

# 3-D PAVEMENT SURFACE MEASUREMENT TECHNOLOGY

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**RPUG**  
Road Profile Users' Group

# Presentation Outline

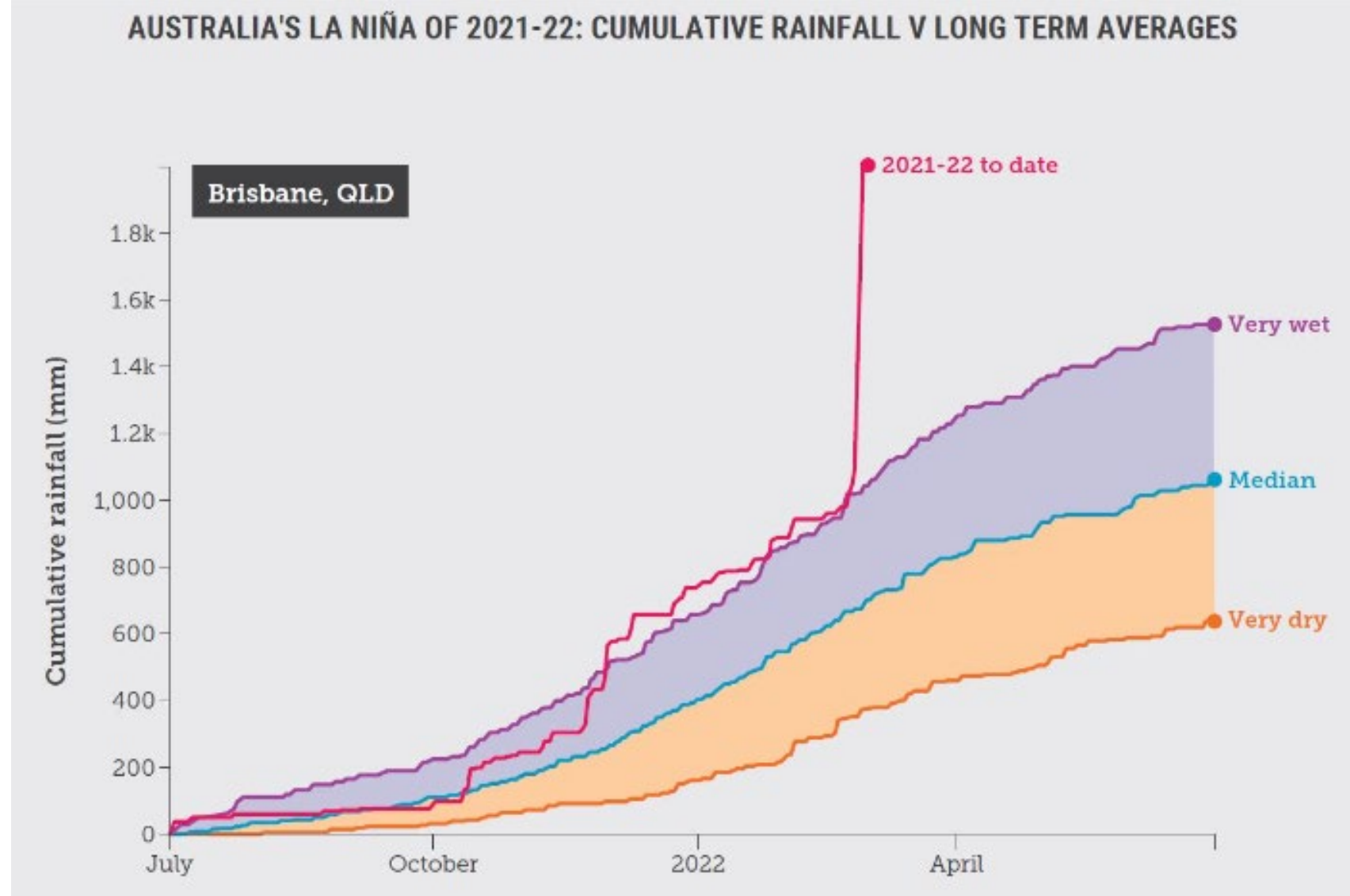
1. Background
2. Aim of Project
3. Catastrophic vs Increased Maintenance
4. Initial Study Outcomes
5. Way Forward



# Background

Flooding is more:

- ✓ Frequent
- ✓ Damaging
- ✓ Widespread
- ✓ Inundating
- ✓ Slower in recovery









**FLOOD IMPACT IN  
BRISBANE EAST**





**FLOOD IMPACT IN  
BRISBANE EAST**





# Brisbane Floods



Laser technology to identify potholes needing repairs on every Brisbane road | 7NEWS



NEWS

# Aim

- ✓ Likely maintenance burden on 'normal' roads subject to inundation
- ✓ Initial survey of 840km of road soon after reopening
- ✓ 6 months later – same 840km plus adjacent roads = 2,000km
- ✓ Did inundation and early opening cause accelerated deterioration?  
If yes, what is the likely increased cost to maintain overtime?
- ✓ How do we model future needs based if extreme weather events become more frequent?







# Why Cracking?

- ✓ Allowed a rapid assessment
- ✓ Proxy for structural capacity – increased fatigue cracking/pumping
- ✓ Still obtain defects but a high degree of accuracy on cracking
- ✓ Cracking as a gestation element for potholes
- ✓ Political imperative to 'fix-potholes'
- ✓ As pavement engineers we needed to understand changes
- ✓ Move from reactive fixing potholes to pre-emptive maintenance



# Output

## Camera video and cracking view

The screenshot displays the Pavement Management Services software interface. The main window shows a map of a road network with a highlighted section. A 'Locators' table is overlaid on the map, listing various road segments. The table has columns for ASSET\_ID, ROUTE\_NAME, ROUTE\_ID, LANE, BeginChainage, and EndChainage. The row for BLUNDER RD QA080 LANE 1 is highlighted in orange. To the right of the map, there are two camera viewports: 'Front Camera' and 'Rear Camera', both showing a perspective view of the road. Further right is a '3D Pavement' view showing a top-down view of the road surface with blue lines indicating cracks. The interface includes a top navigation bar with the company logo and name, a user login area, and a bottom status bar with keyboard shortcuts and map data.

| ASSET_ID  | ROUTE_NAME     | ROUTE_ID | LANE | BeginChainage | EndChainage |
|-----------|----------------|----------|------|---------------|-------------|
| 100978449 | ELMES RD       | NF370    | 1    | 0             | 684         |
| 100978449 | ELMES RD       | NF370    | 2    | 684           | 0           |
| 100979198 | ANNIE ST       | PL040    | 2    | 79            | 0           |
| 100979280 | BLUNDER RD     | QA080    | 1    | 0             | 178         |
| 100979280 | BLUNDER RD     | QA080    | 2    | 178           | 0           |
| 100979342 | CASTLEMAINE ST | LL140    | 1    | 215           | 551         |
| 100979342 | CASTLEMAINE ST | LL140    | 2    | 551           | 215         |
| 100979414 | DALMENY RD     | PB180    | 1    | 19            | 177         |
| 100979414 | DALMENY RD     | PB180    | 2    | 177           | 19          |
| 100979425 | DE HAYR ST     | NF290    | 1    | 0             | 112         |
| 100979425 | DE HAYR ST     | NF290    | 2    | 112           | 0           |
| 100979441 | DOWNEY ST      | NO235    | 1    | 0             | 195         |
| 100979441 | DOWNEY ST      | NO235    | 2    | 195           | 0           |



# Output

## Camera and Laser Data Grid

The screenshot displays the Pavement Management Services interface. At the top, it shows the company logo and the project name '2022077\_Brisbane City [2022]'. The main workspace shows a map of '106979260 | BLUNDER RD | QA080 | 1' with various navigation and control tools. A 'Locators' table is visible, listing various road segments. Two camera windows, 'Front Camera' and 'Rear Camera', provide real-time video feeds of the road. A 'Laser Grid' table displays detailed sensor data for the selected road segment.

| ASSET_ID  | ROUTE_NAME     | ROUTE_ID | LANE | BeginChainage | EndChainage |
|-----------|----------------|----------|------|---------------|-------------|
| 106978449 | ELMES RD       | NF370    | 1    | 0             | 664         |
| 106978449 | ELMES RD       | NF370    | 2    | 664           | 0           |
| 106979196 | ANNIE ST       | PL040    | 2    | 79            | 0           |
| 106979260 | BLUNDER RD     | QA080    | 1    | 0             | 178         |
| 106979260 | BLUNDER RD     | QA080    | 2    | 178           | 0           |
| 106979342 | CASTLEMAINE ST | LL140    | 1    | 215           | 551         |
| 106979342 | CASTLEMAINE ST | LL140    | 2    | 551           | 215         |
| 106979414 | DALMENY RD     | FB160    | 1    | 19            | 177         |
| 106979414 | DALMENY RD     | FB160    | 2    | 177           | 19          |
| 106979425 | DE HAYR ST     | NF290    | 1    | 0             | 112         |
| 106979425 | DE HAYR ST     | NF290    | 2    | 112           | 0           |
| 106979441 | DOWNEY ST      | NO235    | 1    | 0             | 195         |
| 106979441 | DOWNEY ST      | NO235    | 2    | 195           | 0           |

| BeginChainage | EndChainage | client_id | SurveySpeed | NAAASRAqc | LeftRut | RightRut | LaneRut | CentreMPD | CentreETD | Comment            |
|---------------|-------------|-----------|-------------|-----------|---------|----------|---------|-----------|-----------|--------------------|
| 0             | 10          | 106979260 | 59.8        | 189       | 4.4     | 8.3      | 8.7     | 1.3       | 1.2       | Bridge Abutment    |
| 10            | 20          | 106979260 | 57.1        | 108       | 4.6     | 8.9      | 9.5     | 1.6       | 1.5       | Bridge Abutment    |
| 20            | 30          | 106979260 | 56.7        | 74        | 3.8     | 9.8      | 10.0    | 1.1       | 1.1       |                    |
| 30            | 40          | 106979260 | 56.2        | 50        | 3.6     | 9.4      | 9.5     | 1.0       | 1.0       |                    |
| 40            | 50          | 106979260 | 56.0        | 50        | 5.1     | 10.2     | 10.4    | 1.0       | 1.0       |                    |
| 50            | 60          | 106979260 | 56.0        | 138       | 3.2     | 4.2      | 4.5     | 0.9       | 0.9       |                    |
| 60            | 70          | 106979260 | 56.1        | 142       | 3.1     | 10.4     | 10.5    | 1.2       | 1.1       |                    |
| 70            | 80          | 106979260 | 56.1        | 100       | 4.6     | 11.6     | 11.8    | 1.4       | 1.3       |                    |
| 80            | 90          | 106979260 | 56.1        | 289       | 4.3     | 12.2     | 12.3    | 1.4       | 1.3       | Brake / Accelerate |
| 90            | 100         | 106979260 | 55.8        | 114       | 4.0     | 5.9      | 6.2     | 1.4       | 1.3       | Brake / Accelerate |
| 100           | 110         | 106979260 | 55.6        | 175       | 5.6     | 11.2     | 11.6    | 2.0       | 1.8       |                    |
| 110           | 120         | 106979260 | 55.3        | 59        | 4.9     | 10.8     | 11.0    | 1.7       | 1.6       |                    |
| 120           | 130         | 106979260 | 55.3        | 55        | 4.0     | 11.2     | 11.3    | 1.5       | 1.4       |                    |
| 130           | 140         | 106979260 | 55.7        | 162       | 4.1     | 7.5      | 8.0     | 1.2       | 1.2       |                    |
| 140           | 150         | 106979260 | 56.3        | 106       | 4.2     | 9.6      | 9.7     | 1.7       | 1.6       |                    |

# Output

## Thematic Map with Hover

The screenshot displays the Pavement Management Services interface for Brisbane City in 2022. The main map shows a network of roads color-coded by condition. A 'Locators' table is open on the left, and a tooltip is visible over a specific road segment.

| ASSET_ID  | ROUTE_NAME    | ROUTE_ID | LANE | BeginChain | EndChain | Q |
|-----------|---------------|----------|------|------------|----------|---|
| 106978449 | ELMES RD      | NF370    | 1    | 0          | 684      | 0 |
| 106978449 | ELMES RD      | NF370    | 2    | 684        | 0        | 0 |
| 106979188 | ANNIE ST      | PL040    | 2    | 79         | 0        | 0 |
| 106979260 | BLUNDER RD    | QA080    | 1    | 0          | 178      | 0 |
| 106979260 | BLUNDER RD    | QA080    | 2    | 178        | 0        | 0 |
| 106979342 | CASTLEM... ST | LL140    | 1    | 215        | 551      | 0 |
| 106979342 | CASTLEM... ST | LL140    | 2    | 551        | 215      | 0 |
| 106979414 | DALMENY RD    | PB160    | 1    | 19         | 177      | 0 |
| 106979414 | DALMENY RD    | PB160    | 2    | 177        | 19       | 0 |

Hover tooltip for ASSET\_ID: 57217945:  
ROUTE\_NAME: ARMISFIELD ST  
ROUTE\_ID: MA035  
LANE: 2  
From: 743.074  
To: 703.074  
Poor: 509.25  
GO



# Outcomes: Preliminary

- Opening roads quickly after inundation did accelerate decline
- Repeated inundation marked impact on resilience
- Data enabled the council to make the necessary steps to start restoring.
- Data to seek emergency funding.
- Set priority against existing funding
- Study still in progress – modelling future



# Conclusion

- LCMS technology proved a vital tool for rapid assessment
- Whilst the focus was initially quite tight (cracking) the other sensor and imagery proved vital for immediate response.
- Provided good visual 'story'
- Provides an important study baseline for future analysis







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**THANK YOU**