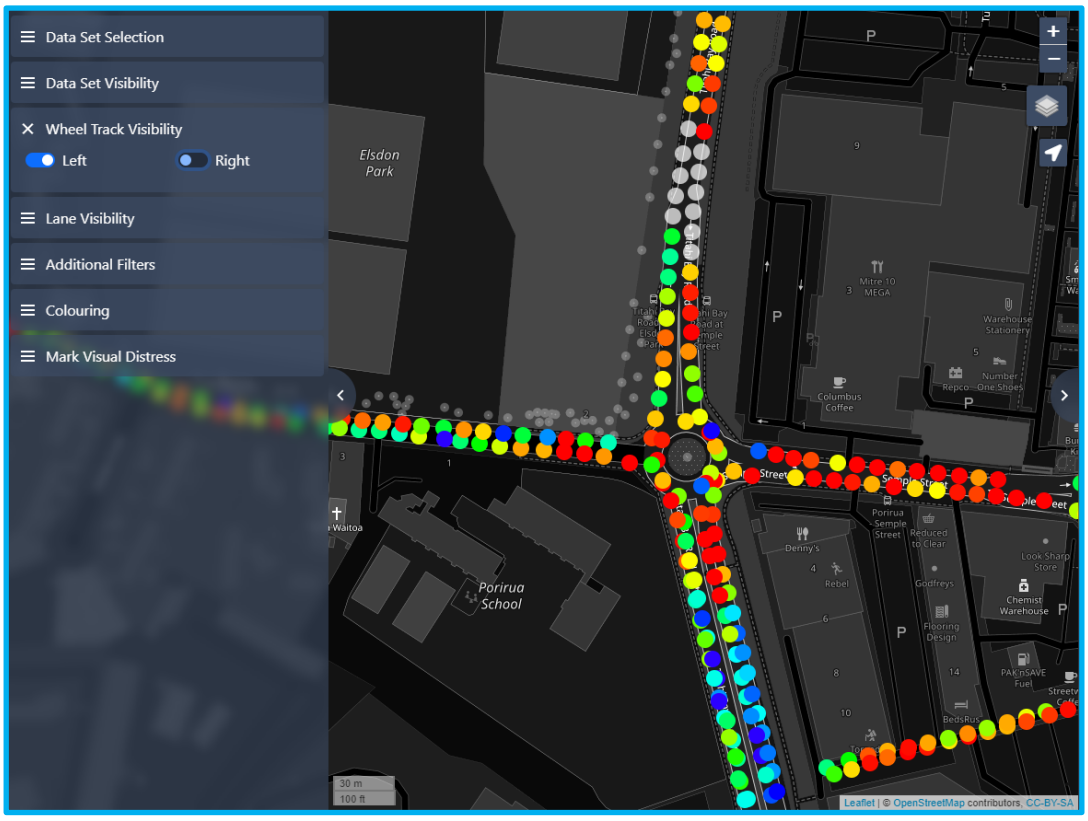

Figure 10 In this example only left wheel track data is displayed

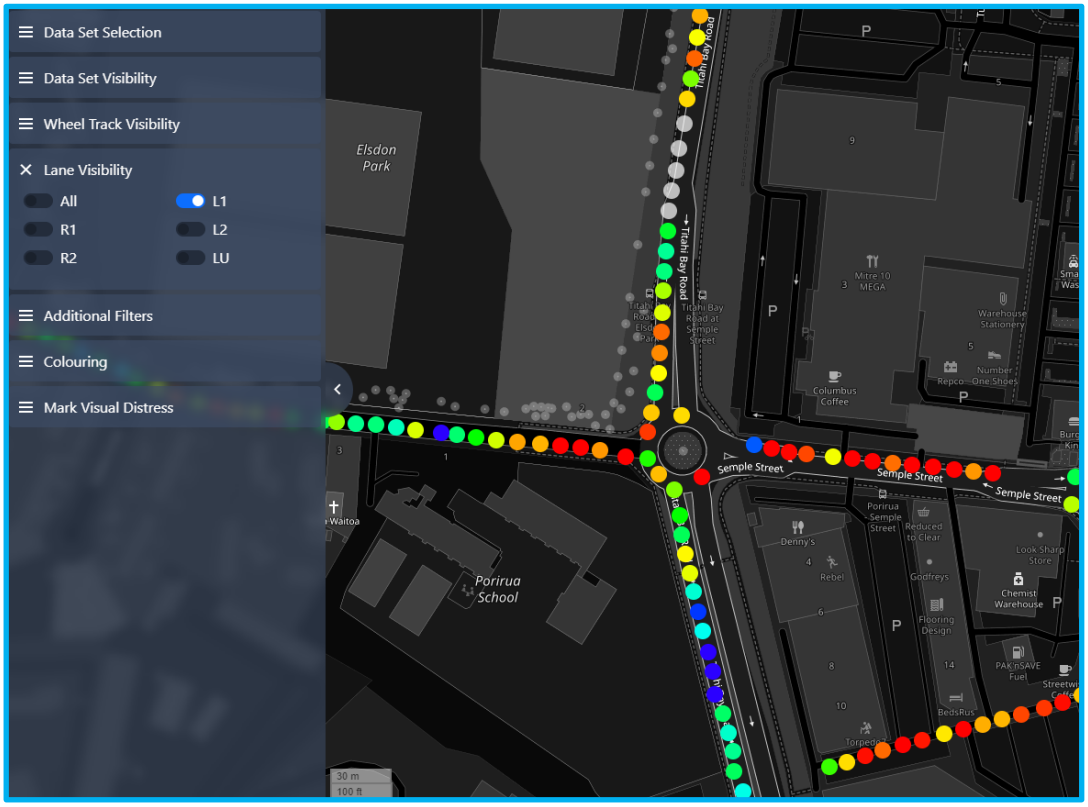

Figure 11 In this example only left lane data is displayed

3 Data Interrogation

In the bottom right corner of the window, a colour legend is displayed for both the comparison and main dataset as shown below.

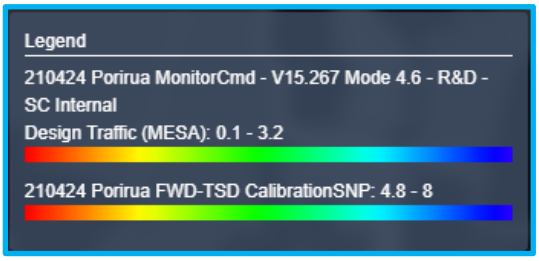

Figure 12 Point colouring legend

In this case the main network (MSD) is displaying Design Traffic (MESA) coloured from red to blue, and the comparison Data Set is coloured by SNP (modified structural number).

3.1 Colouring and Size

To change colours, click Colouring on the left middle side of the window.

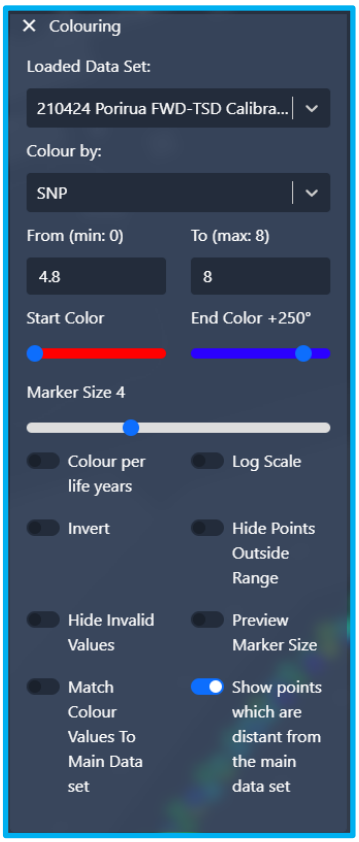

Figure 13 Colouring menu

Within the Colouring panel you can choose how to colour the main and comparison network datasets. Examples of common customisations are shown below.

Figure 14 Reviewing MSD SNP and FWD points coloured by SNP

Note by default, the min and max values (4.8 to 8) in this example are the 10th and 90th percentile of the selected dataset. For direct comparison between main and comparison networks (MSD and FWD data) ensure the ranges for both data sets are the same. This can be quickly achieved by toggling “Match Colour Values To Main Data Set” in the bottom left corner. Confirm in colour legend at bottom right corner.

Figure 15 Networks coloured by SNP

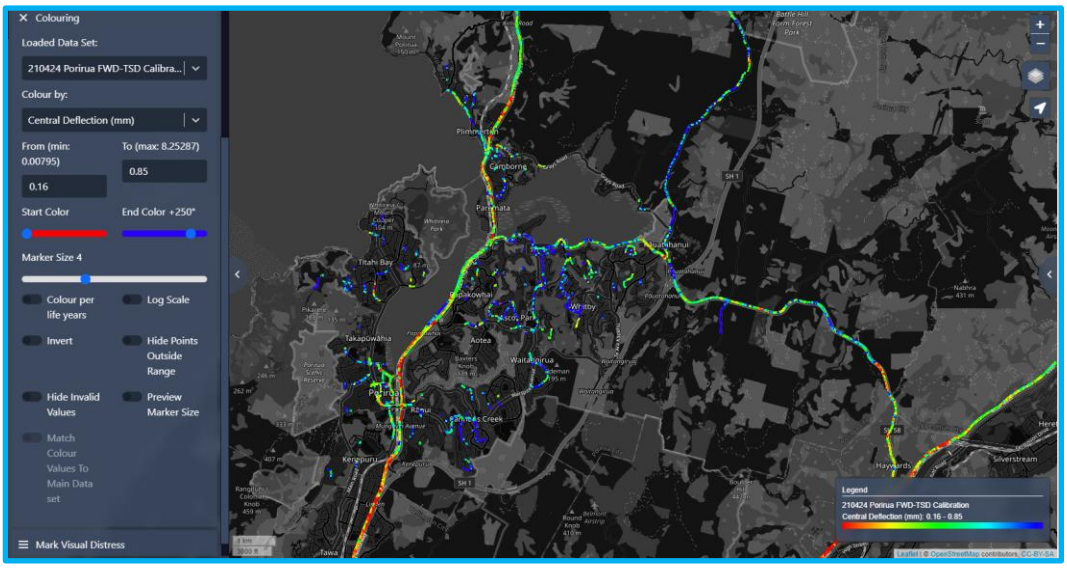

Figure 16 Reviewing FWD-TSD points coloured by Central Deflection (mm)

Figure 17 Colouring by remaining life (years)

3.2 Filtering

It is also possible to filter points from the Data Sets.

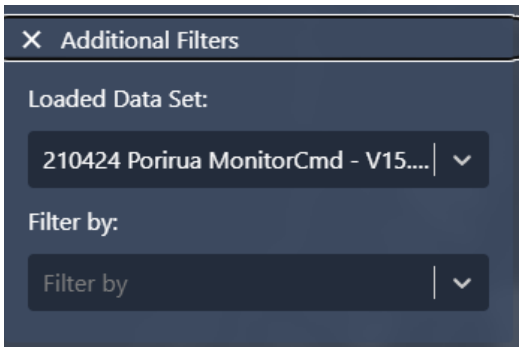

Figure 18 Additional Filters panel

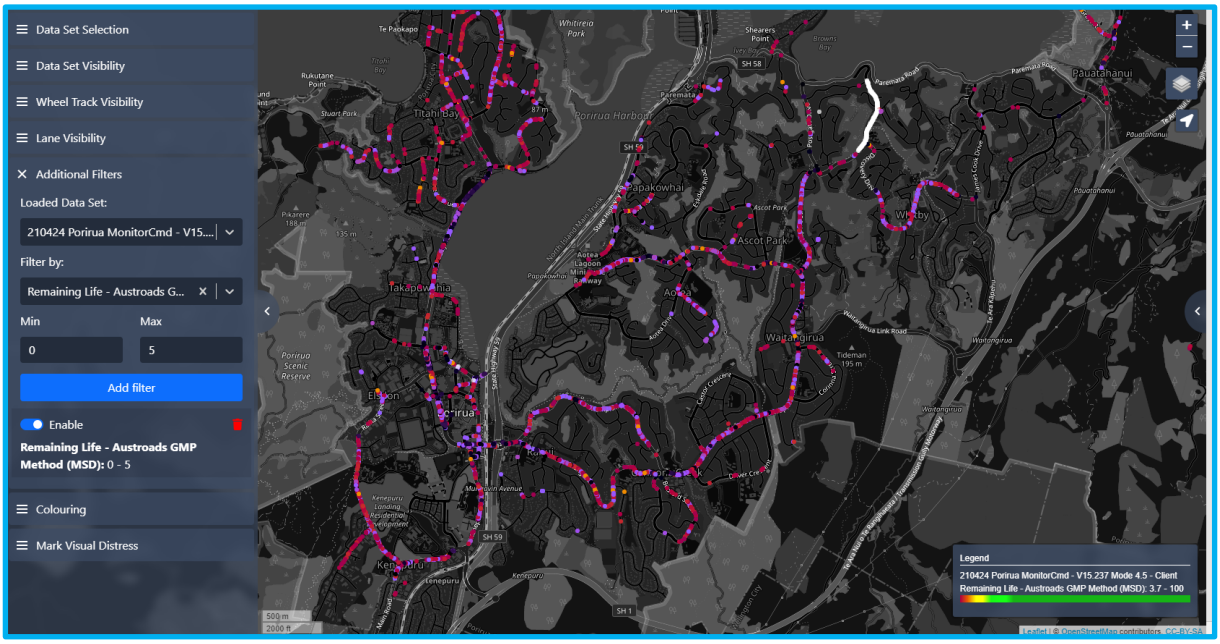

Figure 19. Colouring by remaining life (years), filtered to 0 to 5 years

Figure 20 Colouring by remaining life (years), filtered to 25 years and above, note 70% of the network is highlighted

4 Gazetteer

If you are interested in a particular road and would like to quickly zoom into the road, look to the left of the main window for the Jump to Road search field and enter the name or Road ID of the road you are searching for.

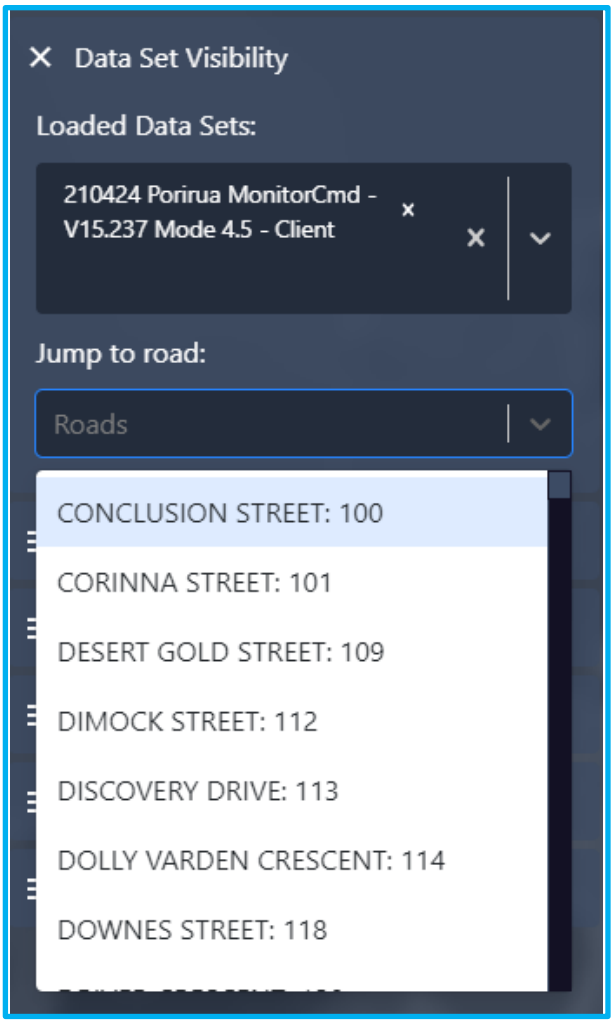

Figure 21. Select/click the road once it pops up from your search

Figure 22 The road of interest will appear zoomed in and centred in the window

Hide the main dataset to make the road name more visible if necessary.

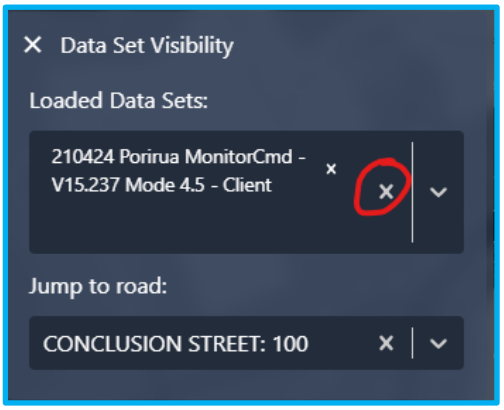

Figure 23 Hiding the main Data Set

5 Changing Map Backgrounds (Satellite vs Road)

Sometimes a satellite image is useful to understand the bigger picture or locate landmarks. Refer to the top right corner to select a different map background.

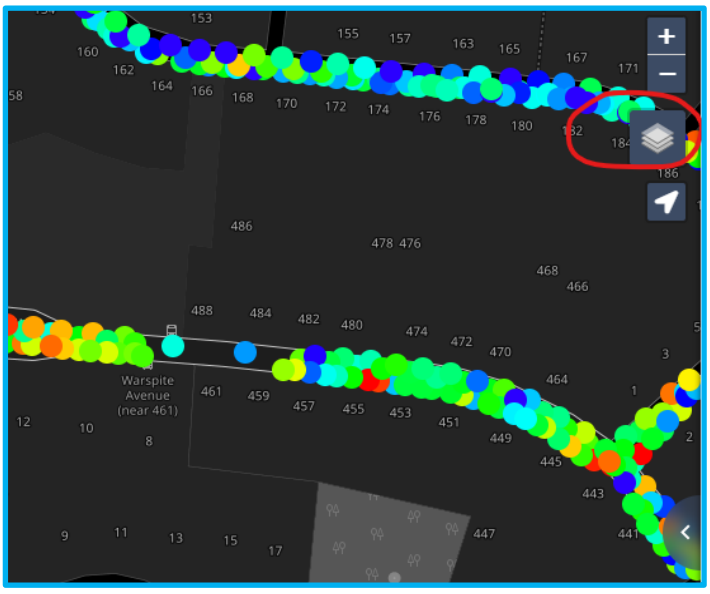

Figure 24 Click the layers button to show available maps

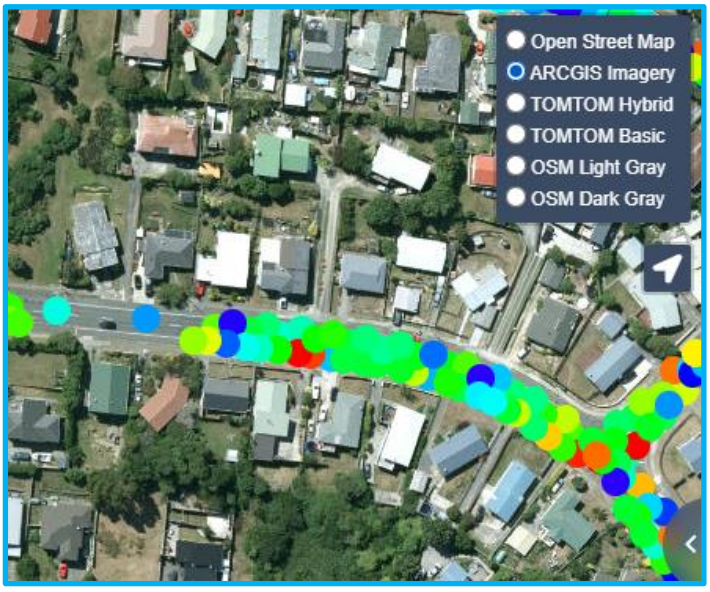

Figure 25 Select the appropriate layer to change the map background

6 Street Photos Captured During Testing

To view a photo of the road condition at the time of MSD testing, select the data point of interest by clicking on it in the main map view. If an image is available, the nearest photo prior to the test point will appear in the panel on the right-hand side of the screen. It is possible to view the photo in greater detail by clicking the Fullscreen icon in the top right-hand corner of the photo panel.

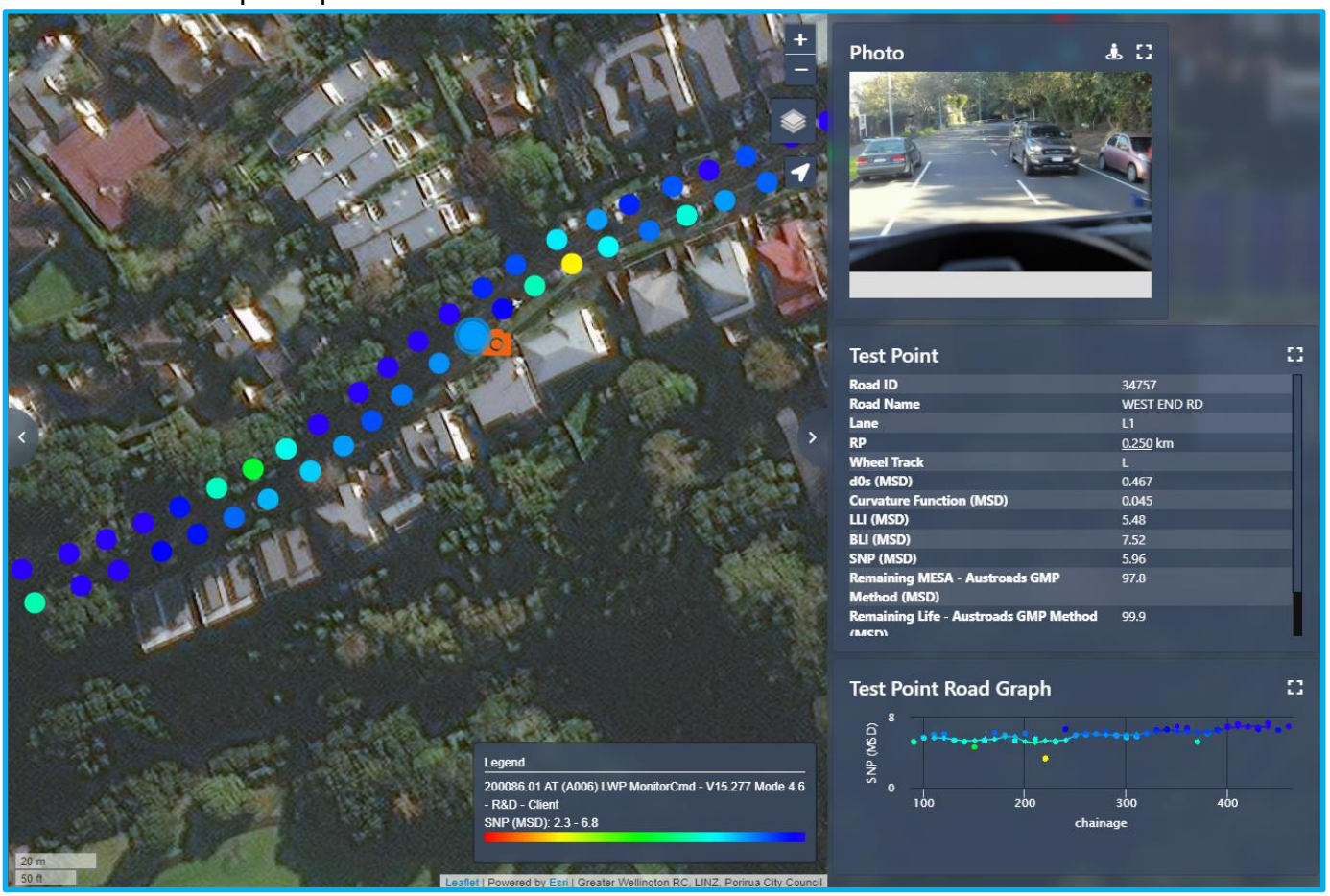

Figure 26 Photo appears in right panel when a data point is clicked

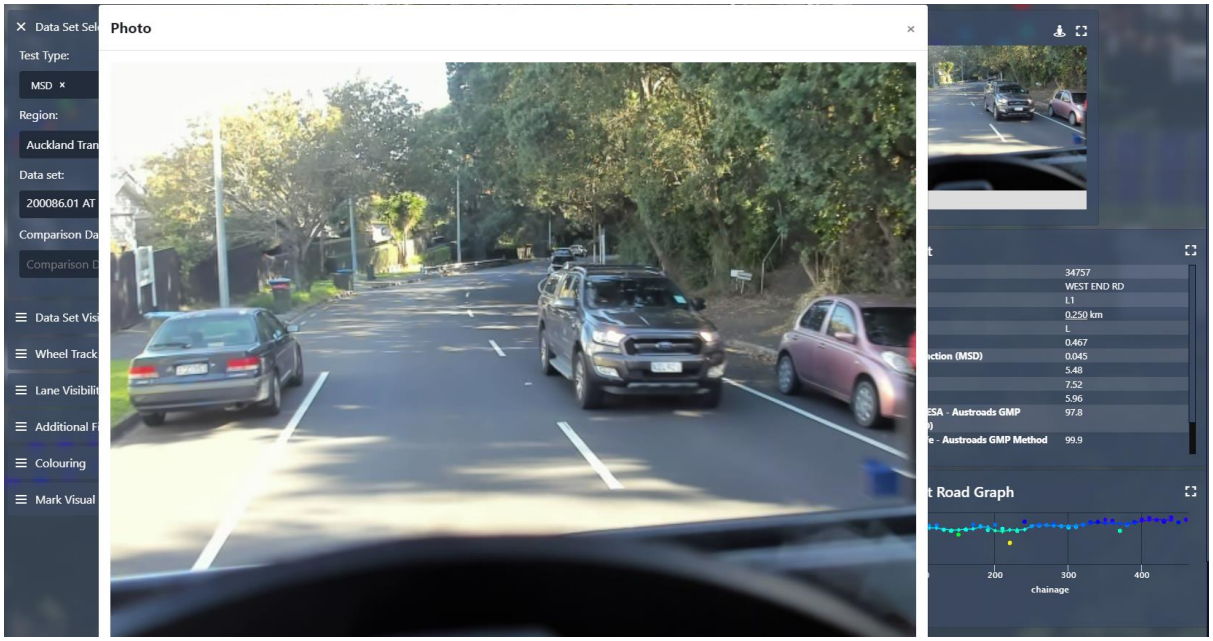

Figure 27 Maximized view of photo of test location appears in a new modal panel

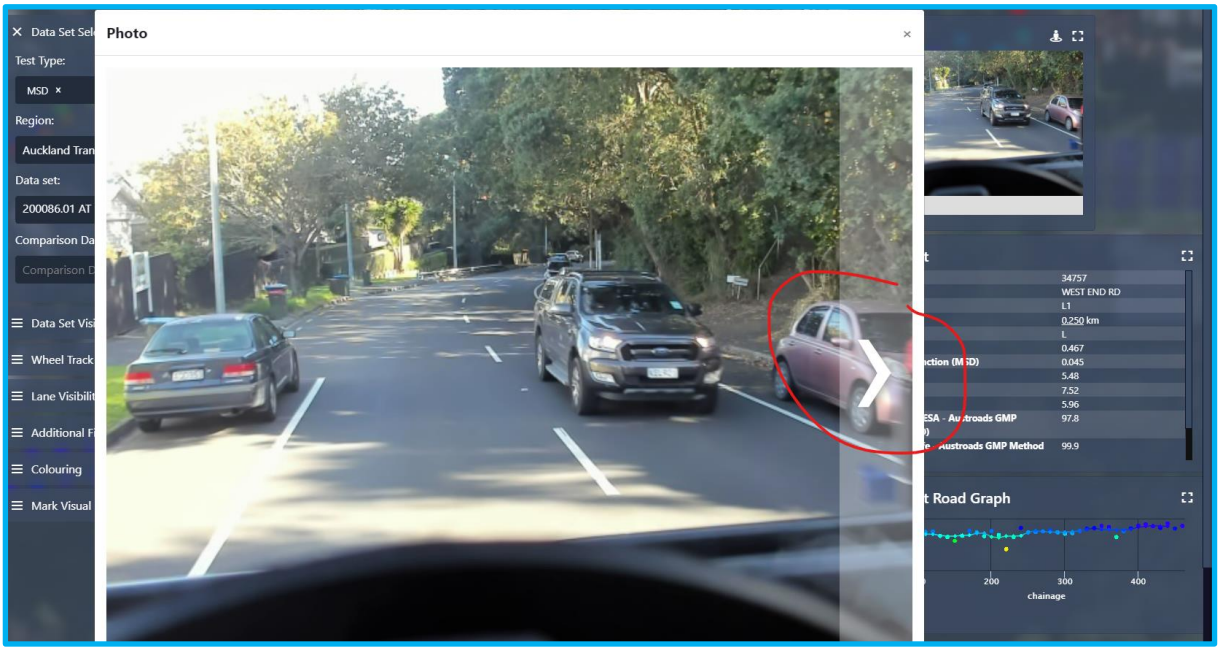

Figure 28. Click on the right chevron to get to the next image

Previous or following images in the test sequence can be easily reached by mousing over the left or right of the photo and clicking the left or right chevron that appears.

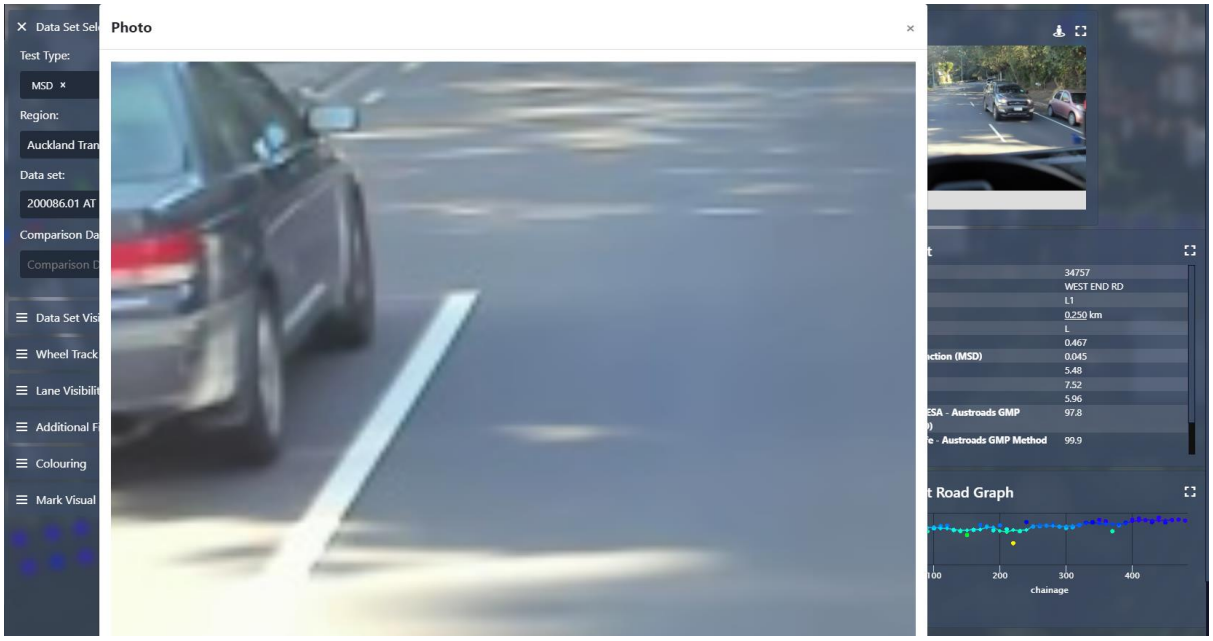

Figure 29 Zoom level is maintained between photos

If you zoom in on a section of the photo, the zoom magnitude will be maintained when you move to the next or previous image in the sequence.

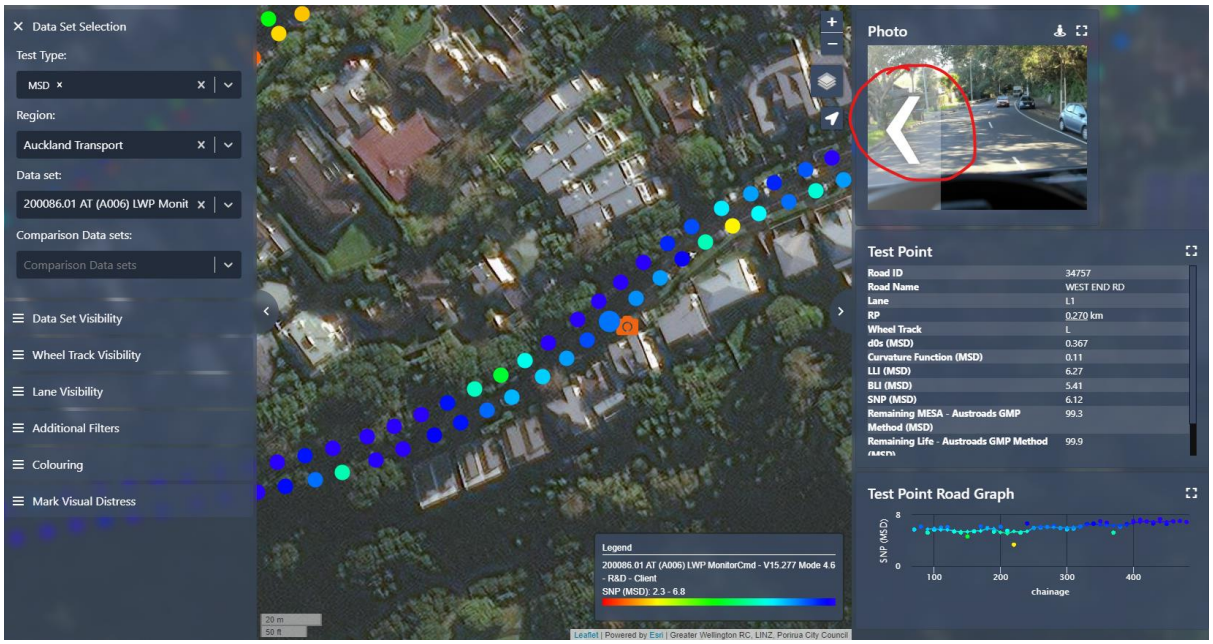

Figure 30 Zoom and previous and next image functions are also available in the right panel

There is no need to maximize the image to access the zoom and next and previous image selectors. All functions are available in the small right-hand panel as well.

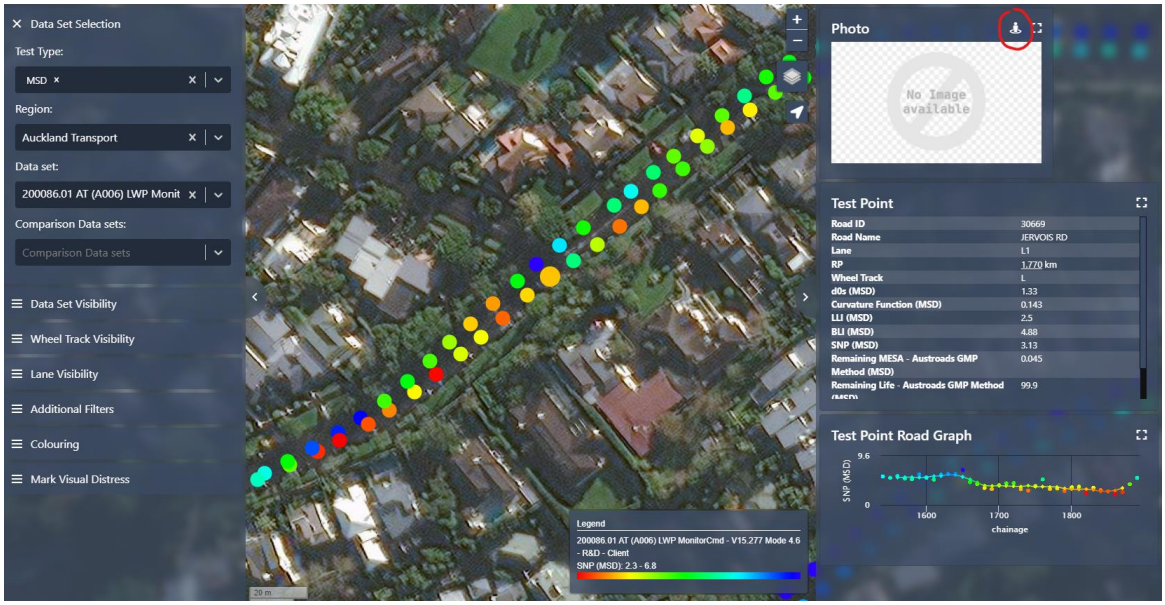

Figure 31 Open Google Street View at the selected location by clicking the button in the top of the photo panel

Where photos are not available, which may be the case pre 2021 or due to camera malfunction, Google Street View can be opened at the nearest location to the test point. Note that care should be exercised with Google Street view imagery that is much older or newer than the MSD test date. It is also up to the user to check their view is orientated to the correct lane and direction of travel.

Figure 32. Google street view imagery, take care with image date and ensuring correct lane and direction

7 Reality Checks - Data Verification

Prior to preliminary issue, GeoSolve endeavours to validate the data by comparing the MSD data to existing relevant FWD/TSD data and by checking a few locations where the MSD is predicting terminal condition (checking for false negatives). The latter checks are documented in PaveState under the Mark Visual Distress panel on the lower left-hand side of the PaveState window.

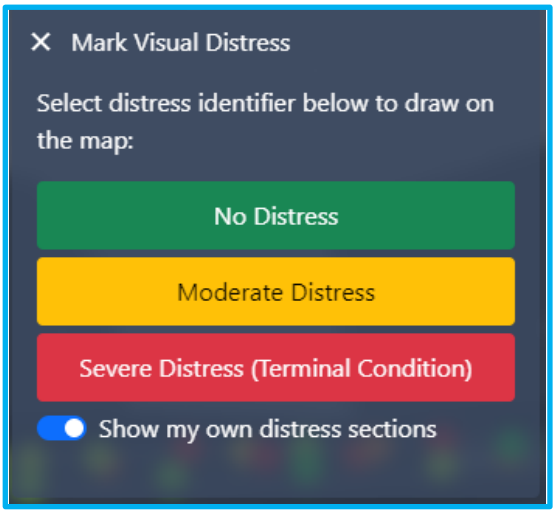

Figure 33 Mark Visual Distress panel

Since August 2021, pins have been replaced by sections to enable more precise road quality documentation.

Sections (and pins) are a dated record of the road quality at the time. This can be somewhat subjective but should offer an indication of whether the pavement surface appears to be in a distressed condition. These reality checks can be undertaken by a variety of means including in person checks, MSD test photo review and Google Street View photo review. Note that the latter should be exercised with care particularly if the photo was taken many years before or after MSD testing OR if the pavement has been re-surfaced or reconstructed between the date of the photo and the date of MSD testing.

Reality checks undertaken by GeoSolve, will always be shown. Select view my own sections to see them as well as shown below.

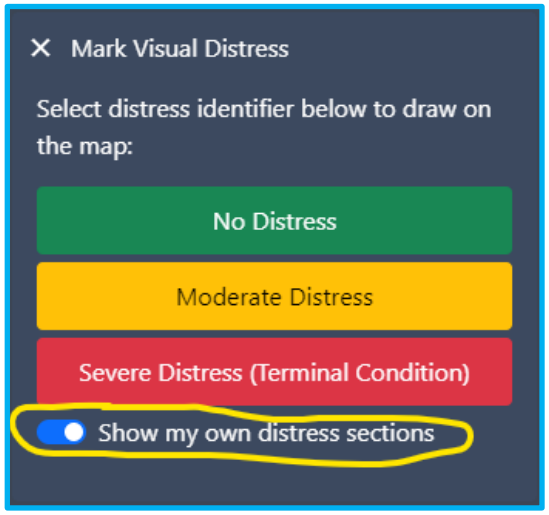

Figure 34 Show my own distress sections

Now you should be able to see (it helps to toggle off both the main and comparison data sets initially) where GeoSolve has undertaken reality checks.

Figure 35 Red and green sections show reality checks already undertaken by GeoSolve

As the asset manager, you will likely have a general feel for your network with or without data. As such, you are in a unique position to locate a few sites with probable structural deficiencies. These sites offer an opportunity for checking for false positives. This can be formally shared via a list of rehab sites, or documented on PaveState.

To document these locations, click the appropriate button (red/bad for failed or visibly distressed pavement areas) and draw a polygon on the map.

Figure 36 Draw a polygon around the distressed section

The section will include a box for adding additional detail that you feel may be useful for own reference and for GeoSolve as well.

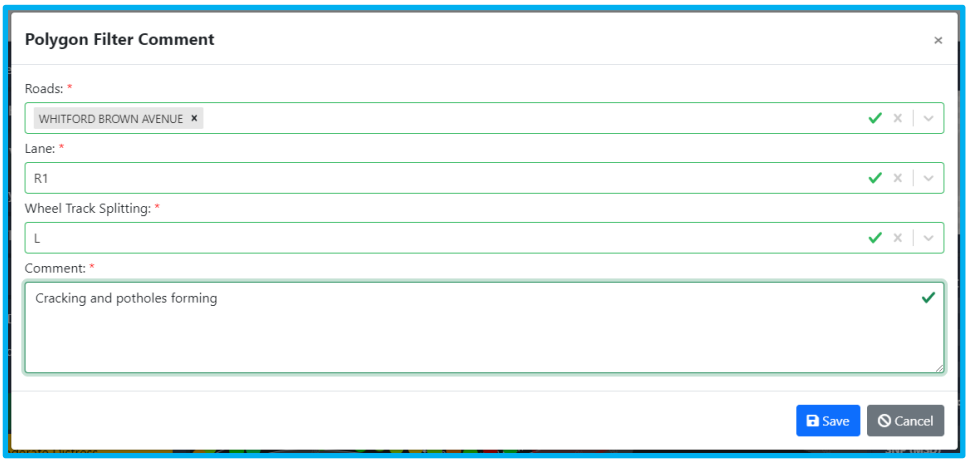

Figure 37 Adding comments to section

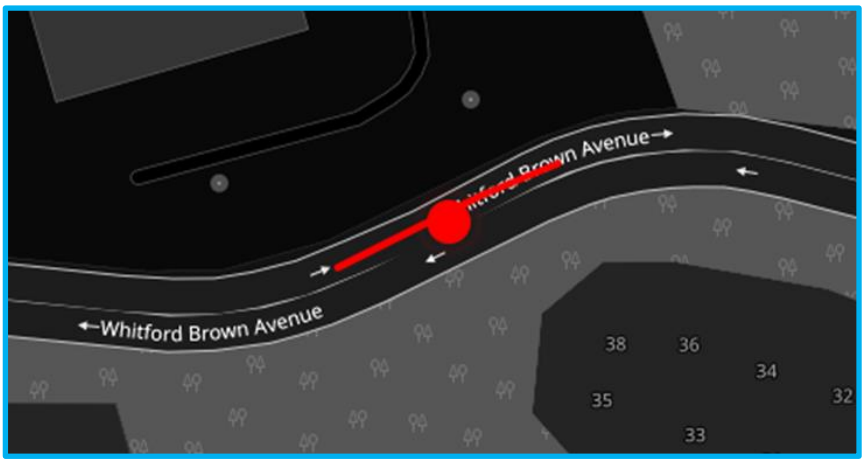

Figure 38 The marked section is shown as a line on the road

After saving the comments, the section inside the polygon on the selected road will be displayed as a line on the road. You may need to hide data sets to help visibility.

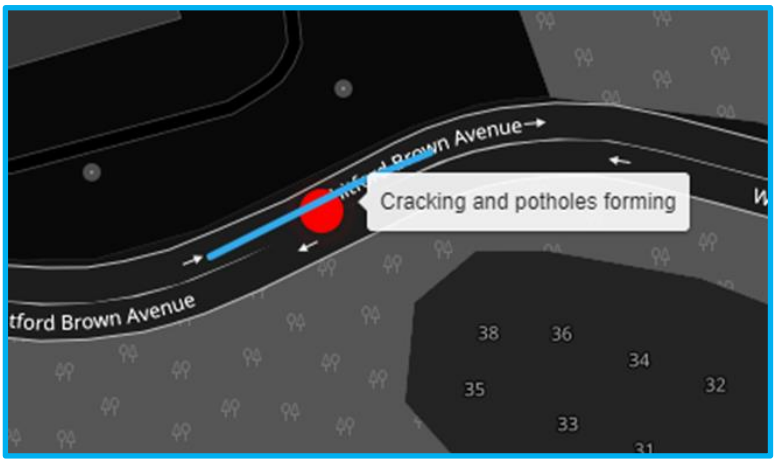

Figure 39 A Tool Tip with the comments is shown if you mouse over the section

Figure 40 Editing or Deleting an incorrectly marked section is possible after clicking on it

If a section was mistakenly drawn on the map, you can delete it by selecting the delete button in the bottom right-hand corner of the modal panel which comes up after clicking on the section.

It is equally important to note pavement in good condition as it is to note pavement in bad condition. Particularly if the MSD is indicating that the pavement is in poor condition, and you are not aware of any problems in that area.

8 Test Point Panel Definitions

When you click on a test point in PaveState, the main data is shown in a panel on the right-hand side of the screen. To view the full set of data available, click the maximize icon in the top right-hand corner of the panel.

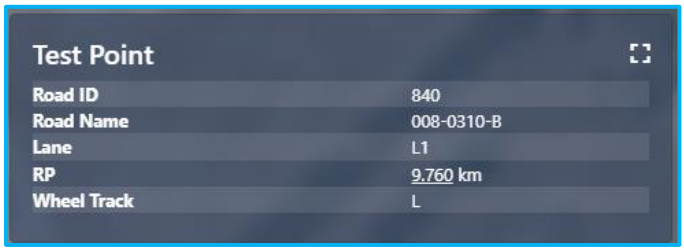

Figure 41 Point data panel

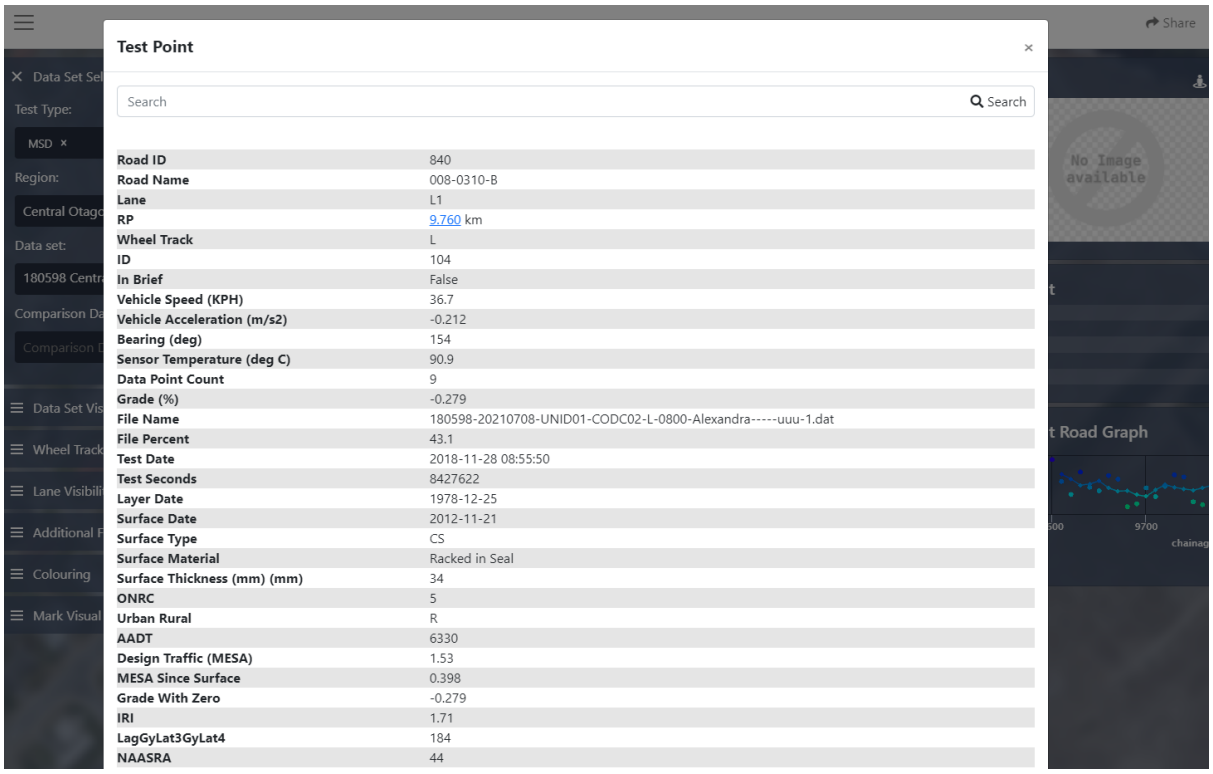

Figure 42 Modal panel showing full data from test point

Data definitions are summarised in Table 1 below and are available as a hover tool tip in PaveState itself for the field selected in the Colour By panel. MSD point panel window definitions are summarised in Table 1 below.

Table 1 MSD point panel window definitions

Field in Data Sheet	Definition
Longitude	Longitude degrees in WGS84 Coordinate System

Latitude	Latitude degrees in WGS84 Coordinate System
Road Name	Name of road of test location
RCA ID	GeoSolve ID number of region test is located within
Chainage	Chainage or station usually in km
Road ID	ID number of road of test location
Lane	For New Zealand: L (left lane, increasing chainage), R (right lane, decreasing chainage), S (shoulder). Lane number 1 is closest to the median in multi lane carriageway
Wheel Track	Test location within lane (left or right wheel track)
Bearing (deg)	Compass bearing of MSD test truck at time of test
Data Point Count	Number of Data Points per Bin Length
Filename	Name of source file, required for locating bowl in Monitor
Test Date	Test date and time in Local Time
Layer Date	Date of most recent construction or reconstruction of pavement tested
Surface Date	Date of most recent surfacing or resurfacing of pavement
Surface Type	NaN = No surface type assignment in RAMM database, Gravel, CS = Chipseal, AC = Asphaltic Concrete
Surface Material	RAMM data extracted describing the surface material
Surface Thickness(mm)	RAMM data extracted, average thickness of surface layer in mm
Surface Distress (MSD Operator)	MSD operator input where distress was observed while testing, 0 = no distress observed, 1 = distress observed
ONRC	RAMM data extracted, 1 (Low Volume) to 8 (High Volume)
Urban Rural	RAMM data extracted, U (Urban), R (Rural)
AADT	RAMM data extracted, annual average daily traffic
Design MESA	ESA0 = AADT*365*%HCV*ESA/HCV*DF DESA = ESA0*CGF Design MESA = DESA/(1x10^6) Millions of equivalent standard axle loads expected over 25 year design life allowing for 3% geometric growth
Mesa Since Surface	Millions of equivalent standard axle loads since the date of the last surfacing
Presence of Shoving (HSD)	HSD data extracted for lane and wheel path, presence of shoving = 1, no shoving detected = 0 (mm)
Ave Rutting Depth (mm) (HSD)	HSD data extracted for lane and wheel path, average rutting depth for specified wheel path over a 20m section (mm)
Ave Texture Depth (mm) (HSD)	HSD data extracted for lane and wheel path, average macro texture depth for specified wheel path over a 20m section (mm)
d0s (MSD)	Central deflection (mm) estimated by applying a transfer function between overlapping MSD and FWD data. For these overlapping points, a transfer function is derived by comparing the cumulative distribution of the MSD vertical deformation parameter and the cumulative distribution of FWD/TSD load standardised (40kN) central deflection parameter.

Curvature Function (MSD)	Curvature function (d0 - d200) (mm) estimated by applying a transfer function between overlapping MSD and FWD data. For these overlapping points, a transfer function is derived by comparing the cumulative distribution of the MSD cracking/curvature parameter and the cumulative distribution of FWD/TSD load standardised (40kN) curvature 200 (d0-d200) parameter.
SNP (MSD)	Adjusted Structural Number (SNP) using AASHTO NDT1 estimated by applying a transfer function between overlapping MSD and FWD data. For these overlapping points, a transfer function is derived by comparing the cumulative distribution of the MSD vertical deformation parameter and the cumulative distribution of FWD/TSD SNP parameter. This denotes the equivalent SNP from MSD dynamic large single tyre rather than static FWD or moving TSD dual. 0 = Low Pavement Structural Capacity 8 = High Pavement Structural Capacity
SNR (MSD)	Structural number for rutting distress mode estimated by applying a transfer function between overlapping MSD and FWD data. For these overlapping points, a transfer function is derived by comparing the cumulative distribution of the MSD rutting parameter and the cumulative distribution of FWD/TSD SNP parameter. This field should be compared to other SN parameters to determine which distress mode is critical. 0 = Low Structural Capacity, 8 = High Structural Capacity
SNC (MSD)	Structural number for cracking distress mode estimated by applying a transfer function between overlapping MSD and FWD data. For these overlapping points, a transfer function is derived by comparing the cumulative distribution of the MSD cracking/curvature parameter and the cumulative distribution of FWD/TSD SNP parameter.
Indicative Remaining MESA (MSD)	Indirect method of correlating SNP to remaining MESA (calculated according to Austroads General Mechanistic Procedure Method). This correlation was derived from FWD data collected in Timaru, NZ.
Indicative Remaining Life (MSD)	Converting remaining MESA above to remaining life in years which is a function of Remaining MESA and Design MESA (3% annual growth is assumed, geometric compounding). 25 indicates that a remaining life of 25+ years is expected
Terminal Year AustroadsGMPMethod (MSD)	Test Date + Remaining Life above

9 Data Charting

Figure 43 Test Point Road Graph panel

Below the test point data there is a panel which shows the data for all visible test points on the selected road. Clicking the maximize icon in the top right-hand corner of the panel will open a full-sized modal with the graph.

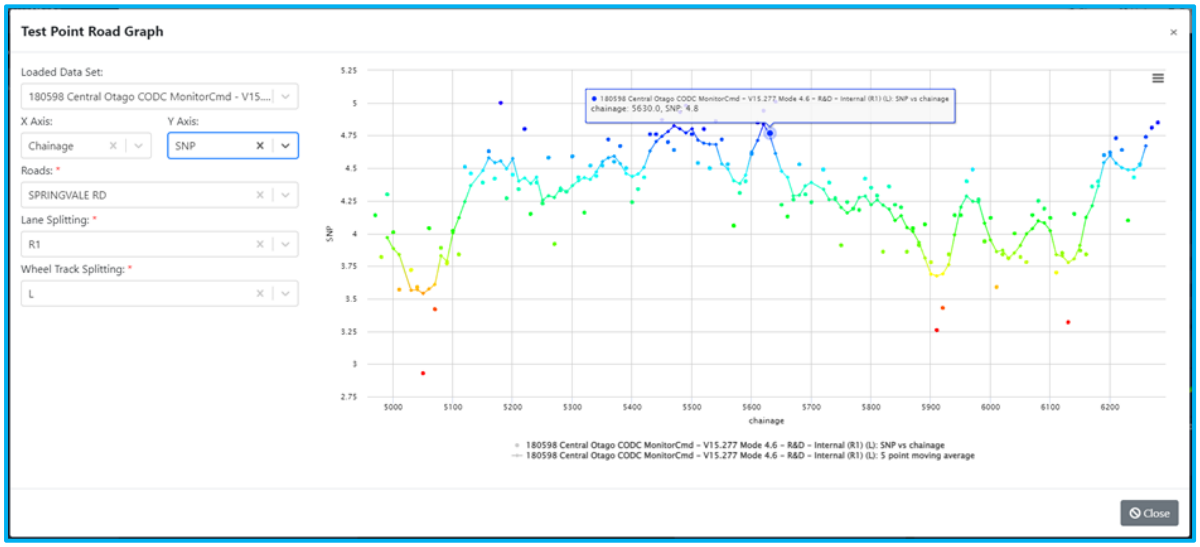

Figure 44 Maximized Test Point Road Graph panel

The full chart has options for printing or exporting as pdf, png, jpeg or svg images, which can be accessed by clicking the hamburger menu icon in the top right-hand corner of the panel.

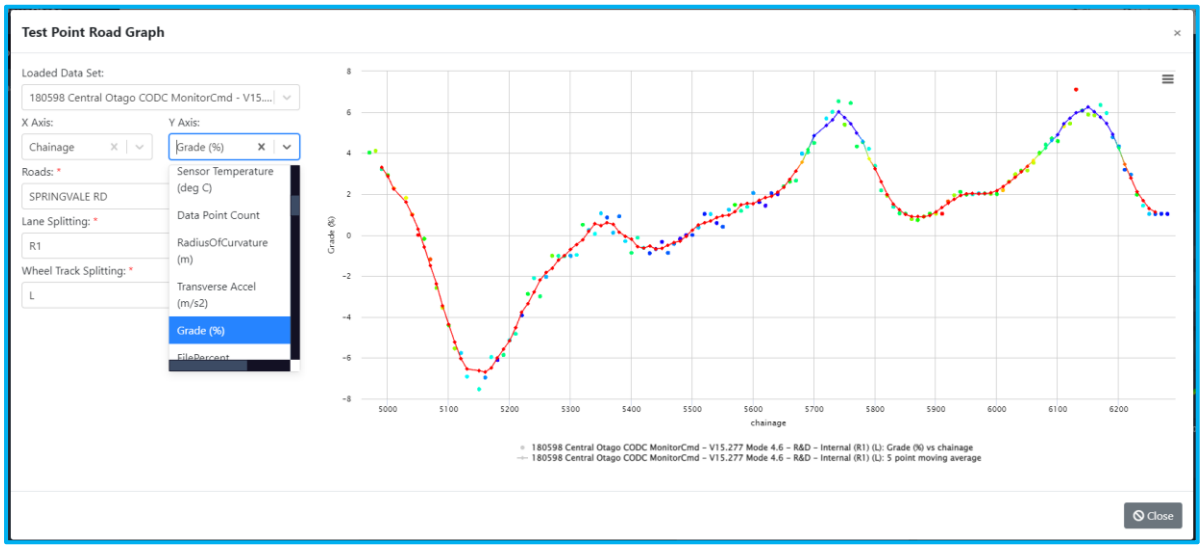

Figure 45 Y-axis shows grade (%) along the selected section of the road

The Y-axis can be changed using the dropdown menu on the left-hand side of the graph. If the area of view contains multiple roads, the desired road can be selected in the respective dropdown on the left-hand side.

10 Management

There are 5 user roles that may be assigned to a PaveState user.

1. Super Admin (<5 GeoSolve Users Only)
2. Staff (GeoSolve Only)
3. Client Admin (1 – 2 Users per Client)
4. Client Dataset Access
5. To Process

Only Super Admin and Client admin will have access to this menu.

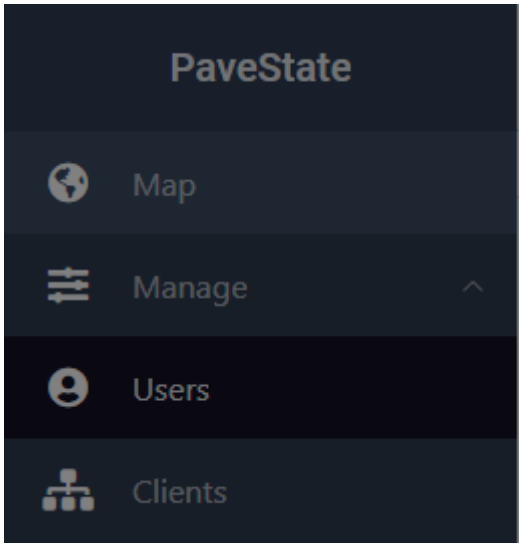

Figure 46 User and Client Management

10.1 Client Admin User Role Responsibilities

Client Admin users will only be able to see the users who have Client Admin or Client Dataset access for the client(s) they are responsible for.

Once client admins are established for a client, they will be responsible for managing new users registering under their client dataset access code. This includes sharing the client access code and PaveState website URL to the appropriate people and approving these users as they register.

Client admins can obtain these access codes in the “Clients” tab above.

As new users register, all client admins for the client associated with the access code used by the new user will receive an email notification requesting user approval. Once approved and assigned the appropriate role, the new user will have access to datasets for viewing on PaveState. New users, once approved, will receive a confirmation email when their account is approved. It is recommended to approve quickly provided the new user is legitimate, to enable prompt viewing of the relevant data.

10.2 Sharing Datasets

For users who have access to the datasets being shared, a shortcut link can be generated for these users enabling quick loading of specific datasets (shortcutting searching for each dataset).

Once the main and comparison datasets are loaded, click share in the top right corner as shown in Figure 47. A link (URL) will be copied to clipboard enabling pasting via Ctrl+V in another browser or on another computer by another user who has access to the same datasets.

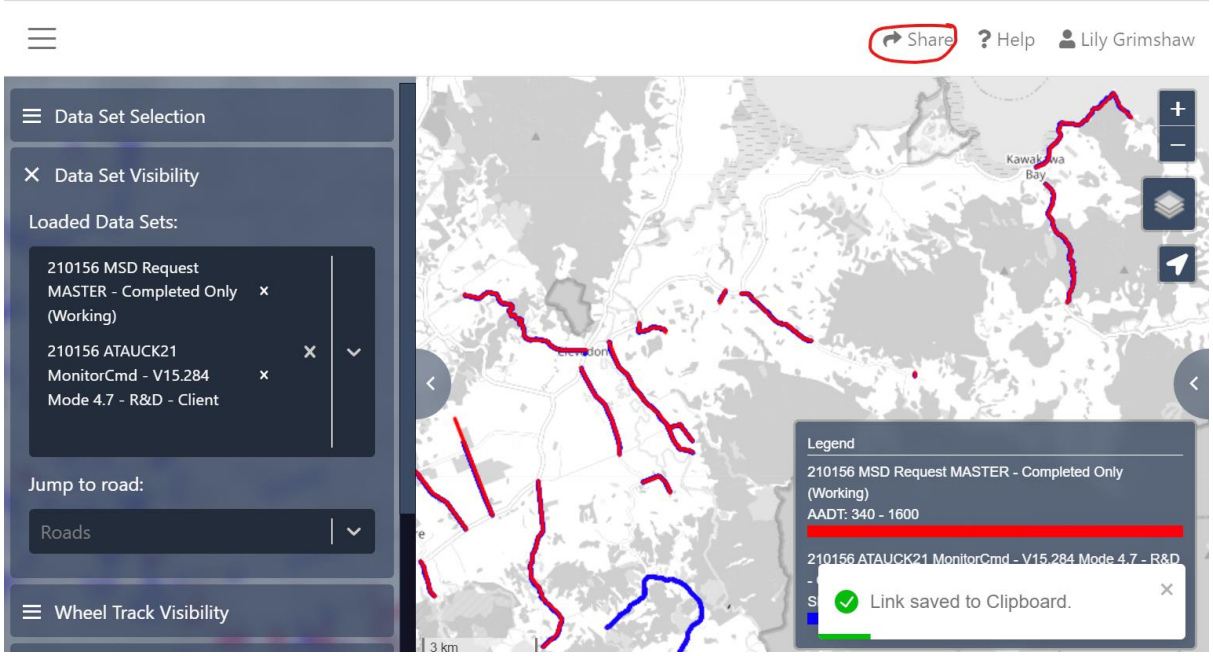

Figure 47. How to share datasets

11 Technical Support

If any issues are encountered while using PaveState or you have any other questions, please don't hesitate to contact:

pavements@geosolve.co.nz