LONDON LOW EMISSION
CONSTRUCTION PARTNERSHIP

16th January 2018

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LONDON LOW EMISSION
CONSTRUCTION PARTNERSHIP

Industry Outreach

- Raising awareness of industry impacts on local air quality
- Encourage uptake of ‘cleaner’ mitigation measures
- Present case studies with cost benefit for low emission solutions

Testing

- Measure ‘real world’ emissions
- Emission reduction trials
- Improve pollution monitoring and quality of data

NRMM

- LEZ enforcement
- Policy support
- NRMM database

Phase 1: 2014-16
Phase 2: 2016-19

Key Progress since last meeting

- LLECP web pages updated
- Chemical dust suppressant case study
- Industry outreach at multiple conferences
- NRMM v2 website launched
- Development of mini-PEMS system
- Generator emission control system
- NRMM Inventory development

10:30	Welcome and introductions	Frances Evans
10:35	Project overview	David Green
10.40	Review of previous meetings minutes	David Green
	INDUSTRY OUTREACH PROGRAMME	
10:45	Industry Outreach Meetings and Media	Daniel Marsh
10:50	LLECP website update	Daniel Marsh
	ABATEMENT MEASURES PROGRAMME	
10:55	Dust Suppressant Application	David Green
11:05	Emissions abatement for Stage IIIA Generators	Daniel Marsh
11:15	NRMM Emissions Inventory Development	David Green
11:20	NRMM Portable Emissions Testing	Carl Desouza
11:30	Future abatement measures	Daniel Marsh
	LOCAL AUTHORITIES SUPPORT PROGRAMME	
11:35	Construction Logistics Plan, Deptford	Daniel Marsh
11:40	NRMM Website update	Daniel Marsh
11:45	Local Authority Project Engagement	Fran Evans
12:00	AOB / Date of next meeting	All
12:00	Finish	All

Industry Outreach Programme

Date	Company / Group / Venue	Reason
09/08/2017	AirScan - Julia McNally	WiFi/BT5 tracking for personal exposure mappinng or CLP vehicle movements
14/09/2017	EIC Parlimentary Reception	
02/10/2017	ICE Clean Air Task Force	Engineering Cleaner Air: Final Report Launch
20/10/2017	GLA NRMM Committee	
24/10/2017	IAQM - Routes to Clean Air	Speaker
26/10/2017	London Build 2017	Speaker
31/10/2017	CPA - Annual Conference	Speaker
16/11/2018	Supply Chain School	Assistance with air quality/emission e-learning modules
21/11/2017	Caterpillar and Perkins Engines	PEMS testing/activity data
29/11/2017	Highways England - Plant Users Group	Speaker
01/12/2017	Considerate Constructors Scheme - Robert Biggs	Input into CCS Air Quality guidance
09/01/2018	Mecalac Construction	Discuss potential PEMS trasting and case study for impact of start/stop technology
22/01/2018	DEFRA	Workshop on options for reducing emissions from non-road mobile machinery
23/01/2018	GLA NRMM Committee	
15/03/2018	AMPS annual conference	Speaker
TBC	Croydon Developers Construction Forum	Speaker

CleanAirUK and 1 other Retweeted

IAQM @IAQM_UK · Jul 20

More speakers for #RTCA have been announced @danieljmarsh will be talking about building a cleaner future for London iaqm.co.uk/event/routes-t...

CPA
PLANT CONFERENCE

highways england

THE LONDON BUILD
SUSTAINABILITY
SUMMIT 2017

"GIVING A PRESENTATION ON DIESEL EMISSION - LONDON LOW EMISSION CONSTRUCTION PARTNERSHIP"

Daniel Marsh
Senior Air Quality Analyst, London Low Emission Construction Partnership

LONDON LOW EMISSION CONSTRUCTION PARTNERSHIP

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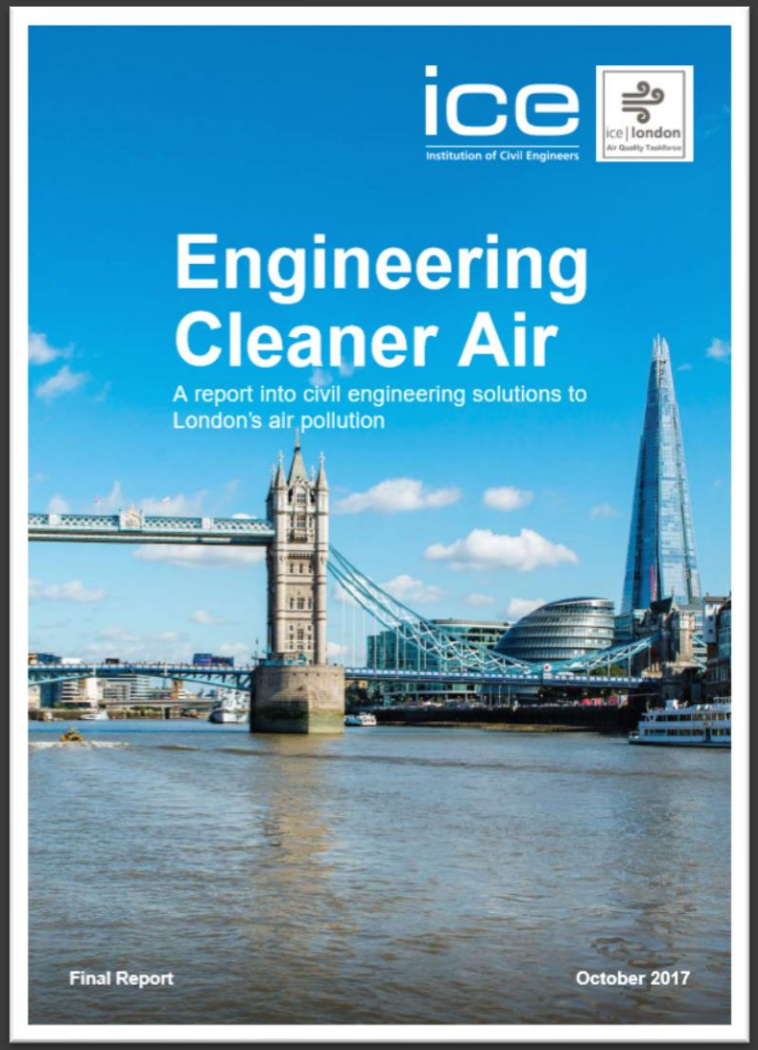
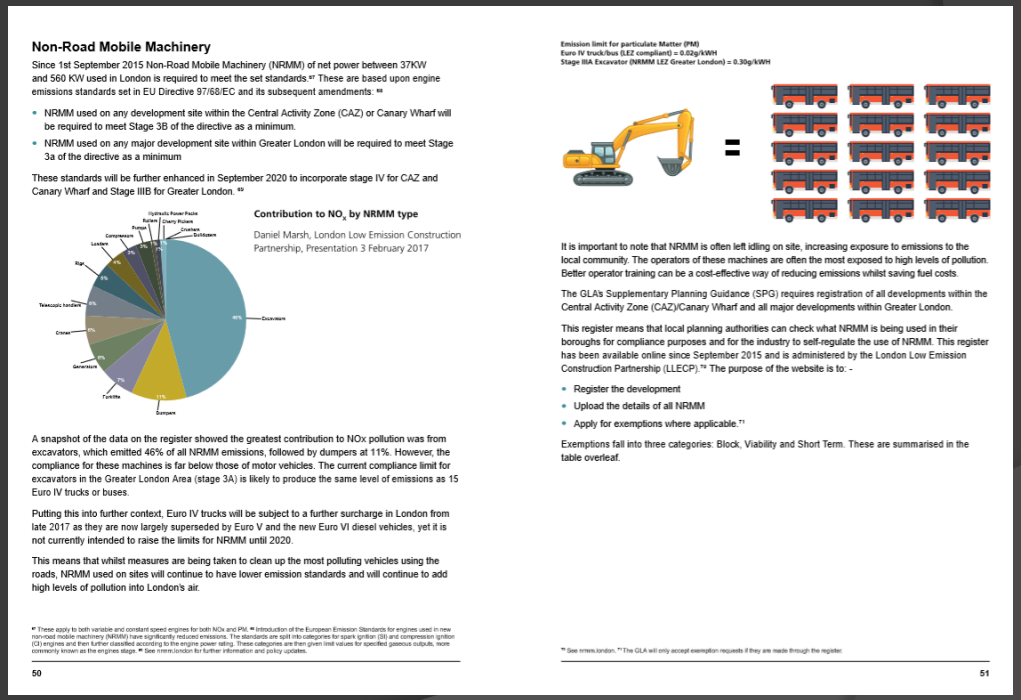


Working with ICE 'London Clean Air Task Force' and Considerate Constructors Scheme to introduce cleaner industry practices and air quality monitoring



Non-Road Mobile Machinery

Since 1st September 2015 Non-Road Mobile Machinery (NRMM) of net power between 37KW and 560 KW used in London is required to meet the set standards.[67] These are based upon engine emissions standards set in EU Directive 97/68/EC and its subsequent amendments: [68]

- NRMM used on any development site within the Central Activity Zone (CAZ) or Canary Wharf will be required to meet Stage 3B of the directive as a minimum.
- NRMM used on any major development site within Greater London will be required to meet Stage 3a of the directive as a minimum

These standards will be further enhanced in September 2020 to incorporate stage IV for CAZ and Canary Wharf and Stage IIIB for Greater London. [69]

Contribution to NO_x by NRMM type

Daniel Marsh, London Low Emission Construction Partnership, Presentation 3 February 2017

A snapshot of the data on the register showed the greatest contribution to NOx pollution was from excavators, which emitted 46% of all NRMM emissions, followed by dumpers at 11%. However, the compliance for these machines is far below those of motor vehicles. The current compliance limit for excavators in the Greater London Area (stage 3A) is likely to produce the same level of emissions as 15 Euro IV trucks or buses.

Putting this into further context, Euro IV trucks will be subject to a further surcharge in London from late 2017 as they are now largely superseded by Euro V and the new Euro VI diesel vehicles, yet it is not currently intended to raise the limits for NRMM until 2020.

This means that whilst measures are being taken to clean up the most polluting vehicles using the roads, NRMM used on sites will continue to have lower emission standards and will continue to add high levels of pollution into London's air.

[67] These apply to both variable and constant speed engines for both NOx and PM. [68] Introduction of the European Emission Standards for engines used in new non-road mobile machinery (NRMM) have significantly reduced emissions. The standards are split into categories for spark ignition (SI) and compression ignition (CI) engines and then further classified according to the engine power rating. These categories are then given limit values for specified gaseous outputs, more commonly known as the engines stage. [69] See nrmm.london for further information and policy updates.

Emission limit for particulate Matter (PM)
Euro IV truck/bus (LEZ compliant) = 0.02g/kWH
Stage IIIA Excavator (NRMM LEZ Greater London) = 0.30g/kWH

It is important to note that NRMM is often left idling on site, increasing exposure to emissions to the local community. The operators of these machines are often the most exposed to high levels of pollution. Better operator training can be a cost-effective way of reducing emissions whilst saving fuel costs.

The GLA's Supplementary Planning Guidance (SPG) requires registration of all developments within the Central Activity Zone (CAZ)/Canary Wharf and all major developments within Greater London.

This register means that local planning authorities can check what NRMM is being used in their boroughs for compliance purposes and for the industry to self-regulate the use of NRMM. This register has been available online since September 2015 and is administered by the London Low Emission Construction Partnership (LLECP).[70] The purpose of the website is to: -

- Register the development
- Upload the details of all NRMM
- Apply for exemptions where applicable.[71]

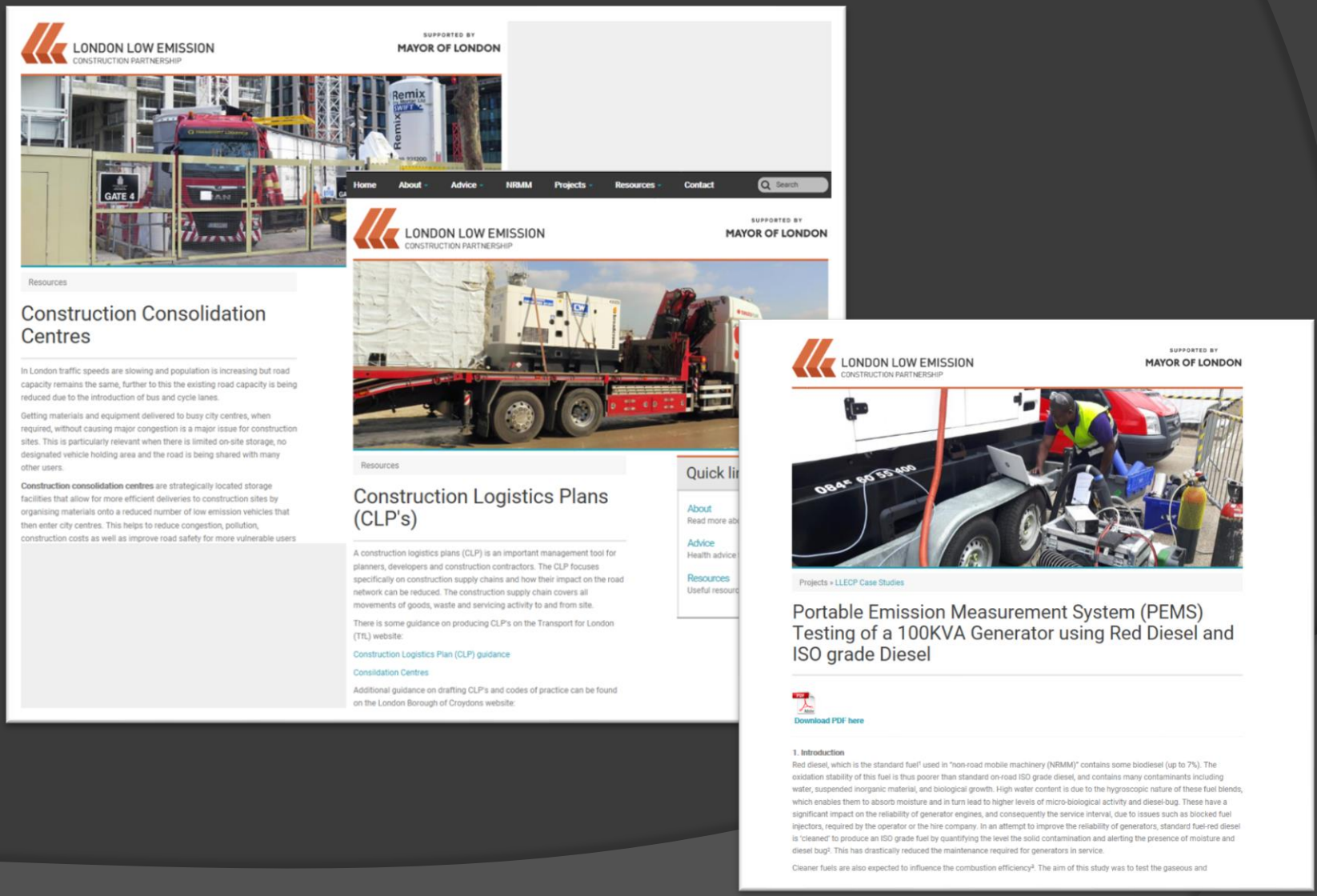
Exemptions fall into three categories: Block, Viability and Short Term. These are summarised in the table overleaf.

[70] See nrmm.london. [71] The GLA will only accept exemption requests if they are made through the register.

https://www.ice.org.uk/ICEDevelopmentWebPortal/media/Documents/Regions/UK%20Regions/ICE-Engineering-Cleaner-Air-Report.pdf


London Low Emission Construction Partnership Website and social media

llecp.org.uk web development



http://www.llecp.org.uk

All Web Site Data

GO TO REPORT

llecp.org.uk overview - Jan 18

All Users
100.00% Sessions

1 Jan 2015 - 12 Jan 2018

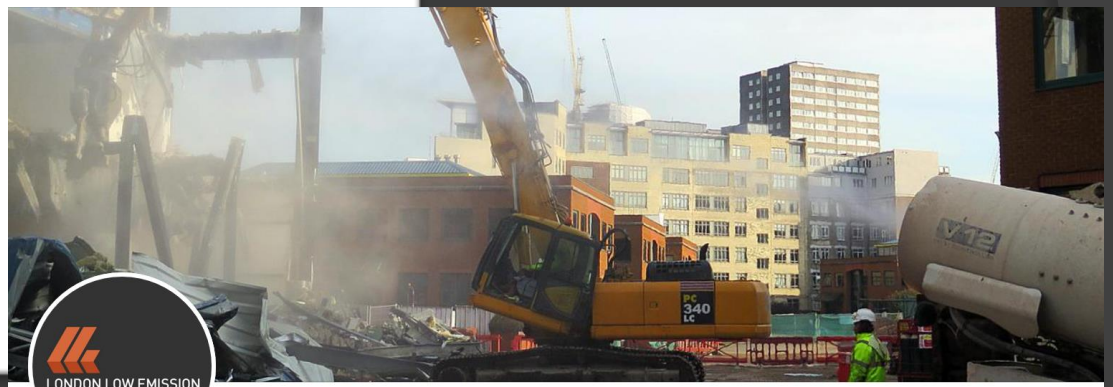
Overview

Sessions

Sessions	Users	Page Views
12,772	9,117	35,383

Pages/Session	Avg. Session Duration	Bounce Rate
2.77	00:03:22	63.04%

% New Sessions
71.37%



LONDON LOW EMISSION
CONSTRUCTION PARTNERSHIP

Tweets	Following	Followers	Likes	Lists	Moments
2,169	1,430	1,818	1,056	1	0

Edit profile

Construction Dust UK
@ConstructDustUK

Raising awareness of the impacts on air quality from construction & demolition in London and testing new emission reduction technology

London, UK
llecp.org.uk
Joined November 2013
124 Photos and videos

Tweets | Tweets & replies | Media

Pinned Tweet

Construction Dust UK @ConstructDustUK · Jan 8
Hybridisation of non-road mobile #machinery reduces #fuel consumption considerably without loss of efficiency lut.fi/web/en/news/-/... #construction #hybrid #NRMM #GreenTech

You Retweeted

Pollution Doncaster @airqualitydonc · 29 Dec 2017
Make a New Year resolution. Help reduce air pollution and get fitter. Leave your car at home and walk or cycle instead

Your Tweet activity

Your Tweets earned **1,428 impressions** over the last **28 days**

View your top Tweets

Who to follow · Refresh · View all

Followed by CRC Healthcare

CMS Law Tax @CMS_Law_...
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LLECP Meeting Minutes

This section of the LLECP website is not for public access or linked through to the main site and is for archiving the presentations given at each of the LLECP group meetings for member reference. These meetings are held quarterly and are attended by representatives of the LLECP member boroughs, GLA, TfL and King's College London.

4th June 2014

10th July 2014

2nd October 2014

13th January 2015

Quick links

About
Read more about the project.

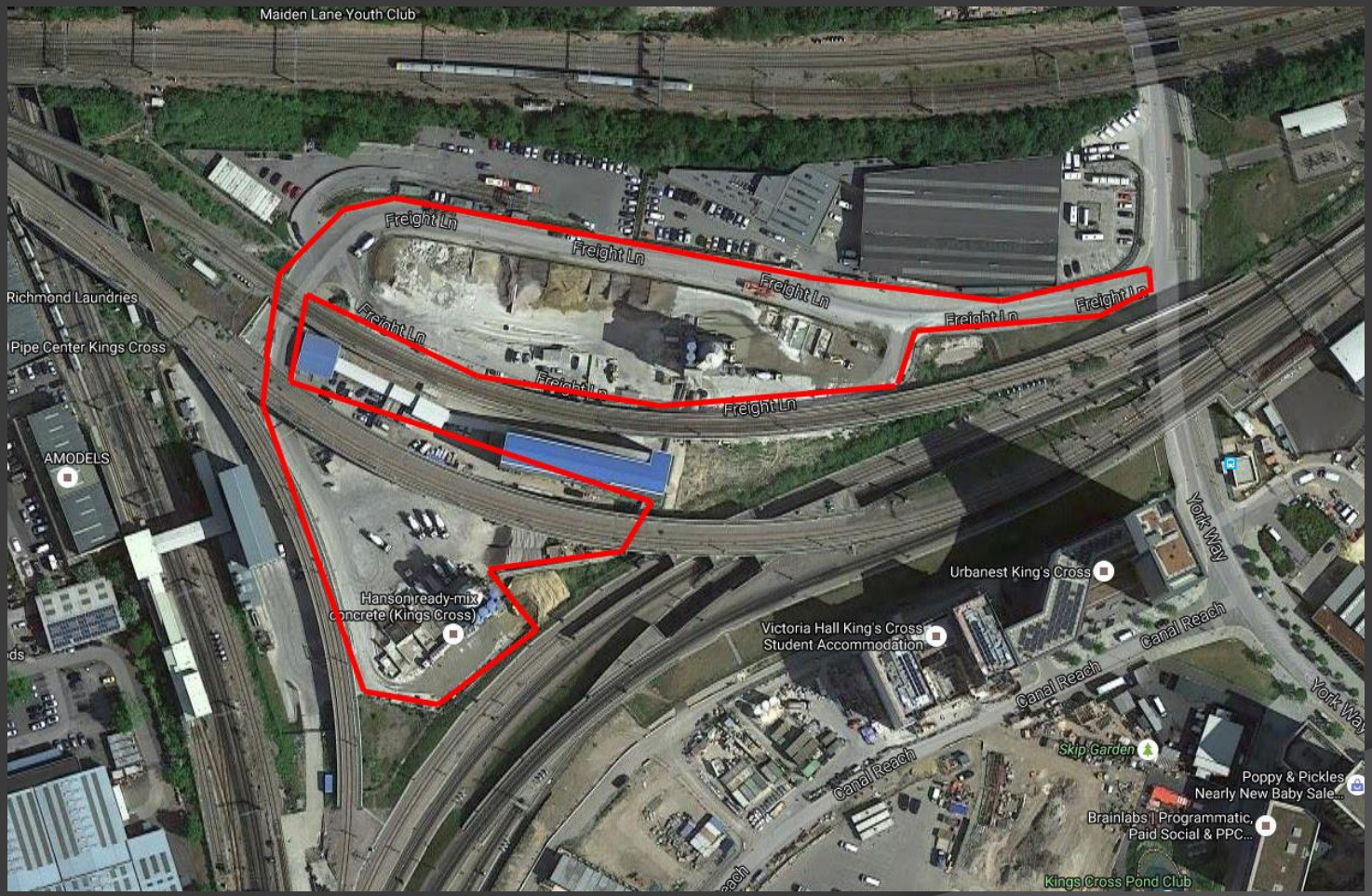
Advice
Health advice for construction dust.

Resources
Useful resources to download.

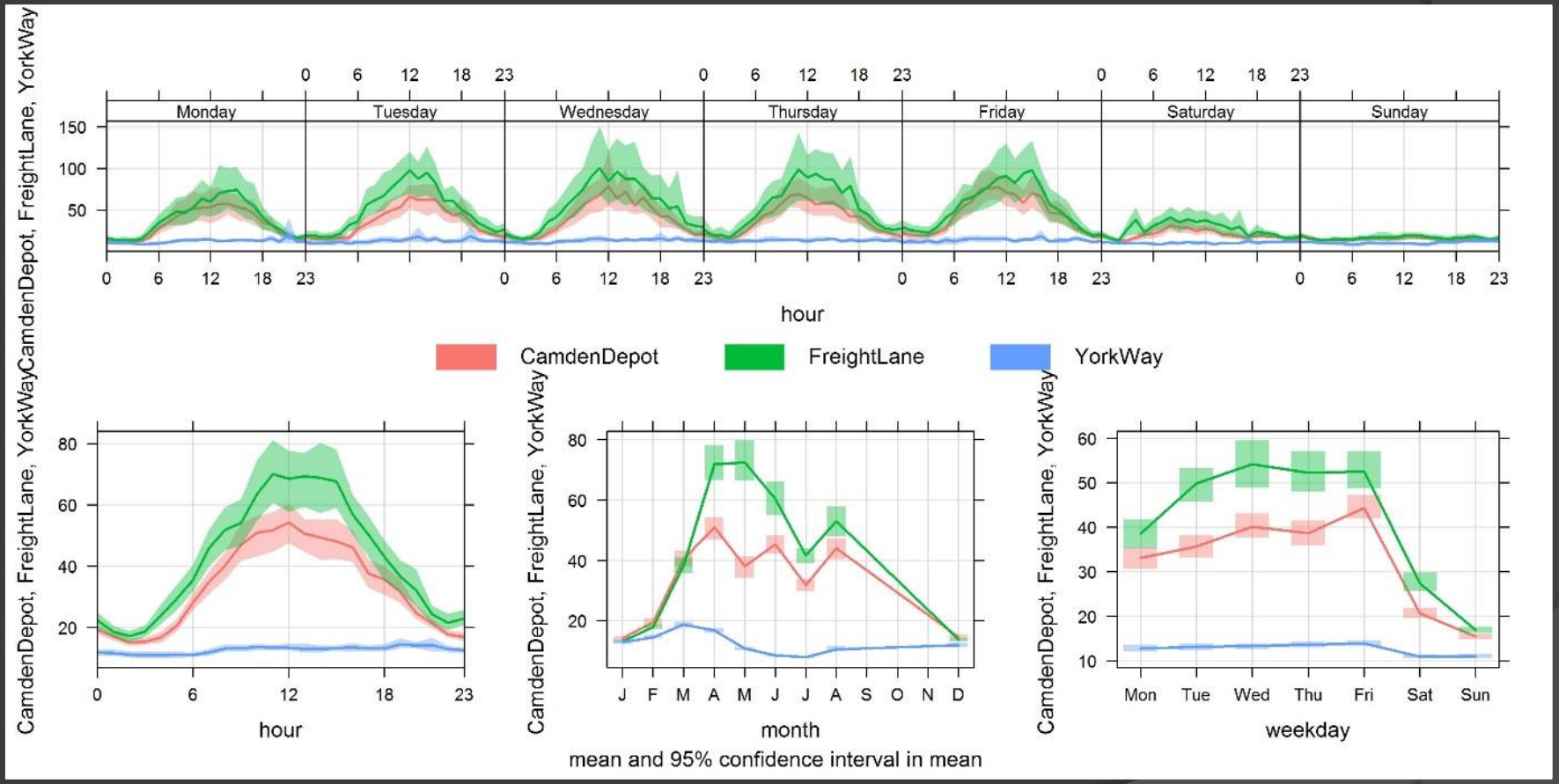
http://www.llecp.org.uk/LLECP-Meeting-Minutes

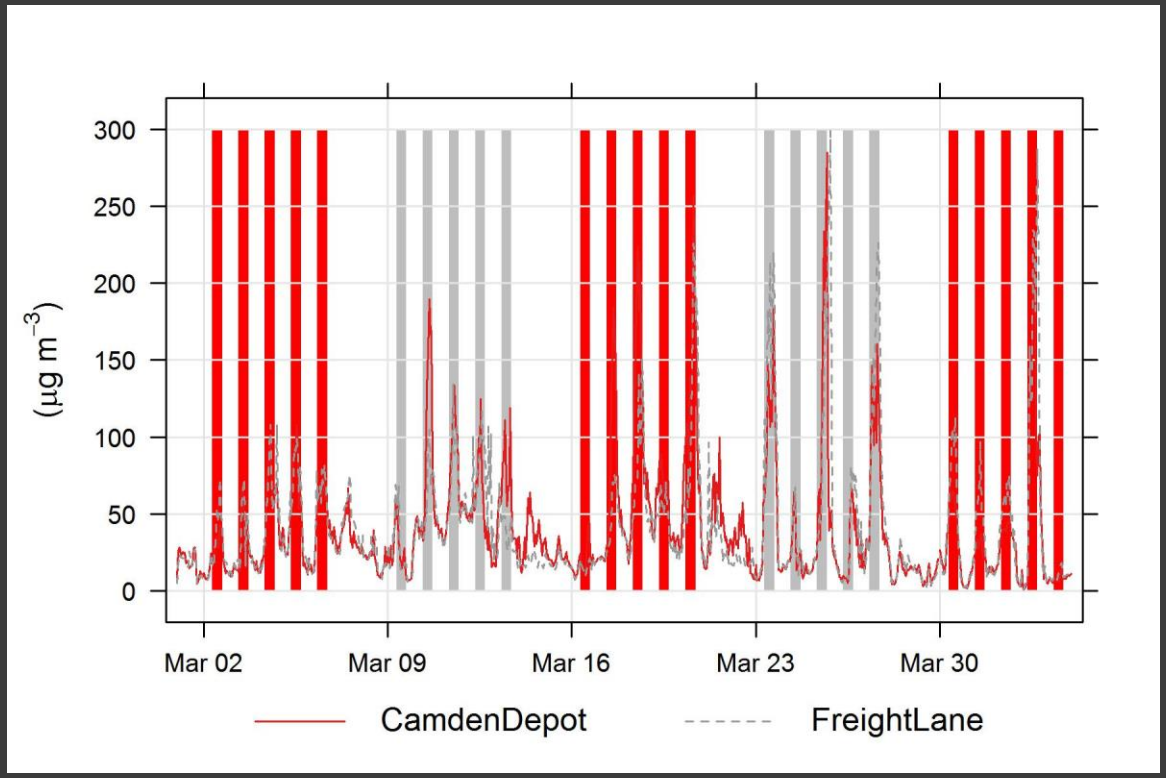
Abatement MeasuresProgramme

Effectiveness of dust suppressant



Long term data



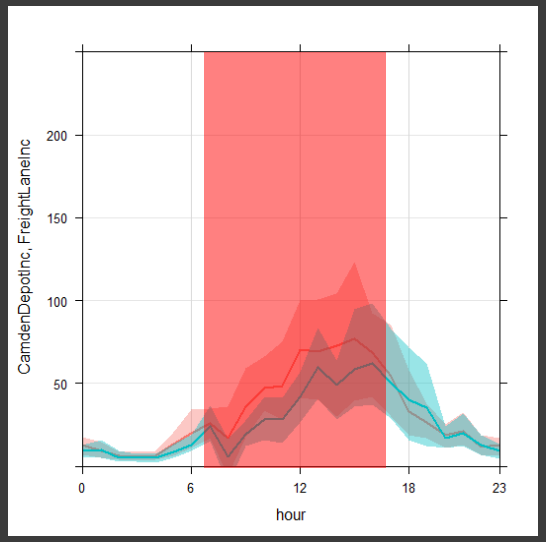


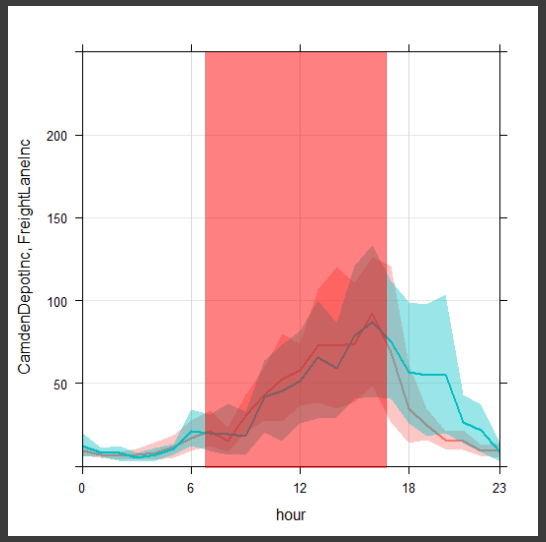
- Each phase was considered independently
- Compare the mean values during operational hours (8am – 5pm) for the weekdays of application against those when there was no CMA applied

No CMA

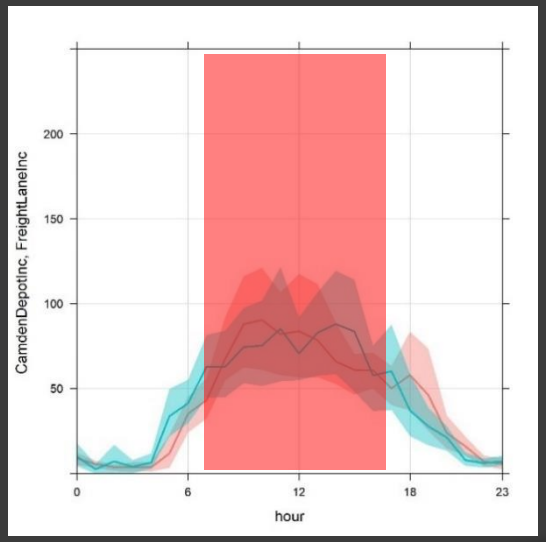
CMA

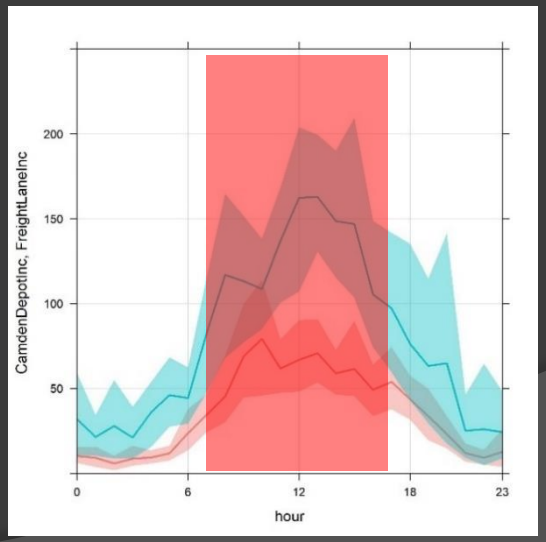
Phase 1





Phase 2



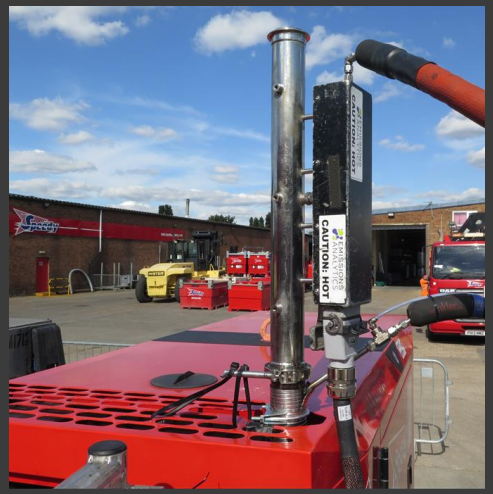


Results

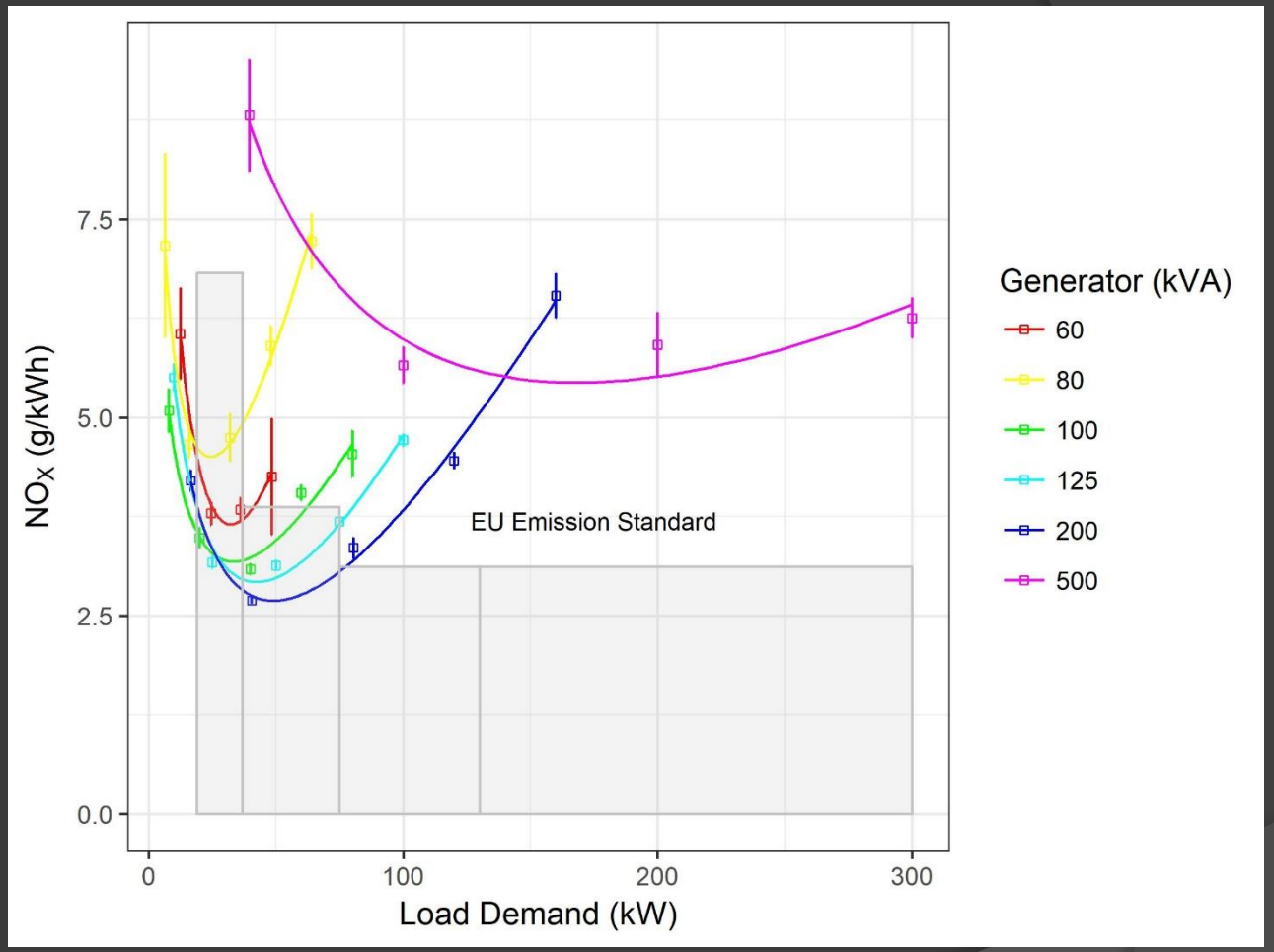
Site	Phase 1					Phase 2				
	CMA ($\mu g\ m^{-3}$)	No CMA ($\mu g\ m^{-3}$)	Difference			CMA ($\mu g\ m^{-3}$)	No CMA ($\mu g\ m^{-3}$)	Difference		
			($\mu g\ m^{-3}$)	(%)	p			($\mu g\ m^{-3}$)	(%)	p
Camden Depot	58.2	50.2	8.0	16	<0.001	61.6	72.7	-11.0	-15	<0.001
Freight Lane	54.3	46.9	7.5	16	<0.001	74.0	129.9	+55.9	+73	<0.001

- All changes highly statistically significant
- Increases at Camden Depot during both phases
- Decrease at Freight lane during Phase 1 and increase in Phase 2
- TfL 2001 trial - the hour following on-site CMA application of between 31% and 59% relative to the control
- Reason for lack of response to CMA difficult to ascertain but likely due to variations in vehicle flow, inadequate application of CMA to last for 9 hour analysis period
- CMA cost £800 per day and has no significant effect on PM concentrations

Emission Abatement for EU Stage IIIA Gensets



Measured NO_X emissions in g/kWh v/s load demand of the generators

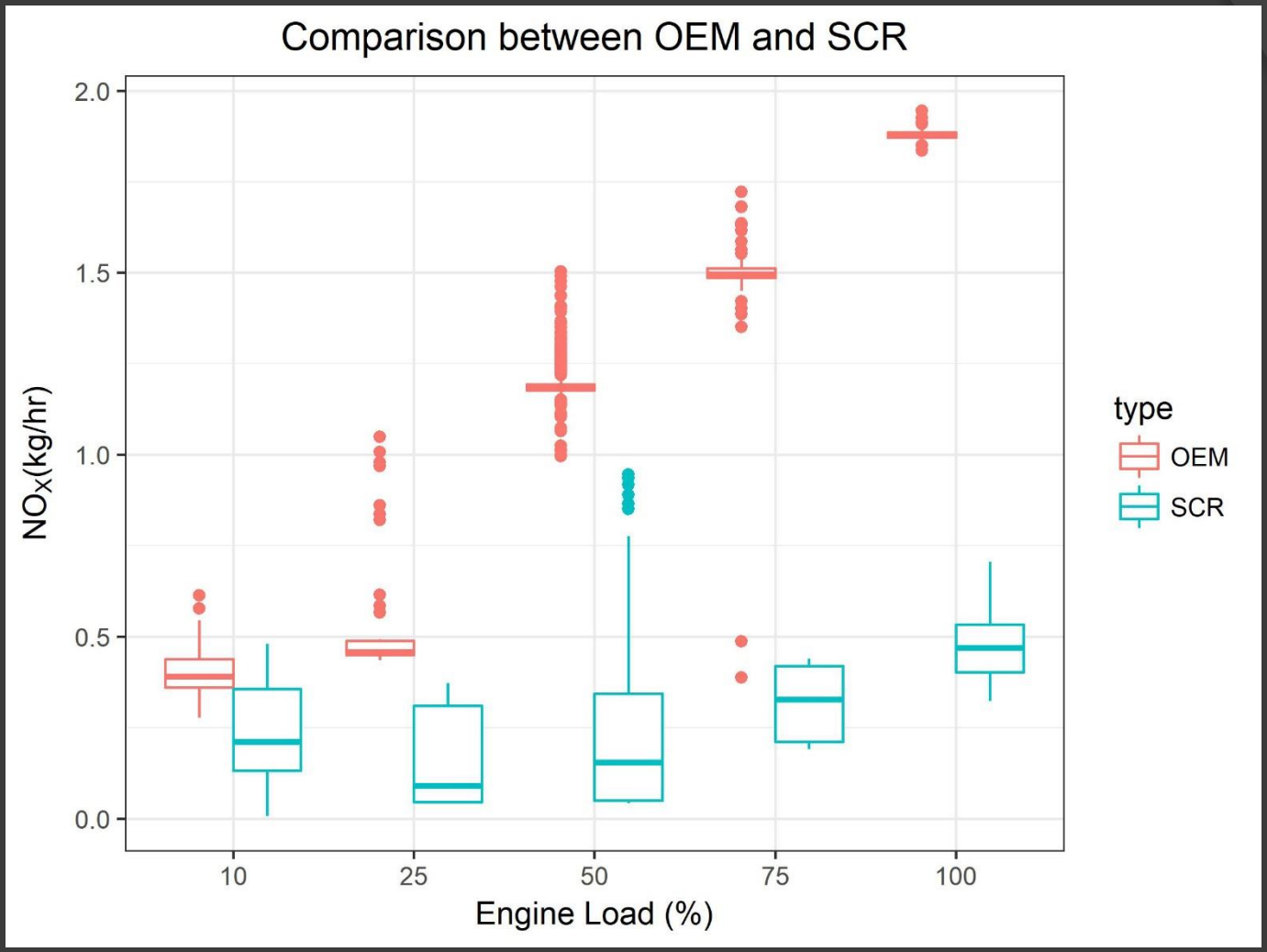


GREEN URBAN TECHNOLOGIES

Firstly Catalysed Diesel Particulate Filter (DPF) combusts the Diesel Particulate Matter as well as oxidising the Carbon Mon-Oxides (CO) and Hydrocarbons (HC) into harmless CO_2 and water.

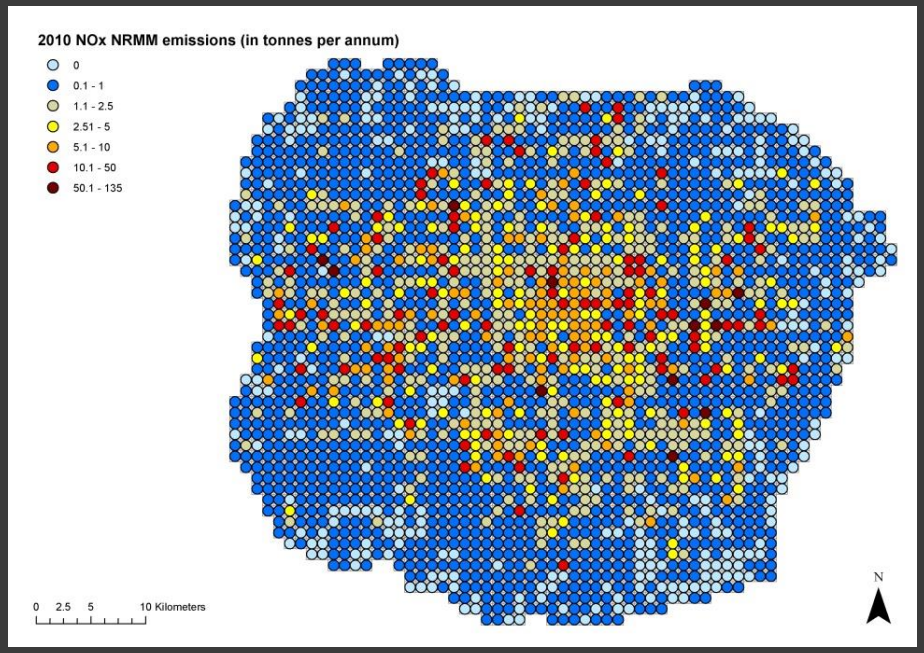
This is followed by an advanced SCR system where AdBlue (a combination of 32% urea in a water solution) is injected into the exhaust to convert the remaining NOx (NO+NO2) into harmless emissions of nitrogen and water.

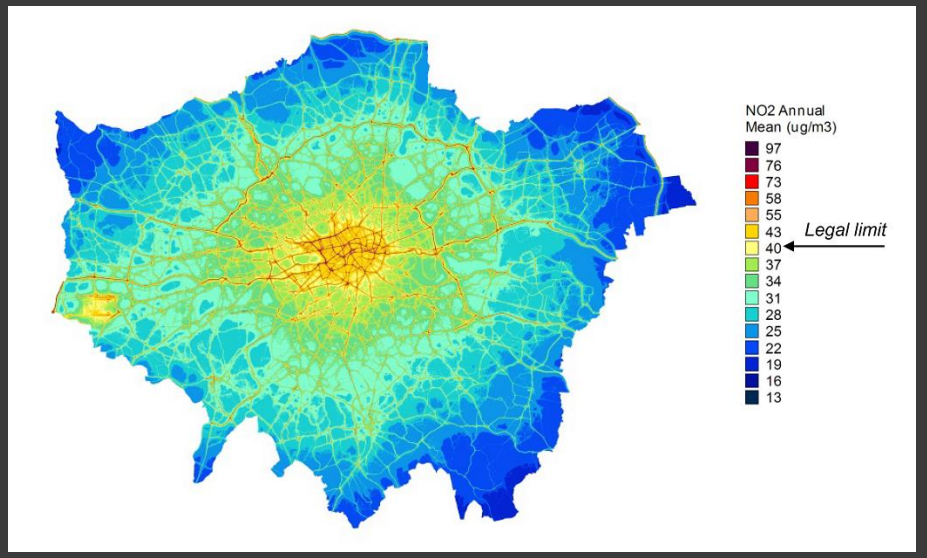
When the Adblue is injected into the exhaust the water content is evaporated and the urea which is left decomposes into a gaseous ammonia gas which reacts across the SCR Catalysts to reduce the NOx back to harmless Nitrogen (N_2) and water vapour



The SCR is more efficient at higher loads, due to the increased engine temps and delivers ~ 73% NOx reduction at full load compared to the OEM.

London Atmospheric Emissions Inventory

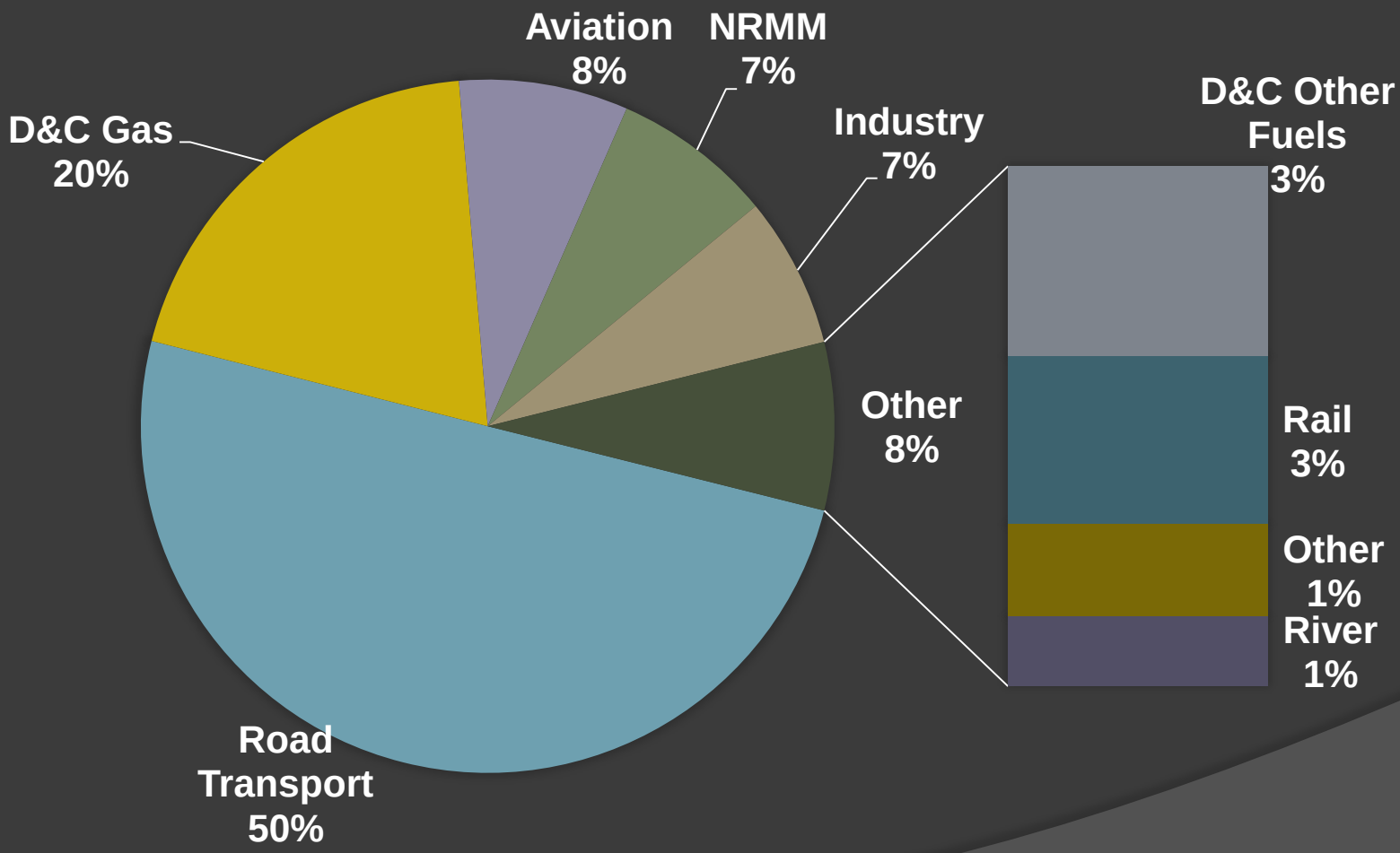




NRMM NO_X Emissions Inventory

Concentrations of NO_2 annual average

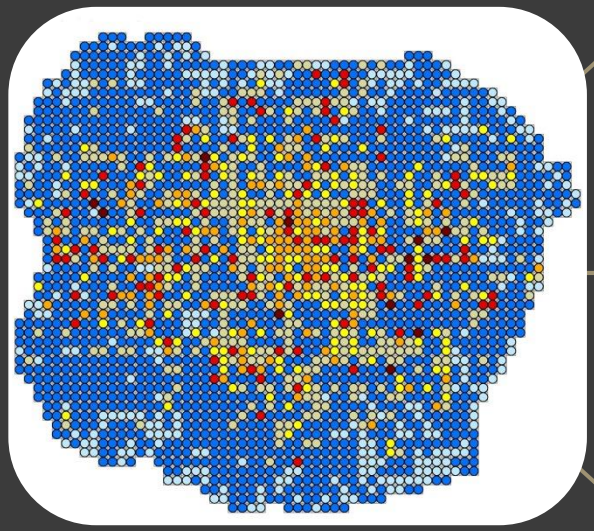
NO_X Emissions Inventory



Current approach to NRMM Inventory

- National Atmospheric Emissions Inventory (NAEI) constructed by Ricardo
- London Atmospheric Emissions Inventory (LAEI) adapted by Aether
- Top down approach
- NAEI
  - Fuel consumption is calculated form Digest of UK Energy Statistics (DUKES)
  - Usage is split by fleet composition fleet composition data from DfT
- LAEI
  - Based on a proportion of NAEI emissions, determined by employment in the construction sector and distributed geographically using the London Development Database (LDD).

NRMM Bottom Up Inventory



Real World Emission Factors

- Engine Test Bed Emissions Factors
- PEMS measurements
- Mini PEMS measurements

Fleet and Location

- NRMM Register
- Supplier data (e.g. JCB Live Link)
- Hire company data
- Compliance visits

Activity Data

- Engine Telematics
  - JCB Live Link
  - Generator suppliers
  - Direct measurements

NRMM PEMS TESTING

Types of NRMM tested

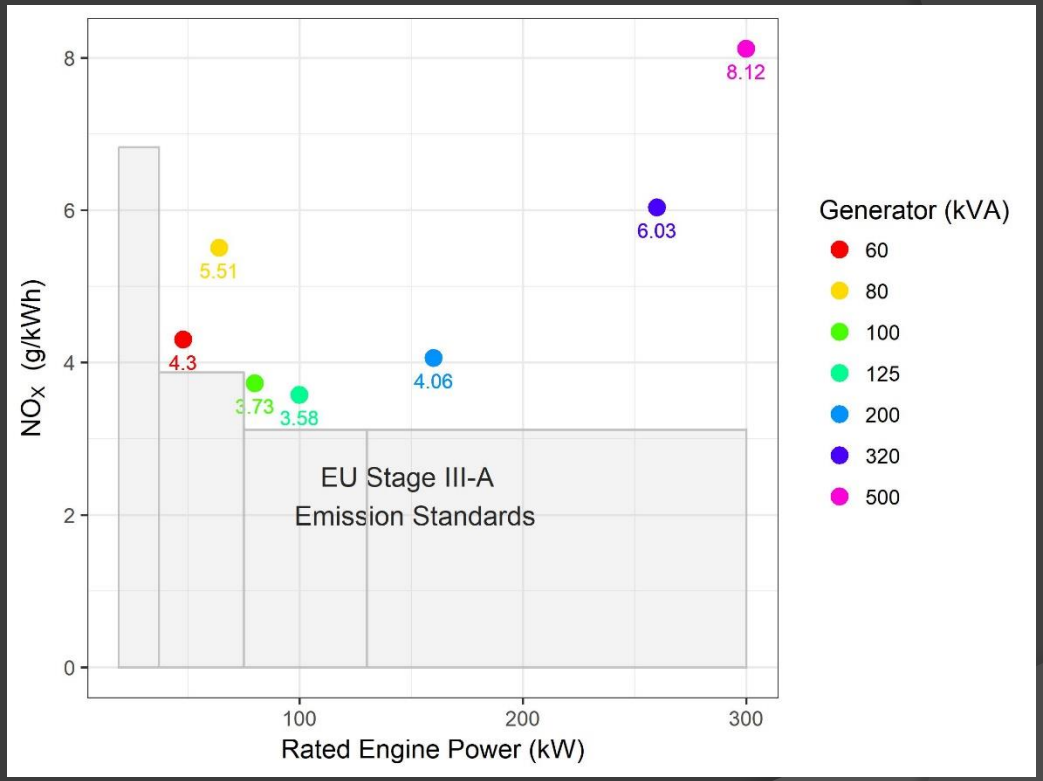
Generators

Excavators

Telehandlers

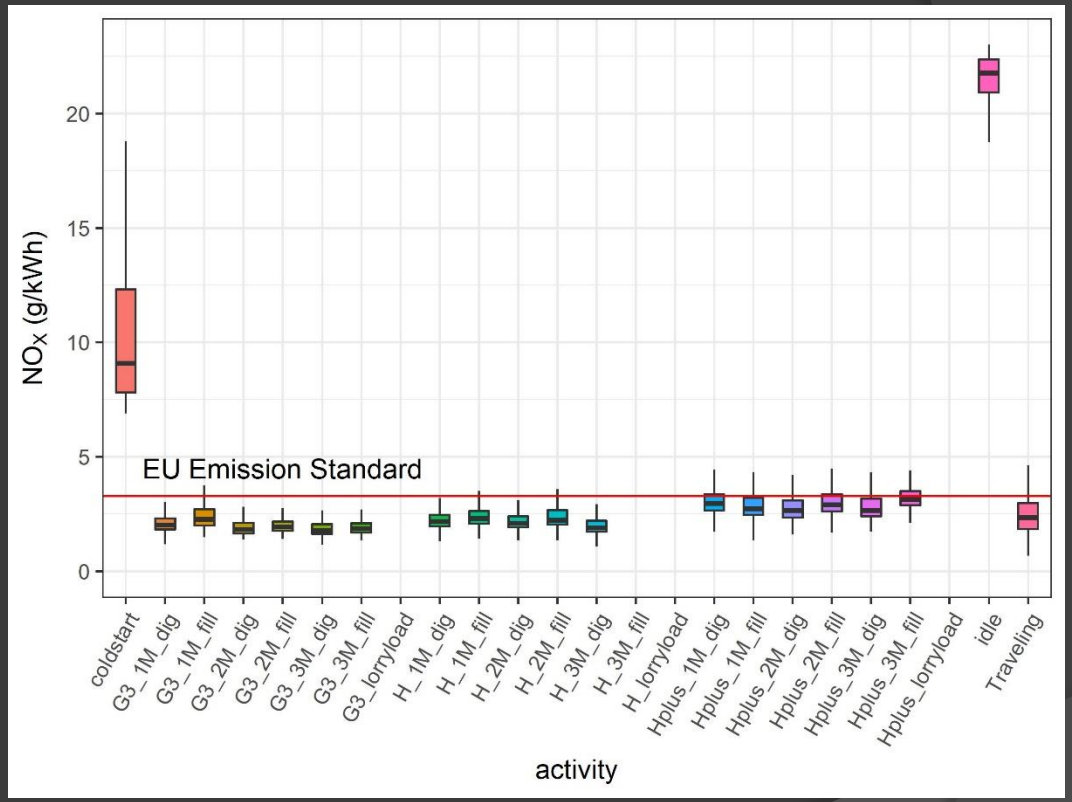
Generator Results:

- Generator emission factors determined using the ISO standards.
- 7 different types of generators.
- All Stage III-A engines



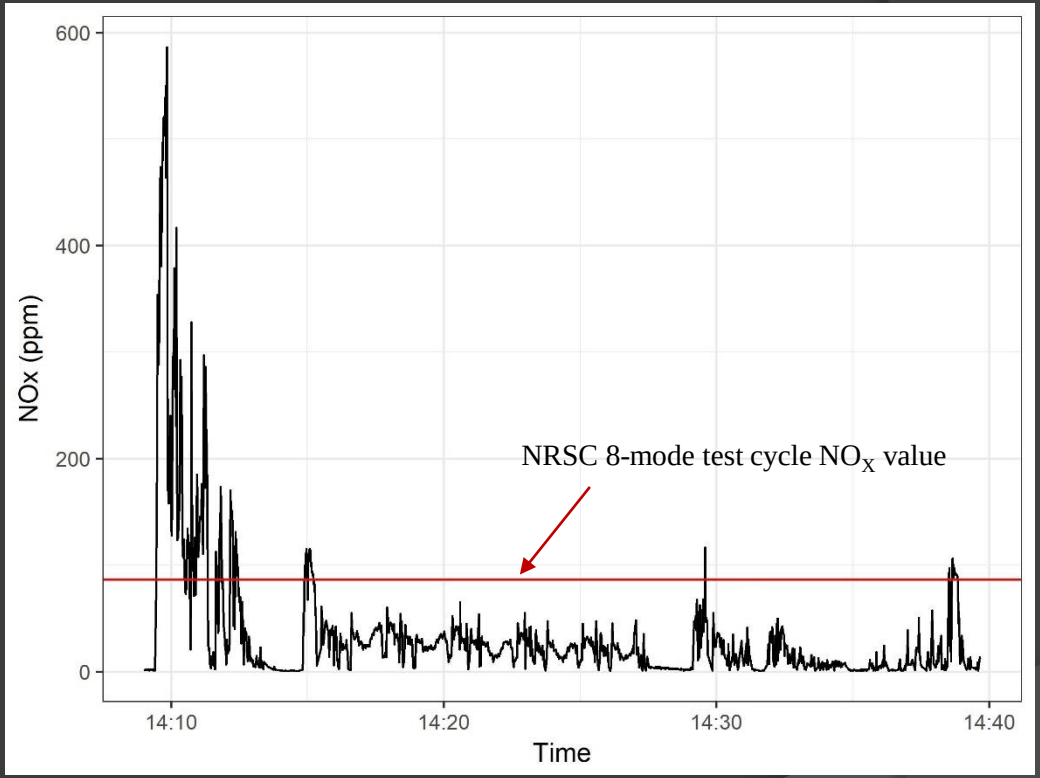
Excavator activity analysis:

- Excavator results based on a single test.
- Different types of activity performed by the excavator.
- Stage III-B engine.



Telehandler mini-PEMS data:

- Preliminary results from the mini-PEMS test.
- Stage IV engine.
- Single-activity test cycle.



Future NRMM to be tested

- Excavators
- Dumpers
- Cranes
- Forklifts
- Loaders
- Rigs
- Pumps

Looking Ahead

Testing new on-board emission abatement technology (PEMS)

Using telematics to better understand and improve operator behaviour

Full site emissions assessment

- Working with major infrastructure projects
- Create full site emissions inventory
- Use for modelling future intervention impacts
- Use mini-PEMS for emission measurement over range of machines
- Correlate telematics/HEMS activity data

Deptford CLP traffic management and emission reductions

- Extensive development in the Deptford area between 2017 and 2026 expected to increase construction related emissions from on-road vehicles
- Brings multiple developments under a single action plan to address and reduce air quality impacts
- Roadside NO_x measurement and traffic counting started in 2017
  - Assess the NO_2 concentrations along Evelyn St in roadside locations relevant to public exposure
  - Relate these concentrations to the traffic measurements to detect changes due to the construction logistics plan

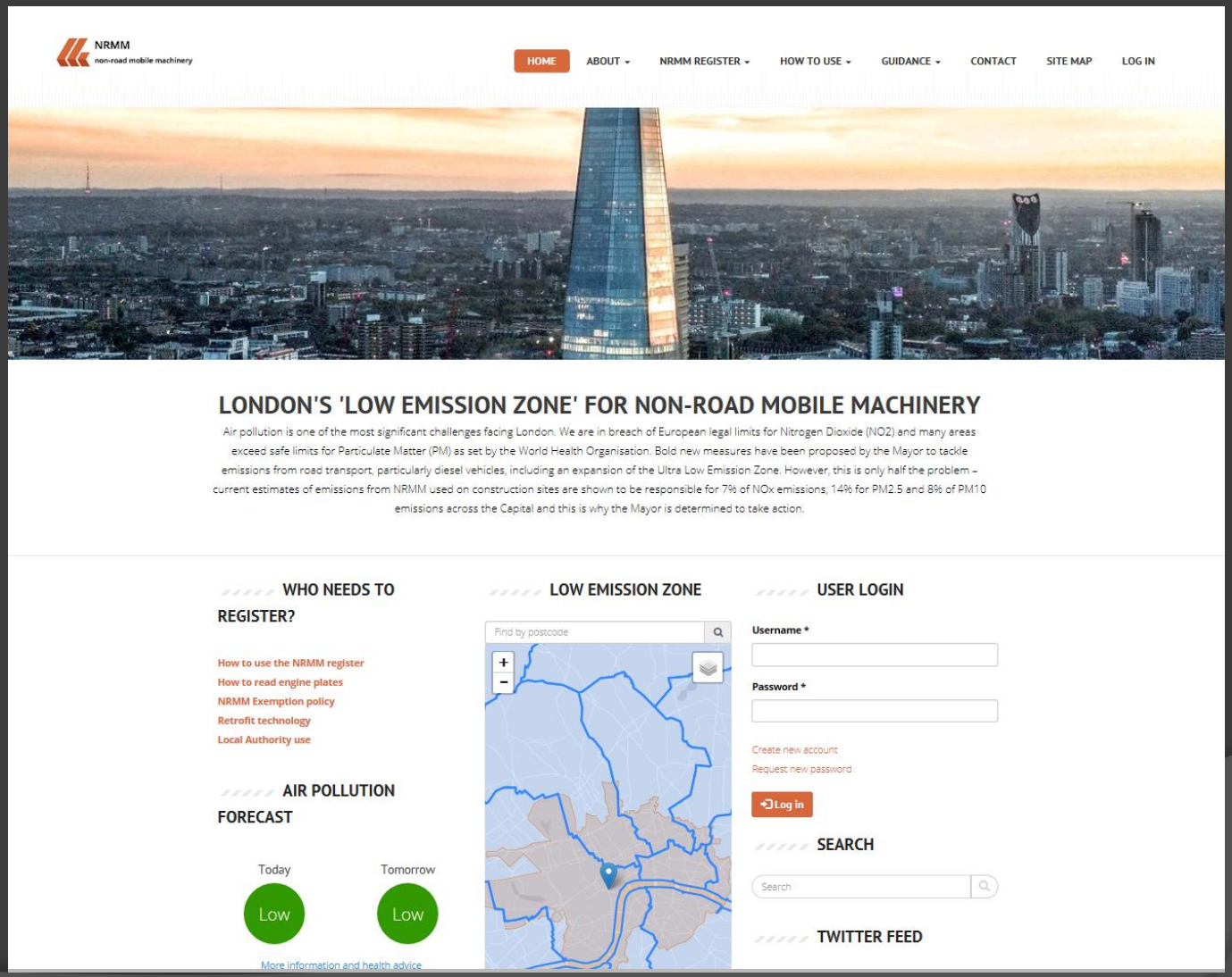
ESC CLP actions include.....

- HGV and cycle safety scheme
- Shared vehicle holding site
- Strategy for re-timing deliveries to site
  - Out of hours deliveries/unloading ‘early doors’
- Utilities works
  - Information sharing to reduce disruption
- Revised traffic and parking enforcement
  - Keeping roads clear and vehicles moving
- Consolidation centres
- HGV’s signage review
- Workforce travel planning

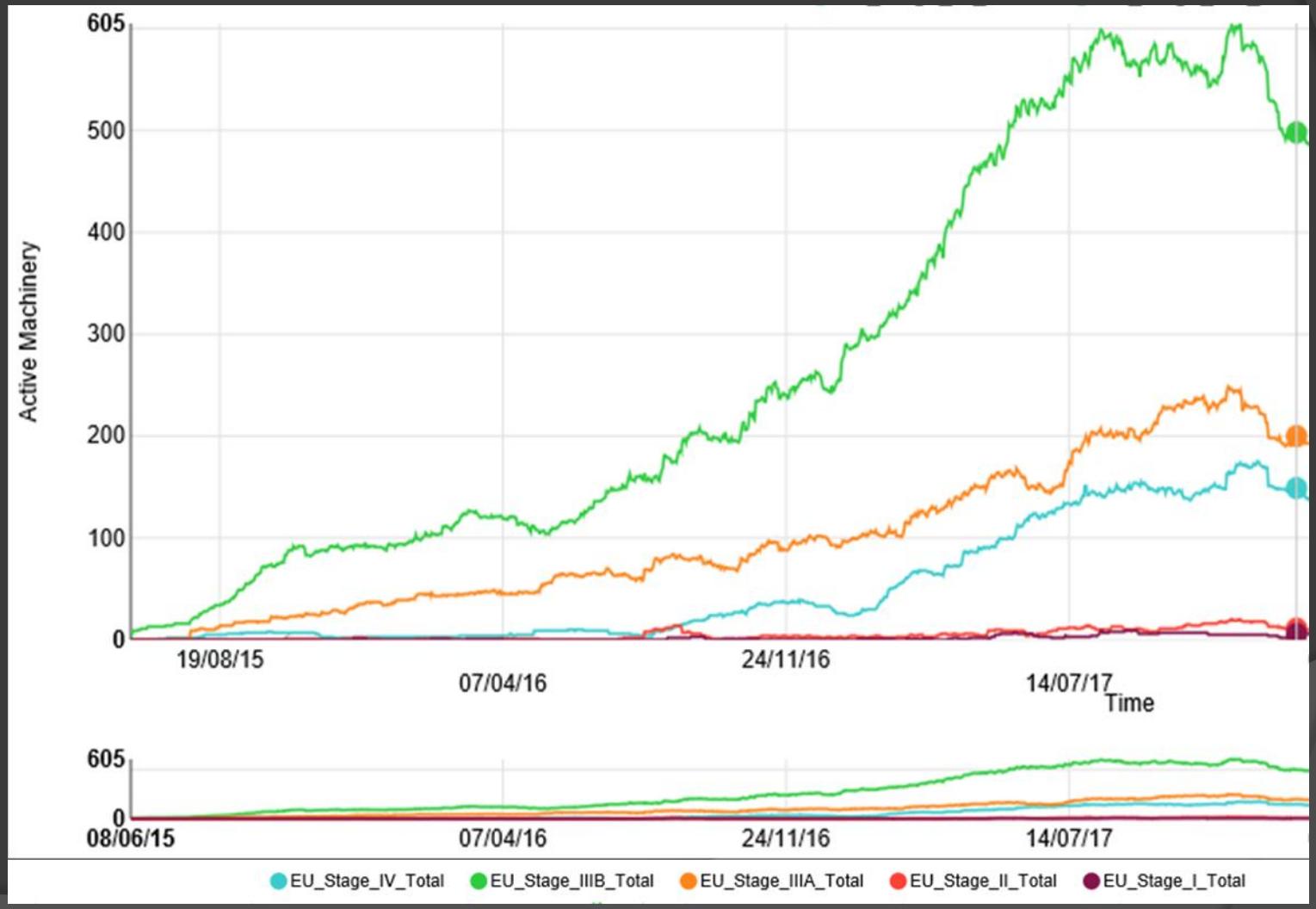
How will the data be used?

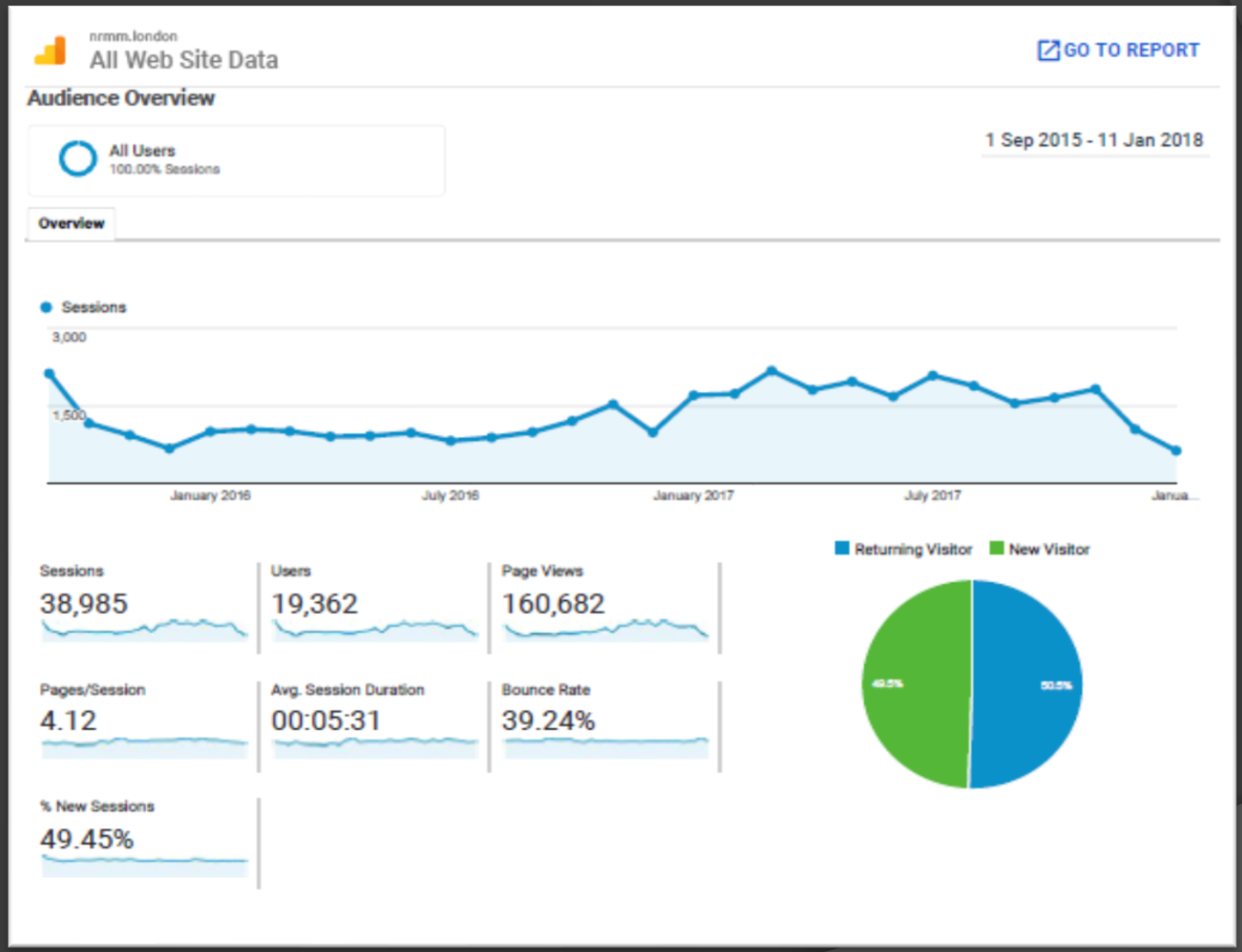
- Communicated back with developers and contractors through ESC CLP Forum
- Used to validate projected daily construction vehicle movements and CLP
- Measure impacts of utilities works
- Future development of ‘traffic toolkit’
  - JIT deliveries
  - Highlight peak and off peak periods in real time
  - Route changing?

NRMM v2.0 website launch



ALL NRMM MACHINERY USAGE BY EU ENGINE EMISSION STAGE




nrmm.london
All Web Site Data
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Audience Overview
All Users
100.00% Sessions
1 Sep 2015 - 11 Jan 2018
Overview
Sessions
3,000
1,500
January 2016
July 2016
January 2017
July 2017
Sessions
38,985
Users
19,362
Page Views
160,682
Pages/Session
4.12
Avg. Session Duration
00:05:31
Bounce Rate
39.24%
% New Sessions
49.45%
Returning Visitor
New Visitor
49.5%
50.5%

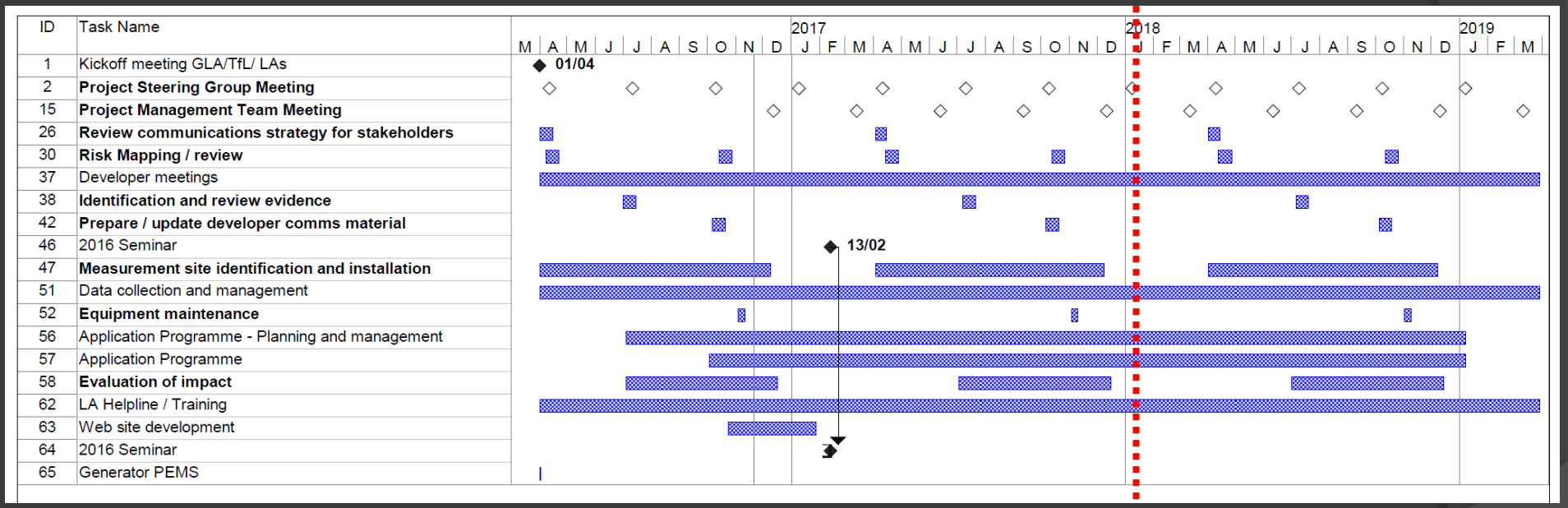
This document contains guidance on the processes and procedures that should be in place on all relevant development sites, including the recommended practices, documentation, considerations and planning conditions.

It can be used by both regulators and developers to better understand what is expected of sites.

http://nrmm.london/sites/default/files/NRMM-Practical-Guide.pdf

Local Authority Project Engagement

Project Plan



Any other business?

- Frequency of LLECP meetings
- Date of next meeting