Hamilton City Council

Addinsight SCATS Influence PoC – interim results

17 August 2022

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SCATS Influence - Proof of Concept

- Could Addinsight delays be used to influence traffic signal timing
- Chosen intersection has characteristics that limit SCATS effectiveness:
  - > 1km queues, unbalanced and don't match road hierarchy
  - River bridge constricts flow and SCATS input data (DS) is not representative
  - Non-adaptive in peaks - timings are fixed (SCATS adaptive struggles due to the bridge)

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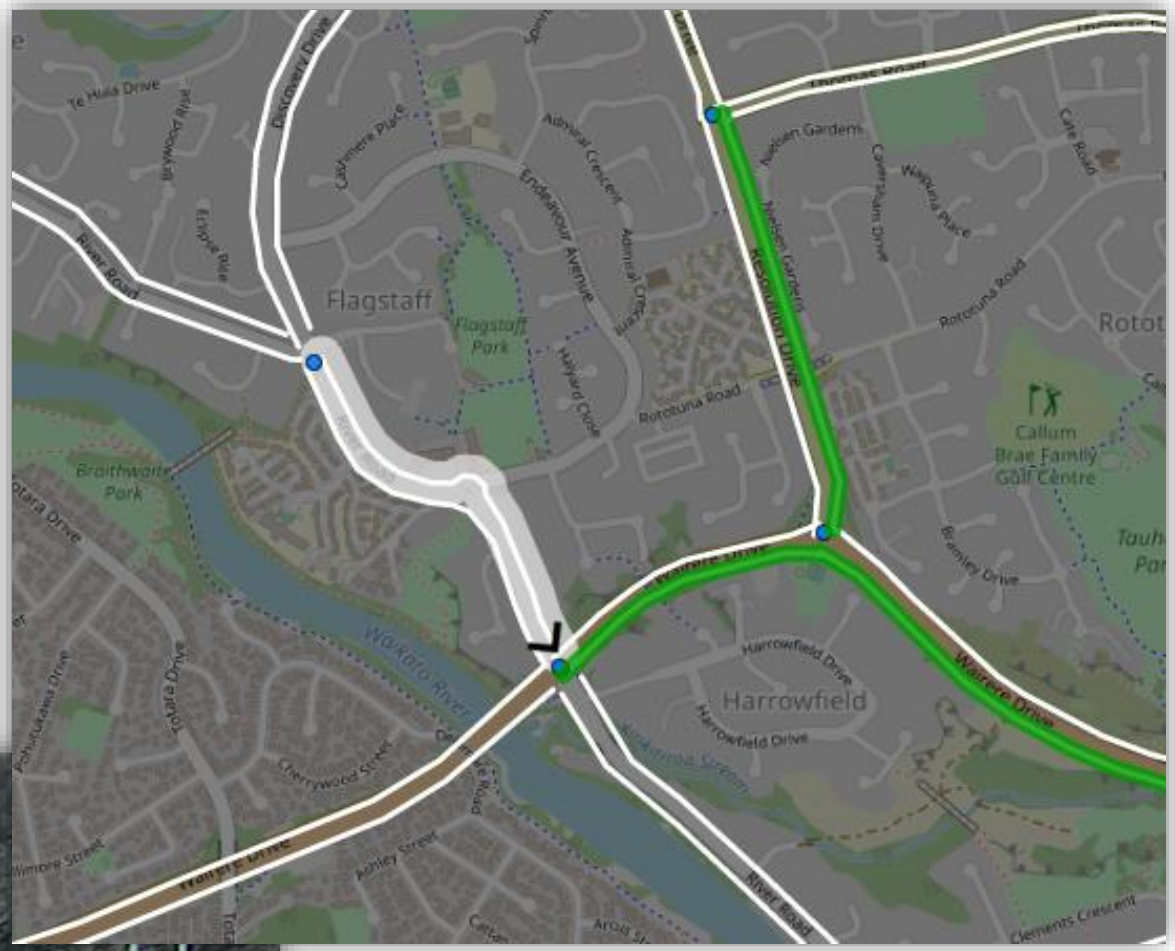
SCATS Influence – Objectives

Morning peak:

- Balance delay between:
  - Total of green links
  - White arrow link

Evening peak:

- Use delay (south-west approach) rather than time of day, to lock SCATS timings



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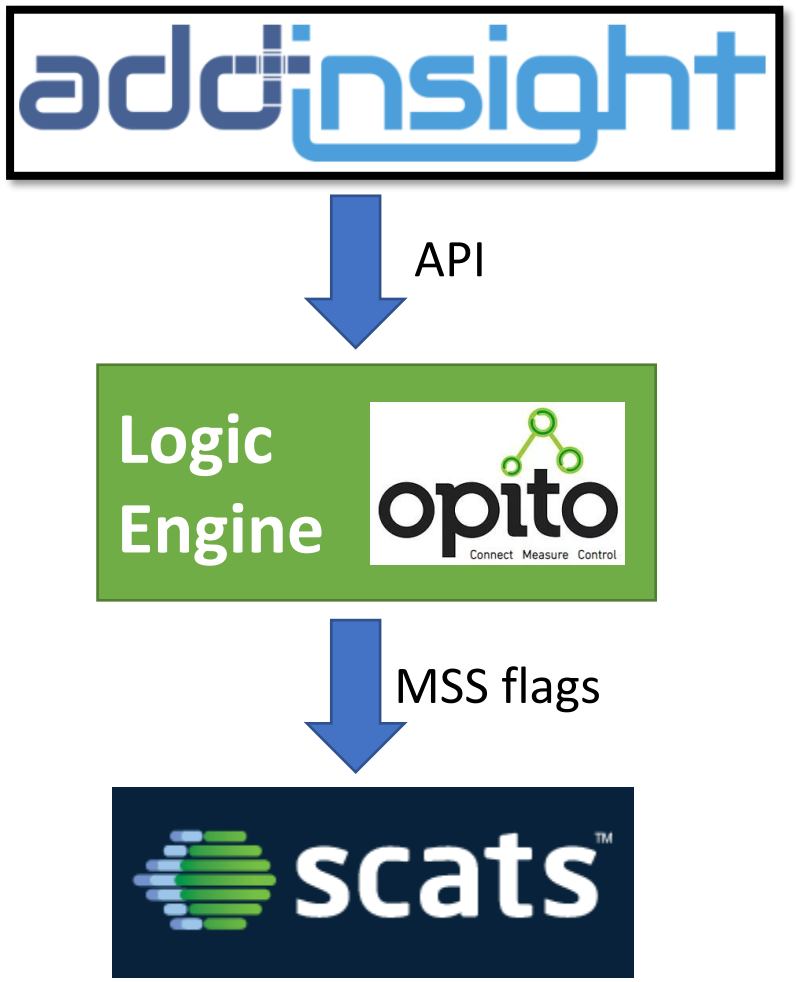
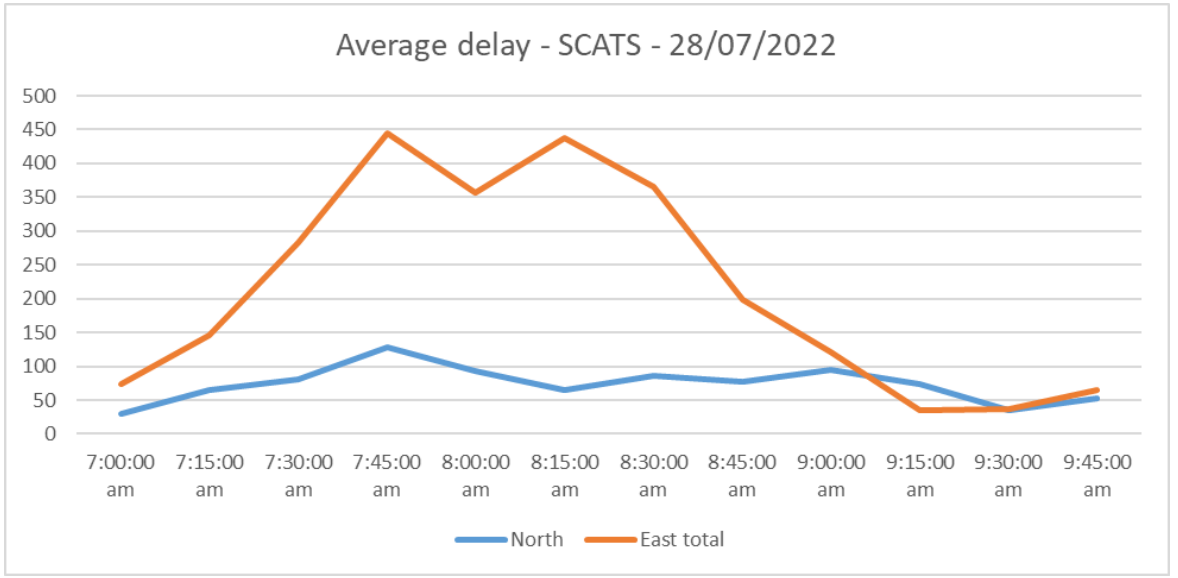
SCATS Influence - Methodology

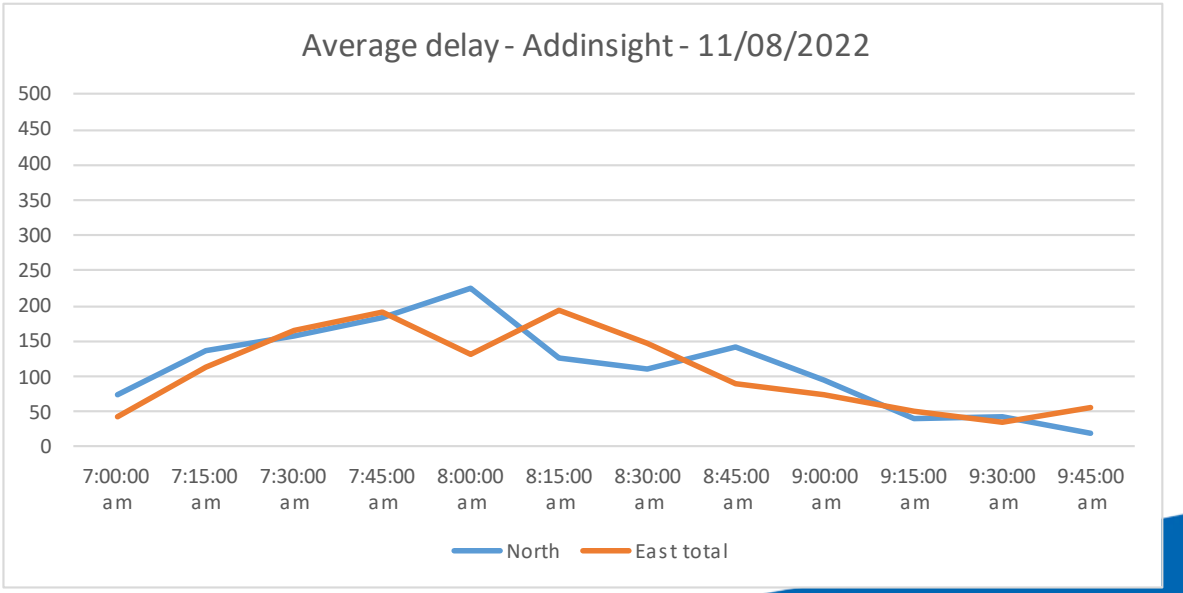


- Normal SCATS control occurs during off-peak (low delay)
- When the delays exceed a threshold, Addinsight “takes over” the choice of timings
- A custom logic engine processes the delays and chooses the best SCATS timing plan (from 8 custom plans)
- SCATS sees which of the 8 flags are raised and locks the respective plan

SCATS Influence – initial results (morning peak)

- Under SCATS (time locks), long queues would sometimes vary between legs (inconsistent)
- Under Addinsight control, the travel times are better balanced
- Road hierarchy can be better maintained
- For comparison, the morning with Addinsight control had:
  - +1% traffic volume
  - -8% total travel time
  - -14% total delay (56 hrs saved)





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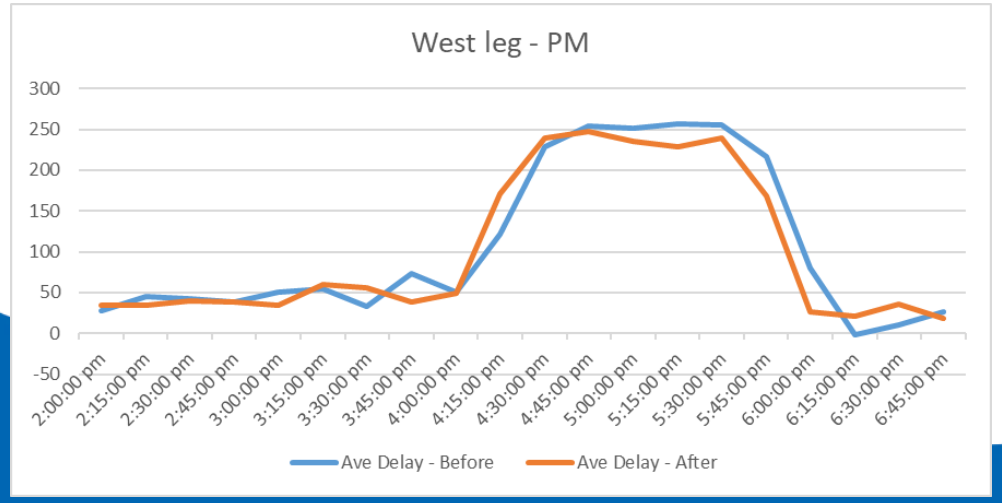
SCATS Influence – initial results (evening peak)

- Due to the bridge, fixed time control has always been used (by time of day)
- Addinsight control initially caused large fluctuations (overshoot), this was improved by adding trend logic to react quicker and reduce overcorrection
- Overall delay no worse than before, but now it's semi-adaptive



Original (time based)

Addinsight

Addinsight + trend logic

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SCATS Influence – interim conclusions

- Addinsight appears to have potential to offer:
  - An additional input for adaptive traffic signal control that considers the whole approach or route
  - Ability to influence traffic signal timings by using travel time rather than stop line detectors
  - Improved journey time reliability (particularly relevant for PT routes)
  - Easier implementation of road hierarchies
- In oversaturated scenarios it can take a while (e.g. 10+ mins) before SCATS changes are reflected in Addinsight (due to queue lengths and the nature of measurement)

Further work

- Methods to improve prediction and reduce “hunting” should be explored, such as the use of reinforcement learning or a predictive model
- Consideration should be given to using total delay vs average delay, and how to include upstream links where delays extend past approach links vs unrelated delay
- Ideally the Addinsight output should feed directly into SCATS as a “virtual” DS or similar

Thank you

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FURTHER INFORMATION

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