Air Quality and Pollution Management In Cambridge

- Dan Clarke – Cambridgeshire County Council (SMART Cambridge)
- Anne-Marie Hindley – Cambridge City Council

Overview

- Introduction - Dan
- Air Quality in Cambridge - Annie
- Recent Projects - Annie
- Wider Context - Dan
- Questions – Annie and Dan

Growth in Greater Cambridge

CAMBRIDGE NAMED UK'S FASTEST-GROWING CITY

	League table ranking	GVA Q4 2017, £millions (Annualised, constant 2013 prices)	Growth (YoY)
1	Cambridge	9,300	2.0%
2	Derby	7,000	1.8%
3	Oxford	8,700	1.7%

Cambridge 'fastest-growing city economy for next decade'

RANK	CITY	PATENT APPLICATIONS (PER 100,000 POPULATION) 2015
1	Cambridge	341.06
2	Coventry	118.36
3	Oxford	79.86

20
Companies listed on the stock market

10.5 %
Growth in turnover for tech sector

10.4 %
Growth in turnover for life sciences

£40bn
Economic output Ambition by 2043

Cambridge takes fastest-growing city crown... again

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Growing pains

Population of Greater Cambridge expected to grow 28% by 2031.

More people means more cars – 25,000 more trips on the network.

More traffic & congestion means increased levels of pollution.

Average house price in Cambridge at an all-time high.

Housing & transport issues make it difficult for business to attract & retain workers.

33,500 new homes and 44,000 additional jobs by 2030.

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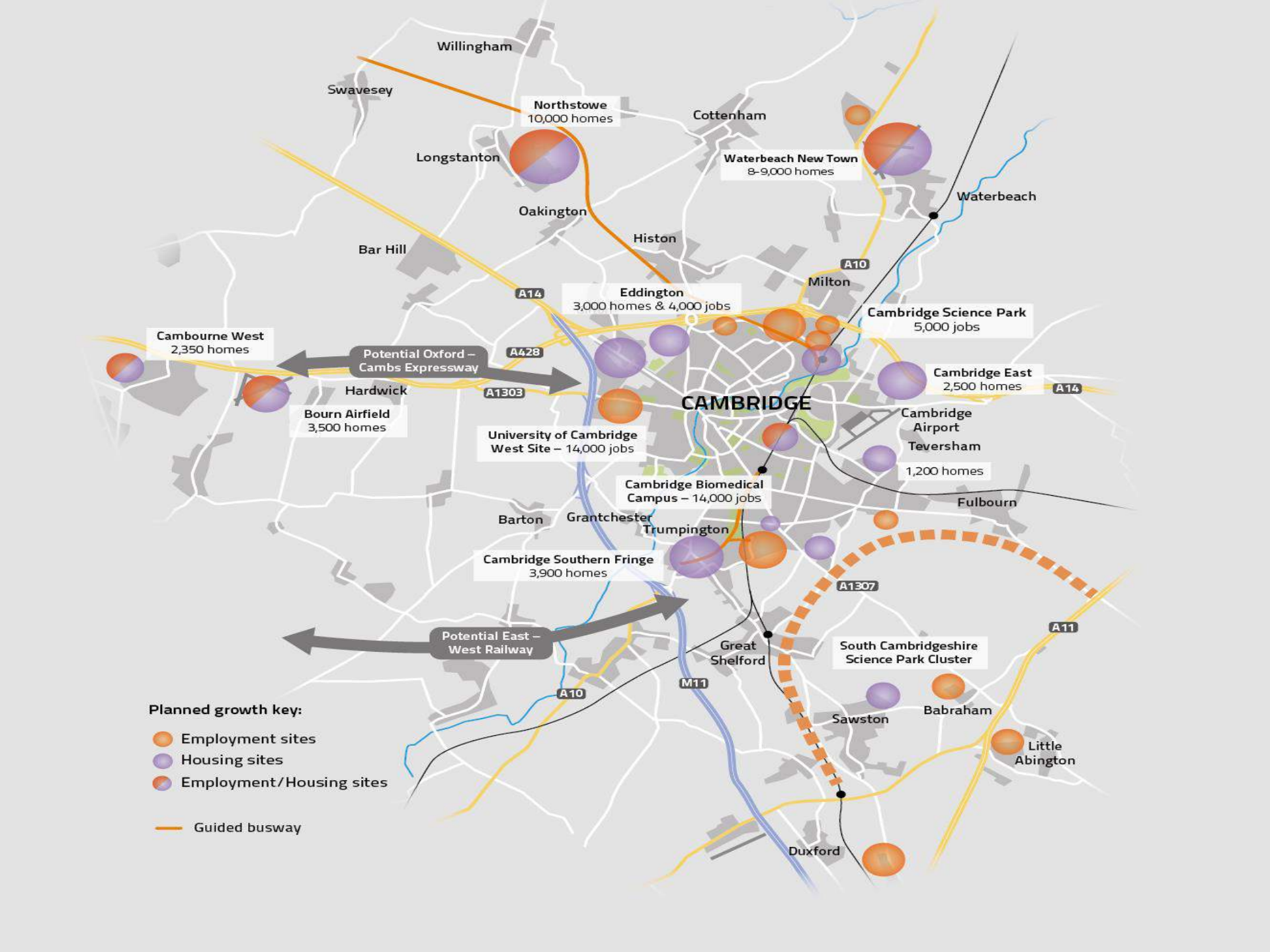

Willingham
Swavesey
Northstowe
10,000 homes
Cottenham
Longstanton
Waterbeach New Town
8-9,000 homes
Waterbeach
Oakington
Histon
Bar Hill
A10
Milton
A14
Eddington
3,000 homes & 4,000 jobs
Cambridge Science Park
5,000 jobs
Cambourne West
2,350 homes
Potential Oxford – Cambs Expressway
A428
Cambridge East
2,500 homes
A14
Hardwick
A1303
CAMBRIDGE
Bourn Airfield
3,500 homes
Cambridge Airport
University of Cambridge West Site – 14,000 jobs
Teversham
1,200 homes
Cambridge Biomedical Campus – 14,000 jobs
Fulbourn
Barton
Grantchester
Trumpington
Cambridge Southern Fringe
3,900 homes
A1307
A11
Potential East – West Railway
Great Shelford
South Cambridgeshire Science Park Cluster
M11
A10
Sawston
Babraham
Little Abington
Duxford
Planned growth key:
Employment sites
Housing sites
Employment/Housing sites
Guided busway

What are we trying to achieve?

Air Quality

Clean air for residents and visitors

Transport

Get 1:4 drivers into the city out of their cars

Transport

Decarbonise the transport system

Climate Change

Zero Carbon by 2050

Residents

Improving the quality of life for residents

Skills

Helping young people secure the skills they need to succeed in the Greater Cambridge 21st century economy

Energy

Triple the capacity of the energy network to support growth

Housing South Cambs

Target of 19,000 new homes between 2011 and 2031

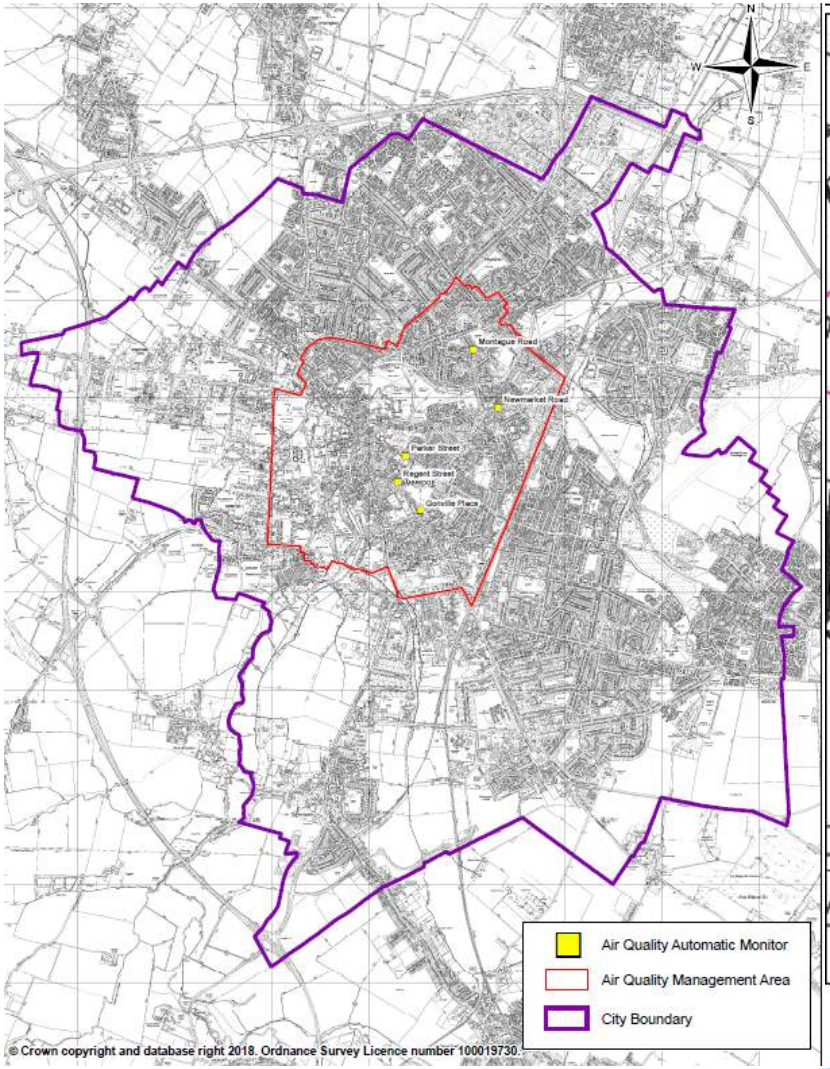
Housing Cambridge

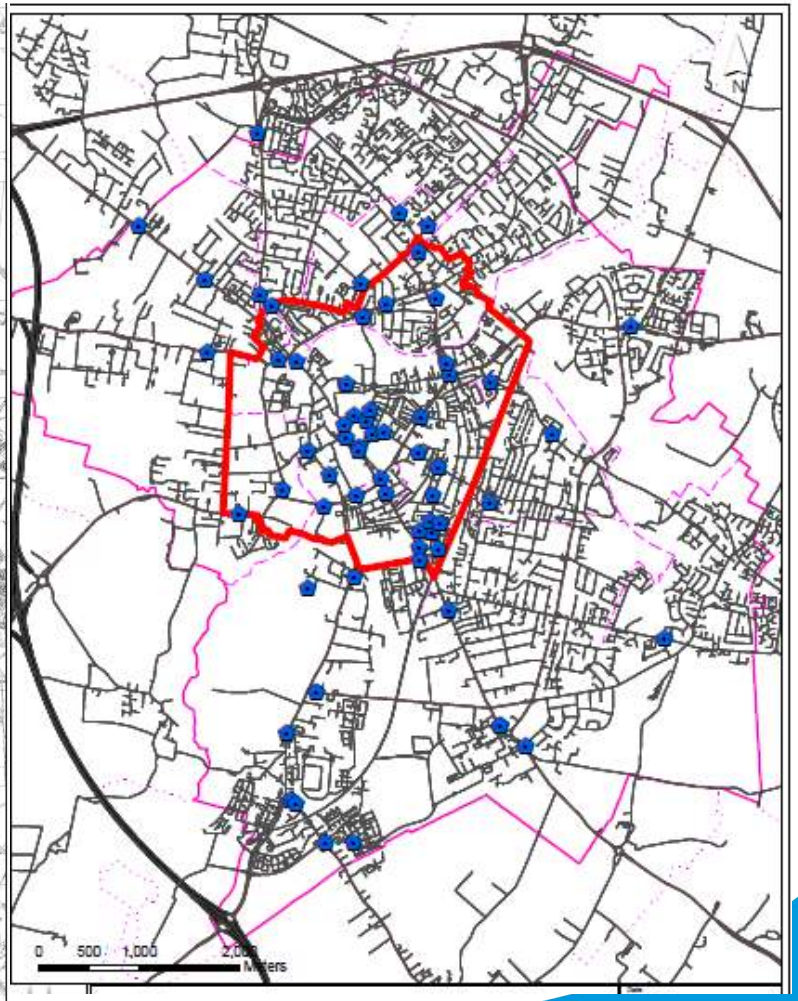
Target of 14,000 new homes between 2011 and 2031

Air Quality in Cambridge

- Current Monitoring
  - 5 Continuous Monitors measuring Nitrogen Dioxide and Particulate Matter both PM_{10} and $PM_{2.5}$
  - 6th Continuous monitor at Station Road which is managed externally
  - 70 “passive” nitrogen dioxide tubes located at various locations across the City

Location of Monitors





Current Pollution Levels

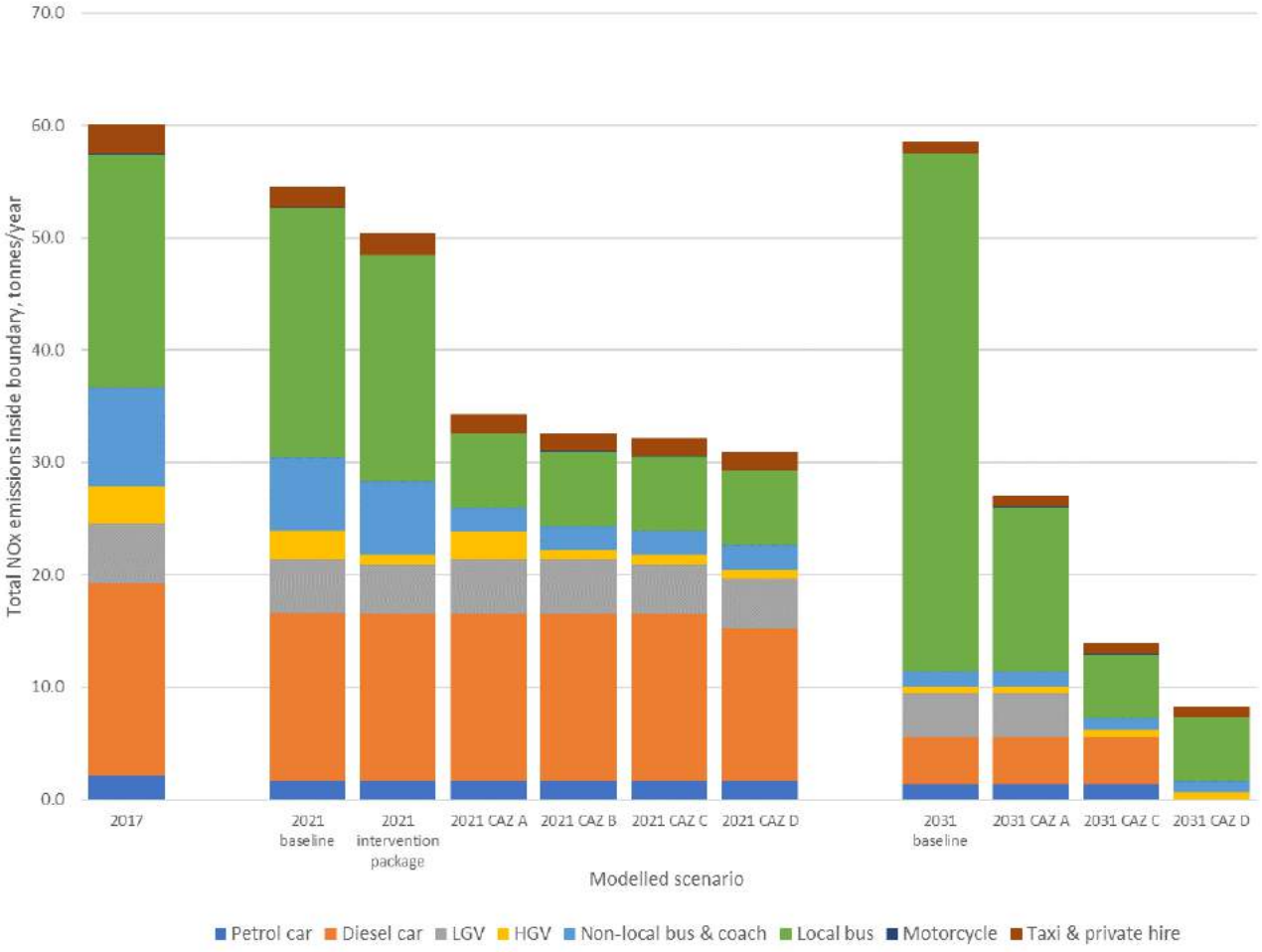
Recent Projects

- Clean Air Zone Feasibility Study
- Baseline Model for Greater Cambridge Area
- Mill Road Monitoring

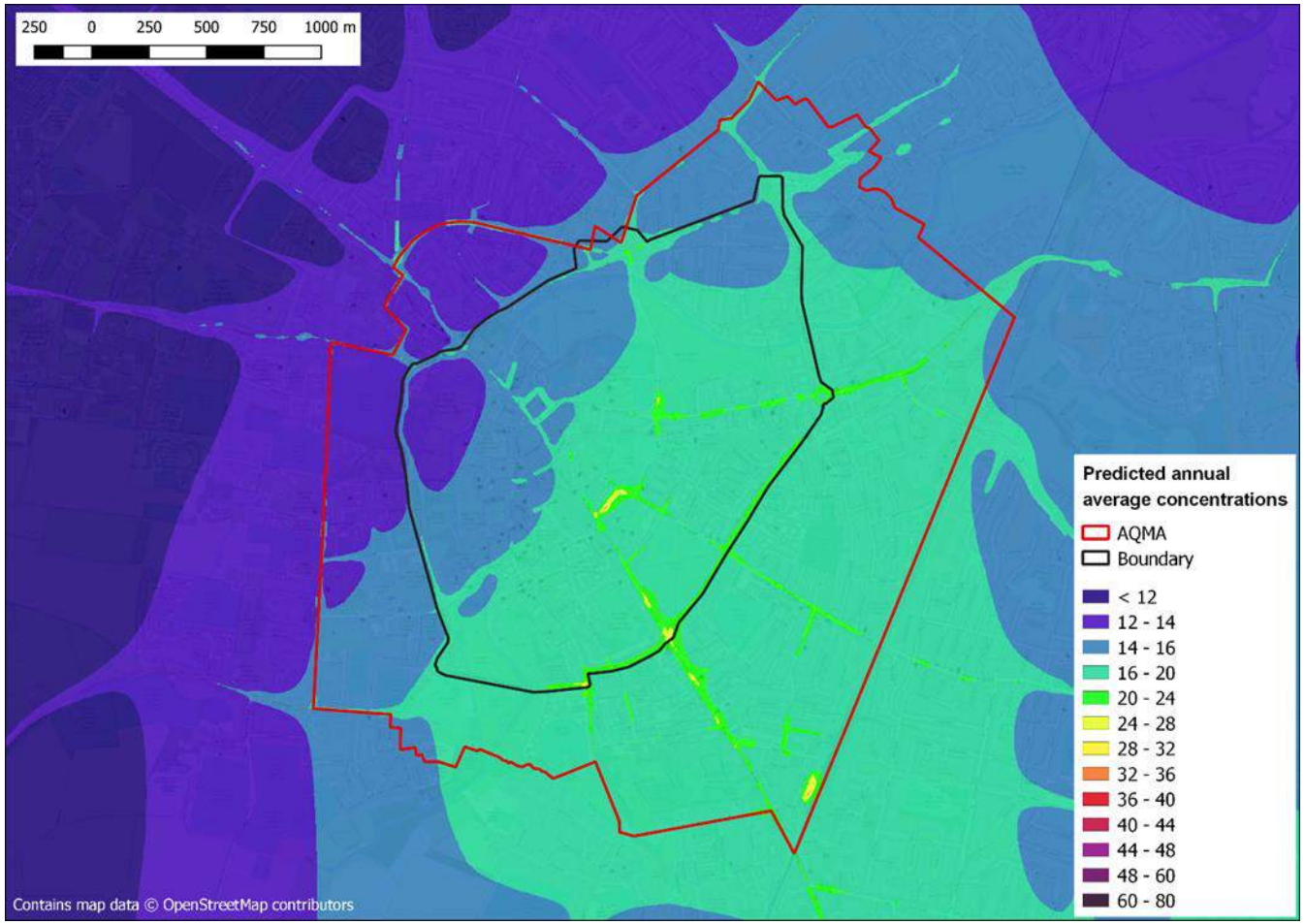
Clean Air Zone Feasibility Study

- Why undertake Feasibility Study?
  - Cambridge and Greater Cambridge area growing – more traffic on the roads resulting in congestion and poorer air quality.
  - Need shift to sustainable transport and an increase in the amount of public transport to provide for the growth and shift.
- Key Findings
  - 106 deaths attributable to poor air quality in Cambridge and South Cambridgeshire.
  - Study found that without intervention air quality would worsen in the next 10 years.
- Interventions modelled included standard CAZ and also non standard CAZ.
- Work undertaken by Cambridge City Council for the GCP.

Clean Air Zone Feasibility Study



Clean Air Zone Feasibility Study



Clean Air Zone Feasibility Study

- Modelling used ANPR data to identify the current fleet make-up in the Cambridge area as well as traffic count points, bus data and taxi data to generate an emissions inventory.
- Modelling used traffic count point data and CSRM data to create Traffic flows.
- Various assumptions were made and data gaps were plugged using national data.
- Baseline concentrations before the addition of traffic data were taken from the national database.
- Building height data used for Cambridge to show how the pollutants dispersed in and around buildings, provided by Ordnance Survey.
- Report and Appendices available at https://www.greatercambridge.org.uk/choices-for-better-journeys/
- Next Steps – Awaiting outcome of choices for better journeys engagement.

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Baseline Model for Greater Cambridge Area

- Air Quality Model to cover Greater Cambridge Area.
- Will be used to assess effects of proposed transport interventions including cumulative effects.
- Being constructed in similar manner to the model used in the CAZ Feasibility Study but a wider area and a different model.

Mill Road Monitoring

- Planned closure of Mill Road bridge to motorised vehicles in Summer 2019 for bridge works.
  - Provision to be made for pedestrians and cyclists
- Opportunity to assess the effect of the closure of a main road into Cambridge on both traffic flows and air quality.
- Traffic monitoring will capture pedestrians and cyclists as well as motorised vehicles.
- Air quality monitoring currently using diffusion tubes to give baseline data.
- Hoping to secure grant funding for trialling low cost air quality sensors as well to give a better diurnal profile and understanding of the potential exposure of people, living, working and visiting the area.

Mill Road Monitoring

- Questions to be answered:
  - Will traffic use official diversions?
  - Will traffic levels on other roads increase? – diversion route and other roads?
  - Will air quality improve in the Mill Road area?
  - Will air quality worsen in other areas?
  - Will there be a modal shift to other forms of transport?
  - What will be the public perception of the impact of the closure?
  - What points can we take from this project when considering other transport interventions?
  - If used - Will the low cost air quality sensors perform well? Will they be useful in other areas? Will they help to provide a better understanding of pollution exposure?

What is the purpose of the Smart Cambridge Programme?

"To investigate, trial and develop emerging technologies and data solutions that can be adopted to assist in the successful mitigation of sustainability challenges across the region, encouraging further economic growth"

connecting CAMBRIDGESHIRE

Connected Infrastructure - Cambridg

Traffic Control

UTC (Urban Traffic Control)

UTC lights	40
Comm's	Mesh Network
Backhaul	12 Locations CPSN

CPSN

40

Traffic lights (stand alone)

No. of lights	180
Comm's	GPRS

180

Integrated Highways Management Centre

Parking guidance and Traffic Management

No of Signs	38
Comm's	Radio Link

38

5 Multi-storey Car parks

Ticket machines	29
Comm's	CPSN network

29

VMS signs

No of Displays	22
Comm's	GP

CCTV link to IHMC

CCTV cameras	12
Comm's	GPRS
Backhaul	n/a

12

ADSL

VIN SUPPLIER

IHMC

ADSL

Park and Ride

5 sites

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CCTV

17

27

Ticket Machines and connected ANPR cameras

Ticket machines	27
ANPR Cameras	17
Comm's	BT Fixed broadband line
Backhaul	Not Known

7

RTPI (Real Time Passenger Information)

No of Flags	155
Comm's	GPRS

4 Pay and Display Car Parks

Ticket Machines	7
Comm's	GPRS

155

Buses

Comm's GPRS

TFT Screens

No of Screens	25
Comm's	ADS

Parking Meters

176

Parking Meters

No of Meters	176
Comm's	GPRS

Air Quality

5

Diffusion tube

No of tubes	60
Comm's	Man

Sampling Stations

No of stations	5
Comm's	Telephone line and modem

Street Lights

Street lights	9882
Comm's	Photo/telecell
Backhaul	Fibre optic

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CMS

9882

Wi-Fi

6

Big Belly Bins

No of bins	6
Comm's	Wi-Fi

DVLA

23

Handheld Meters

No of Handhelds	23
Method of Comms	GPRS

CPSN

Wi-Fi

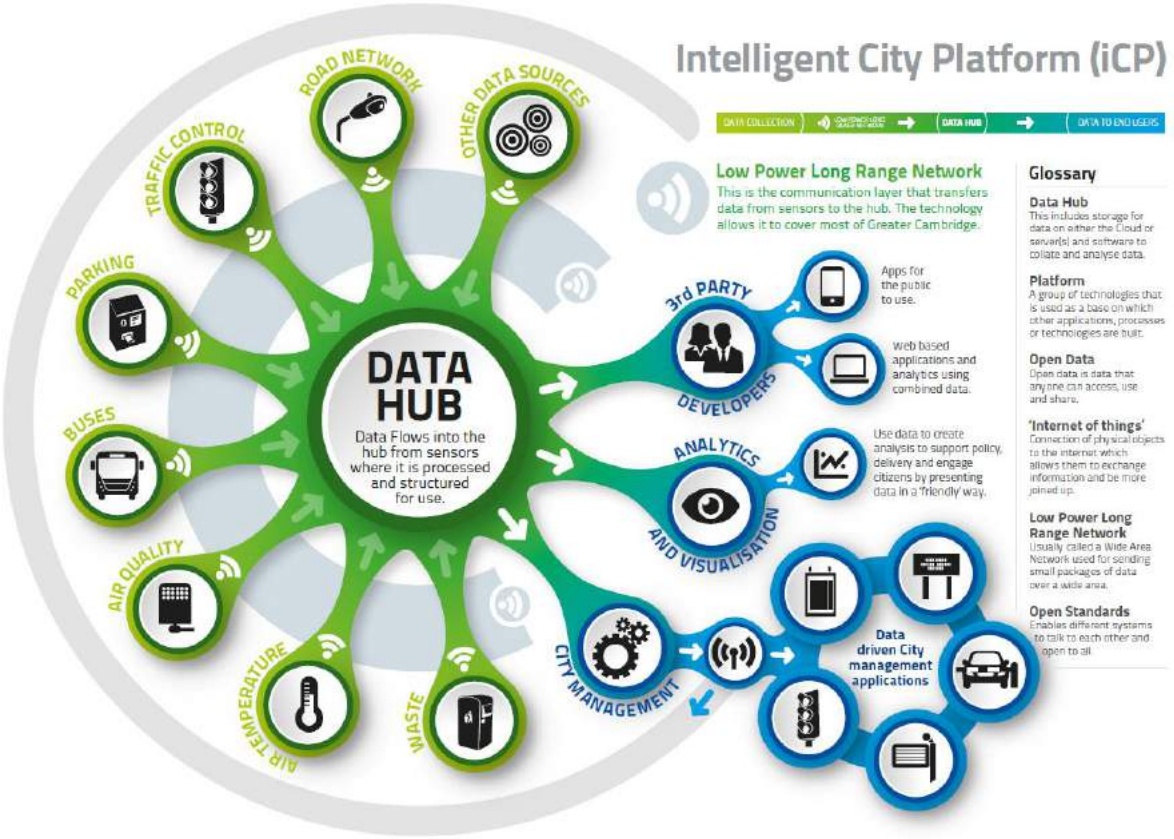
139

CCTV Cameras

No. of cameras	139
Comm's	Encrypted WiFi link
Backhaul	CPSN

Static and Real-Time data

City wide sensor network deployed on LoRa and Sigfox



Analyse data and identify trends

Provides basis for development of data driven applications

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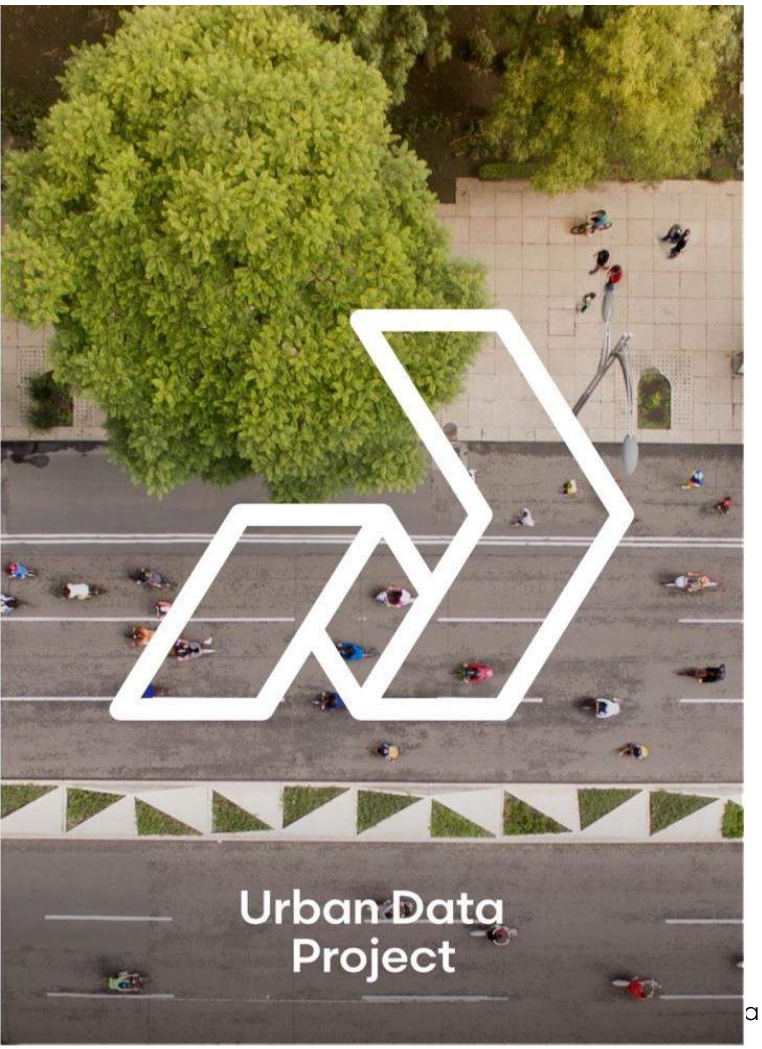

The Urban Data Project is a combination of new technology and transparent policies for cities. Collecting, protecting and applying data to improve city living.

Telensa

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Microsoft

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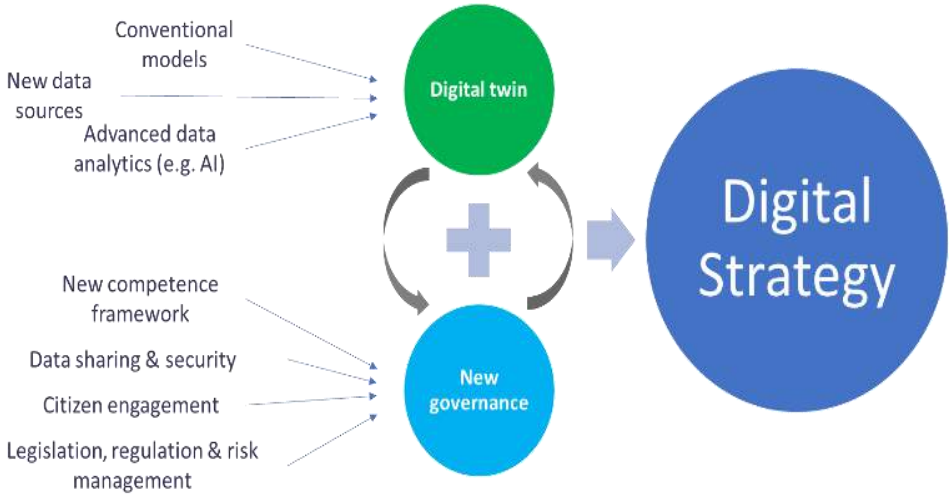
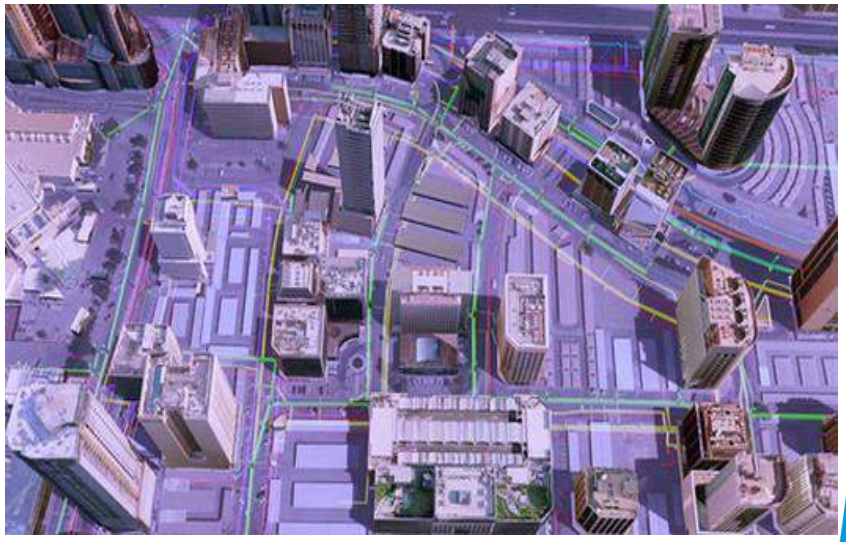
Urban Data Project

Multi Sensor Pods use edge processing to collect data and instantly analyse data from raw video

City Data Guardian platform ensures city control and citizen transparency and helps cities align common data policies and standards





Digital Twin

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CSIC Cambridge Centre for Smart Infrastructure and Construction

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60* RETIREE
BETTER
GREENER
TRANSPORT
NETWORK

Questions?