2016 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2016

Local Authority Officer	Andrew Gillah / Liz Bates
Department	Communities and Neighbourhoods Public Protection
Address	City of York Council Public Protection Hazel Court Eco Depot James Street York, YO10 3DS
Telephone	(01904) 551525
E-mail	public.protection@york.gov.uk
Report reference number	ASR_2016
Date	June 2016

Overview of Air Quality in Our Area

Air quality in York

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2]. The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

City of York Council has declared three Air Quality Management Areas (AQMAs) where the health based national air quality objectives for nitrogen dioxide (NO_2) are currently exceeded. These AQMAs are located in the city centre, in Fulford and along Salisbury Terrace. CYC has a statutory duty to try to reduce NO_2 concentrations within these AQMAs and additional obligations in relation to the protection of public health and reduction of greenhouse gas emissions. The main air pollutants of concern in York are NO_2 and particulate matter (PM). Typically traffic is responsible for around 50-70% of the total NO_2 at any particular location in the city, although the exact amount varies according to proximity to roads and other emission sources.

Recent air pollution monitoring data for York (2015) indicates that the annual average air quality objective for NO_2 is still being breached at numerous locations around the inner ring road (within the city centre AQMA). City centre pollutant concentrations were generally lower in 2015 than those observed in 2014.

Conditions in the Fulford Road and Salisbury Terrace AQMAs have also improved in recent years. Levels of NO_2 in the Fulford AQMA were only just below the annual mean objective level in 2015 and therefore the AQMA is still considered appropriate. The boundary of the Fulford AQMA will be reviewed in 2017.

Concentrations of NO_2 in the Salisbury Terrace AQMA were well below the annual mean objective in 2015. Should concentrations of NO_2 remain at this level throughout 2016, City of York Council will consider revoking this AQMA in 2017.

National air quality objectives for PM_{10} are currently met in York. Health based objective levels for ultra-fine particulates have not yet been set for local authorities to meet. The EU limit value for $PM_{2.5}$ is 25µg/m^3 as an annual average with an additional requirement to reduce average urban background concentrations by 15% by 2020 (against a 2010 baseline). In 2015, the annual average $PM_{2.5}$

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

concentrations measured at York's three monitoring stations were 9.1µg/m^3, 10.2µg/m^3 and 12.0µg/m^3 and were therefore well within the EU limit value.

DEFRA predict that the Yorkshire and Humberside Zone (which includes York) is expected to meet the EU limit values by 2020 (assuming Euro VI diesel engines perform as expected and all local Air Quality Action Plans within the zone are fully delivered). Air quality monitoring and modelling work undertaken by City of York Council indicates that with the proposed York third Air Quality Action Plan measures in place, the health based national air quality objectives for NO_2 will be met in all the current air quality technical breach areas in York by 2021.

Actions to improve air quality

City of York Council has previously produced two AQAPs in 2004 and 2006. These previous plans were primarily modal shift and congestion reduction based plans, with an emphasis on reducing vehicle trips across the city.

Despite the introduction of the two AQAPs, air quality in York continued to deteriorate between 2004 and 2010. In response, York developed an overarching Low Emission Strategy (LES) in 2012 to tackle the issue. This document was the first of its kind in the UK and set out a new approach to local air quality management based on reducing tailpipe emissions from individual vehicles and encouraging the uptake of alternative fuels and low emission vehicle technologies. The Low Emission Strategy has proved particularly effective at tackling emissions from essential service vehicles such as buses, taxis and HGVs, which fall outside of the scope of trip reduction based modal shift measures.

Modal shift and congestion reduction measures remain fundamental to the delivery of air quality improvement and emission reduction in York. The primary local delivery programmes for these measures are the Local Transport Plan (LTP3) and the i-Travel York programme. These programmes include many measures to encourage the uptake of walking, cycling, and public transport in the city. They are supported by planning policies that ensure sustainable travel is embedded into all new development in York.

City of York Council's third Air Quality Action Plan (AQAP3), adopted December 2015[4], sets out how York intends to continue to deliver its ambitious and pioneering overarching Low Emission Strategy (LES) and to work towards becoming an internationally recognised ultra-low emission city.

York's overarching LES (October 2012) has already changed the way York delivers public transport and plans for future transport trips. Since the publication of the LES, York has:

[4] AQAP3 available online at http://www.jorair.co.uk/index.php?page=reports

- Delivered a new fully electric Park & Ride site at Poppleton Bar
- Introduced electric buses at the existing Monks Cross Park & Ride site
- Retrofitted the world's first electric double decker sightseeing bus
- Converted around 7% of the taxi fleet (50+ vehicles) to low emission alternatives (Euro 5+ hybrid or electric) through an innovative taxi incentive grant scheme
- Implemented an extensive 'pay as you go' fast charge public electric vehicle recharging network
- Established 11 publicly accessible rapid chargers
- Achieved a 34% reduction in 'grey fleet ' trips by council staff, reducing CO_2 emissions by 47%
- Developed low emission planning guidance

At the same time, York continues to deliver on walking, cycling and public transport improvements, maintaining its national reputation as a leader in sustainable transport.

York already has much to celebrate in relation to reducing emissions and protecting and improving the health of its residents. However, with an increasing population and thriving local economy, preventing further emission growth and improving air quality remain significant and difficult challenges for the foreseeable future.

Measures in AQAP3 are intended to build upon (but not replace) the modal shift based measures included in previous AQAPs, and are intended to support other emission reduction measures in the Climate Change Framework and Action Plan (CCFAP) and the Local Transport Plan (LTP3).

York secures 'Go Ultra Low' city status

In early 2016, City of York Council was awarded £816,000 from the Office of Low Emission Vehicles (OLEV) and became the only Yorkshire location out of eight in the country to achieve 'Go Ultra Low' city status. The money will be used to fund a city-wide network of hubs, providing ultra fast, reliable and convenient electric charging.

The Go Ultra Low Cities fund is one element of a comprehensive £600 million package of national measures from OLEV to be used by 2020. The package also includes £400 million of guaranteed money for individual plug-in car grants, investment in low emission buses and taxis, and research and development funding for innovative technology.

The 'Go Ultra Low' status follows York's earlier success in securing £308k from DfT's Clean Bus Technology Fund to retrofit 28 school buses used in around York with the latest Selective Catalytic Reduction exhaust technology.

Local Priorities and Challenges

Local Priorities for City of York Council

In December 2015, City of York Council's third AQAP was adopted by the Executive Member. This plan sets out the priorities for air quality improvement measures in the city for the next 5 years, until 2020. Headline measures included in AQAP3 include:

- **Reducing emissions from buses through development of a Clean Air Zone (CAZ) in the city** - entry requirements would be based on the frequency with which buses enter the city centre. The most frequent services would be required to have zero emission capability in the city centre by 2018.
- **Introducing anti-idling measures** – initial proposals are for an education based awareness campaign targeted at local transport operators and supported by increased anti-idling signage. Adoption of enforcement powers remains an option available to City of York Council in the future, if necessary.
- **Reducing emissions from taxis** – continuation of the local taxi incentive scheme, encouraging drivers to switch to hybrid or electric vehicles. Also, a new taxi licensing policy, encouraging taxi drivers to use greener vehicles.
- **Reducing emissions from new development** – by requiring all developers to routinely provide electric vehicle recharging infrastructure and Construction Environmental Management Plans (CEMPs) on new developments. In some cases, full emissions impact assessment will be required, together with emission mitigation plans.
- **Reducing emissions from fleets / CYC fleet** – via the ECO-stars fleet recognition scheme and by encouraging the use of low emission car club vehicles (as an alternative to use of personal vehicles for CYC business), switching the council fleet vehicles to alternative fuels and striving for long term improvements in the council fleet.
- **Increasing awareness of the impact of air pollution of public health** – via an improved marketing and communications strategy focussed on health impacts of air pollution.
- **Reducing emissions from all vehicle types** – by continuing to expand the electric vehicle (EV) charging network within York (and the wider region) and by developing local incentives for the uptake of low emission vehicles. CYC currently provides 11 'rapid charge' and 19 'fast charge' locations around the city. There are also currently approximately 20 additional privately owned

charging points located at hotels, retail parks, supermarkets etc with customer access.

- **Attracting low emission industries, businesses and jobs to York** – by developing a 'green business' hub and working towards development of a freight transhipment centre.
- **Continued modal shift and network improvement measures** – via both the LTP3 capital programme and LSTF programme

AQAP3 measures are intended to build upon the modal shift based measures included in previous AQAPs and are intended to support other emission reduction measures included in the Climate Change Framework and Action Plan (CCFAP) and the Local Transport Plan (LTP3).

Challenges faced by City of York Council

There are a number of challenges faced by City of York Council, and indeed the UK, with respect to air quality improvement measures and the ability of local authorities to meet health based air quality objectives in their areas. These include:

- The failure of current vehicle emission standards to deliver reductions in NO_x emissions. There is still considerable uncertainty about the on-road performance of Euro VI diesel vehicles (as highlighted by the recent VW scandal). If Euro VI vehicles do not perform as expected, the number of UK zones and agglomerations exceeding the EU limit values in 2020 may be greater than the number currently predicted by central government.
- The increasing number of diesel vehicles in York (which have increased primary emission of NO_2 and carcinogenic diesel particulate)
- Development related 'emissions creep' through increased development in the city.
- Unnecessary vehicle idling in the city, particularly amongst heavy diesel vehicles, such as buses and HGVs

The above factors are thought to be responsible for the continued existence elevated levels of NO_2 concentrations in York and are considered to be the main reasons for the current AQMA designations.

How to get involved

Further information can be obtained from the air quality pages of City of York Council's main website https://www.york.gov.uk/airquality, or from City of York Council's dedicated air quality website http://www.jorair.co.uk

If you have any queries on Local Air Quality Management in York, please contact us using the details below:

Email: public.protection@york.gov.uk

Phone: 01904 551525

Write to: Public Protection (Air Quality)
City of York Council
Hazel Court Eco Depot, James Street
York
YO10 3DS

Table of contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in City of York Council's area during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by City of York Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Annex D.

2 Actions to improve air quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12 months setting out the measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by City of York Council can be found in table 1 below. Further information related to declared AQMAs, including maps of AQMA boundaries are available online at https://www.york.gov.uk/downloads/20059/air_pollution

Table 1: Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
City Centre AQMA (AQMA Order No.4)	NO_2 annual mean NO_2 hourly mean (certain roads only)	York (City Centre)	Inner ring road and properties included within 6 areas of technical breach.	See measures in AQAP3 (available online at http://www.jorair.co.uk)
Fulford AQMA (AQMA order No.2)	NO_2 annual mean	York (Fulford village)	A19 corridor between Fishergate and the Outer Ring Road. Includes properties on Fulford Main Street only.	See measures in AQAP3 (available online at http://www.jorair.co.uk)
Salisbury Terrace AQMA (AQMA Order No.3)	NO_2 annual mean	York (Leeman Road area)	Parts of Water End and the Leeman Road Area. Includes properties on Salisbury Terrace only.	See measures in AQAP3 (available online at http://www.jorair.co.uk)

2.2 Progress and Impact of Measures to address Air Quality in York

City of York Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in table 2. More detail on these measures can be found in City of York Council's third Air Quality Action Plan (AQAP3), available online at http://www.jorair.co.uk/index.php?page=reports.

Key completed measures are:

- Development and implementation of LES based Planning Guidance. The guidance forms an Annex to AQAP3 (adopted December 2015). The new guidance required developers to offset large emission damage costs via provision on on-site or off-site facilities and/or contribution towards wider LES measures in York.
- Adoption of a new taxi licensing policy, specifying minimum emission standards for new or replacement taxis. In addition, continued support has been provided for local taxi drivers through the Low Emission Taxi Incentive Scheme, whereby a financial incentive is offered to York based taxi drivers when they trade in a conventionally fuelled vehicle for a low emission alternative.
- Continued delivery of the strategic Electric Vehicle recharging network in the city. City of York Council has also recently been awarded funding through the 'Ultra Low Emission City' scheme for further expansion of the charging network.
- Reducing CYC 'grey fleet' trips by working in partnership with city car club to provide a pool of low emission cars for exclusive use by CYC staff during office hours. This has significantly reduced the number of people using their own private vehicles whilst undertaking CYC business. In addition to promoting the use of low emission car clubs, CYC also operates an electric pool car vehicle.

Progress on the following measures has been slower than expected, for the following reasons:

- Further development of the ECO Stars fleet recognition scheme. There are 66 companies signed up to the York Eco-Stars scheme and whilst there was limited funding available to support further growth of the scheme during 2015, funding has now been identified to continue the scheme until May 2017. The possibility of a local 'procurement' standard for the vehicles used by, or to supply, CYC services is currently being investigated.

- Planning and delivery of CNG refuelling infrastructure (and freight consolidation centre). Whilst a feasibility study was completed in 2015, additional work is needed before the proposals can be included within the Local Plan. Such work will need to address deliverability, environmental and design issues and, where relevant, Green Belt purposes.

- LES Marketing and Health Promotion, including website development. Whilst considerable progress has been made in terms of delivery of many of the measures in City of York Council's Low Emission Strategy (LES), a formal LES marketing strategy and website review has not been progressed as per the original plans and timescales due to staff resources.

City of York Council expects the following measures to be completed over the course of the next reporting year:

- Further development of a bus based Clean Air Zone (CAZ) in city centre.

- Development and implementation of anti-idling measures via signage and a new Anti-Idling Enforcement Policy.

- Strengthening of taxi licensing emission controls via a new Taxi Licensing Policy

- Further development of local incentives for low emission vehicles and alternative fuel use.

- Establish an officer working group with respect to the existing low emission planning guidance, with a view to seeing key development and assessment principles adopted regionally across neighbouring authority areas.

- Further modal shift and network improvement measures

City of York Council's priorities for the coming year are:

- *Clean Air Zone* - Agree responsibility for delivering key elements of the CAZ and agree on an enforcement mechanism. City of York Council is currently in discussions with Leeds and York universities regarding modelling the emissions and health impact assessment of the CAZ and aims to progress these studies over the next 12 months.

- *Anti-idling Measures* - Roll-out of anti-idling measures via signage and a new anti-idling enforcement policy.

- *Planning and delivery of strategic EV charging network* - City of York Council's successful Low Emission City bid will allow the introduction of solar

charged EV points at P&R sites and regional expansion of the York EV charging network.

Table 2: Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
1	Development and implementation of a bus based Clean Air Zone (CAZ) in city centre (based on frequency of entry of individual vehicles)	Promoting Low Emission Transport	Low Emission Zone	CYC	2016/2017	2018	Number of ultra low emission buses operating within York Inner Ring Road	Every electric bus introduced into the CAZ will remove local emissions of NO_2 and PM_{10} and reduce CO_2 emissions by approx 35 tonnes. Emission change modelling currently being undertaken by ITS at University of Leeds ** Also, see table footnote*	Emission change modelling currently being undertaken by ITS at University of Leeds OLEV bid to support purchase of additional electric P&R buses has been submitted and result awaited	2018	Individual buses crossing the inner ring road to be ultra low emission from 2018. The main costs are associated with new buses (cost to third party operators)
2	Development and implementation of anti-idling measures	Traffic Management	Anti-idling enforcement	CYC	2016	2017	n/a	At 5 busiest service bus locations, estimated savings per annum of 1,526kg NO_x, 36kg PM_{10}, 46,555kg CO_2,and 17,949 litres of fuel. **Also, see table footnote*	Enforcement policy currently being prepared.	Ongoing enforcement	Main cost is signage. May be some additional staffing and legal costs to be met

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
3	Further development of Eco-stars fleet recognition scheme	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	CYC	Scheme commissioned 2013	Funding identified to allow scheme to run until June 2017	Number of operators signed up to the scheme	A typical van operator could see its annual output of carbon dioxide fall by six tonnes per year *(see http://www.ecostars-uk.com/about-eco-stars/why-join/)* **See table footnote*	There are currently 66 companies signed up to the York ECO-stars scheme.	Funding identified to allow scheme to run until June 2017	The possibility of a local 'procurement' standard for vehicles used by, or to supply, CYC services is being investigated
4	Planning and delivery of CNG refuelling infrastructure	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV charging, Gas fuel recharging	CYC and third party investor (yet to be identified)	ongoing	To be determined	To be determined	A vehicle running on CNG has significantly lower emissions of NO_2, PM_{10} and CO_2 compared with a diesel equivalent. Detailed emission savings to be determined at planning application stage	Feasibility study completed 2015 Further work is needed to address deliverability, environmental and design issues and, where relevant, Green Belt purpose, before the proposals can be included within the Local Plan.	To be determined	Third party investment opportunities currently being explored

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
5	Freight delivery and service plan for key city centre retailers and streets.	Freight and delivery management	Delivery and service plans	CYC	tba	tba	tba	*See table footnote	Freight improvement study undertaken in 2013, building on York City Centre Movement and Accessibility Framework recommendations.	tba	Currently on hold due to staff resources and funding
5a	Freight consolidation centre	Freight and delivery management	Freight consolidation centre	CYC and third part investor (yet to be identified)	ongoing	To be determined	Number of city centre businesses using consolidation centre.	To be determined *Also, see table footnote	Possible site located. Further work necessary before proposals can be included in the Local Plan.	To be determined	Third party investment opportunities currently being explored
6	Development and implementation of LES planning guidance	Policy guidance and development control	Air quality planning and policy guidance	CYC	2015	2016	Number of EV charging points conditioned through Planning	Aims to minimise additional emission impact of development. Emission savings generally calculated and reported per development.	LES planning guidance forms an Annex to AQAP3 and is already being actively implemented	ongoing	Developers may be required to off-set large emission damage costs via provision of on-site or off-site facilities and/or contribution towards wider LES measures in York.
7a	Financial incentive for low emission taxi purchase	Promoting low emission transport	Taxi emission incentives	CYC	2014	2015/2016	Number of low emission taxis purchased through local grant scheme	A hybrid taxi produces approx 8 tonnes per annum of CO_2 less than a diesel equivalent and has considerably lower emissions of NO_x and PM_{10}. *Also, see table footnote	50 low emission taxis purchased through the scheme to date.	Funding for local scheme expired March 2016.	Alternative funding currently being sought to support further implementation of the scheme.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
7b	Taxi licensing emission controls	Promoting low emission transport	Taxi licensing conditions	CYC	2016	2017	Number of low emission taxis present in the CYC taxi fleet	*See table footnote	New Taxi Licensing Policy approved April 2016	Conditions apply from 1 June 2017 for replacement hackney carriage vehicles, and from 1 Nov 2017 for replacement private hire vehicles.	Following conditions approved by licensing committee in April 2016: Vehicles applying to be licensed as taxis must meet a minimum Euro 5 emission standard for petrol, Euro 6 for diesel, or be ultra low emission vehicles from 1 June 2017 for replacement hackney carriage vehicles, and from 1 November 2017 for replacement private hire vehicles. Operators may experience some increased vehicle replacement costs.
8	Planning and delivery of strategic EV charging network	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV charging, Gas fuel recharging	CYC	Ongoing	Ongoing	Number of recharging events per month at CYC operated charging points	*See table footnote	Successful Ultra Low Emission City bid January 2016	Ongoing	Funding will allow introduction of solar charged EV points at P&R sites and regional expansion of York EV charging network

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
9a	Reducing CYC 'grey fleet' trips	Alternatives to private vehicle use	Car clubs	CYC	Ongoing	Ongoing	In 2014, CYC was awarded the Energy Saving Trust's 'Fleet Hero' award for reducing annual business travel mileage by 20%, CO_2 emissions by 23% and number of vehicles used by 21% (based on 2013 figures).	*See table footnote	CYC has worked in partnership with city car club to provide a pool of low emission cars for exclusive use by CYC staff during office hours. Outside these hours vehicles are shared with other registered club users. In 2015/16 there were 265 CYC car club users, collectively making 6,590 journeys and covering 95,423 miles.	Ongoing	Achieved via a comprehensive suite of green fleet measures. CYC membership of car club has significantly reduced the number of people using their own private vehicles on CYC business.
9b	Introduction of low emission vehicles into CYC fleet	Promoting Low Emission Transport	Company vehicle procurement – prioritising uptake of low emission vehicles	CYC	ongoing	ongoing	Number of full electric and electric hybrid vehicles in CYC fleet	*See table footnote	As well as promoting use of low emission car clubs Public Protection also operates an electric pool car vehicle.	Ongoing	The bulk of the LCV fleet is currently mid-life, so it will be 2018/19 before any potential electric vans could replace the current diesel vehicles.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
9c	CYC Eco-driver training and vehicle emission controls	Vehicle Fleet Efficiency	Driver training and Eco aids	CYC	ongoing	ongoing	Number of CYC staff obtaining ECPO driver training	*See table footnote*	Lightfoot trial completed CYC currently undertaking a fuel additive trial and programme of driver training	Ongoing	CYC has trialled lightfoot technology in CYC vehicles and the overall telematics requirement for the CYC fleet is currently being reviewed CYC currently undertaking a fuel additive trial claimed to reduce emissions and improve fuel consumption. CYC have recently commissioned a programme of mandatory driver training for HGV drivers which includes an eco-driving element.
10	Marketing and Communications Strategy	Public Information	Via the internet Via other mechanisms	CYC	2016	2017	Number of hits on upgraded JorAir website per annum	Not easily quantifiable *See table footnote*	Scope of upgrade to JorAir website currently under discussion	April 2017	Main project will be upgrade of JorAir website. Scope of upgrading works and costs still under discussion. Main improvements to include better data dissemination, more health advice, better use of social media.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
11a	Local incentives for low emission vehicles and alternative fuel use – EV chargers / demonstrators for businesses	Promoting Low Emission Transport	Company Vehicle Procurement – Prioritising the uptake of low emission vehicles	CYC	Winter 2015	Spring 2016	Number of businesses that have installed EV charging and trialled demonstrator vehicle per annum	Target 10 companies	Electric vehicle leased for 3 years (until May 2019) EV Charging installed at 6 business premises in March/April 2016	Ongoing	Additional funding currently being explored for second demonstrator vehicle
11b	Local incentives for low emission vehicles and alternative fuel use – Priority parking / reduced parking fees for low emission vehicles / reduced entry fees for attractions/ freebies	Promoting Low Emission Transport	Priority parking for LEVs	CYC	ongoing	ongoing	Number of low emission permits issued	*See table footnote	A total of 1,217 Low Emission Permits were issued between 01/01/2015 – 31/12/2015. The breakdown is: Resident Household - 711 Temporary Household – 96 Season – 283 Special Control Household – 5 House of Multiple Occupancy – 14 Community Staff – 50 Commercial – 7 Business – 4 Frequent User Pass – 3 Resident Contract Marygate - 6 Resident Contract Fossbank - 19 Resident Contract Monkbar - 14 Resident Contract Nunnery Lane – 5	ongoing	York residents are currently entitled to a discount of 50% on the price of parking permit if they operate a low emission vehicle

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
12	Attracting Low Emission industries, businesses and jobs to York	Policy guidance and development control	Other policy	CYC	ongoing	ongoing	tba	Not quantifiable *See table footnote*	tba	ongoing	Will support wider air quality improvement measures
13a	Modal shift and network improvement measures – I travel York campaign	Promoting travel alternatives	Intensive active travel campaign and infrastructure Includes: - Personalised travel planning - Promotion of walking - Promotion of cycling - school travel plans - workplace travel plans	CYC	ongoing	ongoing	% mode split or walking/cycling/bus vs conventional car drivers and car passengers % car trips into city centre	Target to increase modal shift away from conventional car *See table footnote*	tba	ongoing	i-Travel ongoing programme
13b	Bus improvements	Transport planning and infrastructure	Public transport improvements interchanges, stations and services	CYC	ongoing	ongoing	National Annual Passenger satisfaction survey	Aim to increase uptake of public transport	Bus improvements in progress	2018	Rougier Street improvements to be completed by end of year
13c	Continued delivery of other LTP measures	Transport planning and infrastructure	Cycle network Bus route improvements	CYC	ongoing	ongoing	BBA investment, bus wardens, cycle infrastructure investment	*See table footnote*		ongoing	BBA maintaining bus infrastructure and Sustrans maintaining cycle infrastructure
14	Regulation of industrial and domestic emissions	Environmental Permits	Introduction/Increase of Environment charges through permit systems and economic instruments	CYC	ongoing	ongoing	Number of scheduled inspections completed per annum	*See table footnote*		ongoing	Scheduled inspections undertaken by CYC public protection staff.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
15	Provide more green infrastructure	Policy guidance and development control	Regional groups co-ordinating programmes to deliver area wide strategies to reduce emissions and improve air quality	West Yorkshire Combined Authority	complete	ongoing	tba	*See table footnote	tba	ongoing	-
Additional measures – not listed specifically in current AQAP											
16	Further conversion of diesel double decker tour buses to electric	Vehicle Fleet Efficiency	Vehicle Retrofitting projects	CYC	2015	ongoing	Number of buses converted to electric	*See table footnote	One demonstration bus converted, five further buses to be converted	December 2016	Cleaner bus technology funding £475K obtained to support this (2015)
17	Retrofitting of school buses	Vehicle Fleet Efficiency	Vehicle Retrofitting projects	CYC	2015	ongoing	Number of retrofitted school buses	-	28 buses to be converted	September 2016	Cleaner bus technology funding £308K obtained to support this
18	Solar panels at electric P&R sites	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV charging, Gas fuel recharging	CYC	2016	2017	Amount of energy generated by solar panels	Supply green energy to encourage the uptake of EVs	Funding awarded	2018	LGF bids for LCR and NY to match-fund Go Ultra Low funding

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to date	Estimated Completion Date	Comments
19	Hyper Hubs	Promoting Low Emission Transport	Procuring alternative refuelling infrastructure to promote Low Emission Vehicles, EV charging, Gas fuel recharging	CYC	2016	2017	5-6 Hyper Hubs providing ultra fast charging for EVs with high resilience	tba	Funding awarded	2018	£816K ultra low emission city bid funding obtained to support this project

**** Footnote on Pollution Reduction*** *- As part of City of York Council's third Air Quality Action Plan (AQAP3), the Emissions Factor Toolkit (EFT) published by DEFRA was used to assess the likely levels of NO_x and PM_{10} reduction associated with some of the measures contained within the plan. The results of this modelling work are summarised in chapter 8 of AQAP3, with further detail provided in Annex 4. City of York Council's third Air Quality Action Plan is available for download from http://www.jorair.co.uk/reports/aqap3/aqap3report.pdf*

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and or Concentrations

Local Authorities are expected, under section 7 of Policy Guidance LAQM.PG16 to work towards reducing emission and/or concentrations of $PM_{2.5}$. There is clear evidence that fine particulate matter ($PM_{2.5}$) has a significant impact on human health, including premature mortality, allergic reactions and cardiovascular diseases. The impact of public exposure to particulate matter alone has been estimated to reduce average life expectancy in the UK by around six months and imposes a cost to public health of over £16 billion a year.

Air Pollution and Health in York

Based on national estimates, pro rata, between 94 and 163 people die prematurely in York each year due to the impacts of poor air quality. This is more than the combined estimate of those who die prematurely from obesity and road accidents. Public health framework indicator 3.01 states that the fraction of mortality in York attributable to anthropogenic (man-made) $PM_{2.5}$ particulate air pollution is 4.8% of all deaths (82 deaths). The average for this indicator across England is 5.1%.

It is widely accepted that fine particulate matter has a significant impact on both morbidity and mortality and diesel emissions have been classified as carcinogenic by the International Agency for Research on Cancer (part of the World Health Organisation). There is particular concern about the 'black carbon' fraction of particulate matter due to its health impacts, and its strong ability to absorb light energy and increase global warming. Black carbon emissions in urban environments arise predominantly from diesel transport, but are also a product of biomass combustion, used increasingly for energy production and space heating.

Emissions of oxides of nitrogen (NO_x) and man-made particulate must be reduced to meet the health based national air quality objectives in York and improve public health. The main source of NO_x and man-made particulate in York is traffic, particularly diesel vehicles.

Policy Guidance LAQM.PG(16) acknowledges that many local authorities will consider how to address $PM_{2.5}$ alongside other pollutants when tackling their own fleets and services and/or work with communities and business to achieve improvements in air quality and that few standalone $PM_{2.5}$ measures will be chosen (unless in order to address a very specific local problem).

To date CYC has produced two trip reduction / modal shift based Air Quality Action Plans (AQAPs) and has recently adopted a third Action Plan (AQAP3) focussing on reducing vehicle tailpipe emissions from the remaining vehicle fleet through the use of low emission technologies.

AQAP3 is the main delivery document for York's overarching Low Emission Strategy (LES) (adopted in October 2002). York's LES was the first document of its kind in the UK. It aims to reduce all emissions to air in the city as far as practicable and recognises that there are no 'safe' limits for particulate emissions, particularly $PM_{2.5}$.

Further air quality improvement measures are also included in the Local Transport Plan and the draft Local Plan.

City of York Council is demonstrating a commitment to addressing $PM_{2.5}$ through measures in its third Air Quality Action Plan. Some specific items related directly to reducing fine particulate emissions (and indeed related to reducing exposure to such emissions) are described below.

- **Exposure Reduction through the Planning Process** - Air quality staff routinely comment on planning applications to ensure that new developments are designed in a way which minimises exposure to air pollution and further emission growth. The most recent approach requires developers to calculate the damage cost of the additional emissions that their developments will cause and to mitigate this using a range of sustainable transport and low emission vehicle measures. Such measures must be considered reasonable and proportional, relative to the damage costs associated with the development.

  Pre-planning advice is often provided on locations for key exposure sites (e.g. housing, schools, sports facilities, medical facilities etc) and the use of biomass heating systems is generally discouraged in urban areas and near sensitive receptors.

- **Policy Led Exposure Reduction** – City of York Council's Public Protection team work alongside other council departments to have joint inputs into key council policies that can impact on air quality and exposure reduction. Examples of previous joint policies include the Local Transport Plan, Local Plan, Climate Change Strategy, Air Quality Action Plan and Low Emission Strategy. Work is now being undertaken to strengthen links between air quality and the Health and Well Being Strategy. The Joint Strategic Needs Assessment (JSNA) already recognises the importance of good air quality in delivering a number of key health outcomes, see http://www.healthyork.org/what-its-like-to-live-in-york/environment.aspx

- **Information Led Exposure Reduction** - at the present time there is no single marketing and communications strategy at either a national or local level to deal with dissemination of public information on the links between health, air quality and transport. Within Public Health England (PHE) there is currently increasing interest in developing a national campaign and there are opportunities for York to get involved in the early stages of this via the PHE Air pollution and public health advisory group which is already attended by one of the York air quality officers.

- **Exploring new $PM_{2.5}$ monitoring solutions and 'social monitoring' to reduce exposure** – City of York Council is currently working alongside the University of York and Perkin Elmer to trial a new type of air quality sensor (https://elm.perkinelmer.com/) as part of an international pilot. The project could offer scope to monitor particulate in a wider range of locations across the city. The project will involve some 'social monitoring' aspects related directly to public exposure paths and opportunities to identify alternative less polluted routes. Whilst the programme is still in its early stages, it is anticipated that once the technology is proven, it could be used to undertake further studies relating to exposure, such as:
    - Identifying what pollution is like along key walking, cycling, jogging routes in the city and providing advice on the lowest pollution routes.
    - Monitoring air quality around sports pitches, gyms etc (i.e. locations where people are exercising) and considering if these are suitable locations for these types of activity and if exposure to air pollution in these areas could be reduced.
    - Identify what air pollution is like around schools / nurseries and parks and advise on the lowest pollution routes. Walk and cycle to school campaigns could then be focussed on those schools where children are currently exposure to the highest levels of pollution.
    - Identify where the clusters of air pollution related illnesses are in the city and compare these with pollution levels with the places where these people live and work. Consider what social factors increase exposure to air pollution
- **Low Emission Vehicle Upgrades** - Five more of York's City Sightseeing buses will be converted to electric, following the launch of the world's first retrofitted electric-powered double-decker bus to the service in 2014. City of York Council is working in partnership with Transdev using £475,000 of DfT funding. York has also secured £308k from Department for Transport's Clean Bus Technology Fund to retrofit 28 school buses used in around York with the latest Selective Catalytic Reduction (SCR) exhaust technology.
- **Clean Air Zone** – York is working towards the delivery of a Clean Air Zone (CAZ) which will aim to convert many of the most frequent diesel based bus services in the city to electric by 2018. Two Park and Ride routes have already been converted to mainly electric buses. In the past 3 months a total of 182,191km of bus journeys in York have been undertaken by zero emission electric buses, considerably reducing the amount of fine particulate (as well as NO_x) emitted in the city.

- **Low Emission Taxis** – York has pioneered a taxi grant scheme aimed at encouraging taxi drivers to move away from diesel to petrol hybrid taxis. Through this scheme, the number of petrol hybrid taxis in the York fleet has been increased to over 50 vehicles. Petrol hybrid cars produce significantly less $PM_{2.5}$ emissions than diesel equivalents. York has also recently updated its taxi licensing policies to encourage new vehicles entering the fleet to be mainly hybrid vehicles meeting ultra low emission vehicle standards.

- **Low Emission Vehicle Events** – In the past, York has held Low Emission Vehicle events for the public at the McArthur Glen Designer Outlet

    - April, 2013 – 'Electric Vehicle Show' at Designer Outlet, York

    - April, 2016 – 'Greenwheels Event' at Designer Outlet, York

  Following on from the success of these events, the city has aspirations to open a publically accessible electric vehicle demonstration centre in the city (but funding has not yet been secured). Promotional activities are currently being focused on a number of local businesses where electric vehicle recharging points have recently been installed by the council. A demonstration electric vehicle has been purchased by the council and this will soon be made available to these businesses to trial alongside their new charging point.

Future Opportunities for $PM_{2.5}$ measures

- City of York Council recognises that locally there needs to be a greater input from the Director of Public Health in relation to the formulation and ongoing delivery of air quality improvement measures across the city. A new Director of Public Health has recently been appointed at CYC. Over the coming years it is hoped to deliver improvements in the following areas:

    - Better dissemination of information to the public on the causes and effects of poor air quality and improved access to air quality data for their locality. An upgrade of the current JorAir website is planned which will allow monitoring results to be accessed via an interactive mapping system. Research is also planned into the level of local demand for a public air pollution alert system and methods of delivery (we currently have some capital funding from DEFRA to support this work but not enough staff resource to take it forward). Both these projects will allow members of the public to make more informed choices about where they live and how and when they travel.

    - An improved local approach to Health Impact Assessment (HIA) for key programmes and policies. CYC is currently working with the Institute of Transport Studies (ITS) at the University of Leeds and the Health Economics Unit at the University of York to deliver a HIA for the planned

Clean Air Zone. The wider use of HIA at a local level will help to ensure that changes in emissions to air and the subsequent impact on local health outcomes is given greater consideration within the local decision making process.

- A funding bid has recently been submitted which would allow re-instatement of the 'JorAir' school teaching programme which aims to highlight the causes and effects of poor air quality amongst primary school children. The programme has strong links to active travel and could easily be further adapted to cover a wider range of health outcomes. The programme has previously been very well received by both students and their teachers. Currently there are insufficient staffing resources for delivery of this programme by CYC staff.
- Providing a greater role for the new Director of Public Health in the development and delivery of air quality improvement measures, including full involvement in any future air quality steering group activities.

3. Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

Since 1999, real-time monitoring of nitrogen dioxide and other pollutants has been undertaken at a total of 14 locations across York. Details regarding these sites have been documented in previous air quality reports submitted to DEFRA and the details of current monitoring are provided in Appendix A.

In addition to real time monitoring, City of York Council has also undertaken nitrogen dioxide diffusion tube monitoring at up to 340 locations in the city. Results from this diffusion tube monitoring programme were last reported in the Air Quality Update and Screening report (April 2015)[5].

There have been no significant changes to City of York Council's overall monitoring strategy over the last 12 months, but the number of nitrogen dioxide diffusion tubes has been reduced from 340 to 233 due to ongoing budget pressures and reduced staff resources for air quality monitoring work.

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

City of York Council undertook automatic (continuous) monitoring at 9 sites during 2015. Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available online at http://uk-air.defra.gov.uk/data/

Maps showing the location of the monitoring sites are provided online at http://www.jorair.co.uk/index.php?page=stations. Further details on how the monitors are calibrated and how the data has been adjusted are included at Appendix C.

3.1.2 Non-Automatic Monitoring Sites

City of York Council undertook non-automatic (passive) monitoring of nitrogen dioxide at 233 sites during 2015. Table A.2 in Appendix A shows the details of these sites. Further details on Quality Assurance / Quality Control and bias adjustment for diffusion tubes are included in Appendix C.

[5] Update and Screening Report (April 2015) available online at http://www.jorair.co.uk/index.php?page=reports

3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for 'annualisation' and bias. Further details on bias adjustment and annualisation are provided in Appendix C. Annualisation of diffusion tube data has been undertaken in accordance with the example in Box 7.8 in the guidance note LAQM.TG(16).

3.2.1 Nitrogen Dioxide (NO_2)

Table A.3 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values are provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

Nitrogen dioxide concentrations fell at the majority of continuous monitoring stations in 2015 when compared with the 2014 results. Concentrations at Fishergate and Lawrence Street were consistent between 2014 and 2015. There is evidence of a steady downward trend in nitrogen dioxide concentrations over the last 5 years.

With respect to the **City Centre AQMA** (AQMA Order No.4), exceedances of the health based annual mean NO_2 objective (40µg/m^3) were monitored in the Gillygate, Holgate, Lawrence Street and George Hudson Street/Rougier Street technical breach areas in 2015. Whilst maximum concentrations of NO_2 monitored in the Nunnery Lane/Prices Lane and Fishergate technical breach areas were 38µg/m^3 and 39µg/m^3 respectively, it is considered that breaches of the objective are still possible given the precision of the monitoring technique. The existing city centre AQMA is considered necessary and the existing boundary is still considered accurate.

Whilst CYC has monitored concentrations above the annual mean objective for nitrogen dioxide, recorded values are currently below the level that would be indicative of breaches of the hourly mean objective (60µg/m^3). Should concentrations of nitrogen dioxide below 60µg/m^3 continue to be monitored in future years, the city centre AQMA may need amending accordingly (this area is currently declared on the basis of both the annual mean and hourly mean NO_2 objective).

Concentrations of NO_2 monitored in the **Fulford AQMA** in 2015 were elevated but below the annual mean objective of 40µg/m^3. The highest recorded levels of pollution were at the junction of Fulford Main Street and Heslington Lane and were 37µg/m^3. The AQMA is still considered appropriate but the boundary will be reviewed in 2017.

Concentrations of NO_2 monitored in the **Salisbury Terrace AQMA** in 2015 were all well below the annual mean objective of 40µg/m^3. The highest recorded level of NO_2 within the area of technical breach was 32µg/m^3. Should concentrations of NO_2 remain at this level throughout 2016, the AQMA in this area will be revoked in 2017.

City of York Council's previous Update and Screening Report, submitted to DEFRA in April 2015, monitored elevated concentrations of NO_2 to the south west end of Coppergate. Whilst there are no relevant locations in the vicinity of the diffusion tube monitor, City of York Council is aware of residential properties at first floor level and above elsewhere on the street. In May 2015, further monitoring was established along Coppergate to confirm the position. Based on the 8 months monitoring carried out between May and December 2015 it is considered possible that the annual mean NO_2 objective is being exceeded at relevant locations elsewhere on Coppergate. Once data for a full calendar year has been obtained, a decision will be taken regarding the amendment of the existing City Centre AQMA to include this street. Any such amendment will be reported in future Annual Status Reports.

3.2.2 Particulate Matter (PM_{10})

Table A.5 in Appendix A compare the ratified and adjusted monitoring PM_{10} annual mean concentrations for the last 5 years with the air quality objective of 40µg/m^3.

Table A.6 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

Tables A.5 and A.6 demonstrate that there were no exceedances of the annual mean or daily mean PM_{10} objectives in York during 2015. This has been the case since monitoring of PM_{10} was established in the city.

3.2.3 Particulate Matter ($PM_{2.5}$)

Although not explicitly required under the Local Air Quality Management regime, where Local Authorities undertake $PM_{2.5}$ monitoring they are encouraged to report it as part of the Annual Status Report. Micro particulate, or $PM_{2.5}$, is the pollutant which has the biggest impact on public health and on which the Public Health Outcomes Framework (PHOF) indicator is based.

City of York Council monitor $PM_{2.5}$ at three locations in the city, namely Bootham (urban background site), Fishergate (roadside site) and Gillygate (roadside site). Monitoring of $PM_{2.5}$ at Fishergate and Bootham is carried out as part of DEFRA's Automatic and Rural Monitoring Network (AURN). Monitoring at Gillygate was established by City of York Council as a result of the growing concerns over the heath impacts of $PM_{2.5}$. Results of the $PM_{2.5}$ monitoring undertaken in York are shown at shown in table A.7 in Appendix A. No exceedances of the annual mean $PM_{2.5}$ objective have been recorded to date.

It should be noted that as the Volatile Correction Model (VCM) has not yet been proven to work for $PM_{2.5}$, all data remains as '$PM_{2.5}$ TEOM data' and has not been corrected using this approach.

3.2.4 Sulphur Dioxide (SO_2)

City of York Council does not undertake any sulphur dioxide monitoring in the city.

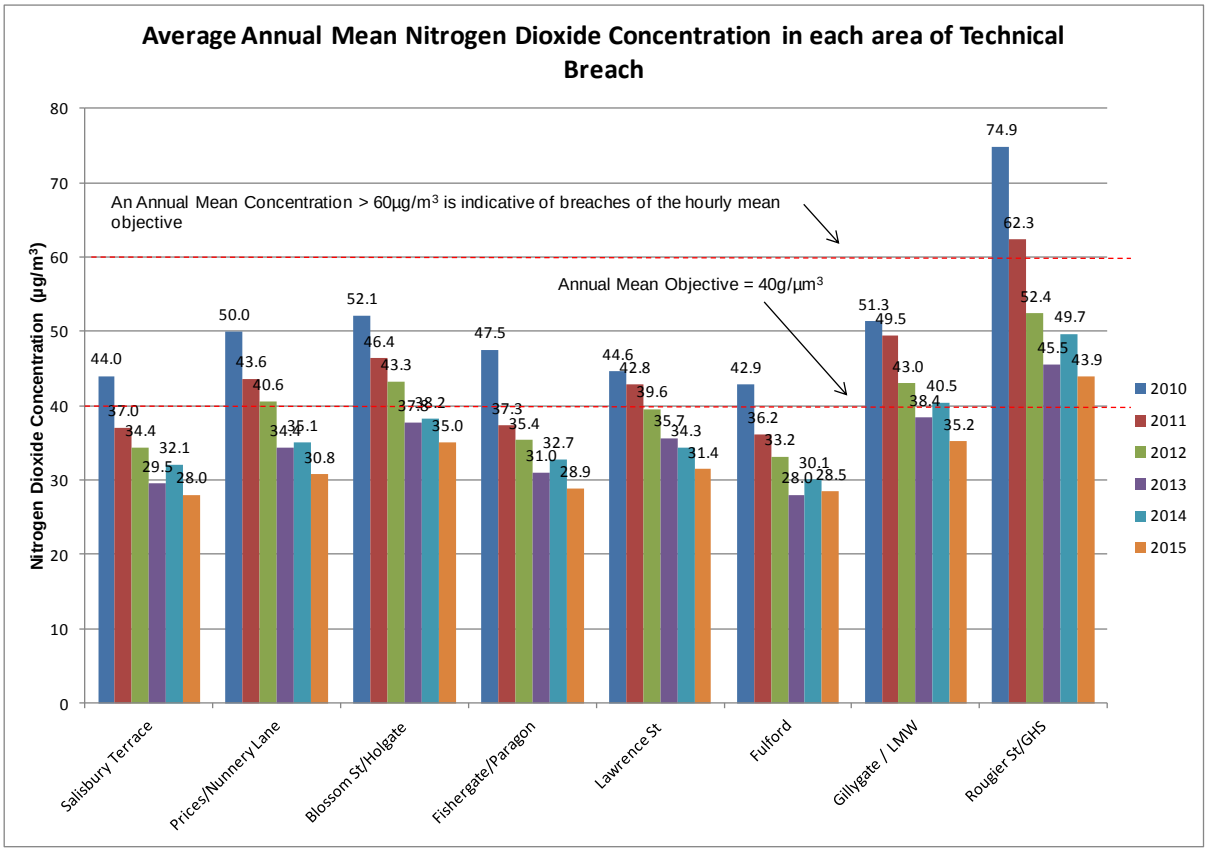
3.3 Air Quality Indicators

3.3.1 Council Plan Air Quality Indicators

Two air quality indicators have been developed for City of York Council's 'Council Plan' that are used to look at trends in air quality across AQMAs/technical breach areas as follows:

CAN027 *– Average Annual mean Nitrogen Dioxide Concentration in each area of Technical breach.* This indicator provides an average nitrogen dioxide concentration based on all monitoring undertaken in each area of technical breach. Monitoring results include bias corrected diffusion tube data and data from continuous monitors (if applicable). Trends in recent years are shown in figure 1 below.

Figure 1: Indicator CAN027 – Trends in average annual mean nitrogen dioxide concentration in each area of technical breach



Whilst average concentrations across the technical breach areas in 2014 increased marginally compared with 2013, there is evidence of a steady downward trend in nitrogen dioxide concentrations over the last 6 years.

CAN028 - *Maximum Nitrogen Dioxide Concentration (at relevant location) in each area of Technical Breach. This indicator provides a maximum recorded annual mean nitrogen dioxide concentration in each area of technical breach. This only considers monitoring at relevant locations and thus is useful to look at the validity of existing AQMA boundaries year to year.*

Figure 2: Indicator CAN028 – Maximum nitrogen dioxide concentration (at relevant location) in each area of technical breach

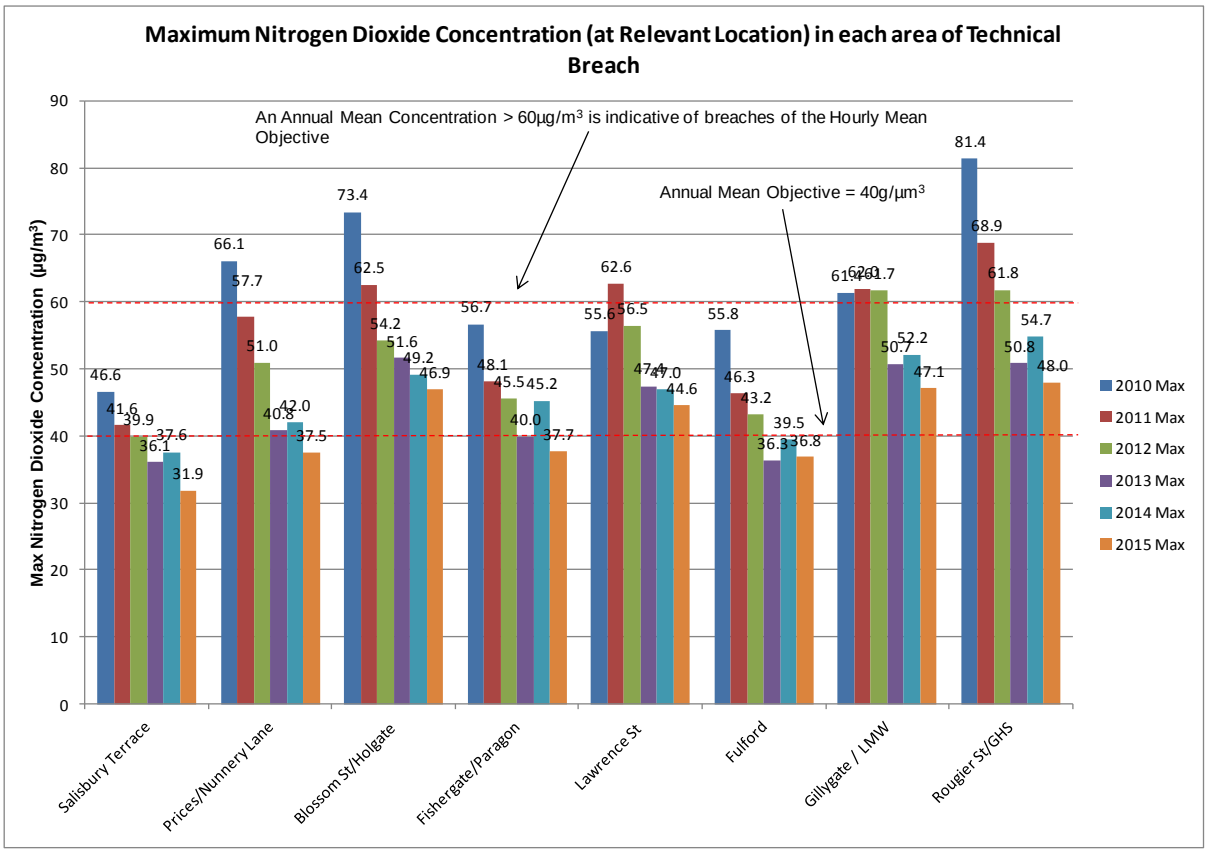


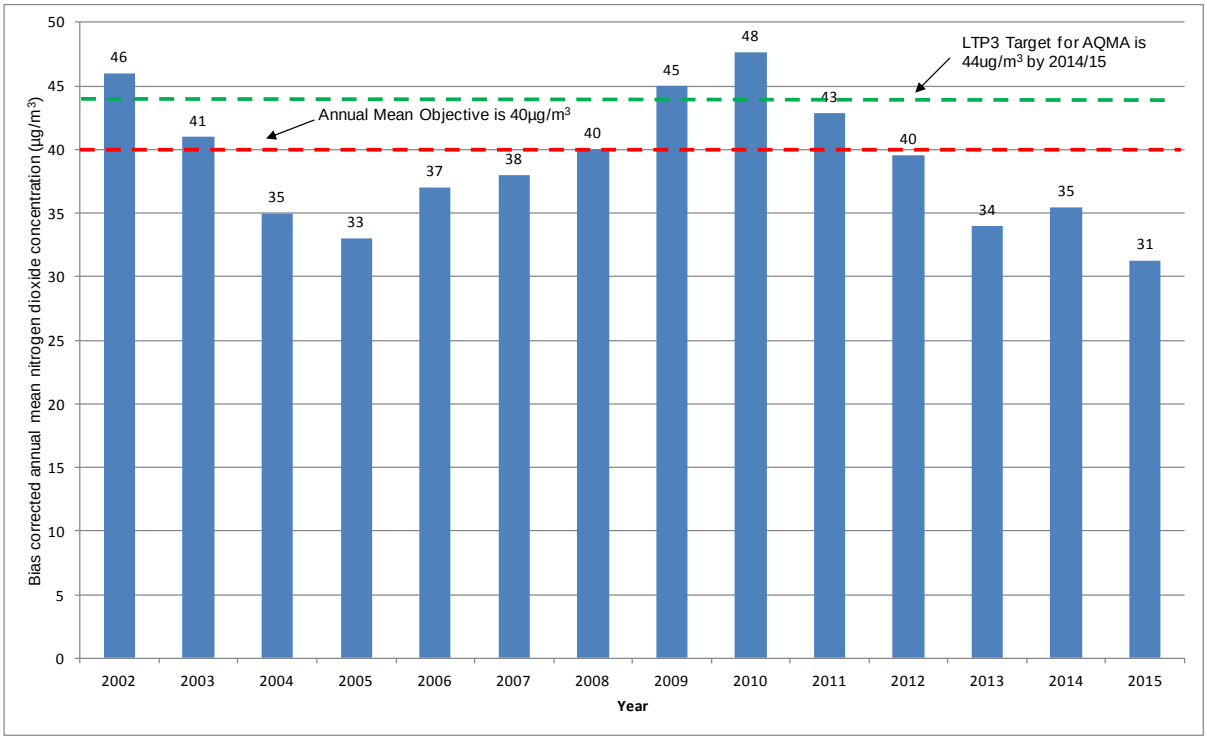
Figure 2 above demonstrates that the maximum annual mean nitrogen dioxide concentration at a relevant location was below the annual mean objective of 40µg/m^3 at 4 of the 8 areas of technical breach. However, based on the precision analysis carried out on the diffusion tube results, the only technical breach area considered to be significantly below the annual mean objective is Salisbury Terrace. Monitoring results (upper 95% confidence limits) from the Prices/Nunnery Lane, Fishergate, and Fulford technical breach areas were 39, 39 and 38µg/m^3 respectively (i.e. within 1-2 µg/m^3 of the objective).

3.3.2 Local Transport Plan (LTP) Indicator

For the purpose of monitoring the impact of York's Local Transport Plan (LTP) a local air quality indicator has been established. This indicator measures the mean of annual average results obtained from 36 diffusion tubes located within York's city centre AQMA.

Figure 3 below shows the results from this indicator for the period 2002 to 2015. As can be seen from figure 3, nitrogen dioxide concentrations across the city were in general decline between 2002 and 2005. This was followed by a steady increase in concentrations between 2006 and 2009. Between 2010 and 2015 concentrations of nitrogen dioxide within the city centre AQMA improved again, with levels of nitrogen dioxide across all the sites used for the indicator falling to 31µg/m^3 in 2015. This is the lowest value ever recorded for this indicator.

Figure 3: Trends in Annual mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites.



4 Planning Application Review

The land-use planning system is recognised to play an integral part in improving air quality. This requires close co-operation between planners and environmental health practitioners.

City of York Council regularly reviews applications with respect to potential air quality and other environmental impacts. Table 3 provides a list of those planning applications that have been considered in relation to air quality by City of York Council Public Protection since the last Air Quality Progress report in April 2014. A formal Air Quality Impact Assessment has been requested for some of these applications.

The Annual Status Report provides an opportunity to keep a record of such applications to provide a picture of where changes in air quality may occur in the future. The information presented in table 3 is also useful to identify where combined impacts of several developments may become important.

It should be noted that electric vehicle recharging is now requested for all residential properties where secure parking is provided (secure parking is defined as a house with a garage or private driveway). Due to the large number of applications, these have been omitted from the table below.

Table 3: Planning Applications Considered since April 2014

Planning Reference	Description	Type	Comments	Status
14/00502/PREAPP and 15/01009/FUL	Change of use from bar to restaurant/hostel. 54 Gillygate, York	Pre-application advice	Comments reflected the fact that if any member of staff associated with either the hostel or the restaurant were to live in the building as their permanent residence, this would be considered as a 'residential unit' in terms of air quality mitigation requirements. In these circumstances, a ventilation strategy and non-opening windows to certain elevations would be appropriate.	**Approved** Air Quality condition not considered necessary
14/00622/ORC	Proposed change of use from offices to 27 flats. Castle Chambers, 7-13 Clifford Street, YO1 9RG	ORC	Informative provided regarding air quality and the need for mechanical ventilation and non-opening windows	**Approved** Condition not attached as considered permitted development
14/00871/PREAPP	Club Salvation and Society Cafe/Bar – conversion to residential. George Hudson Street / Rougier Street	Pre-application advice	Provided advice regarding the orientation of habitable rooms and the potential need for a mechanical ventilation strategy and non-opening windows to mitigate exposure	Awaiting formal planning application(s)

Planning Reference	Description	Type	Comments	Status
14/00811/ORC	Proposed change of use from offices to 25 flats. 16 St Saviours Place, York, YO1 7PL	ORC	Electric vehicle recharging recommended	**Approved** Condition not attached as considered permitted development
14/00834/ORC	Proposed change of use from office to 1 flat. 157 New Lane, York, YO32 9NQ	ORC	Electric vehicle recharging recommended	**Approved** Condition not attached as considered permitted development
14/00672/OUTM	Outline planning application with all matters reserved for erection of petrol filling station, restaurant and 50-bedroom lodge accommodation with associated access, car parking and landscaping, Land Adjacent Hopgrove Roundabout, Beechwood, Hopgrove, York	Outline Application	Discussed the possibility of rapid electric vehicle recharging on the site and recommended condition	**Application withdrawn**

Planning Reference	Description	Type	Comments	Status
14/00799/FUL	Installation of biomass boiler. Churchill Hotel, 65 Bootham, York YO30 7DQ	Full Application	Air Quality dispersion modelling work undertaken. Conditions recommended but application subsequently withdrawn	**Application withdrawn**
14/00924/FULM	Use of premises as retail food store, B&Q Osbaldwick Link Road, Osbaldwick, York, YO10 3JA	Full Application	Air Quality Assessment prepared to consider air quality impact associated with the operation of the proposed development, including vehicle exhaust emissions and emissions from the biomass boiler. Conditions were recommended in relation to the biomass boiler (make, model, stack height, servicing requirements and fuel used) and provision of electric vehicle recharging points (6)	**Approved** Conditions attached regarding biomass boiler specification and EV charging (6 points)
14/00166/PREAP	Former Civil Service Club, Boroughbridge Road, York, YO26 6BZ	Pre-application advice	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	Awaiting formal planning application(s)

Planning Reference	Description	Type	Comments	Status
14/01109/PREAPP and 14/02404/FULM	Conversion, part demolition and extension of existing convent buildings to provide student accommodation. St Joseph's Convent, Lawrence Street, York	Pre-application advice Full Application	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	**Approved** Condition attached regarding electric vehicle recharge points
14/01020/FUL	Holgate Villa, York, YO24 4AB	Full Application	External alterations to approved application, which includes provision of Juliette balconies. No objections raised on the basis of recent air quality monitoring results in the vicinity of the development	**Approved**
14/01366/GRG3	Replacement windows and doors to Festival Flats, Paragon Street, York	Full Application	As the building is in an AQMA technical breach area, non-opening windows and a mechanical ventilation system were recommended	**Approved** Proposed condition not attached by Planning Department

Planning Reference	Description	Type	Comments	Status
14/01375/FUL	Change of use from office to residential use, Swinton Insurance, 1 Bishopthorpe Road, York, YO23 1NA	Full Application	Condition recommended regarding non-opening windows and mechanical ventilation	**Approved** Condition not attached by Planning Department
14/01383/FULM	Change of use from offices to student accommodation comprising 55 self contained units with associated facilities. 2-14 George Hudson Street, York YO1 6LP	Full Application	Condition recommended regarding non-opening windows and mechanical ventilation	**Approved** Condition attached regarding mechanical ventilation and non-opening windows
14/01478/OUTM	Residential development of up to 65 units, Del Monte, Skelton park Trading Estate, Shipton Road, Skelton, York YO30 1XH	Outline Application	Condition recommended regarding CEMP and electric vehicle recharging on the site.	**Approved** Condition attached regarding CEMP and EV charging for each dwelling

Planning Reference	Description	Type	Comments	Status
14/01716/FULM	Erection of 229 dwellings comprising 79 houses and 150 apartments in six blocks with associated infrastructure. Factory, Bishopthorpe Road, York, YO23 1NA	Full Application	Condition recommended regarding CEMP and electric vehicle recharging on the site.	**Approved** Condition attached regarding electric vehicle recharge points and CEMP
14/01054/PREAPP	Land at Boroughbridge Road to the south west of former Civil Service Club	Pre-application advice	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	-
14/01733/ORC	Proposed change of use of part of ground floor from offices to 3 apartments. 4 Rougier Street, York, YO1 6HZ	ORC	Apartments did not overlook any public street, but front a courtyard to the rear of the existing Roman House. No AQ concerns raised	**Approved**
14/01863/PREAPP	Pre-application advice for 68 houses on a 2.35ha site off Eastfield Lane, Dunningon	Pre-application advice	Provided advice regarding the assessment of AQ impacts and emissions associated with the operation of the site. Comments also made regarding the provision of EV charging on the site.	-

Planning Reference	Description	Type	Comments	Status
14/02091/FULM	Residential development including conversion of existing buildings, construction and demolition to form 29 apartments, 5 town houses and 6 mews houses, 1-9 St Leonards place, York YO1 7ET (also 2-4 Museum Street, York)	Full Application	Condition recommended regarding a mechanical ventilation strategy and non-opening windows to certain facades of the development. Condition also recommended regarding electric vehicle recharging on the site	**Approved** Condition attached regarding electric vehicle recharging, non-opening windows and a mechanical ventilation strategy for habitable rooms
14/02178/FULM	Residential development, Castle Chambers, 7-13 Clifford Street, York	Full Application	Condition recommended regarding a mechanical ventilation strategy and non-opening windows	**Approved** Condition not attached by Planning Department
14/02596/EIASP	EIA Scoping Opinion for British Sugar site, British Sugar Corporation Ltd, Plantation Drive, YO26 6XF	Environmental Impact Assessment Scoping Opinion	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	Scope of EIA agreed

Planning Reference	Description	Type	Comments	Status
14/02910/EIASP	EIA Scoping Opinion for Hungate development site	Environmental Impact Assessment Scoping Opinion	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	Considered EIA development
14/02839/PREAPP	Pre-application advice regarding 46-50 Piccadilly	Pre-application advice	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site. Advice also provided regarding exposure mitigation	-
14/02873/PREAPP	Pre-application advice regarding the development of 102 houses, Chapelfields, Acomb	Pre-application advice	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	-
14/02789/OUTM	Outline application for the development of the former British Sugar site	Outline Application	Recommended conditions regarding CEMP and EV charging. Comments also made in relation to the Travel Plan provided for the site. Contribution sought for continued air quality monitoring in the vicinity of the site.	Awaiting decision

Planning Reference	Description	Type	Comments	Status
15/00147/FUL	Simpson York Ltd, Common Road, Dunnington, York, YO1 5PD	Full Application	Biomass information request form requested for the biomass boiler installation	**Approved**
15/00049/FULM	Erection of doctors surgery (use class D1) and shopping parade (use classes A1 (shops), A2 (office), A3 (restaurant/cafe) and A5 (hot food takeaway)) with associated access, car and cycle parking and earthworks	Full Application	Condition recommended regarding provision of electric vehicle recharging on the site	**Approved** Condition attached requiring one freestanding, weatherproof EV recharging point
14/02933/FULM	Huntington Stadium, Jockey Lane, Huntington, York, YO32 9JS	Full Application	Recommended conditions regarding CEMP, electric vehicle recharging and an emission mitigation package for the site	**Approved** Conditions attached regarding EV charging and provision of an emissions mitigation package for the site.

Planning Reference	Description	Type	Comments	Status
15/00166/FULM	Development of 188 dwellings	Full Application	Conditions suggested regarding the provision of electric vehicle recharging on the site. Emissions mitigation statement requested for the site.	Awaiting decision
15/00167/FULM	Development of 69 dwellings	Full Application	Conditions suggested regarding the provision of electric vehicle recharging on the site. Emissions mitigation statement requested for the site.	Awaiting decision
15/00302/EIASN	Environmental Impact Assessment scoping opinion for the proposed redevelopment of a site for residential and commercial uses. Elvington Airfield, Halifax Way, Elvington, York	Environmental Impact Assessment Scoping Opinion	Provided advice regarding the assessment of air quality impacts and emissions associated with the operation of the site.	EIA required
15/000456/FULM	Proposed refurbishment and sub-division of the multi-storey factor for 173 residential apartments	Full Application	Recommended condition regarding the provision of electric vehicle recharging on the site.	**Approved**
15/00183/FULM	Residential development of 130 dwellings with associated public open space and allotments, Land At Boroughbridge Road To The South West Of Former Civil Service Club and Trenchard Road	Full Application	Recommended condition regarding CEMP, electric vehicle recharging and emission mitigation package	Awaiting decision

Planning Reference	Description	Type	Comments	Status
15/00472/EIASP	Scoping opinion for proposed poultry unit, Bradley Lane, Rufforth, York	Environmental Impact Assessment Scoping Opinion	The proposals indicated that the unit will house up to 288,000 broilers at one time and will be mechanically ventilated. There was no relevant exposure within 100m of the site. As such, no air quality issues were raised in relation to the site.	Comprises EIA development
15/00723/LBC	Internal alterations and new window opening to No. 5 Monkgate and No. 1 Lord Mayors Walk	Listed Building Consent	Informative included regarding mechanical ventilation due to elevated levels of nitrogen dioxide observed in recent years (although below objective)	**Approved**
15/00581/FULM	Six storey and five storey extensions, demolition of public toilets, external alterations, new roof storey and change of use of offices to hotel (use Class C1) with re-sited public toilets. Extension to rear of Cedar Court Grand Hotel to form dining pavilion, Roman House 4 - 8 Rougier Street York YO1 6HZ	Full Application	Recommended condition regarding electric vehicle recharging	**Approved** Condition attached regarding EV charging provision on the site
15/00473/FULM	87 dwellings, New Lane, Huntington	Full Application	Recommended condition regarding electric vehicle recharging	**Approved** Condition attached regarding EV charging provision in

Planning Reference	Description	Type	Comments	Status
				each dwelling with secure parking provision
15/00735/PREAPP	Relocation and consolidation of Autohorn facilities, Whitehall Grange	Pre-application Advice	The thresholds for undertaking an air quality assessment were outlined. A statement relating to the use of alternative fuels as part of the site operation was requested.	-
15/00798/OUTM	Erection of 109 dwellings at land to the north of Avon Drive, Huntington, York	Outline Application	Recommended condition regarding electric vehicle recharging	Refused (on basis of inappropriate development within greenbelt and impact on potential archaeological features)
15/00758/FULM	Erection of 175 bed care home and play area following demolition of Red Lodge, former library and tennis clubhouse building	Full Application	Recommended condition regarding electric vehicle recharging	Awaiting decision

Planning Reference	Description	Type	Comments	Status
15/01327/PREAPP	Former Fire Station site, Clifford Street	Pre-application Advice	Recommended condition regarding electric vehicle recharging	-
15/00978/PREAPP	Provision of short-term holiday lets, St Maurice's Road	Pre-application Advice	Recommended mechanical ventilation and electric vehicle recharging	-
15/01509/FULM	Conversion of upper floors from office space to 3 self contained flats. No, 6-7 Bridge Street, YO1 6DD	Full Application	Condition recommended regarding non-opening windows and ventilation strategy (unless it can be demonstrated through site specific monitoring that pollution levels are below health based objective levels).	**Approved** Condition attached regarding sealed glazing and mechanical ventilation
15/01709/OUTM	Hungate Development Site, Hungate, York	Outline Application	Suggested conditions regarding CEMP, ventilation strategy / non-opening windows and electric vehicle recharging	Awaiting decision
15/01891/FULM	Partial conversion of ground and first floor offices into 37 residential apartments	Full Application	Suggested conditions regarding CEMP and electric vehicle recharging	Awaiting decision

Planning Reference	Description	Type	Comments	Status
15/01309/FULM	Erection of 3 storey building forming 14 flats following demolition of existing buildings. North Lodge, Clifton Park Avenue, York	Full Application	Suggested conditions regarding electric vehicle recharging	Application withdrawn
15/02031/FULM	Erection of poultry farm including 6 poultry buildings, feed silos, biomass boilers, wood chip store, office and landscaped embankment	Full Application	Installation of biomass boilers	Application withdrawn
15/02155/FULM	Demolition of buildings in the conservation area and erection of 9 houses and 2-storey restaurant with 5 flats above. Former Fire Station, 18 Clifford Street, York	Full Application	Suggested condition regarding electric vehicle recharging	Awaiting decision
15/02295/FULM	Erection of 3 storey block of 6 apartments. Car parking Area, Holgate Road, York	Full Application	Informative provided regarding mechanical ventilation strategy as elevated levels of nitrogen dioxide observed in recent years (below health based objective level).	**Approved** Condition attached regarding mechanical ventilation
15/02321/FULM	Erection of 109 bedroom hotel, Former Unit A1 Parkside Commercial Centre, Terry Avenue, York	Full Application	Suggested condition regarding electric vehicle recharging	Awaiting decision

Planning Reference	Description	Type	Comments	Status
15/02440/FULM	Proposed student accommodation. St Lawrence Working Mens Club, 29 - 33 Lawrence Street, York, YO10 3BP	Full Application	No air quality issues raised. Applicant proposed mechanical ventilation strategy to one student block (closest to road)	**Approved** Condition attached regarding mechanical ventilation to one block
15/02486/FULM	Three storey extension to provide 25no. flats and communal facilities, erection of 2no. semi-detached bungalows and alterations to access road, Glen Lodge Sixth Avenue York	Full Application	No air quality issues raised, but informative placed on application regarding electric vehicle recharging provision on the site	**Approved**
15/02031/FULM	Erection of poultry farm including 6 poultry buildings, feed silos, biomass boilers, wood chip store, office and landscaped embankment	Full Application	The proposals indicate that the unit will house up to 288,000 broilers at one time and will be mechanically ventilated. As this was below the 400,00 bird threshold, no further detailed assessment was considered necessary with respect to dust/particulate emissions. The site required an Environmental Permit from the EA and emissions from the biomass boilers were assessed as insignificant in accordance	Application withdrawn

Planning Reference	Description	Type	Comments	Status
			with the relevant EA guidance. It was not considered that any further assessment or Local Planning Authority control is needed.	
15/02519/PREAPP	Pre-application advice for the change of use of 6039sqm/65,000sqft office space at 2 Rougier Street to a hotel	Pre-application Advice	Advised that a hotel use would not be considered a relevant location with respect to the annual mean nitrogen dioxide objective. Mitigation not specifically required in terms of air quality, however, it was recommended that the applicant consider a mechanical ventilation strategy to reduce exposure of future patrons of the hotel to elevated levels of pollution in this general area of the city.	-
15/02490/FULM	Erection of retail unit (Class A1) - Car Park Lying To The South Of Hurricane Way York	Full Application	Suggested condition regarding electric vehicle recharging	**Approved** Condition attached regarding provision of freestanding outdoor recharging unit

Planning Reference	Description	Type	Comments	Status
15/02515/PREAPP	Pre-application advice regarding conversion of Stonebow House to residential	Pre-application Advice	Six months nitrogen dioxide diffusion tube monitoring being undertaken to inform the need for residential premises to be fitted with fixed windows that cannot be opened and associated mechanical ventilation. The results of the monitoring will also be used to inform the suitability of balcony space for the development.	-
15/02803/PREAPP	Millthorpe School - Construction of two storey building with associated playground area, cycle shelters and service access and associated new car parking and all-weather multi-use games area	Pre-application advice	Pre-application advice provided regarding electric vehicle recharging, assessment of biomass boilers and a Construction Environmental Management Plan	-
15/02623/FUL	Conversion of offices on ground floor and basement to 3no. flats (retrospective). 21 Clifford Street York, YO1 9RG	Full Application	A whole house ventilation unit was proposed for each apartment, however, plans included opening windows with trickle ventilation. This was not considered acceptable in terms of air quality. Further comments were provided to highlight that windows should be non-opening. An alternative approach was also offered to the applicant whereby	**Approved** Condition attached regarding sealed glazing and mechanical ventilation

Planning Reference	Description	Type	Comments	Status
			at least 6 months worth of site specific nitrogen dioxide monitoring should be undertaken to allow an estimation of the concentrations of nitrogen dioxide directly next to the building and to inform the use of	
15/02833/FULM	Change of use of existing building to form convenience store at ground floor, 2no. flats at first floor and erection of four storey extension to rear to accommodate 14no. flats with associated car and cycle parking. Groves Chapel, Union Terrace, York, YO31 7WS	Full Application	The building is set back from the road and all residential aspects are to the rear of the building, away from the road. It was not considered that the development would introduce new opportunities for relevant exposure in this area. It was not considered that the levels of traffic associated with the development would result in any further deterioration in air quality. A condition was recommended regarding electric vehicle recharging	Awaiting decision
15/02932/ORC	Proposed change of use from offices to 48 apartments - Aviva Yorkshire House, 2 Rougier Street, York, YO1 6HZ	ORC	Air Quality informative provided regarding a ventilation strategy and electric vehicle recharging	**Approved**

Planning Reference	Description	Type	Comments	Status
15/02516/FUL	Catering Support Centre, St Maurices Road, York, Conversion to 7no. dwellings (class C3) and 2no. office suites (class B1) etc	Full Application	Concerns were raised that the building is located next to a section of road that experiences standing traffic. A mechanical ventilation strategy and non-opening windows were recommended, unless it could be demonstrated through site specific monitoring that concentrations of nitrogen dioxide at the proposed property facades are below health based standards.	**Approved** Condition attached regarding sealed glazing and mechanical ventilation
15/02517/FUL	Change of use of upper floors and ground floor retail store to 4no. residential units, The Art Shack 4 - 6 Gillygate, York, YO31 7EQ	Full Application	Site located within Air Quality Management Area. A mechanical ventilation strategy and non-opening windows were recommended, unless it could be demonstrated through site specific monitoring that concentrations of nitrogen dioxide at the proposed property facades are below health based standards.	Awaiting decision
16/00665/FULM	Land To The South Of Partnership House, Monks Cross Drive, Huntington, York, Mixed use development including retail store, workshop, storage and offices and a	Full Application	Conditions recommended regarding provision of electric vehicle recharging (2 points) and a Construction Environmental Management Plan	Awaiting decision

Planning Reference	Description	Type	Comments	Status
	drive-through restaurant			
16/00410/PREAPP	Pre-application advice regarding conversion to residential. The Parish, St.Johns Church, Micklegate	Pre-application advice	Site located within Air Quality Management Area. A mechanical ventilation strategy and non-opening windows were recommended, unless it could be demonstrated through site specific monitoring that concentrations of nitrogen dioxide at the proposed property facades are below health based standards.	-
16/00999/EIASN & 16/00998/EIASP	Screening opinion / Scoping Opinion in relation to the operation of an aggregates manufacturing facility	Screening Opinion / Scoping Opinion	The site will be subject to an EA permit that will contain conditions regarding dust management and mitigation.	EIA Required (scoping opinion currently awaiting decision)

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
CM1	Bootham	B	460,022	452,777	3.04	NO_x, PM_{10}	No	C, FDMS	Y (0m)[1]	49.6	N
CM2	Fishergate	R	460,746	451,038	2.66	NO_x, PM_{10}	Yes	C, FDMS	Y (10m)	3.2	Y
CM3	Holgate	R	459,512	451,282	1.65	NO_x, PM_{10}	Yes	FDMS	Y (12m)	2.5	Y
CM4	Nunnery Lane	R	460,068	451,199	1.65	NO_x	Yes	C	Y (4m)	1.7	Y
CM5	Gillygate	R	460,147	452,345	2.50	NO_x, PM2.5	Yes	C, TEOM	Y (3m)	2.1	Y
CM6	Lawrence Street	R	461,256	451,340	1.65	NO_x	Yes	C	Y (5m)	3.2	Y
CM7	Heworth Green	R	461,126	452,602	1.53	NO_x	No	C	Y (3m)	1.2	Y
CM8	Plantation Drive	R	457,428	452,620	~1.65	PM_{10}	No	TEOM	Y (17m)	1.0	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
CM9	Fulford Road	R	460,937	449,464	~1.65	NO_x	Yes	C	Y(19m)	5.0	Y

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) [1]	Distance to Kerb of Nearest Road (m) [2]	Tube collocated with a Continuous Analyser?
5	Lampost 15 Forge Close, Jockey Lane	R	462040	454883	NO_2	OUT	16.9	1.9	N
6	Lampost top of Nunnery Lane Car Park	R	459777	451406	NO_2	IN	7.7	2.8	N
7	Gillygate opposite Portland Street	R	460217	452421	NO_2	IN	2.3	0.3	N
8	Portland Street - triplicate	B	460163	452468	NO_2	OUT	3.7	1.8	N
9	Portland Street - triplicate	B	460163	452468	NO_2	OUT	3.7	1.8	N
11	Holly Bank	B	458846	450946	NO_2	OUT	7.7	0.7	N
13	Papillion hotel, Gillygate	R	460176	452377	NO_2	IN	0.1	1.5	N
14	Gillygate Surgery	R	460167	452347	NO_2	IN	1.5	2.3	N
15	Foss Islands Rd	R	461105	451458	NO_2	IN	1.9	1.9	N
16	Prices Lane	R	460160	451152	NO_2	IN	2.5	1.2	N
17	Drainpipe of house 18 Queen St	R	459646	451500	NO_2	IN	0.2	1.3	N
18	Lampost 4 Haxby Road	R	460457	452903	NO_2	IN	3.3	1.9	N
25	Heworth Road - Lamppost 6	R	461721	452709	NO_2	OUT	7.2	1.4	N
26	Haleys Terrace (previously Longwood Road)	R	460829	453524	NO_2	OUT	8.5	0.4	N
33	Haxby Road (nr Whitecross Rd)	R	460598	453227	NO_2	OUT	14.5	1.7	N
35	Carr Lane	R	457603	451492	NO_2	OUT	6.2	2.9	N
37	Jarvis Abbey Park	R	459522	451187	NO_2	IN	21.6	2.7	N
44	Lampost 8 Monkgate Cloisters	R	460679	452326	NO_2	IN	2.0	1.6	N
45	Clarence St	R	460319	452754	NO_2	IN	3.6	2.0	N
47	Strensall Road	R	462009	456996	NO_2	OUT	19.2	0.8	N
50	BLANK	N/A	N/A	N/A	NO_2	N/A	N	N/A	N
60	First lampost on Navigation Road	R	461017	451781	NO_2	IN	13.0	0.2	N
78	Gillygate Monitoring Station - triplicate	R	460149	452342	NO_2	IN	3.4	2.3	Y
79	Gillygate Monitoring Station - triplicate	R	460149	452342	NO_2	IN	3.4	2.3	Y
80	Gillygate Monitoring Station - triplicate	R	460149	452342	NO_2	IN	3.4	2.3	Y
83	Drainpipe 6 Stockton Lane - nr Heworth Rd roundabout	B	461597	452830	NO_2	OUT	0.1	8.8	N

88	Lampost 1 Yew Tree Mews Osbaldwick Village	B	463354	451972	NO_2	OUT	4.9	0.6	N
90	Lampost Opposite Montaque Street on Cambleshon Road	R	459997	450109	NO_2	OUT	19.8	1.0	N
96	Heslington Lane	R	460978	449452	NO_2	OUT	1.5	2.5	N
100	House Near A59 Ringroad Roundabout	R	456228	453312	NO_2	OUT	0.2	15.0	N
101	Wiggington Road near the ringroad roundabout	R	459746	455897	NO_2	OUT	15.0	0.5	N
102	Signpost between houses 252 & 254 on Salisbury Terrace - triplicate	R	458703	452429	NO_2	IN	0.2	1.0	N
103	Signpost between houses 252 & 254 on Salisbury Terrace - triplicate	R	458703	452429	NO_2	IN	0.1	1.4	N
104	Signpost between houses 252 & 254 on Salisbury Terrace - triplicate	R	458703	452429	NO_2	IN	0.1	1.4	N
107	Inbetween corner shop & betting office	R	458779	452387	NO_2	IN	3.0	3.8	N
108	On signpost opposite side of road from 200 Salisbury Terrace	R	458814	452373	NO_2	IN	0.2	1.5	N
109	Signpost outside 16 Rougier Street	R	459924	451833	NO_2	IN	0.2	2.5	N
110	Signpost inbetween Club Salvation & 31 George Hudson Street	R	459985	451727	NO_2	IN	0.2	2.3	N
111	Lampost at side of Cedar Court opposite entrance to Multistorey Car Park on Tanner Row	R	459917	451728	NO_2	OUT	26.0	2.6	N
112	Lampost outside St Gregorys Mews, opposite Council HQ Toft Green	R	459873	451684	NO_2	OUT	1.0	2.3	N
114	Bus Stop outside Society bar/cafe Rougier Street	R	459981	451778	NO_2	IN	30.0	2.7	N
115	Inside Bus Stop - opposite tube 114	R	459962	451771	NO_2	IN	47.0	1.5	N
116	111 Poppleton Road, drainpipe	R	458212	452037	NO_2	OUT	0.1	5.3	N
125	Osbaldwick Derwenthorpe	R	463194	451967	NO_2	OUT	20.0	1.6	N
126	New Tube (Osbalwick Parish Council) nr Bridge	R	463482	451896	NO_2	OUT	17.5	0.9	N
127	Lampost to left of 102 Layerthorpe (flats)	R	461108	452313	NO_2	OUT	3.3	1.8	N

128	Drainpipe between 7-9 Livingstone Street	R	458686	452369	NO_2	IN	0.1	1.6	N
129	Drainpipe to front of 88 Station Road	R	455968	453397	NO_2	OUT	0.1	14.5	N
2a	Fishergate Monitoring station - triplicate	R	460746	451034	NO_2	IN	16.3	3.5	Y
2b	Fishergate Monitoring station - triplicate	R	460746	451034	NO_2	IN	16.3	3.5	Y
2c	Fishergate Monitoring station - triplicate	R	460746	451034	NO_2	IN	16.3	3.5	Y
3a	Bootham Monitoring Station - triplicate	B	460024	452767	NO_2	OUT	39.0	49.6	Y
3b	Bootham Monitoring Station - triplicate	B	460024	452767	NO_2	OUT	39.0	49.6	Y
3c	Bootham Monitoring Station - triplicate	B	460024	452767	NO_2	OUT	39.0	49.6	Y
95a	Fulford Monitoring Station - triplicate	R	460938	449465	NO_2	OUT	19.0	6.5	Y
95b	Fulford Monitoring Station - triplicate	R	460938	449465	NO_2	OUT	19.0	6.5	Y
95c	Fulford Monitoring Station - triplicate	R	460938	449465	NO_2	OUT	19.0	6.5	Y
9a	Portland Street - triplicate	B	460163	452468	NO_2	OUT	3.7	1.8	N
A1	Bootham traffic light outside dance shop	R	460088	452263	NO_2	IN	0.2	2.3	N
A11	Traffic lights end of Water Lane	R	459341	453042	NO_2	IN	13.6	0.4	N
A12	Lampost 7 Clifton Green	R	459251	453008	NO_2	IN	12.9	2.2	N
A13	Lampost 1 Clifton Dale - triplicate	B	459335	452931	NO_2	OUT	2.7	1.6	N
A14	Lampost 1 Clifton Dale - triplicate	B	459335	452931	NO_2	OUT	2.7	1.6	N
A14a	Lampost 1 Clifton Dale - triplicate	B	459335	452931	NO_2	OUT	2.7	1.6	N
A17	Sailsbury Road	R	458578	452472	NO_2	IN	8.7	1.5	N
A19	17 Sailsbury Terrace - triplicate	R	458713	452414	NO_2	IN	0.2	1.3	N
A19a	17 Sailsbury Terrace - triplicate	R	458713	452414	NO_2	IN	0.2	1.3	N
A19b	17 Sailsbury Terrace - triplicate	R	458713	452414	NO_2	IN	0.2	1.3	N
A2	Drainpipe on front of registry office	R	459917	452405	NO_2	IN	0.2	3.4	N
A20	224 Sailsbury Terrace – triplicate	R	458760	452404	NO_2	IN	0.2	1.1	N
A20a	224 Sailsbury Terrace – triplicate	R	458760	452404	NO_2	IN	0.2	1.1	N
A20b	224 Sailsbury Terrace – triplicate	R	458760	452404	NO_2	IN	0.2	1.1	N
A21	Kingsland Terrace	B	458806	452326	NO_2	OUT	0.2	1.4	N
A22	Kingsland Terrace	B	458792	452242	NO_2	OUT	0.2	23.8	N
A25	Garfield Terrace	R	458706	452225	NO_2	OUT	0.2	1.5	N
A29	Low Poppleton Lane	B	456939	453013	NO_2	OUT	23.6	1.1	N
A3	WRVS building -Bootham	R	459822	452492	NO_2	IN	0.2	2.6	N
A30	Boroughbridge Road	B	457060	452888	NO_2	OUT	8.3	6.2	N

A36	Boroughbridge Road	B	457625	452446	NO_2	OUT	0.2	9.4	N
A38	Boroughbridge Road	B	457857	452334	NO_2	OUT	0.2	10.3	N
A4	St Olaves Road	B	459699	452638	NO_2	IN	5.8	0.7	N
A40	Poppleton Road School	B	458109	452196	NO_2	OUT	0.2	7.9	N
A41	140 Poppleton Road	R	458172	452108	NO_2	OUT	0.2	5.3	N
A45	Grantham Drive	B	458384	451817	NO_2	OUT	0.2	10.5	N
A48	9 Poppleton Road	R	458666	451468	NO_2	OUT	0.2	4.9	N
A50	Outside Fox pub -Holgate Rd	R	458732	451393	NO_2	IN	16.1	0.3	N
A51	Thrall entrance	B	458827	451348	NO_2	IN	18.0	2.2	N
A52	Holgate Road (cornor of Hamilton Dr East)	R	458945	451254	NO_2	IN	10.9	2.0	N
A53	Holgate Road	R	459066	451239	NO_2	IN	7.9	2.7	N
A55	Holgate Road	R	459351	451221	NO_2	IN	5.5	0.2	N
A56	Holgate Road	B	459470	451268	NO_2	IN	0.2	10.2	N
A57	Hairdressers Holgate Road	R	459533	451280	NO_2	IN	0.2	2.8	N
A6	Clifton Bingo Hall	R	459536	452811	NO_2	IN	6.2	3.0	N
A60	Shipton Road	B	458906	453276	NO_2	OUT	0.2	21.5	N
A62	42 Shipton Road	B	458806	453483	NO_2	OUT	0.2	15.7	N
A64	Lamppost outside Charlie Browns	R	460030	452327	NO_2	IN	2.4	0.6	N
A66	70 Shipton Road	B	458672	453685	NO_2	OUT	0.2	18.4	N
A69	6 South Cottages	B	458375	453958	NO_2	OUT	0.2	10.0	N
A7	51 Clifton	R	459441	452892	NO_2	IN	3.3	2.1	N
A70	120 Shipton Road	B	458299	454070	NO_2	OUT	0.2	13.0	N
A71	154 Shipton road	B	458121	454254	NO_2	OUT	0.2	9.6	N
A74	176 Shipton Road	B	458041	454371	NO_2	OUT	0.2	7.1	N
A77	Lampost outside 206 Shipton Road	B	457929	454537	NO_2	OUT	6.1	1.7	N
A81	Lampost outside 276 Shipton Rd	B	457733	454805	NO_2	OUT	0.2	8.4	N
A85	Drainpipe front of Greenside guest house	B	459364	453009	NO_2	OUT	0.2	11.5	N
A88	111 Boroughbridge Road, Drainpipe nearest Garage at side of the door	B	457470	452550	NO_2	OUT	0.2	12.9	N
A9	Lime Tree House	R	459295	453067	NO_2	IN	12.6	1.7	N
A90	Lampost 25 Shipton Rd	R	459238	453157	NO_2	IN	8.2	1.9	N
A94	5 Salisbury Road	R	458651	452426	NO_2	OUT	0.2	13.7	N

A96	Ousecliffe Gardens signpost, outside 31 Water End	R	459038	452850	NO_2	IN	10.0	0.6	N
A97	Lampost next to Air Quality Monitoring Station on Plantation Drive	R	457431	452616	NO_2	OUT	18.7	2.2	N
B1	Lamppost 1 Lowther Street opposite Riverside House Flats	R	460848	452582	NO_2	IN	0.2	1.3	N
B15	Lampost 99 Huntington Road	R	461294	455305	NO_2	OUT	28.0	1.6	N
B19	Lampost 5 outside Huntington Primary School	R	461891	455876	NO_2	OUT	17.2	1.6	N
B2	Lampost 7 Huntington Road opposite Park Grove	R	460924	452697	NO_2	IN	2.5	1.3	N
B29	Eastern Terrace	R	461453	452750	NO_2	OUT	0.3	1.0	N
B3	Lampost 11 Huntington Road outside no 70	R	460952	452826	NO_2	OUT	2.9	1.4	N
B36	Lampost 60 Malton Road - triplicate	B	462565	454194	NO_2	OUT	16.9	0.6	N
B37	Lampost 60 Malton Road - triplicate	B	462565	454194	NO_2	OUT	16.9	0.6	N
B37a	Lampost 60 Malton Road - triplicate	B	462565	454194	NO_2	OUT	16.9	0.6	N
B38	482 Malton Road	B	463757	455155	NO_2	OUT	0.2	11.7	N
B41	76 Lawrence Street	B	461326	451330	NO_2	IN	0.2	6.5	N
B42	83 Lawrence Street	B	461430	451348	NO_2	IN	0.2	7.2	N
B43	117 Lawrence Street	B	461557	451343	NO_2	IN	0.2	7.9	N
B44	Outside nursing home, Lawrence Street	R	461643	451343	NO_2	IN	8.6	1.9	N
B45	Pedestrian crossing Traffic Light Melrosegate Crossroads	R	461849	451284	NO_2	IN	17.3	0.5	N
B47	47 Hull Road	B	462019	451289	NO_2	OUT	0.2	12.2	N
B48	61 Hull Road	B	462122	451289	NO_2	OUT	0.2	12.8	N
B50	134 Hull Road	R	462291	451269	NO_2	OUT	0.2	3.7	N
B51	117 Hull Road	B	462384	451298	NO_2	OUT	0.2	13.2	N
B56	Lampost 40 Hull Road	R	462888	451289	NO_2	OUT	14.4	2.3	N
B58	231 Hull Road	B	462970	451300	NO_2	OUT	0.2	14.0	N
B60	Lampost 1 Nursery Gardens	B	463234	451339	NO_2	OUT	10.7	1.3	N
B63	Lampost 54 Tang Hall Lane	R	462704	451300	NO_2	OUT	13.2	0.9	N
B72	Front of York Cycleworks	R	461122	451374	NO_2	IN	10.0	2.9	N
B74	Heworth Court Hotel sign outside Sutherland	B	461371	452708	NO_2	OUT	5.2	17.8	N

	House on side of house on drainpipe.								
B80	On drainpipe on front of Heworth Surgery.	B	461185	452663	NO_2	OUT	24.5	13.4	N
B82	Lampost Dalguise Grove	B	460974	452563	NO_2	OUT	3.1	1.1	N
B83	Lampost 24 Outside No.55 Heworth Green	R	461285	452695	NO_2	OUT	11.3	1.0	N
B84	Drainpipe to the left of the front door on 167 Hull Road	B	462654	451293	NO_2	OUT	0.2	13.4	N
B85	Lampost 7 Outside St Lawrences Working Mens Club	R	461227	451368	NO_2	IN	18.8	5.6	N
B86	Lampost 16 Heworth Green, next to Air Quality Station	R	461116	452602	NO_2	OUT	5.0	0.7	N
B88	Telegraph Pole 381 Hull Road	R	462799	451291	NO_2	OUT	10.0	6.8	N
B89	Outside old DC Cook site on signpost	R	461170	451357	NO_2	IN	2.0	2.8	N
B90	11 Lawrence Street	R	461133	451394	NO_2	IN	0.1	4.4	N
C12	Lampost 1 Ainsty Grove	B	458825	449928	NO_2	OUT	10.8	0.3	N
C17	248 Tadcaster Rd	B	459085	450544	NO_2	OUT	0.2	20.6	N
C18	196 Mount Vale	B	459204	450772	NO_2	IN	0.2	9.2	N
C19	Trentholme Dr	B	459271	450819	NO_2	IN	7.7	0.4	N
C2	Lampost 66 Tesco roundabout	R	458333	448974	NO_2	OUT	16.9	1.1	N
C20	Elmbank hotel	B	459280	450923	NO_2	IN	21.4	0.5	N
C21	Dalton Terrace	R	459410	451040	NO_2	IN	3.8	3.5	N
C22	Park Street	B	459570	451195	NO_2	IN	14.4	1.1	N
C23	The Mount	R	459553	451252	NO_2	IN	0.2	3.0	N
C26	Outside Odean	R	459639	451334	NO_2	IN	12.9	0.8	N
C27	Windmill Pub	R	459717	451433	NO_2	IN	0.2	3.2	N
C28	House top of Selby Rd	B	461201	448386	NO_2	OUT	0.2	15.3	N
C29	Lampost 34 Selby Road	R	461196	448426	NO_2	OUT	21.7	0.5	N
C30	Lampost 2 Selby Rd	R	461185	448462	NO_2	OUT	13.1	1.2	N
C31	2 Selby Rd	B	461193	448473	NO_2	OUT	0.2	14.1	N
C32	Fordlands Rd	B	461128	448823	NO_2	OUT	5.4	6.8	N
C33	124 Main St	B	461085	448933	NO_2	OUT	1.0	11.2	N
C34	103 Main St	R	461085	449067	NO_2	OUT	0.2	3.5	N
C36	50 Main St	R	461052	449146	NO_2	OUT	0.2	3.7	N

C37	59 Main St	B	461045	449223	NO_2	OUT	0.2	6.7	N
C38	lampost 8 Main St	R	461038	449225	NO_2	OUT	6.0	0.4	N
C39	18 Main St	R	460974	449336	NO_2	OUT	0.2	2.4	N
C4	147 Tadcaster Rd	B	458470	449126	NO_2	OUT	0.2	14.3	N
C40	Adams House B&B	B	460910	449628	NO_2	OUT	0.2	8.7	N
C42	300 Fulford Rd	B	460857	449748	NO_2	OUT	0.2	10.0	N
C43	Lampost 39 Fulford Rd - triplicate	R	460869	449730	NO_2	OUT	8.7	0.3	N
C43a	Lampost 39 Fulford Rd - triplicate	R	460869	449730	NO_2	OUT	8.7	0.3	N
C44	Lampost 39 Fulford Rd - triplicate	R	460869	449730	NO_2	OUT	8.7	0.3	N
C49	Alma terrace	B	460860	450530	NO_2	IN	6.0	0.9	N
C51	Conservative Club	R	460871	450727	NO_2	IN	9.8	1.0	N
C52	Howard St	R	460853	450781	NO_2	IN	9.9	1.4	N
C53	Winterscale St	R	460766	450924	NO_2	IN	14.7	2.1	N
C54	Escrick St	R	460762	451069	NO_2	IN	1.7	3.2	N
C56	Pedestrian crossing on junction of Scarcroft Road/The Mount	R	459484	451141	NO_2	IN	25.1	1.3	N
C57	Lampost 1 Nelson's Lane	B	458912	450111	NO_2	OUT	5.9	1.3	N
C58	Drainpipe of 4 Main Street Fulford	R	460926	449429	NO_2	OUT	0.2	3.6	N
C59	Drainpipe of 34 Tadcaster Road	R	458735	449713	NO_2	OUT	0.2	3.6	N
C62	East Mount Road	R	459579	451251	NO_2	IN	0.1	1.0	N
C63	1 St Edwards Close	R	458790	449740	NO_2	OUT	0.1	15.6	N
C7	Slingsby Grove	R	458611	449477	NO_2	OUT	1.4	2.6	N
D10	Daisy Taylors Card Shop, Kings Square	B	460443	451927	NO_2	OUT	0.2	0.9	N
D12	On signpost outside 26 Fossgate	R	460567	451740	NO_2	IN	0.2	1.6	N
D13	Lampost 4 Skeldergate, opposite City Mills	R	460271	451358	NO_2	IN	1.6	1.6	N
D14	Lampost 3 Barbican Road outside No.7	R	461077	451354	NO_2	IN	1.9	0.2	N
D16	Lampost 1 , Paragon St	R	460708	451231	NO_2	IN	0.2	3.0	N
D17	Piccadilly/ Merchantgate junction	R	460575	451616	NO_2	IN	19.3	0.3	N
D18	Lampost 6 Clifford St opposite Peckitt Street	R	460395	451502	NO_2	IN	0.4	1.8	N
D19	Bridge St/ Micklegate Junction	R	460038	451626	NO_2	IN	1.7	0.2	N
D20	Low Ousegate / Clifford St junction, outside Waterstones	R	460323	451685	NO_2	IN	36.5	0.5	N

D22	Outside Museum Gardens	R	460035	452010	NO_2	IN	7.9	2.1	N
D24	Priory St sign Micklegate	R	459805	451543	NO_2	OUT	3.4	0.5	N
D25	Bus Stop E outside Royal York Hotel	R	459693	451750	NO_2	IN	169.3	0.4	N
D26	Lampost 14 Piccadilly (near Travellodge)	R	460671	451400	NO_2	IN	15.5	2.1	N
D27	Lampost 2 St Deny's Road - outside hotel	R	460734	451563	NO_2	OUT	11.7	1.5	N
D28	Lampost 4 outside The Garden of India restaurant on Fawcett Street	R	460764	451185	NO_2	IN	23.6	2.4	N
D30	Lampost outside Barbican Centre	R	460834	451252	NO_2	IN	35.5	0.1	N
D31	Lampost 9 Barbican road outside No.24	R	461002	451229	NO_2	IN	2.0	0.3	N
D32	Lampost 3 Bishopgate Street -next to bench	R	460258	451208	NO_2	IN	22.2	1.9	N
D33	Lampost 17 Nunnery Lane outside 81	R	460075	451174	NO_2	IN	3.9	0.2	N
D35	Drainpipe of house 22, Prices Lane	R	460134	451170	NO_2	IN	0.2	1.6	N
D36	Lampost 7 Bishopthorpe Road, opposite entrance to Charlton St	R	460135	450884	NO_2	IN	6.1	0.2	N
D37	Lampost 3, Bishopthorpe Road, outside house 26	R	460157	450988	NO_2	IN	2.0	2.0	N
D38	Lampost 2 Scarcroft Rd	R	460088	450929	NO_2	IN	2.7	1.6	N
D39	Lampost 1 Bishopthorpe Road	R	460185	451055	NO_2	IN	1.5	0.5	N
D4	Lampost 11 Lord Mayor's Walk - opposite bike shop	R	460560	452300	NO_2	IN	25.1	2.3	N
D40	Lampost 16 Nunnery Lane	R	460069	451196	NO_2	IN	3.3	1.6	N
D41	Drainpipe of 55 Lord Mayor's Walk	R	460286	452487	NO_2	IN	0.2	3.8	N
D43	Rougier Street Signpost 1, has “Except for Access” sign on it.	R	459920	451834	NO_2	IN	113.9	0.3	N
D45	Lampost 6 The Stonebow Opposite Windsors World of Shoes	R	460673	451869	NO_2	IN	15.6	1.0	N
D47	Lampost 8 Jewbury	R	460682	452187	NO_2	IN	0.6	2.4	N
D48	Outside De Grey House right hand side of side entrance gate post	R	460103	452180	NO_2	IN	33.6	2.3	N
D49	Lampost 1 Fishergate	R	460656	451269	NO_2	IN	0.2	2.8	N
D50	Drainpipe side of Cardshop Coppergate	R	460371	451682	NO_2	OUT	N	1.9	N
D51	Inside Taxi Rank @ York Railway Station	R	459640	451722	NO_2	OUT	N	40.0	N
D52	Lampost 3 Kent Street at side of car park	R	460887	451140	NO_2	OUT	2.0	90.0	N

D53	58 Nunnery Lane	R	460115	451146	NO_2	IN	0.1	3.6	N
D54	76 Nunnery Lane	R	460146	451116	NO_2	IN	0.1	5.5	N
D55	Museum Street - Opposite Thomas's Pub	R	460087	452065	NO_2	IN	1.8	2.2	N
D6	Margaret Phillipson Court, Aldwalk	B	460570	452177	NO_2	OUT	0.2	2.6	N
D8	Lampost 2, The Stonebow - Jorvick café	R	460553	451843	NO_2	OUT	27.3	0.5	N
D9	Lampost 8, Lord Mayor's Walk outside no 34	R	460483	452357	NO_2	IN	1.8	0.1	N
D56	Three Tuns Pub, 12 Coppergate	R	460400	451685	NO_2	OUT	0.1	1.6	N
D57	Lampost 4, Pedestrian Crossing, Coppergate	R	460416	451708	NO_2	OUT	11.9	2.4	N
D58	Traffic lights, opposite Duttons, Coppergate	R	460435	451732	NO_2	OUT	8.0	0.1	N
D59	Bus Stop outside 8/9 SLP	R	460087	452156	NO_2	IN	1.8	2.7	N
D60	No entry sign outside ‘Schuh’ Shoe Shop	R	460294	451883	NO_2	OUT	N	1.7	N
130	Outside 81 Low Mill Close	R	463663	451054	NO_2	OUT	13.6	1.1	N

(1) 0 if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the facade of a residential property)

(2) N/A if not applicable

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentrations ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
Bootham	UB	Automatic	93.09	93.09	25.02	23.36	18.99	18.75	15.82
Fishergate	R	Automatic	95.62	95.62	31.53	31.37	27.23	26.48 (fully ratified)	27.35 (ratified Jan – Sept only)
Holgate	R	Automatic	88.84	88.84	33.80	33.06	38.00	32.5	30.73
Nunnery Lane	R	Automatic	97.12	97.12	37.45	33.22	32.50	34.11	28.37
Gillygate	R	Automatic	97.80	97.80	**49.8**	30.21	32.80	34.65	27.76
Lawrence Street	R	Automatic	88.93	88.93	36.30	34.17	**40.40**	34.7	34.10
Heworth Green	R	Automatic	80.58	80.58	39.41	34.88	27.81	33.58	27.96
Fulford Road	R	Automatic	93.90	93.90	28.81	27.59	24.68	27.72	25.00
5	R	DT	100	100	22.4	23.82	17	19.3	16.2
6	R	DT	100	100	**56.74**	**49.05**	**40.6**	39.0	37.4
7	R	DT	100	100	**61.39**	**53.52**	**48.4**	**55.2**	**44.9**
8	B	DT	100	100	25.63	25.3	20.9	20.1	16.3
9	B	DT	100	100	25.98	28.2	21.6	19.2	15.3
11	B	DT	92	92	24.44	22.89	21.8	18.6	15.8
13	R	DT	100	100	**57.7**	**61.67**	**46.5**	**48.3**	**45.5**
14	R	DT	100	100	**62.01**	**53.41**	**50.7**	**52.2**	**47.1**
15	R	DT	75	75	**45.99**	**41.55**	35.8	37.7	37.4
16	R	DT	100	100	**47.96**	**44.16**	35.9	37.4	37.5
17	R	DT	100	100	**42.72**	39.71	34.2	37.1	32.2

18	R	DT	100	100	**40.54**	35.99	31.8	34.4	29.9
25	R	DT	100	100	36.18	31.28	27.9	29.3	26.1
26	R	DT	83	83	34.11	29.9	25.9	30.0	24.1
33	R	DT	83	83	34.46	30.65	24.2	28.3	26.9
35	R	DT	100	100	34.88	32.13	25.6	27.5	24.9
37	R	DT	100	100	**42.57**	**40.48**	34.5	37.5	33.2
44	R	DT	100	100	35.08	30.61	26.5	30.3	25.7
45	R	DT	100	100	**41.3**	38.92	32.9	35.6	31.1
47	R	DT	100	100	36.47	30.76	28.2	28.0	27.6
50	BLANK	DT	Blank	Blank	Blank	Blank	Blank	Blank	Blank
60	R	DT	100	100	28.53	27.12	19.7	27.3	21.3
78	R	DT	100	100	39.78	33.93	30.4	32.1	29.0
79	R	DT	100	100	**40.26**	31.66	31.2	35.2	29.4
80	R	DT	100	100	**40.47**	33.85	31.1	33.0	28.6
83	B	DT	100	100	28.82	27.48	22.3	20.7	18.3
88	B	DT	92	92	21.35	19.11	15.7	15.7	12.8
90	R	DT	83	83	19.72	20.75	17.3	19.4	16.0
96	R	DT	92	92	25.63	27.22	24.2	26.8	23.3
100	R	DT	100	100	26.89	24.07	20.4	23.1	19.5
101	R	DT	100	100	**43.24**	39.58	32.6	35.8	33.8
102	R	DT	100	100	**40.6**	39.01	36	34.5	31.9
103	R	DT	100	100	**40.65**	38.54	34.1	37.6	31.1
104	R	DT	100	100	**41.08**	39.91	36.1	36.9	31.0
107	R	DT	100	100	24.62	22.84	18.8	20.7	18.9
108	R	DT	100	100	33.13	31.4	22.9	26.3	23.5

109	R	DT	83	83	**58.54**	**56.5**	-	-	**46.4**
110	R	DT	100	100	**62.2**	**61.75**	**48.6**	**51.3**	**46.6**
111	R	DT	100	100	35.72	35.42	28.1	31.9	25.1
112	R	DT	100	100	31.89	28.07	24.5	27.2	23.3
114	R	DT	92	92	**49.13**	**46.64**	**40**	**41.5**	39.3
115	R	DT	92	92	**59.35**	**49.32**	38.5	**48.4**	**42.6**
116	R	DT	100	100	35.97	34.09	29.1	31.5	28.0
125	R	DT	83	83	-	-	17.1	17.5	15.8
126	R	DT	100	100	-	-	-	19.6	16.0
127	R	DT	100	100	-	-	-	24.4	23.0
128	R	DT	100	100	-	-	-	22.5	18.6
129	R	DT	100	100	-	-	-	21.1	17.4
2a	R	DT	100	100	34.53	34.83	29.7	30.6	28.6
2b	R	DT	100	100	34.68	33.66	29.4	29.9	26.5
2c	R	DT	100	100	35.96	32	31.2	32.0	26.3
3a	B	DT	92	92	24.02	27.91	20.3	17.4	14.4
3b	B	DT	100	100	25.93	24.79	18.9	19.0	15.1
3c	B	DT	83	83	25.51	23.12	19.5	16.2	16.0
95a	R	DT	100	100	32.36	30.05	26.2	25.9	24.4
95b	R	DT	100	100	31.84	29.06	24.4	27.5	24.6
95c	R	DT	100	100	32.8	29.07	25	24.7	25.0
9a	B	DT	100	100	25.04	24.88	21.1	19.8	15.5
A1	R	DT	100	100	**61.72**	**56.9**	**51.6**	**52.3**	**46.0**
A11	R	DT	75	75	**43.52**	**43.12**	34.1	37.4	33.6
A12	R	DT	100	100	**43.57**	36.37	30.7	33.8	28.7

A13	B	DT	100	100	26.64	27.31	20.8	19.7	16.4
A14	B	DT	100	100	26.08	26.25	21.8	19.9	16.4
A14a	B	DT	100	100	25.44	25.98	22	20.0	15.2
A17	R	DT	100	100	34.94	35.31	28.9	32.3	27.6
A19	R	DT	100	100	36.8	33.79	30.2	31.6	27.7
A19a	R	DT	100	100	36.4	33.6	28.3	30.9	28.8
A19b	R	DT	100	100	**41.6**	33.38	28.7	31.9	28.6
A2	R	DT	83	83	**46.71**	**41.19**	35.4	-	31.1
A20	R	DT	92	92	37.2	34.4	31.2	32.5	28.7
A20a	R	DT	100	100	36.98	38.74	32.4	35.6	28.8
A20b	R	DT	100	100	38.33	37.7	30.7	34.3	29.3
A21	B	DT	100	100	29.36	30.33	22.7	22.8	18.5
A22	B	DT	100	100	28.92	28.94	23	22.4	18.1
A25	R	DT	100	100	30.19	29.21	26	28.4	22.6
A29	B	DT	92	92	27.81	29.78	22.8	21.0	18.3
A3	R	DT	83	83	39.5	36.26	30.5	34.4	29.2
A30	B	DT	100	100	25.05	24.13	21.2	22.1	17.8
A36	B	DT	75	75	25.09	22.74	-	-	15.2
A38	B	DT	100	100	22.61	25.8	20.6	19.1	15.3
A4	B	DT	100	100	28.68	28.31	24.6	21.0	18.2
A40	B	DT	92	92	27.77	30.74	25.6	22.9	17.8
A41	R	DT	100	100	27.97	27.06	22.3	26.0	20.6
A45	B	DT	100	100	21.85	22.79	19.8	18.8	14.3
A48	R	DT	100	100	32.89	28.04	25.4	26.9	23.7
A50	R	DT	92	92	38.11	34.12	30.6	-	26.2

A51	B	DT	100	100	32.87	29.82	24.8	23.8	19.9
A52	R	DT	92	92	**40.91**	38.52	34.6	37.1	31.0
A53	R	DT	100	100	**40.39**	36.7	32.4	32.2	30.8
A54	R	DT	75	75	-	-	-	**41.3**	36.9
A55	R	DT	92	92	**40.87**	39.92	35.3	36.3	31.8
A56	B	DT	83	83	35.59	39.28	32.9	30.2	26.3
A57	R	DT	100	100	**62.49**	**54.23**	**51.6**	**49.2**	**46.9**
A6	R	DT	100	100	35.53	31.39	27.1	28.8	25.5
A60	B	DT	100	100	21.8	22.95	18.6	16.7	13.4
A62	B	DT	92	92	18.84	21.1	16.4	15.3	13.6
A64	R	DT	100	100	**40.54**	38.05	35.6	35.1	29.3
A66	B	DT	100	100	23.81	26.26	18.9	18.1	14.5
A69	B	DT	100	100	22.22	20.68	17.3	14.9	12.5
A7	R	DT	92	92	36.45	36.08	28.7	29.3	27.5
A70	B	DT	100	100	25.7	24.83	21.7	19.7	16.4
A71	B	DT	100	100	19.57	21.32	16	16.2	12.3
A74	B	DT	92	92	20.04	19.24	17.3	13.8	12.6
A77	B	DT	67	67	27.9	25.5	20.5	21.9	16.6 (estimate)
A81	B	DT	100	100	25.43	26.71	19.6	17.6	15.2
A85	B	DT	100	100	30.33	27.6	24.4	23.0	19.3
A88	B	DT	100	100	23.96	23.96	19.7	21.4	15.7
A9	R	DT	92	92	**43.76**	38.44	33.8	34.4	30.1
A90	R	DT	100	100	**48.23**	**45.68**	37.4	**40.0**	36.0
A94	R	DT	100	100	30.09	33.75	26.7	26.2	22.0
A96	R	DT	100	100	-	35.89	31.5	34.4	28.4

A97	R	DT	92	92	-	-	-	22.0	18.8
B1	R	DT	100	100	36.82	36.88	30.4	31.8	29.4
B15	R	DT	92	92	24.36	24.01	20.2	22.6	19.2
B19	R	DT	83	83	26.18	28.43	21.5	21.7	19.7
B2	R	DT	100	100	36.75	30.88	24.9	28.7	24.4
B29	R	DT	100	100	29.47	28.85	24.3	25.6	22.2
B3	R	DT	92	92	29.13	27.3	24.1	25.2	21.5
B36	B	DT	83	83	20.49	26.03	17	16.0	13.0
B37	B	DT	100	100	22.3	22.59	18.4	16.0	14.6
B37a	B	DT	83	83	19.6	22.13	17.7	16.5	14.6
B38	B	DT	100	100	24.25	26.99	22	20.0	16.3
B41	B	DT	92	92	**41.56**	**42.31**	34.9	31.6	28.1
B42	B	DT	92	92	30.43	31.33	26.7	24.4	20.8
B43	B	DT	100	100	28.43	27.43	23.3	21.2	18.6
B44	R	DT	92	92	**42.17**	34.32	33	34.0	31.3
B45	R	DT	92	92	37.16	34.26	26.9	30.9	28.1
B47	B	DT	92	92	23.17	23.23	19	16.9	15.1
B48	B	DT	83	83	29.03	26.02	22.7	20.0	17.5
B50	R	DT	100	100	31.36	28.36	24.1	27.1	24.3
B51	B	DT	92	92	27.27	22.77	20.3	19.5	16.5
B56	R	DT	100	100	**42.56**	31.79	33.7	34.5	31.8
B58	B	DT	83	83	25.56	27.85	20.8	20.1	16.9
B60	B	DT	92	92	26.37	29.65	20.7	20.0	17.8
B63	R	DT	92	92	**41.37**	37.67	32.2	34.9	29.5
B72	R	DT	100	100	**62.64**	**56.46**	**47.4**	**47.0**	**44.6**

B74	B	DT	83	83	28.34	29.13	22.6	22.6	18.9
B80	B	DT	100	100	23.63	24.22	17.9	19.0	15.2
B82	B	DT	100	100	30.61	30.39	22.3	22.4	19.4
B83	R	DT	92	92	38.7	33.85	27.9	32.0	27.6
B84	B	DT	100	100	29.95	29.79	26.2	23.2	20.2
B85	R	DT	100	100	39.43	37.01	33.1	32.5	29.1
B86	R	DT	100	100	30.28	28.8	25.9	26.9	22.9
B88	R	DT	100	100	39.03	35.45	31.8	33.2	28.8
B89	R	DT	100	100	-	-	-	36.6	35.0
B90	R	DT	100	100	-	-	-	38.3	35.5
C12	B	DT	92	92	25.71	24.68	21.5	19.8	15.9
C17	B	DT	92	92	25.27	26.43	21.6	20.0	15.5
C18	B	DT	100	100	35.3	36.92	29.3	25.2	22.3
C19	B	DT	50	50	28.31	28.01	21.3	18.7	17.0 (estimate)
C2	R	DT	100	100	**43.46**	35.89	33.1	35.3	32.0
C20	B	DT	100	100	24.08	26.4	23.4	20.3	16.9
C21	R	DT	100	100	35.33	32.45	28.2	28.3	26.9
C22	B	DT	83	83	26.99	34.27	28.6	22.9	19.4
C23	R	DT	100	100	**50.41**	**48.48**	38.5	**42.9**	39.9
C26	R	DT	100	100	**53.34**	**46.79**	**40.9**	**42.1**	**40.4**
C27	R	DT	100	100	**62.79**	**54.52**	**49.1**	**52.0**	**46.7**
C28	B	DT	100	100	21.4	21.73	17.9	17.5	14.2
C29	R	DT	100	100	38.29	33.83	30.2	33.5	28.8
C30	R	DT	75	75	**41.91**	35.75	34	35.2	29.3
C31	B	DT	100	100	25.84	27.37	21	20.5	17.9

C32	B	DT	100	100	34.48	33.13	26.9	25.4	22.8
C33	B	DT	100	100	23.75	24.09	-	19.8	14.4
C34	R	DT	100	100	32.1	29.06	26.6	28.6	23.7
C36	R	DT	100	100	36.35	33.43	26.9	30.8	29.7
C37	B	DT	100	100	30.68	29.39	26.2	23.6	20.3
C38	R	DT	92	92	37.1	35.3	30.7	30.8	28.2
C39	R	DT	100	100	**44.92**	**40.19**	31.5	35.3	35.1
C4	B	DT	92	92	25.04	24.29	20.8	19.4	16.4
C40	B	DT	92	92	29.57	30	21.8	20.8	18.0
C42	B	DT	100	100	30.15	32.04	23.8	23.6	20.7
C43	R	DT	92	92	38.83	32.75	29.4	32.3	28.7
C43a	R	DT	100	100	37.53	31.74	29.2	32.3	28.8
C44	R	DT	92	92	37.84	32.96	29.6	28.7	26.8
C49	B	DT	92	92	28.78	30.14	23.7	22.9	18.6
C51	R	DT	100	100	34.35	32.92	30.7	31.7	25.2
C52	R	DT	100	100	31.41	29.81	24.9	28.3	23.1
C53	R	DT	92	92	28.02	28.1	25.4	25.0	22.2
C54	R	DT	83	83	33.6	32.43	29.3	-	25.5
C56	R	DT	100	100	**42.51**	**40.19**	33.3	34.6	32.1
C57	B	DT	83	83	32.11	28.96	27.2	25.7	18.1
C58	R	DT	100	100	**46.34**	**43.16**	36.3	39.5	36.8
C59	R	DT	100	100	37.73	35.83	30.9	33.8	29.9
C62	R	DT	100	100	-	39.43	28.6	30.7	28.4
C63	R	DT	83	83	-	-	-	20.6	19.2
C7	R	DT	92	92	37.08	31.92	29.2	30.8	23.8

D10	B	DT	100	100	26.41	27.57	20.9	21.5	16.9
D12	R	DT	92	92	28.52	26.31	22.1	25.7	22.0
D13	R	DT	100	100	31.92	27.74	25.2	27.8	24.5
D14	R	DT	100	100	**51.35**	**47.05**	**42**	**46.1**	39.0
D16	R	DT	100	100	**48.06**	**45.51**	**40**	**45.2**	37.7
D17	R	DT	83	83	**41.53**	36.09	31.8	34.0	31.8
D18	R	DT	100	100	34.31	37.74	27.8	30.8	26.3
D19	R	DT	100	100	**68.85**	**53.36**	**50.8**	**54.7**	**48.0**
D20	R	DT	83	83	**56.16**	**47.87**	**40.6**	**43.9**	**40.3**
D22	R	DT	100	100	**46.72**	**41.74**	33.4	39.9	33.0
D24	R	DT	100	100	**42.16**	39.13	31.9	-	30.3
D25	R	DT	92	92	**52.49**	**47.53**	-	**41.0**	35.1
D26	R	DT	83	83	36.61	32.8	26.7	29.2	25.3
D27	R	DT	92	92	33.19	30.21	23.9	26.2	25.9
D28	R	DT	100	100	**43.94**	**40.44**	34	37.3	34.1
D30	R	DT	100	100	34.45	33.96	25.6	28.8	25.0
D31	R	DT	92	92	**46.64**	36.91	33	39.9	31.8
D32	R	DT	100	100	**45.32**	**44.61**	35.4	37.1	34.1
D33	R	DT	33	33	**42.46**	37.51	29.2	31.3	25.4 (estimate)
D35	R	DT	100	100	**44.79**	**44.26**	38.8	**42.0**	37.3
D36	R	DT	100	100	**48.93**	**43.23**	34.5	37.5	34.9
D37	R	DT	83	83	39.46	**41.41**	30.9	33.2	26.7
D38	R	DT	92	92	28.71	27.82	25	26.5	22.5
D39	R	DT	100	100	**42.21**	**40.61**	35.7	34.0	29.0
D4	R	DT	92	92	37.97	35.12	28.3	31.7	27.2

D40	R	DT	100	100	35.16	32.44	30	31.5	28.1
D41	R	DT	100	100	**55.02**	**44.49**	38.7	**41.1**	37.6
D43	R	DT	75	75	**59.57**	**47.96**	**45**	**47.9**	**40.4**
D45	R	DT	92	92	39.66	38.04	28.9	32.2	26.1
D47	R	DT	92	92	39.92	38.49	32.5	33.4	27.2
D48	R	DT	100	100	**56.62**	**42.4**	37.3	**41.2**	33.3
D49	R	DT	100	100	**50.03**	**43.36**	38.5	**43.3**	39.1
D50	R	DT	100	100	-	-	**42.8**	**44.3**	**41.9**
D51	R	DT	100	100	-	-	-	**65.3**	**57.1**
D52	R	DT	100	100	-	-	-	27.6	24.1
D53	R	DT	67	67	-	-	-	32.1	27.2 (estimate)
D54	R	DT	100	100	-	-	-	30.6	25.1
D55	R	DT	100	100	-	-	-	39.8	**42.6**
D6	B	DT	100	100	27.7	27.66	24	22.6	18.0
D8	R	DT	92	92	**49.42**	**42.87**	**40.1**	**41.4**	36.3
D9	R	DT	100	100	**47.67**	**42.56**	38.4	36.6	31.7
D56	R	DT	58	58	-	-	-	-	**51.7 (estimate)**
D57	R	DT	58	58	-	-	-	-	37.1 (estimate)
D58	R	DT	67	67	-	-	-	-	**44.0 (estimate)**
D59	R	DT	58	58	-	-	-	-	**50.7 (estimate)**
D60	R	DT	50	50	-	-	-	-	22.2 (estimate)

130	R	DT	58	58	-	-	-	-	14.3 (estimate)

Notes: Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**. NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per LAQM.TG16 if valid data capture for the full calendar year is less than 75%. Such tubes are marked as 'estimate' in the table above. See Appendix C for details.

Table A.4 – 1 Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour means > 200 µg/m^3 (3)				
					2011	2012	2013	2014	2015
Bootham	UB	Automatic	93.09	93.09	0	0	0	0	0
Fishergate	R	Automatic	95.62	95.62	0	0	0	0	0
Holgate	R	Automatic	88.84	88.84	0	0	0	0	0
Nunnery Lane	R	Automatic	97.12	97.12	0	0	0	0	0
Gillygate	R	Automatic	97.80	97.80	**19**	0	0	0	0
Lawrence Street	R	Automatic	88.93	88.93	0	0	0	0	2
Heworth Green	R	Automatic	80.58	80.58	1	0	0	0 (59.5)	0
Fulford Road	R	Automatic	93.90	93.90	0	0	0	0	0

Notes: Exceedances of the NO_2 1-hour mean objective (200µg/m^3 not to be exceeded more than 18 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

(3) If the period of valid data is less than 90%, the 99.8th percentile of 1-hour means is provided in brackets

Table A.5 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2011	2012	2013	2014	2015
Bootham	Background	97%	97%	17.92	12.05	11.68	14.99	15.26*
Fishergate	Roadside	96%	96%	*	18.29	18.84	18.42	17.76*
Holgate Road	Roadside	42%	42%	23.5	20.95	23.80	18.30	20.93 (note low data capture)
Plantation Drive	Roadside	N/A	N/A	20.65	18.83	18.05	17.20	N/A**

Notes: Exceedances of the PM_{10} annual mean objective of 40µg/m3 are shown in **bold**

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

**Note that 2015 data for Fishergate and Bootham has been ratified for the period 01/01/2015 – 30/09/2015 and is provisional for the period 01/10/2015 – 31/12/2015 **2015 data for Plantation Drive is not available due to equipment malfunction*

Table A.6 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
Bootham	Background	97%	97%	8 (35.93)	3	3	4	6
Fishergate	Roadside	96%	96%	2 (35.67)	8	4 (33.8)	7	8
Holgate Road	Roadside	42%	42%	24	14	10 (39.12)	8 (32.10)	7 (41.10)
Plantation Drive	Roadside	N/A	N/A	12	4	4	7	N/A

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold**.

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets

Table A.7 – $PM_{2.5}$ Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	$PM_{2.5}$ Annual Mean Concentration ($\mu g/m^3$) *[EU Limit Value - 25$\mu g/m^3$]*				
				2011	2012	2013	2014	2015
Bootham (TEOM-FDMS)	Background	97%	97%	-	10.18	11.49	12.42	10.20
Fishergate (TEOM-FDMS)	Roadside	89%	89%	-	13.40	13.27	13.57	12.01
Gillygate (TEOM)	Roadside	96%	96%	-	-	-	9.70	9.06

(1) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(2) Data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%)

Appendix B: Full Monthly NO_2 Diffusion Tube Results

Table B.1 – NO_2 Monthly Diffusion Tube Results – 2015

Site ID	NO_2 Mean Concentration ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean	
													Raw Data	Bias Adjusted (1)
5	28.7	25.8	27.1	18.7	14.7	15.3	14.3	14.1	22.2	29.0	28.7	24.6	21.9	16.24
6	51.8	65.5	52.5	51.8	34.2	39.7	48.5	43.2	60.4	62.8	52.5	43.7	50.6	37.43
7	61.3	75.6	46.0	54.8	53.7	54.2	55.2	57.9	66.7	71.4	65.3	66.1	60.7	**44.94**
8	30.9	37.2	28.8	22.0	15.9	13.8	14.5	18.1	23.5	29.2	29.8	32.1	24.7	16.28
9	29.2	34.4	22.0	21.4	12.6	15.3	13.6	17.8	22.5	26.5	30.0	33.6	23.2	15.35
11	24.6	31.5	24.6	16.2		16.4	16.8	17.2	21.6	30.4	33.8	29.2	23.9	15.76
13	53.1	73.2	71.2	62.3	53.7	57.5	52.0	60.7	64.2	73.0	61.1	56.0	61.5	**45.53**
14	57.3	76.6	62.3	66.1	56.7	49.5	61.3	65.7	64.7	71.2	55.8	76.6	63.7	**47.13**
15	50.0	58.3	45.8	59.4	36.3		48.9	47.6			53.5	54.4	50.5	37.37
16	59.8	62.3	52.0	46.4	40.5	37.4	39.3	47.2	55.6	63.0	56.3	48.1	50.7	37.51
17	49.5	46.2	48.3	35.3	39.0	35.3	35.3	42.4	44.3	51.8	45.6	48.3	43.5	32.17
18	49.3	52.5	26.7	39.9	31.3	30.0	30.8	37.4	43.5	45.1	48.7	49.9	40.4	29.93
25	44.3	41.8	40.1	33.8	26.9	28.5	29.2	28.1	35.1	37.6	35.7	42.2	35.3	26.13
26	41.1	42.0	32.9	35.0	21.8	23.5	27.3	23.9		39.9	37.6		32.5	24.06
33	50.0	46.4	43.2		26.9	24.3	27.1		31.7	41.8	40.1	31.7	36.3	26.90
35	36.1	46.8	38.6	28.7	27.9	23.7	25.6	21.8	31.7	39.7	44.9	38.2	33.6	24.90
37	48.9	53.3	48.7	41.6	34.6	32.9	40.5	38.6	48.5	53.1	47.0	50.6	44.9	33.21
44	46.4	47.9	37.2	32.5	29.4	21.6	27.7	28.1	35.7	38.8	34.2	37.1	34.7	25.70
45	40.5	48.9	44.3	44.1	31.5	34.0	36.7	37.4	45.5	54.2	44.1	42.6	42.0	31.09
47	43.0	43.7	38.2	27.1	32.5	29.0	24.6	33.8	36.1	43.7	50.4	45.5	37.3	27.62
50	1.1	2.9	1.0	1.3	-	1.5	0.8	-	-	-	0.8	1.0	BLANK	BLANK

60	30.4	43.2	28.1	20.8	20.1	17.8	22.5	22.3	29.6	34.6	37.6	38.4	28.8	21.31
78	41.3	48.9	40.7	41.3	32.5	30.0	34.0	35.9	40.3	47.9	30.9	45.8	39.1	28.97
79	40.5	47.0	41.3	32.5	33.4	31.1	33.2	37.8	41.8	47.9	45.3	44.3	39.7	29.38
80	39.9	47.2	39.9	42.4	29.4	29.6	31.5	34.0	35.5	48.7	38.0	47.8	38.7	28.63
83	35.1	36.3	27.9	24.4	23.3	20.2	21.8	22.5	23.7	28.8	39.0	30.2	27.8	18.35
88	27.3	29.2	22.9	17.8	10.7	9.7		12.4	16.4	16.6	24.6	25.8	19.4	12.82
90	29.0	28.8	25.4		15.5	16.2	16.6	16.8	20.1	24.6		23.3	21.6	16.02
96	38.2	42.2	36.7	28.3	25.8	25.4	26.7	25.6	30.9		36.1	30.4	31.5	23.31
100	27.1	31.7	28.8	24.3	21.6	19.7	22.5	21.6	23.9	29.2	32.3	32.9	26.3	19.47
101	59.6	60.5	48.7	46.2	40.7	35.9	36.7	37.4	43.2	46.8	53.1	39.5	45.7	33.83
102	51.8	45.3	50.6	45.5	35.0	31.5	34.6	36.5	49.3	52.0	42.6	41.8	43.0	31.85
103	49.9	42.0	50.6	40.1	35.1	38.0	33.4	35.5	47.0	55.6	38.8	37.2	41.9	31.05
104	48.5	49.9	44.9	46.0	30.2	29.2	33.2	31.9	49.3	53.9	47.6	37.6	41.8	30.98
107	29.8	34.4	28.7	22.2	17.8	17.4	16.2	19.5	24.8	32.5	30.4	32.1	25.5	18.86
108	40.3	44.5	36.9	31.3	20.6	23.1	24.1	26.0	29.2	37.1	37.6	30.6	31.8	23.52
109	66.7	71.6	60.0		51.4		57.3	57.1	58.6	61.7	74.7	67.0	62.6	**46.36**
110	74.7	63.6	67.8	56.5	56.9	58.8	53.9	57.1	67.6	72.4	67.8	57.5	62.9	**46.56**
111	38.2	43.0	37.4	33.2	25.4	21.8	26.2	29.8	35.5	45.1	37.6	34.4	34.0	25.15
112	35.0	43.7	31.1	27.9	21.8	26.4	23.9	26.7	32.5	35.3	39.9	33.4	31.5	23.30
114	61.1		60.9	54.4	50.4	44.1	49.5	48.5	59.8	61.9	46.2	47.4	53.1	39.33
115	71.6	59.6		62.3	58.3	56.5	57.1	51.2	52.9	53.7	52.9	56.9	57.5	**42.61**
116	47.6	43.9	43.7	38.8	34.2	29.8	30.6	31.1	33.4	44.3	42.0	35.0	37.9	28.04
125	26.7	35.1	25.6		15.1	12.4	10.1	15.5	19.7	22.7	30.8		21.4	15.82
126	31.3	33.6	26.4	19.7	13.2	12.8	15.5	15.5	20.2	26.0	19.3	25.8	21.6	15.99
127	34.4	42.0	32.5	28.3	21.8	21.0	26.0	26.0	30.8	26.7	39.5	43.2	31.0	22.96
128	30.9	20.4	30.6	24.4	17.0	17.8	19.3	20.4	28.1	33.8	32.3	26.5	25.1	18.61
129	28.3	24.8	25.4	23.1	17.6	14.9	21.4	19.9	22.2	25.4	31.3	28.5	23.6	17.44
2a	43.4	46.2	43.0	37.4	30.4	27.1	30.0	34.0	40.7	47.4	43.7	39.7	38.6	28.57
2b	46.8	35.7	39.3	32.1	26.5	27.7	28.1	26.0	38.8	46.0	42.2	40.5	35.8	26.52
2c	45.3	43.2	37.8	34.4	28.7	21.4	26.9	30.0	38.6	48.7	38.8	32.1	35.5	26.27
3a		32.7	26.5	18.0	14.3	11.7	14.5	15.1	19.3	26.2	30.2	31.7	21.8	14.42

3b	32.7	32.9	27.7	17.6	13.8	11.1	14.7	17.8	18.9	20.1	31.9	36.3	22.9	15.15
3c	32.3	37.6			14.5	12.0	15.1	16.4	20.1	23.5	33.8	36.7	24.2	15.98
95a	40.3	44.9	35.0	30.6	25.0	22.5	25.0	24.8	33.6	41.4	38.0	34.4	33.0	24.41
95b	42.8	40.7	34.2	31.5	25.6	26.5	26.5	28.3	31.5	39.7	42.8	28.7	33.2	24.61
95c	41.3	45.5	36.3	29.6	25.6	26.5	28.3	29.0	33.8	41.8	37.2	29.8	33.7	24.97
9a	25.0	36.1	24.8	21.4	14.7	11.1	15.3	17.6	24.3	29.2	31.1	30.6	23.4	15.48
A1	70.3	56.7	61.3	59.8	56.9	56.9	53.9	64.4	61.3	72.4	68.4	63.8	62.2	**46.03**
A11		52.1	48.7	41.6			37.6	40.7	46.4	48.1	46.6	46.6	45.4	33.61
A12	45.8	39.2	43.5	37.1	28.5	29.4	32.5	32.1	42.4	49.5	39.2	46.8	38.8	28.74
A13	30.0	36.3	27.9	24.6	13.0	13.2	13.9	16.2	24.3	34.0	30.8	34.4	24.9	16.43
A14	32.3	32.1	26.5	21.6	15.7	14.7	16.2	17.2	23.3	34.2	32.1	31.3	24.8	16.36
A14a	24.6	34.0	27.1	19.7	11.7	13.6	15.5	17.6	23.5	32.1	28.7	27.9	23.0	15.18
A17	44.5	40.1	30.6	35.1	30.6	29.4	31.5	35.3	40.3	47.8	37.6	43.7	37.2	27.55
A19	42.6	49.9	40.7	38.6	31.3	27.1	32.3	32.5	39.3	36.9	39.7	38.2	37.4	27.71
A19a	40.9	46.6	43.7	39.0	33.0	31.9	30.2	32.3	34.8	40.5	47.9	46.8	39.0	28.85
A19b	45.8	52.1	42.4	39.0	29.4	26.7	30.2	33.6	36.5	44.1	49.1	33.8	38.6	28.55
A2	55.0	48.9	44.3	32.1	33.0	35.7		36.1	40.3	43.0	52.0		42.0	31.13
A20	50.2	43.5		40.5	28.7	26.9	30.9	31.9	46.4	55.6	35.0	37.4	38.8	28.75
A20a	45.6	48.3	44.3	40.1	27.9	29.2	28.7	33.0	48.1	49.5	40.3	30.9	38.8	28.76
A20b	42.4	45.3	47.0	42.4	25.2	29.8	34.6	33.2	45.1	50.6	43.4	36.5	39.6	29.33
A21	35.0	38.4	29.4	25.6	22.3	21.0	23.5	22.3	27.1	31.3	33.4	25.8	27.9	18.45
A22	33.2	40.3	33.0	25.0	20.8	15.1	18.7	22.2	25.0	29.8	33.2	32.7	27.4	18.11
A25	35.3	37.4	35.1	27.7	21.6	20.1	21.0	26.4	34.8	40.5	33.0	32.7	30.5	22.56
A29	31.3	36.1	30.6	26.2	18.1	18.5	18.7	19.3	25.4	29.8		50.8	27.7	18.30
A3		41.3	40.7		28.5	31.7	36.3	40.9	41.3	41.8	45.8	45.8	39.4	29.17
A30	30.8	36.7	30.6	25.6	19.9	21.6	21.2	22.2	25.0	33.4	28.3	28.5	27.0	17.81
A36				21.8	18.0	18.1	18.5	18.3	24.3	30.2	31.1	26.9	23.0	15.21
A38	28.1	31.1	29.4	22.0	14.1	16.6	16.4	16.2	21.6	28.1	28.3	26.7	23.2	15.34
A4	36.1	39.2	28.8	22.9	22.2	21.4	22.2	21.2	26.2	27.7	29.2	32.9	27.5	18.16
A40	30.9		34.0	28.8	15.3	19.9	19.9	23.1	27.7	34.2	31.9	30.2	26.9	17.77
A41	32.5	28.5	34.0	26.4	19.5	21.2	21.4	22.9	31.1	38.4	30.8	26.7	27.8	20.56

A45	27.3	29.2	22.0	21.0	15.9	15.1	15.3	16.0	21.0	26.9	27.5	22.9	21.7	14.32
A48	41.3	39.3	34.4	31.3	21.4	25.0	22.7	26.0	31.3	36.1	37.2	38.0	32.0	23.70
A50	38.4	46.4	39.7	36.7	24.8	26.0		29.0	39.5	44.1	37.6	27.5	35.4	26.24
A51	38.8	42.8	32.9	26.4	24.6	18.0	24.3	22.9	28.3	30.6	35.1	36.3	30.1	19.86
A52	53.1	51.0	45.8	39.2	27.5	35.0	31.9	37.6	45.1		50.4	44.1	41.9	31.01
A53	50.6	51.8	45.3	38.8	39.7	27.9	35.3	32.5	38.8	45.5	43.5	49.1	41.6	30.77
A54		48.9	56.7		46.2	43.5	44.7	47.0	54.8	58.3	48.7		49.9	36.93
A55	50.4	46.0	46.8	34.2	35.5	37.1	39.7		40.5	47.4	51.0	44.3	43.0	31.83
A56		50.6	44.9	41.6	33.0	30.6	29.4	32.9	44.9	46.4	43.4		39.8	26.27
A57	64.2	60.4	67.4	59.6	52.3	48.9	56.3	60.5	78.1	82.7	72.0	57.9	63.4	**46.92**
A6	42.8	47.6	34.0	25.0	27.1	22.3	28.5	27.1	32.1	36.5	45.5	45.1	34.5	25.51
A60	24.6	26.2	22.7	18.7	13.9	13.0	14.9	14.7	20.2	25.8	23.9	24.8	20.3	13.40
A62	26.2	26.4		20.1	13.0	13.6	15.1	15.9	18.5	23.9	26.4	27.5	20.6	13.59
A64	44.7	50.6	39.9	36.9	29.0	31.7	26.2	32.9	46.4	52.7	38.8	45.1	39.6	29.30
A66	27.9	31.5	23.9	19.7	16.0	13.8	15.5	16.0	21.4	22.9	27.9	26.5	21.9	14.48
A69	23.9	26.0	19.3	21.6	11.3	13.6	13.6	13.6	17.8	24.6	22.2	20.1	18.9	12.51
A7	44.5	48.5	41.1	34.0	29.4	24.8	26.9		37.6	40.9	38.4	42.6	37.2	27.51
A70	27.3	31.9	26.0	21.8	17.0	18.9	18.1	28.5	24.6	30.2	26.4	27.1	24.8	16.39
A71	23.1	30.4	22.3	14.7	10.5	8.6	12.4	14.7	16.4	23.5	23.3	24.3	18.7	12.34
A74	26.5	31.9	22.3	17.4	11.3	10.5	12.6	14.1	17.2	21.6	25.2		19.2	12.65
A77	33.6	31.3	29.0		15.3	15.1		19.5			35.7	26.5	25.8	16.56
A81	31.9	35.5	27.9	16.4	12.8	16.6	16.6	18.0	21.8	22.5	28.5	28.5	23.1	15.24
A85	34.4	37.1	29.2	28.7	21.2	19.1	23.9	25.8	27.3	33.2	38.0	33.6	29.3	19.34
A88	29.4	31.3	27.5	22.5	14.3	16.0	17.0	18.3	23.1	24.3	30.2	30.8	23.7	15.67
A9	52.1	44.5	49.7	35.1	28.8	29.8	26.4	35.0		50.8	49.5	45.6	40.7	30.11
A90	55.4	66.1	53.1	46.8	32.5	38.8	42.2	38.2	43.9	56.2	55.6	55.4	48.7	36.04
A94	45.5	47.2	41.6	26.2	13.8	16.6	15.9	16.6	23.3	35.0	30.9	43.7	29.7	21.98
A96	39.3	40.5	45.8	36.7	24.8	28.1	34.6	31.5	36.5	53.5	44.5	45.1	38.4	28.44
A97	31.1	39.7	29.8	24.4	13.8	15.3	18.5	17.2	24.3	32.3	33.2		25.4	18.82
B1	50.4	54.2	39.9	35.0	28.1	34.4	31.7	34.8	39.5	39.3	49.3	39.3	39.7	29.37
B15	33.0	37.4	29.6		16.6	15.7	18.1	18.9	24.4	31.9	30.4	29.0	25.9	19.19

B19		38.8		24.1	19.9	13.4	19.7	20.8	27.5	34.0	31.3	36.1	26.5	19.66
B2	38.4	36.7	38.2	29.8	22.0	24.4	24.1	24.8	31.1	38.2	39.7	47.9	32.9	24.39
B29	36.9	45.1	34.4	28.1	21.0	21.0	22.5	23.3	29.6	37.1	28.1	33.4	30.0	22.24
B3	38.8	41.4	33.8	26.4	18.1	16.2	19.7	22.9	27.5		34.4	40.1	29.0	21.50
B36	28.5	22.5	25.6	20.6	15.3	13.9	13.2	13.6	20.2		24.1		19.7	13.04
B37	30.0	32.7	25.6	19.7	13.4	13.0	14.5	15.3	20.4	36.5	23.9	19.7	22.0	14.56
B37a	35.0	31.9	28.5	20.4	15.1		13.8	13.9	18.9	24.3		20.1	22.2	14.65
B38	30.9	32.7	25.6	25.8	17.2	16.8	19.1	19.1	23.3	28.7	26.2	31.5	24.7	16.34
B41	52.0	57.1	36.1	43.9	37.6	39.9	32.1	38.4		44.7	43.2	43.5	42.6	28.13
B42	35.3	38.4	36.3	30.8		27.1	27.3	24.8	34.4	37.4	24.3	30.0	31.5	20.78
B43	32.9	36.3	31.1	27.5	26.4	19.1	23.5	21.4	30.0	32.9	27.9	29.2	28.2	18.61
B44	49.3	55.2	47.8	33.2	33.4	30.8		33.6	47.9	52.9	38.6	41.8	42.2	31.27
B45	44.9	47.6	37.8		23.9	30.8	31.5	33.4	43.4	47.0	41.3	35.5	37.9	28.07
B47	31.7	31.3	24.4		15.9	16.4	14.5	17.0	22.3	25.0	26.2	26.4	22.8	15.08
B48	33.8	35.5	30.0		20.8	19.5	19.9	18.7	26.5	31.7	28.7		26.5	17.51
B50	39.5	45.1	33.8	32.3	24.3	27.5	25.4	24.6	30.2	34.4	38.8	37.8	32.8	24.29
B51	32.9	36.7	26.4	18.7	19.3	15.7		18.9	22.7	24.8	31.9	26.9	25.0	16.50
B56	46.6	56.0	47.4	41.1	34.0	26.9	37.2	34.2	44.1	49.3	52.9	46.0	43.0	31.82
B58	31.3	29.0	28.1	23.3	20.8	18.0	19.9	20.4		31.5	33.4		25.6	16.89
B60	30.6	41.4	23.5	23.3	17.4		21.4	18.3	23.9	26.4	35.3	34.2	26.9	17.75
B63	52.3	57.7	41.8	34.4		33.6	34.6	39.9	39.9	43.5	11.7	49.1	39.9	29.52
B72	58.1	78.1	58.3	62.6	57.9	58.3	55.0	53.3	54.6	59.6	71.8	55.2	60.2	**44.59**
B74	38.6	40.5	32.1	30.8	18.0	13.9		19.9	28.5	33.6		30.8	28.7	18.92
B80	29.2	34.2	27.7	18.3	13.9	13.6	15.7	17.2	21.6	27.5	31.1	26.7	23.1	15.23
B82	36.7	42.2	29.6	24.6	22.2	19.7	18.9	20.8	25.6	30.8	39.3	41.4	29.3	19.36
B83	55.0	46.6		38.4	28.5	24.3	28.1	29.4	39.9	47.8	32.1	40.1	37.3	27.60
B84	34.4	38.8	25.6	28.7	25.2	26.4	28.1	30.2	29.4	33.8	31.5	35.1	30.6	20.21
B85	49.1	51.0	46.2	35.7	29.0	26.0	28.7	33.2	43.7	49.9	39.2	39.7	39.3	29.09
B86	31.9	35.5	26.9	26.5	24.4	22.0	26.9	28.8	32.9	40.9	40.1	33.4	30.9	22.85
B88	42.2	55.8	45.5	33.8	30.0	26.5	28.3	29.2	38.4	47.2	46.8	42.8	38.9	28.78
B89	54.4	52.0	51.2	43.2	48.9	56.2	44.3	38.8	45.5	52.7	38.8	41.1	47.2	34.98

B90	58.6	61.5	53.1	44.5	39.5	35.5	39.5	36.1	50.8	62.6	49.3	43.5	47.9	35.46
C12	26.0	32.3	25.6	23.3	15.5	14.9		17.4	22.7	28.3	28.8	30.0	24.1	15.90
C17	27.5	28.3		25.2	14.5	17.2	18.5	20.1	24.8	29.2	26.9	25.6	23.4	15.48
C18	46.8	52.0	36.1	27.9	25.0	24.6	26.7	26.2	33.6	32.7	39.0	34.8	33.8	22.31
C19	30.8		28.5	22.3				19.5	25.8	31.5			26.4	17.03
C2	56.5	34.8	49.3	37.6	37.4	31.9	35.7	39.3	42.8	42.8	56.0	53.9	43.2	31.96
C20	27.9	33.2	32.1	25.6	19.5	20.6	20.1	17.6	28.1	30.0	27.3	25.0	25.6	16.89
C21	45.5	46.4	44.9	31.3	29.0	29.2	31.1	30.8	38.6	43.2	33.4	33.0	36.4	26.93
C22	40.5			28.7	21.6	18.3	23.7	23.3	31.9	39.5	34.8	31.3	29.4	19.39
C23	68.0	60.5	60.5	49.7	47.8	44.1	50.2	47.6	55.8	58.1	57.7	47.4	53.9	39.94
C26	64.9	68.0	54.2	52.3	44.5	45.8	51.0	45.8	60.7	64.7	47.0	54.8	54.5	**40.35**
C27	67.8	74.1	68.6	64.0	53.9	45.8	62.6	55.2	69.5	68.2	70.5	56.5	63.1	**46.69**
C28	21.4	29.6	25.8	20.8	14.3	13.2	17.0	16.4	22.0	24.3	28.5	25.6	21.6	14.25
C29	43.9	44.3	39.3	35.0	28.1	28.1	29.6	32.5	39.2	49.5	54.2	43.7	38.9	28.84
C30				38.2	31.3	34.2	34.6	32.7	45.5	55.8	48.5	35.1	39.5	29.27
C31	30.9	35.3	30.9	24.8	16.4	17.6	20.8	19.5	23.5	31.7	34.0	38.8	27.0	17.85
C32	45.8	45.1	41.1	31.1	25.2	25.0	26.5	27.5	36.7	43.4	35.1	31.3	34.5	22.78
C33	28.1	26.0	27.1	20.2	14.1	15.7	16.0	14.9	20.2	28.1	26.0	25.8	21.9	14.43
C34	37.2	38.8	39.5	26.9	19.9	23.5	25.8	27.7	34.8	43.7	35.5	31.3	32.1	23.73
C36	49.3	45.6	43.7	36.7	29.6	33.6	35.7	37.6	39.7	44.9	47.0	38.6	40.2	29.75
C37	35.0	34.6	30.6	30.2	20.4	22.0	24.4	26.2	32.1	39.3	32.5	41.4	30.7	20.29
C38	42.4	46.8	44.3		28.8	27.3	29.2	33.6	39.2	48.1	45.1	33.8	38.1	28.18
C39	57.1	59.2	54.4	44.1	40.9	32.7	39.7	41.8	46.0	52.5	53.7	47.0	47.4	35.12
C4	32.1	34.8	26.0	24.3	18.1	16.4	18.1		22.2	25.4	24.6	30.6	24.8	16.37
C40	31.7	36.5	27.5		20.2	19.7	22.7	23.5	26.0	32.1	32.1	27.3	27.2	17.97
C42	40.7	43.2	33.6	29.4	27.7	22.5	26.7	24.1	28.1	36.1	32.7	30.6	31.3	20.66
C43		51.8	42.6	41.8	32.7	27.1	30.9	33.0	39.0	45.8	43.9	37.1	38.7	28.66
C43a	49.3	52.5	43.9	31.7	28.7	30.6	31.7	33.6	39.5	48.1	45.1	32.9	39.0	28.85
C44	48.7	47.0		28.7	29.2	21.4	34.4	18.3	43.0	46.6	45.8	34.6	36.2	26.77
C49	32.3	38.4	31.7	25.4	18.5	19.5	20.8	22.9		36.9	33.4	29.8	28.1	18.59
C51	35.1	43.4	43.9	33.8	22.3	23.3	26.9	29.4	34.4	41.3	39.5	35.7	34.1	25.24

C52	41.3	45.3	35.3	29.6	21.6	9.7	25.0	23.7	32.1	36.9	36.3	37.2	31.2	23.07
C53	40.3	32.9	36.7	27.7	21.6	18.5	21.4		28.5	38.6	35.3	28.5	30.0	22.20
C54	45.8		35.1		21.6	25.4	24.8	31.3	39.9	49.9	39.2	31.1	34.4	25.48
C56	50.0	56.2	49.7	35.9	36.3	35.9	35.0	36.7	43.7	49.9	47.2	44.5	43.4	32.14
C57	31.1	36.5	34.2	9.7	20.6	23.1	25.2	24.4	30.6		38.8		27.4	18.12
C58	60.9	55.8	53.5	41.1	45.3	43.0	39.9	44.1	49.1	53.7	56.3	54.2	49.7	36.83
C59	49.7	52.9	38.8	36.7	34.8	30.0	33.6	34.4	42.8	39.7	45.8	44.9	40.3	29.86
C62	43.7	48.5	43.2	35.7	32.1	30.9	30.0	32.1	38.6	40.5	46.2	38.0	38.3	28.35
C63	34.0	37.1	31.5	25.0	22.0	19.9	19.5	19.1	24.1			26.7	25.9	19.16
C7	43.0	50.8	40.1	35.3	23.3	20.8	19.7	28.5	34.8		29.2	27.7	32.1	23.77
D10	32.5	36.5	26.7	24.3	17.6	18.3	20.6	19.1	22.7	29.8	29.4	29.8	25.6	16.92
D12	34.2	32.3	26.4	31.1	23.1	21.4	24.4	25.4		38.6	35.3	34.2	29.7	21.97
D13	43.2	41.6	35.1	30.4	22.0	22.9	24.8	25.8	34.8	42.4	35.7	38.4	33.1	24.50
D14	59.2	58.3	55.4	50.6	40.5	47.4	46.2	52.9	57.9	58.6	53.7	51.6	52.7	39.01
D16	52.7	60.7	49.9	52.3	41.8	43.0	40.3	46.0	59.4	64.7	48.5	51.2	50.9	37.68
D17	46.4	53.7	42.0	39.0	29.2	31.3			45.6	40.7	52.9	48.9	43.0	31.82
D18	48.1	41.1	35.7	29.4	27.3	25.6	26.2	29.6	39.3	47.9	42.4	33.8	35.5	26.32
D19	72.2	56.2	66.1	69.7	58.6	62.3	60.2	67.8	69.1	71.8	57.3	66.3	64.8	**47.98**
D20	51.0		58.4	56.7	46.0	50.2	48.5		58.3	60.2	62.5	52.9	54.5	**40.33**
D22	48.9	52.0	44.5	35.7	34.2	36.9	39.9	43.0	48.7	52.5	46.4	51.4	44.5	32.95
D24	55.2	51.8	46.4	39.7	33.8	23.1	35.1	35.7	40.3	37.4	50.2	42.0	40.9	30.29
D25		58.8	47.2	47.6	42.8	34.6	41.6	43.9	53.9	47.4	54.8	48.7	47.4	35.08
D26		40.1		32.5	24.4	20.4	26.0	30.8	37.8	43.7	46.2	39.7	34.2	25.30
D27	36.5	44.1	31.5	31.3	26.4	25.8		29.0	35.9	43.5	41.4	39.7	35.0	25.93
D28	51.4	58.1	47.4	49.3	41.4	41.1	39.2	35.1	50.4	52.9	49.1	37.8	46.1	34.13
D30	43.0	48.9	38.8	29.4	25.4	15.3	24.4	26.0	37.1	43.4	38.6	35.1	33.8	25.01
D31	42.8	50.4	43.9	42.2	33.8	37.1	36.9	42.4	47.4	56.9		39.2	43.0	31.83
D32	56.9	52.9	35.7	39.2	32.1	39.7	42.2	43.2	52.5	60.2	52.3	45.5	46.0	34.08
D33	43.5	45.3	42.4									36.9	42.0	25.42
D35	63.6	65.1	45.3	44.7	34.0	42.0	44.5	49.3	50.8	51.0	63.8	50.8	50.4	37.32
D36	56.9	59.8	46.8	39.2	37.8	35.3	40.3	42.4	50.2	60.5	53.9	43.0	47.2	34.93

D37	43.4	46.8	27.7	33.4	24.8	25.6	29.4	34.4			46.4	48.5	36.0	26.69
D38	35.0	43.7	33.4	29.0	21.4	22.2	22.0		28.5	34.4	31.7	32.9	30.4	22.49
D39	40.7	56.3	34.4	41.3	26.9	26.4	35.7	34.0	41.8	48.1	41.4	43.0	39.2	29.00
D4	42.8	46.2		36.5	27.1	26.9	26.7	31.3	34.8	42.0	47.9	41.3	36.7	27.17
D40	43.9	47.0	39.9	33.4	26.0	27.9	24.4	30.2	42.2	52.5	44.3	43.5	37.9	28.10
D41	59.0	64.9	51.4	48.9	45.8	49.5	42.8	43.0	44.9	55.6	54.8	48.1	50.7	37.56
D43		50.2			47.8	51.0	43.5	56.3	53.7	68.0	66.9	53.1	54.5	**40.35**
D45	29.4	47.8	41.4	19.3	30.8		29.0	31.1	34.8	46.2	40.7	36.9	35.2	26.07
D47	37.6	47.8		38.6	23.7	29.0	30.8	31.5	41.8	48.9	37.4	36.9	36.7	27.19
D48	46.4	42.2	43.9	48.1	35.0	40.3	41.3	39.3	47.2	53.9	48.7	53.1	44.9	33.28
D49	61.1	65.9	51.6	53.9	45.6	44.1	44.7	46.0	47.4	58.6	60.5	54.1	52.8	39.09
D50	66.3	64.6	56.9	54.4	47.9	47.2	48.7	52.0	62.3	65.9	64.4	48.5	56.6	**41.90**
D51	86.3	98.7	90.9	81.6	68.6	82.3	25.0	80.2	77.4	84.4	82.3	67.0	77.1	**57.06**
D52	35.7	41.1	34.4	31.3	19.9	24.3	25.4	28.1	36.1	42.6	33.6	38.6	32.6	24.12
D53	35.0	41.4		39.3	24.6		27.7	30.2	40.9	48.7			36.0	27.17
D54	36.1	43.0	30.8	34.0	22.9	26.4	28.8	30.0	40.1	47.0	33.0	34.0	33.8	25.05
D55	48.7	57.5	53.9	53.7	43.9	51.4	59.2	58.6	60.2	74.9	60.2	68.2	57.5	**42.59**
D6	37.2	37.8	28.1	25.6	19.3	17.2	19.9	19.1	23.9	30.0	34.8	34.6	27.3	18.02
D8	53.7	56.3	49.7		37.6	35.0	42.0	40.1	58.8	61.9	51.6	52.9	49.1	36.32
D9	43.4	37.6	47.4	38.4	35.3	39.5	40.7	41.1	48.7	58.8	37.4	44.9	42.8	31.67
D56					60.0	66.1	58.3	56.5		73.3	68.4	65.3	64.0	**51.74**
D57						39.5	43.9	46.2	53.1	56.9	52.0	42.8	47.8	37.10
D58					54.6	43.2	55.0	50.6	57.9	58.3	59.0	58.6	54.6	**43.96**
D59						55.2	61.9	64.6	68.4	68.6	68.6	69.7	65.3	**50.68**
D60							23.9	23.9	30.4	30.4	33.8	37.6	30.0	22.16
130					14.7		12.8	14.3	18.7	23.7	22.7	22.2	18.4	14.27

(1) See Appendix C for details on bias adjustment

Appendix C: Supporting Technical information/ QA-QC for Air Quality Monitoring Data

C1: Significant changes to sources / changes to proposed monitoring in 2016

No significant changes to report.

C2: Monitoring / modelling of emissions

No updated information to report.

C3: Summary of additional evidence gathered (or being gathered) in support of measures for Action Plans and links to any final reports

Third Air Quality Action Plan (AQAP3) approved

City of York Council's third Air Quality Action Plan (AQAP3) supports the "polluter pays principle", in that it is targeted at reducing pollution from the vehicles that pollute most. Various studies undertaken in York have shown that diesel buses contribute disproportionately to nitrogen dioxide levels in York. AQAP3 proposes a Clean Air Zone (CAZ) in the city centre with entry requirements based on a combination of bus emission standards and the frequency at which they enter the city centre. The most frequent services would be required to be ultra low emission in the city centre by 2018.

Whilst the decision to approve a Clean Air Zone (CAZ) for the city has been referred to Full Executive for consideration, a number of measures have been approved for further examination by officers, including:

- A progressive approach to dealing with vehicle idling, with measures including working with bus operators to adhere to their existing anti-idling policies; erection of signage, warnings by enforcement officers and potential fines.
- A review of the taxi licensing system to further encourage the use of low emission vehicles in the taxi fleet
- Further development of the business case for a freight transhipment / consolidation centre with an associated compressed natural gas (CNG) refuelling facility
- A review of council procurement policy to promote the uptake of low emission vehicles
- Raising public awareness of poor air quality and its impact on public health

Progress with measures will be reported to the Executive Member and Scrutiny Committee on an annual basis via an 'Annual Status Report'.

The approved Air Quality Action Plan, containing a full list of measures, is available to view at http://democracy.york.gov.uk/documents/s100985/Annex%20F.pdf. The final revisions to the report are detailed in the minutes of the Decision Session - Executive Member for Environment, 14th December, 2015, available to view at http://democracy.york.gov.uk/ieListDocuments.aspx?CId=870&MID=9167.

Taxi Licensing Policy

Over the years, City of York Council has set a number of policies and conditions in relation to taxi licensing, they had not, however, been contained within one document. On 25th April 2016, the Gambling, Licensing and Regulatory Committee considered a report proposing to consolidate all the existing policies along with the proposed new policies into a single policy document. The new policy contained a series of proposals designed to reduce emission from taxis. At this meeting it was approved that only the following European Emission Standards will be accepted for new private hire applicants from 1 November 2016, and all replacement vehicles for both taxi and private hire, as from 1 June 2017 and 1 November 2017 respectively:

- **Petrol vehicles** – Euro V petrol vehicle class
- **Diesel vehicles** – Euro VI diesel vehicle class
- **Diesel wheelchair accessible vehicles** – Euro V diesel class
- **Ultra low emission vehicles** – defined as 75g CO_2/km and under (e.g. petrol/hybrid, fully electric vehicles).

This policy is part of the Council's ambition to have an ultra low emission taxi fleet in York that benefits people's health and creates a more pleasant environment.

The emission standards above will be subject to ongoing review, considering the latest air quality monitoring results, to determine whether they are making sufficient progress towards achieving the health based air quality objectives.

C4: QA/QC on monitoring data

To ensure that the air quality data obtained by City of York Council fully complies with the requirements of the Review and Assessment process, a comprehensive set of QA/QC procedures are in place. The aims of the QA/QC programme were fully detailed in *'Technical Annex 2: Air Pollution Monitoring in York'* which was submitted with the Second and Third Stage Review and Assessment of Air Quality in York.

All continuous monitoring sites are calibrated fortnightly by City of York Council's Public Protection team. Sites are serviced by the equipment suppliers every 6 months and independently audited every 12 months. The annual audit also provides an independent check of site cylinder concentrations against reference standards.

All City of York Council continuous monitoring sites are currently serviced and maintained by 'Matts Monitors'. Data management is currently undertaken by Ricardo-AEA with all results being published to the Air Quality England website at: http://www.airqualityengland.co.uk/. The latest round of station audits were carried out in January 2016 by Ricardo-AEA *(Fulford Road Site)* and National Physical Laboratory *(NPL)* (All other sites).

For the purpose of this report, all TEOM particulate (PM_{10}) data collected during 2015 has been corrected using the Volatile Correction Model (VCM) as made available by DEFRA at www.volatile-correction-model.info/Default.aspx (note that $PM_{2.5}$ is presented as uncorrected TEOM data as the VCM is not considered appropriate for correction of $PM_{2.5}$ data). No correction factors have been applied to the TEOM-FDMS data presented in this report.

C5: Bias adjustment and precision analysis of diffusion tubes

Introduction

As part of the Second and Third Stage Review and Assessment of Air Quality in York, a detailed discussion of the accuracy and precision of diffusion tubes was included in Technical Annex 2: Air Quality Monitoring in York. This included a detailed description of how to calculate accuracy and precision factors for diffusion tubes.

For the purpose of this Annual Status Report, new accuracy and precision factors have been calculated for the nitrogen dioxide diffusion tubes for 2015. These factors are based on readings obtained in the 2015 calendar year. The method used to calculate these factors is the same as that outlined in Technical Annex 2 of the Second and Third Stage Review and Assessment of Air Quality in York and the reader should refer to that document for further information.

Calculation of Accuracy Factors

The accuracy factors are calculated from the results obtained from diffusion tubes co-located with real time chemiluminescence analysers. To calculate the bias of the diffusion tubes scatter plots of chemiluminescence data versus diffusion tube data for roadside and background monitoring sites were plotted. For each scatter plot a ***y=mx*** line of best fit was applied. In each case the gradient of the line, m was taken as the bias factor.

Background diffusion tube monitoring

The bias factor for the tubes located at the urban background monitoring site was found to be 1.514, demonstrating that in general the diffusion tubes overestimated the nitrogen dioxide concentrations at the urban background sites by 51.4%. For the purpose of this report bias corrected averages for background sites have been calculated by dividing the raw tube result by 1.514 (or multiplying by 0.66)

Roadside diffusion tube monitoring

The bias factor for the tubes located the roadside monitoring locations was found to be 1.3506, demonstrating that in general the diffusion tubes overestimated the nitrogen dioxide concentration at the roadside by 35.06%. For the purpose of this report bias corrected averages for roadside and kerbside sites have been calculated by dividing the raw tube result by 1.3506 (or multiplying by 0.74).

Comparison of locally derived bias correction factors and factors from national diffusion tube bias adjustment factor spreadsheet

The overall 2015 bias correction factor from the national diffusion tube bias adjustment factor spreadsheet for ESG (Didcot) [preparation method 50% TEA in acetone] from 21 studies, was 0.81

There were 3 collocation studies (not including York) that were undertaken at background monitoring sites, with the bias factors ranging from 0.56 (Medway Council) to 0.77 (Gravesham Borough Council), with the average bias factor being 0.69. It was considered that that the locally derived background bias correction factor of **0.66** was comparable to this figure and has been used for the bias correction of City of York Council's background diffusion tubes.

There were 14 collocation studies (not including York) that were undertaken at roadside / kerbsite monitoring sites, with the bias factors ranging from 0.7 (Medway Council) to 0.99 (Wrexham Country Borough Council), with the average bias factor being 0.83. It was considered that the locally derived roadside bias correction factor of **0.74** was broadly in line with this figure. In addition, the linear regression analysis undertake on the local data showed very good agreement (R^2 value of 0.89) and it was therefore considered appropriate to use this local figure in preference to the nationally derived average figure. Historically, locally derived bias correction factors have always been used for the correction of City of York Council's diffusion tube data.

Calculation of Precision Factors

The precision factors are calculated from the results obtained from diffusion tubes co-located side by side. A measurement of the precision of the diffusion tubes has been made by calculating the Relative Standard Deviation (RSD) of the Variance of the results obtained from each of the duplicate sites[6] in York using Equations 1 and 2.

Equation 1: $\text{Variance} = \text{Sum}\ \{(X_a - X_{a+1}/X_m)^2\}$

Where X_a = result 1 for month X

X_{a+1} = result 2 for month X

X_m = mean of X_a and X_{a+1}

Equation 2: $\text{RSD of Variance \%} = (\text{Variance}/n)^{1/2} \times 100$

Where n = total number of duplicate tube results

2015 data

The Relative Standard Deviation of Variance for a single month at a single site was found to be 6.84%. This is equivalent to +/- 13.67% at 95% confidence limit.

The annual mean nitrogen dioxide concentrations in most cases have been calculated by taking the mean of 12 monthly readings. It was therefore necessary to calculate the prevision of the annual mean at a 95% confidence level for each site using Equation 3.

Equation 3: $\textit{Precision of annual mean} = \dfrac{13.67}{(n-1)^{1/2}}$

Where n = number of readings used to calculate the annual mean at a particular site.

In most cases n = 12, hence the precision of the majority of the annual averages is around +/- 4.12%.

For sites where only 11 tubes were retrieved the precision of the annual averages is around +/- 4.32%.

For sites where only 10 tubes were retrieved the precision of the annual averages is around +/- 4.56%.

For sites where only 9 tubes were retrieved the precision of the annual averages is around +/- 4.83%.

[6] Where diffusion tubes were exposed in triplicate (i.e. A, B, and C), the tubes have been expressed as 3 duplicate sets for the purposes of the precision calculations (i.e. AB, AC, and BC).

Annualising diffusion tube data (period to annual correction)

LAQM.TG16 states that for those nitrogen dioxide diffusion tube sites with fewer than 9 months work of data, it is necessary to perform annualisation. Annualisation effectively scales the available monitoring data to provide an estimate of the annual mean nitrogen dioxide concentration. This can then be compared with health based Air Quality Objectives.

City of York Council undertook background diffusion tube monitoring of nitrogen dioxide at a number of background locations during 2015. Of these sites, 39 diffusion tubes had 12 months data available and have been used to derive the period to annual ratios required for the annualisation. The following steps were used:

- **Step 1** - Calculate the period mean for the diffusion tube sample requiring annualisation
- **Step 2** - Calculate the corresponding period means and annual means for each of the 39 background diffusion tube locations. Use these two figures to calculate the period mean to annual mean ratio for each of the 39 diffusion tube sites.
- **Step 3** – Calculate the average ratio across the 39 background monitoring sites (i.e. n = 39)
- **Step 4** – Use the ratio in Step 3 to adjust the period mean (Step 1) to provide an estimate of the annual diffusion tube mean (non-bias adjusted)
- **Step 5** – Bias correct the value calculated in step 4 using the appropriate bias correction factor.

A summary of the annualisation is provided in Table C.1 below.

Table C.1 – Summary of Annualisation

Site ID	Type	In AQMA ?	Site Description	Valid Months	Tube Period Mean (ppb)	Average Ratio (n=39)	Estimate of Tube Annual Mean (ppb)	Bias Correction Factor	Estimate of Bias Corrected Mean (ppb)	Estimate of Bias Corrected Mean (µg/m^3)
A77	B	OUT	Lampost outside 206 Shipton Road	8	13.5	0.97	13.1	1.5140	8.7	16.6
C19	B	IN	Trentholme Drive	6	13.8	0.98	13.5	1.5140	8.9	17.0
D33	R	IN	Lampost 17 Nunnery Lane outside 81	4	22.0	0.82	18.0	1.3506	13.3	25.4
D53	R	IN	58 Nunnery Lane	8	18.8	1.02	19.2	1.3506	14.2	27.2
D56	R	OUT	Three Tuns Pub, 12 Coppergate	7	33.5	1.09	36.6	1.3506	27.1	**51.7**
D57	R	OUT	Lampost 4, Pedestrian Crossing, Coppergate	7	25.0	1.05	26.2	1.3506	19.4	37.1
D58	R	OUT	Traffic lights, opposite Duttons, Coppergate	8	28.6	1.09	31.1	1.3506	23.0	**44.0**
D59	R	IN	Bus stop outside 8/9 SLP	7	34.2	1.05	35.8	1.3506	26.5	**50.7**
D60	R	OUT	No entry sign outside Schuh Shoe Shop	6	15.7	1.00	15.7	1.3506	11.6	22.2
130	R	OUT	Site relocated from Low Mill Close (new from April 2015)	7	9.7	1.04	10.1	1.3506	7.5	14.3

Appendix D: Summary of Air Quality Objectives in England

Table D.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[7]	
	Concentration	Measured as
Nitrogen dioxide (NO_2)	200µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40µg/m^3	Annual mean
Particulate Matter (PM_{10})	50µg/m^3 not to be exceeded more than 35 times a year	24-hour mean
	40µg/m^3	Annual mean
Sulphur dioxide (SO_2)	350µg/m^3 not to be exceeded more than 24 times a year	1-hour mean
	125µg/m^3 not to be exceeded more than 3 times a year	24-hour mean
	266µg/m^3 not to be exceeded more than 35 times a year	15-minute mean

[7] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3)

Glossary of Terms

Abbreviation	Description
AQAP / AQAP3	Air Quality Action Plan – a detailed description of measures, outcomes, achievement dates and implementation methods, showing how the LA intends to achieve air quality limit values. AQAP3 refers to City of York Council's Third Air Quality Action Plan
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives.
ASR	Air Quality Annual Status Report
AURN	Automatic Urban and Rural Network (UK air quality monitoring network)
DEFRA	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air Quality screening tool produced by Highways England
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm (micrometres or microns) or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- All City of York Council's previous Review and Assessment reports can be found online at http://www.jorair.co.uk/index.php?page=reports
- DEFRA Technical Guidance LAQM.TG(16) is available online at: https://consult.defra.gov.uk/communications/laqm_changes/supporting_documents/LAQM%20Technical%20Guidance%202016.pdf
- DEFRA Policy Guidance LAQM.PG(16) is available online at: https://consult.defra.gov.uk/communications/laqm_changes/supporting_documents/LAQM%20Policy%20Guidance%202016.pdf