

Digital Innovation and Efficiency Committee

Report title:	Innovative use of Technology for Highways
Date of meeting:	14 November 2018
Responsible Chief Officer:	Tom McCabe – Executive Director, Community and Environmental Services
Strategic impact Networks of connected devices and associated systems provide new opportunities to achieve savings for the Council and improve outcomes in Norfolk.	

Executive summary

The Internet of Things (IOT) and associated networks provides new opportunities for the Council to explore alternative ways of delivering services and achieving outcomes for the people of Norfolk.

This paper proposes a field trial using LoRaWAN and low-cost road surface temperature sensors in Great Yarmouth to;

1. Gather road surface temperature profile data to inform a feasibility study on whether the introduction of an urban domain could reduce the number of gritting treatments in Great Yarmouth, and;
2. To better understand the benefits and limitations of LoRaWAN in order to determine the most appropriate future business uses it could be applied to.

Recommendations:

1. To approve the field trial of roadside sensors.
2. To direct officers to return to committee with the results and potential options if successful.
3. To consider the results of the trial at a future meeting to decide on next steps.

1. Background

- 1.1. Following previous approval by the Digital Innovation and Efficiency Committee, gateways have been installed on the Millennium Library and County Hall to provide LoRaWAN coverage across Norwich.
- 1.2. Funding has been secured for more gateway installations elsewhere in the County in conjunction with developing business needs.
- 1.3. Low-cost, mobile devices fitted with a wide variety of sensors including temperature, humidity and movement can now be installed anywhere within the LoRaWAN coverage area to record and transmit data wirelessly to a central data hub.

2. Strategic Context

- 2.1. Under Section 41 of the Highways Act 1980 Norfolk County Council has a statutory duty to ensure that the roads, for which it is the highway authority, are reasonably free of ice/snow. This duty is discharged by CES Highways and is funded through the Highways Maintenance Revenue Fund.
- 2.2. Norfolk County Council's priority 1 & 2 gritting network is 3,500km long and is routinely treated throughout the winter season. This network is covered by 49 individual routes, each with its own gritter and two drivers.
- 2.3. Specialist forecasts are obtained from an external provider, driven by weather models combined with sensor data from twelve roadside weather stations that monitor road surface temperature, humidity, wind speed and direction, air temperature, surface state (dry/wet/ice/snow), visibility and grip levels.
- 2.4. The county is currently divided into 6 forecasting domains, and a decision on what treatments are required is made every 24 hours for each of these 6 domains. The purpose of these domains is to minimise the number of unnecessary treatments by taking into account variations in climate conditions across Norfolk, including the impact of the coastline and urbanisation in Norwich.
- 2.5. During the 2017/18 season, the two Inland Norfolk domains were treated 117 times and Norwich was treated 90 times. The separate Norwich domain has therefore saved 100 tonnes of salt, 189 hours of driver time as well as fuel; an approximate saving of £8,500 over the season.
- 2.6. King's Lynn and Great Yarmouth are two other major urban areas in Norfolk, but these are not yet ring fenced in their own domain like Norwich is. Due to their urban nature it is likely that significant parts of these towns will be warmer than the rest of the domain they currently reside in. However, we do not yet have sufficient data on road surface temperatures to prove if this is the case or not.
- 2.7. The cost of each gritting treatment in Great Yarmouth is estimated at £540.

3. Pilot Scope

- 3.1. The pilot will utilise LoRaWAN technology to deploy low-cost road surface temperature sensors across Great Yarmouth to gather data to determine whether Great Yarmouth could be treated less than currently, saving salt, fuel and driver time. This will result in improved cost efficiency and environmental benefits including reduction in carbon emissions.
- 3.2. The installation of an additional gateway to provide LoRaWAN coverage across Great Yarmouth will be arranged by IMT.
- 3.3. A number of suppliers present at the The Things Conference held in Norwich 15th-16th October 2018 have expressed an interest in working with Norfolk County Council, including supplying sensors on loan free of charge in order to facilitate a trial.
- 3.4. Suitable locations to install the trial sensors will be identified by Highways using thermal mapping data and Google Street View. As well as strategic locations around Great Yarmouth, a control site will be chosen at one of the existing roadside weather stations and also a demo site within the County Hall grounds.

Installation will be arranged by the Highways team.

- 3.5. The sensors will be left in-situ throughout the remainder of the current winter season, which runs until 15th April 2019.
- 3.6. Data will be regularly downloaded manually onto a file directory on a local server throughout the trial so that the data can be used to inform the Great Yarmouth forecasting domain feasibility study.

4. Financial Implications

- 4.1. The use of social value funding from the Council's existing Capita/Updata network contract to purchase and install gateways.
- 4.2. Installation of road surface temperatures ideally needs to be embedded into the road surface, and will involve operative and traffic management costs.
- 4.3. Officer time in IMT and Highways to plan and organise the trial as well as remotely extracting and reviewing data from sensors.

5. Issues, risks and innovation

- 5.1. This is the first trial of sensors utilising LoRaWAN technology in Norfolk, reliability has therefore not previously been proven.
- 5.2. Sensor data may show that an additional forecast domain in Great Yarmouth may not introduce a cost efficiency.
- 5.3. This is innovative use of new technology and will help identify the future opportunity to utilise more sensors to cover the whole county, to either complement or even replace the existing network of roadside weather stations, as well as in other business use applications both within and outside of Highways.

Officer Contact

If you have any questions about matters contained in this paper or want to see copies of any assessments, eg equality impact assessment, please get in touch with:

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