FLOOD DETECTION PROJECT

Presented by

LGAQ Lab

LGAQ
LGAQ
Powered by Telstra
Explore IoT with Telstra

CONNECT
INNOVATE
ACHIEVE
CAPCOM

HONDA
Austral Honda

AirPlay
NETWORK CONFIGURATION
LG House Guest
CHOOSE THIS APPLE TV
Open Meet

1

THE PROBLEM

“Can we get FTP access to store some flood images.”

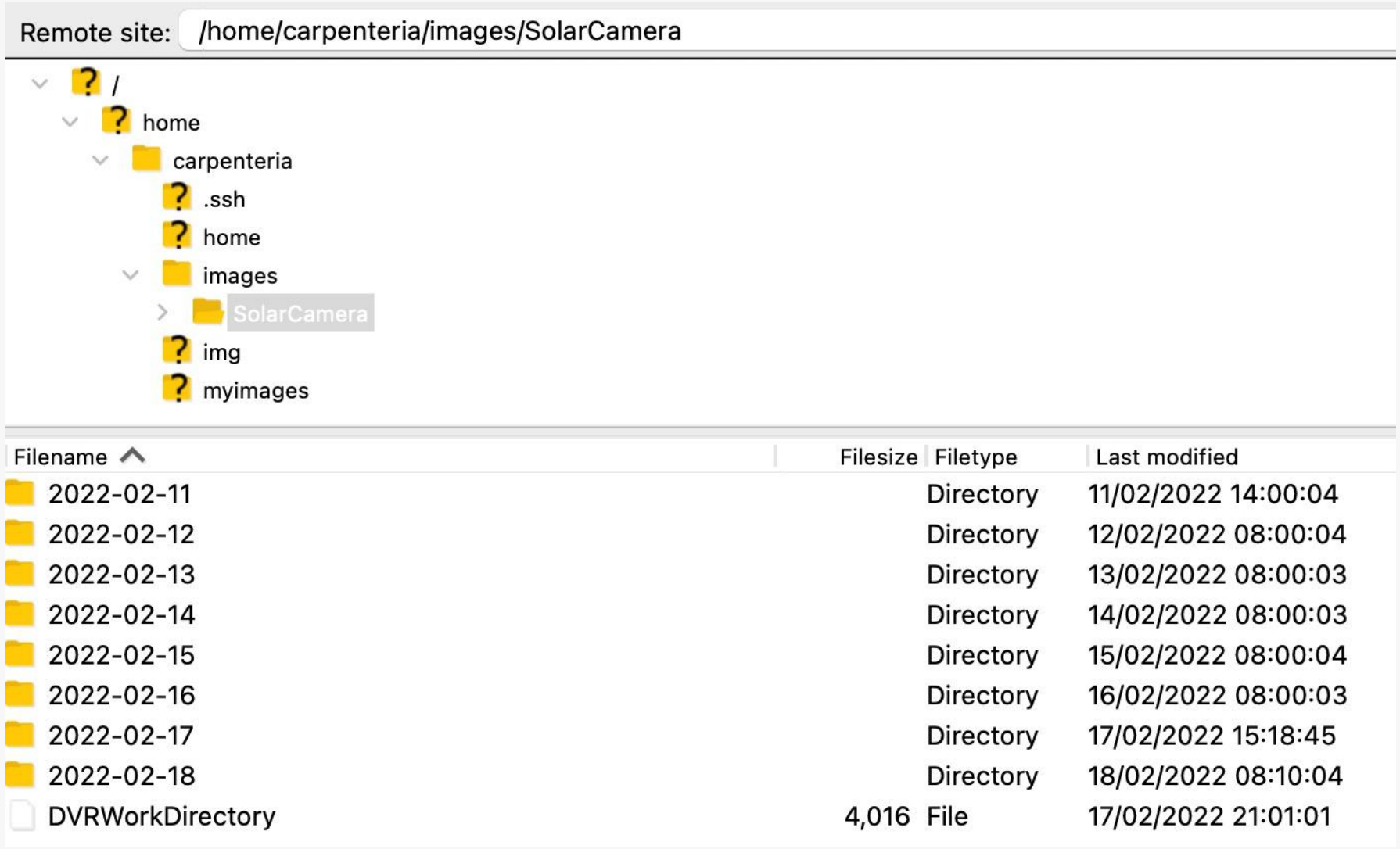
- Tom Loadsman, Electrician from Carpentaria Shire Council

SURE, BUT WHY?

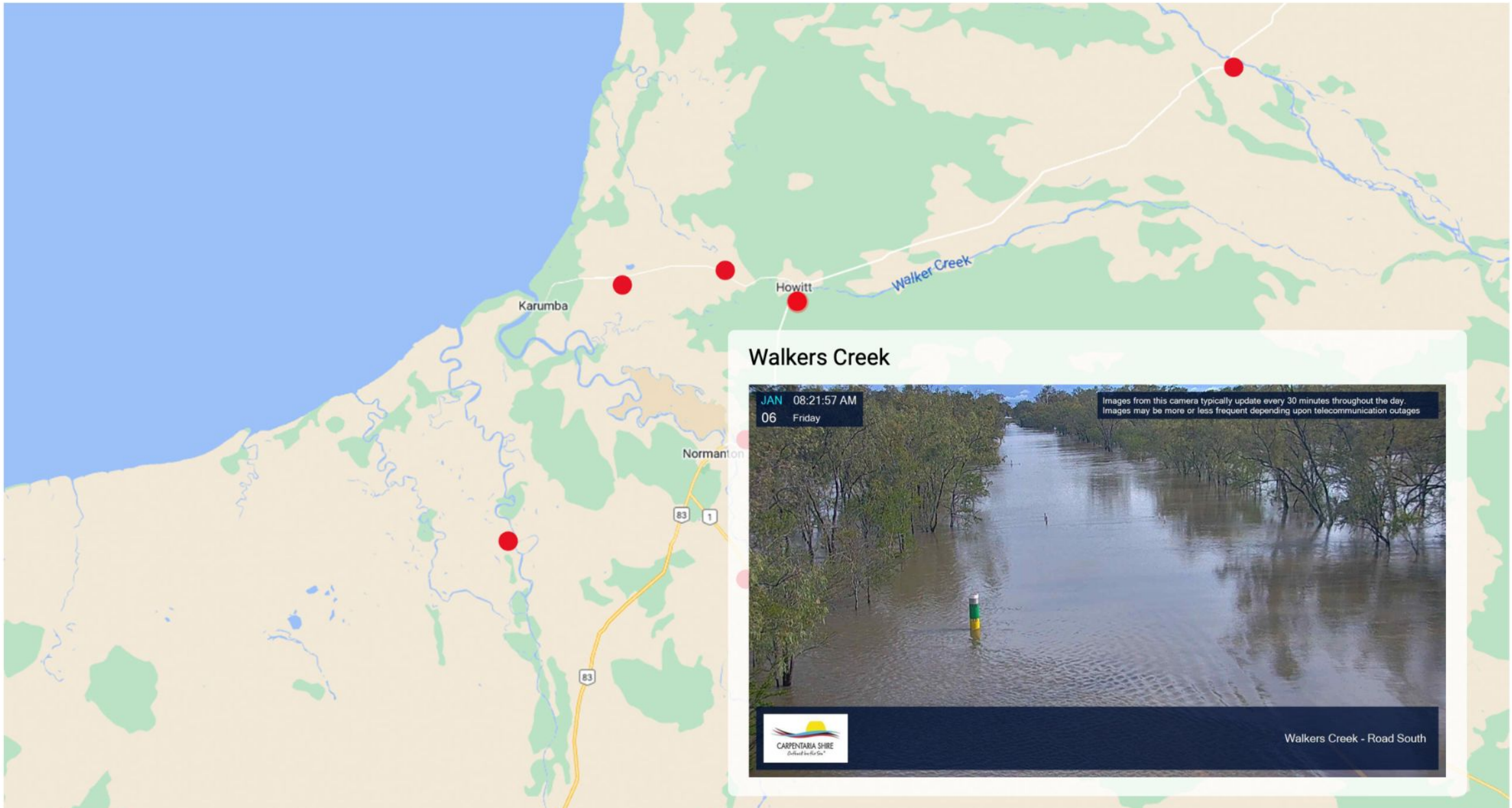
The satellite cameras we have keep failing, so we want to store images on a server to display on our website.

SURE, BUT WHY?

The satellite cameras we have **keep failing**, so we want to store images on a server to **display on our website**.


Remote site: /home/carpenteria/images/SolarCamera
/
home
carpenteria
.ssh
home
images
SolarCamera
img
myimages
Filename
Filesize
Filetype
Last modified
2022-02-11 Directory 11/02/2022 14:00:04
2022-02-12 Directory 12/02/2022 08:00:04
2022-02-13 Directory 13/02/2022 08:00:03
2022-02-14 Directory 14/02/2022 08:00:03
2022-02-15 Directory 15/02/2022 08:00:04
2022-02-16 Directory 16/02/2022 08:00:03
2022-02-17 Directory 17/02/2022 15:18:45
2022-02-18 Directory 18/02/2022 08:10:04
DVRWorkDirectory 4,016 File 17/02/2022 21:01:01

Carpentaria Flood Map



From: Mark Crawley
Sent: Tuesday, 3 January 2023 9:05 AM
To: Electrician- Tom Loadsman
Cc:
Subject: FW: Carpentaria Shire Council Contact Form

Tom

Good morning and Happy New Year

Thought I would share the information below, received via website enquiry, job well done, cheers

Kind regards

Mark Crawley
Chief Executive Officer
CARPENTARIA SHIRE COUNCIL
Ph: 07 4745 2200
PO Box 31, NORMANTON QLD 4890

http://www.carpentaria.qld.gov.au

Find us on Facebook

Dear Carpentaria Shire Council team

You have received an email from your Contact form.

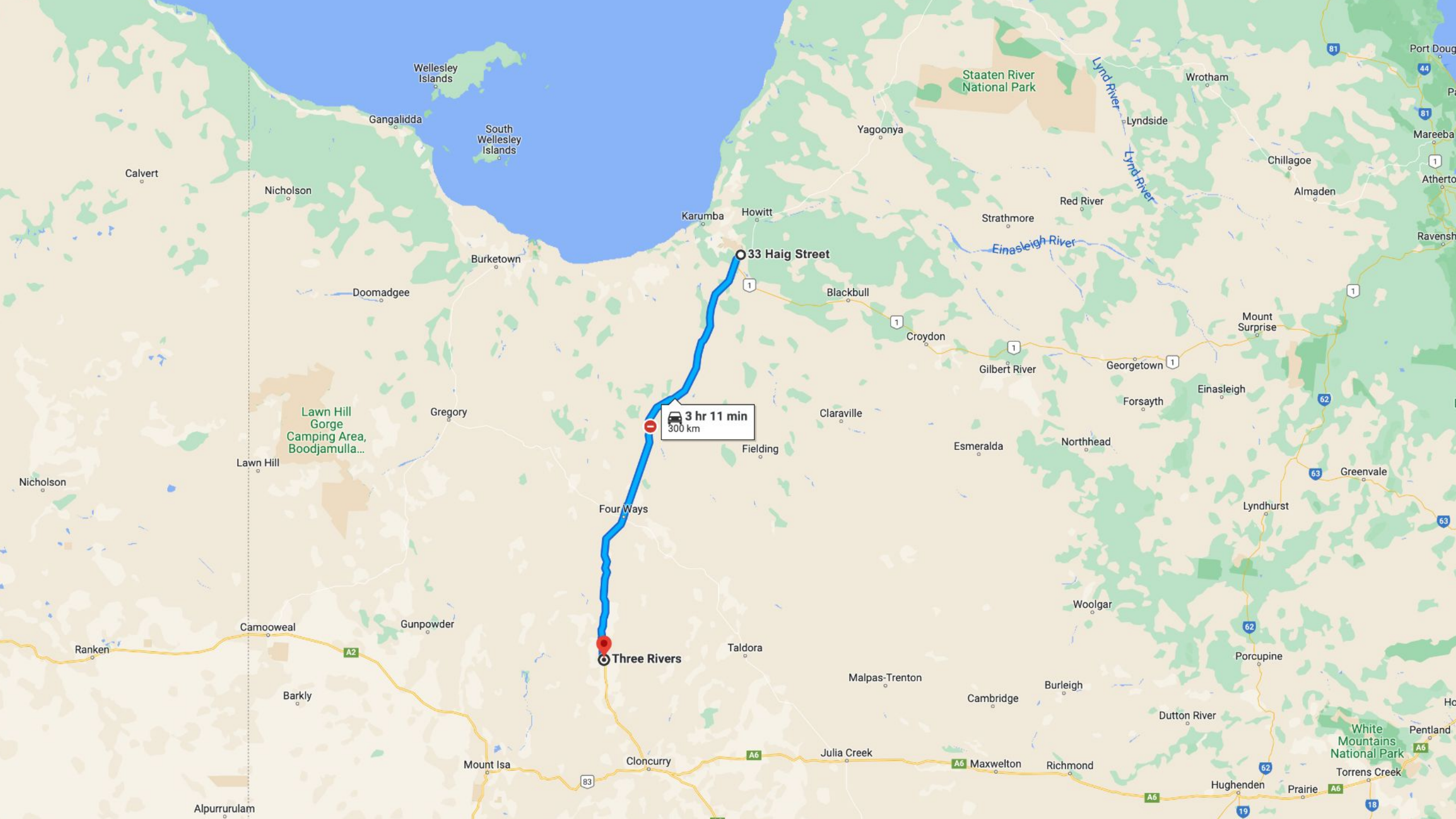
Please action accordingly.

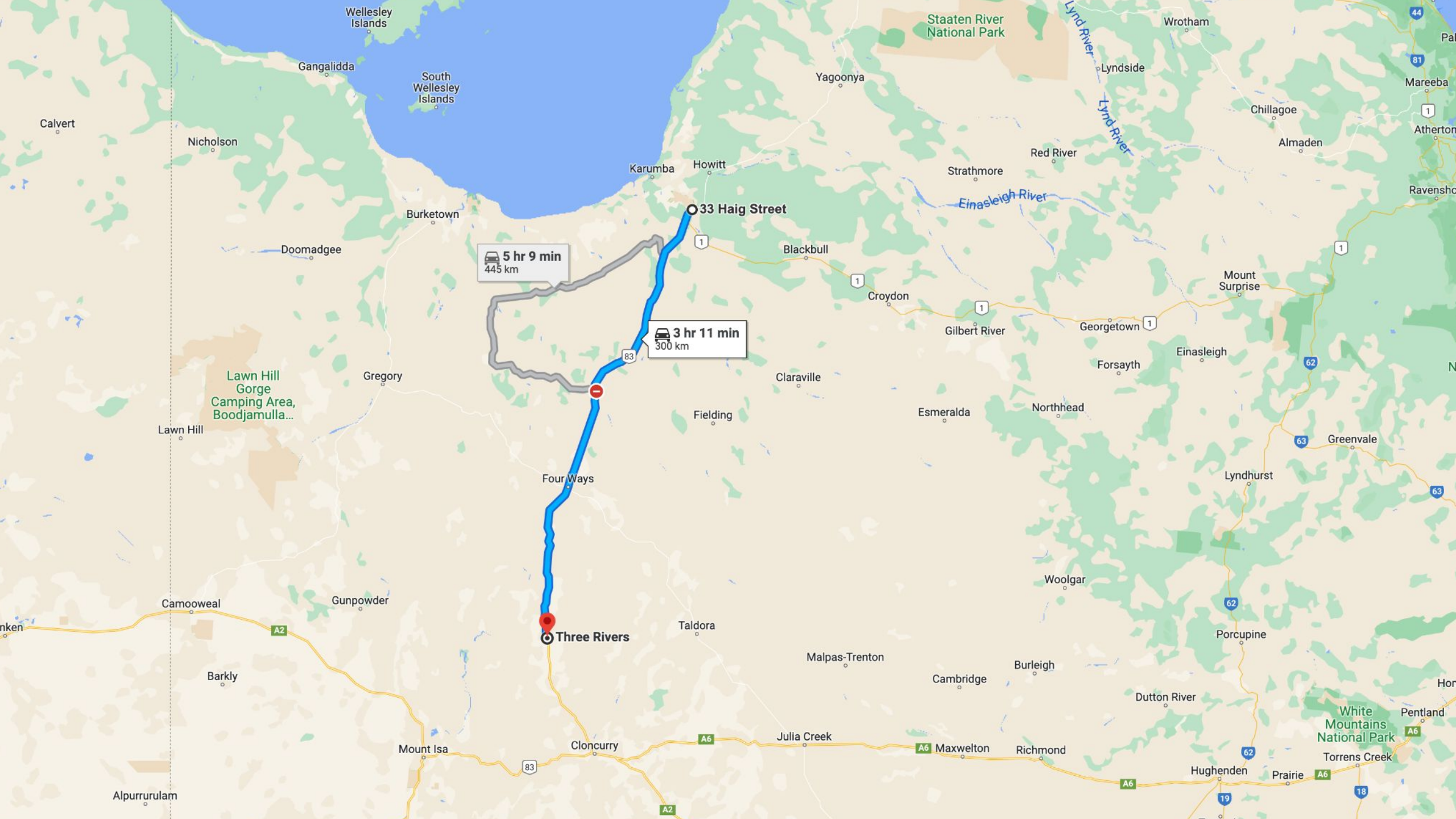
Page: Contact Carpentaria Shire Council

- Name [redacted]
- Phone [redacted]
- Email [redacted]
- Rating Excellent
- Comments Congratulations on the new Carpentaria Flood Map feature on your website. It is far better than what was previously available.

Kind regards,

Carpentaria Shire Council


33 Haig Street
3 hr 11 min
300 km
Three Rivers
Wellesley Islands
Gangalidda
South Wellesley Islands
Calvert
Nicholson
Karumba
Howitt
Burketown
Doomadgee
Staaten River National Park
Yagoonya
Lynd River
Lyndside
Wrotham
Chillagoe
Almaden
Red River
Strathmore
Einasleigh River
Blackbull
Croydon
Gilbert River
Georgetown
Mount Surprise
Forsayth
Einasleigh
Claraville
Fielding
Esmeralda
Northhead
Gregory
Lawn Hill Gorge Camping Area, Boodjamulla...
Lawn Hill
Four Ways
Greenvale
Lyndhurst
Woolgar
Porcupine
Taldora
Malpas-Trenton
Burleigh
Cambridge
Dutton River
Camooweal
Gunpowder
Ranken
Barkly
Mount Isa
Cloncurry
Julia Creek
Maxwelton
Richmond
Hughenden
Prairie
Torrens Creek
White Mountains National Park
Pentland
Alpurrurulam


33 Haig Street
5 hr 9 min
445 km
3 hr 11 min
300 km
Three Rivers
Wellesley Islands
Gangalidda
South Wellesley Islands
Calvert
Nicholson
Karumba
Howitt
Yagoonya
Staaten River National Park
Lynd River
Wrotham
Lyndside
Mareeba
Chillagoe
Almaden
Atherton
Red River
Strathmore
Einasleigh River
Burketown
Doomadgee
Blackbull
Croydon
Mount Surprise
Gilbert River
Georgetown
Forsayth
Einasleigh
Claraville
Gregory
Lawn Hill Gorge Camping Area, Boodjamulla...
Lawn Hill
Fielding
Esmeralda
Northhead
Greenvale
Lyndhurst
Four Ways
Woolgar
Camooweal
Gunpowder
Taldora
Porcupine
Malpas-Trenton
Burleigh
Barkly
Cambridge
Dutton River
White Mountains National Park
Pentland
Mount Isa
Cloncurry
Julia Creek
Maxwelton
Richmond
Torrens Creek
Hughenden
Prairie
Alpurrurulam

How can we make it even better?

2

THE OPPORTUNITY

Build an AI model that can automatically detect flooding over roads.

Flood cameras are a critical disaster communication tool. The AI will help us greatly in increasing the **safety of road users** and the **efficiency of council operations**.

Tom Loadsman, Carpentaria Shire Council

PROJECT **OPPORTUNITIES**

WHAT THE PROJECT AIMS TO ACHIEVE FOR COUNCILS

Reduce travel time

Flooding over roads can be determined remotely without 8 hour round trips needing to be taken.

Introduce automations

Introduce new automation opportunities, such as email notifications, website updates and SMS.

Improve communication

Provide clear and specific flooding updates to more people through a range of channels.

Improve camera reliability

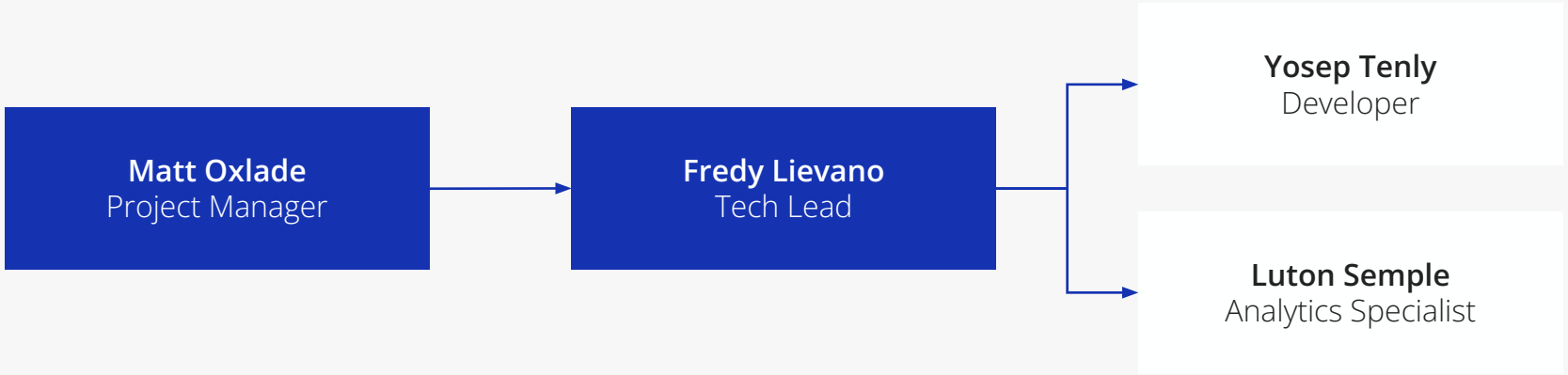
Deploy modern cameras with higher resolutions that provide a greater level of detail and reliability.

3

THE TEAM

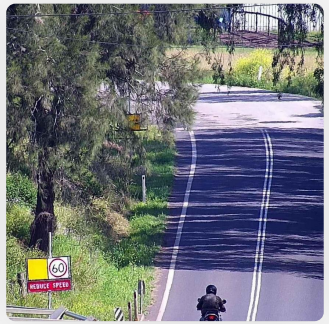
THE **TEAM**

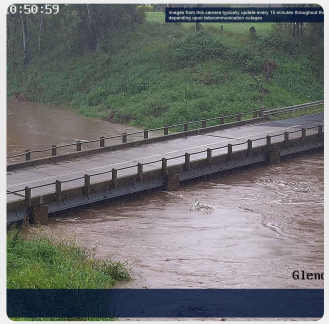
WHO MADE THE AI MODEL



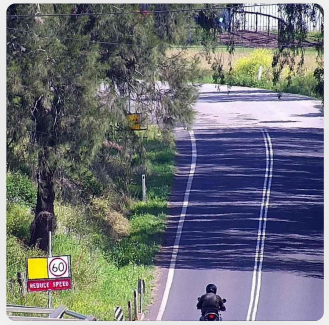
4

THE SOLUTION

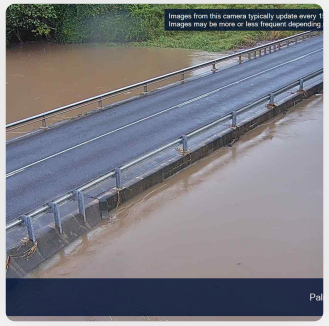

60
REDUCE SPEED

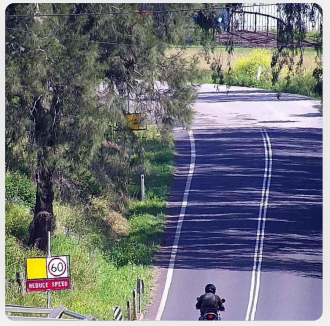

0:50:59

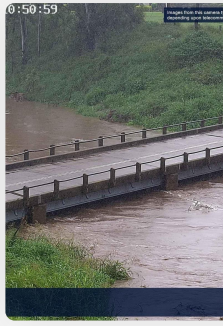
21-01-06 07:15:21+10:00 - Crofton Ck - Highway East Bound

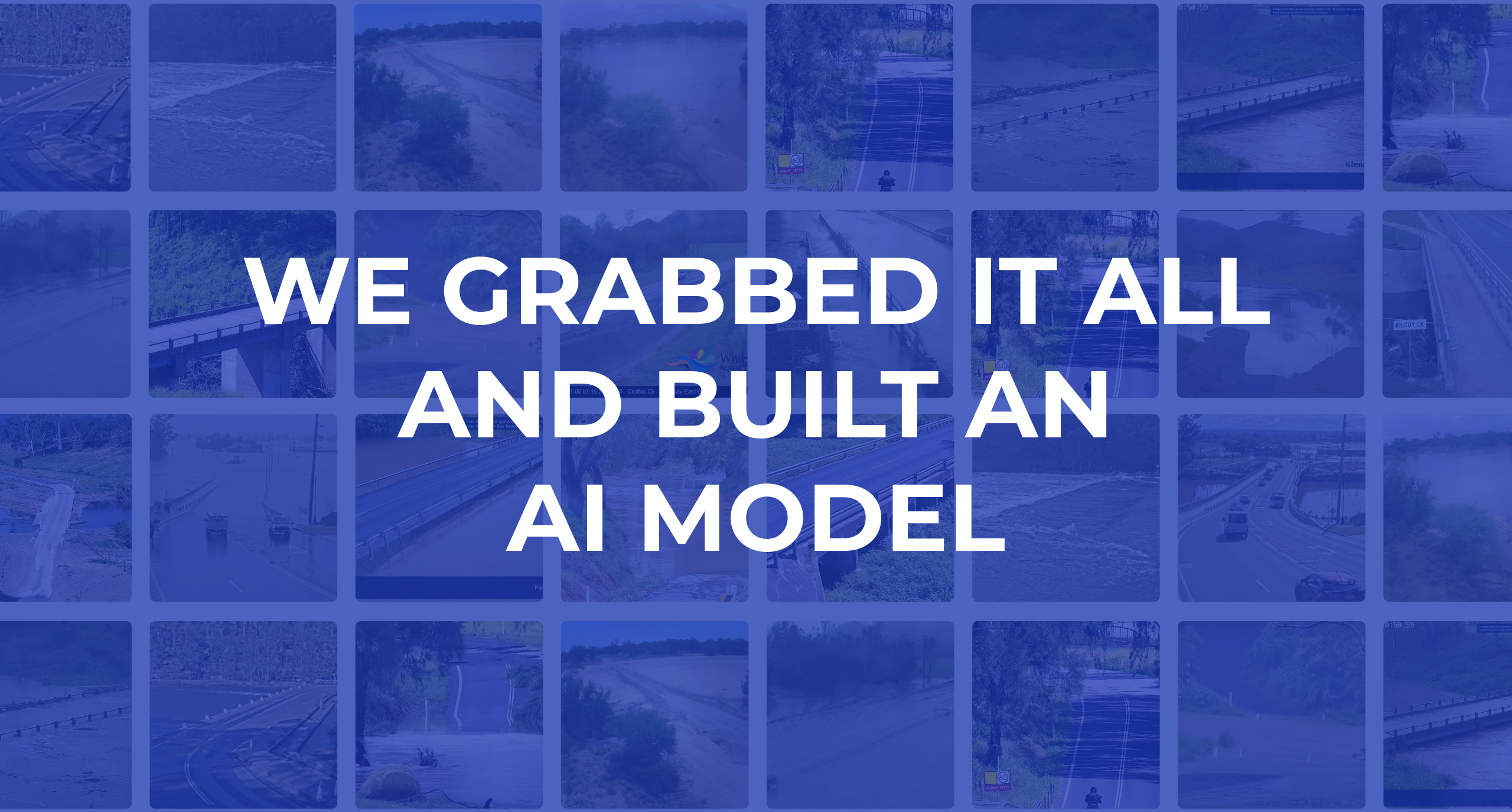
KILCOY CK

60
REDUCE SPEED

KILCOY CK


Images from this camera typically update every 1
Images may be more or less frequent depending


60
REDUCE SPEED


0:50:59


WE GRABBED IT ALL
AND BUILT AN
AI MODEL

Images used to train

500+

Current model’s accuracy

98.6%

Super clear 4k camera that uses 100% green energy.

552KB/s
2022-09-15 13:59:14
Jenny Lind, Carpentaria Shire Council

2023-01-04 08:15:38
Jenny Lind, Carpentaria Shire Council

2023-01-05 08:45:35
Jenny Lind, Carpentaria Shire Council

04-01-2023 14:04:24
Corduroy, Carpentaria Shire Council

05-01-2023 14:30:05
Corduroy, Carpentaria Shire Council

06-01-2023 12:00:05
Corduroy, Carpentaria Shire Council

04-01-2023 19:45:29
Little Bynoe River, Carpentaria Shire Council
e Bynoe River

08-01-2023 20:15:29
Little Bynoe River, Carpentaria Shire Council
e Bynoe River

2023-01-04
Jenny Lynd

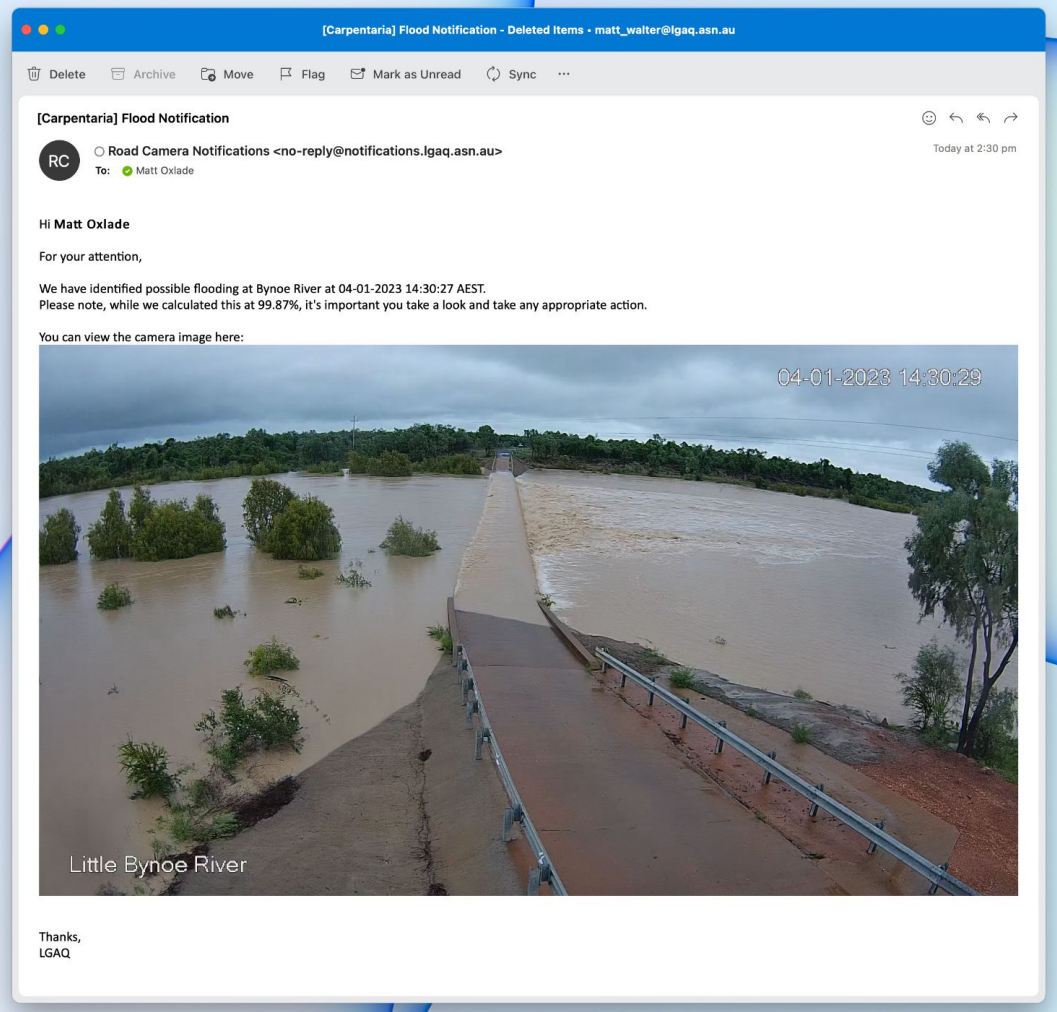
05-01-2023
Brannigans

05-01-2023
Corduroy

04-01-2023
Bynoe River

2023-01-05
Norman River

08-01-2023
Flinders River



THE **EMAILS**

WHAT HAPPENS WHEN FLOODING IS DETECTED?

The council receives an email.

The email is automatically generated when the AI model determines flooding over the road from the camera's snapshot. It includes:

- The location and time the flooding was detected.
- The confidence rate of the detection.
- The image that was used where flooding was detected.

COUNCIL **NEEDS**

TOP 8 REQUIREMENTS OR EXPECTED OUTCOMES FOR DIGITAL TRANSFORMATION

Automation of processes
74%

Better business outcomes
68%

Increase flexibility
60%

Support digital delivery of service
60%

Desire to lower costs
56%

Increase customer reach
44%

Additional data security
33%

Scalability
25%

POTENTIAL **AUTOMATIONS**

WHAT THE AI MODEL COULD AUTOMATE

SMS notifications to council officers

Automatically upload the flooded image to council's website

Automatically remove the image of the flooded road from the council's website

Facebook ChatBot

Update the road closure boards

Feed other automations that are run internally

5

HOW IT **WORKS**

HOW **IT WORKS**

HOW THE AI MODEL IDENTIFIES FLOODING

THE **SECURITY**

WHAT SECURITY STEPS HAVE BEEN TAKEN

Encapsulated device model

Managed elements (images) can only be accessed internally, otherwise all assets require key-based secure connections.

API access

Uploaded images are completely locked from any read access off any device unless registered within LGAQ's security model.

AWS consultation

Utilises AWS' Shared Responsibility Model, where all cloud elements are protected from external parties using a role-based access model.

6

COST & **TIME**

CURRENTLY COSTS
LESS THAN ONE
LUNCH PER WEEK.

Our cameras (1 day)

- Individual AI models need to be created for new locations
- No additional time required to omit overlays
- Hosting uses existing LGAQ hosting

Existing cameras (3 days)

- Individual AI models need to be created for existing cameras
- Requires additional work to omit overlay graphics
- Dependant on how images are hosted and can be accessed
- Will copy the image and host it on LGAQ infrastructure
- No changes are made to the way existing cameras operate

7

THE PRODUCT

How can we make it even better?

POC VS **PRODUCT**

WHERE WE COULD TAKE A PRODUCT

Proof of concept

Research
Pilot cameras were researched and procured through Telstra.

Designed and trained AI
LGAQ designed and trained the AI based off Carpentaria's riskiest locations.

Deployed cameras
Six cameras were placed around Carpentaria Shire Council.

Email notifications
LGAQ designed and programmed email notifications for flood detection.

Product

Night time identification
Additional flooding detection between total nightfall and first light every day.

Camera downtime notifications
Email notifications that are triggered if cameras disconnect at any time.

Website automations
Automatically upload and remove images to councils' websites.

SMS and Messenger notifications
Allow members of the public to sign up for notifications by SMS or Messenger.

8

THE QUESTIONS

Why is it so cheap?

A mix of clever thinking, IDF funding and the utilisation of existing LGAQ resources to apply their breadth of knowledge to a new challenge. There's no bottom-line to attend to, we are building in accordance to our members' needs.

Are the cameras recording everything?

The cameras take images, not video. Images are taken in 15-minute increments and flooding is determined against the image. We can either publish those images or not depending on the councils' preferences.

What about privacy concerns?

We use an encapsulated device model and have consulted with Amazon Web Services to ensure the APIs built are adopting best-practice security. We can work with councils on custom security protocols if required.

Why is it so cheap?

A mix of clever thinking, IDF funding and the utilisation of existing LGAQ resources to apply their breadth of knowledge to a new challenge. There's no bottom-line to attend to, we are building in accordance to our members' needs.

Are the cameras recording everything?

The cameras take images, not video. Images are taken in 15-minute increments and flooding is determined against the image. We can either publish those images or not depending on the councils' preferences.

What about privacy concerns?

We use an encapsulated device model and have consulted with Amazon Web Services to ensure the APIs built are adopting best-practice security. We can work with councils on custom security protocols if required.

Why is it so cheap?

A mix of clever thinking, IDF funding and the utilisation of existing LGAQ resources to apply their breadth of knowledge to a new challenge. There's no bottom-line to attend to, we are building in accordance to our members' needs.

Are the cameras recording everything?

The cameras take images, not video. Images are taken in 15-minute increments and flooding is determined against the image. We can either publish those images or not depending on the councils' preferences.

What about privacy concerns?

We use an encapsulated device model and have consulted with Amazon Web Services to ensure the APIs built are adopting best-practice security. We can work with councils on custom security protocols if required.

Why not use the flood height poles for detection?

The PTZ cameras currently in use can be rotated. Councils told us that this is important to us, but can lead to the pole being out of view in some instances and therefore unable to be used to detect flooding in all situations.

Can it detect anything other than floods?

The AI model can detect flooding at present, but it can be trained to detect a range of different things. The current proof-of-concept pilot has us focusing exclusively on flooded roads, but will consider additional detection in the future.

How is this different from other flooding tools?

Price and customisation. This is built specifically for a council, and can apply directly to other councils with similar issues. This isn't product-first, but instead it's solution-first. Plus it's cheap. Super cheap.

Why not use the flood height poles for detection?

The PTZ cameras currently in use can be rotated. Councils told us that this is important to us, but can lead to the pole being out of view in some instances and therefore unable to be used to detect flooding in all situations.

Can it detect anything other than floods?

The AI model can detect flooding at present, but it can be trained to detect a range of different things. The current proof-of-concept pilot has us focusing exclusively on flooded roads, but will consider additional detection in the future.

How is this different from other flooding tools?

Price and customisation. This is built specifically for a council, and can apply directly to other councils with similar issues. This isn't product-first, but instead it's solution-first. Plus it's cheap. Super cheap.

Why not use the flood height poles for detection?

The PTZ cameras currently in use can be rotated. Councils told us that this is important to us, but can lead to the pole being out of view in some instances and therefore unable to be used to detect flooding in all situations.

Can it detect anything other than floods?

The AI model can detect flooding at present, but it can be trained to detect a range of different things. The current proof-of-concept pilot has us focusing exclusively on flooded roads, but will consider additional detection in the future.

How is this different from other flooding tools?

Price and customisation. This is built specifically for a council, and can apply directly to other councils with similar issues. This isn't product-first, but instead it's solution-first. Plus it's cheap. Super cheap.

THANK YOU

25 Evelyn Street, Newstead QLD 4006

+61 411 398 812

matt_oxlade@lgaq.asn.au

fb.com/LocalGovQLD

@localgovqld

@LGAQ