Merseytravel Clean Air Preliminary Options Study

Developing the Liverpool City Region Air Quality Action Plan

Duncan Urquhart BSc(Hons) MSc Csci MIAQM

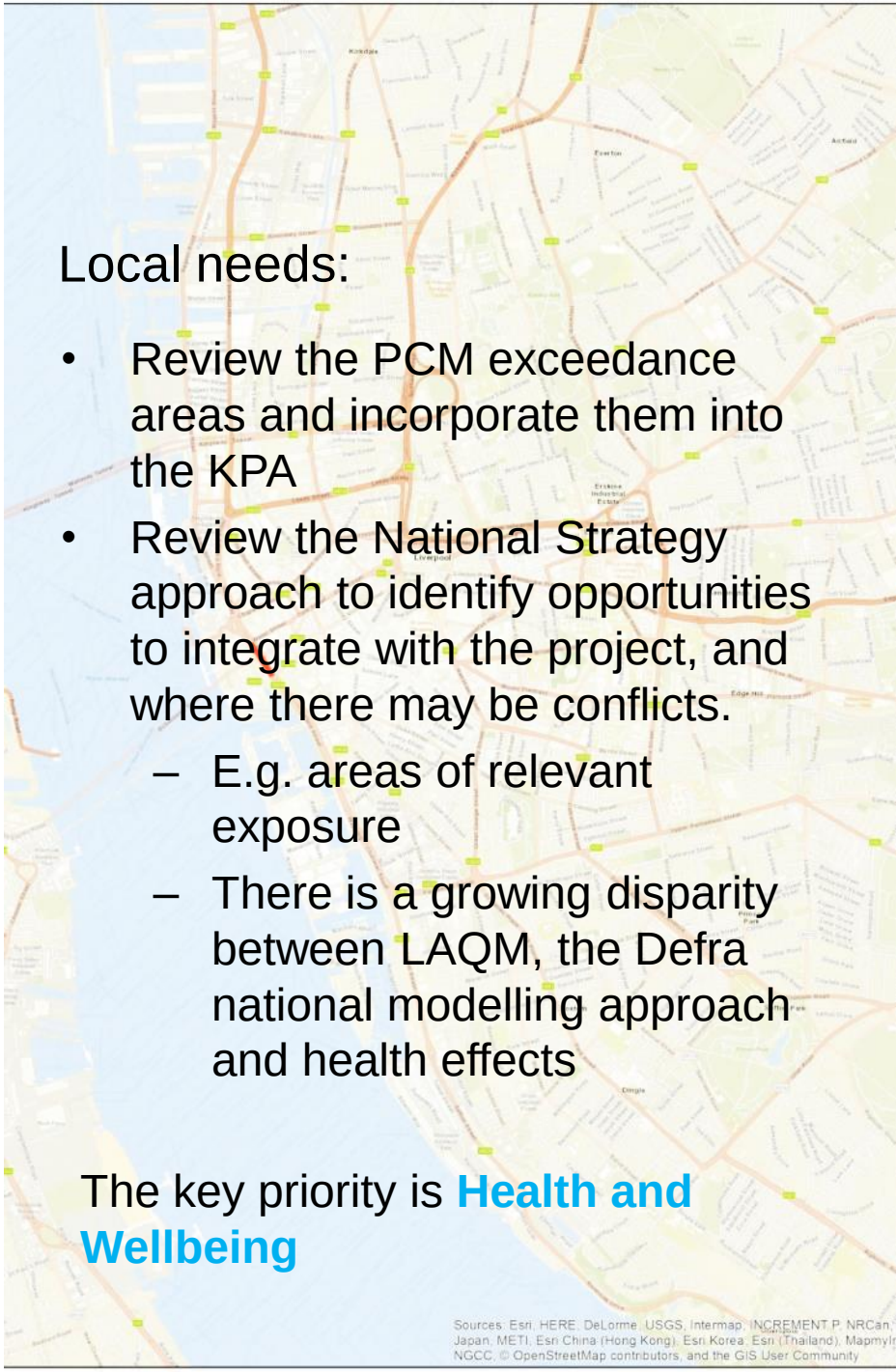
28 September 2017

Objectives

Statutory requirements:

- National strategy is focused on
  - Relevant exposure
  - National modelling outcomes (PCM)
  - A plethora of guidance which can be challenging to apply (TG/PG16)
  - Policy overlaps (NPPF/PPGs)
  - Standard modelling approaches
  - National reporting and monitoring processes

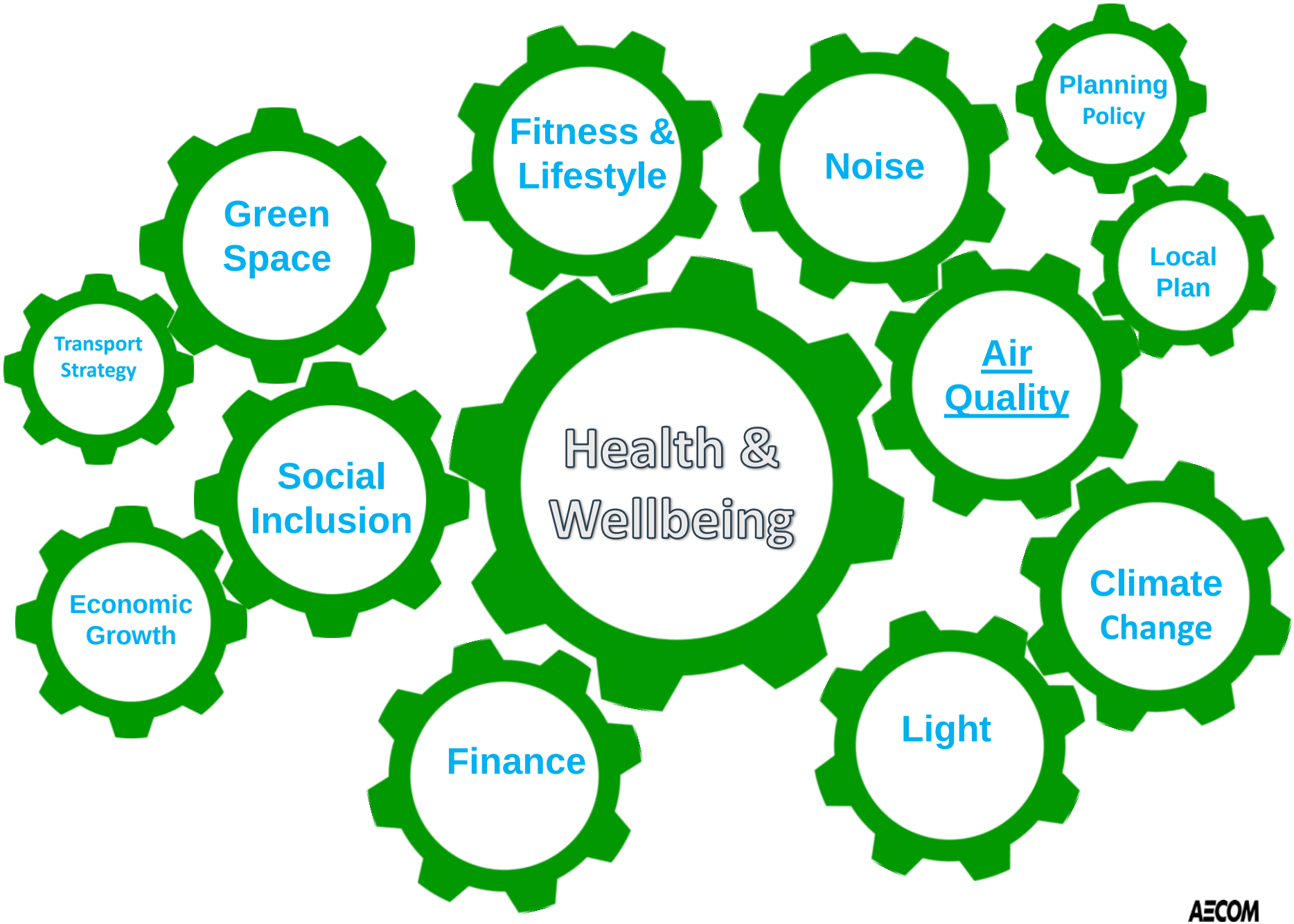
The central concern is **Exposure**



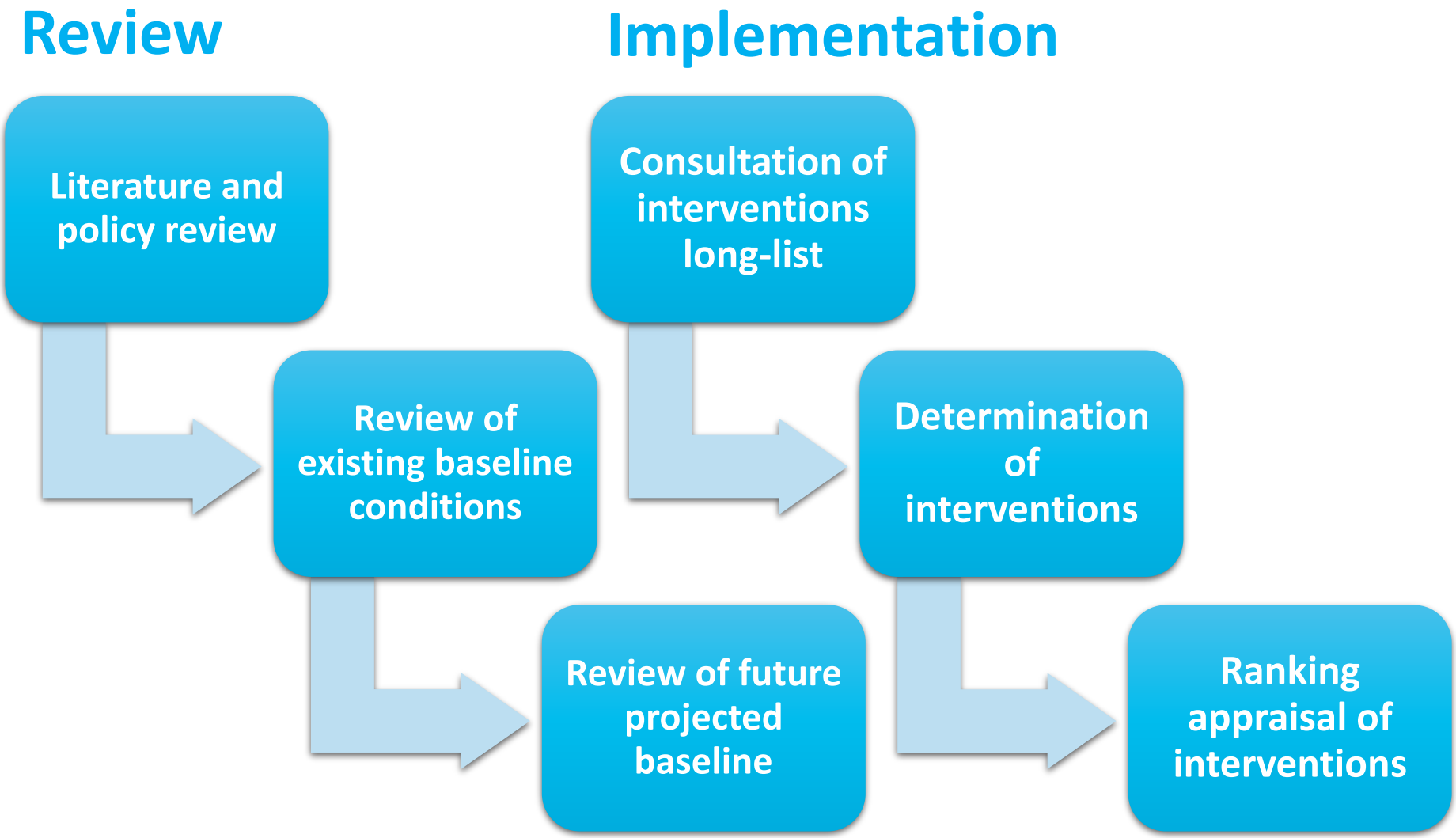
Local needs:

- Review the PCM exceedance areas and incorporate them into the KPA
- Review the National Strategy approach to identify opportunities to integrate with the project, and where there may be conflicts.
  - E.g. areas of relevant exposure
  - There is a growing disparity between LAQM, the Defra national modelling approach and health effects

The key priority is **Health and Wellbeing**


Planning Policy
Fitness & Lifestyle
Noise
Green Space
Local Plan
Transport Strategy
Air Quality
Social Inclusion
Health & Wellbeing
Climate Change
Economic Growth
Finance
Light
AECOM

Project Structure



The Liverpool City Region

Month, Day, Year

The Liverpool City Region

The Liverpool City Region is an economic and political area comprising:

- Liverpool
- Halton
- Knowsley
- Sefton
- St Helens
- Wirral

The Liverpool City Region Combined Authority was established in 2014 under the provisions of the Local Democracy, Economic Development and Construction Act 2009.

Membership of the CA comprised leaders of the six authorities and the local enterprise partnership.

The CA is represented by a Metropolitan Mayor

LIVERPOOL CITY REGION
COMBINED AUTHORITY

Baseline Review

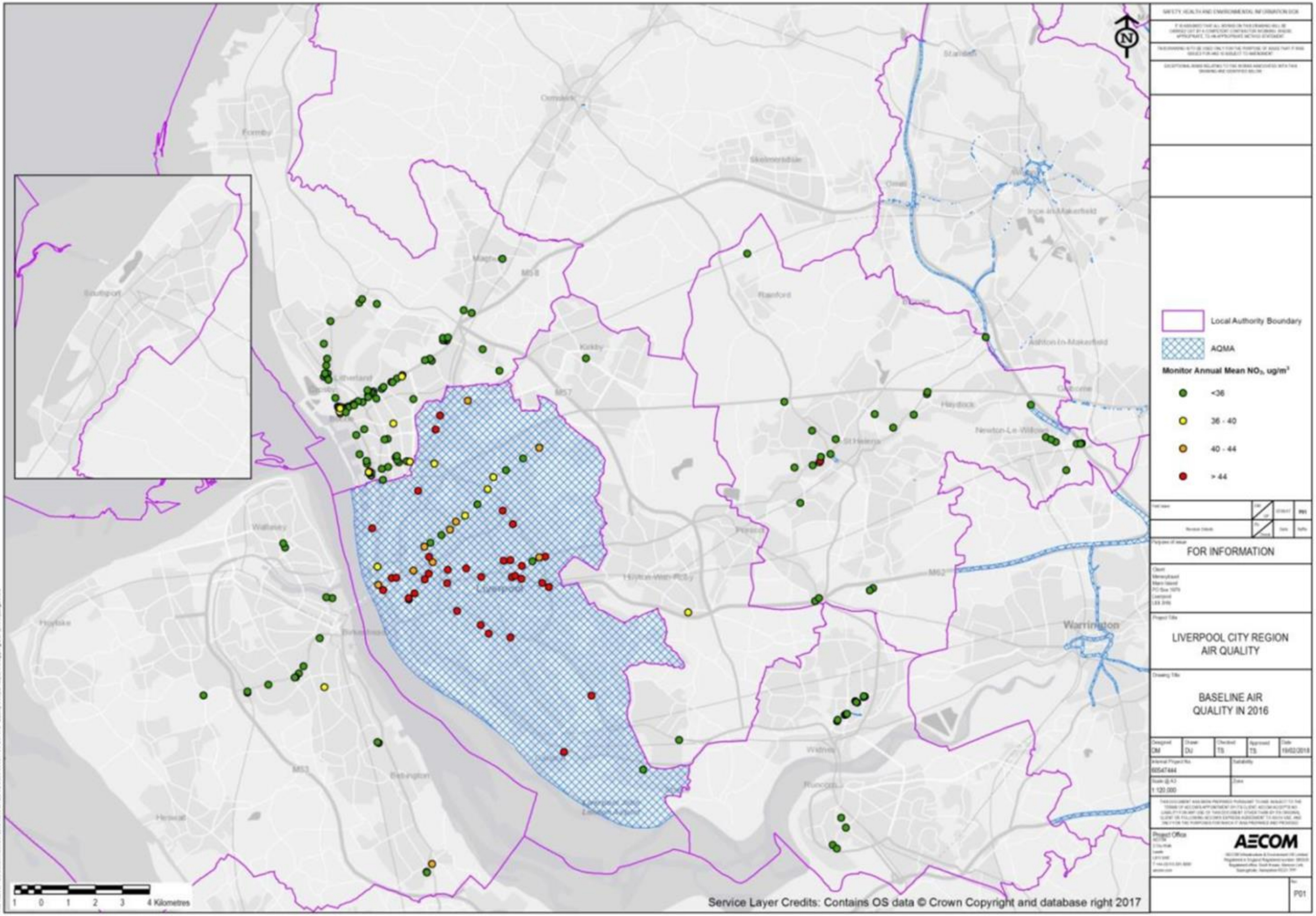
Local Air Quality

Review Existing Data

Screening Key Priority Areas

Economic Effects

Month, Day, Year


Local Authority Boundary
AQMA
Monitor Annual Mean NO_2, ug/m^3
<36
36 - 40
40 - 44
> 44
FOR INFORMATION
LIVERPOOL CITY REGION
AIR QUALITY
BASELINE AIR
QUALITY IN 2016
Designed DM
Drawn DU
Checked TS
Approved TS
Date 19/02/2018
Internal Project No. 60547444
Scale @ A3 1:120,000
AECOM
P01
Formby
Ormskirk
Skelmersdale
Southport
Maghull
Rainford
Kirkby
Litherland
Bootle
St Helens
Haydock
Newton-Le-Willows
Ince-in-Makerfield
Ashton-in-Makerfield
Wallasey
Liverpool
Huyton-With-Roby
Prescot
Hoylake
Birkenhead
Bebington
Heswall
Widnes
Runcorn
Warrington
M58
M57
M62
M53
1 0 1 2 3 4 Kilometres
Service Layer Credits: Contains OS data © Crown Copyright and database right 2017

Baseline Review

Local Air Quality

Review Existing Data

Screening Key Priority Areas

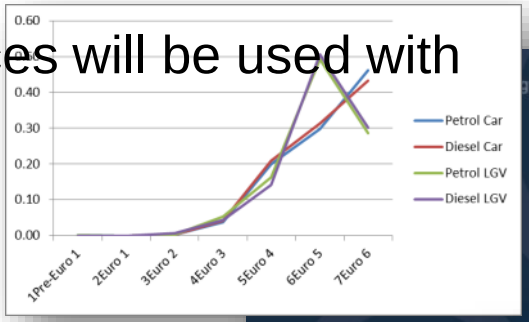
Economic Effects

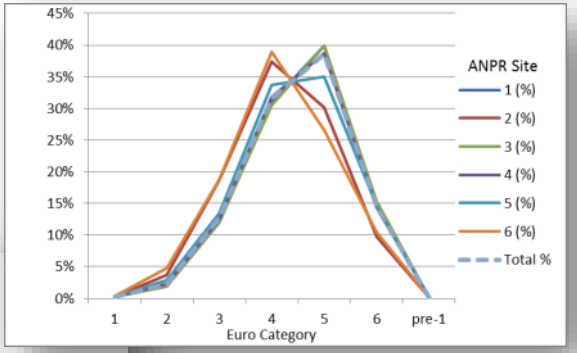
Month, Day, Year

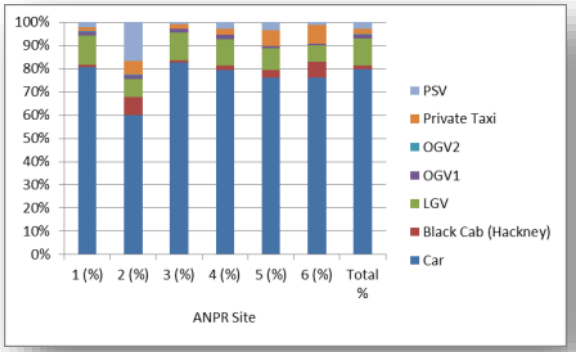
Using Existing Data

Existing information sources will be used with common tools:

- AirViro
- DfT data
- LA monitoring data
- Defra PCM
- Population and demographics
- Transport polices
- Development aspirations



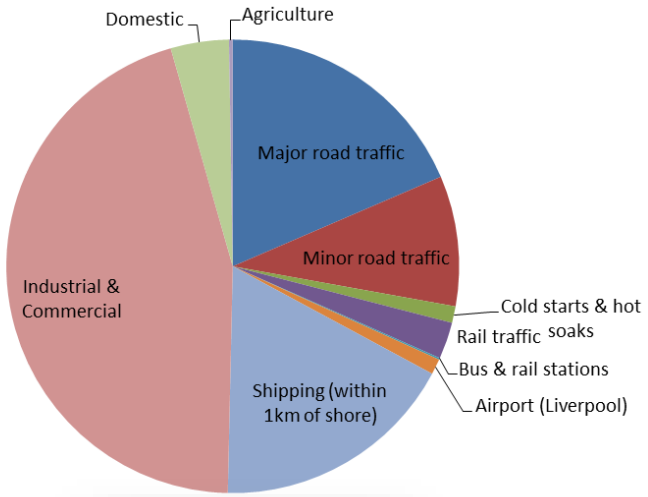




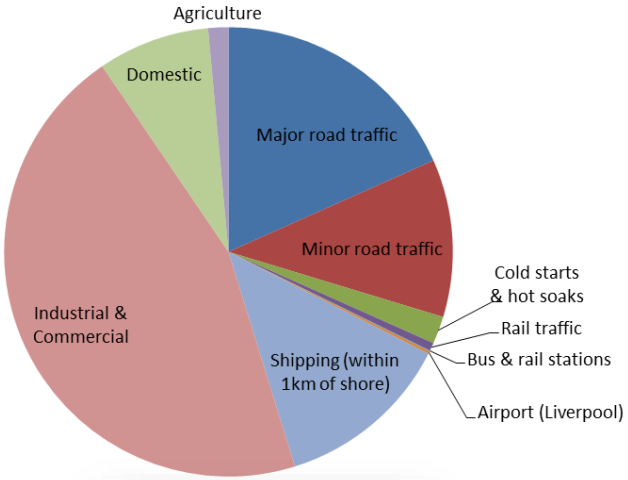
Emission Sources in LCR

All Sources

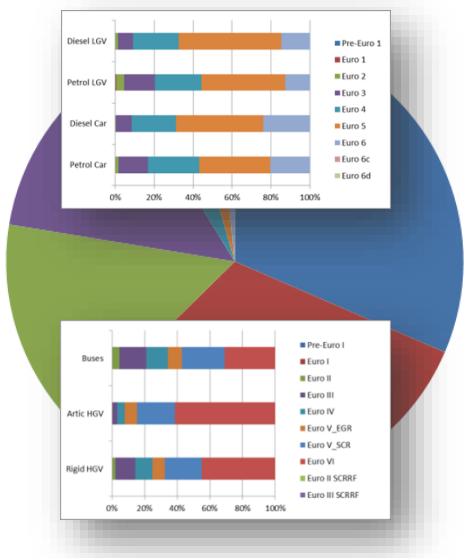
NO_X



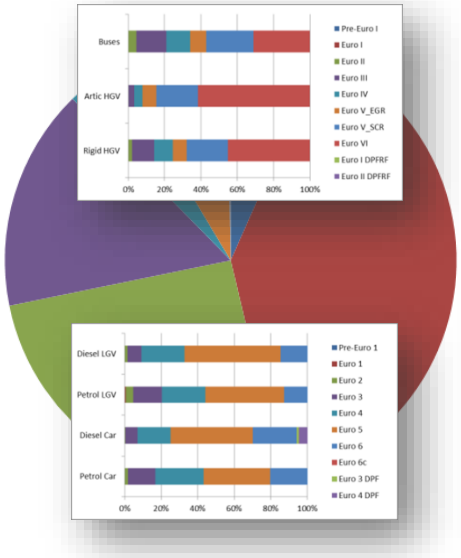
PM_{10}

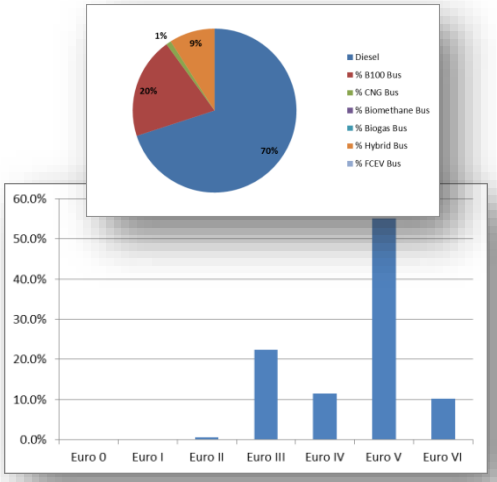


Transport Sources



- Petrol Cars
- Diesel Cars
- Diesel LGVs
- Rigid HGVs
- Artic HGVs
- Buses/Coac
- Other





Baseline Review

Local Air Quality

Review Existing Data

Screening Key Priority Areas

Economic Effects

Month, Day, Year

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW

CONSTRUCTION

MAINTENANCE / OPERATION / DECOMMISSIONING / DEMOLITION

First issue	DM / DP	01/06/17	P01
No issue Details	BL / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client: Highways England, Merseytravel, Marin Island, PO Box 1976, Liverpool, L69 3HN

Project Title: LIVERPOOL CITY REGION AIR QUALITY

Drawing Title: NOX EMISSIONS LCRTM 2020 MODELLED AS 2016

Designed	Drawn	Checked	Approved	Date
DM	DM	HP	HP	16/01/2018

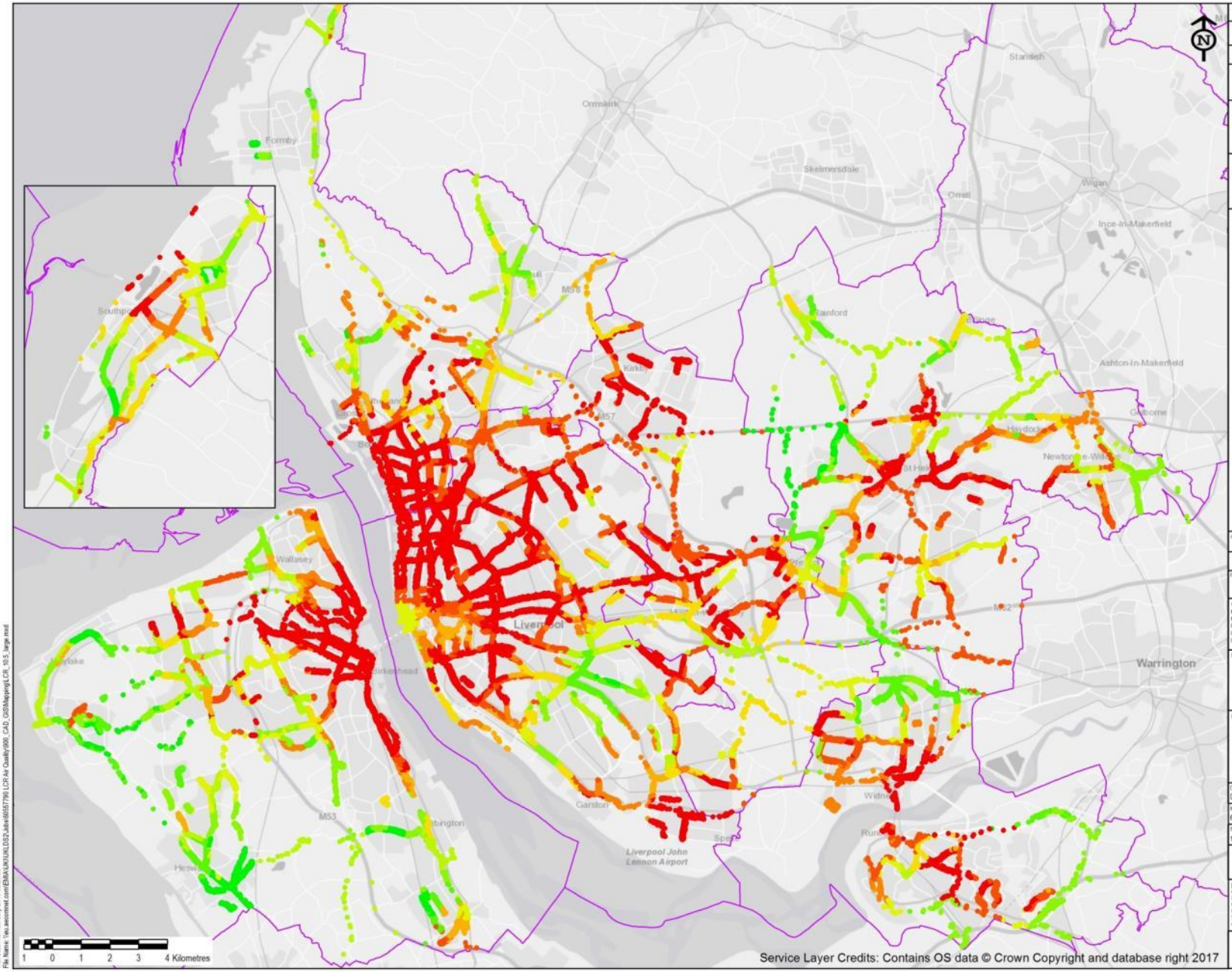
Internal Project No. 60547444	Suitability S0
Scale @ A3 1:160,000	Zone M5 J10

Project Office
Royal Court
East Close, Chesterfield
Derbyshire S41 7SL
Tel: (01246) 209221
Fax: (01246) 209229
www.aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 855029
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Rev P01

Plot Date: 16 January 2018 10:06:20
File Name: \\ea.aecomnet.com\EMEA\UK\UKLDS2\Jobs\60547799 LCR Air Quality\900_CAD_GIS\Mapping\ LCR_ 10.5.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW

Index of Multiple Deprivation

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 - 9

Local Authority Boundary

First issue	DM / DP	20/06/17	P01
No issue Details	Ini. / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Merseytravel
Mann Island
PO Box 1976
Liverpool
L69 3HN

Project Title:
LIVERPOOL CITY REGION AIR QUALITY

Drawing Title:
INDICES OF MULTIPLE DEPRIVATION SCORES WITHIN 50M OF MAJOR ROUTES

Designed	Drawn	Checked	Approved	Date
DM	DU	TS	TS	19/02/2018

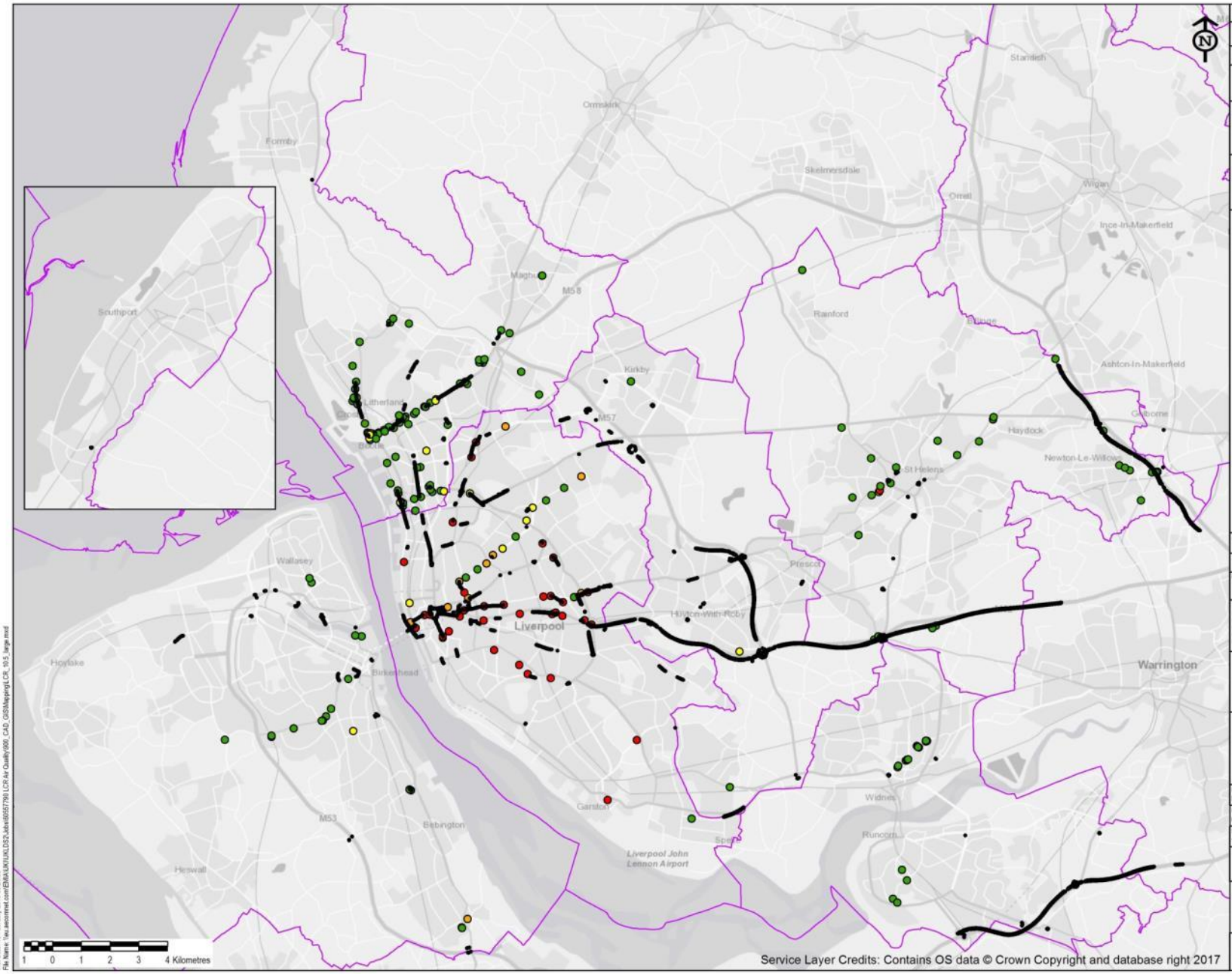
Internal Project No.	Suitability
60547444	
Scale @ A3	Zone
1:120,000	

Project Office
AECOM
2 City Walk
Leeds
LS11 9AS
T +44 (0)113 391 6000
aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 855029
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Rev P01

Plot Date: 19 February 2018 09:09:39
File Name: \\ea.aecomnet.com\EMEA\UK\UKLDS2\Jobs\60547790 LCR Air Quality\900_CAD_GIS\Mapping\LCR_10.5_large.mxd



Roadside Annual Mean NO_2, ug/m^3

- <32
- >32

Monitor Annual Mean NO_2, ug/m^3

- <36
- 36 - 40
- 40 - 44
- > 44
- Local Authority Boundary

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW

First issue	DM / DP	20/06/17	P01
No issue Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Merseytravel
Mann Island
PO Box 1976
Liverpool
L69 3HN

Project Title: LIVERPOOL CITY REGION AIR QUALITY

Drawing Title: SCREENING HIGH ROADSIDE NO_2 CONCENTRATIONS

Designed	Drawn	Checked	Approved	Date
DM	DU	TS	TS	19/02/2018

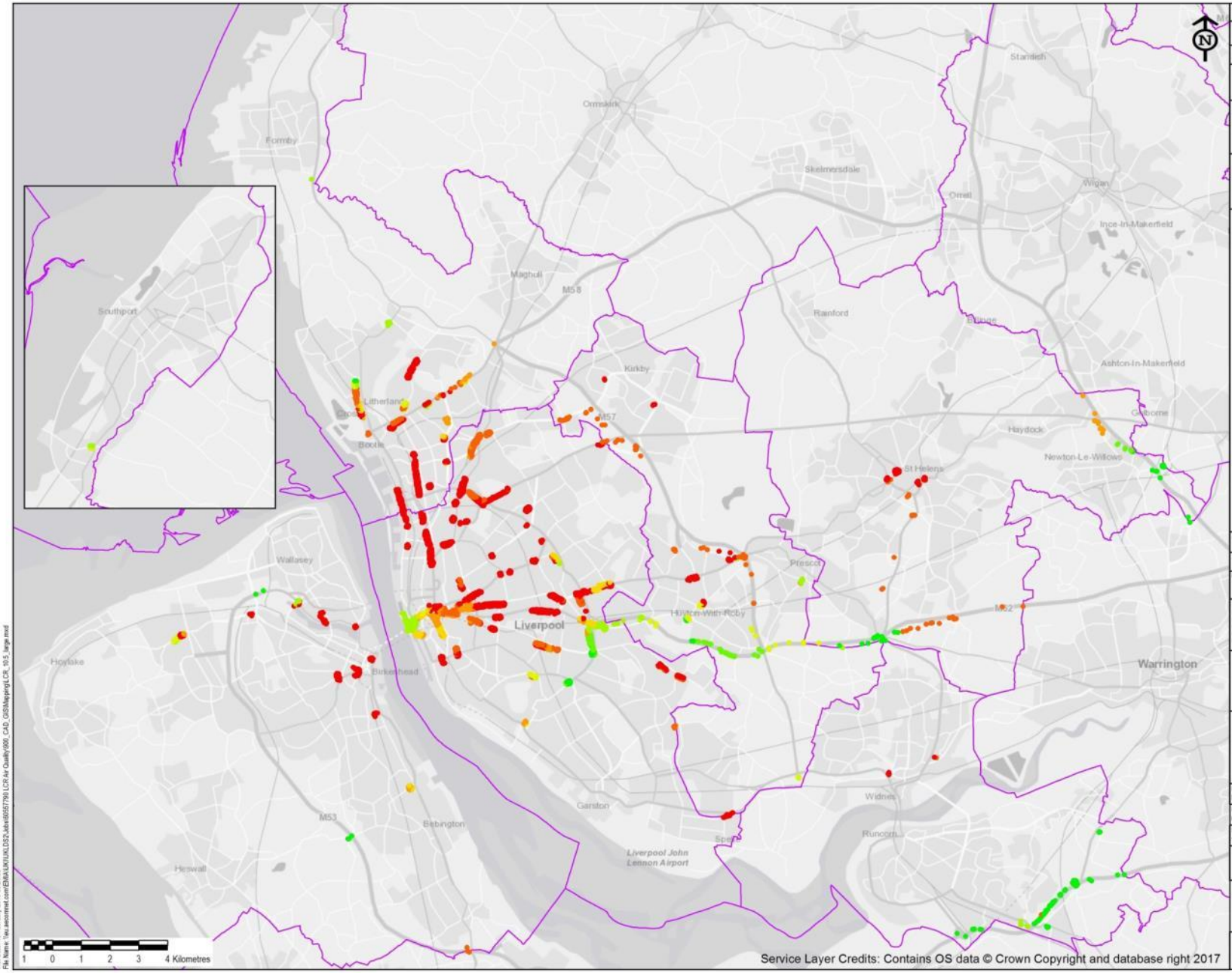
Informal Project No: 60547444	Suitability
Scale @ A3: 1:120,000	Zone

Project Office
AECOM
2 City Walk
Leeds
LS11 9AS
T +44 (0)113 391 6000
aecom.com

AECOM
AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 855029
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Rev P01

Ref Date: 19 February 2018 09:29:39
File Name: \\ea.aecomnet.com\EMEA\UK\UKLDS2\Jobs\60557790 LCR Air Quality\900_CAD_GIS\Mapping\ LCR_ 10.5_ large .mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW

Index of Multiple Deprivation

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8 - 9

Local Authority Boundary

First issue	DM / DP	20/06/17	P01
No issue Details	BL / DMcB	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Merseytravel
Mann Island
PO Box 1976
Liverpool
L69 3HN

Project Title: LIVERPOOL CITY REGION AIR QUALITY

Drawing Title: PRIORITY PROPERTIES WITHIN 50M OF HIGH NO_2 CONCENTRATIONS

Designed	Drawn	Checked	Approved	Date
DM	DU	TS	TS	19/02/2018

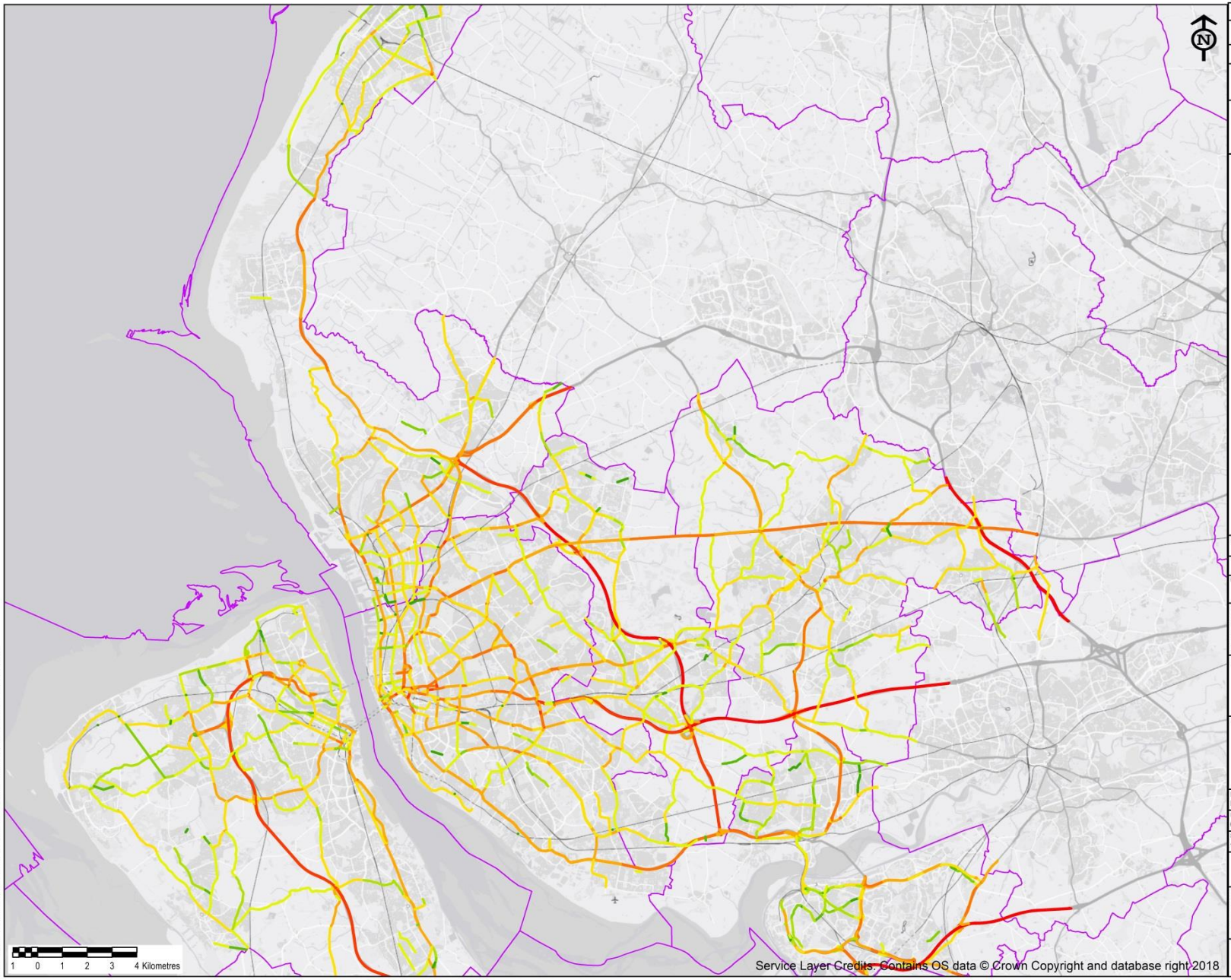
Internal Project No.	Suitability
60547444	
Scale @ A3	Zone
1:120,000	

Project Office
AECOM
3 City Walk
Leeds
LS11 9AR
T +44 (0)113 391 6000
aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 855029
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Rev P01

Plot Date: 19 February 2018 09:29:39
File Name: \\ea.aecomnet.com\EMEA\UK\UKLDS2\Jobs\60547799 LCR Air Quality\900_CAD_GIS\Mapping\LCR_10.5_large.mxd



SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION BOX

IT IS ASSUMED THAT ALL WORKS ON THIS DRAWING WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROPRIATE METHOD STATEMENT.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT.

EXCEPTIONAL RISKS RELATING TO THE WORKS ASSOCIATED WITH THIS DRAWING ARE IDENTIFIED BELOW:

First issue	DM / OP	07/09/17	P01
Revision Details	By / Check	Date	Suffix

Purpose of issue: FOR INFORMATION

Client
Merseytravel
Mann Island
PO Box 1976
Liverpool
L69 3HN

Project Title: LIVERPOOL CITY REGION AIR QUALITY

Drawing Title: ROAD TRAFFIC NOISE LEVELS AT 10M

Designed	Drawn	Checked	Approved	Date
DM	DU	TS	TS	19/02/2018

Internal Project No.	Suitability
60547444	
Scale @ A3	Zone
1:140,000	

Project Office
AECOM
2 City Walk
Leeds
LS11 9AS
T +44 (0)113 391 6800
aecom.com

AECOM Infrastructure & Environment UK Limited
Registered in England Registered number: 868328
Registered office: Scott House, Alencon Link, Basingstoke, Hampshire RG21 7PP

Rev P01

Plot Date: 19 February 2018 09:07:29
File Name: \\eu.aecomnet.com\EMEA\UK\LDS2\Jobs\60557790 LCR Air Quality\900_CAD_GIS\Mapping\ LCR_10.5.mxd

Baseline Review

Local Air Quality

Review Existing Data

Screening Key Priority Areas

Economic Effects

Month, Day, Year

Damage Cost Estimates

Buses	NO_X Emissions, tonnes/yr		PM_{10} Emissions, tonnes/yr		Damage Cost, Central Value	
	Total	Per Bus	Total	Per Bus	Total	Per Bus
Total 2016	9,759	8.3	423	0.4	£229,963,357	**£196,214**
Diesel	7420	9.0	301	0.4	£173,640,016	**£211,653**
B100 Bus	1753	7.5	82	0.3	£41,656,092	**£177,714**
CNG Bus	75	6.4	3	0.3	£1,786,362	**£152,420**
Hybrid Bus	510	4.8	37	0.3	£12,880,887	**£122,117**

Grey Fleet	Emission Model Parameters		Basic EFT Fleet 2016		All Euro 6	
	Km/yr	km/hr	NOX	PM10	NOX	PM10
Urban	846382	48	55808	5255	50038	4916
Motorway	846382	90	68745	3344	61054	2855
			124553	8599	111092	7771
			£2,621,087	£499,805	£2,337,821	£451,671

HGVs	Annual Emission, kg		Annual Damage Cost	
	NO_X	PM_{10}	NO_X	PM_{10}
LGVs	834837	40759	£17,568,306	£2,369,137
- Rigid HGVs	517126	36206	£10,882,403	£2,104,479
- Artic HGVs	122141	11363	£2,570,328	£660,467
Total			**£31,021,038**	**£5,134,083**

Consultation

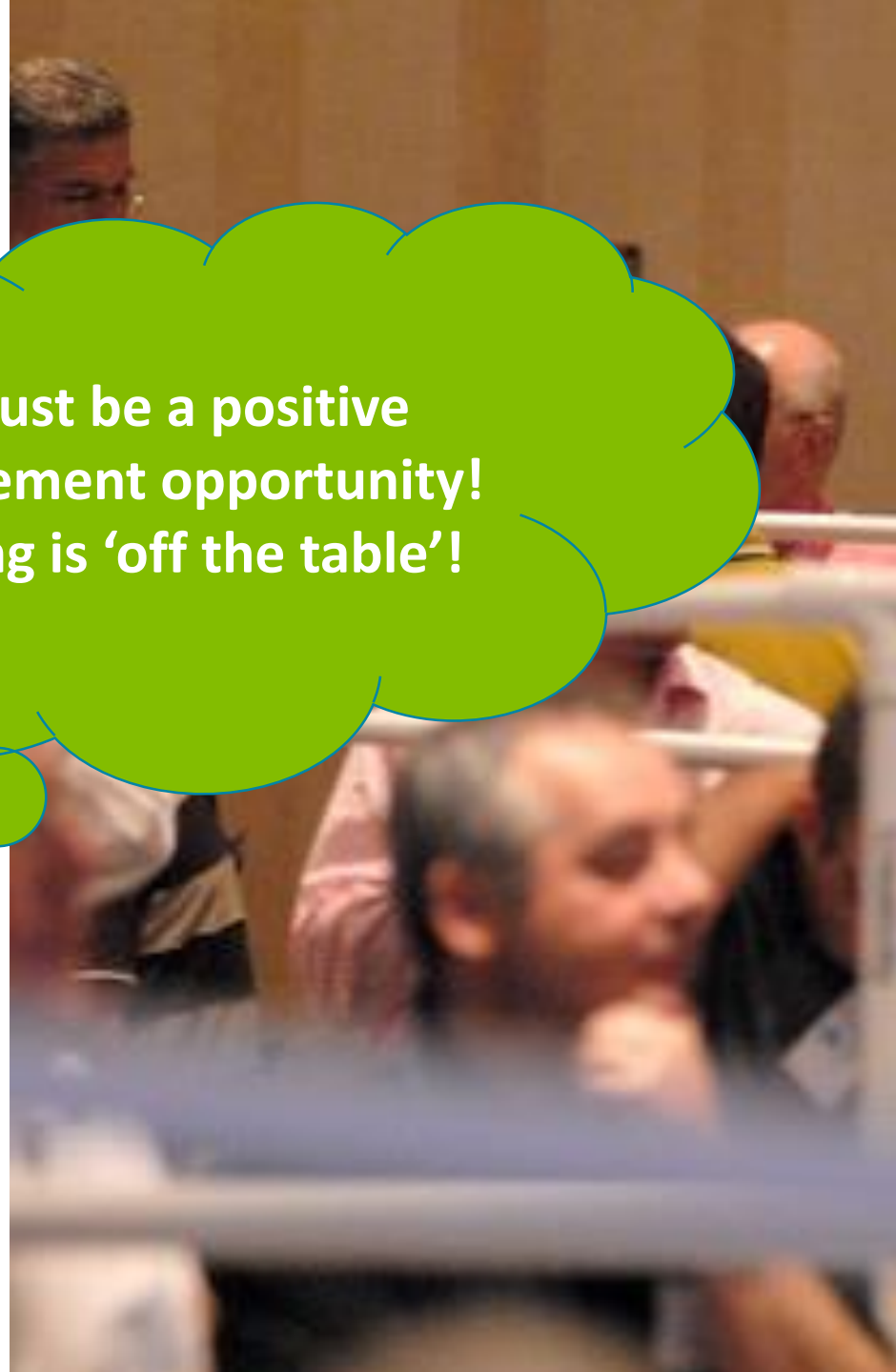
Month, Day, Year

Stakeholder Consultatio

Key stakeholder cons
throughout the proce

- Key Stakeholder g
  - Policy Work Group
  - Technical Steering Group
  - Task & Finish Group

- Commitment will be required for defined actions by individuals
  - Defined milestones
  - KPIs



Draft Interventions

Month, Day, Year

Performance Indicators

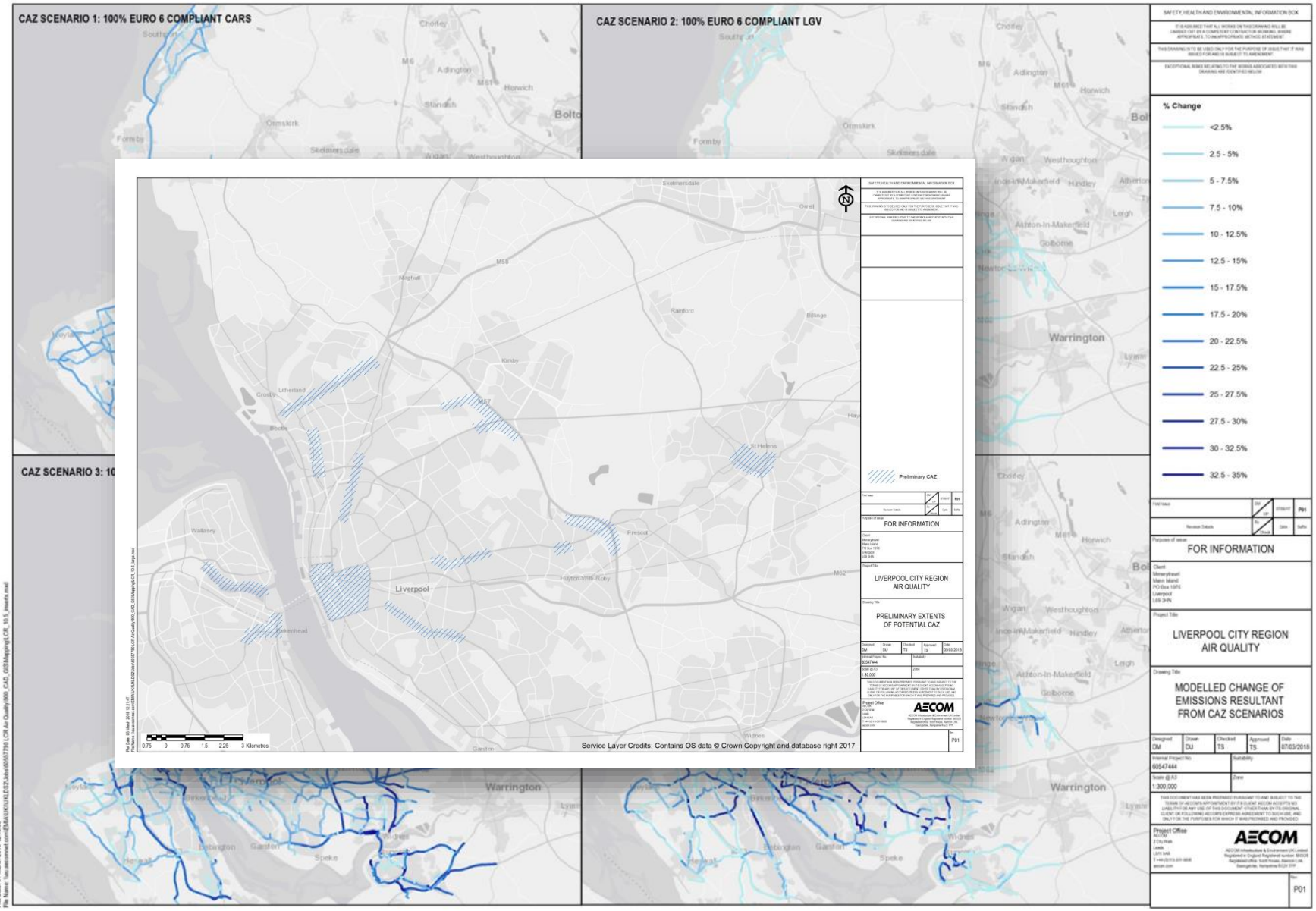
Outcome Categories	Description of Potential Outcome
Infrastructure Improvements	Infrastructure improvements may be used to improve journey times and reduce congestion, and also to provide necessary resources for specific parts of the fleet, such as bus layover facilities. There has traditionally been a reliance on infrastructure changes, which has been used to directly or indirectly achieve beneficial local air quality effects.
Modal Choice	The choice and access to travel modes helps determine the baseline conditions. This will consider the access to, and choice of, vehicle type, age, and the overall proportion of journey mixes.
Policy & Enforcement	Encompassing policy and guidance to directly, or indirectly, regulate specific emission components. This may also include aspirational objectives, in terms of achieving best-practice
Informed Travel Choice & Accessibility	A focus on people and users, rather than the infrastructure being used, may empower and enable individual to make informed travel choices will ensure that long-term sustainability can be achieved.
Engagement & Education	'Enabling' will be achieved through awareness, education and engagement so that understanding air quality becomes a part of day-to-day conversation, much like the effects of smoking or drinking are understood with regard their health effects.
Fleet Improvements	Physical changes to the fleet that achieve reduced emissions, though increased adoption of low emission vehicles and exhaust abatement technologies.

Performance Indicators

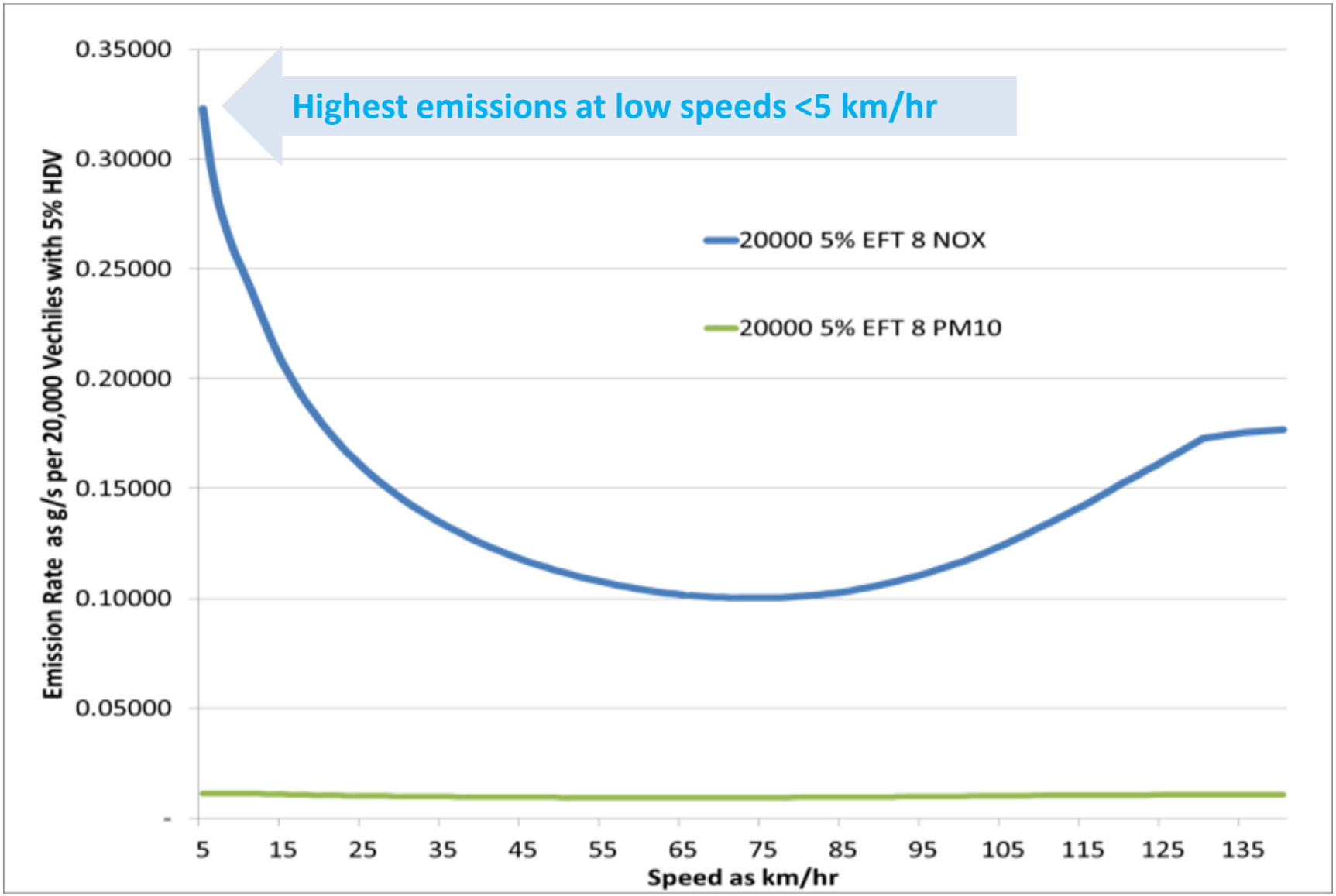
Type	Effect	Example
Reduce Traffic with Modal Shift	Reduce the number of vehicle movements, either during peak hours or more generally. This may affect the whole fleet or only part of it.	Reduce the number of private cars by redistribution onto alternative transport, and changing the need and requirements of travel.
Increase Efficiency	Reduce congestion and achieve lower emissions from the existing fleet.	Changing speeds to achieve less stop-start movement or more efficient driving profiles, such as through variable speed limits, traffic-light timing or driver education.
Improve Fleet	Change the composition of the existing fleet to increase the proportion of low emission vehicles.	Displace older vehicles in favour of vehicles that achieve ultra-low emissions, such as Electric Vehicles (EV).
Reduce Exposure	Reduce the level of exposure resultant from traveling on, or near, highways or other pollutant sources	Public education and empowerment, to promote an understanding of the exposure pathways, leading to change in behavior

Score		Cost	Timescales	Population Affected	Climate Change	Social Inclusion
High	3	No costs, or funds allocated	Immediate <10 months	Whole Region > 1000 properties	Negative	Negative
Medium	2	<£10,000	Short < 2020	Large Areas > 100 properties	Neutral	Neutral
Low	1	<£100,000	Long > 2020	Discrete areas <100 properties	Detrimental	Detrimental

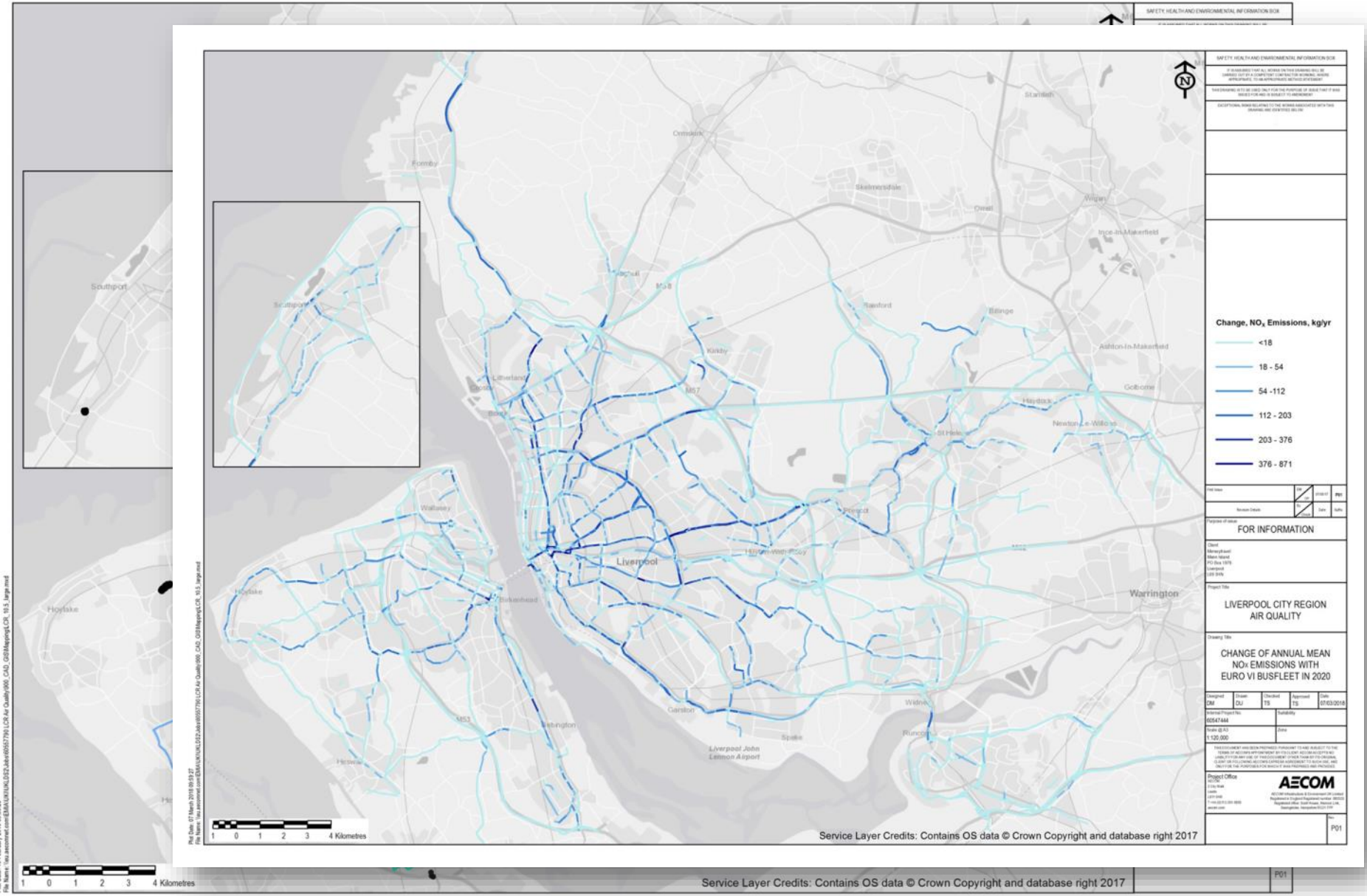
CAZ


CAZ SCENARIO 1: 100% EURO 6 COMPLIANT CARS
CAZ SCENARIO 2: 100% EURO 6 COMPLIANT LGV
CAZ SCENARIO 3: 10
Preliminary CAZ
FOR INFORMATION
LIVERPOOL CITY REGION AIR QUALITY
PRELIMINARY EXTENTS OF POTENTIAL CAZ
Service Layer Credits: Contains OS data © Crown Copyright and database right 2017
% Change
<2.5%
2.5 - 5%
5 - 7.5%
7.5 - 10%
10 - 12.5%
12.5 - 15%
15 - 17.5%
17.5 - 20%
20 - 22.5%
22.5 - 25%
25 - 27.5%
27.5 - 30%
30 - 32.5%
32.5 - 35%
FOR INFORMATION
LIVERPOOL CITY REGION AIR QUALITY
MODELLED CHANGE OF EMISSIONS RESULTANT FROM CAZ SCENARIOS
AECOM
P01

Speed Effects

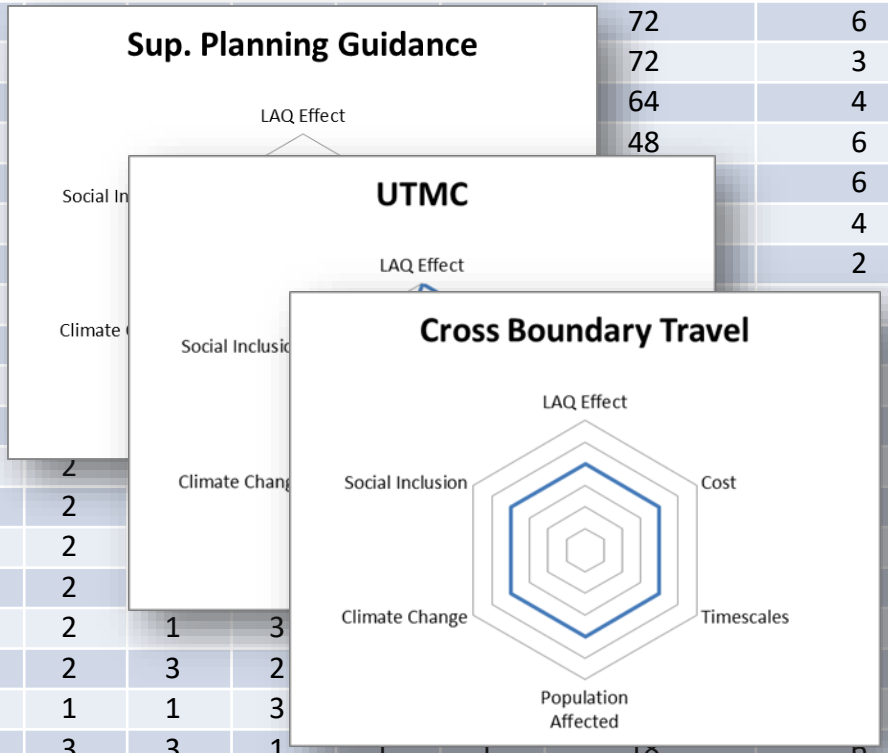


Bus Retrofit



Ranking and Scores

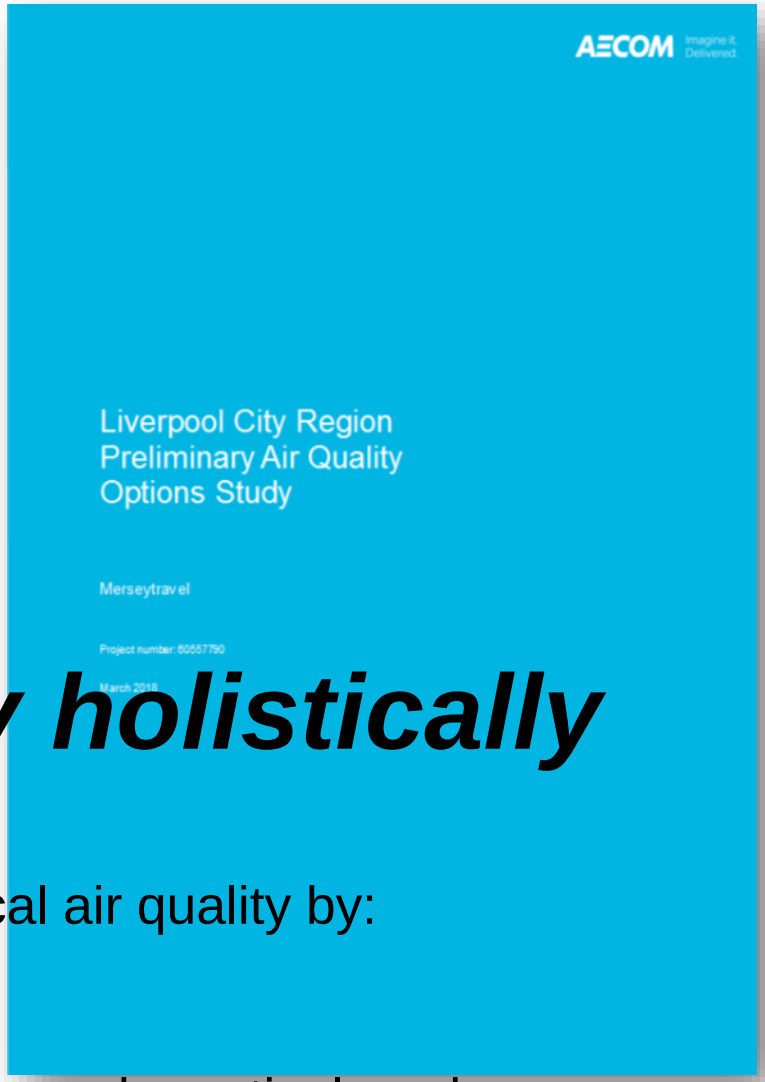
Intervention	LAQ Effect	Cost	Timescales	Population Affected	Climate Change	Social Inclusion	Ranking Score	Ranking Score for LAQ Effect and Timescale Only
UTMC	3	3	2	2	2	1	72	6
Sup. Planning Guidance	2	3	2	3	2	1	72	4
Fleet Recognition Scheme	2						72	6
Engagement & Education	1						72	3
Cross Boundary Travel	2						64	4
Bus Fleet Upgrades	3						48	6
Mersey Toll	3							6
Fleet Management	2							4
Travel Cards	1							2
Web Resources	1							
Car Clubs	1							
Pollution Event Forecasting	1							
Segregated Bus Lanes	2							
Red Routes	2	2						
Freight Coordination	3	2						
Taxi Management	2	2						
Real-time Passenger Information	1	2						
Travel Planning Resources	1	2	1	3				
Green Infrastructure	1	2	3	2				
CAZ	3	1	1	3				
Construction Emissions	2	3	3	1	1	1	18	6
Bus Layover Facilities	2	2	1	2	2	1	16	2
Cycling Infrastructure	1	2	1	2	2	2	16	1
School Audits	1	2	2	2	1	2	16	2
Alt Fuel Infrastructure	2	1	1	2	2	1	8	2
Shared Space	1	1	1	2	2	2	8	1




AECOM
Imagine it.
Delivered.
Outcomes
Month, Day, Year

Key Principles

- Novel use of existing data
- Recognising the effects on AQ of planned works
- Create links to related disciplines
- Engagement with key stakeholders



Tackling air quality holistically

An optimistic strategic plan to improve local air quality by:

- Using local data
- Focussing on public health
- Ensuring interventions were achievable and practical, and would make a measurable difference


AECOM
Imagine it.
Delivered.
WELLS FARGO
AECOM
AECOM