Innovative Intelligent Transport System (ITS) solutions in a regional environment

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Case study: Bruce Highway

- Current situation and issues
- Analysis
- Impacts
- Solutions
- System overview
Case study: Bruce Highway

Current situation and issues

Analysis

Impacts

Solutions

System overview
Current situation

- Relates to the Bruce Highway from Gympie to Cairns
- Seasonal rainfall occurs every year in regional Queensland
- Limited available funding
- Proposing a control measure to ensure motorist safety.
Current situation and issues

Analysis

Impacts

Solutions

System overview
2015 rainfall during February at Cobbs Gully
Cobbs Gully
21 February 2015 at 12.35pm
Cobbs Gully
22 February 2015 at 8.40am
Cobbs Gully
22 February 2015 at 2.08pm
Cobbs Gully
22 February 2015 at 5.29pm
2015 rainfall during February at Jackass Creek
Jackass Creek
22 February 2015 at 8.28am
Jackass Creek
23 February 2015 at 9.02am
2014 rainfall during March at Coondoo Creek Bridge
Coondoo Creek Bridge
28 March 2014 at 11.30am
Coondoo Creek Bridge
28 March 2014 at 1.25pm
Coondoo Creek Bridge
28 March 2014 at 9.19pm
Current situation and issues

Analysis

Impacts

Solutions

System overview
Impacts

- Communities
- Economies
- Families
- Businesses
- Damage to road network.
IF IT’S FLOODED, FORGET IT.
## Willingness-to-pay standardised crash cost – 2015 dollar value

<table>
<thead>
<tr>
<th>Crash severity</th>
<th>Cost to the community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatal</td>
<td>$8,987,396</td>
</tr>
<tr>
<td>Hospitalisation</td>
<td>$626,974</td>
</tr>
<tr>
<td>Medical treatment</td>
<td>$124,154</td>
</tr>
<tr>
<td>Minor injury</td>
<td>$40,525</td>
</tr>
<tr>
<td>Property damage only</td>
<td>$9,678</td>
</tr>
</tbody>
</table>
Current situation and issues

Analysis

Impacts

Solutions

System overview
The solution

- Comprehensive monitoring system
- Real time data and imagery
- Eliminates closure inspection requirements
- Automatic updates and
- Automatic warning devices activation on site.
Mitigation cost

- Monitoring system
- Vulnerable locations
- Estimate installation costs = $75,000 per site
- Approximately 75 sites
- Estimated total cost of roll out = $6 million.

A fatality costs the community $9 million
Customers first

• Safety is the number 1 priority
• Warning system
• Keeping the public informed
• Keep Queensland closer together.
Ideas into action

• Investigated technologies
• Amalgamated viable options
• Budget constraints
• Communications shortfalls.
Unleash potential

• National roll out
• Additional ITS enhancements
• Manage resources.
Be courageous

- Identification of a problem
- High level of product control
- Research and development project.
Empower people

- To find a viable solution
- All roads users.
Connecting Queensland through social media
General system overview

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FLM_MA1597_01R1-0</td>
<td>CULVERT &amp; ROAD CROSS SECTION</td>
<td>1</td>
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<tr>
<td>2</td>
<td>FLM_MA1608_01R1-0</td>
<td>8m TILT POLE LAYOUT</td>
<td>1</td>
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<tr>
<td>3</td>
<td>FLM_MA1612_01R1-0</td>
<td>ULTRASONIC SENSOR BOX ASSY</td>
<td>1</td>
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<tr>
<td>4</td>
<td>FLM_MA1415_01R1-1</td>
<td>FLUID LEVEL SENSOR ASSEMBLY</td>
<td>2</td>
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<tr>
<td>5</td>
<td></td>
<td>FLOOD SIGN</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>FLM_MA1612_01R1-0</td>
<td>ENCLOSURE ASSEMBLY (3 BATTERY)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>4m PEDESTAL POLE</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>MRBRKT37A</td>
<td>CAMERA MOUNT BRACKET (SHEPHERDS HOOK)</td>
<td>1</td>
</tr>
</tbody>
</table>

Image: Microair Avionics
Hardware

- Tilt pole and footing
- Flood monitoring station
- Sensors
- Solar panel, camera and infrared illuminator
- Optional sign controller.
Current system communications

- Short burst data
  - Fewer problems with hung communication

E-mail alert sent to department staff for upload to 13 19 40

Satellite

Image: Microair Avionics and floodmonitoraustralia.com
Digital camera unit

Solar panel unit

Sign controller
Sensors

** No structures were harmed in the mounting of these devices**

Images: Microair Avionics
Web based application
Structured database

stations with imminent alert

WB-BDB-BCCR-RF1
Bucca Road - Little Creek Crossing

1 hrs 08 mins until water reaches reference level

RL -0.45m
Lights: On
Sign: Closed
Picture: Available

stations requiring attention

WB-BDB-BKER-RF1
Bourke Road

"Water Over Road" warning sign needs to be manually closed. Sensors indicate road no longer in flood condition.

RL -0.35m
Lights: Off
Sign: Open
Picture: Available

stations ok

WB-BDB-KDLF-EF1
Kendall's Flat

No Alerts Current

QLD-BDB-BNRD-FM1
Boonies Drive - Swampy Marsh Crossing

No Alerts Current
Structured database (cont.)
Structured database (cont.)

Image: floodmonitoraustralia.com
Alerts can be sent to staff ...

- ... so 13 19 40 can be updated as the situation unfolds.
Additional functions available by satellite link

- Infrastructure Monitoring System
  - Historical data capture
  - Flood monitoring
  - Solar flag light
  - Vehicle activated signs
  - Blue emergency phone
  - Infrared visual camera

- Vehicle classification and counting
- Advance warning controllers
- Wig wag sign controllers
- Sub soil monitoring
- Vehicle activated signs

Future connection to STREAMS mandatory

Image: Microair Avionics
Flood Monitoring Station architecture – meeting the department’s requirements
Roadside flood warning sign
Water level sensor
Flood level imaging

Transport and Main Roads Intelligent Transport System (ITS)

ITS Field Site

Regular data updates

Flood level data collector

Regular data updates

STREAMS server

Regular data updates

BOM public web site

Regular data updates

Other agencies

Bureau of Meteorology

Regular data updates

Workstation
Future direction

- Determine quantity, location and priority for additional sites
- Progress STREAMS/BOM data exchange
- Progress STREAMS enhancements
  - User interface, alerts
  - Satellite connectivity
  - STREAMS/131940 interface
- Investigate lower-cost site monitoring systems
- Adopt ‘Internet of Things’ solutions.
Thank you