Processing Roughometer Roughness Data

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Article Purpose	This article defines the standard process for preparing Roughometer survey data, running the QGIS processing model, and exporting validated outputs.
Intended Users	PNG AMB - GIS team
Last Reviewed	30 March 2026

Background

Information relating to the PNG National Road Network is stored and managed within the AWM (ThinkProject ASSET & WORK MANAGEMENT, formerly RAMM) road management system.

The AWM database is the authoritative source for carriageway geometry, asset information, and condition data used by the Department of Works to support network planning, maintenance prioritisation, and investment decisions.

Road roughness data, measured as International Roughness Index (IRI), is a key pavement condition indicator and is collected periodically using Roughometer surveys. To ensure data is reliable and comparable over time, Roughometer survey outputs must be spatially aligned to the AWM carriageway network and correctly managed within the AWM Roughness Reading table.

This article describes the standard process for preparing Roughometer survey data, spatially processing it in QGIS, validating outputs, and importing the results into AWM, including the correct treatment of latest and historic roughness records.

Introduction

This procedure provides a standardised method for processing Roughometer survey data and importing the results into the AWM road management system.

It describes the required input files, data preparation steps, spatial processing using QGIS, validation checks, and the final import of roughness data into the AWM Roughness Reading table. The process ensures that Roughometer survey data is correctly cleaned, spatially aligned to carriageway sections, and managed in accordance with AWM data requirements.

This procedure is intended to support consistent, accurate, and auditable entry of road roughness data for the PNG National Road Network.

Methodology

Required Input Files

This section lists the datasets and configuration files required to process Roughometer survey data through QGIS and prepare it for import into AWM. All files must be available and correctly formatted before commencing the

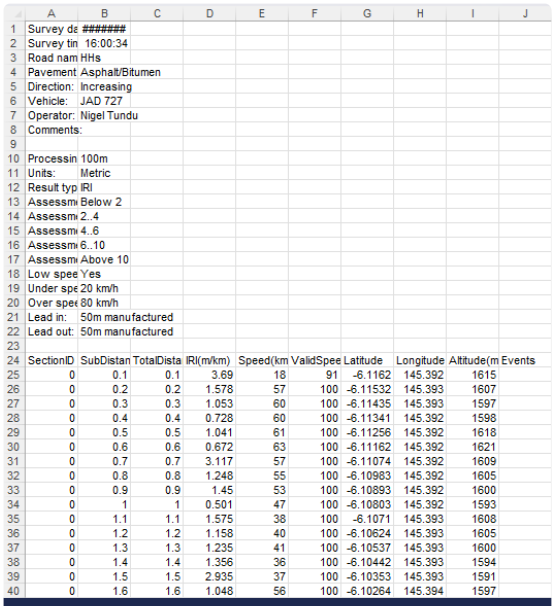
methodology steps to ensure the process runs correctly end to end.

- Roughometer CSV survey files
- Carriageway section geometry (GeoJSON exported from AWM)
- Carriageway section export (CSV exported from AWM)
- Road filter CSV (Manually created)
- QGIS Processing Model file (DoWH SharePoint)

Retrieve, Clean and Load Roughometer Data

This section describes how Roughometer survey files are retrieved and cleaned to produce a single, consistent dataset suitable for spatial processing. It covers the removal of metadata, consolidation of survey files, and loading of validated roughness data into QGIS with correct spatial reference.

1. Access the Department of Works SharePoint and navigate to the appropriate Roughometer data.
2. Download all CSV files associated with the survey.
3. Open each downloaded Roughometer CSV file in Excel.
4. Save a copy with "cleaned" suffix.
5. Remove the metadata rows at the top of the file (likely 22 rows). Example in screenshot below.



	A	B	C	D	E	F	G	H	I	J
1	Survey da	#######								
2	Survey tin	16:00:34								
3	Road nam	HHs								
4	Pavement	Asphalt/Bitumen								
5	Direction:	Increasing								
6	Vehicle:	JAD 727								
7	Operator:	Nigel Tundu								
8	Comments:									
9										
10	Processin	100m								
11	Units:	Metric								
12	Result typ	IRI								
13	Assessm	Below 2								
14	Assessm	2..4								
15	Assessm	4..6								
16	Assessm	6..10								
17	Assessm	Above 10								
18	Low spee	Yes								
19	Under spe	20 km/h								
20	Over spe	80 km/h								
21	Lead in:	50m manufactured								
22	Lead out:	50m manufactured								
23										
24	SectionID	SubDistan	TotalDista	IRI(m/km)	Speed(km	ValidSpee	Latitude	Longitude	Altitude(m	Events
25	0	0.1	0.1	3.69	18	91	-6.1162	145.392	1615	
26	0	0.2	0.2	1.578	57	100	-6.11532	145.393	1607	
27	0	0.3	0.3	1.053	60	100	-6.11435	145.393	1597	
28	0	0.4	0.4	0.728	60	100	-6.11341	145.392	1598	
29	0	0.5	0.5	1.041	61	100	-6.11256	145.392	1618	
30	0	0.6	0.6	0.672	63	100	-6.11162	145.392	1621	
31	0	0.7	0.7	3.117	57	100	-6.11074	145.392	1609	
32	0	0.8	0.8	1.248	55	100	-6.10983	145.392	1605	
33	0	0.9	0.9	1.45	53	100	-6.10893	145.392	1600	
34	0	1	1	0.501	47	100	-6.10803	145.392	1593	
35	0	1.1	1.1	1.575	38	100	-6.1071	145.393	1608	
36	0	1.2	1.2	1.158	40	100	-6.10624	145.393	1605	
37	0	1.3	1.3	1.235	41	100	-6.10537	145.393	1600	
38	0	1.4	1.4	1.356	36	100	-6.10442	145.393	1594	
39	0	1.5	1.5	2.935	37	100	-6.10353	145.393	1591	
40	0	1.6	1.6	1.048	56	100	-6.10264	145.394	1597	

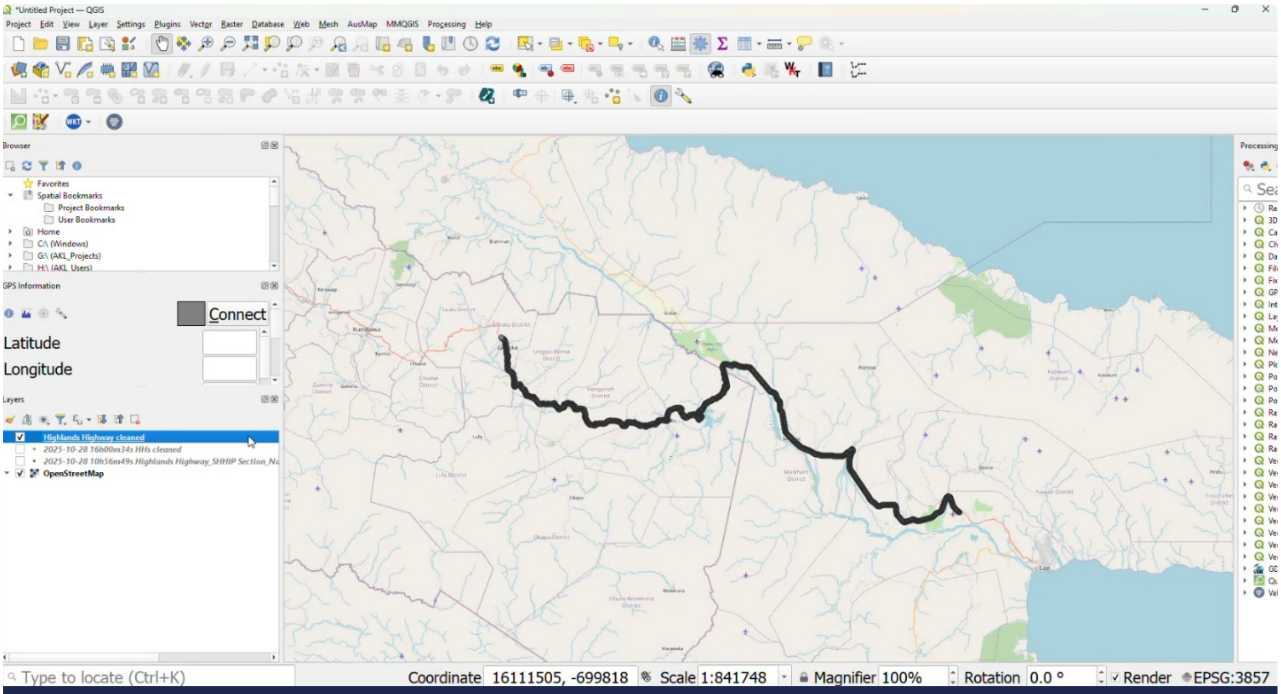
Roughometer data before removing metadata.

1. Copy all data rows from the first file and paste it into a new file.
2. In the new file, append the data from the second file, removing the duplicate header row.
3. Save the combined dataset as a single CSV.

Column	Data Type	Description
SectionID	Integer	
SubDistance(km)	Decimal	
TotalDistance(km)	Decimal	

Column	Data Type	Description
IRI(m/km)	Decimal	
Speed(km/h)	Decimal	
ValidSpeed(%)	Decimal	
Latitude	Decimal	
Longitude	Decimal	
Altitude(m)	Decimal	
Events	String	

1. Open QGIS and create a new project.
2. Add a base map (e.g. OpenStreetMap).
3. Go to Layer → Add Layer → Add Delimited Text Layer, and load the combined CSV file.
4. Confirm latitude and longitude fields are correctly recognized in the X and Y fields.
5. Add the layer to the map.



Roughometer data layer in QGIS.

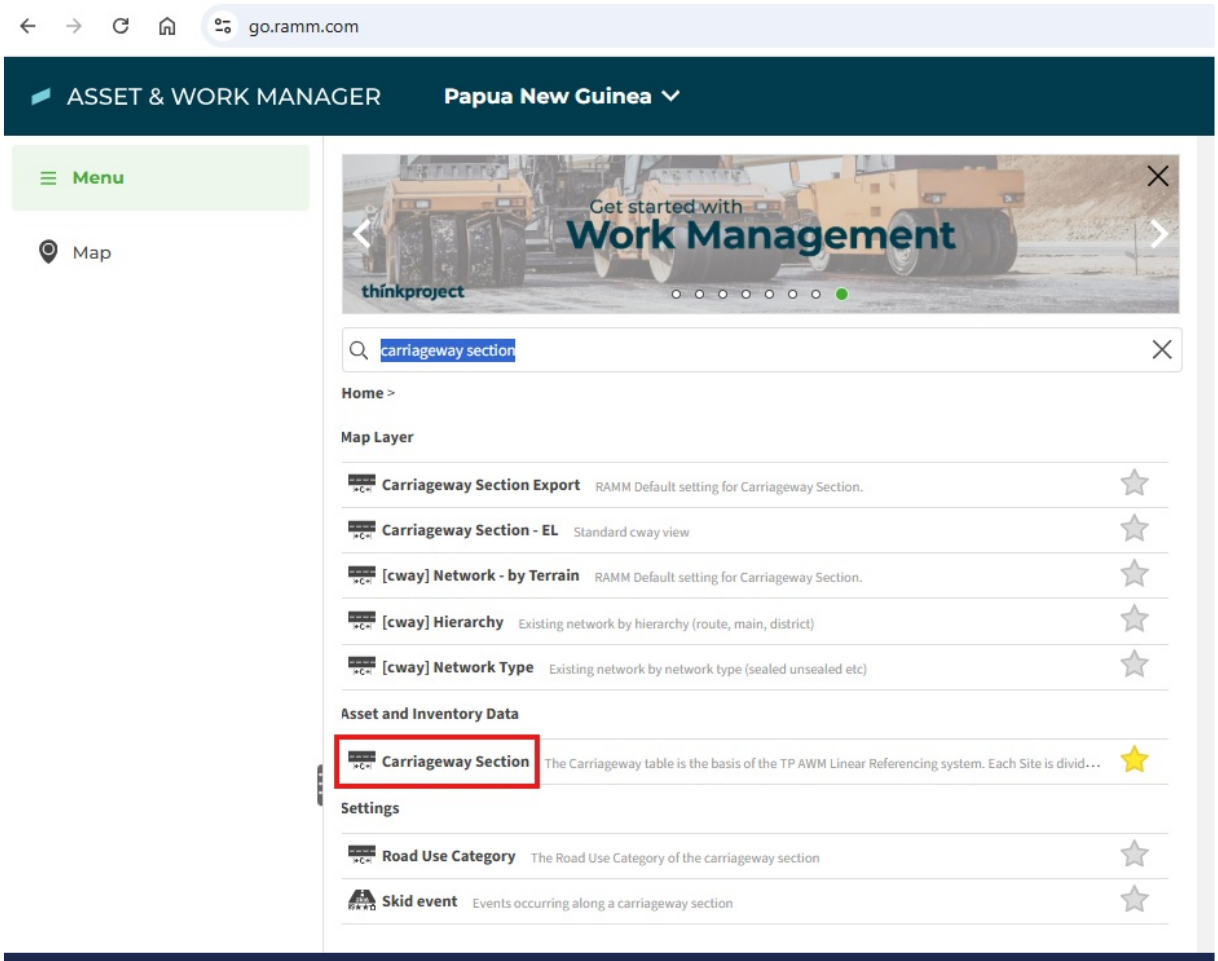
Export Required Data from AWM

This section describes how the required carriageway datasets are exported from AWM for use in QGIS processing. These exports provide the authoritative geometry and carriageway identifiers needed to correctly align and validate Roughometer survey data.

Export Carriageway Geometry

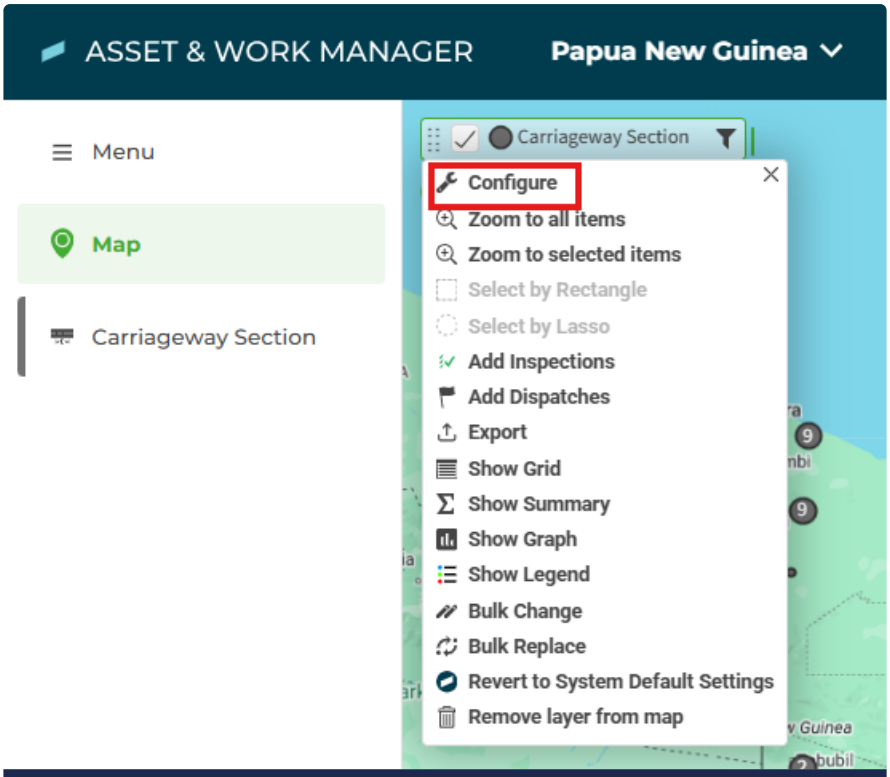
1. Open AWM and confirm the correct database is selected (Papua New Guinea).

2. In the Menu search and select Carriageway Section.



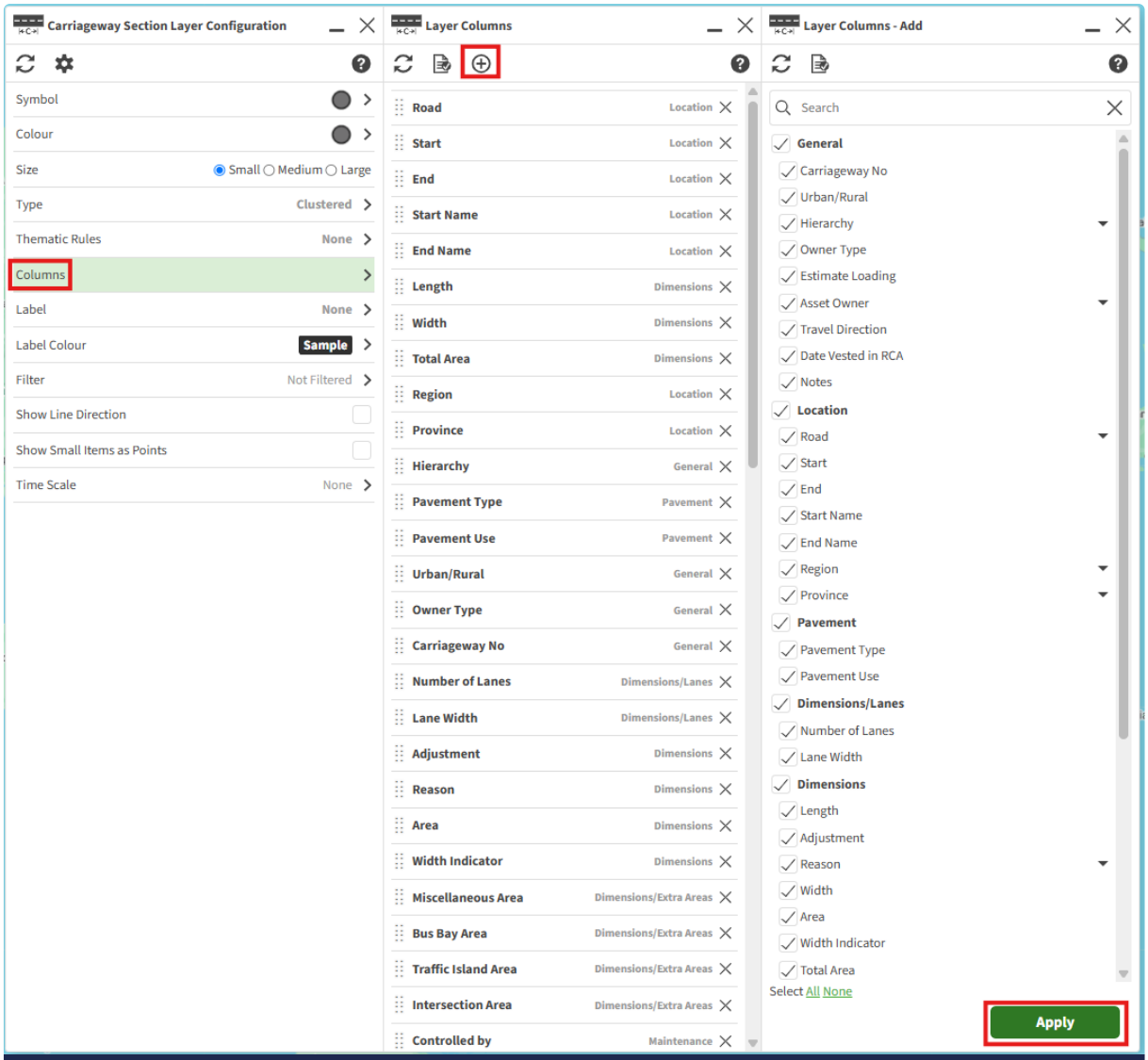
Carriageway Section layer in AWM

3. Click on the Carriageway Section layer in the Map view, and select Configure.

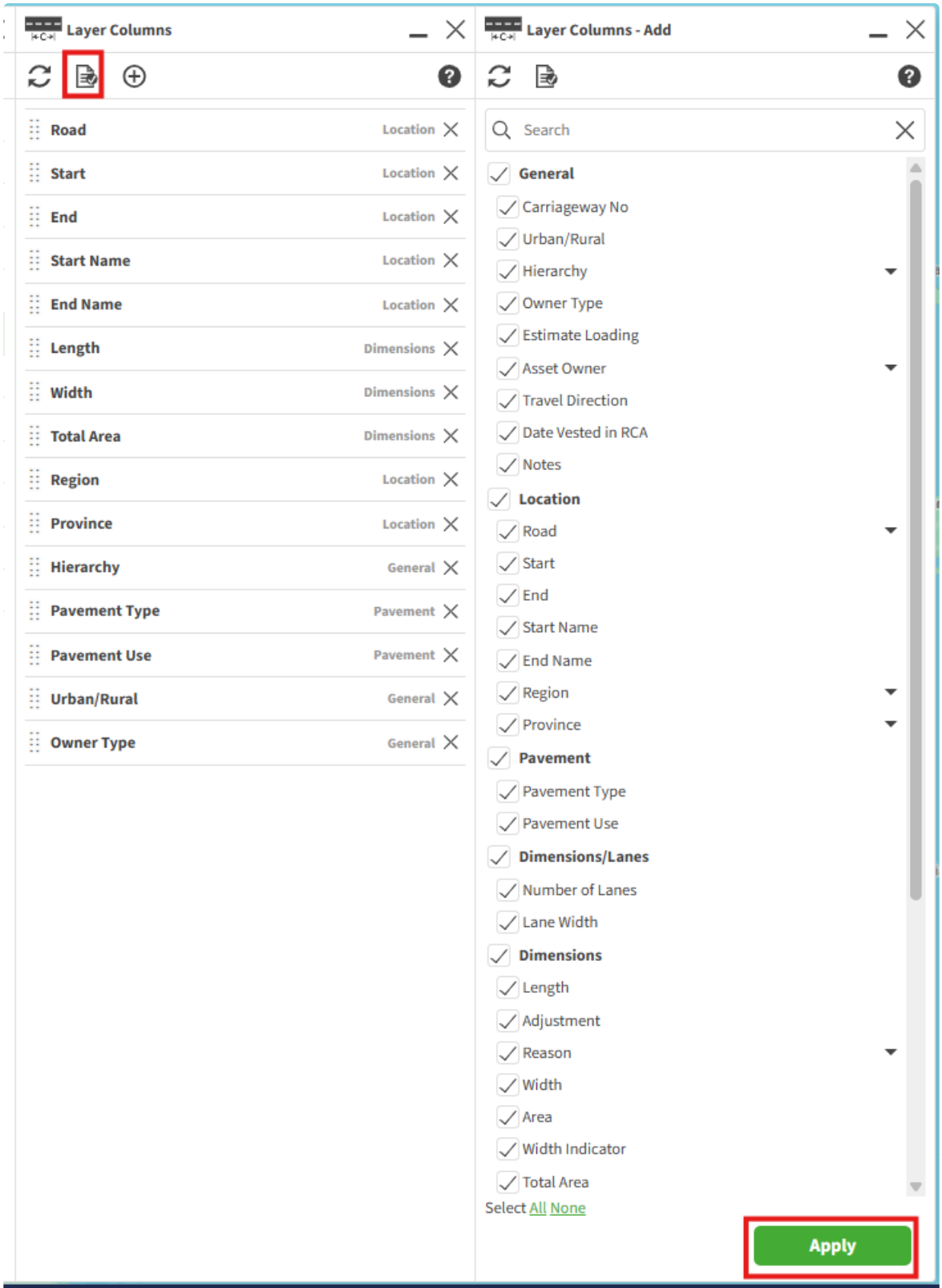


Navigating to the "Layer Configuration" pane from the Map view

4. Select "Columns", then click the Add button, then "All". Then click apply twice. This will add these columns to the export as attributes.

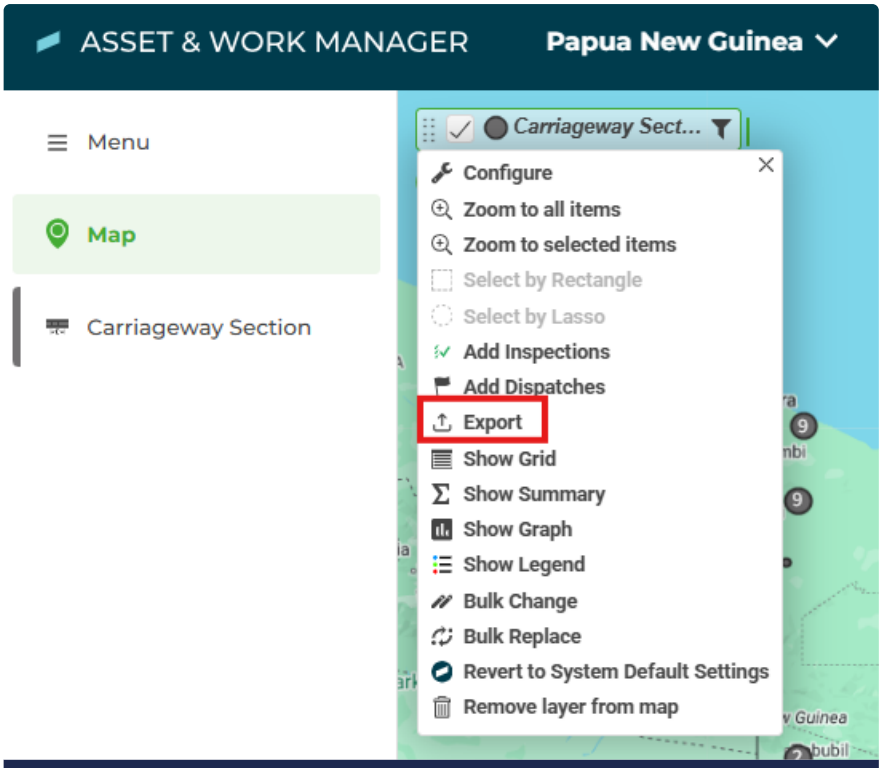


The Layer Configuration pane,Layer Columns pane, andLayer Columns - Add pane



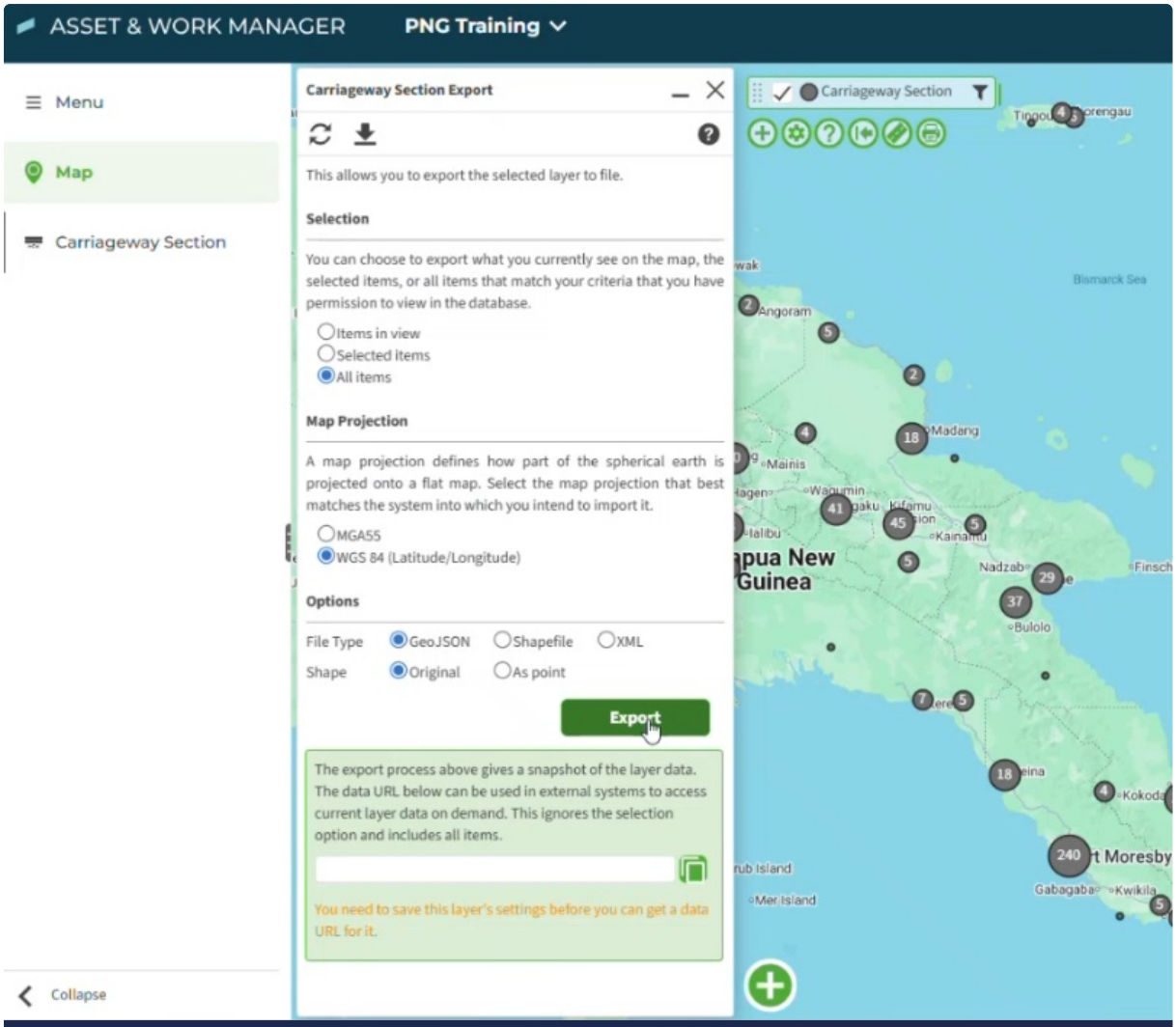
Applying changes to selected columns, with the "Apply" button in green, then the "Apply" icon in the top-left.

5. Click on the Carriageway Section layer and select Export.



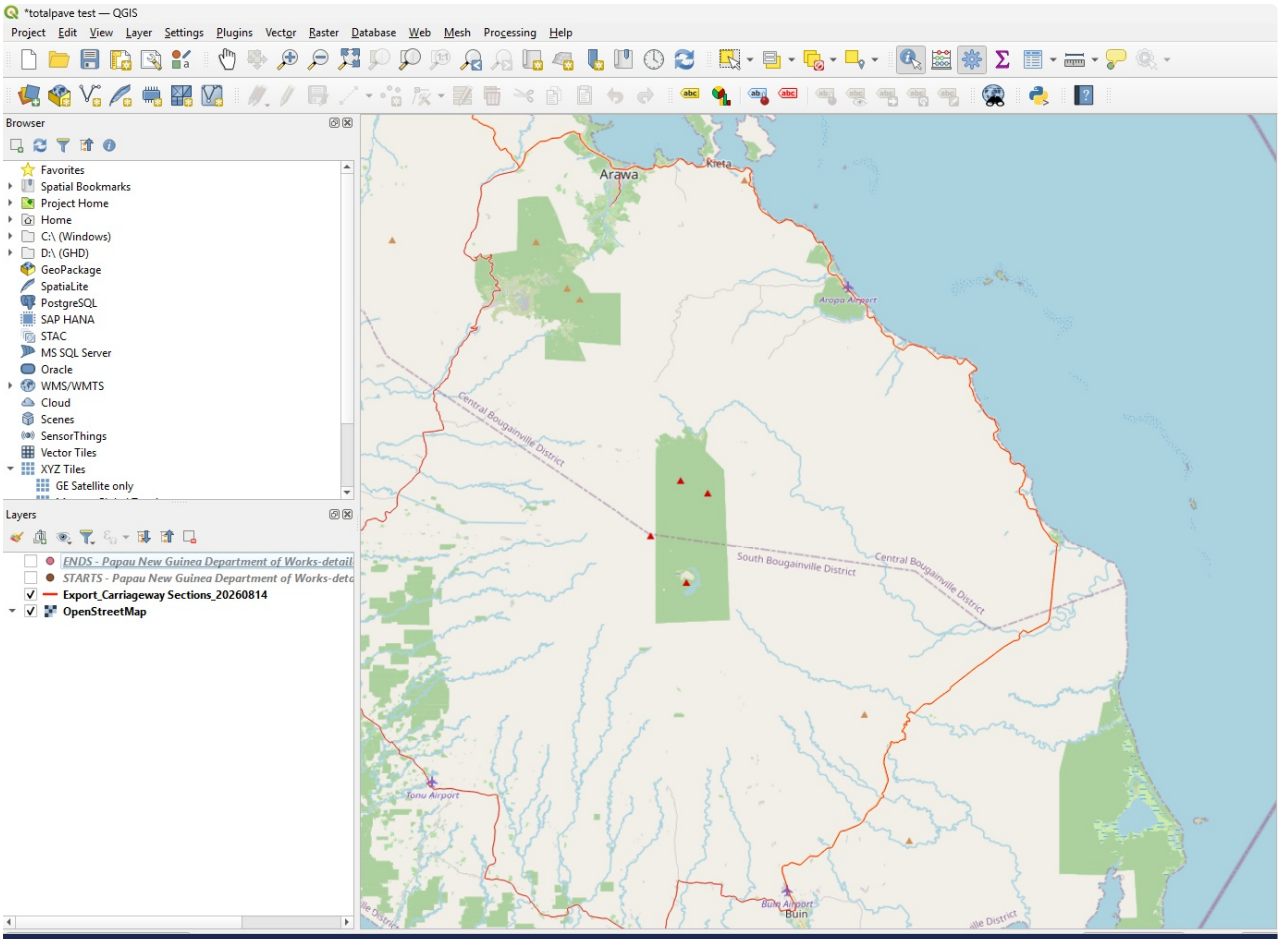
Carriageway Section layer Export button

6. Choose the following options: All items, WGS 84 (Latitude/Longitude), GeoJSON and Original (As seen below). Then click Export.



AWM GeoJSON export of Carriageway Geometry.

7. Add the Carriageway Section GeoJSON to the QGIS project.



Carriageway Section GeoJSON added to QGIS as a vector layer, as shown in red

The GeoJSON file should include the following attributes:

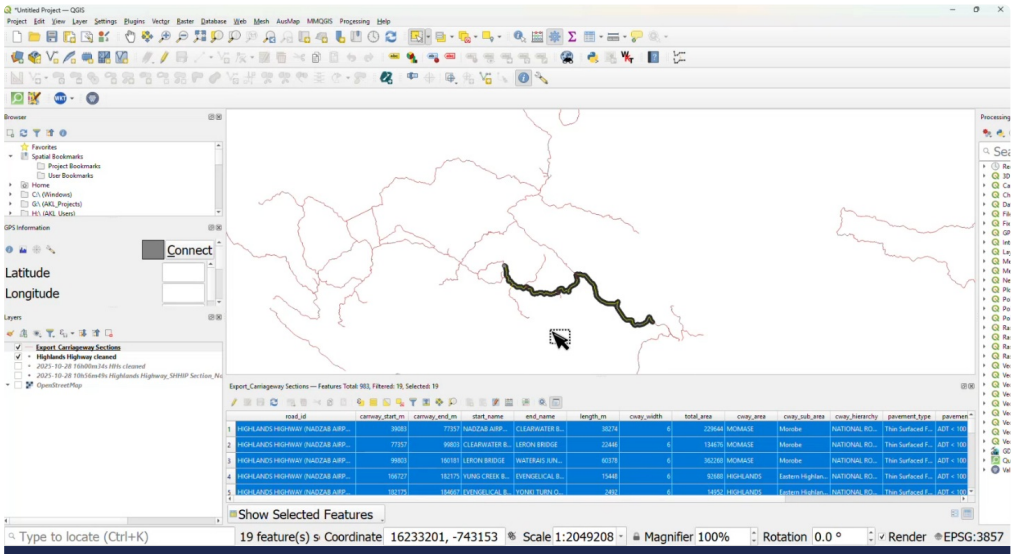
Column	Data Type	Description
Carriageway No	Integer	Unique Identifier for the Carriageway Section
Road	String	The Road the item is on.
Start	Integer	Most Roads have a series of carriageways. When determining the Start of each carriageway, the displacement in metres from the road origin is used.
End	Integer	End displacement(m) in metres from the road origin
Start Name	String	Start Name is mostly the name of the of the Road at the start of a carriageway section, Surface, Pavement and similar. If the item doesn't start with a Road, you would use a Feature such as the Bridge or seal change as the Start Name.
End Name	String	End Name is mostly the name of the of the Road at the end of a carriageway section, Surface, Pavement and similar. If the item doesn't end with a Road, you would use a Feature such as the Bridge or seal change as the End Name.
Length	Integer	Length is calculated from the difference in the Start and End displacements
Width	Decimal	Carriageway width in metres to one decimal place (e.g. 8.6).
Total Area	Decimal	Where a user has added an Area correction to the standard calculated Area, the two values are summed to give a Total Area.
Region	String	Area within which road section falls. - Suburb, Ward etc.
Province	String	Sub-area or zone into which road section falls
Hierarchy	String	Functional classification of road section

Column	Data Type	Description
Pavement Type	String	Pavement type for calculation
Pavement Use	String	Pavement Use Code categories
Urban/Rural	String	Type of area. eg. Rural, Urban (U/R)
Owner Type	String	Owner of section e.g. LA, PTE, CROWN (L/P/C)

Create Road Filter File

This section outlines how to generate a road filter file that identifies the specific roads covered by the Roughometer survey. The road filter is then used in the QGIS processing model to restrict analysis to relevant roads only.

1. Load the exported GeoJSON file into QGIS by selecting Layer → Add Layer → Add Vector Layer.
2. Open the attribute table by right clicking on the layer and selecting Open Attribute Table.
3. Using the Select tool, hold shift and highlight all carriageway sections which lie on your previously imported layer.
4. At the bottom of the screen select Show All Features → Show Selected Features.
5. Copy the resulting highlighted table from the previous step into an Excel file using Ctrl C and Ctrl V. (It should look something like the table shown in the image below).



Highlighted table of selected Carriageway Sections to be copied in QGIS.

1. In Excel delete all columns other than road_id, and then remove duplicate entries in the road_id column so that each road appears once. (Note you may just be left with one entry in the column if there is only one road).
2. Export the final list as a CSV, this is now your road filter file.

Column	Data Type	Description
road_id	String	This is taken from the AWM Carriageway Sections GeoJSON export.

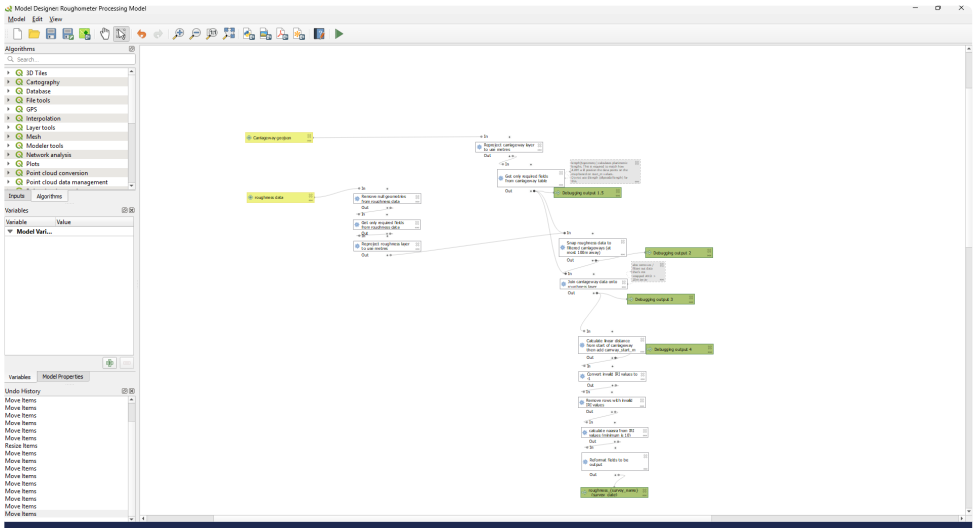
Run the QGIS Processing Model

This section describes how to configure and execute the QGIS processing model used to spatially align Roughometer survey data to the AWM carriageway network. It covers loading the model, assigning the required inputs, and running the model to generate validated roughness outputs for review.

1. If you don't already have the model file navigate to it in SharePoint and download it.

2. Open QGIS and select Processing → Model Designer.

3. Open the QGIS Processing Model file.



QGIS Processing Model file open in Model Designer.

1. Assign all required inputs: Carriageway GeoJSON, Carriageway CSV, road filter CSV and Roughometer CSV. (Note you should have already loaded the Carriageway GeoJSON and Roughometer CSV into QGIS and can hence select the layer instead of the file as the input).

2. Run the model.

Review and Export Model Output

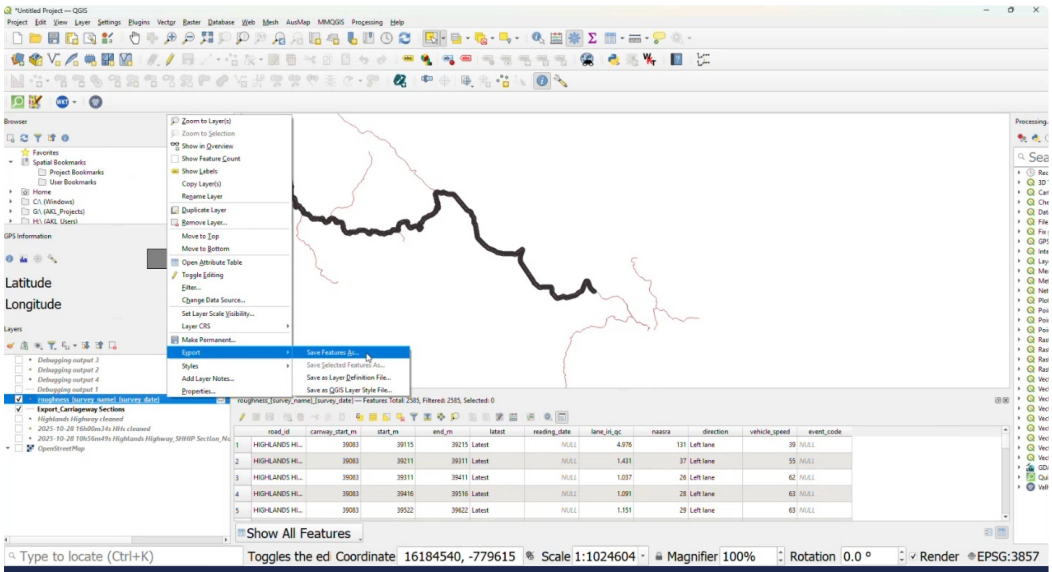
This section explains how to review the outputs generated by the QGIS processing model to ensure all required fields and records are present and valid. It also describes how to export the verified output to CSV format for downstream validation and import into AWM.

1. Locate the output layer created by the model.

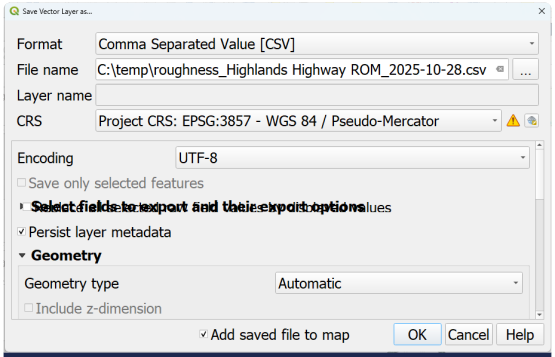
2. Open the attribute table and verify required fields are present.

    a. Export the output layer as a CSV file to a local directory (e.g. C:\Temp). To do this, click the layer and select Export → Save Features as. Then change the Format from "ESRI Shapefile" to "Comma

Separated Value [CSV]". Then click the ellipsis next to File name in order to browse, and choose a location to save the file. If a Select Datum Transformations windows pops up, click "OK".



Screenshot in QGIS of exporting the model output layer.



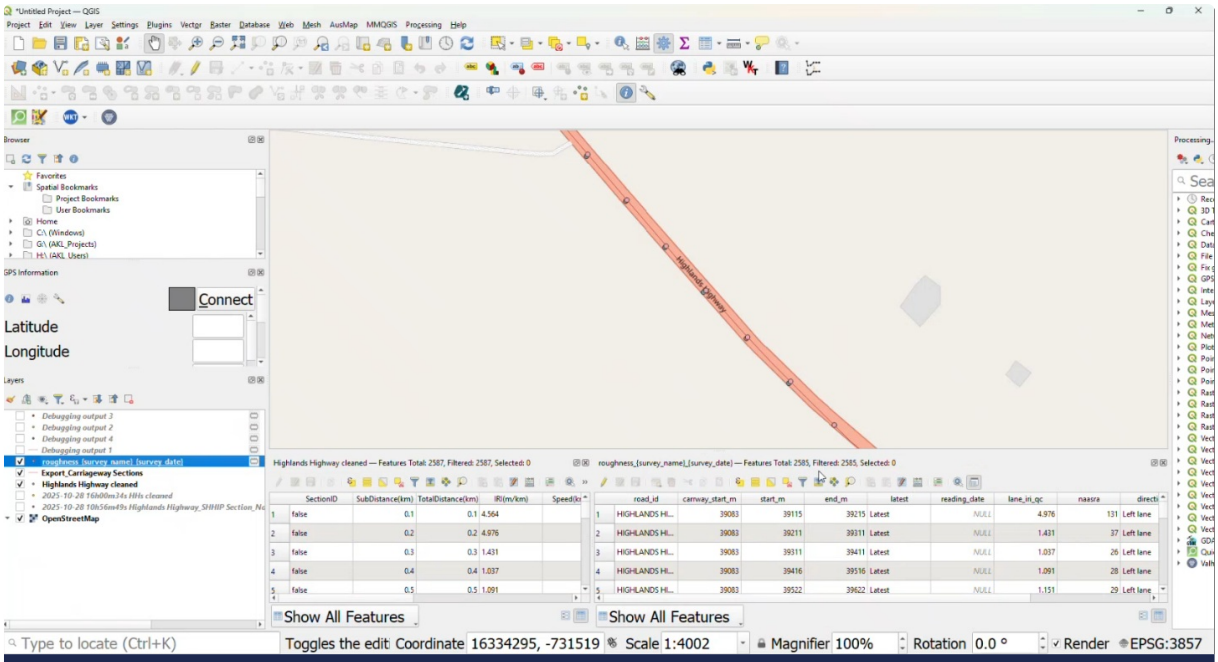
Screenshot in QGIS of the Save Feature as... window.

Validate Data Integrity

This section describes the checks required to confirm that the processed Roughometer output is complete, accurate, and consistent with the original survey data. It focuses on identifying missing records, resolving spatial alignment issues, and ensuring the dataset is fit for import into AWM.

1. Open the exported CSV from the previous step. If an error shows up when opening, remove the layer from QGIS and attempt to reopen the file.

2. Compare row counts between the input CSV and the model output CSV.



Comparison of input vs output CSV.

1. Identify missing rows caused by missing values or spatial offset.

2. If there are missing rows in the output this is caused by missing values in the input or a spatial offset. If required, you can adjust the snap distance in the QGIS Model Designer by double clicking on the 'Snap roughness data' cell in the model and changing the tolerance.

Import data into AWM

Following the validation step, it is time to upload the data into AWM. Guidance for this process is provided in the article: Road Roughness - AWM Import Process

Validate Data Integrity after importing into AWM

This section covers a process to validate the roughness data loaded into AWM, against the original roughness survey data.