ROAD INFRASTRUCTURE
MANAGEMENT FORUM

Our Carbon Equation

New Zealand IPWEA
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALASIA

Modern Tools for Modern Data Implementing the CSA

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Northland Transportation Alliance

NORTHLAND TRANSPORTATION ALLIANCE

Far North District Council
KAIPARA DISTRICT
Whangarei District Council
Northland REGIONAL COUNCIL
WAKA KOTAHI NZ TRANSPORT AGENCY

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in association with
IDS Infrastructure Decision Support

What is Candidate Selection Algorithm - CSA

- Premise for the CSA came from the 2016 ‘Research Report 599 Review of the NZ Transport Agency treatment selection algorithm’
- This paper suggested improvement to the old TSA. This transpired into the development of open-source CSA Trigger logic based on TSA with improvement from report 599
- RIMS were tasked with the development and implementation of CSA
- Report ‘FINAL_03July20_IDSRIMSCSARep.pdf’ published July 2020 by RIMS contains
  - The Trigger Logic, SQL scripts to extract data from RAMM and the testing results as applied to the Auckland Transport test network.

NTA – Modern Data

- NTA do not undertake Sealed Rating
- This has been replaced by LCMS cracking/pothole data along with full HSD rutting, rough, texture and Video capture
- Given the flexibility of JunoViewer we could take full advantage of the LCMS cracking/pothole data into the input file with ease
- NTA have a good coverage of Falling Weight data, CSA is built to take advantage of this form of data – one of the key improvement areas from report 599

CSA – Modern Data Minimum Standard

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- HSD Rutting, Texture, Roughness
- HSD Cracking
  - LCMS or other need to ensure you have validated and understand the data
- Network Video – Priceless in so many ways
- Network and Project Level FWD
- Good Pavement and Surfacing maintenance data
- Surfacing data accurate
- Traffic ADT/ONRC accurate – Roughness trigger impact
- Treatment Length segmentation

CSA - Under the Hood

- Understand the SQL and how data is extracted from RAMM
  - Check SQL select criteria against DB. To ensure all data available has been extracted
- Run the SQL dump into spreadsheet and just check through the data being created
  - Do some checks against DB for numbers in the Output file (CSA_TL_V0) . Being open source, you can alter the SQL to gather more data as it represents key characteristics of your network or service approach

CSA - Under the Hood

- Do the normal data backfill in the output file e.g. missing surface attribute. Critical ones are
  - Surface Dates, material, function, top surface life
  - Condition Defaults where none exist
- Working through this process will provide better understanding of the data being used and the CSA Trigger Logic
- Taking ownership of the Data and what is being used is key in this process

Techo Stuff - CSA

- Use of SCI seems surplus in the trigger logic
- FWD - Radius of Curvature (RoC) trigger was driving a lot of Rehab. Revised to trigger to use curvature (D0-D200)
- Need to consider the use of the Rutting trigger dependent on whether this is HSD Rutting or Manual Rating data
- Roughness was main trigger for Rehab,
  - Short lengths especially,
  - Urban high-volume rough roads triggered Rehab – needs consideration
- Surface triggers worked well with the LCMS data
- Resurface Next Time – None triggered in the outputs

Can a mere mortal RUN CSA? Or an Engineer!

- It will take several skill sets.
  - An understanding of your RAMM database and how it works
  - An understanding of SQL statements in general
  - An understanding of the network being modelled (very important)
  - Ability to manipulate data both in SQL and Excel to make the process efficient and to get a deeper understanding of the data
- It may be that this comes from several people with specific skills in these areas

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How Open Source is CSA

- Getting Data out and prepping to run is straight forward
- You will need to create the Trigger Logic in a tool of some sort.
  - I understand dTIMS has been coded with CSA Trigger Logic
  - CSA Logic could be coded into a Spreadsheet
  - Could be coded in SQL if you had the right skill set or similar tool
  - Coded into other AM tools like JunoViewer that allow this
- This make the CSA as it stands very flexible based on the chosen environment to create the trigger logic

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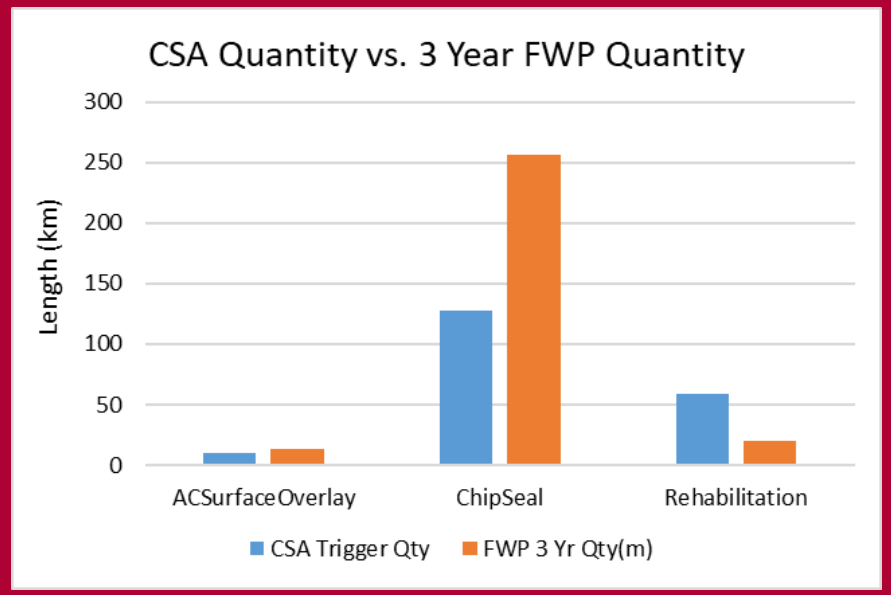

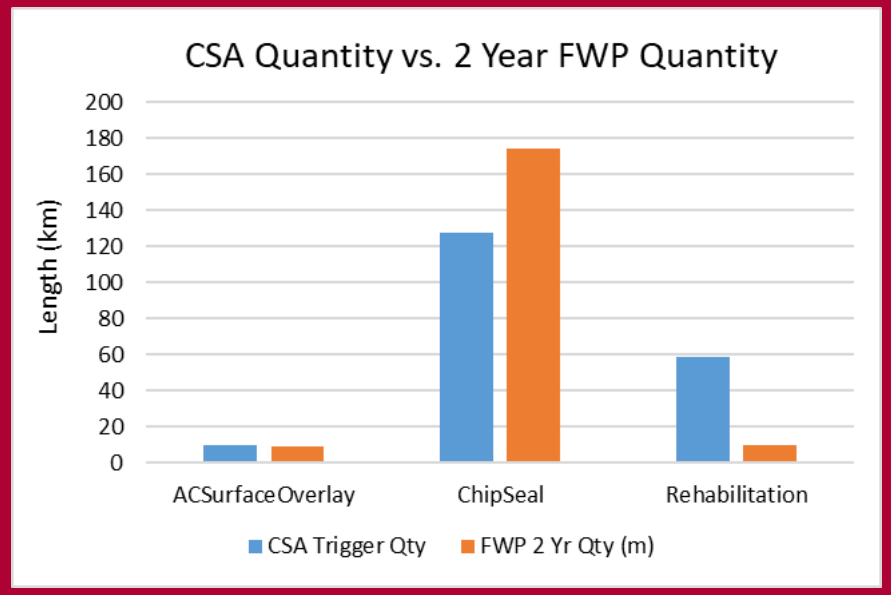

NTA Output CSA vs. FWP

- Compare 2 & 3 Year FWP
  - CSA Rehab High
    - High Urban Roughness and ADT/ONRC
    - Short lengths high Roughness
    - Good outcomes Rutting, FWD
  - CSA ChipSeal Low – FWP more risk-based treating with Pre-seal and resurface
  - CSA Thin AC – reasonable fit with FWP quantities

Treatment Category	CSA Qty(m)	FWP 2 Yr Qty (m)	FWP 3 Yr Qty(m)
ACSurfaceOverlay	9668	9327	12867
ChipSeal	127233	174571	256891
Rehabilitation	58487	10281	19757
Tota	**195388**	**194179**	**289515**

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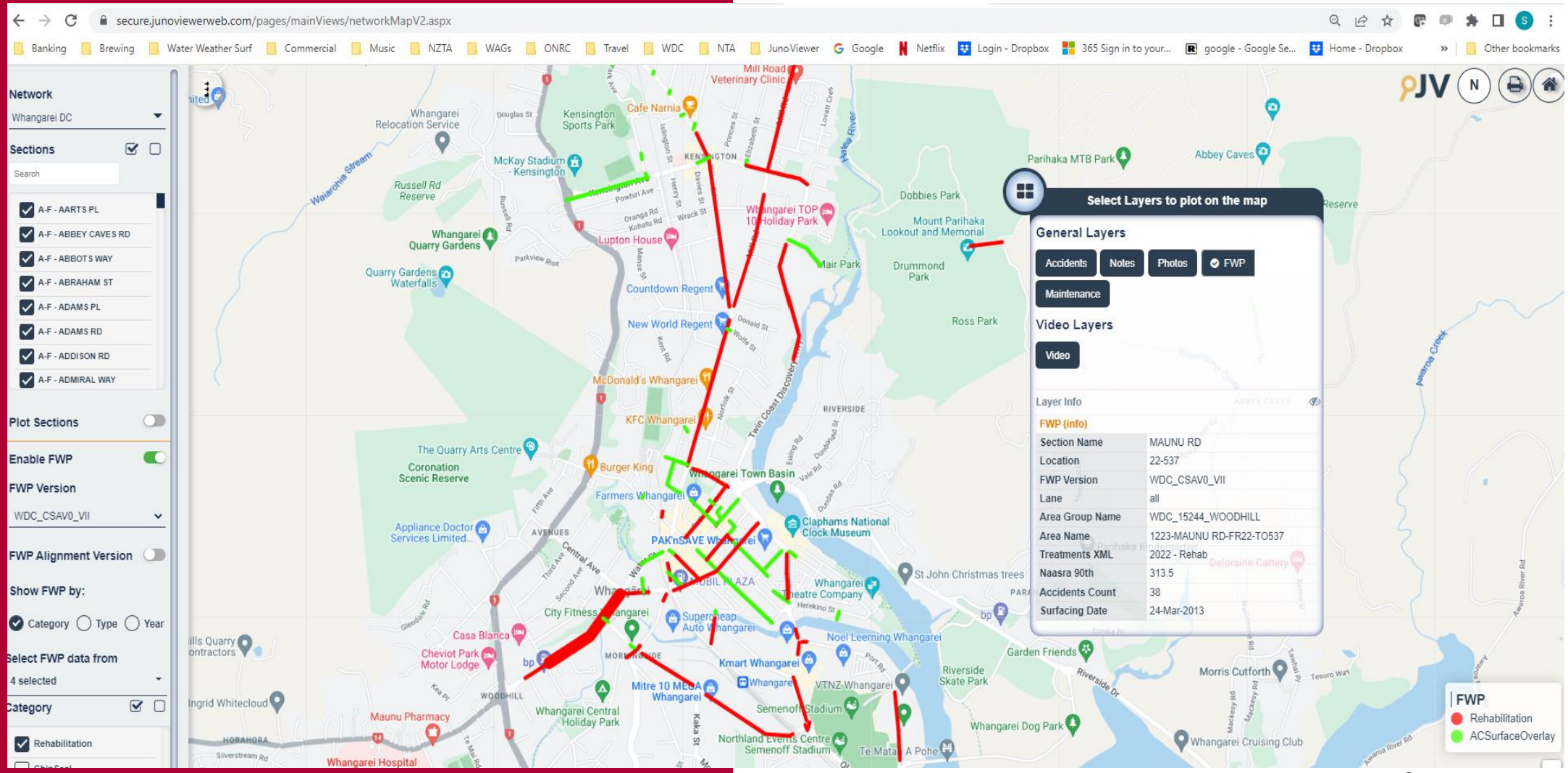
Site Selection CSA vs. FWP

- Urban Roads High ADT and Rough



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Site Selection CSA vs. FWP

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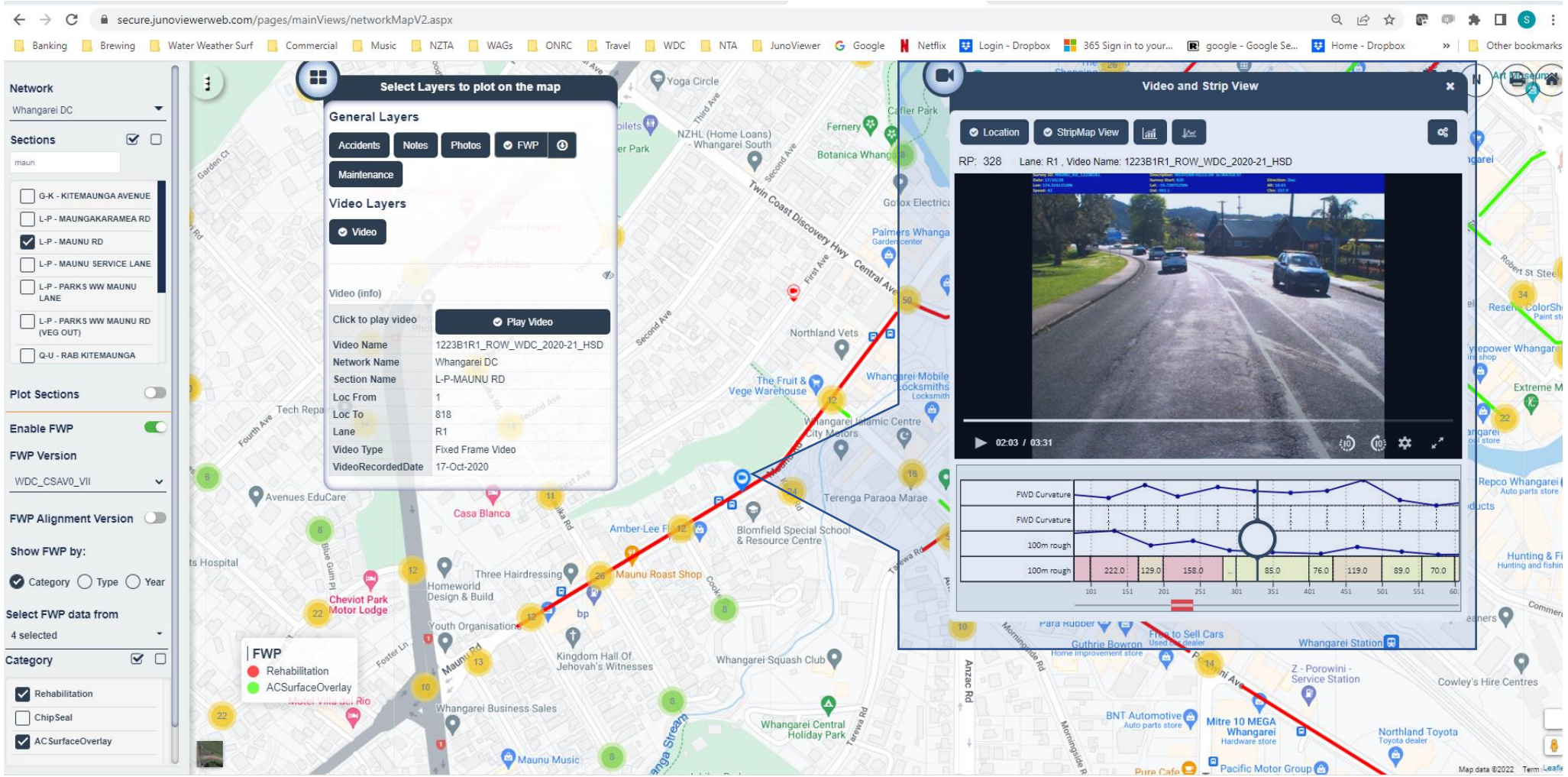

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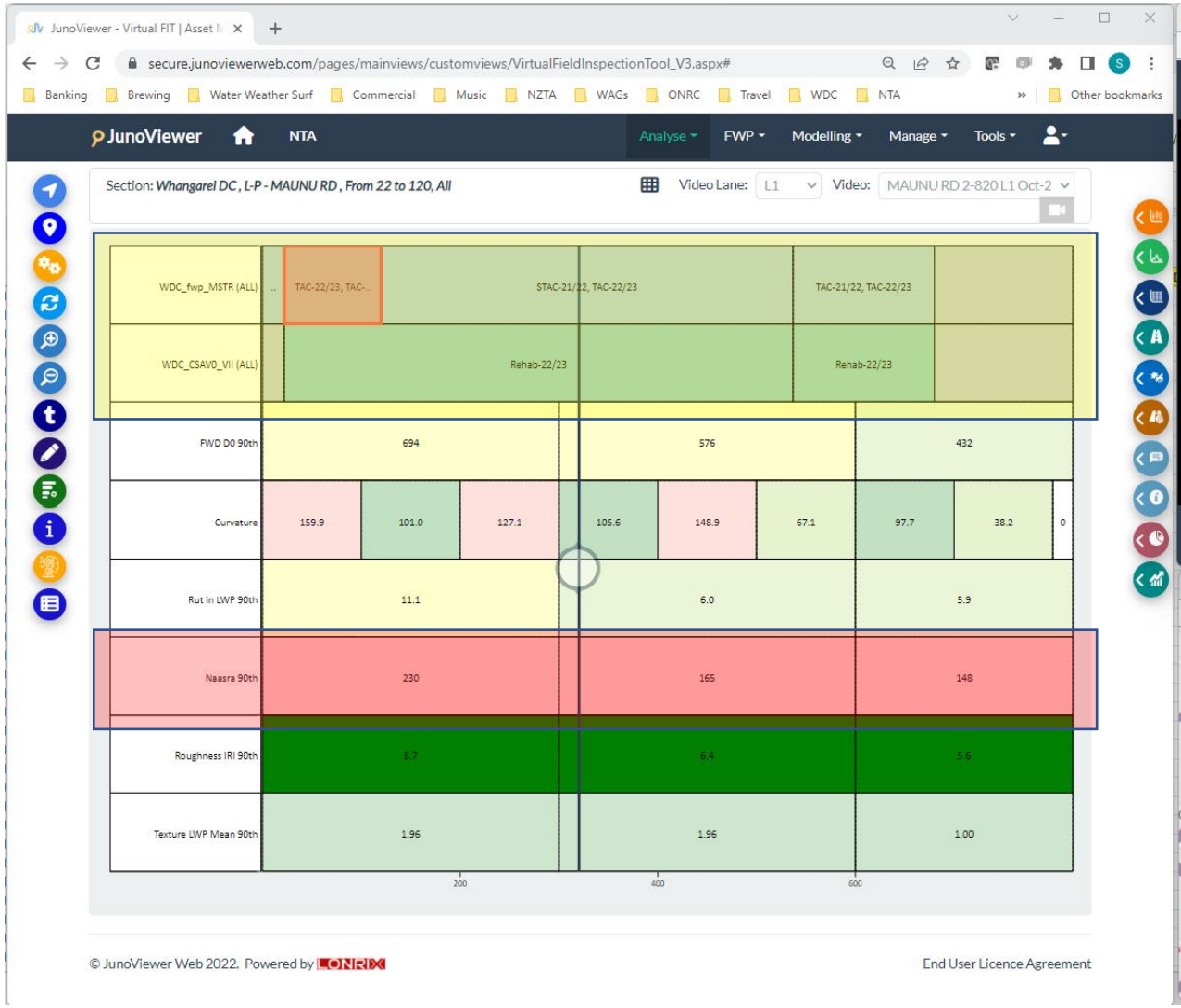
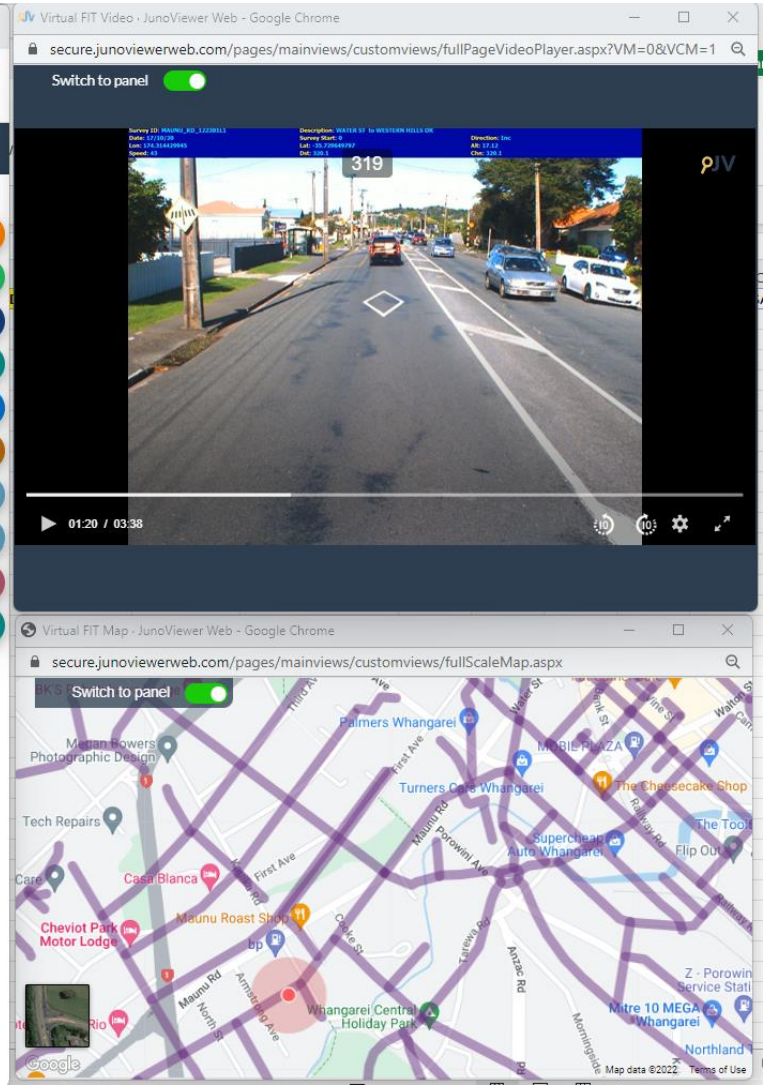
Site Selection CSA vs. FWP





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How Does CSA and TSA Compare

- CSA Not as simple to use – Not a User plug and play like TSA
- Building Logic from scratch will require effort
- Forces users to look carefully at data being extracted for use
- Flexibility; introducing more data as required and building triggers, good and bad

Carbon Question

- Better up-front decision-making results in less wasted effort e.g.
  - Site assessments, design input where site may not be required
- Programmes still require onsite validation – but with more desktop validation this can reduce onsite visits

Why JunoViewer

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- Part of the NTA Tactical/Operational tool-box
  - Video Analysis, Short to Medium term decision making, FWP Site validation
- Lonrix did the heavy lifting to code the Logic for JunoViewer
- Easy to understand Logic and setup
- Access to tweaking logic/triggers to take account of our network characteristics
- Ease of Adding further info to the input file for individual reporting
- Quick data extract and programme analysis
- Virtual Fit tool to review sites
  - Excellent Condition data Visualisation to assess site deterioration
  - Hours of historical video to support condition data
- For Example ability to add Policy decisions into the Logic AC vs. chip seal replacement

CSA - Is it Good to Go

- Overall; a good step forward as the Industry and data is changing rapidly. CSA open-source nature allows industry to move with this change
- It would appear to be working in terms of its intent as short-term site selection tool
- Given the NTA condition data the CSA is good fit to take full advantage of this data
- CSA will be a key component in the tool-box for our evidence base
- However, what are the expectations from Investment partners? Who owns the tool and is looking after change/implementation?

Opportunities For Improvement

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- Development of Training/User Documentation based on user cases/Industry training
  - Explanation on Key Data Attributes and how these impact Trigger Logic
  - Explanation of the SQL in full to allow people to upskill
- Introduce Treatment Unit Costs as per TSA
  - NTA have introduced this as part of JunoViewer setup
- Introduction of temporal logic based on simple prioritization / ranking process to spread treatments over a 3-year planning horizon