

PVC LEAK DETECTION



ST. JOHN'S
DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Overview

PVC Leak Detection – Case Study

- Leak Detection Techniques
- Study Location
- Background
- Case Study Results
- Summary

PVC Leak Detection

You suspect a leak – how do you find it?



ST. JOHN'S
DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Techniques

What Tools or Techniques are available?

1. Noise Surveys ★
2. Ground Listening
3. Noise Loggers
4. Leak Noise Correlator
5. District Metered Areas ★
6. Step Testing ★
7. System Build Out



ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Toolbox

Noise Survey

(* typically used for metallic systems)

- Easily accessible points within water distribution system - hydrants, valves, curb stops, etc.
- Crews listen to each hydrant / valve and record notes;
- Can be done from a list or map;
- Results are reviewed to determine a potential leak area (area of interest).



ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Toolbox

District Metered Areas

- Discrete areas in which all incoming (and outgoing) water is metered.
- Typically defined by pressure differences caused by various water distribution infrastructure – PRVs, pump stations, water storage reservoirs, etc.
- Distinct boundaries created by natural “gaps” in the distribution system or closed valves.
- Flow data is monitored daily and minimum calculated night flow is compared to actual flow
- Variance in flows = leak(s) or usage

ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Toolbox

Step Testing

- A method of determining areas of potential leakage through a process of isolating sections of the water distribution system for short periods of time.
- Requires a defined area in which all water is metered – these are typically district metered areas.



ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Toolbox – Step Testing

Step Testing Procedure:

- Confirm boundary – ensure that there is only one supply for the area.
- Locate and close step valves, record time valves were opened and closed.
- Leave the step valves closed for 5-15 minutes.
- Record data from flow meter - initial flow, lowest flow and total drop/change
- Monitor water pressure at the high point (or critical point) to ensure that the pressure does not drop below 20 psi.
- If pressure drops quickly it may indicate a large usage or leak – reopen valves.



ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Leak Detection Toolbox – Step Testing

Review Results:

- Compare measured drop in flow to expected drop.
- Areas with large drops could be subdivided in smaller sections and then additional steps completed.
- Conduct sounding or other methods of leak detection in the area of interest to locate water leak or source of water usage.



Study Location

Brookfield Plains

- 411 Parcels
- 4.4 km of watermain (200mm and 300mm diameter)
- Constructed in several phases between 2008 and 2013.
- All watermains are constructed from PVC.

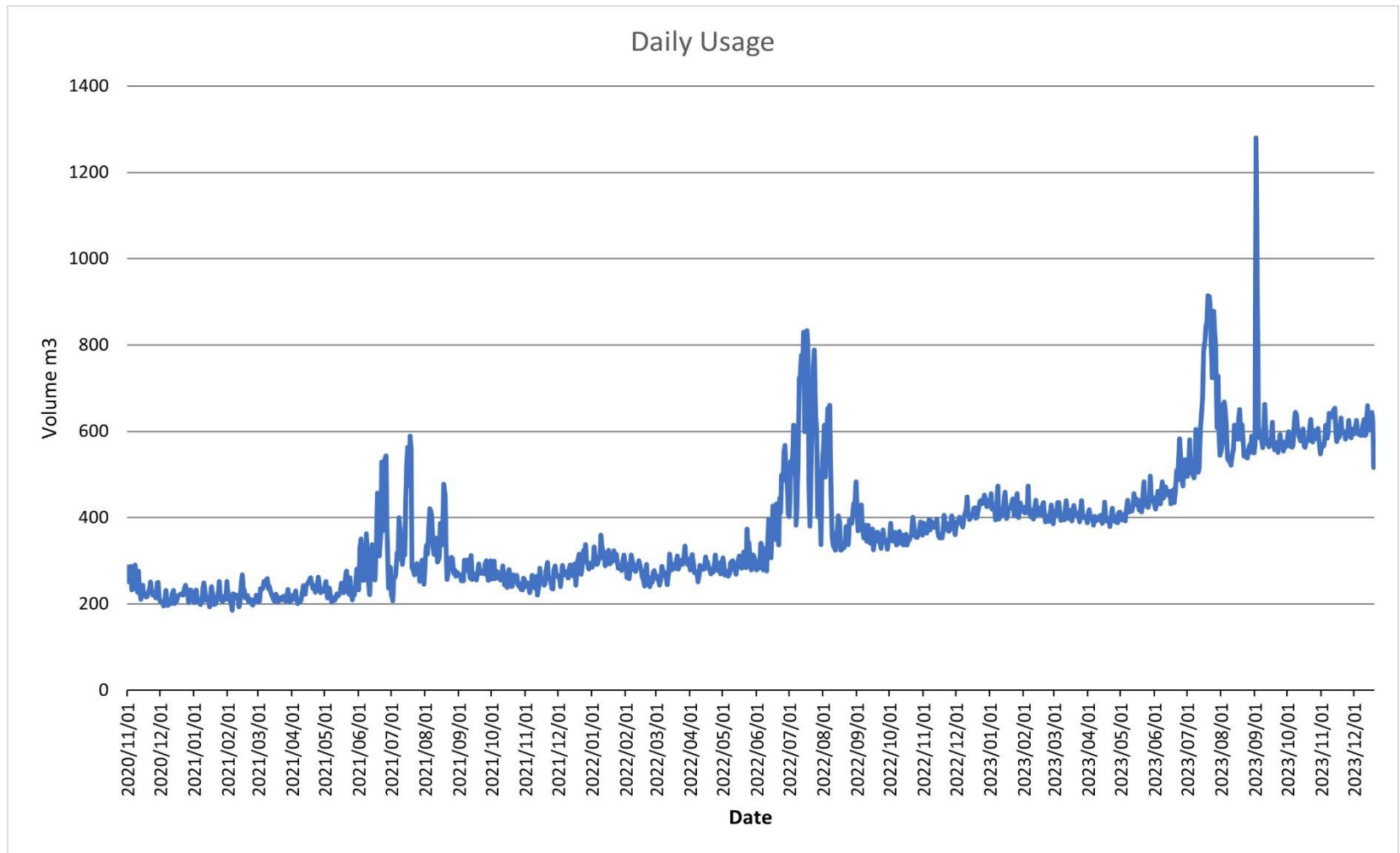


Background

- Area supplied through an adjacent municipality
- Water usage is metered at municipal boundary and the billing is adjusted accordingly
- Water usage increased and night usage was high
- Increase first noticed in 2022
- Substantial increase noticed in September 2023



Background – Water Consumption



Investigation #1

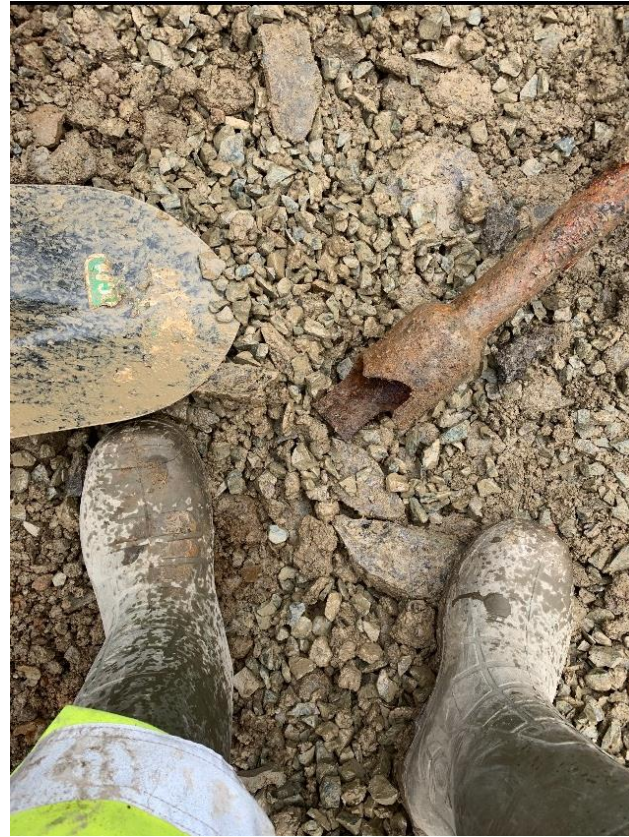
Noise Survey
of vacant lots
Check to see
if curb stops
are open.



Investigation #1 – Curb Stops



Investigation #1 - Repair



Investigation #1 - Results

Repair #1

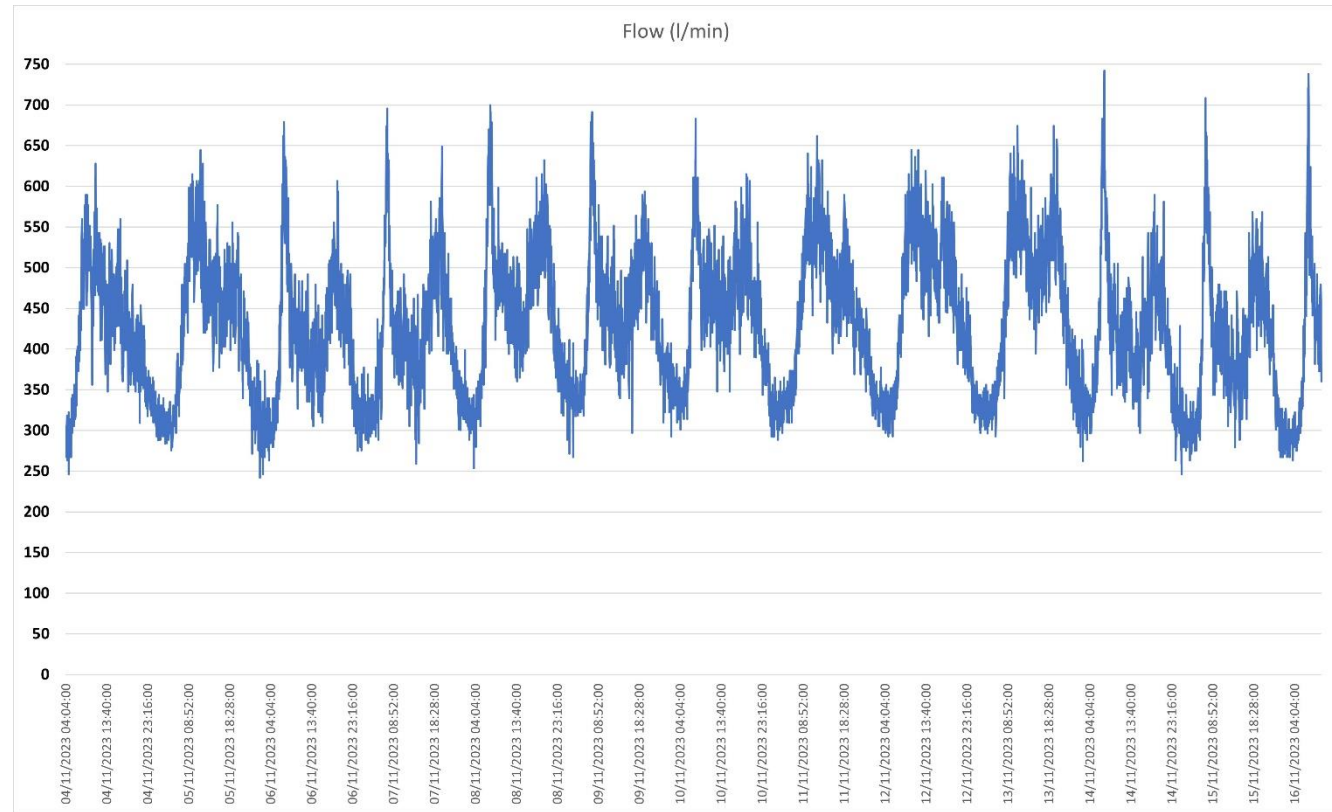
- Leak found, hole in PEX



Investigation #1 - Results

Repair #1

- Minimal reduction in water usage



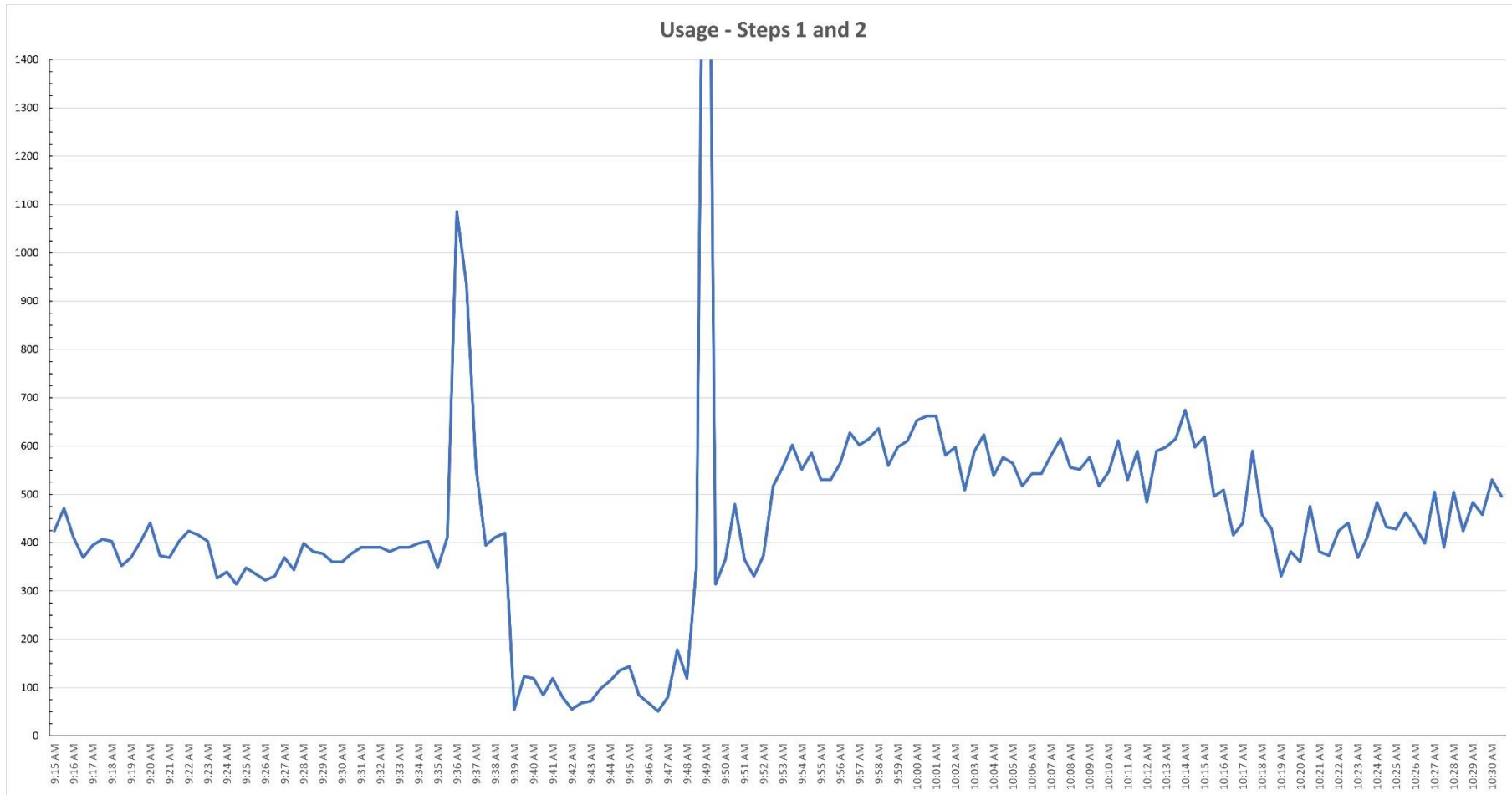
Investigation #2

Step Testing

Divide the area in half



Investigation #2 – Meter Data Steps 1 & 2



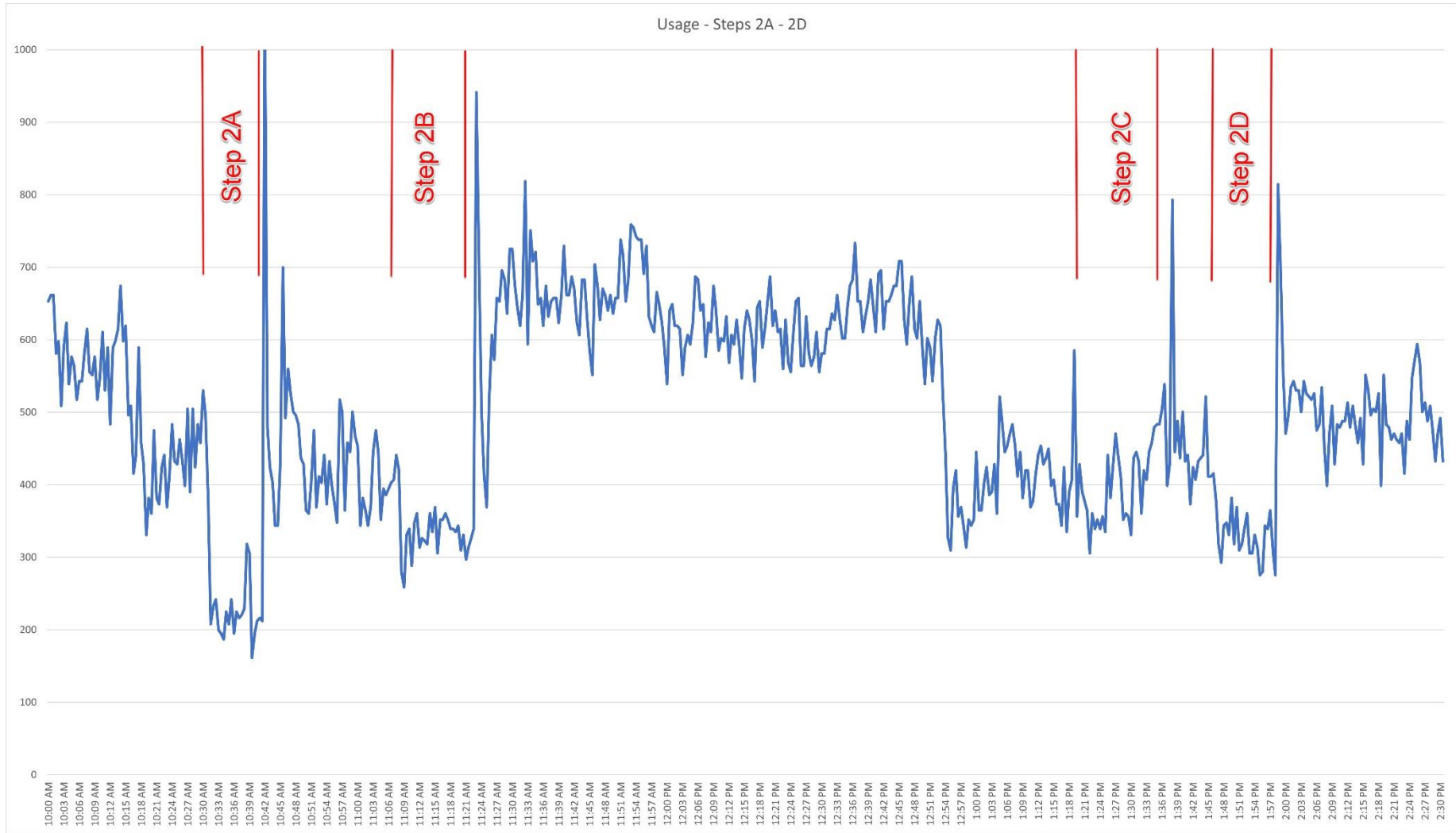
Investigation #2 – Step Testing

Step Testing

Divide Step Area 2 in into smaller steps



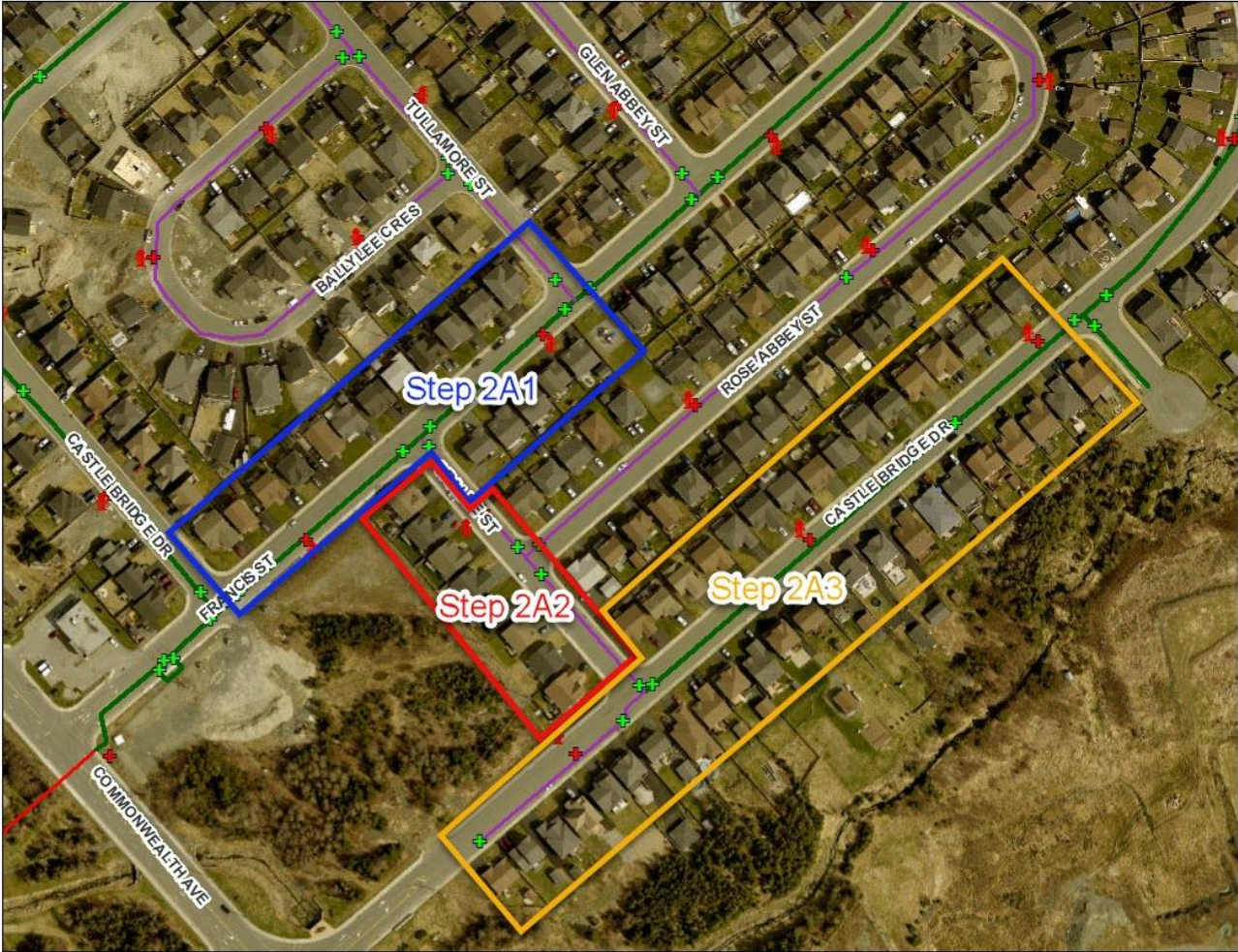
Investigation #2 – Meter Data Step 2



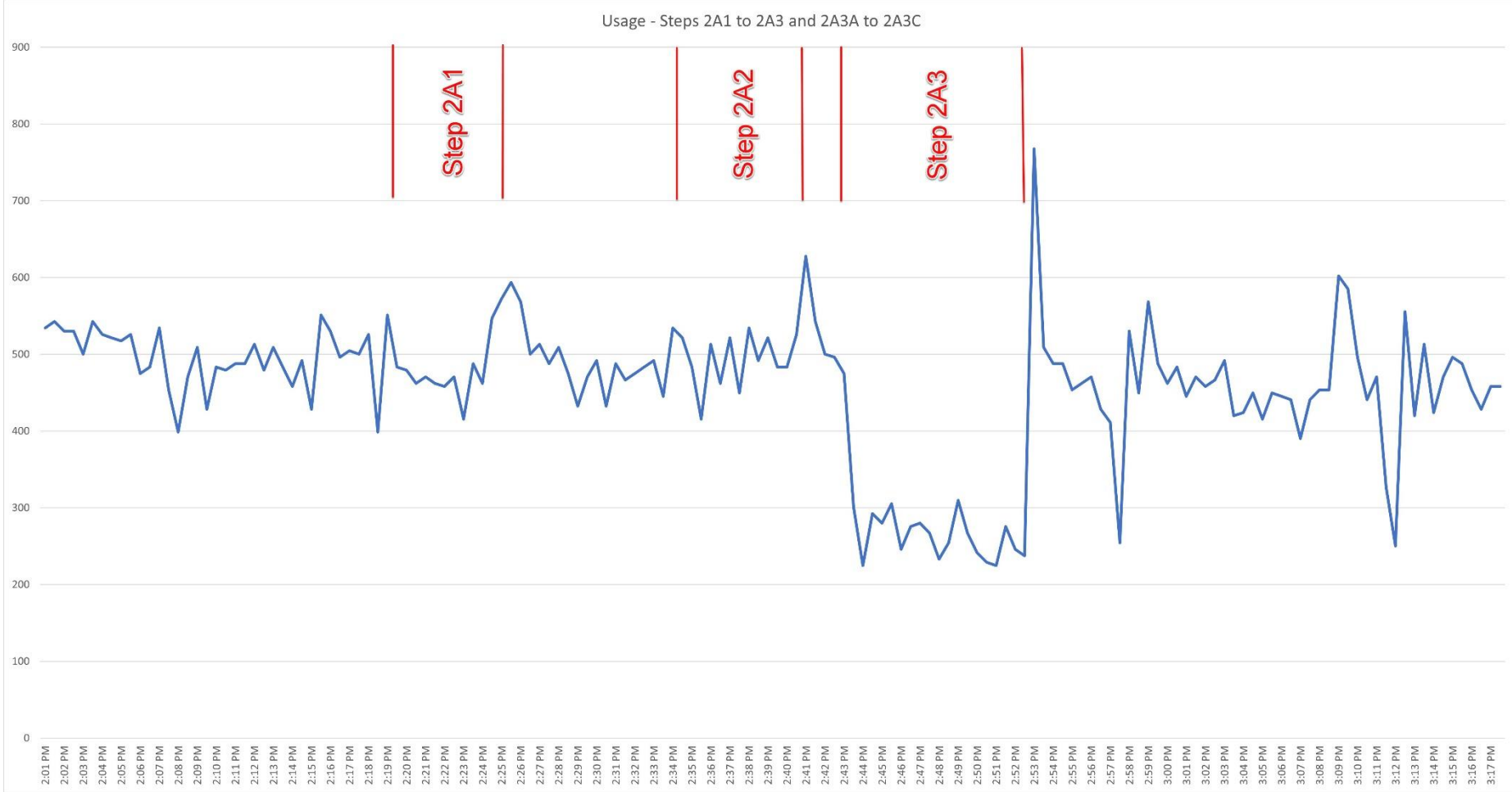
Investigation #2 – Step Testing Area 2A

Step Testing

Divide Step Area 2A in into smaller steps



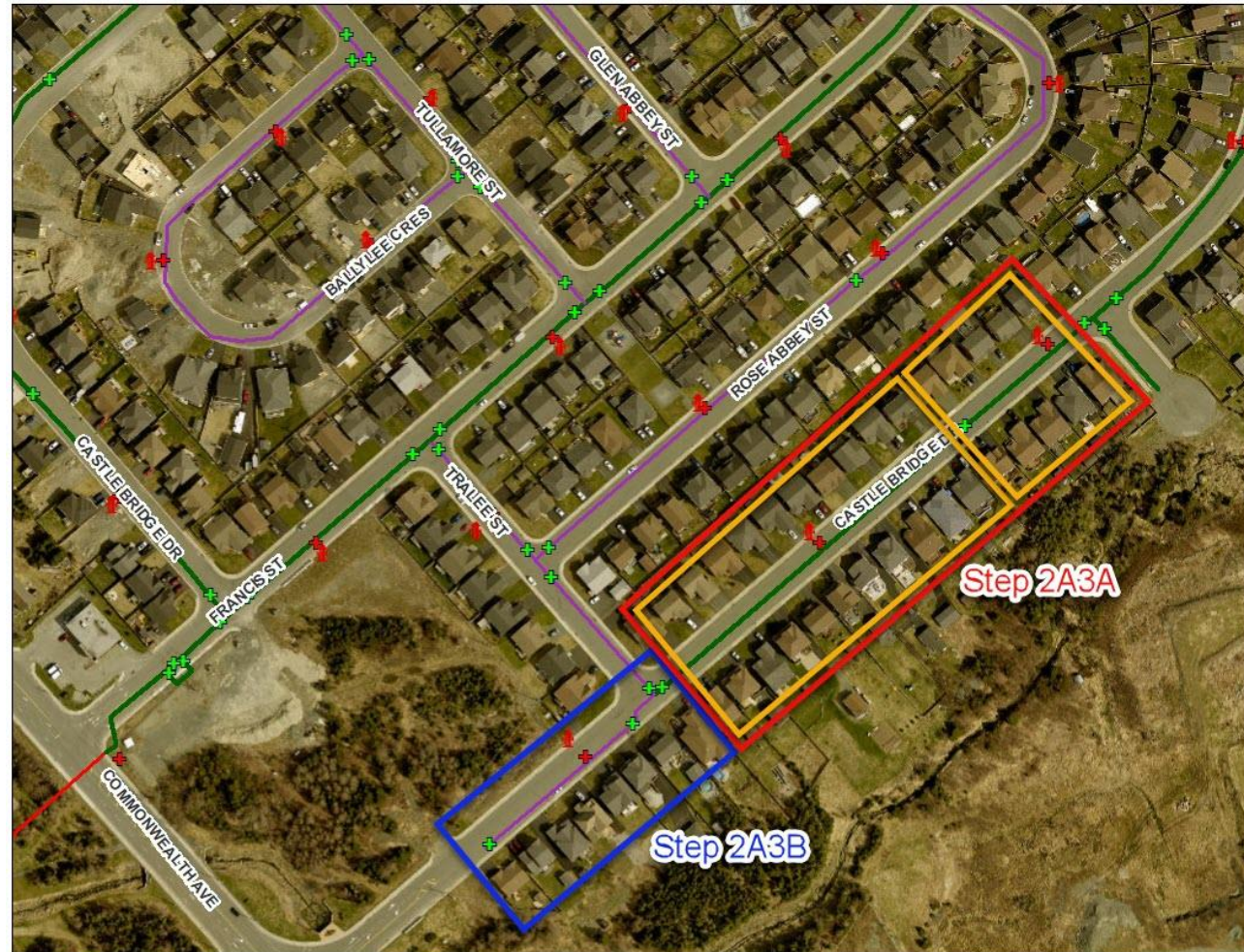
Investigation #2 – Meter Data Step 2A



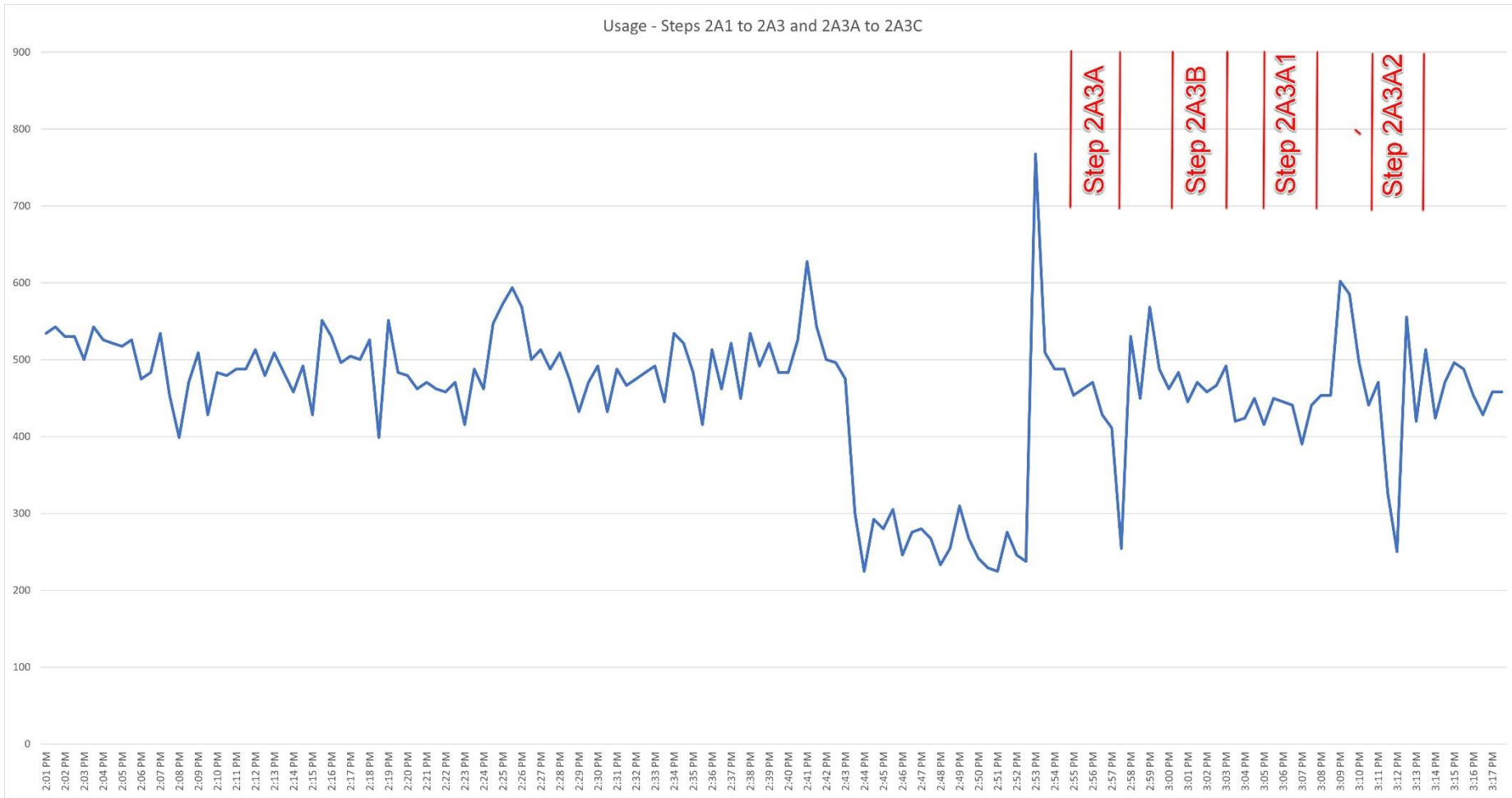
Investigation #2

Step Testing

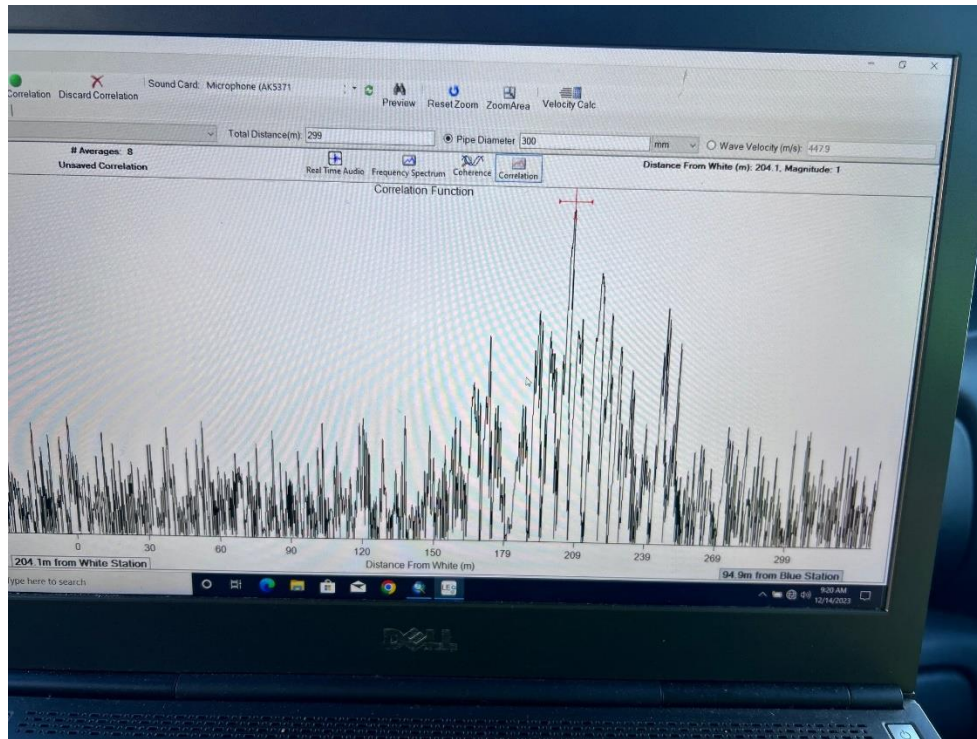
Divide Step Area 2A3 in into smaller steps



Investigation #2 – Meter Data Step 2A3



Investigation #2 – Leak Detection



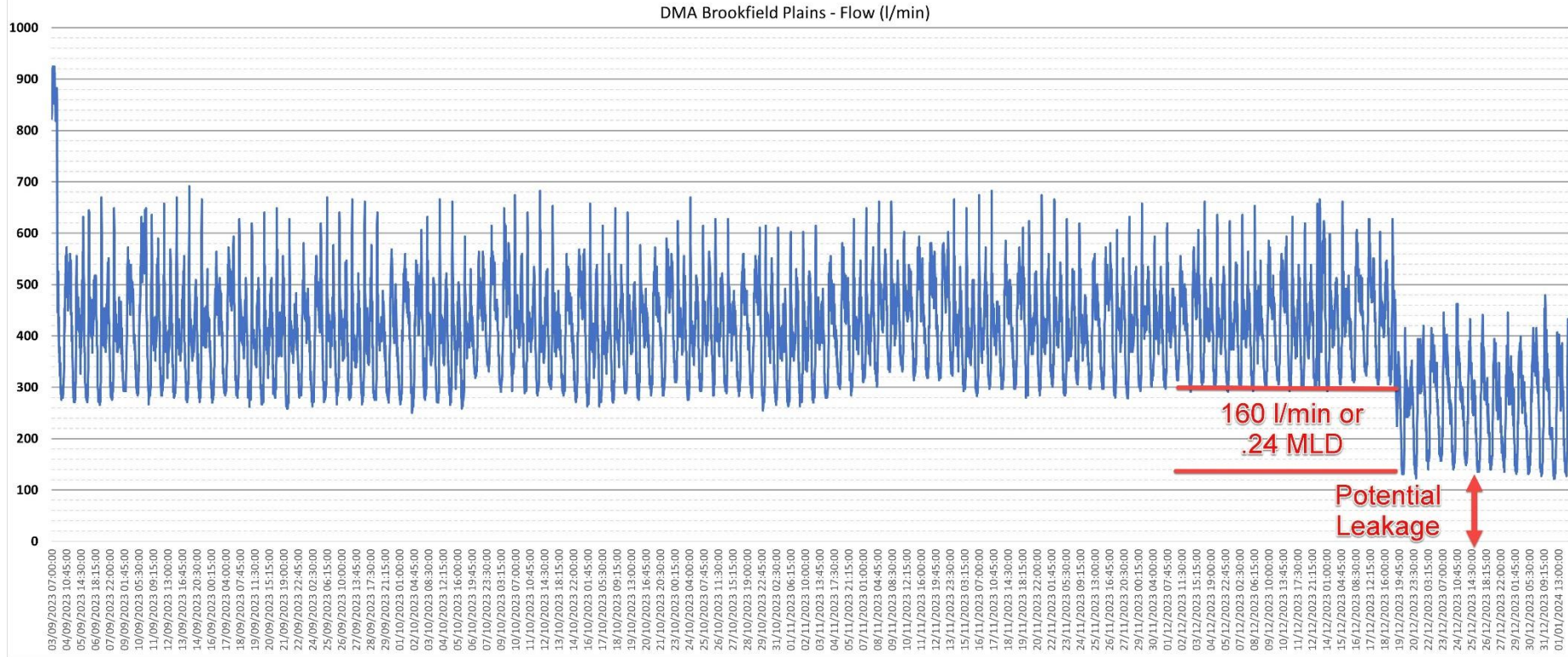
Investigation #2 – Repair



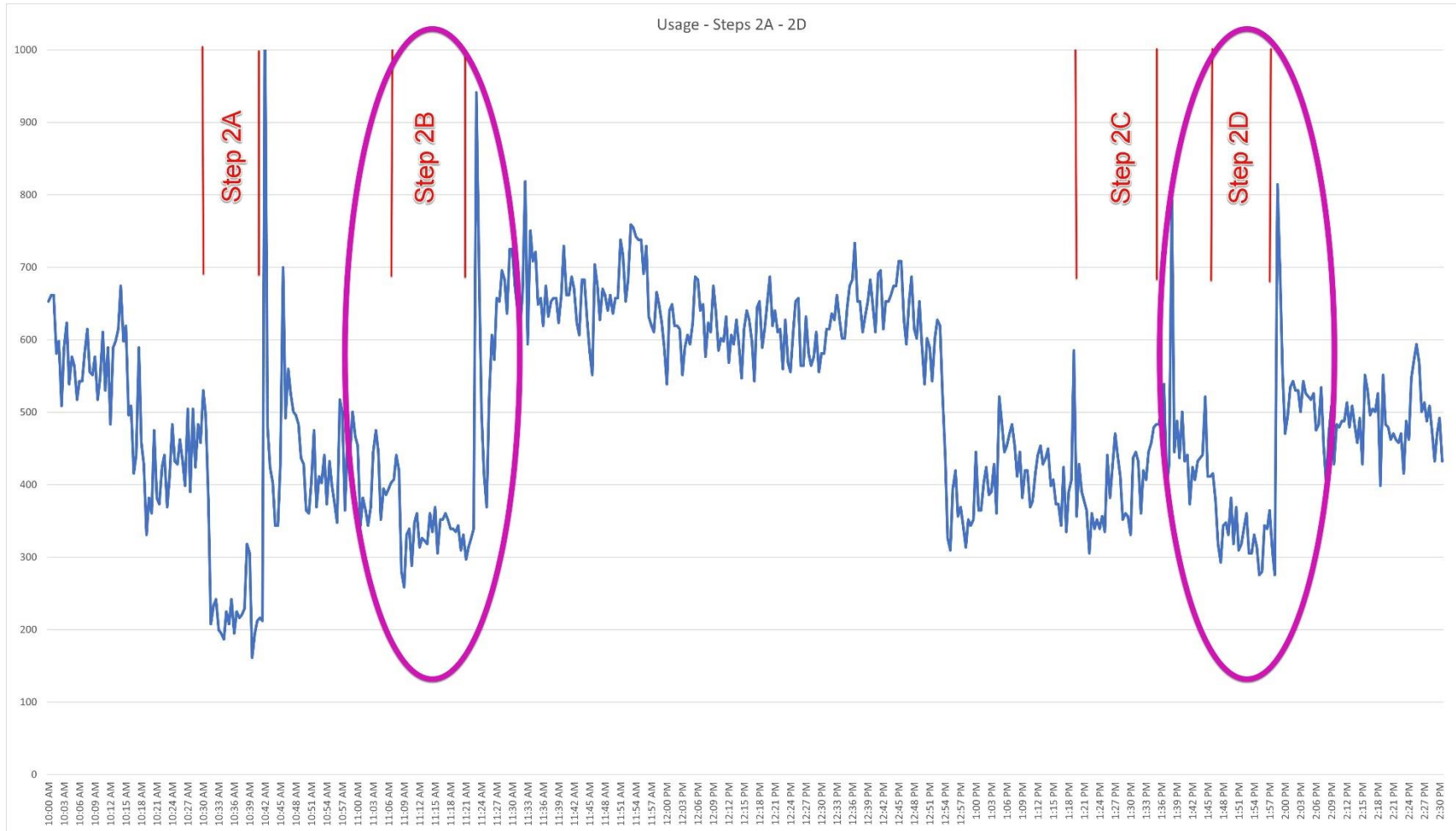
Investigation #2 – Repair



Investigation #2 – Final Results



Investigation #3



Investigation #3 – Step Testing Area 2D

Step Testing

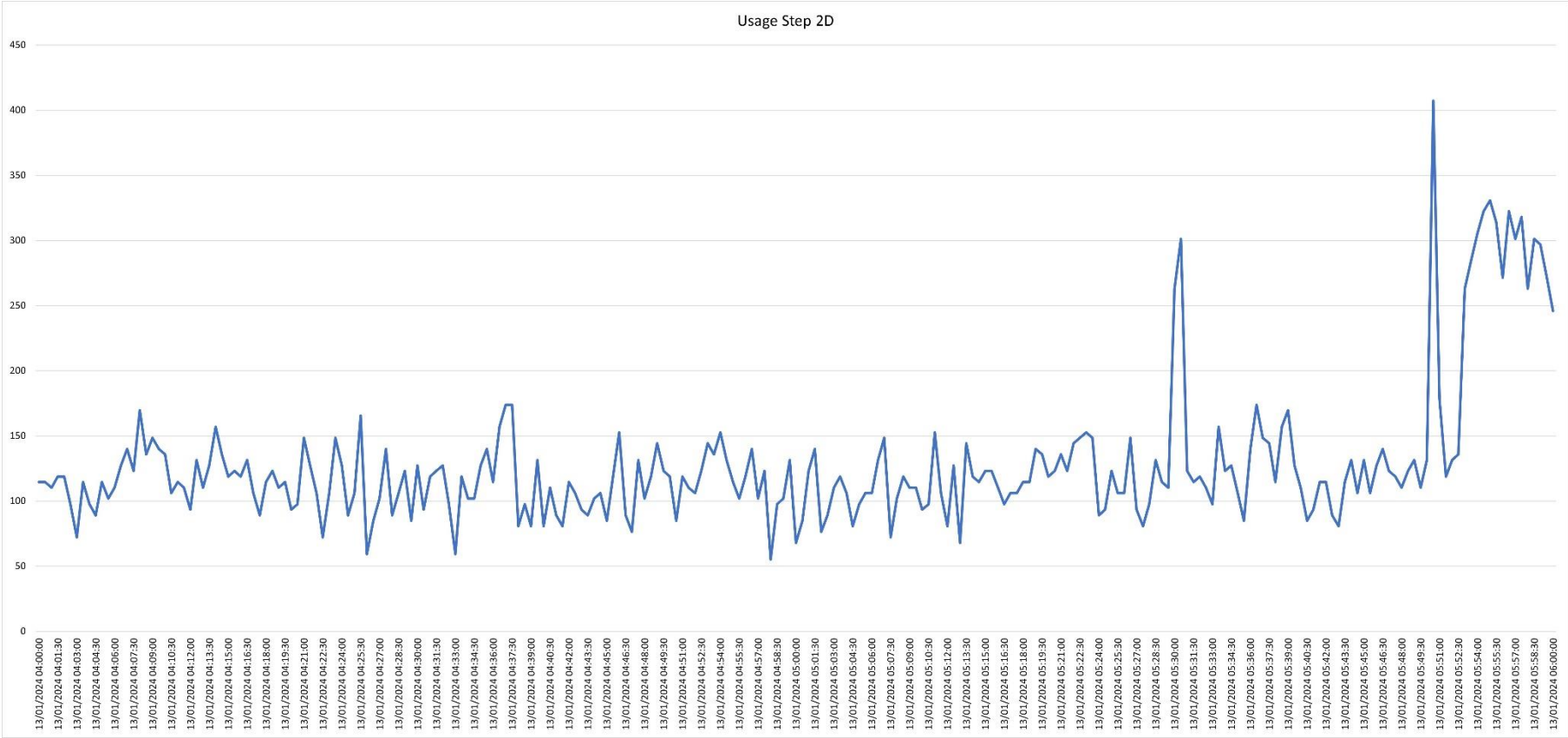
Divide Step Area 2D in into smaller steps



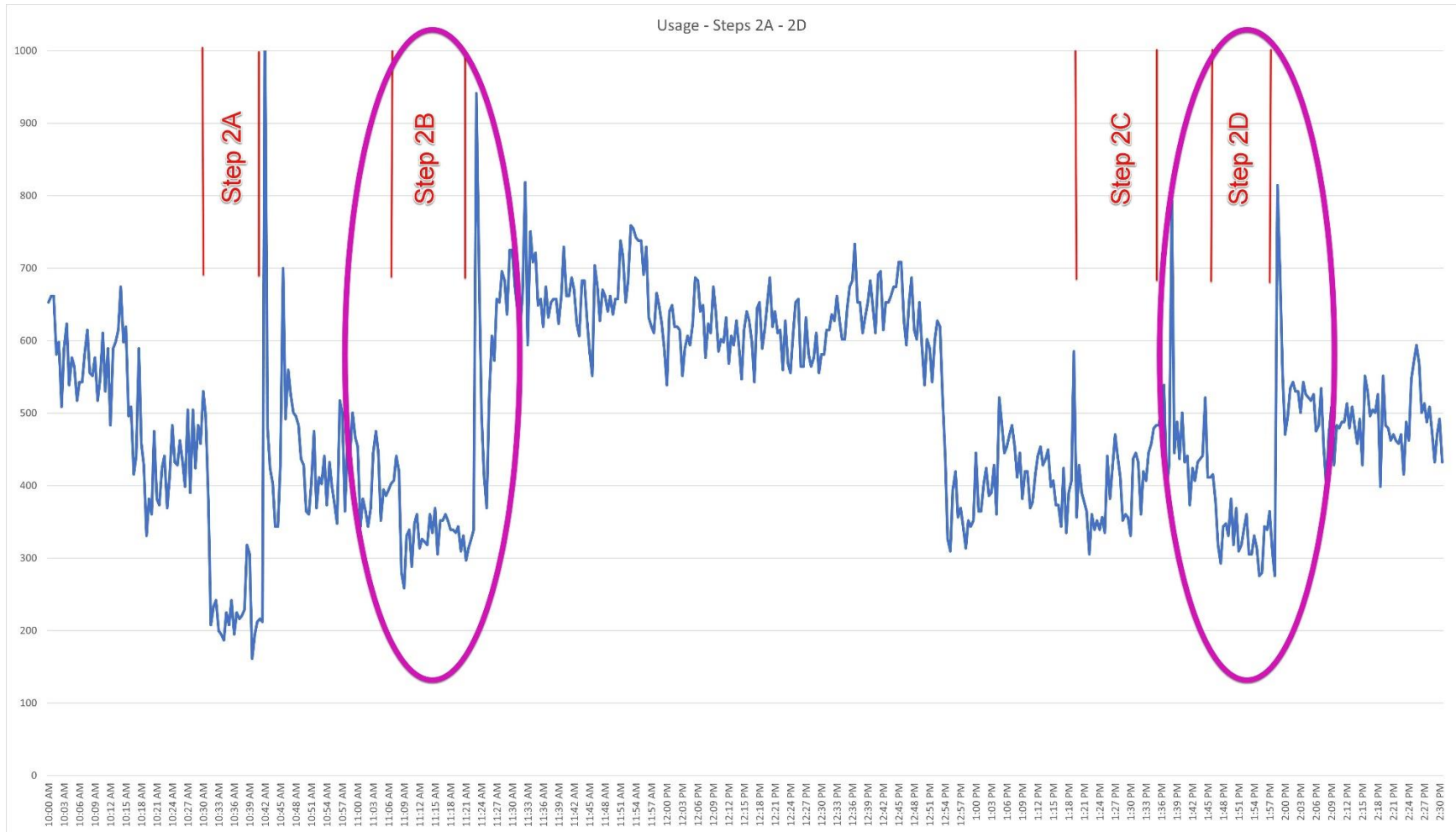
ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Investigation #3 – Meter Data Step 2D



Investigation #3



Investigation #3 – Step Testing Area 2B

Step Testing

Divide Step Area 2B in into smaller steps

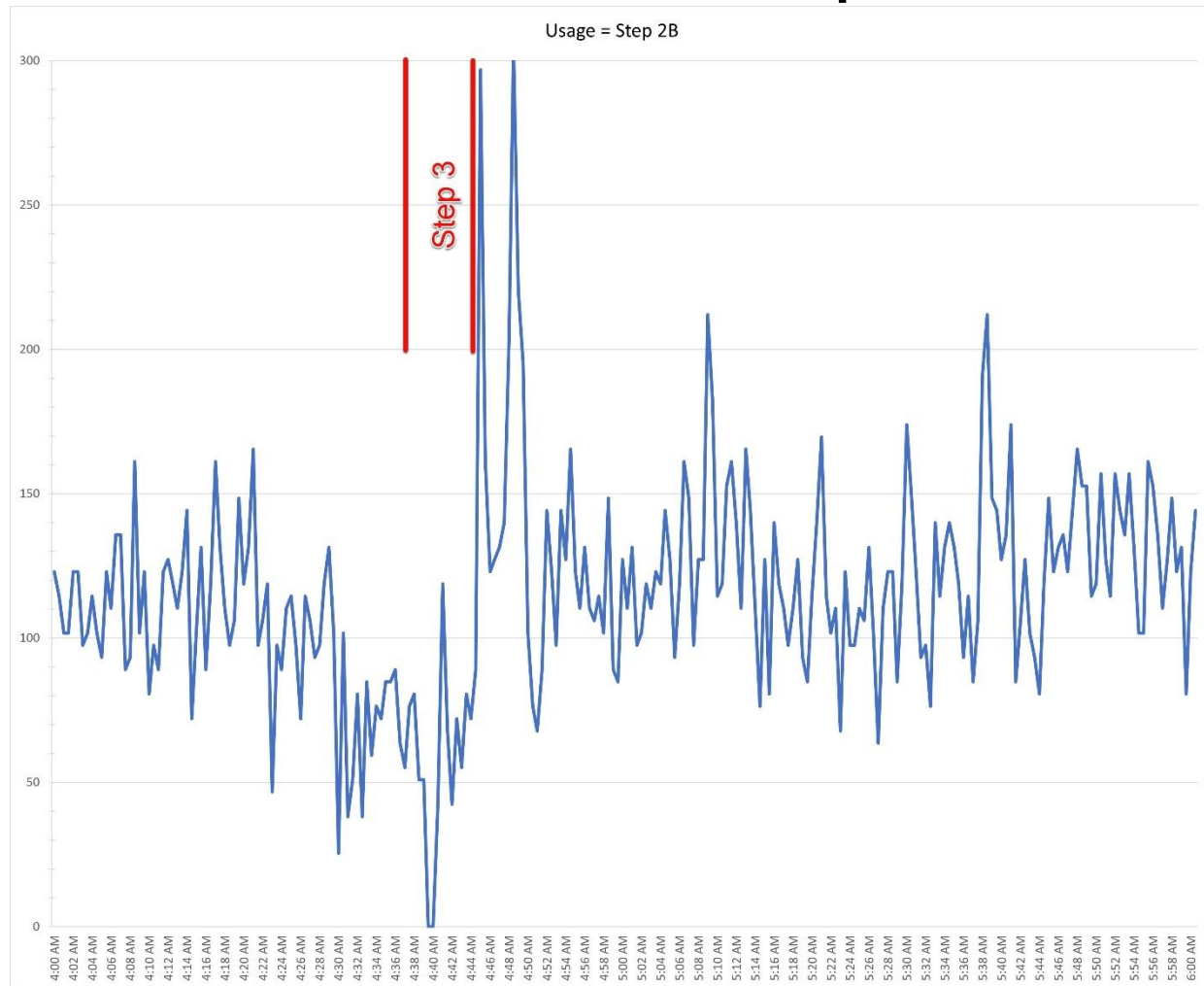


ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

Investigation #3 – Meter Data Step 2B

- Leak Located in Step 3



Investigation #3 – Leak Detection



Investigation #3 – Preliminary Results Step 2B

- Due to winter conditions the leak has not been repaired yet.
- Leak scheduled to be repaired in April or May.
- We will review flow meter data under completion of the repair.

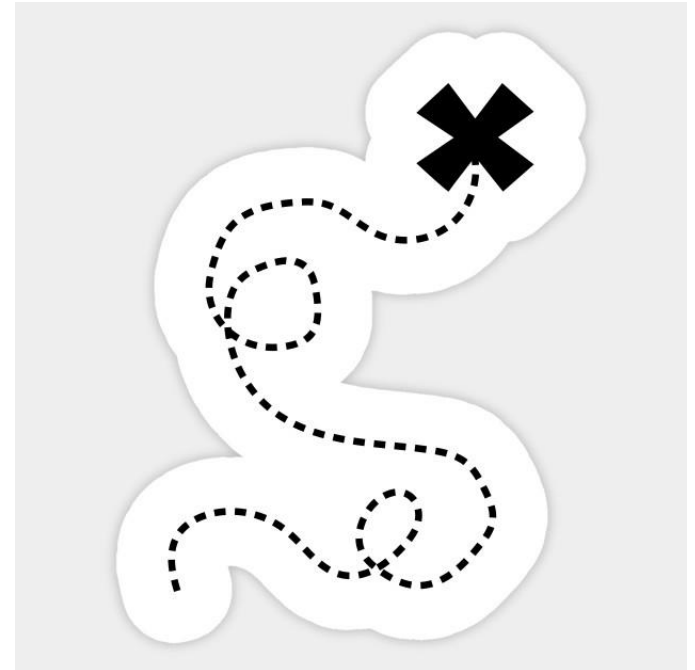
ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

PVC Leak Detection

Summary

- Leaks can be found on PVC watermains
- A flow meter is required
- For smaller leaks Step Testing best conducted over night
- After a leak is repaired, recheck the area for additional leaks



ST. JOHN'S

DEPARTMENT OF PUBLIC WORKS
INFRASTRUCTURE DIVISION

A panoramic view of St. John's, Newfoundland, at night. The city lights are reflected in the harbor water. In the foreground, there is a rocky hillside. The sky is dark blue.

Thank You

ST. JOHN'S
DEPARTMENT OF PUBLIC WORKS
WATER & WASTEWATER DIVISION