VEHICLE IMPACT ON STRUCTURES AUTOMATED RISK ASSESSMENT

How FME extracts NZTA CAS data from ArcGIS Online, compares it against Snowflake event records, and applies user-defined rules to calculate structure risk ratings

FME **ArcGIS Online** **Snowflake**

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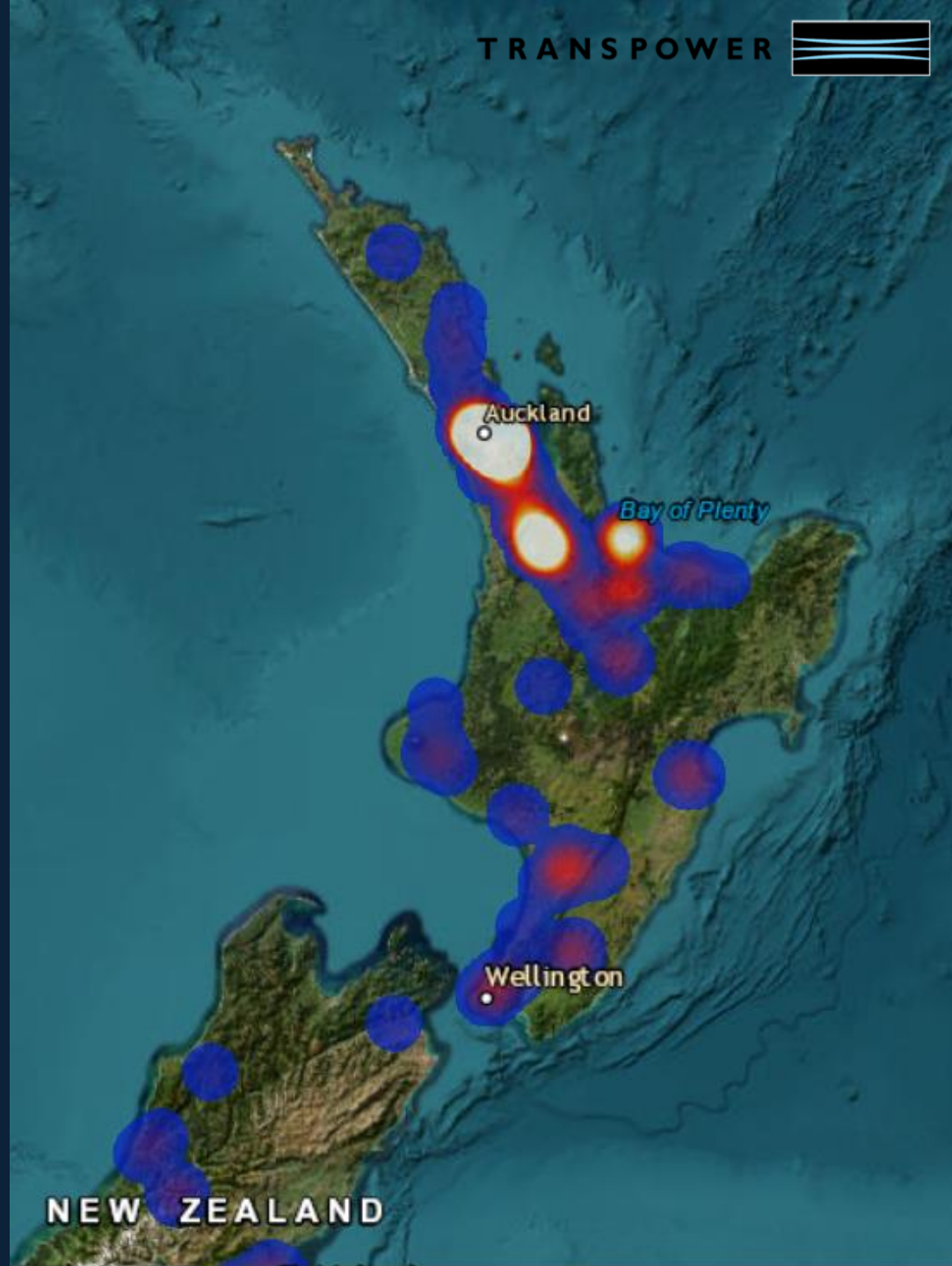


OVERVIEW

FME story in one line

Turn frequently updated, high-volume source data into a transparent and repeatable structure risk rating.

Public safety • Network resilience • Repeatable prioritisation

PROBLEM

Why automate the assessment?

New data monthly, weekly, nightly

CAS data is regularly updated and contains hundreds of thousands of records. Manually re-reading everything increases runtime and competes with other FME Flow automations.
Speed limit data is extracted from NZSLR nightly basis.

Transpower assets could receive an update any time.

Multiple systems

Crash data, structure assets, road context, speed limits, incident records and public-safety criticality must be brought together consistently.

Repeatable decisions

Clear, visible rules let us rank every structure on the same basis, instead of reacting to whichever one was impacted by a vehicle.

Here automation turns the data we already have into risk we can act on.

INPUTS

Where the data comes from ?

CRASH HISTORY

NZTA CAS

Crash locations, severity and crash attributes

Snowflake incidents

Recorded vehicle-to-pole incidents

WHAT WE OWN

Structure assets

Commissioned structures from the enterprise geodatabase

Public safety criticality

Enterprise criticality attribute used in scoring

ROAD ENVIRONMENT

Road centrelines

Proximity between structures and the road network

Speed limits

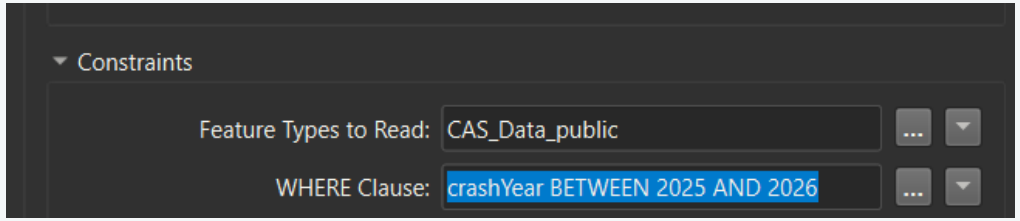
Road speed context near structures

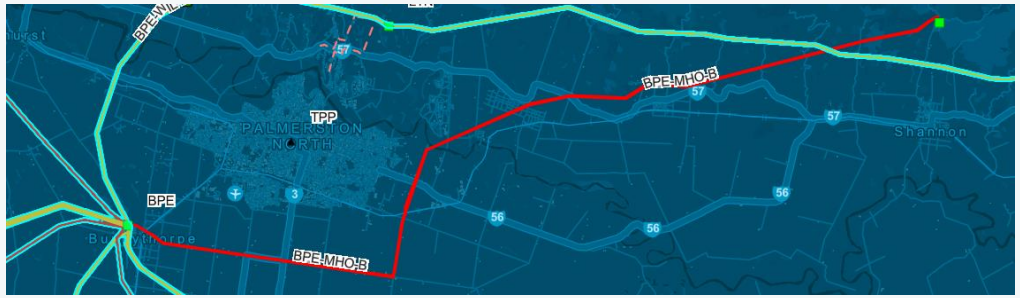
Design principle: keep source ownership intact, then integrate only what the risk model needs.

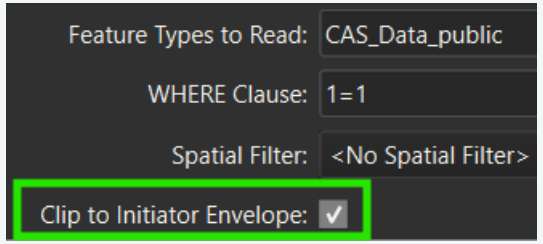
Efficient extraction of CAS data

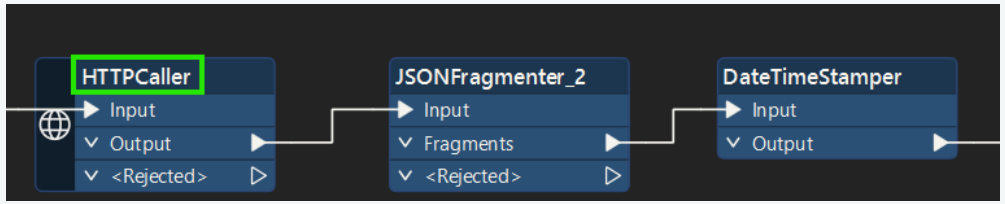
The extraction pattern should minimise payload, maintain traceability and remain resilient as the source grows.

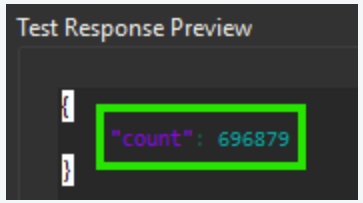
1	**Query**	Feature Reader filter records at source with a WHERE clause when appropriate.
2	**Clip**	Pass an envelope around the line of interest so only nearby CAS records are retrieved.
3	**Standardise**	Retain required attributes and create a stable identifier.
4	**Validate**	Check schema, geometry and expected record behaviour.







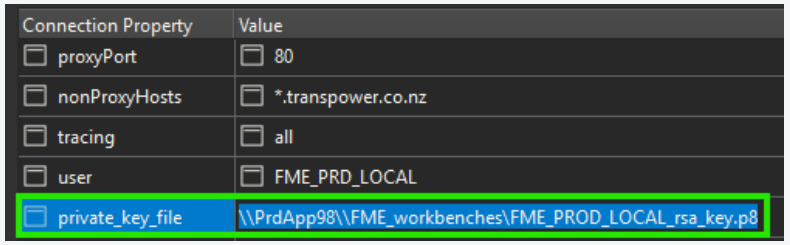


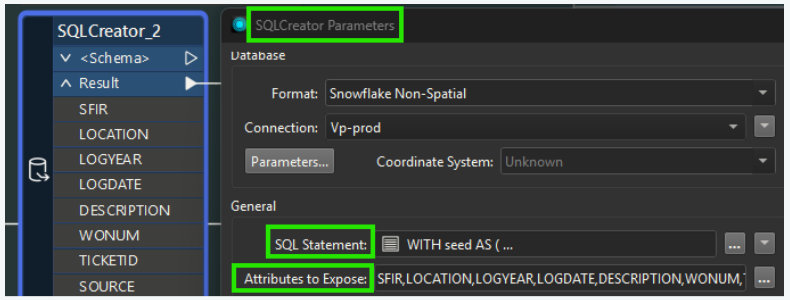


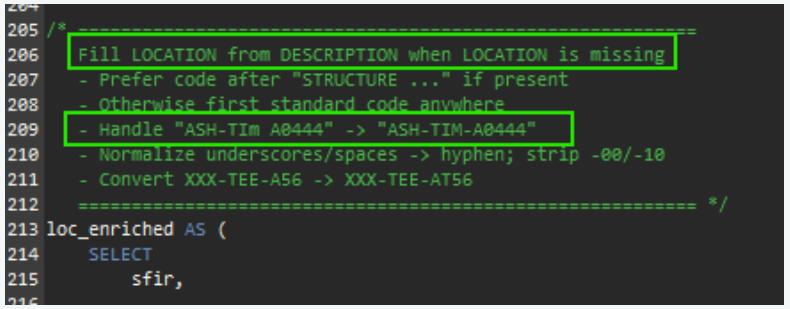
Querying incident data from Snowflake

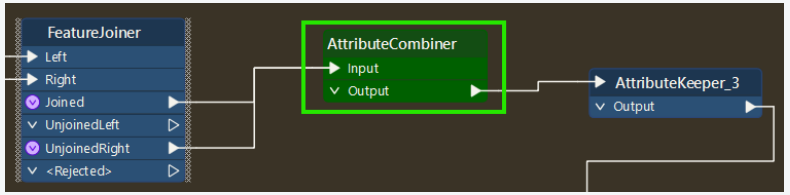
Connecting securely, then pulling back only the incident records the model needs.

1	**Authenticate**	Connect to Snowflake using stored credentials held in FME Flow, not in the workbench.
2	**Query**	Run SQL against the incident data product so the filtering happens in Snowflake, not in FME.
3	**Shape**	Keep the fields the risk model uses and build point geometry from the recorded location using Feature Joiner.
4	**Combine**	Bring the incident records alongside the CAS crash data for the same structures.









ANALYSIS

Measurements we derive from the data

Road proximity

Find structures near road centrelines.

Intersection proximity

Measure distance to nearby intersections.

Crash proximity

Associate crashes occurring near structures.

Incident linkage

Connect recorded pole-impact events.

Asset context

Add speed and criticality attributes.

Each relationship creates a measurable risk signal for the rules engine.

Rules we apply to those measurements

Crash history

Crash within 20 m
Severe or Fatal crash nearby
Crash involving post or pole

Road exposure

Within 5 m of centreline
Within 10 m of centreline
Higher nearby speed limit

Network consequence

Public safety criticality available
Recorded internal incident
Asset-level context

SCORING

Example: how a structure receives a rating

Within 5 m of road centreline	+2
Crash recorded within 20 m	+1
Nearby speed limit greater than 80 km/h	+2
Public safety criticality populated	+1
In a frequent crash area	+2
TOTAL	**8**

ILLUSTRATIVE RATING

HIGH

Rating thresholds should be agreed and governed by the business.

OUTPUTS

From risk score to hotspot insight

Structure Risk Rating

Device Position	BPE-MHO-A0588
Structure Type	Single Circuit Single Pole
Status	COMMISSIONED
Public safety (NZD)	$314,333
Distance from centreline (m)	8.24
Speed Limit	100
Intersection 50m	Yes
Intersection 100m	Yes
Crashes involving a pole or post	No
Crashes within 20m	1
Severe crash within 20m	1
Risk	8
Street view	View

Decision-ready outputs

- Structure-level risk score and rating
- Filtered CAS layer near structures
- Interactive map for exploration
- Hotspot view for geographic clustering
- Repeatable refresh through FME Flow

BENEFITS

Where FME automation pays off

01

FLEXIBLE REFRESH

Runs weekly, on demand when needed, and tells us if it fails.

02

CONSISTENT METHOD

Apply the same spatial logic and rules every run.

03

TRACEABLE RISK

Show which rule signals contribute to each score.

04

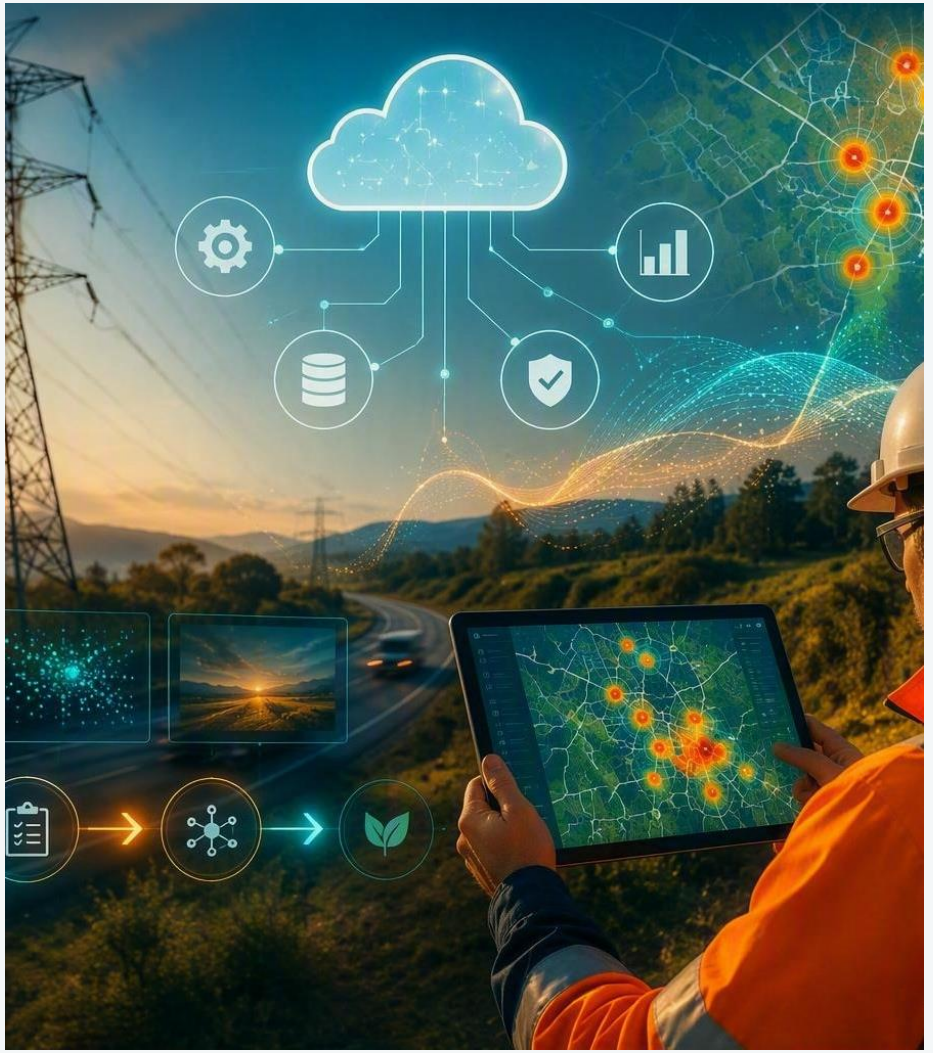
FOCUSED ACTION

Prioritise investigation and mitigation using risk evidence.

LESSONS LEARNED

Challenges along the way

Crash location accuracy	Points sit on the road, so crashes are matched by a spatial join within a buffer. Direction of travel, and which side of the road the crash happened on, is not always recorded.
Agreeing thresholds	Set distances and severity with the Risk and Health and Safety team.
Key pair authentication	Fiddly to set up but needed once MFA became the preferred pattern.
Data source availability	Checks in FME to make sure all datasources are available prior to the schedule run.



Future work

The webapp is built. The next step is getting it used widely and sharing what it shows.

REFINE

More data, fine tune rules, sharper risk

SCALE

Risk across line sections, not just towers

PARTNER

Waka Kotahi, EDBs and local councils

Questions