



How Renfrewshire Council are using IOT to improve indoor environmental conditions within their homes

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Renfrewshire Council

Who we are



- ▶ **Local Authority West of Scotland**
- ▶ **Circa 12,000 homes in housing stock**
- ▶ **Wide range of property and construction types**
- ▶ **Housing Investment Team are in charge of investing in and maintaining the housing stock**

Planned Investment

	Increased Thermal Comfort Homes that can be heated to an enhanced heating regime of 23°C in the living room and 20°C in other rooms for 16 hours a day, every day	1
	Reduced Energy Demand A home that can be heated adequately on medium to low incomes for between £300 to £500 per annum over the coming decade.	2
	Improved Air Quality Homes that provide an internal environment that is healthy through good ventilation.	3
	Lower Carbon Emissions Homes that reduce carbon emissions and that contribute to our climate change objectives on the road to zero emissions	4
	Future Proof Homes that can be further improved without works causing practical barriers	5

- ▶ **Asset and Energy Team**
- ▶ **Our role is to plan investment into the housing stock to ensure that we meet targets**
- ▶ **We do this through pilot projects to assess trial solutions**
- ▶ **Pilot project learning is transferred into multi million pound investment programme's**

Repairs



- ▶ Moisture Damage
- ▶ Water Ingress
- ▶ Internal Leak
- ▶ Lack of Heat or Ventilation

Fuel Poverty

A household is considered fuel poor if:

after housing costs have been deducted, more than 10% (20% for extreme fuel poverty) of their net income is required to pay for their reasonable fuel needs



Scottish Government
Riaghaltas na h-Alba
gov.scot

How do we monitor?

Energy Performance Certificate (EPC) Scotland

Flat 0/1, 17 Mimosa Road, Bridge of Weir, PA11 3NF

Dwelling type: Ground-floor flat
Date of assessment: 23 February 2016
Date of certificate: 23 February 2016
Total floor area: 65 m²
Primary Energy Indicator: 248 kWh/m²/year

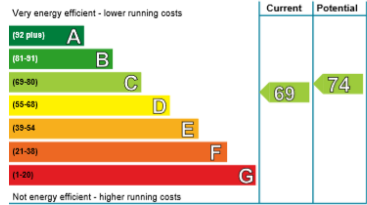
Reference number: 2574-1011-1202-4966-3900
Type of assessment: RdSAP, existing dwelling
Approved Organisation: NES
Main heating and fuel: Boiler and radiators, mains gas

You can use this document to:

- Compare current ratings of properties to see which are more energy efficient and environmentally friendly
- Find out how to save energy and money and also reduce CO₂ emissions by improving your home

Estimated energy costs for your home for 3 years*	£2,079	See your recommendations report for more information
Over 3 years you could save*	£333	

* based upon the cost of energy for heating, hot water, lighting and ventilation, calculated using standard assumptions




Energy Efficiency Rating

This graph shows the current efficiency of your home, taking into account both energy efficiency and fuel costs. The higher this rating, the lower your fuel bills are likely to be.

Your current rating is band C (69). The average rating for EPCs in Scotland is band D (61).

The potential rating shows the effect of undertaking all of the improvement measures listed within your recommendations report.



Project/Phase:
 Name:
 Address:
 Post Code:
 Telephone:
 General info

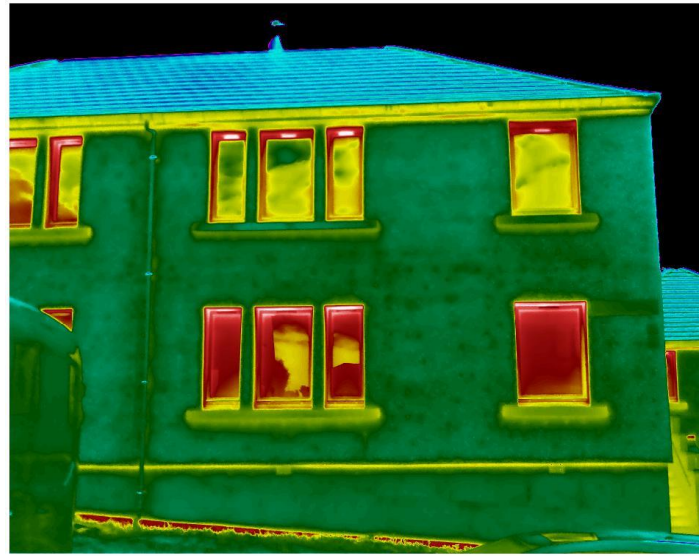
1 - About Your Property
 What kind of heating system do you have?
 • Gas Combi Boiler
 • Gas Standard Boiler
 • Electric Storage Heaters
 • Other - Details

What kind of cooker do you have?
 • Gas Cooker
 • Electric Cooker

Meter Type:
 • Electric Prepayment Credit
 • Gas Prepayment Credit

2 - About Your Household
 How many people of each age bracket usually live in your household?
 0-5 _____
 6-11 _____
 12-17 _____
 18-24 _____
 25-34 _____
 35-44 _____
 45-54 _____
 55-64 _____
 65-74 _____
 75 or Older _____

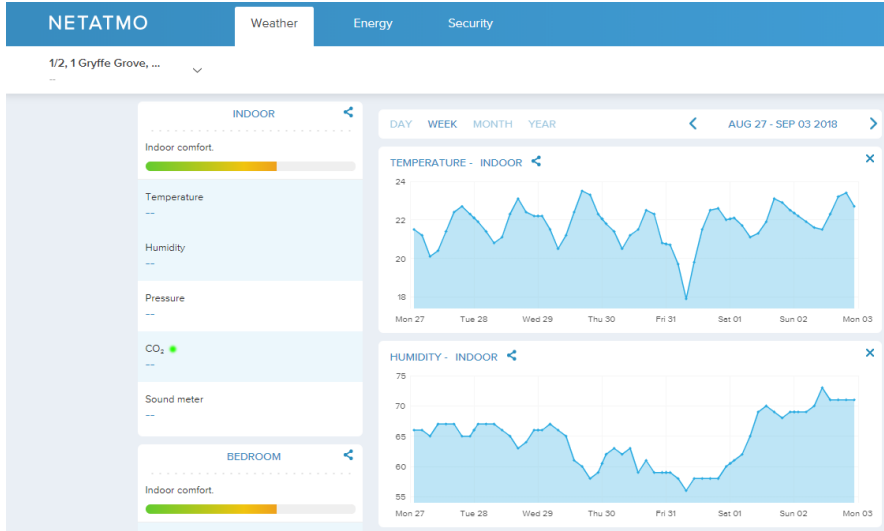
Approximately which category does your household income as a whole fall into per year?
 Less than £5000



What should we monitor?

- ▶ Indoor Temperatures
- ▶ Relative Humidity
- ▶ Co2
- ▶ Habitable Rooms (Living Room, and Bedrooms)
- ▶ Data accessed remotely
- ▶ Ideally over a calendar year to cover all seasons
- ▶ Large volume of properties
- ▶ Trends more important than accurate data

Pilot Project



Name	Long	Lat	ModuleN:	ModuleType							
1/2, 1 Gryffe Grove, BOW	-4.252900124	55.83010101	Indoor	Indoor							
Timestamp	Timezone : Europe/London	Temperature	Humidity	CO2	Dew Point	Min Humidity	Max Humidity	Max CO2	Temp		
1534248960	2018/08/14 13:16:00	22.5	68	710	16.1	40	70	1000	21		
1534250760	2018/08/14 13:46:00	22.6	68	687	16.2	40	70	1000	21		
1534252560	2018/08/14 14:16:00	22.7	67	661	16.1	40	70	1000	21		
1534254360	2018/08/14 14:46:00	22.9	67	640	16.3	40	70	1000	21		
1534256160	2018/08/14 15:16:00	23.1	67	614	16.5	40	70	1000	21		
1534257960	2018/08/14 15:46:00	23.1	67	599	16.5	40	70	1000	21		
1534259760	2018/08/14 16:16:00	23.1	66	588	16.3	40	70	1000	21		
1534261560	2018/08/14 16:46:00	23.1	66	568	16.3	40	70	1000	21		
1534263360	2018/08/14 17:16:00	23.1	66	552	16.3	40	70	1000	21		
1534265160	2018/08/14 17:46:00	23.1	66	543	16.3	40	70	1000	21		
1534266960	2018/08/14 18:16:00	23.1	66	527	16.3	40	70	1000	21		
1534268760	2018/08/14 18:46:00	23.1	66	519	16.3	40	70	1000	21		
1534270560	2018/08/14 19:16:00	23	66	509	16.2	40	70	1000	21		
1534272360	2018/08/14 19:46:00	23	66	502	16.2	40	70	1000	21		
1534274160	2018/08/14 20:16:00	22.9	66	492	16.1	40	70	1000	21		
1534275960	2018/08/14 20:46:00	22.9	66	486	16.1	40	70	1000	21		
1534277760	2018/08/14 21:16:00	22.8	66	473	16	40	70	1000	21		
1534279560	2018/08/14 21:46:00	22.8	66	473	16	40	70	1000	21		
1534281360	2018/08/14 22:16:00	22.7	66	522	15.9	40	70	1000	21		
1534283160	2018/08/14 22:46:00	22.8	67	693	16.2	40	70	1000	21		
1534284960	2018/08/14 23:16:00	22.8	68	768	16.4	40	70	1000	21		
1534286760	2018/08/14 23:46:00	22.8	68	822	16.4	40	70	1000	21		
1534288560	2018/08/15 00:16:00	22.9	68	875	16.5	40	70	1000	21		
1534290360	2018/08/15 00:46:00	22.9	68	899	16.5	40	70	1000	21		



Tender

“Renfrewshire Council require a single contractor to supply an end to end service to monitor the internal environmental conditions (including temperature, humidity and Co2 levels) within domestic properties owned by the Council”

“The contractor must provide all environmental sensors, supply, installation and maintenance of a Long Range Wide Area Network (LoRaWan or equivalent) for connection to a software system and a software as a service system to provide the Council with data, reports and analysis of any environmental data collected including recommendations on a per property basis”

- ▶ Open Tender
- ▶ Released on Public Contract Scotland in October 2019
- ▶ 62 expressions of interest
- ▶ 7 tender responses
- ▶ Contract award to IOPT in February 2020

Network Requirements

- ▶ Supply, Install and Manage a private LoRaWAN network on behalf of Renfrewshire Council
- ▶ Coverage of as much of the housing stock as possible
- ▶ 8 Gateways to be fitted on Multi
- ▶ 6 Gateways at other suitable sites to maximise coverage
- ▶ Network must have geolocation capability
- ▶ Mobile Network Backhall
- ▶ No Network Server at any Council location
- ▶ Funding from Scottish Enterprise Can Do Innovation Challenge Fund



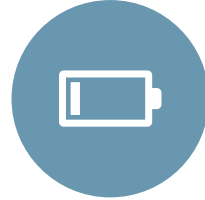
Sensor Requirements



TEMPERATURE
RELATIVE HUMIDITY
AND CO2



CANNOT BE OPENED
WITH A STANDARD
SCREWDRIVER



BATTERY POWERED
BUT NOT WITH A
STANDARD BATTERY



BATTERY LIFE OF AT
LEAST 4 YEARS



NO VISABLE LIGHTS



NO LARGER THAN A
SINGLE LIGHT
SWITCH



SENSORS TO BE
INSTALLED IN ALL
HABITABLE ROOMS



MUST CONNECT
THROUGH THE
LORAWAN NETWORK


Sensors







Data Analysis

- ▶ Provide software as a system to collate, analyse, alert and report collected data
- ▶ Data must be collected at least every 15 minutes and provided at least weekly
- ▶ Provide reports with identifies and propose properties that require intervention
- ▶ Provide an interactive platform or portal for Council Officers to access for analysis and resident education purposes
- ▶ Work with Council on criteria or algorithm for intervention
- ▶ Council will provide property data to inform the algorithm
- ▶ Refine criteria and algorithm based on feedback from Council intervention visits

iOpt.
RENFREWSHIRE COUNCIL OVERVIEW
OVERVIEW PROPERTIES
JACK.SLATER@IOPTASSETS.COM




Renfrewshire Council
Click to select a landlord

-  Landlords
-  Installer Company
-  Installers
-  Settings

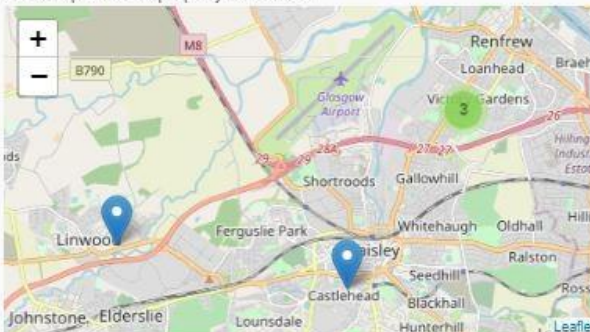
Most Recent Alerts
Click to view all properties that are at risk.

Critical Alert Properties	0
High Risk	0
Medium Risk	0
Abandoned Properties	0
Illegal Occupied	0
Fuel Poverty	0

Percentage of Risk
See and review all your property overview.








Map of properties
Click on pin to view property dashboard



Property Code ↑	Address	Area	Type	Status	Alert Type	Alert Severity
PRN: 15 Paisley Rd	15 Paisley Rd Paisley PA4 8XD Scotland		Detached	Not Occupied		VIEW
PRN: 20 Arkleston Rd	20 Arkleston Rd Renfrew PA4 0RA Scotland		Ground Floor Flat	Rental Occupied		VIEW
PRN: 30 High Calside TFL	Top floor Left 30 High Calside Paisley PA2 6BE Scotland		Top Floor Flat	Rental Occupied		VIEW
PRN: 5 Millford Dr	5 Millford Dr Linwood Paisley PA3 3EJ Scotland			Not Occupied		VIEW
PRN: 50 Paisley Rd	50 Paisley Rd Renfrew PA48JL Scotland		Ground Floor Flat	Not Occupied		VIEW

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 **Maryhill**
Click to select a landlord

-  Landlords
-  Installer Company
-  Installers
-  Settings

OVERVIEW OVERVIEW ROOMS KPIS SURVEYS JACK.SLATER@IOPTASSETS.COM

Property (PRN): Maryhill 3 (6/4@71)
See and review all the property overview

6/4 71 Glenavon Road, Glasgow, G20 0HR, Scotland

Area: Maryhill

Property Type:

No. Rooms: 5

Occupancy Status: Occupied

Boiler Type: Unknown

Insulation Type: Unknown


Heating System: Quantum Electric Heaters

Ventilation: Mechanical Manual

Rooms










- U [View Room](#) →
- Bedroom [View Room](#) →
- Lounge [View Room](#) →
- Y [View Room](#) →
- D [View Room](#) →

Alerts

Alert ↑	Severity	Start Time	Actions
Max Temperature Exceeded	Critical	Friday, February 21st 2020 02:06:07	

Rows per page: 25 1 of 1

Average Readings


7 Days	30 Days	90 Days
 642 ppm  23.7 (c)  47.8 (g/m3)	 659 ppm  23.8 (c)  48.7 (g/m3)	 618 ppm  23.7 (c)  42.7 (g/m3)

Dew Point: Calculated Temperature **13.3 c**

Mould Risk: Level **No Warning**

Overview Graph

Bedroom **Lounge**



1 DAY 7 DAYS 30 DAYS 90 DAYS

Start Date: _____

End Date: _____

USE DATES

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Maryhill
Click to select a landlord

Landlords

Installer Company

Installers

Settings

☰ **KPI PROPERTY OVERVIEW** OVERVIEW ROOMS **KPIS** SURVEYS JACK.SLATER@IDPTASSETS.COM

High Temperature Disabled

This KPI will alert you if a property is seeing high temperature readings on an ongoing basis

Parameters

Mean Average Temperature \geq 25

Day period \geq 5

Window period = 10

Humidity Disabled

This KPI will alert you if a property is reporting very high humidity over 'x' days in a row

Parameters

Humidity Percentage \geq 70

Days = 14

Humidity Range Disabled

This KPI will alert you if a property is reporting high humidity over 'x' days in a row

Parameters

Humidity Percentage \geq 65

Humidity Percentage \leq 70

Days \leq 30

Low Temperature Disabled

This KPI will alert you if a property is seeing low temperature readings on an ongoing basis

Parameters

Mean Average Temperature \leq 13

Day period \geq 5

Window period = 10

Max Temperature Disabled

This KPI will alert you if a property records a temperature spike

Parameters

Max Temperature \geq 27

Min Temperature Disabled

This KPI will alert you if a property is significantly cold

Parameters

Min Temperature \leq 11

Mould Risk Disabled

This KPI will alert you if a property is at risk of being prone to mould growth

Parameters

Not Occupied Disabled

This KPI will alert you if a property has not had a person inside over the course of three weeks.

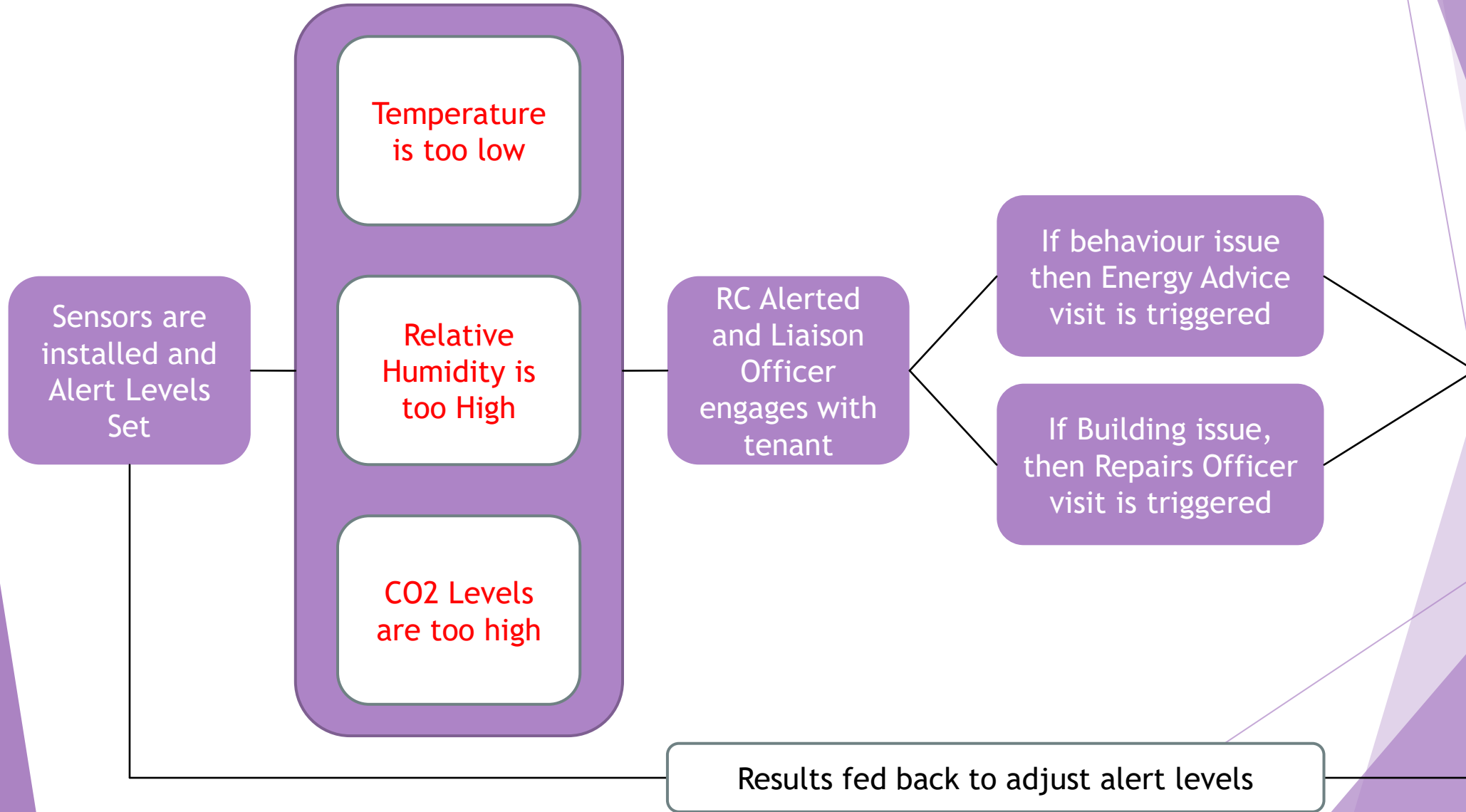
Parameters

Occupied Disabled

This KPI will alert you if a property has had a person inside the property outside of working hours

Parameters

How does it all fit together?



Where are we now?

- ▶ Contract Awarded in February 2020
- ▶ Delayed start due to Covid Shut Down
- ▶ IOPT have set up the Portal
- ▶ Working with IOPT to set initial alert limits
- ▶ IOPT have produced an installer training video
- ▶ Network to be installed in August
- ▶ First installs of sensors in void properties as soon as network in place

What next?

- ▶ 3300 Sensors to be installed in the first 2 years
- ▶ Option to extend into a 3rd and 4th Year
- ▶ Roll out to all of our stock
- ▶ Develop and refine algorithm for alerts and engagement process
- ▶ Use the data gathered to support other services
- ▶ Use the network for other monitoring equipment
- ▶ Other Council departments can use the network

Thank You