Implementation of a Road Condition Warning System (RCWS) in Alberta

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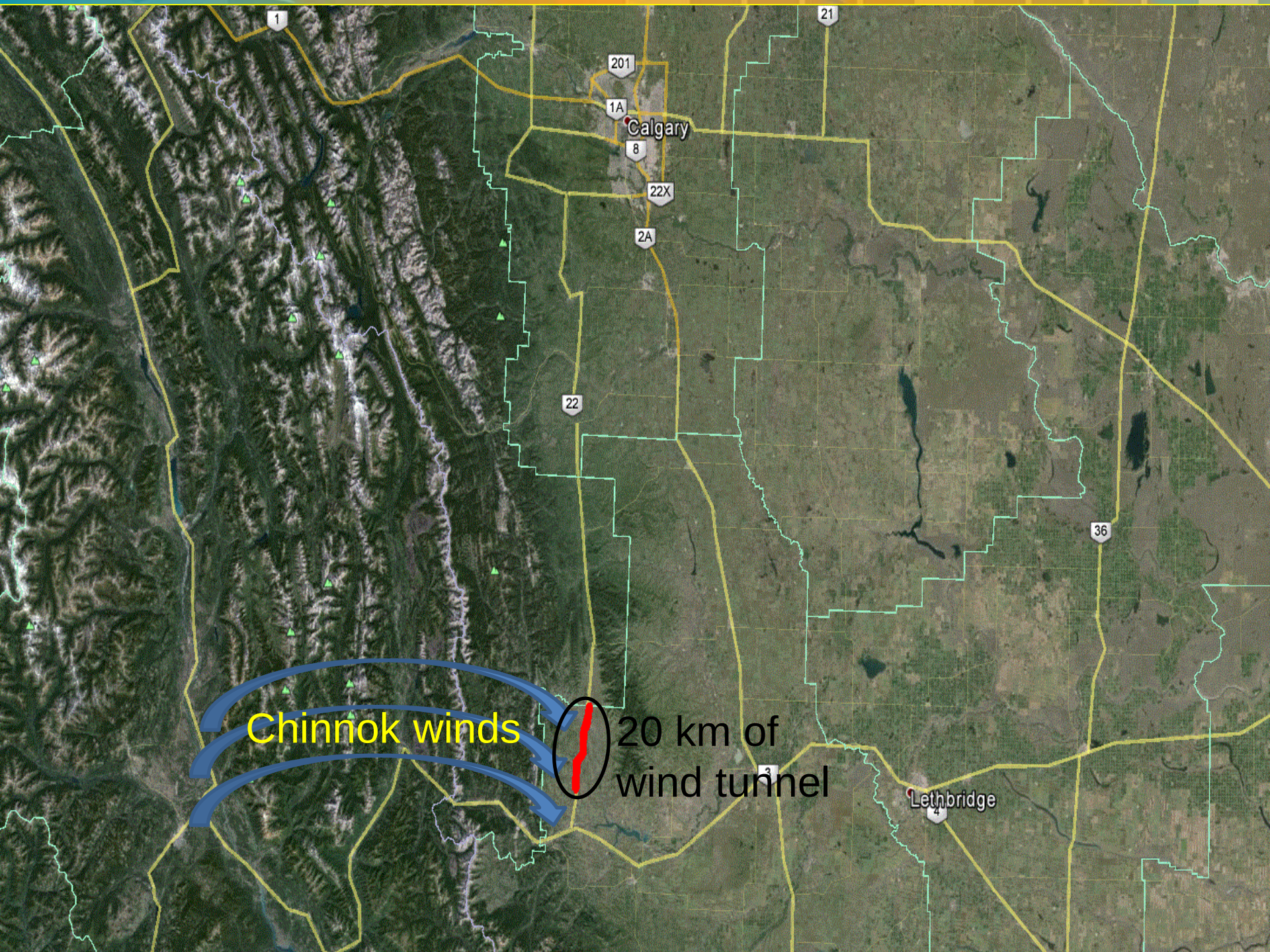
Alberta Government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21
201
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Calgary
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Chinnok winds
20 km of
wind tunnel
3
Lethbridge
4

“Wind Tunnel” Problem on Highway 22

- Vehicles are blown into ditches or to oncoming traffic
- Tractor trailers, motorcycles (less likely due to the season), and recreational vehicles (RV) are most vulnerable

Alberta Transportation

Some Collision Stats

September to April period (prior to 2010):

- 35-40 blown-over incidents per year
- 4 to 6 reportable single-vehicle crashes per year

In the 2010/2011 season:

- 16 reportable crashes

On just one day February 11, 2011:

- 8 vehicles were blown over
- 6 were truck trailer units (3 from BC, 2 from Ontario and 1 from Nevada)

Some Collision Stats

Cost per collision:

- Mainly property damage only (PDO)
- Estimates range from $25k to $40k
- Other agencies estimated upwards of $80k

https://www.youtube.com/watch?v=Q6Prjg9IwQc

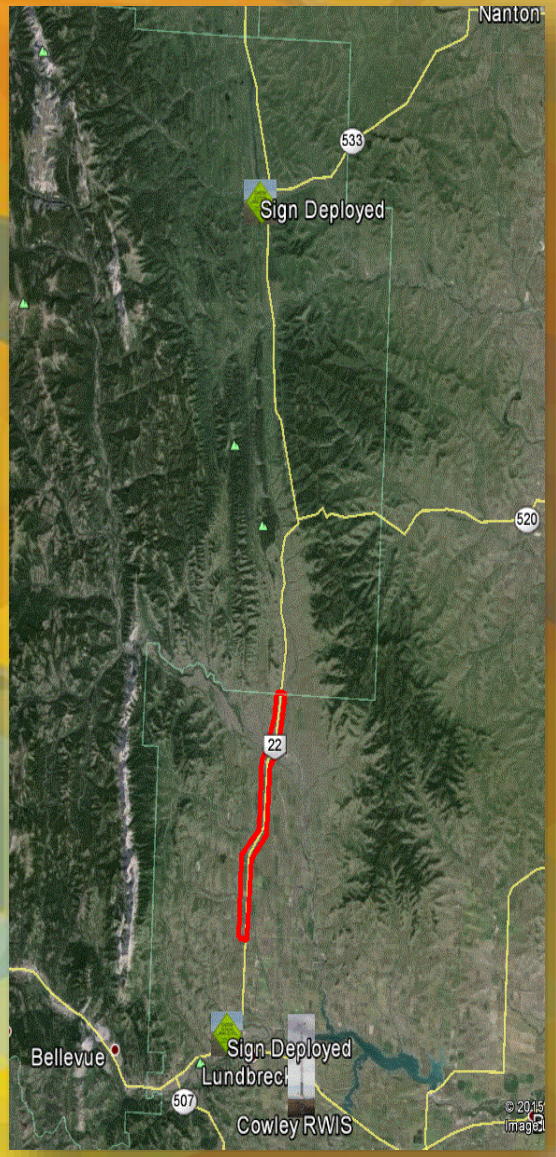
Previous Advisory System

- Static signs were installed

- Portable warning signs were added when wind gusts exceeded 80 km/h
- Vehicle Inspection Stations (VIS) were alerted and verbal warnings passed to truckers at Alberta and BC VIS

Limitations of the Previous System

- Lack of 24/7/365 monitoring
- No instrumentation at the “tunnel” area
- Labour-intensive; not responsive enough
- Static warning signs “tuned out” by the drivers
- Verbal communications with truck drivers were inconsistent and other drivers were not given same warnings



Wind Warning Task Group

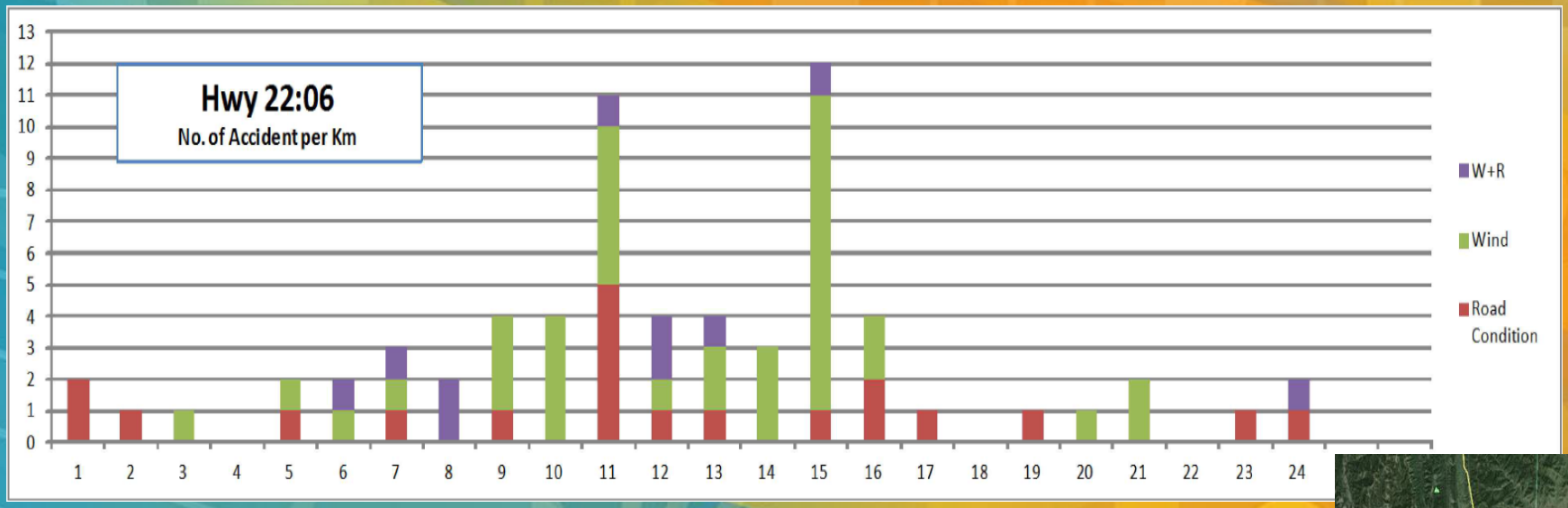
Formed in June 2011:

- Police, landowners, emergency services, Alberta Transportation, and maintenance contractor

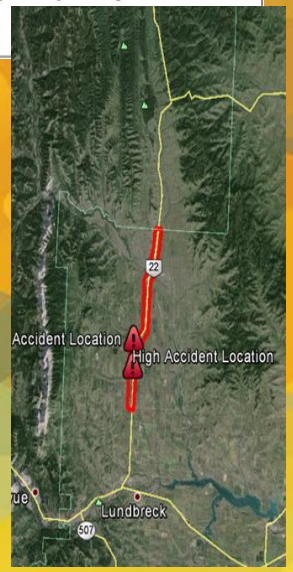
Recommendations:

- Add a new road weather station inside the “tunnel” at Lundbreck to monitor the conditions 24/7/365
- Add static warning signs with beacons on approaching highways
- Add dynamic warning signs that can update wind conditions

Research



- Collision analyses showed where wind-related crashes were occurring
- Selected the highest-collision area for a new road weather station to be built
- Research from other agencies was reviewed and showed an automated system would bring immediate benefits



Road Condition Warning System (RCWS) Requirements

A full road weather station with:

- A ruggedized wind sensor
- Other atmospheric and road sensors

Automated software monitoring and control (24/7/365):

- Real-time reporting of wind speeds
- Data smoothing
- Wireless communications to the signs
- Email and text message alerts
- Integration with 511 Alberta

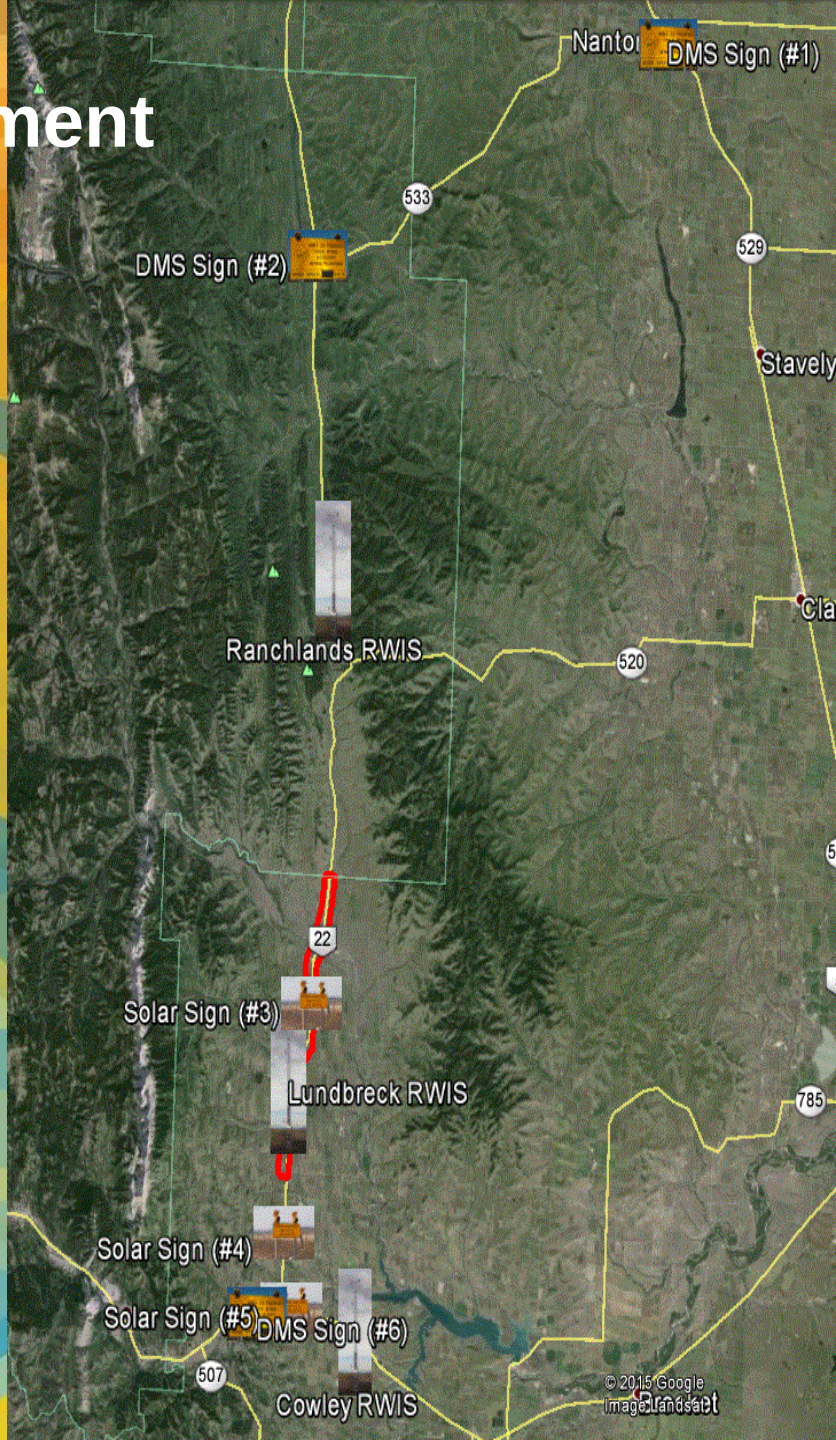
New Warning Signs

- Flashing beacons
- Solar powered

- 6 advisory signs with LED (light emitting diode) to show wind speeds
- Flashing beacons
- A/C power

Sign Placement

- At major intersections so drivers may choose alternate routes
- Signs were located over a 100 km stretch of roadways
- System was fully functional in September 2015



Concept of Operations

1. Wind data from the new road weather station (RWIS)

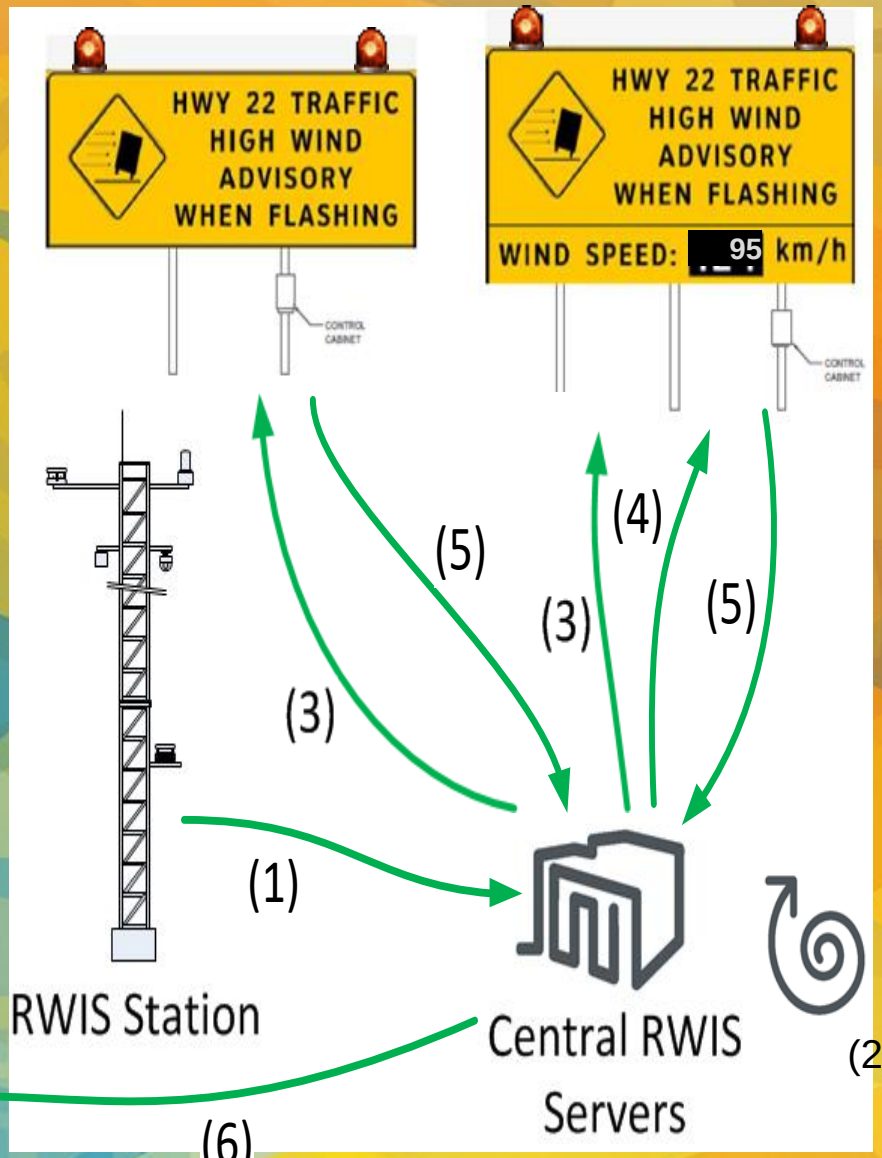
2. The rule engine determines if the 80 km/h threshold has been reached

3. The beacons are activated via cellular communications

4. The wind speed on the LED signs is updated every minute

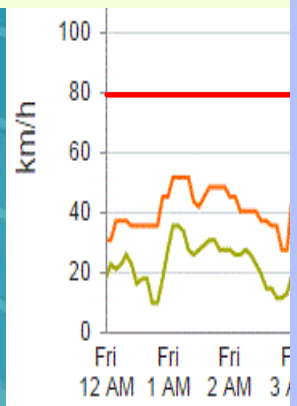
5. System is checked regularly for faults

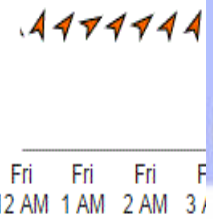
6. Text messages are broadcasted

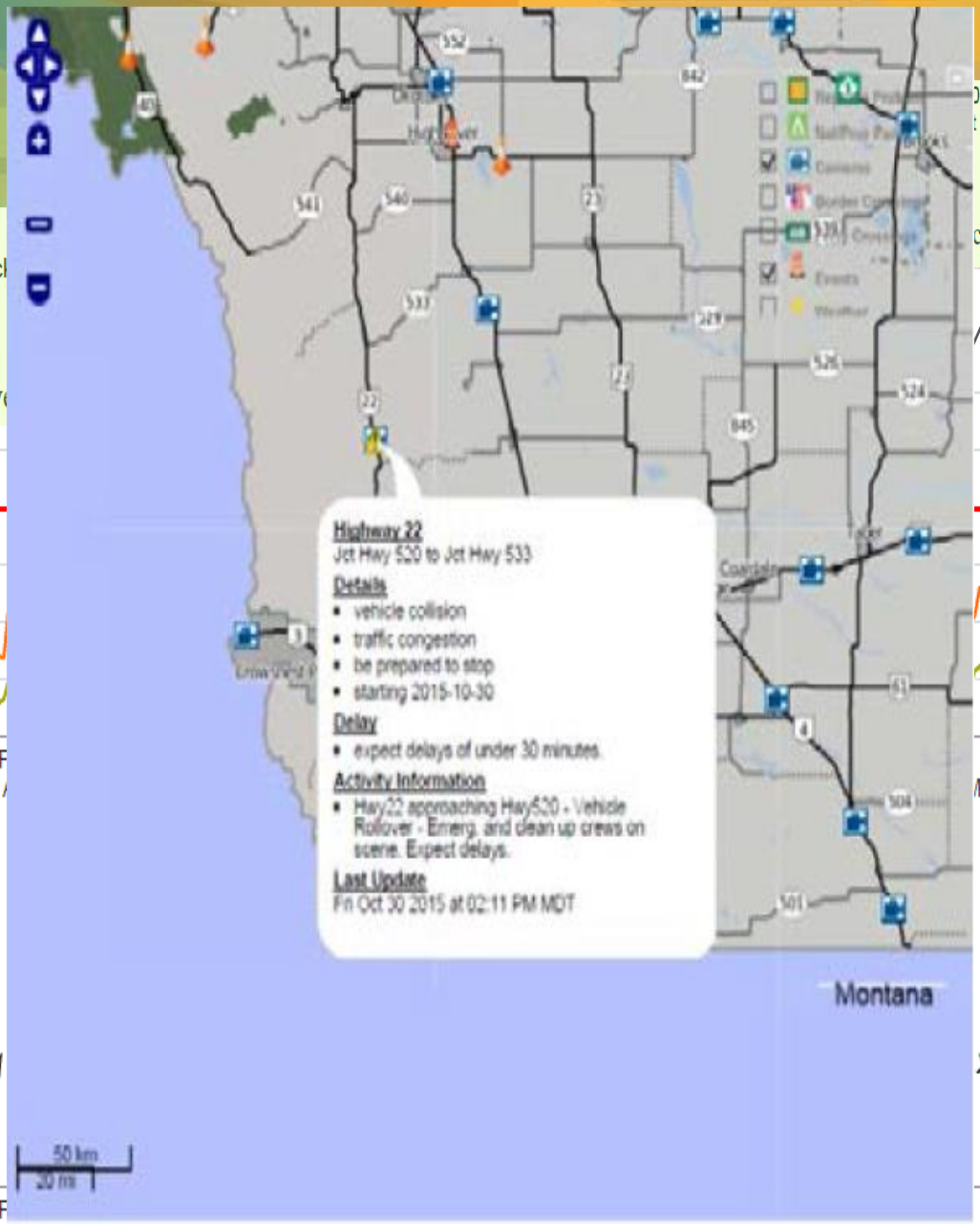


Date: 15/10/30 11:45
Subject: Event at site Lundbreck

Event at site Lundbreck: Wind ev

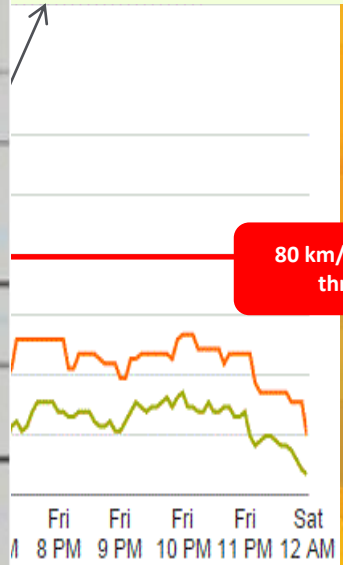


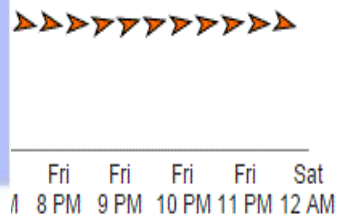




17:40
site Lundbreck: Wind event stopped with speed 59 km/hour

ck: Wind event stopped with speed 59 km/hour





511 Alberta - Helping You Arrive Safely

Results by the Numbers (one-year after)

85

Number of high wind events

164

Number of hours the beacons were active

143

Highest gust wind in km/h detected

4

Number of high wind-related incidents or crashes (from 35-40/year)

Conclusions – Lessons Learned

- Initial system and user requirements may change
- May need a broad range of stakeholders inputs early on
- Local knowledge, experience and field support is very valuable
- Full field testing is needed
- Wireless telecommunications and power resources very important
- Be patient!

Questions?