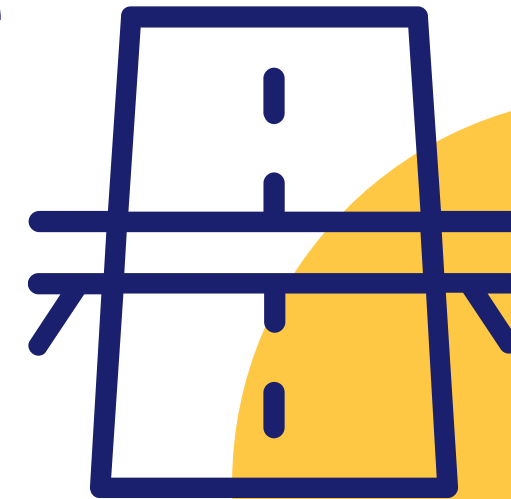




Transport Infrastructure Ireland

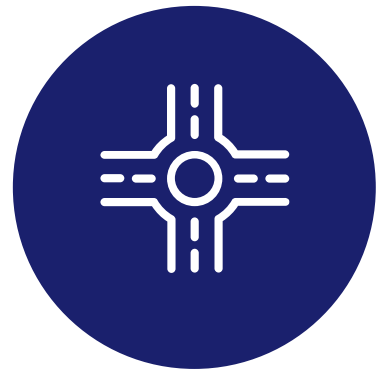
AI-Driven Asset Intelligence: Transforming Ireland's Transport Networks for a Resilient Future

Institute of Asset Management – Annual Conference 2026
17th June 2026



Gerard O'Dea – Senior Engineer Transport Infrastructure Ireland
Stephen Smyth – Senior Manager Transport Infrastructure Ireland

Overview



TII Background

- Asset Management Structure



Connected Vehicle Data Pilot

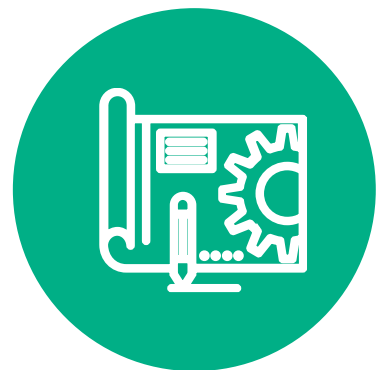


Data Driven Asset Management

- Annual Machine Surveys
- AI Data Collection & Processing
 - Active Travel Pilot
 - National Road Survey

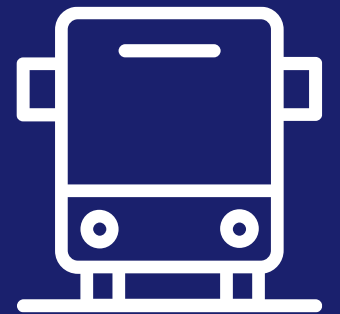


Next Steps



Dashboard Reporting

TII Background



Background to TII

Transport Infrastructure Ireland (TII) was formed following the merger of the **National Roads Authority (NRA)** and the **Railway Procurement Agency (RPA)**

- NRA established in 1993, under the Roads Act 1993
- RPA established in 2001, under the Transport(Railway Infrastructure) Act 2001
- TII established in 2015, under the Roads Act 2015

TII's growing, dynamic workforce of 300+ technical and professional experts play **a pivotal role in the transformation of the transport sector**, in line with Ireland's National Development Plan.

TII's current remit is across:

- Roads
- Greenways
- National Cycle Network
- Light Rail
- Metro



Background to TII (Video)





Purpose

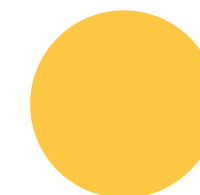
TII's purpose is to provide **sustainable transport infrastructure and services**, delivering a **better quality of life**, supporting **economic growth** and **respecting the environment**.

Function

TII's function is to provide an integrated approach to the future development and operation of the **national roads network** and **light rail infrastructure** throughout Ireland.

Strategy

National Roads 2040 (NR2040), which will allow TII to **enable Project Ireland 2040**, responding to evolving national policy and aligning to the Department of Transport's National Investment Framework for Transport in Ireland (NIFTI).



Road Network – Assets Managed

TII has been **leading the development of the Major Interurban Road Network** across the country, connecting Ireland's major cities for the past 25 years.

Across **5,314km** of national roads, TII manages:



Carriageway & Earthworks
assets worth
€ 14.1 billion

5314 km roads
1200 km is high quality
motorway and dual
carriageway



Drainage & Ducting
assets worth
€2.5 billion

600 km urban positive drainage
1200+ km designed drainage
(filter, carrier, kerb and gully)



Bridges, Walls and Structures
assets worth
€ 4.2 billion

3400 structures,
700 gantries



Land
assets worth
€ 5.2 billion

14000 hectares



Tunnels & Major Structures
assets worth
€ 1.9 billion

3 x tunnels
(1 x bored
2 x immersed tube)



Traffic Systems, Signs and Markings
assets worth
€ 0.4 billion

600 traffic signals
130,000 road signs



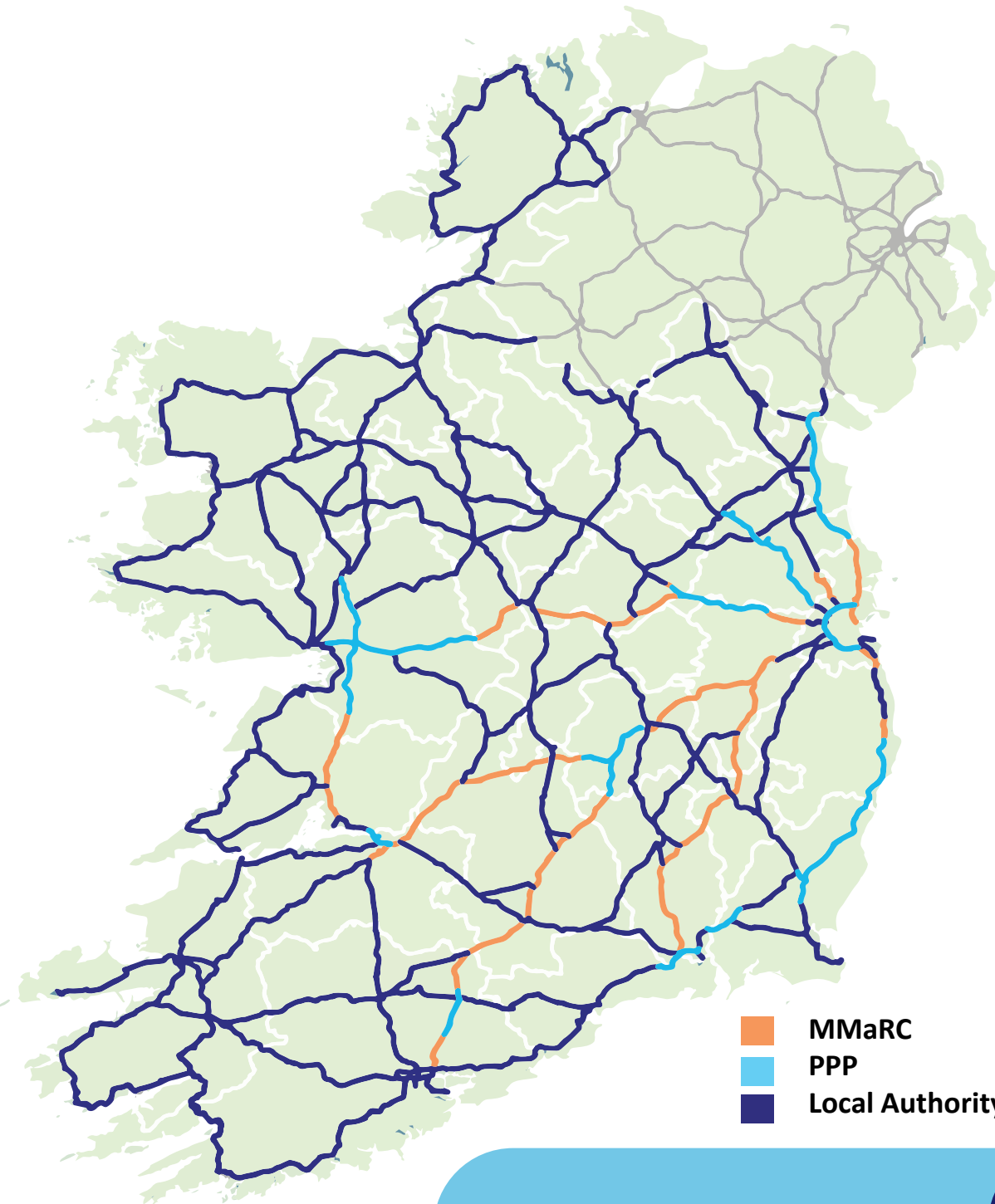
Street Lighting
assets worth
€ 0.2 billion

42,000 streetlights



Footpaths and Cycleways
assets worth
€ 0.1+ billion

1000+km of footpaths,
200+ km cycleways



MMaRC
PPP
Local Authority

*Other Ancillary Assets not shown such as buildings, depots, ITS, safety barriers, other street furniture, utilities and accommodation works total c . € 2.4bn

Value of the Irish National Roads Network

Key statistics of the NRN, 2024

3.5 million daily trips,
and highest ever
average daily traffic.

Connecting people
and places and
help develop
communities.



80-90% of all kilometres
travelled by goods vehicles
within Ireland occur on the
NRN.

Providing
opportunities
to access jobs,
education, leisure,
and services.



With an estimated value
exceeding €31 billion, it is
one of the Ireland's most
valuable assets.

Permitting efficient
movement of goods
and services, and
enabling economic
activity.



Approximately **5,300 kilometres** in length, representing 5%
of Ireland's overall road network.

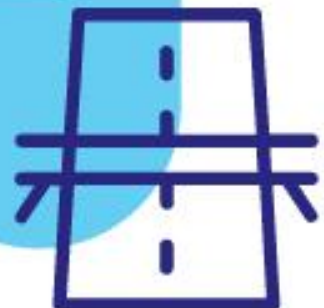
First designated in 1977, with rapid expansion in years
since.

3.5 million daily individual journeys, including 82,000
heavy-goods vehicles.

Important tourism and cultural asset, enabling further
economic and social development.

More than 200 Million Public Transport trips each year

Transport Infrastructure Ireland
TII Statement of Strategy
2026–2030



TII Statement of Strategy - Asset Management Objectives

Sections

- 4. TII's Purpose, Vision and Values
- 5. Goals
- 6. Safety
- 7. New infrastructure

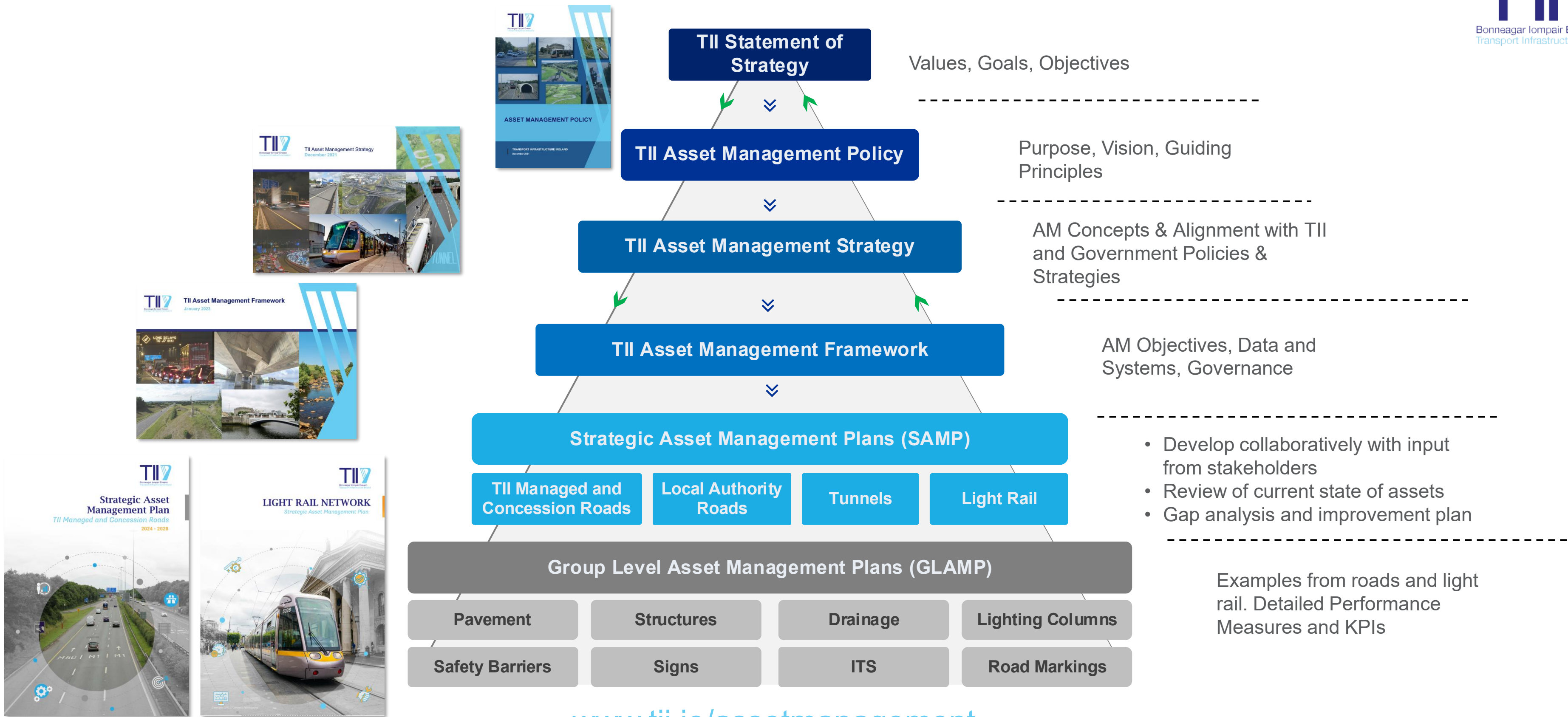
8. Network Management (Asset Management, Operation and Services)

Manage, maintain and operate TII's transport infrastructure, networks, assets and services in a safe, efficient and sustainable manner in order to preserve the state's investment in transport infrastructure and maximise the resultant economic and societal benefits from these investments.

9. Enablers

[tii-statement-of-strategy-2026-2030-1.pdf](#)

TII Asset Management Structure



www.tii.ie/assetmanagement

“Assets will be managed in a sustainable manner through the development, implementation, and maintenance of an asset management approach that is risk-based and **data-driven**, enabling us to make informed decisions throughout the life of our assets.”

TII Approach to Data Driven Asset Management

Annual Network Condition Surveys – 6600km RSP/LCMS/SCRIM



Pavement Condition & Skid Resistance

- Longitudinal profile*
- International Roughness Index (IRI)*
- Longitudinal profile variance (3m and 10m)*
- Transverse profile*
- Rut Depth*
- Crossfall*
- Surface macrotexture expressed as Mean Profile Depth (MPD)*
- Characteristic Skid Coefficient (CSC)*



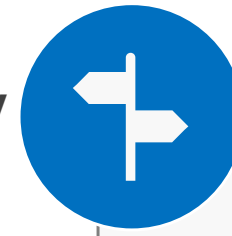
Structural Condition & Surface Defects

- Laser Crack Measuring System (LCMS)*
- Digital Video Survey*
- Surface Defects



Pavement Structure & Structural Capacity

- Pavment Deflection by Falling Weight Deflectometer (FWD)
- Ground Penetration Radar (GPR)
- Coring
- Foundation Capacity

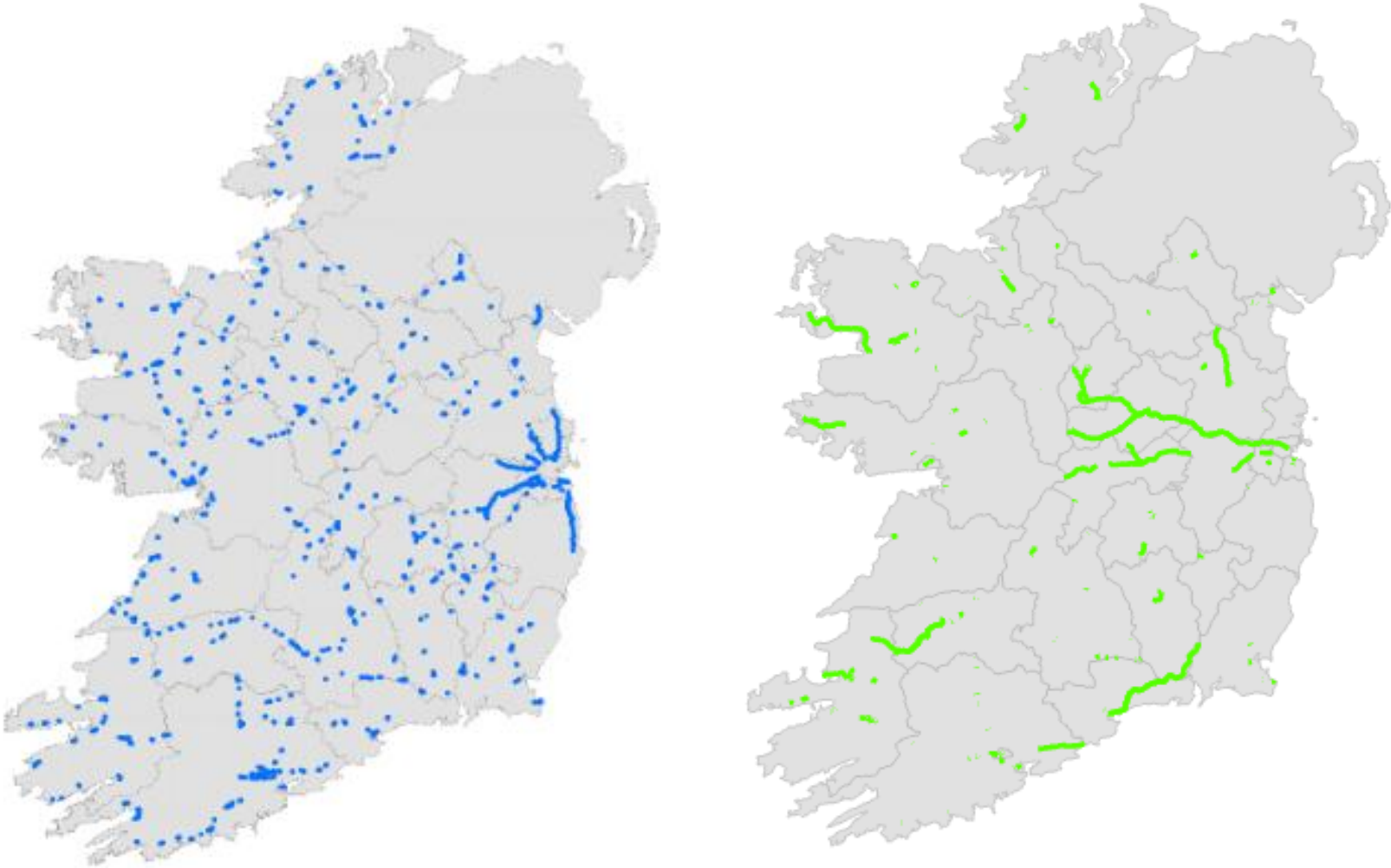


Other Road Information

- Gradient*
- Radius of Curvature*
- Rise and Fall and Bendiness Index
- Edge Detection and Shape Index

Transport Infrastructure Ireland: Active travel

Existing



c.800 km Footpath/way

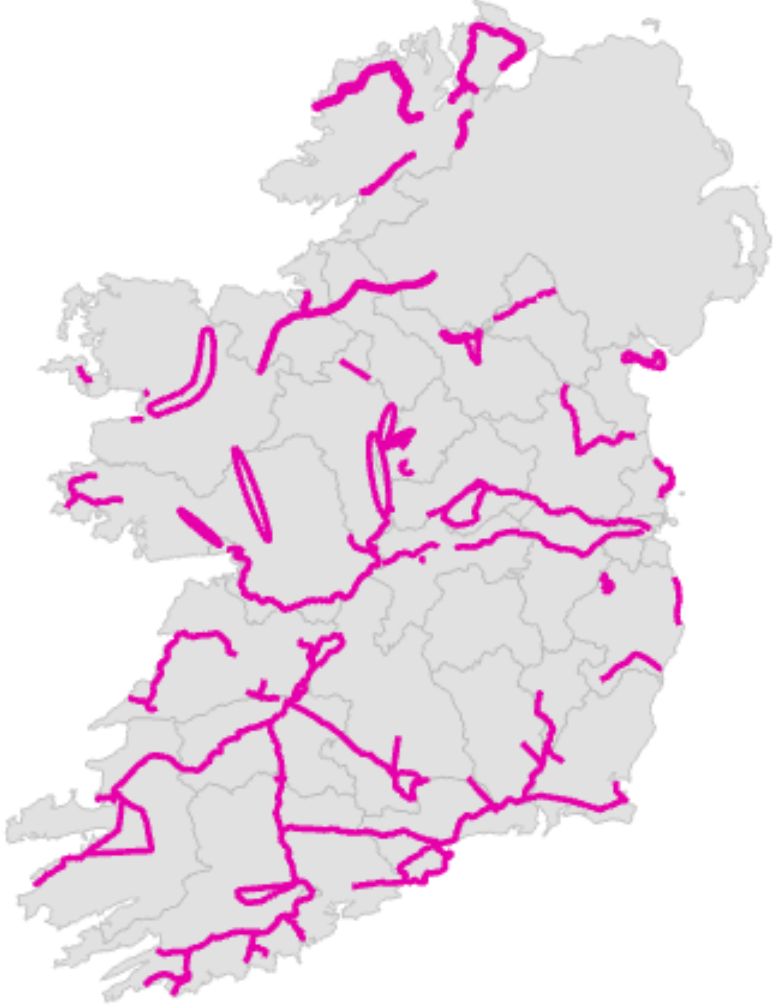
c.800 km Cycleways/Greenways



Planned



National Cycle Network c.3500km

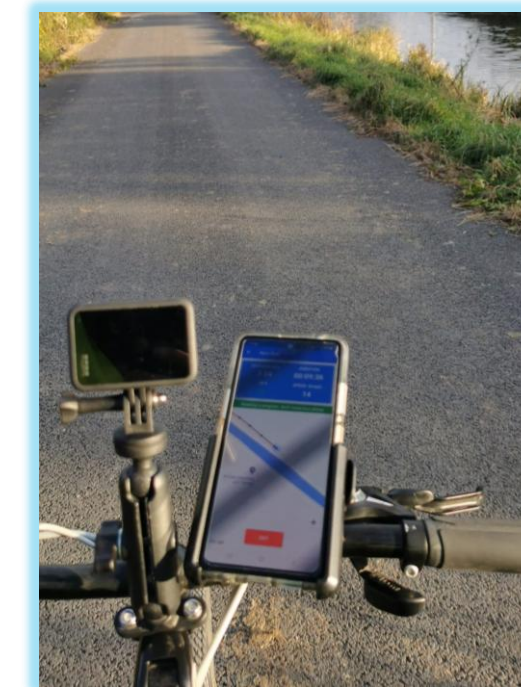


Greenways c.2500km

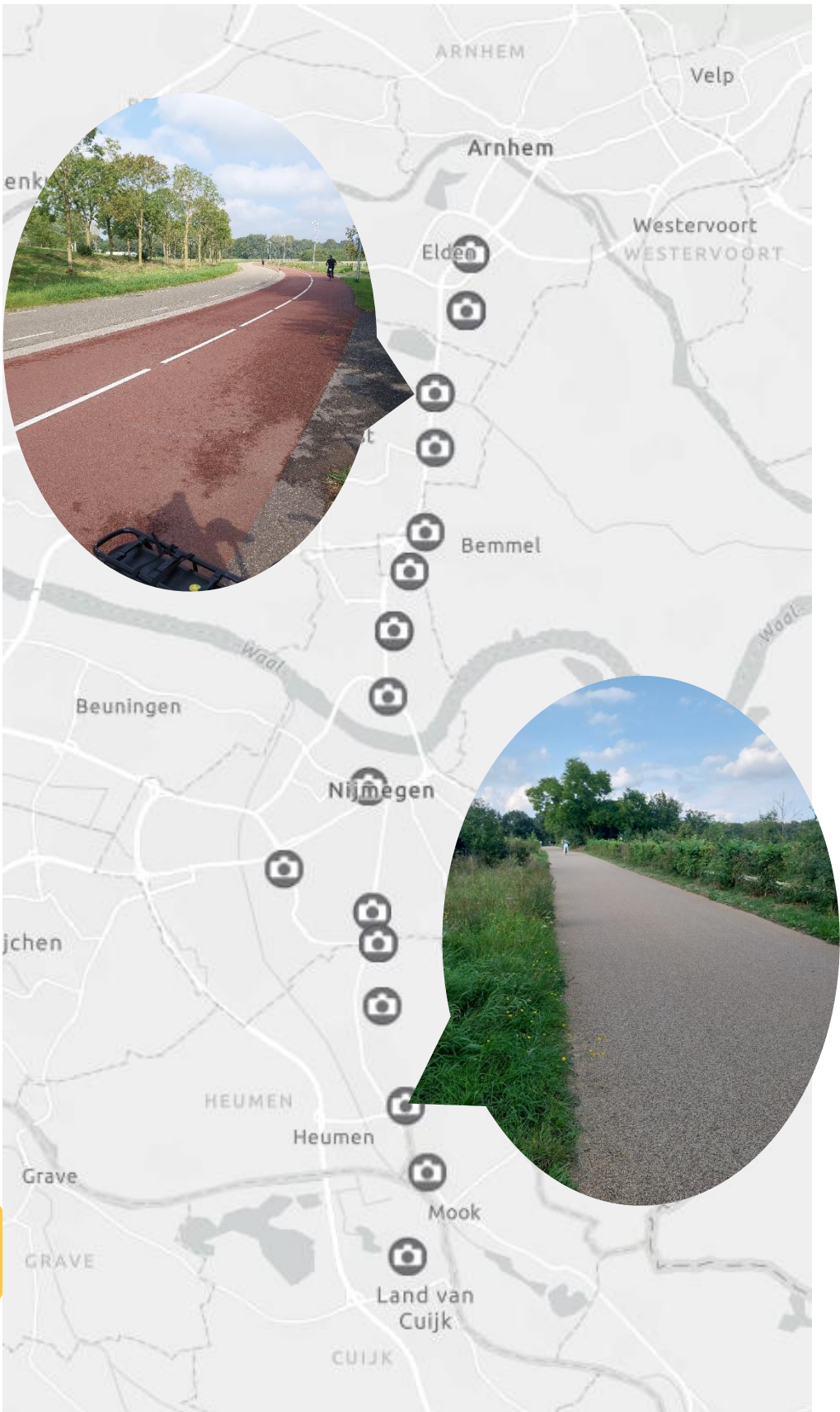


Active Travel - Data Driven Asset Management

- R&D / Innovations in Data Collection & Condition Assessment:
- **Current**
 - ESRI AGOL Field Maps Collector App
 - GoPro Georeferenced Video Data Collection – UbiPIX
 - Vaisala Road AI App
 - MapRoad – Inventory and Data Capture
- **Ongoing**
 - VivaCity AI Sensor
 - Trial Xenomatics - Xenobike – LiDAR.
 - PavAnalytics Research University of Galway



ATI– Data Collection – AGOL Field Maps



Greenway – Video Data Collection - UbiPix

Device Set Up

- GPS Enabled Smart Phone or GoPro
- Camera Mounted to Bike Frame



TII Pavement & Asset Management

tii-pam.ubipix.com/index.php?action=view_channel&id=27#

Quick Start Guide...
UbiPix Users Guide...

TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

My Tracks | Upload | Account | Logout

Search...
Go Email

CHANNELS

Recordings for the Limerick Greenway Site Visit 23 Aug 2023 (EB) Channel

Thumbnail

Title

Channels

Recording Date

Upload Date

Views

Duration

Media Type

Privacy Status

Limerick Greenway Site Visit 23 Aug 2023

TII Active Travel Infrastructure Inspections - Ger

Limerick Greenway Site Visit 23 Aug 2023 (EB)

23-08-2023 01:25:04pm

23-08-2023 05:18:43pm

4

00:09:18

Public

Limerick Greenway Site Visit 23 Aug 2023

TII Active Travel Infrastructure Inspections - Ger

Limerick Greenway Site Visit 23 Aug 2023 (EB)

23-08-2023 11:33:30am

23-08-2023 05:09:45pm

3

00:04:51

Public

Greenway– Video Data Collection - UbiPix

TII Pavement & Asset Management

tii-pam.ubipix.com/index.php?action=view_channel&id=14

My Tracks | Upload | Account | Logout

Quick Start Guide...
UbiPix Users Guide...

TII

Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Search...
Go Email

CHANNELS

Recordings for the TII Active Travel Infrastructure Inspections - Ger Channel

No TAG's Loaded

Options

Search:

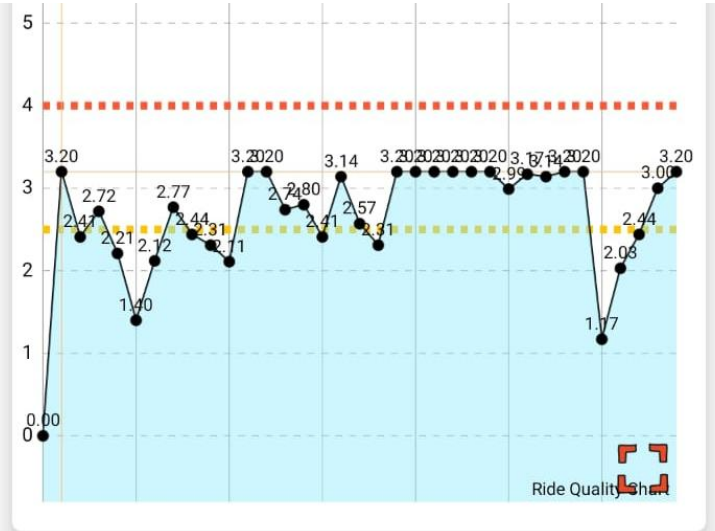
Thumbnail	Title	Channels	Recording Date	Upload Date	Views	Duration	Media Type	Privacy Status
	Auto Title: Fri Sep 15 2023 12:06:55 GMT+0100 (Irish Standard Time)	TII Active Travel Infrastructure Inspections 12-09-2023 04:42:19pm - Ger	12-09-2023 04:42:19pm	15-09-2023 01:47:26pm	0	00:06:05		Public
	Auto Title: Fri Sep 15 2023 12:06:55 GMT+0100 (Irish Standard Time)	TII Active Travel Infrastructure Inspections 12-09-2023 04:32:02pm - Ger	12-09-2023 04:32:02pm	15-09-2023 01:41:51pm	0	00:06:58		Public

Greenway Asset Renewal – Data Collection – Geo Tagging Defects

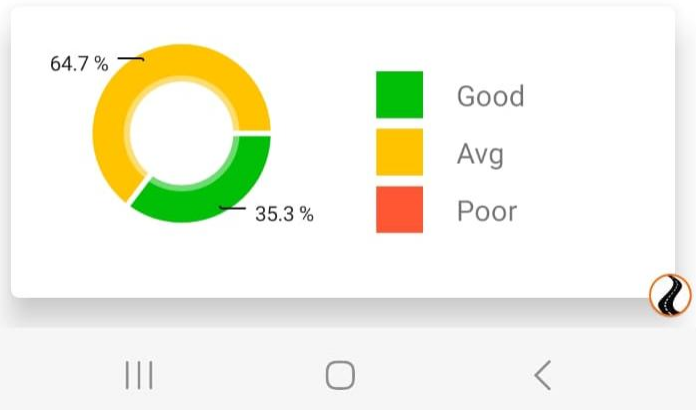
Option to Export Geolocated Inspections / Defects to Excel

A	B	C	D	E	
TAG_ID	DESCRIPTION	LATITUDE	LONGITUDE	SURVEY DATE	LINK URL
26	Edge Breakup & Rutting	53.81529558	-9.537194561	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
31	Ponding, Mud, Detritus	53.81402174	-9.53680702	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
34	Exposed 804 Subbase	53.81478245	-9.537123624	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
37	Narrowing of Track due to Vegetation in growth	53.81665767	-9.536453281	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
24	Post and Rail Fencing Damage	53.81521721	-9.537151949	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
27	Ponding at Overbridge	53.81263159	-9.534265071	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
29	Change of Surface from Bound to Limestone Dust	53.81372549	-9.536507275	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
32	Ponding at Overbridge	53.81423182	-9.536938703	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
35	Fencing Broken	53.81501485	-9.537030031	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
38	Severe Rutting / Edge Breakup	53.81746727	-9.535701562	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
25	Edge Breakup / Rutting	53.81521721	-9.537151949	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
28	Temporary works at Connection to new link	53.81268172	-9.534438297	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
30	Ponding, Mud, Detritus	53.81385908	-9.536672612	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
33	Ponding	53.81426673	-9.536959018	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
36	Vegetation Ingrowth	53.81617198	-9.53687169	05-04-2023 10:47:21am	https://tiipam.ubipix.cc
39	Severely rutted & uneven, surface washed away, subbase exposed	53.81839926	-9.534884802	05-04-2023 10:47:21am	https://tiipam.ubipix.cc

Potential to integrate georeferenced video data with roughness data from accelerometers on smart device



Pie Chart



AI / Machine Learning
Automated Distress
Identification



Vaisala Road AI – Service Architecture

DATA COLLECTION



- Video Recording with Vaisala recording application
- Existing videos and images from any camera (e.g. Dash Cam)

DATA PROCESSING



- Cloud based data storage
- Processing through machine-learning software

DATA MANAGEMENT



- Web based user interface
- Data transfer to other graph-based system (Excel/CSV file, GIS)



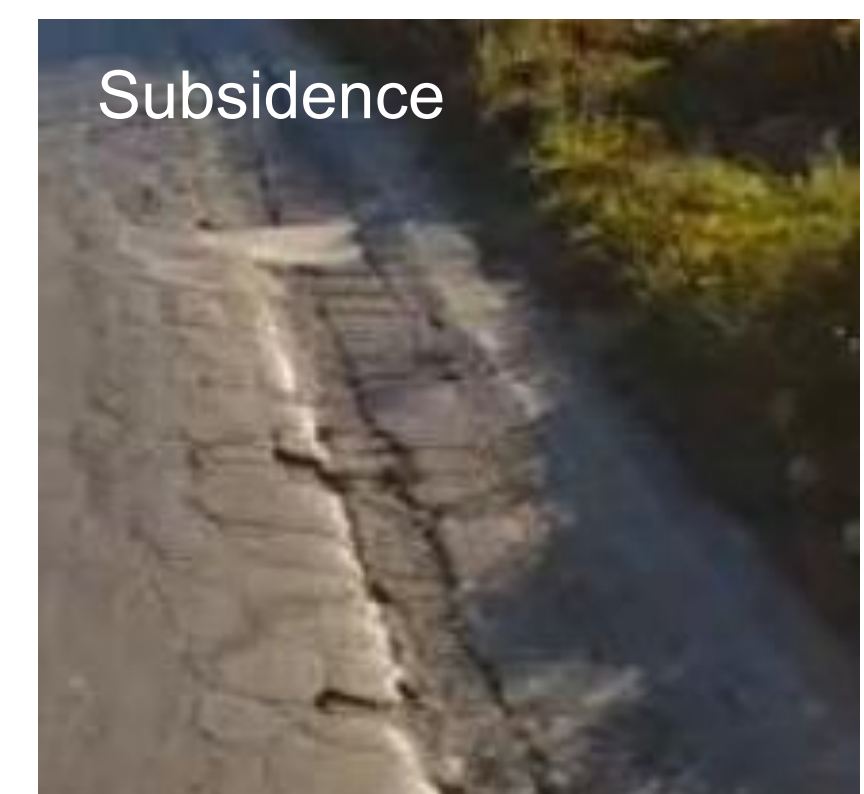
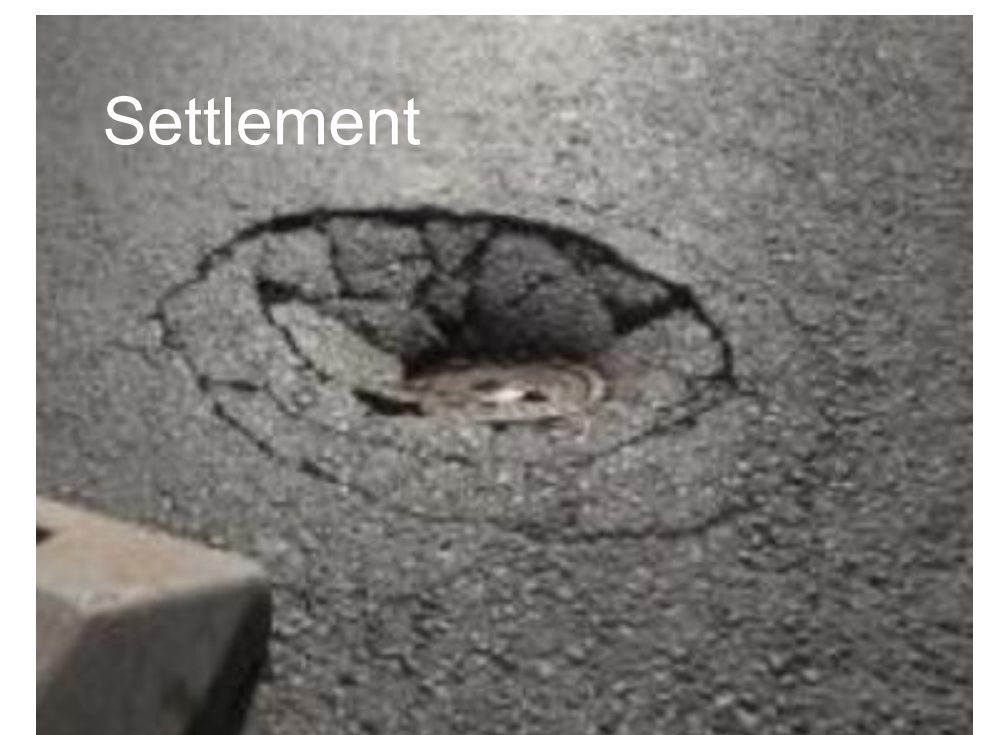
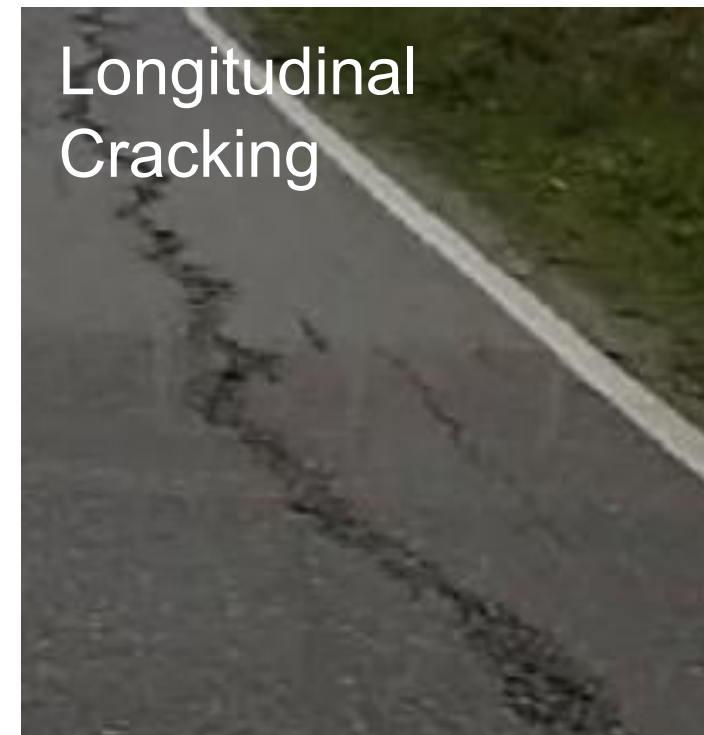
ENCRYPTED DATA TRANSFER



Computer Vision - Surface Defects

VAISALA

TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

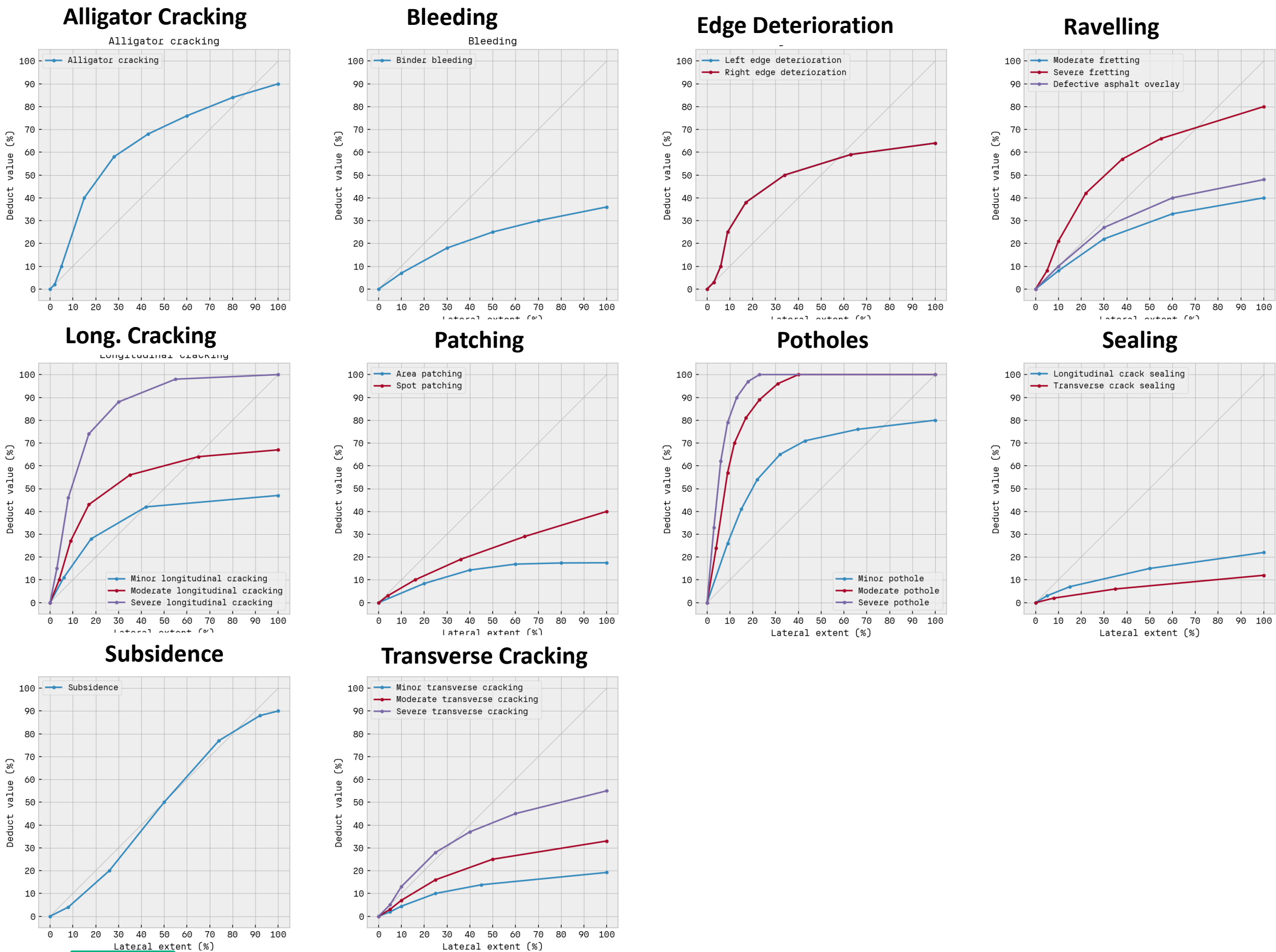


RoadAI Asphalt Condition Index (0-100)

The score is based on deduct value curves and compounding effect limitations similar to the ASTM D6433.



RoadAI is officially approved for surveying road conditions under the UK Department for Transport's PAS 2161 standard.



RoadAI Survey – Active Travel Network 2024-2025

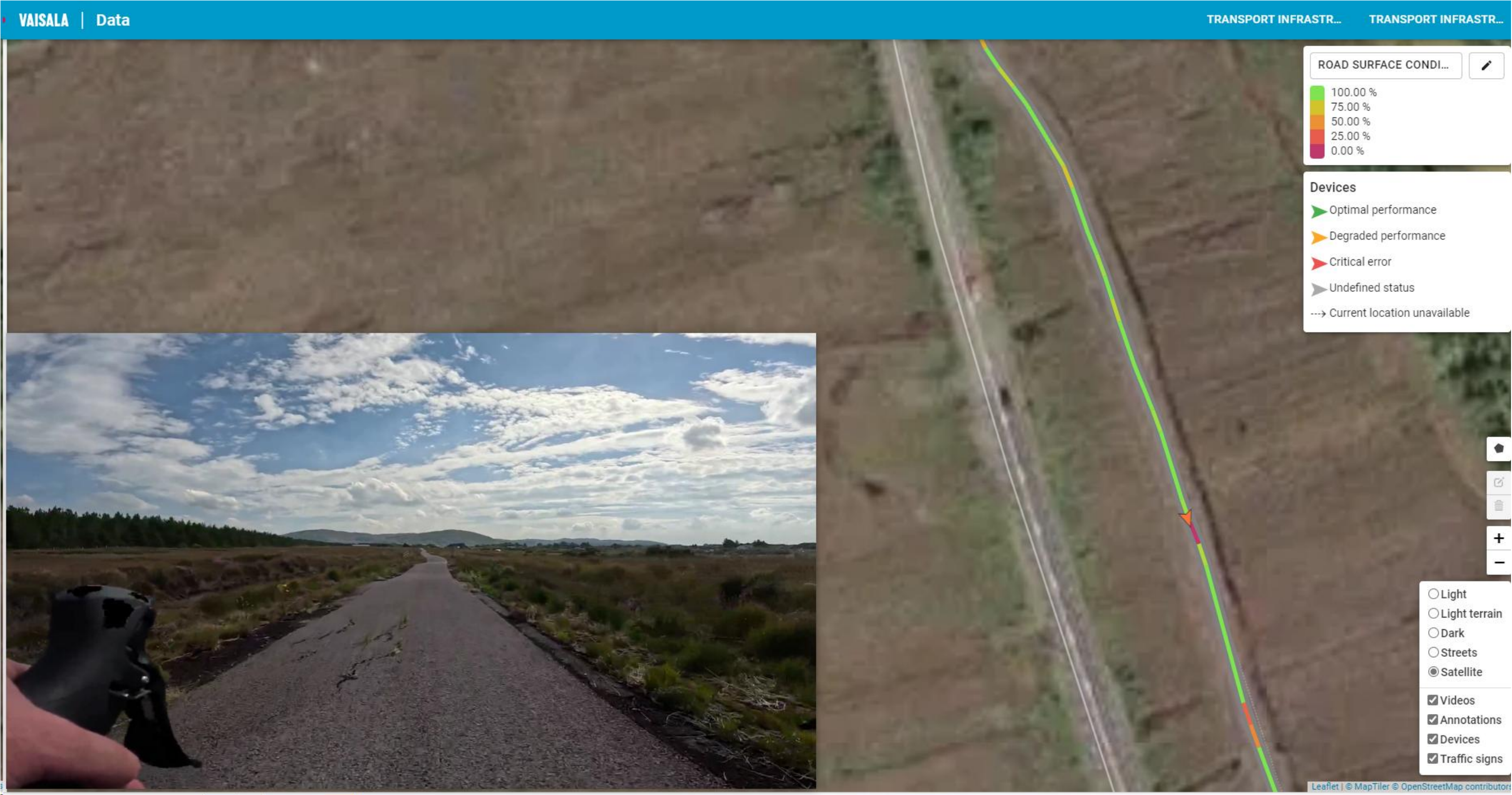


- Active Travel Network Pilot 2024 – 340km
- 2025 – Full Network Survey c.700km
- Captured in conjunction with PMS Xenobike LiDAR Surveys

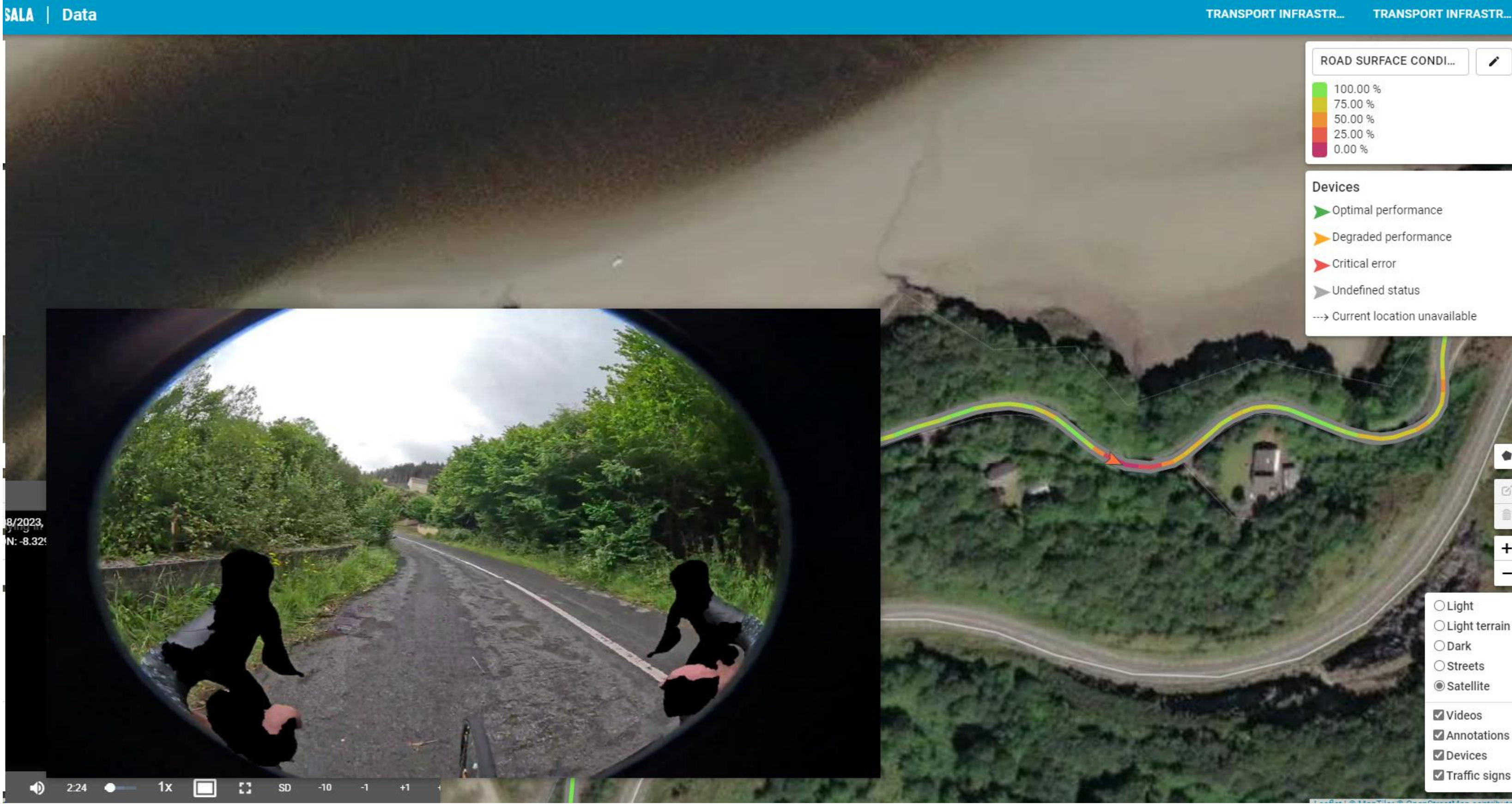




Vaisala Road AI – ATI Condition Assessment



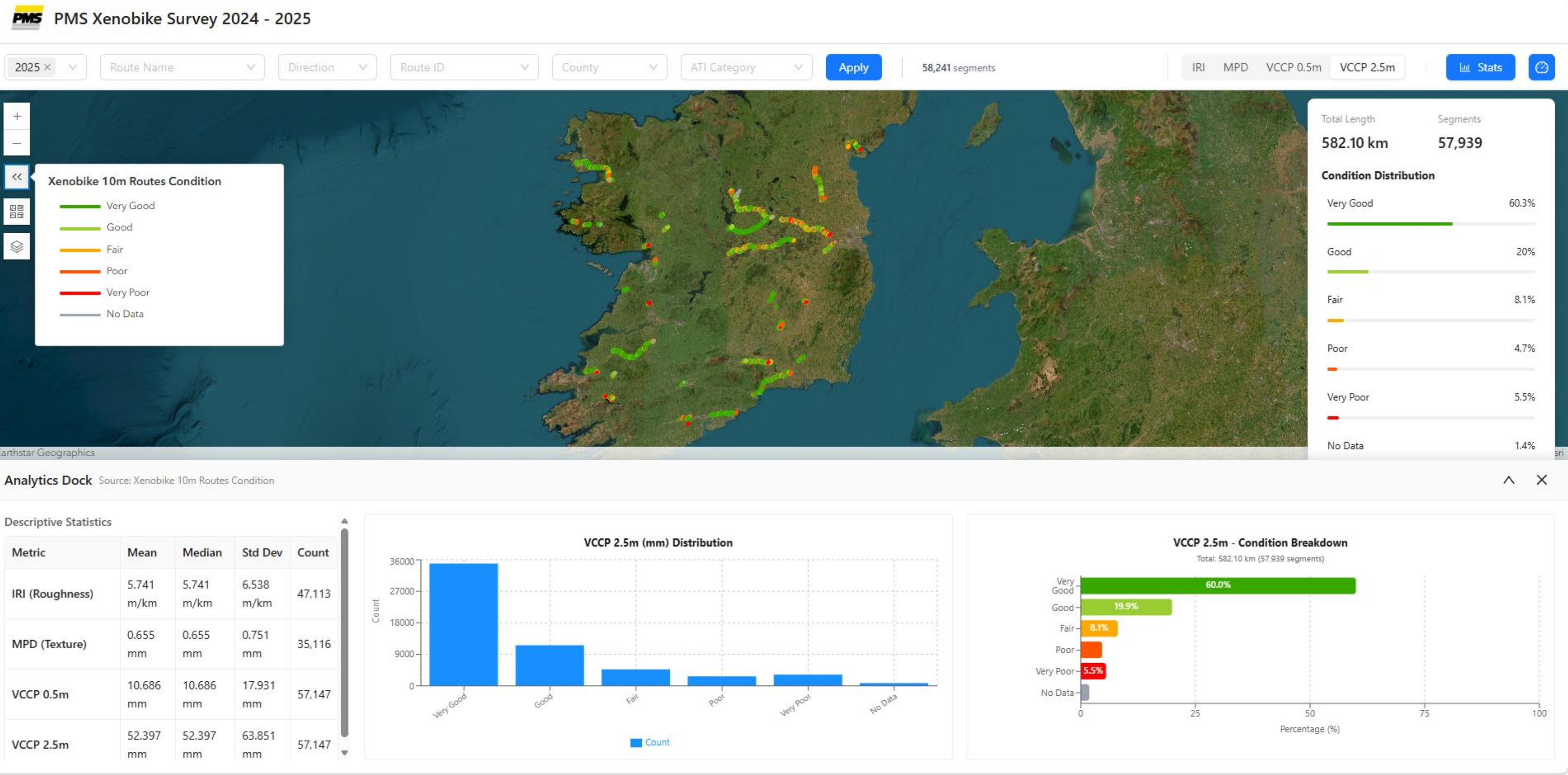
Vaisala Road AI – ATI Condition Assessment



Greenway – Data Collection – Vaisala Road AI (Video)



Xenobike WebGIS Tool



Xenobike WebGIS Tool

PMS PMS Xenobike Survey 2024 - 2025

2025 ×

Route Name

Direction

Route ID

County

ATI Category

Apply

58,241 segments

IRI

MPD

VCCP 0.5m

VCCP 2.5m

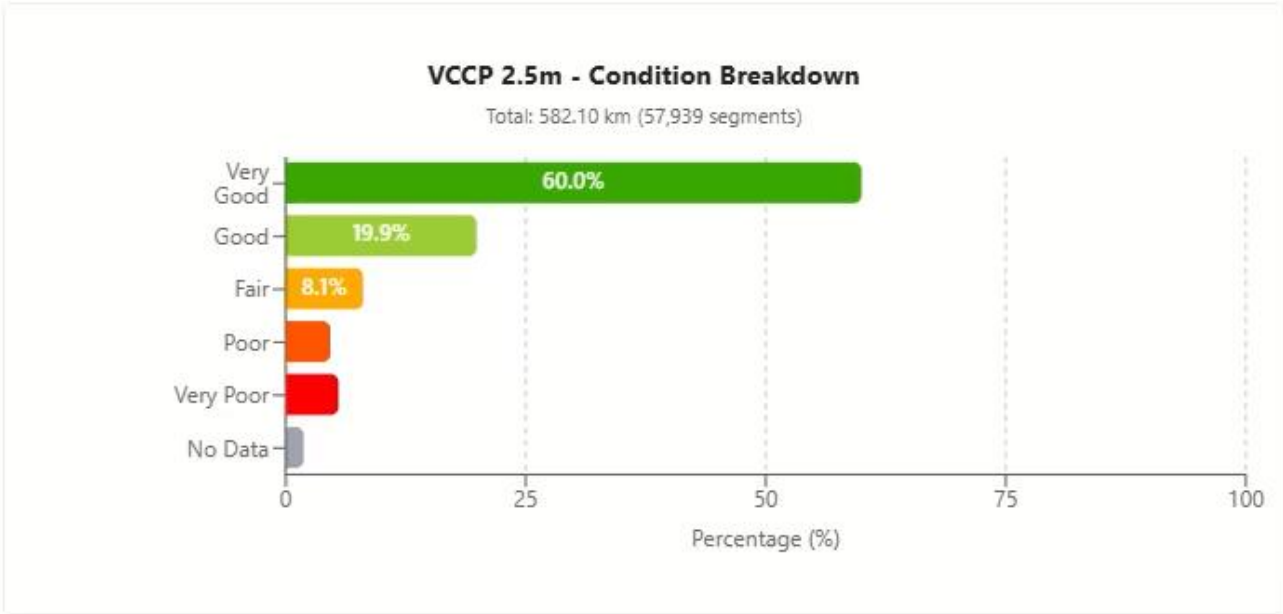
Stats



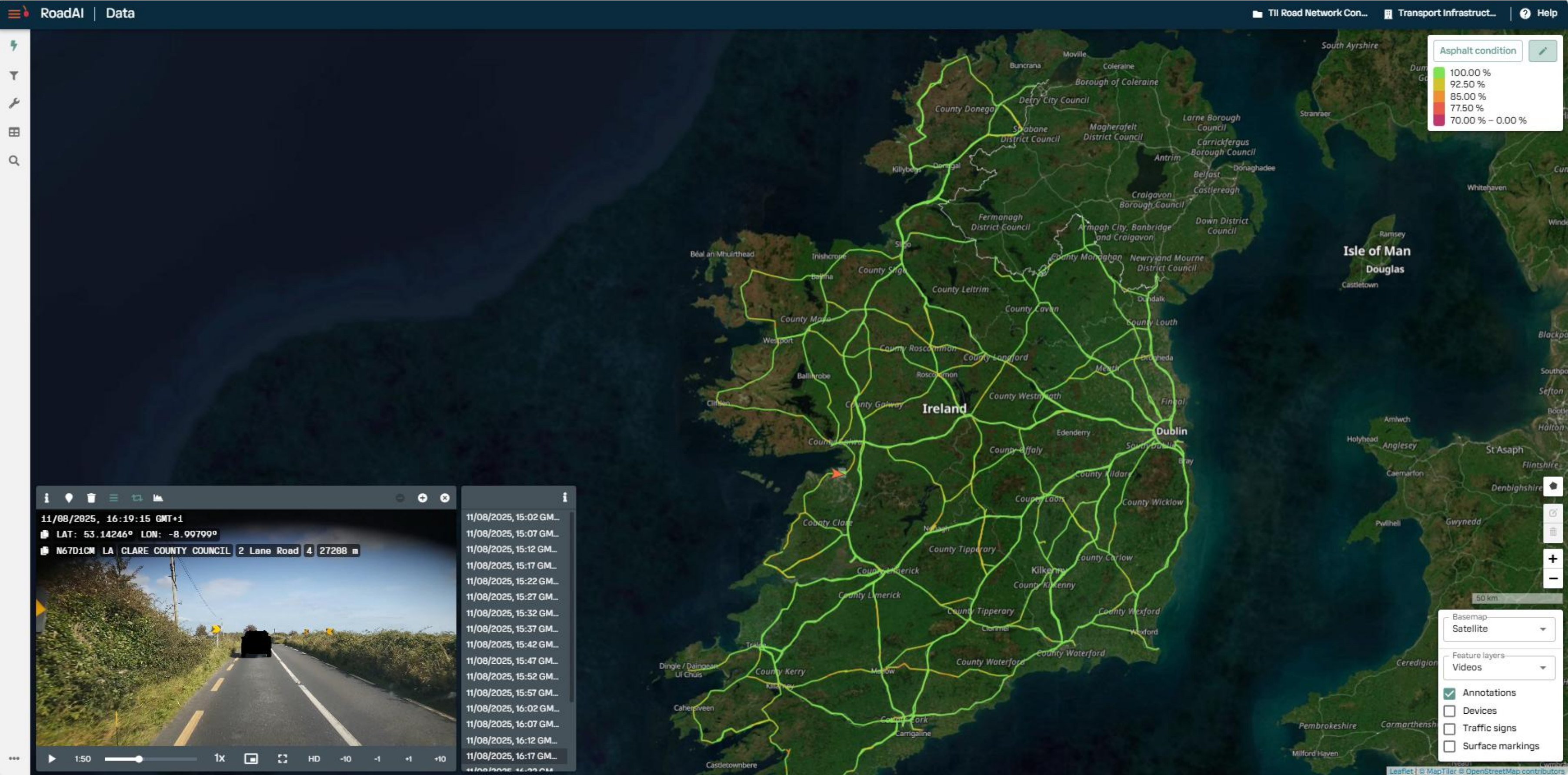
Analytics Dock Source: Xenobike 10m Routes Condition

Descriptive Statistics

Metric	Mean	Median	Std Dev	Count
IRI (Roughness)	5.741 m/km	5.741 m/km	6.538 m/km	47,113
MPD (Texture)	0.655 mm	0.655 mm	0.751 mm	35,116
VCCP 0.5m	10.686 mm	10.686 mm	17.931 mm	57,147
VCCP 2.5m	52.397 mm	52.397 mm	63.851 mm	57,147



Vaisala RoadAI Survey 2025 – 6600km



RoadAI | Data
TII Road Network Con... Transport Infrastruct... ? Help

Computer vision tools ^

☐ Road weather mode

Detector mode

Segmentation mode

1280x720 Panoptic

Labels

Alligator cra...	Area patchi...	Cobblestones	Concrete ba...
Cracking	Defective as...	Edge deteri...	Fatting
Fretting mo...	Fretting sev...	Guard rail	Storm drain
Gutter	High frictio...	High frictio...	Joint defecti...
Joint cracki...	Kerbstone	Line red	Line white
Line yellow	Longitudina...	Manhole	Minor cracki...
Pavement bl...	Pedestrian c...	Pedestrian s...	People
Pothole	Pothole grav...	Minor potho...	Stop line
Road	Road gravel	Hatched ma...	Root defect
Rutting	Safety bollard	Subsidence	Severe crac...
Severe poth...	Severe trans...	Sidewalk	Signs
Sound barrier	Concrete sp...	Spot patchi...	Stacked box...
Static item	Streaking	Streetlight	Surface mar...
cv_label_sur...	Traffic polla...	Traffic cones	Traffic light
Transverse ...	Transverse j...	Transverse j...	Transverse ...
Transverse ...	Unlabeled	Vehicles	Wire barrier

Fixes

- No fixes
- Longitudinal sealing
- Transverse sealing
- Spot patching
- Area patching

02/07/2025, 11:45:40 GMT+1
 LON: -7.18692° LAT: 52.40289°

02/07/2025, 10:35 Gm...

02/07/2025, 10:40 Gm...

02/07/2025, 10:45 Gm...

02/07/2025, 10:50 Gm...

02/07/2025, 10:55 Gm...

02/07/2025, 11:00 GM...

02/07/2025, 11:05 GM...

02/07/2025, 11:10 GM...

02/07/2025, 11:15 GM...

02/07/2025, 11:20 GM...

02/07/2025, 11:25 GM...

02/07/2025, 11:30 GM...

02/07/2025, 11:35 GM...

02/07/2025, 11:40 GM...

02/07/2025, 11:45 GM...

02/07/2025, 11:50 GM...

02/07/2025, 11:55 GM...

Basemap

Light

Feature layers

Videos

☒ Annotations
☐ Devices
☐ Traffic signs

Vaisala Road AI Road Marking & Signs

RoadAI | Data

Create

Computer vision tools

Road weather mode

Detector mode

Segmentation mode

1280x720 Panoptic

Labels

Alligator cra...
Cracking
Fretting mo...
Gutter
Joint cracki...
Line yellow
Pavement bl...
Pothole
Rutting
Severe poth...
Sound barrier
Static item
Transverse ...
Transverse ...

Area patchi...
Defective as...
Fretting sev...
High frictio...
High frictio...
Kerbstone
Longitudina...
Pothole grav...
Road gravel
Safety bollard
Severe trans...
Concrete sp...
Streaking
Transverse j...
Unlabeled

Cobblestones
Edge deteri...
Guard rail
Line red
Line white
Manhole
Minor potho...
Hatched ma...
Subsidence
Sidewalk
Spot patchi...
Streetslight
Traffic cones
Traffic light
Vehicles
Wire barrier

Concrete ba...
Fattening
Storm drain
Joint defecti...
Minor cracki...
People
Root defect
Severe crac...
Stacked box...
Surface mar...
Transverse ...
Transverse ...

TII Road Network Con...

Transport Infrastruct...

Help

996 / 5047

02/07/2025, 11:37:01 GMT+1

LON: -7.24161° LAT: 52.49208°

02/07/2025, 11:37:01 GMT+1

2 days ago

Condition

1 2 3 4 5

Action

Missing OK Replace

02/07/2025, 10:40 G...

02/07/2025, 10:45 G...

02/07/2025, 10:50 G...

02/07/2025, 10:55 G...

02/07/2025, 11:00 G...

02/07/2025, 11:05 G...

02/07/2025, 11:10 G...

02/07/2025, 11:15 G...

02/07/2025, 11:20 G...

02/07/2025, 11:25 G...

02/07/2025, 11:30 G...

02/07/2025, 11:35 G...

02/07/2025, 11:40 G...

02/07/2025, 11:45 G...

02/07/2025, 11:50 G...

02/07/2025, 11:55 G...

add tags

—

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indication

Exit Taper Gantry

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02/07/2025, 11:37:01 GMT+1

Not available

52.49186, -7.24154 (WGS-84)

348

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0.99854

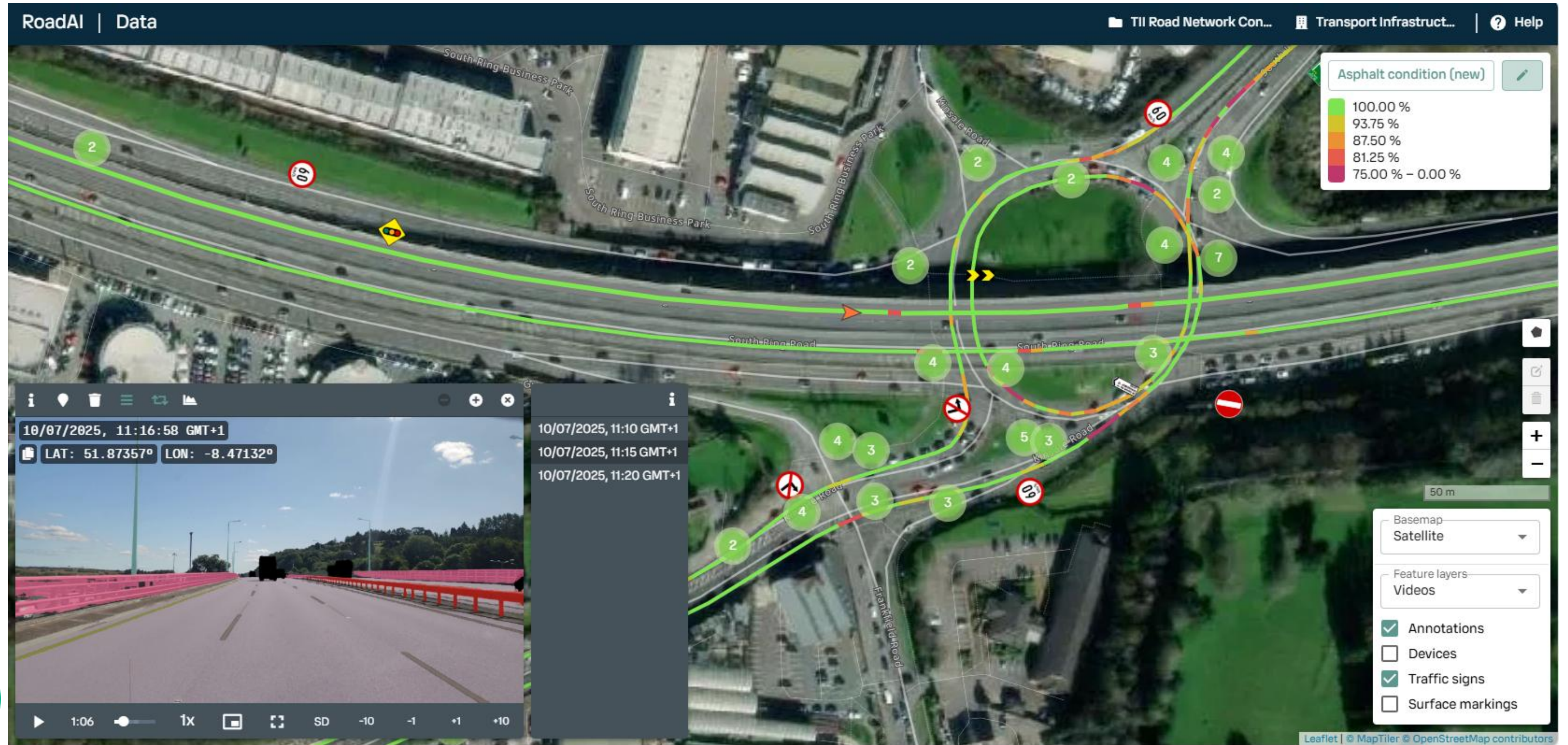
ization co...

1

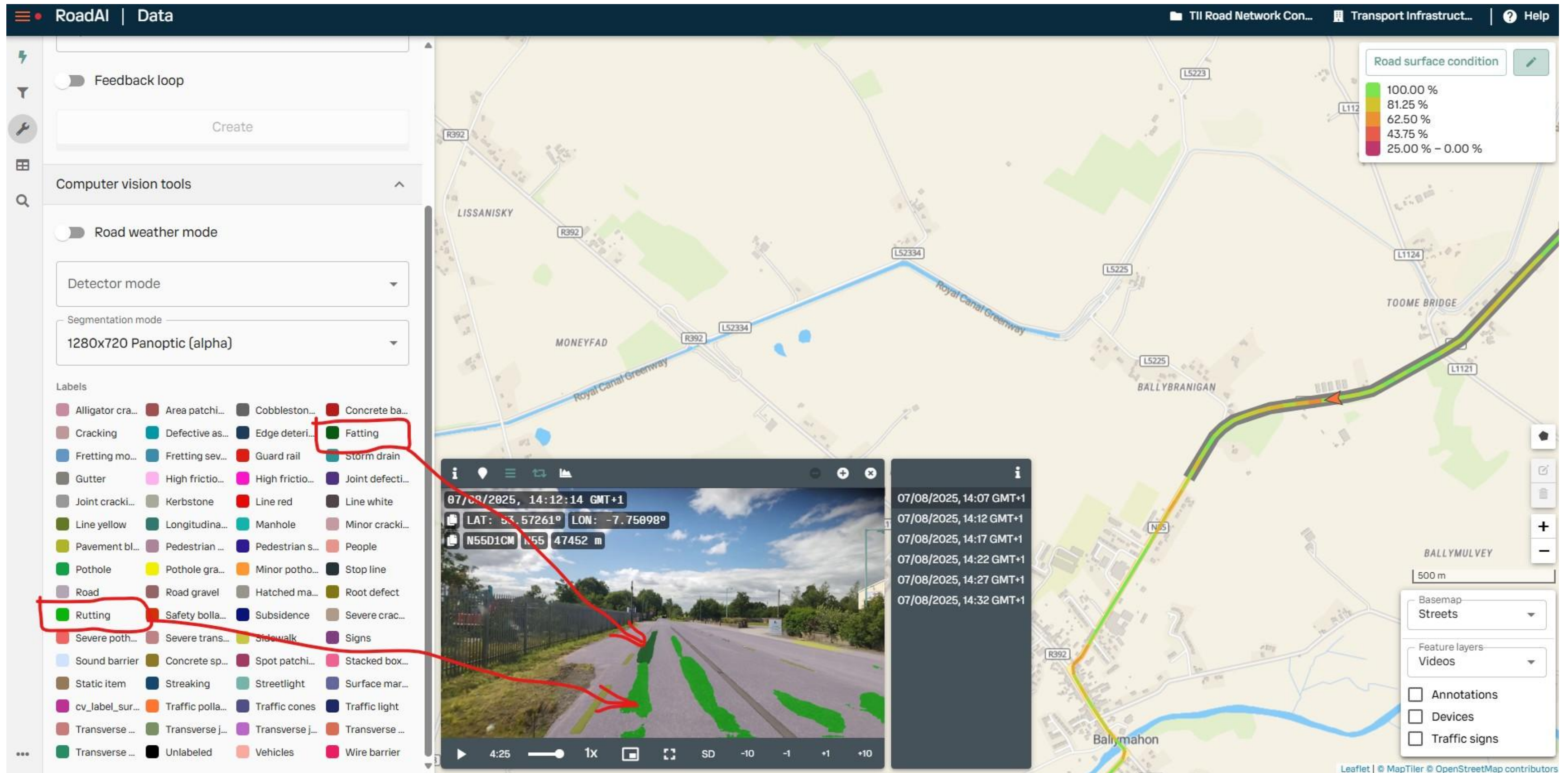
Visual examples of line marking condition



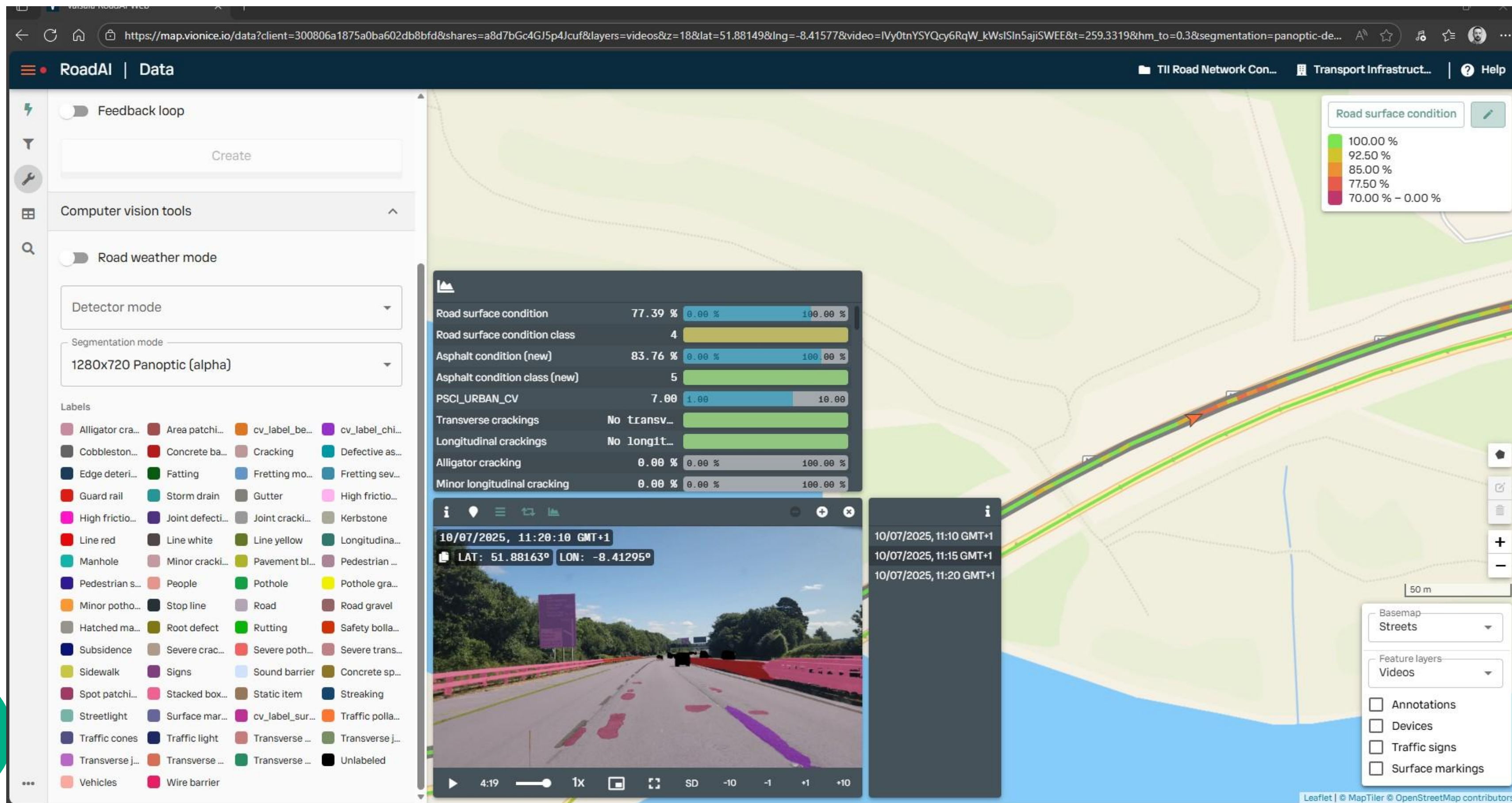
Vaisala Road AI – Sign Detection



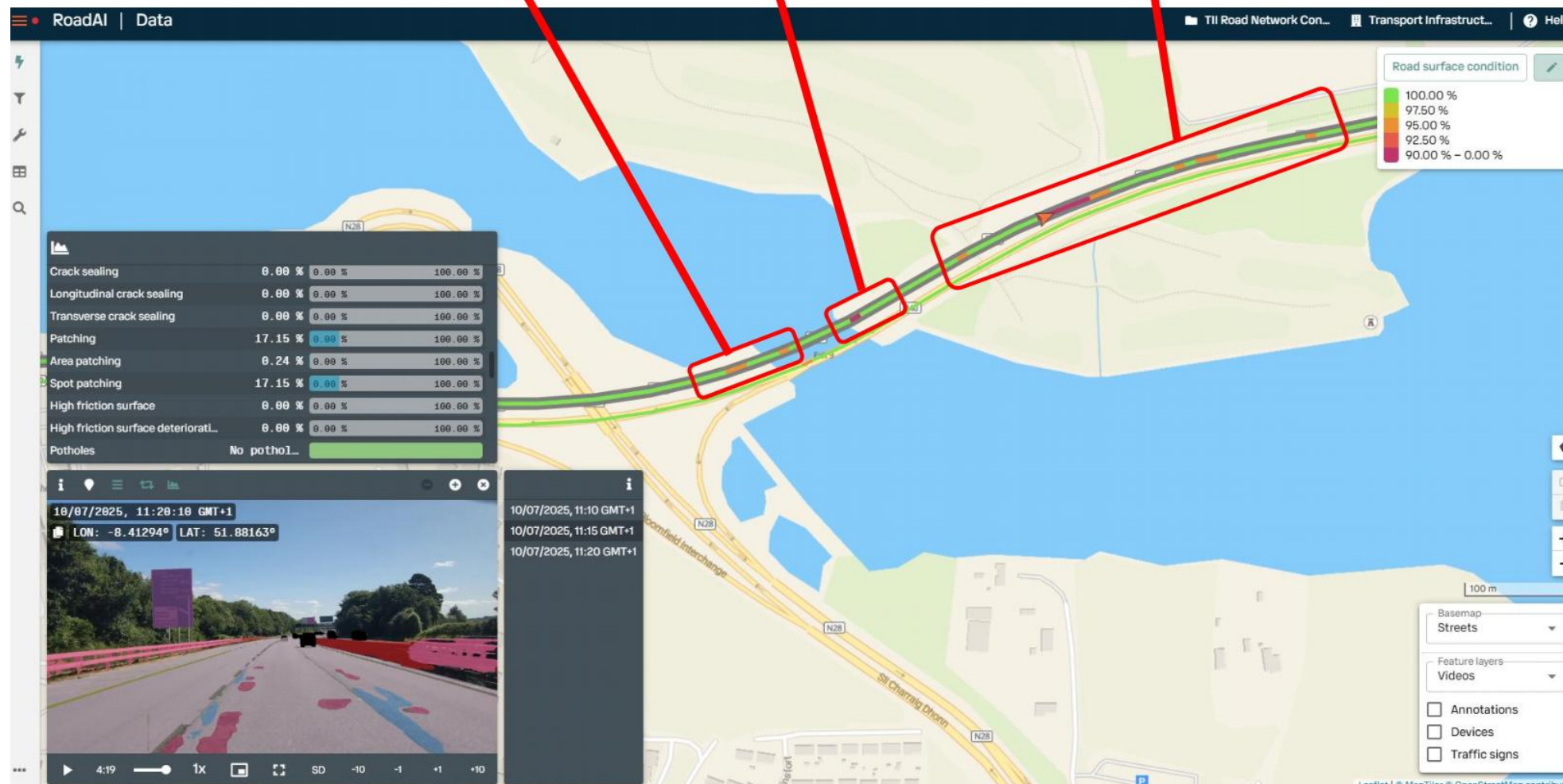
Vaisala Road AI – NRN Defects



Vaisala Road AI – Motorway Defects



Vaisala Road AI – Comparisons with MMaRC Defect Surveys



Vaisala Road AI - Demo



RoadAI – Connected Vehicle Data Pilot – Road Roughness

- 1000km Pilot - Galway, Clare, Limerick
- Independent machine data validations ongoing to compare
 - AI V LCMS (ravelling and cracking)
 - Connected Vehicle Data IRI V Machine Profile IRI (m/km)



AGOL Reporting



Conclusions



Ease of data collection



Enables real-time monitoring



Speed of post processing



Road Model Integration



User Interface



Cost Effective



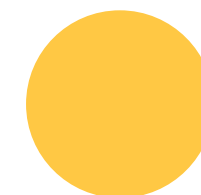


Next Steps

**Connected
Vehicle Data Pilot**

**Machine data
validations –
Roads and
Active Travel**

**2026 Network
Survey –
Including
Interchanges**



Key Takeaways

User Experience

AI and connected vehicle data can support and augment traditional machine based surveys and ultimately enhance user experience of national infrastructure



Data Driven Asset Management

Data-driven approaches are essential to managing new and expanding asset classes like cycleways and greenways.



Faster, Safer more Consistent

AI is enabling faster, safer, and more consistent asset condition assessment at national scale.



Proactive Asset Management

The future of asset management is **proactive and predictive**, not reactive.





Thank you for your attention

Q&A

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