

# Improving the customer experience in the face of climate change impacts using digital twins



# Endeavour Energy operates an electricity distribution network over 24,500 km<sup>2</sup> and spans from the Blue Mountains, Western Sydney and down to the Illawarra



**1.1 million+**  
connected business  
& residential customers



**85%**  
Of area considered bushfire  
prone



**160km**  
Of coastline



**3 major city hubs**  
Our network covers 3 of the Greater  
Cities Commission 6 Cities



# Like most utility networks, we're facing the impacts of climate change and extreme weather events – this has made us rethink the way we build, maintain and operate our network to provide our customers with safe, affordable and reliable electricity



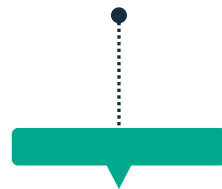
Dec '19 - Jan '20



Black Summer Bushfires



Various Storms

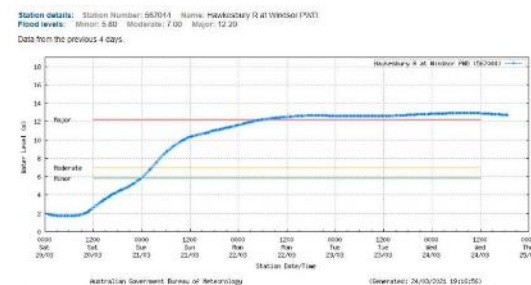


Feb, July, Sep, Nov 2020

March 2021



Hawkesbury River Major Flood



Shoalhaven Storms



August 2021

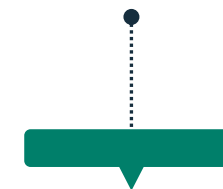
January 2022



Wollongong Storms



Hawkesbury River Major Flood



March 2022

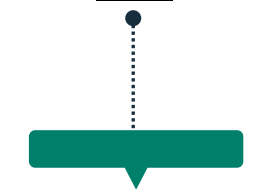
April 2022



Hawkesbury River Floods

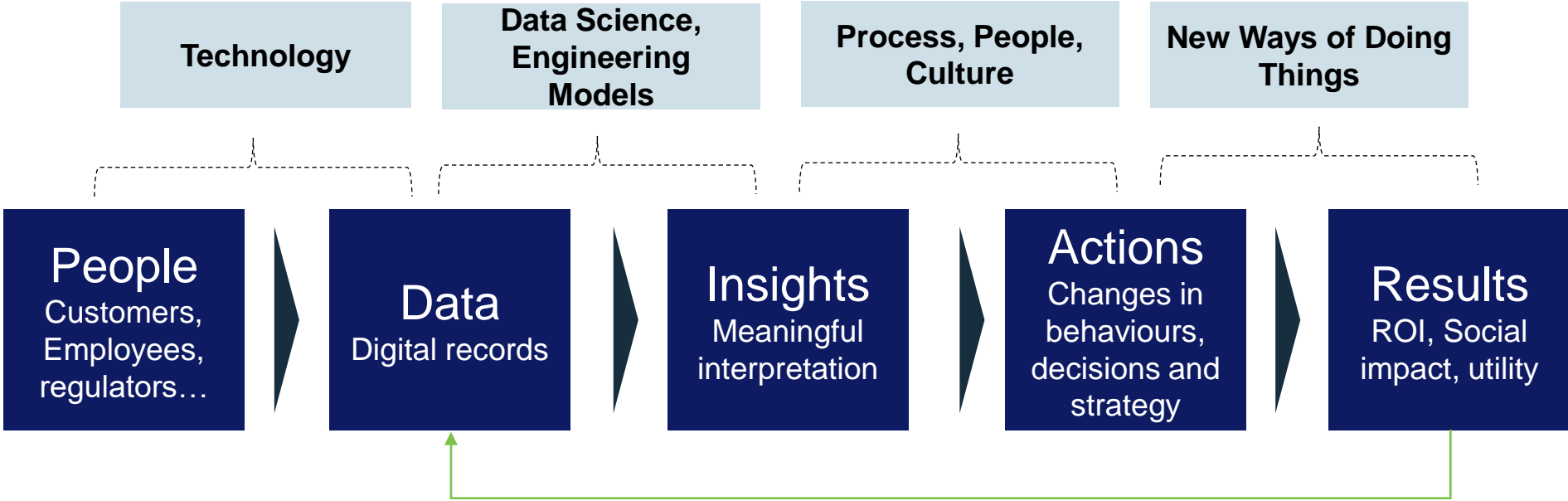


Hawkesbury River Major Flood

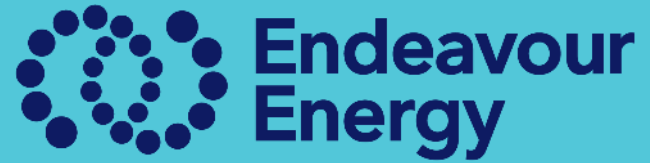


July 2022

# Improving the customer experience connected to our network requires the digital tools, people and data



“Helps organisations to become data-driven, ensuring that key decisions, actions and processes are strongly influenced by data-driven insights rather than by human intuition” - Chamorro-Premuzic



# Supporting customers better in times of crises

**POWER**  
together

# When you're in the thick of a natural disaster, you often don't know how bad it is; the Hawkesbury floods between March 2021 and July 2022 were between 1 in 20 to 1 in 50 year floods



## Rain bomb set to soak Greater Sydney within hours as BOM issues severe weather and flood warnings

7news.com.au, Other, 02/03/2022, Hamish Goodall

The Bureau of Meteorology (BoM) has issued a number of severe weather and flood warnings for Greater Sydney on Wednesday as NSW braces for more wet weather. Fears of a serious Sydney storm failed to eventuate on Tuesday night as the weather system that caused chaos in the state's north moved slower down the coast than expected. [...] Report fallen power lines to either Ausgrid (131 388), Endeavour Energy (131 003), Essential Energy (132 080) or Evoenergy (131 093) as shown on your power bill.

[Read More](#)

## Hawkesbury River continues to rise as more evacuated around Windsor



By Sarah Falson  
Updated July 5 2022 - 10:37am, first published 9:11am



6.39pm On Jul 4, 2022

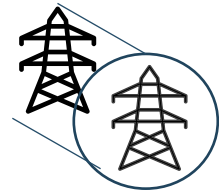
## Nepean River peaks, but levels rising along Hawkesbury

## NSW floods updates: 'No doubt' floods becoming 'more common' as NSW inundated for fourth time in 18 months, Premier says — as it happened

By Jessica Riga and Shiloh Payne

Posted Mon 4 Jul 2022 at 6:37am, updated Mon 4 Jul 2022 at 6:46pm

# A Digital Twin is a virtual model designed to reflect a physical object, process or system



Represents something physical with a digital model



Connects with “right time” data so the model reflects reality



But it is NOT just a data model, but must include relational interactions



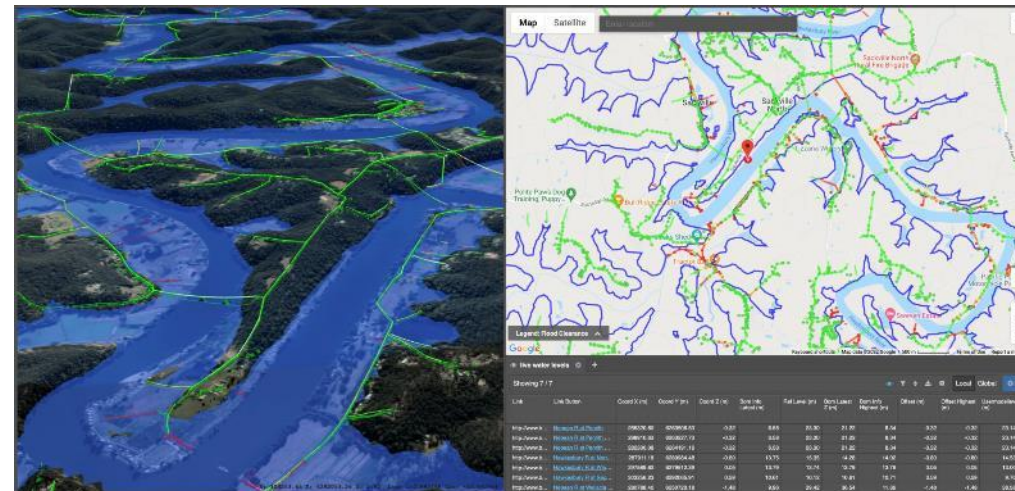
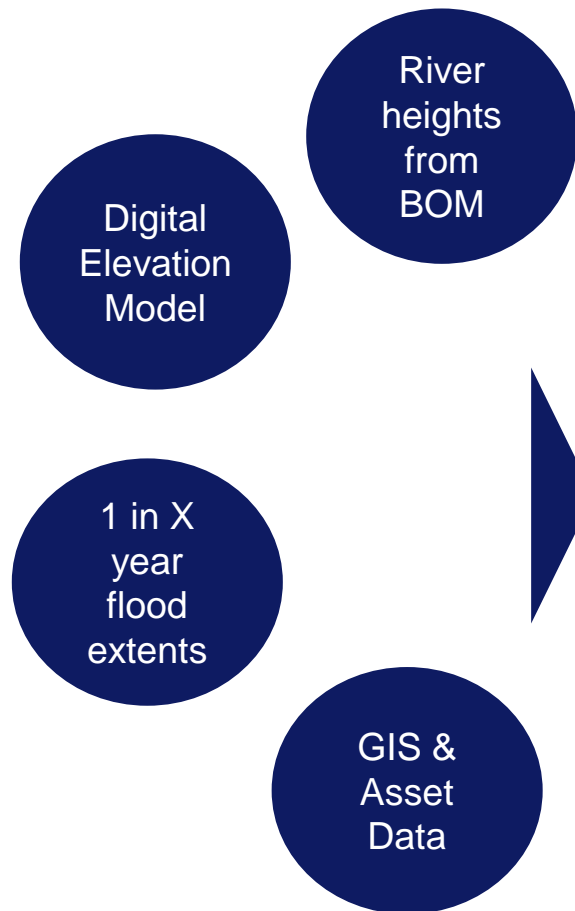
Looks & feels like the real environment



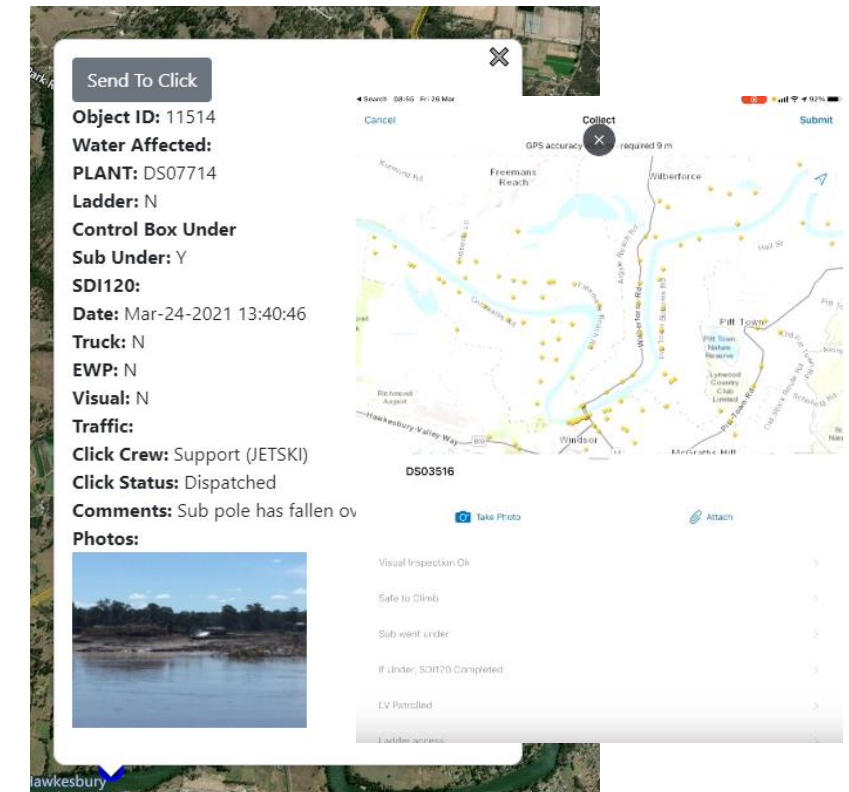
Enables simulations with varying degrees of fidelity

Source: Berutti (2019)

# Using the digital twin flood modelling capabilities provided an unprecedented amount of intelligence and data on how the flood was affecting our network and our customers in real time



Data is ingested to provide a real-time flood overlay to obtain clearance levels of mains to flood waters and network assets as well as premises likely impacted by water



Purpose built app to facilitate desktop and in-field inspection and provide information to customer liaisons



# Using the digital twin to improve customer outcomes

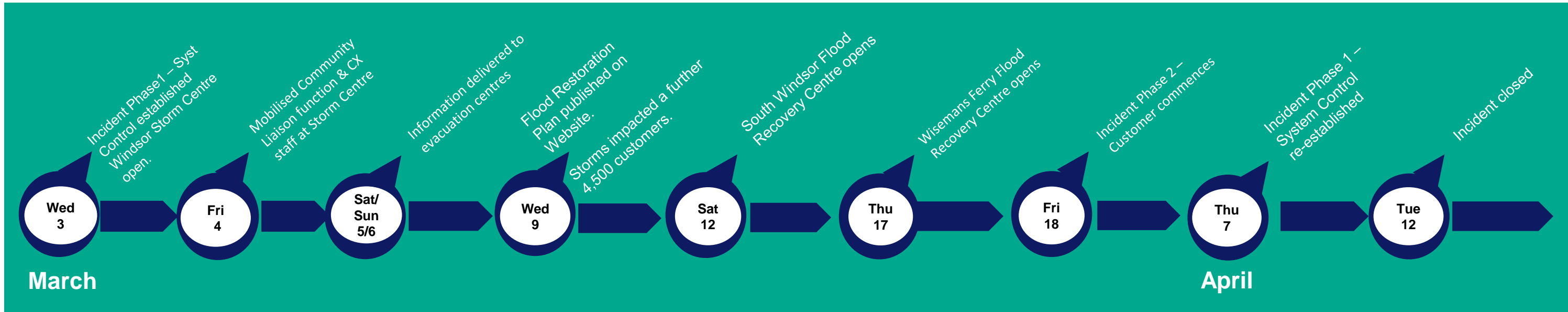
Improved accuracy of information  
and level of detail for customers






Faster restoration

Improved safety – for our community,  
customers and our people







# Flood response communications



 <b>Customer Contact</b>	 <b>External Communication</b>	 <b>Social Media</b>	 <b>Accredited Service Providers</b>	 <b>Community Liaison</b>
<p><b>Total inbound calls: 3,146</b></p> <ul style="list-style-type: none"> <li>Primarily outage lodgement and ETR clarification.</li> </ul> <p><b>Total outbound calls: &gt;700</b></p> <ul style="list-style-type: none"> <li>Including accessibility to premise for ASP reconnections.</li> </ul> <p><b>Outbound SMS: 228,998</b></p> <ul style="list-style-type: none"> <li>Notice before switching and updated ETRs</li> <li><b>Life support customers – 157</b> Proactive calls made when immediately impacted</li> </ul>	<p><b>Media</b></p> <p>Earned coverage via targeted interviews on Channel 9 Today Show, Radio 2GB and local press (ABC, Hawkesbury online, etc)</p> <p><b>Website - Flood Restoration Banner:</b></p> <p>Included information regarding:</p> <ul style="list-style-type: none"> <li>Flood Restoration plan (update daily)</li> <li>Flood Safety Information</li> <li>Customer Assistance</li> <li>Reconnection process and advice</li> </ul> <p>There were 236,000 unique visits to the website, including 94,300 new users. Majority of access via mobile.</p>	<p>Tagging local community groups, media, Councils, and emergency services led to some posts being shared 500+ times</p> <p>899 messages received via Direct Message during March. Responsiveness rated at 100% with 38 min average turn around</p> <p>24 posts in March reached over 400,000 people with 120,000 engagements (likes, comments, shares)</p> <p>Facebook Sent Messages – 896 Facebook Received Messages – 1,762</p>	<p>ASPs were engaged directly to assist with immediate follow up after safety inspections. In some cases enabling customers to access a temporary supply to facilitate clean up activity.</p> <p>An ASP panel was established to assist connecting to the network following repairs and certification at an agreed cost which Endeavour Energy paid directly and no cost to the customer for final connection.</p>	<p><b>Storm Centre &amp; Field Ops Support:</b></p> <ul style="list-style-type: none"> <li>CX staff based at Storm Centre and in field as required to assist with customer liaison</li> </ul> <p><b>South Windsor Recovery Centre:</b></p> <ul style="list-style-type: none"> <li>Staff on site 12 March to 16 March</li> </ul> <p><b>Wisemans Ferry Recovery Centre:</b></p> <ul style="list-style-type: none"> <li>Staff on site 17 March to 22 March</li> </ul> <p><b>Food spoilage claims processed: 138</b></p> <p><b>Retailer Communications:</b></p> <ul style="list-style-type: none"> <li>Updated regularly and positive feedback received from Retailers.</li> </ul>

# Social Media was strategically focused to ensure widespread communication of public safety messages and targeted grassroots community information.....

Endeavour Energy	Endeavour Energy	Endeavour Energy	Endeavour Energy
<b>ELECTRICITY AND WATER DON'T MIX</b> With high volumes of rainfall currently impacting the Greater Sydney and Sout...	<b>FLOOD RESPONSE UPDATE</b> After yet another wet weekend, our Endeavour Energy teams are working hard behind...	<b>EMERGENCY ACCESS REQUIRED:</b> Let's work together to keep everyone safe! If you have Endeavour Energy power pole...	<b>POWER RESTORATION UPDATE</b> Thank you for your patience as our teams work to safely and quickly restore power after the extre...
			
Impressions: 173,517	Impressions: 76,918	Impressions: 45,903	Impressions: 45,562
Reach: 142,932	Reach: 63,194	Reach: 35,614	Reach: 34,532
Engagements: 19,311	Engagements: 22,865	Engagements: 6,902	Engagements: 6,629
Engagement Rate (per Impression): 11.1%	Engagement Rate (per Impression): 29.7%	Engagement Rate (per Impression): 15%	Engagement Rate (per Impression): 14.5%
Shares: 339	Shares: 104	Shares: 28	Shares: 14
Reactions: 2,190	Reactions: 632	Reactions: 303	Reactions: 179

**Endeavour Energy @endeavourenergy · 13h**  
**FLOOD RESPONSE UPDATE:** Continued torrential rain & rising floodwaters at #Windsor, #NorthRichmond and #WisemansFerry are hampering efforts to safely restore power to the 1,100 flood affected homes. Crews will be on the ground when safe access is available. #floods #NSWses



3 replies, 2 likes, 3 shares

**Endeavour Energy @endeavourenergy · 13h**  
**GENERATOR SAFETY:** If using a portable generator for power during floods, make sure deadly exhaust fumes don't enter your home. Generators shouldn't be connected to switchboards unless you've had an isolation switch installed by a licensed electrician. #floodsafety

4 shares, 5 likes

**Endeavour Energy @endeavourenergy · Mar 4**  
**POWER OUTAGE UPDATE:** This map highlights properties currently impacted by flooding & power outages in our network. Our field teams are continuing to work towards safely & quickly restoring power as soon as floodwaters recede in each of the locations. #floods #sydneystorms #NSWses

**Endeavour Energy @endeavourenergy · 13h**  
**CHECK ON YOUR NEIGHBOURS:** With communications limited in some flooded areas, please share emergency response messages with your friends, family and neighbours where you can. Call 000 for life-threatening emergencies. #floodresponse #sydneystorms

3 shares, 2 likes

**Endeavour Energy @endeavourenergy · Mar 4**  
**FLOOD RESPONSE UPDATE:** Jamie Dunn, our Manager Distribution West, & David Campbell, our Head of Field Operations, explain the next steps to safely restoring power once the floodwaters recede. There is a big job ahead of us but we won't stop until it is done! #sydneystorms #floods

# And the community responded ... appreciating real-time news & two-way engagement community information.....

**Clare Venables**  
I was so impressed when we had an issue that you sent someone so quickly to help us, and we are cut off by the floods. 🙏🙏

**Endeavour Energy**  
Clare Venables Thank you Clare, our crews have been on the ground assisting where it's safe to do so. We appreciate the feedback.

**Helen Waisel**  
Your team did a stellar job today restoring power to Kurrajong homes after a massive fallen tree overnight, thank you!!!

**Endeavour Energy**  
Helen Waisel That's great to hear, we appreciate your positive feedback. Regards EE Team

**Matthew Bryant**  
what about singleton rd laughtondale why didn't that get fixed last Wednesday when the roads weren't even flooded

**Endeavour Energy**  
Hi Matthew, I am sorry to hear that your power is still out. For safety reasons, we have had to isolate power in some areas and unfortunately this means some of our community not directly impacted by the flood water have been without power. We apologise... See more

**Lisa Hilleard**  
Your staff member was really lovely txtng to check my service was back, when he wasn't able to access the property due to gates. Going that extra mile makes all the difference.

**John Moore** Great work Endeavour Energy RFS SES and other support agencies. You are valued and needed. 24 big red trucks plus support vehicles from Fire Rescue NSW must be invisible. [Read less](#)

**Doug Wiggins** Your teams have achieved awesome results in terrible conditions. Thank you. [View reply](#)

**Macdonald Valley Association** Thank you for the opportunity for our communities to share their experiences. We have shared this on our Facebook. And thank you to the crews for... [Read more](#)



**Billy Gruner** Brilliant job people. Very very impressive

1d • Reply Message Tag

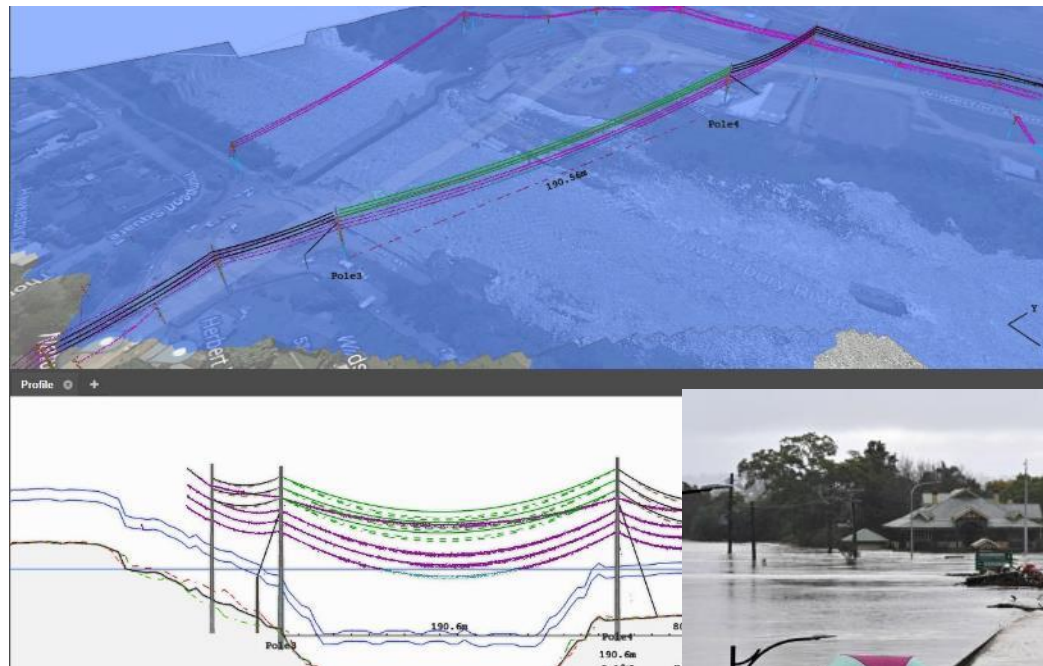
# Our people were on the ground providing support for customers



# Designing more resilient assets

# Using the diagnostic capabilities and the tool's design functions has allowed us to design assets more resilient to floods and other extreme weather conditions so we can keep the lights on for our customers

**i** Designing a more resilient network – 33kV feeder to have a minimum height of 17m AHD at Windsor Bridge



**ii** Constructing a more resilient network



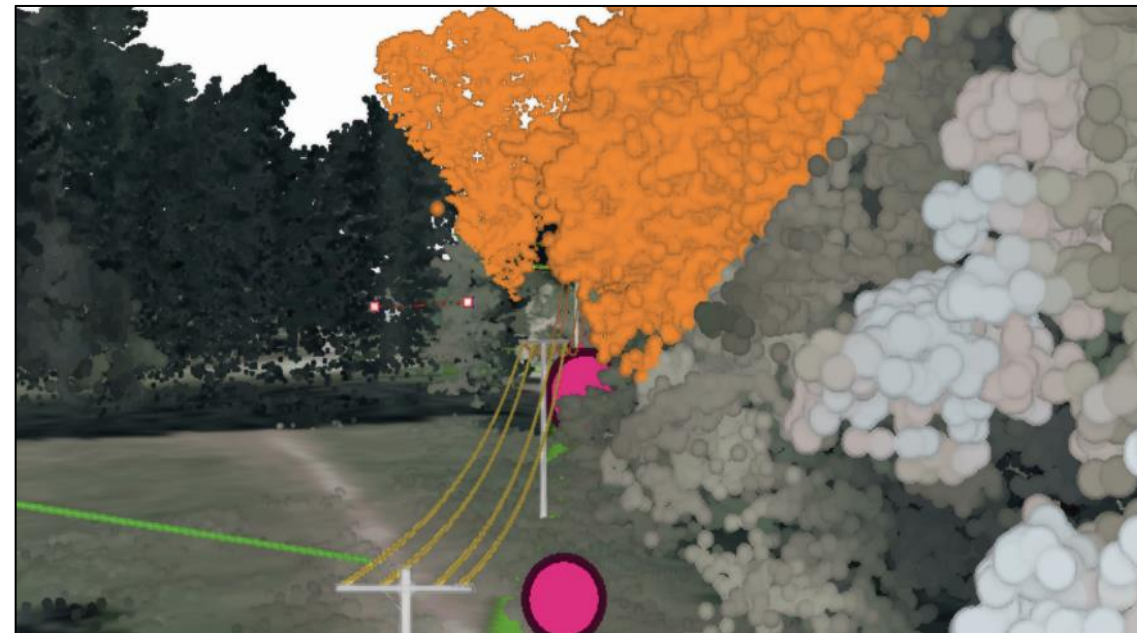
The flip side to the impacts of La Ninas is the impacts of El Ninos on the vegetation around the electricity network; we're focused on getting more visibility in this area so we can improve how we design our network and maintain our existing overhead network.



Tree canopy segmentation, growth tracking and modelling



Vegetation encroachment, vegetation fall-in risk and conductor clashing risks



# What we're working on



# We're also starting to use drones to help expedite inspections



# Improving Customer Communication

- Providing more detailed information on the ‘why’ and ‘what’ for planned and unplanned outages
- Using data science techniques to improve estimated time to restoration and streamlining the communication of updates.

[Home](#) > [Outages](#) > [Planned and unplanned outages](#) > [Improving network resilience - CCT projects](#)

## Improving network resilience - CCT projects

[Current power outages](#)

[Report a fault or hazard](#)

[Report a faulty street light](#)

[What to do if you're without power](#)

[How we respond to storms](#)

[Planned and unplanned outages](#)

[Street lights](#)

We're committed to providing safe, reliable power to our community. That's why we are replacing bare overhead powerlines with covered conductor to improve network resilience during storms and to reduce the risk of bushfire in your area.

In this program, we are replacing bare high voltage conductors with covered conductors in the areas of greatest risk.

While the immediate disruption to your power supply is regrettable, we are making these necessary changes now to deliver long-term benefits before the upcoming bushfire and storm seasons.

Covered conductors will reduce the number of unplanned outages and the likelihood of powerlines starting bushfires by 98-99% in the areas of highest bushfire risk in the network.

Thank you for your patience and support while we complete these important works to improve the safety and reliability of your electricity supply.

### Why

Much of Endeavour Energy's network was built in the 1950s and 60s when bare electricity conductors were the only cost effective way to get power to homes and businesses.

Now there is new cost-effective technology to improve the safety and resilience of power supply in those areas most prone to disruption from external factors like vegetation, storms and bushfires.



Covered conductor is designed to reduce unplanned outages and the likelihood of powerlines starting bushfires.



**Endeavour  
Energy**



**POWER  
together**