

Annual Progress Report (APR)



2018 Air Quality Annual Progress Report (APR) for
Dundee City Council

In fulfilment of Part IV of the
Environment Act 1995

Local Air Quality Management

June 2018

Local Authority Officer	J Landwehr R Brooks J Baird
Department	Community Safety & Protection
Address	Neighbourhood Services Dundee City Council 3 City Square DUNDEE DD1 3BA
Telephone	01382 436280
E-mail	jamie.landwehr@dundeecity.gov.uk pollution.control@dundeecity.gov.uk
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Executive Summary: Air Quality in Our Area

Air Quality in Dundee

Dundee City Council (DCC) has an Air Quality Management Area (AQMA) covering the whole city, as a result of exceedances of the Air Quality Objectives (AQOs) for nitrogen dioxide (NO₂)(annual mean and hourly mean) and particulate matter (PM₁₀)(annual mean). The main source contributing to these exceedances is road traffic, however the increasing popularity of wood burning stoves and other biomass sources has the potential to increase local background concentrations.

Dundee City Council currently monitor for NO₂ and PM₁₀, the latest results and trends are discussed in Chapter 3. The majority of monitoring locations are showing an improving trend in pollutant concentrations, however potential for exceedances of the AQOs exist at the following locations:

- the city centre bus corridor;
- the inner ring road;
- adjacent to the trunk road network; and
- main arterial routes.

Dundee City Council produced its Air Quality Action Plan in 2011 and has a Corporate Air Quality Steering Group which co-ordinates actions to improve air quality in the city. The group contains representatives from various council services including: corporate policy; fleet management; planning; transportation and environmental health. The group also includes representatives from other major employers, including Dundee University and NHS Tayside. The Scottish Environment Protection Agency consult with the council on new industrial process applications and provide an annual update on existing processes in the city. DCC intends to liaise with Transport Scotland as part of the NLEF process to discuss whether any additional actions are possible to reduce pollutant concentrations at relevant locations close to the trunk road network in Dundee.

Actions to Improve Air Quality

Dundee City Council has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Key completed measures are:

- The Whitehall St / Crichton St / Nethergate bus movement review was completed with the report received in July 2017. Information from this project will help inform the Cleaner Air for Scotland National Modelling Framework assessment for Low Emission Zones.
- In 2017, there was a 33% increase in membership (105 rising to 140) of the Dundee ECO Stars fleet recognition scheme for Heavy Duty Vehicles, with vehicle numbers rising to 5946 by 31 December 2017. This has since risen to 143 members covering over 6000 vehicles.
- Over 10% of Dundee's taxis are now fully electric (there was an 18% increase in electric taxis between August and November 2017), with 17 members (including 519 vehicles) joined to the Dundee ECO Stars fleet recognition scheme for Taxis / Private Hire Vehicles by 31 December 2017.
- The Drive Dundee Electric campaign was launched by DCC in June 2017 and has been successful in engaging with current and potential EV owners (both in public and business). It has helped raise awareness about EVs and incentives by hosting, talking or exhibiting at events (Green Fleet Dundee @ Caird Hall in August; Cenex-

Dundee City Council

LCV in September; Dundee Food & Flower Festival in September, EV Festive Parade in Dundee in November), building an online social media presence (@DundeeElectric has over 400 followers on Twitter) and creating and distributing PR material. Dundee City Council also supported and participated in the inaugural 'National Clean Air Day' on June 5 2017, with an event being held in the City Square to promote travel alternatives that are beneficial to air quality.

- Dundee continues to be described as 'leading the way' in electric vehicle uptake, with 75 charging posts (supplying 181 charging points) within the council area. Of these, 56 charging posts (118 charging points) are owned by Dundee City Council. Further steps were taken in 2017 to increase the charging infrastructure to meet the high demand by focusing on the completion of the rapid charging hubs. Construction at the Lochee hub commenced in 2017 (officially opened April 2018), while investigatory work for the Princes Street hub continued (work on site commenced in March 2018).
- The adopted Dundee Cycling Strategy progressed with regular meetings of the Dundee Cycling Forum throughout 2017.
- Dundee City Council continued to promote public transport as an attractive and affordable alternative to private car. This included the 'Kids travel for 20p' scheme which ran during the Easter break in 2017 and saw more than 13200 bus journeys (over 800 per day) taken for 20p during this period.

*"Scotland's First
Tesla Taxi"*



Local Priorities and Challenges

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

- Continuing active participation with the Cleaner Air for Scotland (CAFS) Governance Group and in the implementation/consideration of aims and objectives of CAFS across all relevant service/policy areas to contribute to the achievement of the necessary air quality improvements. The actions that are to be taken forward in 2018/19 are detailed in **Section 2.3**;
- A continued expansion of the infrastructure to support uptake of ULEV by taxi trade, with the Princes Street charging hub opening. Drive Dundee Electric will continue to help raise awareness and encourage uptake of low emission vehicles;
- Continuation of the “i-bike officer” initiative to raise awareness and encourage modal shift to gain air quality improvements, whilst also supporting and participating in Clean Air Day 2018 which will be held on 21 June 2018;
- Continuation of both ECOSTARS Schemes for Heavy Duty Vehicles and Taxis/Private Hire vehicles to encourage engagement with and participation of these transport providers in the achievement of air quality improvements in the city;
- Development of Active Travel hub at the Waterfront and identification of a suitable operator of this which is due to open in Summer 2019;
- Creation of a ‘Cycling Action Plan Project Officer’ to help implement actions within the 2016 Cycling Strategy; and,
- Expansion of the ‘Kids Travel for 20p’ scheme to run through the summer holidays in 2018.
- Upgrade the council’s urban air quality monitoring network to include PM_{2.5} monitoring in line with new statutory requirements to determine whether an AQMA is required or not;
- Contribute to the development of a city model of Dundee as part of the National Modelling Framework, being developed under the Cleaner Air for Scotland Strategy;
- Continue to liaise with Transport Scotland and the Scottish Environment Protection Agency (SEPA) in the development of the National Low Emission Framework (NLEF) being development under CAFS to help inform how this can be taken forward in Dundee;
- Take forward the other proposed Local Air Quality Management tasks highlighted in **Section 6.3**.

“Celebrating National Clean Air Day with electric bikes and cars in City Square”



How to Get Involved

Further information on air quality in Dundee can be found on the website at the following location: <http://www.dundee.gov.uk/air-quality/>

This includes advice on how we can all help to improve air quality in Dundee, such as: using public transport; car-sharing & car clubs; no-idling; electric vehicles; cycling; walking; and **not** burning wood or having a garden bonfire.

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1. Local Air Quality Management

This report provides an overview of air quality in Dundee during 2017. 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 Progress Report (APR) summarises the work being undertaken by Dundee City Council to improve air quality and any progress that has been made.

Table 1.1 – Summary of Air Quality Objectives in Scotland

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Nitrogen dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m ³	Annual mean	31.12.2005
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 7 times a year	24-hour mean	31.12.2010
	18 µg/m ³	Annual mean	31.12.2010
Particulate Matter (PM _{2.5})	10 µg/m ³	Annual mean	31.12.2020
Sulphur dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005
Benzene	3.25 µg/m ³	Running annual mean	31.12.2010
1,3 Butadiene	2.25 µg/m ³	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mg/m ³	Running 8-Hour mean	31.12.2003
Lead	0.25 µg/m ³	Annual Mean	31.12.2008

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 measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by Dundee City Council can be found in **Table 2.1**. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=365

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	Description	Action Plan
Dundee City Council AQMA	<ul style="list-style-type: none"> • NO₂ annual mean • PM₁₀ annual mean • NO₂ hourly mean 	Dundee	The whole of the local government area of the City of Dundee was declared an AQMA in respect of the annual mean objective for NO ₂ in July 2006. In October 2010 the AQMA Order was amended to include the annual mean objective for PM ₁₀ . The AQMA was further amended in March 2013 to include the hourly mean objective for NO ₂	<p>Air Quality Action Plan for Nitrogen Dioxide (NO₂) and Fine Particulate Matter (PM₁₀)-January 2011</p> <p>https://www.dundee.gov.uk/sites/default/files/publications/Dundee%20CC%20FinalAQAP_Jan11.pdf</p>

2.2 Progress and Impact of Measures to address Air Quality in Dundee City Council

Dundee City Council has taken forward a number of measures during the current reporting year of 2017 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in **Table 2.2**. More detail on these measures can be found in the Air Quality Action Plan relating to the AQMA. Key completed measures are:

- Dundee continues to be described as ‘leading the way’ in electric vehicle uptake. In 2017 further steps were taken to increase the charging infrastructure to meet the high demand by focusing on the completion of the rapid charging hubs. Construction at the Lochee hub is underway and at a point close to completion. Solutions are being explored to stabilise the foundations for construction of the Princes Street hub;
- Dundee Council also launched the Drive Dundee Electric campaign and has been successful in engaging with current and potential EV owners (both in the public and businesses). It has helped raise awareness about EVs and incentives by hosting, talking or exhibiting at events, building an online social

media presence and creating and distributing PR material. Some highlights so far include:

- Hosting Green Fleet Dundee event where over 80 delegates attended. The event allowed Dundee City Council, the campaign and other stakeholders to have EV related discussions and answer questions with those who attended;
 - Exhibited at Cenex LCV. Carried out the organisation of display content and design. The event allowed the campaign/council to make multiple new relationships with essential businesses such as for on-street charging solutions, engaged with people from government and created new funding opportunities. Worked with Evolt to have 'Drive Dundee Electric' branding on their panel opposite – raising more awareness for the campaign and Dundee area;
 - Exhibited at local Flower and Food Festival (Camperdown Park, Dundee). The event welcomed 20k+ visitors over the weekend. Drive Dundee promotional materials and leaflets were given out and information boards prompted public discussion. A Tesla, Nissan e-nv van and Kia Soul were brought along for the public to familiarise themselves with and learn more about;
 - EV Festive Parade, Dundee. 30+ EVs attended and had an opportunity to network at the finishing point in the centre – also giving locals an opportunity to drop in and find out more. Mentioned in the local newspaper and EVAS Newsletter: http://eva.scot/assets/documents/EVAS_January_2018_Newsletter_R_ev3.pdf ;
 - Drive Dundee Electric Twitter (@DundeeElectric) now has 300 followers with a high engagement rate. There were 78.6K impressions from 21/10/17-19/1/18. From Aug–Dec 2017 there was an average of 184 mentions a month and an average of 820 profile visits per month; and,
 - Over 10% of Dundee's taxis are now fully electric and over 380 pure electric vehicles are signed up for free parking (with registration increasing after the Drive Dundee Electric campaign was launched).
- Continuation of both ECOSTARS Schemes for Heavy Duty Vehicles (HDV) and Taxis/Private Hire vehicles (PHV). During 2017 several national operators and local companies continued to be recruited. There are 143 members (6022 vehicles) in the HDV Scheme and 17 (519 vehicles) in the Taxi/PHV Schemes;
 - The Dundee Cycling Strategy was adopted in June 2016 and gives a greater focus to all the cycling related work around the Council. In 2017, the adopted Dundee Cycling Strategy was further progressed with regular meetings of the Dundee Cycling Forum held throughout the year;
 - During 2017/18 consultants completed a review of bus movements in Crichton Street/Whitehall Street/Nethergate to investigate and identify measures to improve congestion and air quality. The information from this project will help inform the CAFS (NMF/LEZ) assessment process being undertaken Dundee City Council or/ detailed in **Section 2.3** of this report; and,
 - Active participation in the Cleaner Air for Scotland Governance Group and in the implementation/consideration of aims and objectives of CAFS across all relevant service/policy areas to contribute to the achievement of the necessary air quality improvements. An update on progress is detailed in **Section 2.3**.

Progress is on-going with the following measures:

- Revision of Council Travel Plan in line with the requirements of the 'Cleaner Air for Scotland- The Road to a Healthier Future' (CAFS) cross-government strategy. Dundee City Council has a Council Travel Plan (CTP) to reduce the number of single occupancy car journeys made while on Council business and when commuting to work and to incentivise the use of public transport and walking and cycling and car sharing. However, this needs to be revised to bring it in line with DCC's Air Quality Action Plan, the revised corporate policy covering business travel and CAFS deliverables. Air Quality Action Plan Support Funding was provided from the Scottish Government in 2017/18 and consideration was given to bring in external consultants to take this forward. However, as the council had employed a number of graduate staff, the Scottish Government (SG) was approached and agreed to carry forward the funding into 2018/19 to allow the Council to retain one of the graduates to undertake this task. This project is now scheduled to be completed in early 2018/19.
- The Scottish Government expects any Scottish local authority which has, or is currently developing, a Sustainable Energy Action Plan to ensure that air quality considerations are covered. Dundee City Council has committed to becoming a signatory to the EU Covenant of Mayors (CoM) and Civic Leaders signed its 'Adhesion Form' on 19th March 2018. Through the Dundee Partnership, the city will develop a 'Sustainable Energy and Climate Action Plan' (SECAP) for Dundee that will aim to reduce area wide emissions and deliver multiple social, economic and environmental benefits. Air quality funding was provided to develop the Baseline Emissions Inventory (BEI) element of SECAP development to identify and quantify the principle sources of CO₂ and GHG emissions and their respective reduction potentials from transport, municipal, tertiary and residential sectors. This work was completed in March 2018. Funding has also been obtained to deliver a community stakeholder engagement event to support the SECAP development and explore the multiple themes of the plan, agree objectives and the necessary policy interventions and actions required to deliver it. The event will be by invitation and designed to attract the green groups in the city as well as the community planning partnership organisations.

Dundee City Council expects the following measures to be continued over the course of the next reporting year:

- Continuing active participation with the Cleaner Air for Scotland (CAFS) Governance Group and in the implementation/consideration of aims and objectives of CAFS across all relevant service/policy areas to contribute to the achievement of the necessary air quality improvements. The actions that are to be taken forward 2018/19 are detailed in **Section 2.3**;
- A continued expansion of the infrastructure to support uptake of ULEV by taxi trade, with the Princes Street charging hub opening. Drive Dundee Electric will continue to help raise awareness and encourage uptake of low emission vehicles;
- Continuation of the "i-bike officer" initiative to raise awareness and encourage modal shift to gain air quality improvements, whilst also supporting and participating in Clean Air Day 2018 which will be held on 21 June 2018;
- Continuation of both ECOSTARS Schemes for Heavy Duty Vehicles and Taxis/Private Hire vehicles to encourage engagement with and participation of these transport providers in the achievement of air quality improvements in the city;

- Development of Active Travel hub at the Waterfront and identification of a suitable operator of this, which is due to open in Summer 2019;
- Creation of a 'Cycling Action Plan Project Officer' to help implement actions within the 2016 Cycling Strategy; and,
- Expansion of the 'Kids Travel for 20p' scheme to run through the summer holidays in 2018.

Table 2.2 Progress on Measures to Improve Air Quality

KEY TO TABLE

Potential Air Quality Benefits

Small	0 - 0.5 µg/m ³
Medium	0.5 - 1.0 µg/m ³
High	greater than 1.0 µg/m ³
n/a	not applicable

Action Plan Measure Priority Level	
High	
Medium	
Low	

Timescale (Years from 2011)	
Short	1 - 2
Medium	3 - 5
Long	6 +

2018 Updates are shown in blue text

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
1	Measure M1: Existing Road Infrastructure Improvements	Transport planning and infrastructure	► City Centre Improvements - Union St	DCC City Development Department (Transportation Division)			Implementation of improvements	High	Union Street Road Infrastructure improvements completed December 2011. Two way traffic was maintained. Pavement widths were altered and the bus stops have been removed to reduce congestion and bus idling.	Union Street Road infrastructure improvements completed 2011	The levels of NO ₂ at Union St have shown a consistent improving downwards trend to well below the objective level since 2010. . NO ₂ concentrations at some of the monitoring locations in Nethergate and Whitehall Street increased initially after the removal of bus stops from Union Street. Recently concentrations have reduced
		Transport planning and infrastructure	► NW Arterial Route Improvement - Lochee Rd						Not estimated	Alterations carried out at Lochee Road/Rankine Street in February 2012 removed central reservation to free up road space and reduce congestion	Completed 2012

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
1 cont		Transport planning and infrastructure	► City Centre Improvements - Meadowside		1 year trial of closing of nearside lane to increase distance between traffic and receptors successful. Funding received in 2015/16 to make temporary surface permanent.	2013 +		Not estimated	Meadowside – in 2012 trial of lane closure at the north end of street to increase separation distance between traffic and receptors was put in place for two weeks from the 26/11/12. As the monitoring results were inconclusive , it was agreed to install a temporary paving surface which was completed in October 2013 to allow the impact on monitored concentrations to be studied for a 12month period. During the extended trial period nitrogen dioxide concentrations reduced by 19% and there was an 11% reduction in PM ₁₀ . Due to the significant improvement in pollutant concentrations permanent street infrastructure changes were completed in Feb/March 2016	Completed 2016	The greatest improvement in pollutant concentrations between 2013 and 2014 was seen at the Meadowside automatic monitor. Nitrogen dioxide concentrations, reduced by 19% and 11% for PM ₁₀ . The monitoring results since 2015 demonstrate that the air quality improvements attributable to this infrastructure change have been maintained. The slight increase in PM ₁₀ observed in 2016, possibly due to nearby roadworks, was not seen in 2017 with PM ₁₀ levels reducing to well below 2015 levels.
1 cont		Transport planning and infrastructure	► Arterial Route Improvements - Stannergate		Traffic/Pollution Modelling Dundee East area (including Stannergate roundabout) to identify options for AQ improvement. Funding received in 2016/17 for source characterisation & identification was carried forward into 2017/18	2013		Not estimated	Consultants engaged in 2013 to carry out traffic micro-simulation modelling and air dispersion modelling. Final draft of the AD Modelling received in April 2016, Summary of findings presented in APR 2016. Potential baseline exceedances identified at relevant receptors at the following locations: <ul style="list-style-type: none"> A92 (between Broughty Ferry Road and Greendykes Road (PM₁₀, & NO₂); Scott Fyfe roundabout (A92/A972/B961/B959/C223) (PM₁₀); Claypotts junction (A92/B978)(PM₁₀); Modelled scenarios focused on proposed developments in the port area and possible improvements to Stannergate roundabout. None of the options studied currently being pursued. Area will be re-examined as part of the NMF Funding carried forward and consultants were commissioned to undertake work early 2017/18. Outcome of the study is discussed in Section 4.5 of the APR2018	2016/17 2017/18	2017 NO ₂ monitoring on the A92 between Broughty Ferry Road and Greendykes Road were below the objective. 2017 NO ₂ concentrations were below the objective at the closest receptor to the Stannergate roundabout. In 2017 the annual mean and daily mean objectives for PM ₁₀ were met at the Stannergate Osiris.
1 cont		Transport planning and infrastructure	► City Centre Upgrade 13 traffic signals with fibre optic connections		Funding contribution Awarded in 2016/17 Reallocated	2017/18		Not estimated	A Fibre network is to be implemented to improve Traffic Signals communication (and revenue saving) with the Control Room in Dundee House. This network will improve reliability and efficiency of UTC. This project was originally scheduled to be undertaken in 2016/17 but it has been delayed until 17/18. Procurement of fibre problematic due to ERDF bid, but is still progressing.	2018/19	

Dundee City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
1 cont		Transport planning and infrastructure	► City Centre Improvements – Seagate / St. Andrews Street		Funding provided in Financial Year 14/15 to provide engineering design and air dispersion modelling of changes to bus stop locations Further Funds provided in 2016/17 to review and undertake traffic and AQ modelling of preferred options	2014/15		Not estimated	<p>In late 2014, JMP were commissioned to undertake a review of transport activity on the Seagate with a specific focus on identifying actions that would address its poor air quality. Their commission included engagement with local bus operators given that buses account for around 60% of harmful emissions. The report concluded that there were no affordable actions that could ensure AQ thresholds were met, but a range of actions could help reduce emissions. The "Air Dispersion modelling demonstrated that if all buses and HDVs were Euro VI then no exceedances of the NO₂ or PM₁₀ objectives would persist in the city centre</p> <p>Following receipt of the final report on Seagate' (produced by JMP), the Council agreed that further traffic and air dispersion modelling was required of the preferred options before any of the recommendations could be taken forward. The traffic modelling has shown that the proposed transport management options would be unacceptable on traffic congestion, access and air quality grounds.</p> <p style="color: blue;">This area will be re-examined as part of the NMF/NLEF assessment process</p>	2018/19	NO ₂ concentrations exceeded the annual mean objective in 2017. PM ₁₀ concentrations remained below the annual mean objective
1 cont		Transport planning and Infrastructure	City Centre Improvements – Crichton Street/ Whitehall Street /Nethergate		Funding provided in 2016/17 to undertake review of bus movements in Crichton Street/ Whitehall Street/ Nethergate carried forward into 2017/18	2016/17		Not estimated	<p>Consultants were commissioned in March 2016 to undertake this work and their final report was submitted in July 2017.</p> <p>The report examined the current bus movements through the city centre, assessed passenger and bus usage of city stances, stop dwell time, idling and layover and also investigated the appropriateness of a Traffic Regulation Condition as well as other statutory measures to tackle air quality issues. The executive summary of this report is in Appendix C.5 of the main report. The information from this project will help inform the CAFS (NMF/LEZ) assessment process being undertaken by Dundee City Council.</p>	2017/18	

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2	<p>Measure M2: DCC will enhance the Urban Traffic Management and Control (UTMC) system to reduce congestion</p>	Traffic management	<ul style="list-style-type: none"> ▶ Real-time traffic monitoring. ▶ Improved control regime to smooth out peak traffic. 	DCC City Development Department (Transportation Division)		Implementation of UTMC improvements and carry out annual review to measure % reduction in congestion in line with target	<ul style="list-style-type: none"> ▶ 10% reduction in congestion (journey times) in targeted areas during peak times before and after implementation of measure. ▶ Annual review of impact 	Small	<p>Scheme designed to expand UTMC to two congested junctions in Lochee Rd AQ hotspots.</p> <p>Schemes now implemented and the traffic management improvements will be assessed in terms of AQ improvements by Environmental Protection Division. ▶ UTMC was implemented in March 2013 which will see further traffic management enhancements. ▶ Seagate / Commercial Street traffic light refurbishment to improve bus and traffic flows through this AQ hotspot on the main bus corridor completed Feb 2013. Coupled with increased enforcement of waiting restrictions to reduce congestion. ▶ Successful trial of Bluetooth journey time monitoring of western arterial route, possibility of expansion to include AQ hotspots.</p> <p>Schemes now implemented and the traffic management improvements will be assessed in terms of AQ improvements by Neighbourhood Services. UTC are monitoring the traffic although ongoing roadworks can impact of traffic flow through the junctions</p>	Completed 2013	<p>NO₂ concentrations in Seagate reduced between 2013 and 2017. PM₁₀ concentrations were below the objective in 2017, with a decreasing trend over the past 7 years. .</p>

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2 cont		Traffic management			TACTRAN Capital Grant funding for expanded automation of journey time monitoring to allow activation of traffic management systems to alleviate congestion.	2013		Not estimated	Funding provided in FY 14/15 to expand Bluetooth Traffic Speed Monitoring System to include the Lochee Road corridor a known air pollution hotspot was completed by 31 st March 2015 In 2016 the system was expanded along the eastern corridor on the A92 coming in from Arbroath and Broughty Ferry. Ongoing discussions re maintenance costs with Transport Scotland and IBI. In 2017- Ongoing discussions re maintenance costs with Transport Scotland and IBI	2016	n/a
		Traffic management			Improve traffic flow/management strategies in Lochee Rd- introduce MOTES	2013		Not estimated	MOTES now unlikely to be deployed as it appears to have limited effect. Expansion of Bluetooth traffic speed monitoring to include the Lochee Road corridor was completed by 31 st March 2015	2015	n/a
		Traffic management			Paramic/AIR E modelling of key junctions – Kingsway/Forfar Road & Lochee Road Corridor to test options	2013		Not estimated	Consultants engaged in 2013 to carry out traffic micro-simulation modelling and air dispersion modelling. Final Modelling received in April 2016. Summary of options contained in Appendix C of APR2016. Kingsway / Forfar Road study identified potential baseline exceedances at relevant receptors at the following locations: <ul style="list-style-type: none"> A972T (Kingsway – Pitkerro Road roundabout) (NO₂); A90 (north of the Kingsway) (NO₂); and Forfar Road (A929) / Clepington Road (C244) junction (PM₁₀ & NO₂). Options studied included A90 Bypass and improvements to signal timings, the bypass being the most beneficial scenario. Neither option currently being pursued. Lochee Road Corridor options studied – closure of Cleghorn Street/Lochee Road junction and improvements to bus fleets. Study also found signal timings along the corridor to be optimised. Improvements to the bus fleets was the most beneficial of the options tested. Neither option currently being pursued. Both areas will be re-examined as part of the NMF/NLEF assessment process being taken forward by DCC.	2016	Concentrations measured by NO ₂ diffusion tubes, installed in 2016 at sites close to the identified exceedance locations in the Kingsway / Forfar Road study area, were below the objective. Tube north of the Kingsway was removed at start of 2017 as concentration was well below the objective.

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3	Measure M3: DCC to identify partnership and funding to continue benefits of Smarter Choices/Smarter Places: Dundee Travel Active Programme	Promoting travel alternatives	<ul style="list-style-type: none"> ► Identify and implement wider partnership to continue programme. ► Identify funding. 	DCC City Development Department (Transportation Division)			<ul style="list-style-type: none"> ► Increase % of people who walk and cycle to work in Dundee. ► Identify funding for education 	Small	<p>► Social Marketing Campaign undertaken - focussing on the Lochee Road corridor (Reported in AQAP Progress Report 2012, Appendix 1). ► DCC initiated partnership with a local social enterprise to develop a Behavioural Change Centre of Excellence.</p> <p>► Designed a programme of in-class workshops to promote sustainable and active travel in 11 primary schools. ► Established a new Bike Boost programme to promote cycling to work and other journeys.</p> <p>► DCC is actively working to secure funds for future investment in Dundee Travel Active.</p> <p>2012 summary - Broughty Ferry targeted for Personalised Travel Planning delivered by Social Enterprise Positive Steps..</p> <p>► DCC staff travel policy now being implemented and this will further encourage modal shift to active modes.</p> <p>► Investigated a school based travel behaviour change programme for 2013. ► 19.7% of people estimated to be walking or cycling to work in Dundee. The data is published by the Scottish Government every two years. The 19.7% data is taken from the Scottish Household Surveys undertaken in 2009 and 2010. The target in the City Development Service Plan 2012-2017 is 25%.</p> <p>Summary 2013 ► Broughty Ferry has had Personalised Travel Planning delivered by Social Enterprise Positive Steps.</p> <p>41% of trips to work by Active Travel (walking and cycling) in 2012. This figure is taken from Scottish households survey (SHS) undertaken in 2012 and relates to a very small sample size (92 people).</p> <p>Summary 2014--Sustans Funding used to help deliver improved cycling and walking connectivity. A limited level of SCSP funding has been used to improve signage around the Green circular. Doctor Bike has visited Dundee City Square several times offering bike maintenance workshops.</p> <p>Summary 2015-Dr Bike has visited the City Square, Dundee University and Abertay University Campus several times offering bike maintenance workshops. I-bike initiative also commenced in July as detailed below.</p> <p>Summary 2016 - Cycling Scotland's annual monitoring report published in early 2016 showed significant growth in the number of people choosing to cycle in Dundee. Cycling was recorded as 'main mode of travel' by 4.2% of respondents.</p> <p>Summary 2017- Hands Up Survey Data 2017: -Primary Schools 46% walk, 5% cycle, 4% scooter -Secondary Schools 49% walk, 2% cycle See also Measures 16,17 & 22</p>	2012+ on-going	A reduction in transport / unnecessary journeys is predicted however this may be difficult to measure.

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		Promoting travel alternatives			Behavioural Change Primary School programme to promote sustainable travel options in all primary schools in Dundee. Funding provided in FY 2014/15 to extend programme to P5 pupils over two academic years. Funding sought in FY for 2015/16. Funding Carried into 2018/19 to progress this work	2013+			<p>Primary school focussed Personalised Travel Planning contract awarded and all P5 pupils in Dundee to be given classroom sessions on Air Quality, Sustainable Travel, Active Travel benefits March – October 2013. Summer term & Autumn Term 2014</p> <p>Feedback from these sessions has been very positive.</p> <p>Summary 2015-It was the intention to undertake the Primary school focussed Personalised Travel Planning Sessions in-house but this was not feasible. The work was put out to tender and awarded to JMP Consultant in December 2015 with the intention of programming completion by the end of June 2016 for the 2015/16 intake of pupils.</p> <p>Summary 2016- Continued programme of behavioural change projects promoted with schools throughout 2016/17 with varying levels of engagement from school communities.</p> <p>Summary 2017 – DCC recently employed a number of trainee graduates and the Scottish Govt agreed to underspend from 2017/18 being carried forward into 2018/19 to retain a student to undertake classroom workshops sessions on sustainable travel, low carbon and air quality. In addition the graduate will also review the Council Staff Travel Plan.</p> <p>* Continued programme of behavioural change projects promoted with schools throughout 2017 with varying levels of engagement from school communities.</p> <p>8 schools participating in Living Streets WOW (Walk Once a Week) project with a city wide push for more participation throughout 2018 with the Journey to School Campaign</p>	Ongoing	
3 cont		Promoting travel alternatives			<p>3 "Doctor Bike" Safety Events planned for the City Square</p> <p>Funding to provide match funding for i-bike initiative sought in FY for 2015/16 to 2017/18</p>	<p>2013/14</p> <p>2015/16</p>			<p>Doctor Bike has visited Dundee City Square several times offering bike maintenance workshops</p> <p>i-bike officer in place from July 2015. Initially working with Grove and Menzieshill Secondary Schools and their respective feed-in primary schools encouraging cycling.</p> <p>i-bike officer in place throughout 2016 working first with Menzieshill and Grove and their cluster schools, before moving on to Harris and St Paul's (and cluster primary schools) from August 2016</p> <p>2017 Update . i-bike officer in place throughout Dundee. Levels of support – Supported (4 Primary Schools & 2 Secondary School), Intensive (7 Primary & 1 Secondary School), At a distance (3 Primary & 1 Secondary School)</p>	Ongoing	

4	<p>Measure M4: DCC will introduce measures to improve bus services and reduce emissions</p>	<p>Transport planning and infrastructure</p>	<p>► Statutory Bus Quality Partnership. ► Voluntary Bus Quality Partnership</p>	<p>DCC City Development Department (Transportation Division)</p>	2011+	<p>► Identification of new corridors that directly benefit air quality.</p>	Medium	<p>Opportunities investigated as part of Air Quality Low Emission Charter</p> <p>Publication of Cleaner Air for Scotland Strategy(CAFS) (launched November 2015)</p> <p>DCC represented (along with other major city local authorities) on CAFS Governance Group and are working with the Scottish Government and partner organisations in development of the National Modelling Framework and National Low Emission Framework to bring forward options for further air quality improvements. Details of the progress to date is contained in Section 2.3 of the main report.</p> <p>Study commissioned in summer 2017 to review stance allocation in Dundee City centre with a particular focus on improving air quality. (See Appendix C.5).</p>	Medium Term
		<p>Vehicle Fleet efficiency</p>				<p>► Average age fleet and Euro category, fuel type</p>			2012+

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4 cont.	Measure M4, cont.	Vehicle Fleet efficiency	► Fleet Renewal – Emissions Improvements	DCC City Development Department (Transportation Division)		2011+	► Fleet age, Euro class, fuel type	Medium	<p>► National Express Dundee introduced 15 new Euro V buses during December 2011 for use on Services 22 (Ninewells Hospital - City Centre-Downfield-Craigowl View) and 28/29 (Douglas-Charleston-Douglas via City Centre). ► During 2010/11 Stagecoach invested in 20 new Euro V double-deckers on its major Service 73 corridor (Ninewells-City Centre-Broughty Ferry-Carnoustie-Arbroath) and Service 20 (Dundee-Forfar). ► 4 new Euro V coaches also have also been introduced in new route (Dundee-Arbroath-Montrose-Aberdeen)</p> <p>2012 Summary - ► No bids submitted for Green Bus fund 3 ► DCC looking at Hydrogen Fuel cell opportunities for buses in a collaborative approach through the Scottish Cities Alliance. ► National Express Dundee applied to Scottish Government's Green Bus Fund 2 and invest in hybrid engine technology. ► Stagecoach invested in 6 new Euro V buses on their Dundee to Blairgowrie route (Service 57)</p> <p>2013 Summary - Through the Scottish Cities Alliance (SCA) investigations into potential for Hydrogen fuel alternatives are being developed with major EU funding opportunity hopefully being available 2014-2020. SCA and ten Cities are engaged with EU proposal in terms of Scotland's suitability for Hydrogen Fuel cell bus expansion.</p> <p>2014 Summary - In Dundee, National Express has been operating Diesel Electric Hybrid buses since 2013 and these have been operationally very successful in terms of the 'green' message and attracting users. National Express are also looking to modernise the smaller midi bus sized vehicles in their fleet. Stagecoach will introduce 15 Diesel Electric buses in Spring 2015 to Service 73 corridor Electric Vehicle operation and charging infrastructure expansion has put Dundee to the forefront of this technology. Dundee alongside the Scottish Cities Alliance is exploring Hydrogen Fuel cells as alternative fuel technology for buses, through EU funded Hydrogen Fuel cell Joint Undertaking. Stagecoach have announced that approximately 18 new Diesel Electric buses will replace existing Euro 5 buses in Spring 2015 and new Euro 6 diesel vehicles will replace Euro 5 vehicles later this year also. These major bus industry investments will have a positive impact on air quality in Dundee.</p> <p>2015 Summary- DCC has an informal working partnership with the main bus operators in Dundee. Stagecoach introduced 18 Euro VI electric-hybrid buses on their Service 73 route in May 2015. Investment in new buses at Xplore Dundee has been limited with the arrival of just 5 new buses in 2015. Some "younger" buses from the wider National Express group have been redeployed to Dundee during 2015.</p> <p>2016 Summary –DCC has an informal working partnership with the main bus operators in Dundee. Investment in new vehicles (EURO VI) has been limited in 2016, with only one new vehicle being purchased this year.</p> <p>2017 Summary -DCC support the review of Bus Service Operators Grant (BSOG) payments and the pilot Scottish Bus Emissions Abatement Retrofit Programme (BEAR) funding for retrofitting. DCC have submitted a letter in support of local Bus Operators application for funding.</p>	2013+	

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		Vehicle Fleet efficiency					<ul style="list-style-type: none"> ►Lobby Scottish Government for fuel duty rebates for low carbon fleet 		<p>Bus Service Operators Grant (BSOG) changes from April 2012 will reward use of cleaner fuels and incentivise the use of cleaner vehicles.</p> <p>2013 Summary-Current enhanced BSOG available for operation of Diesel Electric Hybrid buses. Further investigate enhanced BSOG where Hydrogen Fuel Cell vehicles are introduced.</p> <p>2014 –No Change</p> <p>2015 Summary - The government continues to review its BSOG payments and Dundee City Council officers have contributed to that discussion and debate.</p> <p>2016 & 2017 Summary No Change</p>		
4 cont.		Vehicle Fleet efficiency			National Express Dundee will introduce nine Diesel Electric Hybrid buses into their fleet in April / May 2013 as per Green Bus Fund 2 bid success	2013			<p>In 2013 High profile launch event for the nine Hybrid Buses introduced by National Express Dundee – coupled with promotional work with local schools</p> <p>Completed</p>	2013	New cleaner emission vehicles are now successfully in operation
		Vehicle Fleet efficiency			ECO Stars Dundee Fleet Management Recognition Scheme being introduced	2013/14			See Measure 6 – National Express Dundee one of the 12 inaugural members and Stagecoach joined the scheme in 2014		
	Measure M4, cont.	Traffic Management Vehicle Fleet Efficiency	►Tackling Idling Bus Emissions	DCC City Development Department (Transportation Division)		2011+	<ul style="list-style-type: none"> ►Traffic Regulation Conditions within the city centre. ►'No-idling' signage on bus routes. ► Driver Training/Awareness Raising 	Small	<ul style="list-style-type: none"> ►Opportunities being investigated as part of Air Quality Low Emission Charter (Reported in AQAP 2012, Appendix 2). ►National Express Dundee and Stagecoach have invested in in-vehicle monitoring systems and vehicles with auto-shutoff technology 	2012+	

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4 cont.	Measure M4, cont.	Promoting low emission transport	► Low Emission Zones (LEZ) for buses	DCC City Development Department (Transportation Division)		2013	► Investigate the Traffic Regulation Conditions for LEZ in City Centre. ► Route choice for clean buses see Park & Ride facilities	High	<p>Opportunities being investigated as part of Air Quality Low Emission Charter. (Reported in AQAP 2012, Appendix 2)</p> <p>see Measure 5 re Park and Ride Facilities)</p> <p>Publication of Cleaner Air for Scotland Strategy(CAFS) (launched November 2015)</p> <p>DCC are represented (along with other major city local authorities) on CAFS Governance Group and are working with the Scottish Government and partner organisations in the development of the National Modelling Framework and National Low Emission Framework to bring forward options for further air quality improvements. Details of the progress to date is contained in Section 2.3 of the main report.</p>	Med Term, 2015-2016+	
		Promoting low emission transport			Bus Emission Modelling being undertaken to test likely improvements associated with various scenarios including possible LEZ for buses by 2017	2013/14			<p>Model of main City Centre Bus Corridor set up to model the impact of the following low emission Scenarios:</p> <p>S1 – 2017 All Buses Euro V S2 –2017 All Buses Euro VI S3 – 2017 All Buses & HGVs Euro V S4 – 2017 All Buses & HGVs Euro VI</p> <p>Modelling Report submitted July 2015, summary of findings available in Appendix C of DCC 2016 Air Quality Annual Progress Report (APR).</p>	2015	

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5	Measure M5: DCC will explore provision of Park and Ride facilities that do not have adverse impact on air quality	Alternatives to private vehicle use	<ul style="list-style-type: none"> ► Provision of Park and Ride (P&R) facilities 	DCC City Development Department (Transportation Division) & Tayside and Central Scotland Transport Partnership (TACTRAN)			<ul style="list-style-type: none"> ► Report on identification and prioritisation of P&R facilities ► Implementation of scheme ► Passenger numbers 	Medium	<p>Site at Wright Avenue selected as preferred location for P&R at Dundee West and at site on south side of Tay Road Bridge identified for Dundee South and confirmed by NE Local Plan reporter.</p> <p>► Both sites taken forward with detailed design. Dundee West underwent pre - planning application consultation and detailed planning consent applied for in mid-2013.</p> <p>Dundee West site at Wright Avenue rejected by Development Management Committee In October 2013.This will require TACTRAN and DCC to review Dundee area Park and Ride strategy.</p> <p>Summary 2014-TACTRAN and DCC to review Dundee area Park and Ride strategy. Also to engage with Transport Scotland as there are national transport policy implications in terms of Park and Ride around Scotland's cities It is not anticipated that Dundee West Park and Ride option will be revisited in the timeframe of this monitoring framework. Wider strategy around city under review with TACTRAN, SESTRAN, Fife Council and Transport Scotland DCC, Fife Council, TACTRAN and SESTRAN actively investigating funding opportunities to secure land purchase at Dundee South (Tay Road Bridge) landfall.</p> <p>Summary 2015- TACTRAN and DCC to review Dundee area Park and Ride strategy. Also to engage with Transport Scotland as there are national transport policy implications in terms of Park and Ride around Scotland's cities. Wider strategy around city under review with TACTRAN, SESTRAN, Fife Council and Transport Scotland DCC, Fife Council, TACTRAN and SESTRAN actively investigating funding opportunities to secure land at Dundee South (Tay Road Bridge) landfall.</p> <p>Summary 2016 - Park and Ride around the city needs further development and funding. It has now been included in the Tay Cities Deal that has recently been agreed between the partner councils.</p> <p>Summary 2017 -Awaiting decision on Tay Cities Deal</p>	+	

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6	Measure M6: DCC will introduce measures to reduce emissions from Heavy Goods Vehicles	Freight and delivery management	►Perth & Dundee Retail Freight Consolidation Centre	DCC City Development Department Transportation Division)& TACTRAN		2011+	►Implementation of scheme ► Vehicle fleet in the AQMA ► Study for the alternate system of retail freight	Small	<p>Opportunities being investigated as part of Air Quality Low Emission Charter (See AQAP2012 Appendix 2)</p> <p>Summary 2013-LaMILO (Last Mile Logistics) projects to deliver exploratory social enterprise model freight consolidation based on successful Dutch model. ENCLOSE project developed and looking at Sustainable Urban Logistics Plan for Dundee (SULP)</p> <p>Summary 2014- Dundee City Council is working with the Heavy Duty Vehicle operators to reduce environmental impact of these vehicles. An accreditation scheme - ECO STARS is operating that recognises green fleets. DCC are also partners in an EU funded project ENCLOSE that is looking to make City Logistics more efficient and environmentally friendly. The Dundee Sustainable Urban Logistics Plan was approved by the City Development Committee on 27.10.14</p> <p>Summary 2015-A number of new members joined ECO STARS Scheme for Heavy Duty Vehicles in 2015 with the membership increasing to 79 by the 31st December.</p> <p>Summary 2016 - A number of new members joined ECO STARS Scheme for Heavy Duty Vehicles in 2016 with the membership increasing to 105(4666 vehicles) by the 31st December.</p> <p>Summary 2017 – A number of new members joined ECO STARS Scheme for Heavy Duty Vehicles in 2017 with the membership increasing to 140 (5946 vehicles) by the 31st December.</p>	2012+	
6 cont	Measure M6 cont.	Freight and delivery management	►Freight Quality Partnership (FQP)	DCC City Development Department Transportation Division)& TACTRAN			►Implementation of partnership ► Changes in hourly profile of HGVs in AQMA	Small	<p>Dundee is included as part of TACTRAN's Regional Freight Quality Partnership</p> <p>Summary 2015 - A Freight Consolidation business plan has been prepared and ongoing discussions with a potential operator to develop a small scale Freight consolidation centre in the city.</p> <p>Summary 2016 -- Ongoing discussions with an operator to develop a small scale Freight consolidation centre in the city. They are currently seeking funding to take this forward</p> <p>Summary 2017 - Unchanged</p>	Long term	

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6 cont		Freight and delivery management			A freight routing planning tool will be launched by TACTRAN which should encourage HGVs to follow appropriate routes	Jan-13			The TACTRAN Freight Planning Tool was established in The 2013		
		Freight and delivery management			Dundee is participating in a pan European project (ENCLOSE) investigating city logistics with carbon and emission reduction as important factors under investigation	2013			The Dundee Sustainable Urban Logistics Plan (SULP) was developed to give legacy post ENCLOSE project in terms of energy efficient and 'green' city logistics. The Plan was approved by the City Development Committee on 27.10.14		
6 cont		Vehicle Fleet Efficiency			ECO Stars Dundee Fleet Management Recognition Scheme being introduced in 2013 Funding to continue in 2015/16 2016/17 2017/18 & 2018/2019	2013			Dundee ECO Stars Fleet Recognition Scheme was successfully launched on the 13th December 2013 with 12 inaugural members. This is a fleet accreditation system that acknowledges greener fleets. The Corporate Air Quality Steering Group intends to seek funding for future years. Dundee ECO Stars Recognition Scheme for heavy duty vehicles fleets had 79 members by the 31 st December 2015 Dundee ECO Stars Recognition Scheme for heavy duty vehicles fleets continues to be successful reaching a membership of 105(4666 vehicles) by the 31st December 2016 Dundee ECO Stars Recognition Scheme for heavy duty vehicles fleets continues to be successful reaching a membership of 140(5946 vehicles) by the 31st December 2017	Ongoing	A number of participating members are now demonstrating working towards operating cleaner /greener fleets.
		Promoting Low Emission Transport			Match funding for feasibility study for ULEV/ZEV deliveries in 2015/16 FY				A Freight Consolidation business plan has been prepared and ongoing discussions with a potential operator to develop a small scale Freight consolidation centre in the city. Summary 2016 - Ongoing discussions with an operator to develop a small scale Freight consolidation centre in the city. They are currently seeking funding to take this forward Summary 2017 – Unchanged from 2016		

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7	Measure M7: DCC will seek improvements in emissions standards, including NO ₂ and PM ₁₀ for the council fleet and public service vehicles	Promoting Low Emission Transport	<ul style="list-style-type: none"> ▶ Development of Green Procurement Strategy ▶ To set target for Euro category/fuel type 	<ul style="list-style-type: none"> ▶ DCC Corporate Fleet Manager ▶ DCC Environment Department 			<ul style="list-style-type: none"> ▶ Approval of Strategy (Asset Management Plan) ▶ Average age fleet and Euro category, fuel type 	Small	<ul style="list-style-type: none"> ▶ New Corporate Fleet Manager appointed December 2011 ▶ New Fleet Section to develop a reporting procedure to compare replacement vehicles in relation to emission improvements ▶ New Fleet Section will create a replacement plan for all vehicles to maintain fleet age profile ▶ 2011 makeup of the waste collection fleet - 12 x Euro 3, 17 x Euro 4 and 23 x Euro 5. Fleet is continually moving towards newest Euro Category ▶ The Fleet section replaced 60 vehicles 2012/13 all with improved emissions standards <p>Summary 2013 The Fleet Section has bought in over 50 new vehicles in 2013 replacing the oldest and most polluting vehicles where possible. And have also undertaken an exercise with hire company to replace over 30 of the oldest hire vehicles in the fleet. ▶ 2 new Euro 6 engine Refuse Collection vehicles have been ordered to join the fleet in 2014.</p> <p>There are also 39 electric vehicles in the Council Fleet contributing to lower emissions.</p> <p>DCC Transportation delivering in partnership with Developing Car Clubs in Scotland and Co-Wheels seven additional car club vehicles all of which are Electric Vehicles</p> <p>Summary 2014-Following the introduction of 7 Euro 6 refuse collection vehicles in 2014. The Fleet are looking to introduce another 5 in 2015. A further 7 electric cars have been added to the Fleet towards the end of 2014 with further cars and 1 van on order. The Fleet Section have also been offered a government grant to lease a number of vehicles, the leasing is currently out to tender but it is hoped to lease a further 7 vehicles.</p> <p>Summary 2015- The Fleet Section has spent approximately £1.8 million in 2015/16 replacing 31 vehicles and 45 items of plant.</p> <p>Summary 2016 - The fleet has now a total of 81 electric vehicles running across all operations. The ongoing replacement programme has seen the introduction of 16 Euro 6 RCV's to date, with another 2 on order. The Council Fleet covered over a "Million Electric Miles" achieving significant emission reductions.</p> <p>Summary 2017 - 3 new euro 6 minibuses arriving in January 2018, with an additional 4 refuse collection vehicles due at the beginning of February. These will replace the oldest most polluting vehicles in the fleet. An analysis is now being undertaken into electric ground maintenance equipment.</p> <p>▶ See also Measure 14</p>	2014+	
		Promoting Low Emission Transport			The development of an Asset Management Plan which will incorporate environmental issues as part of the replacement criteria	2013/14				<p>An asset management plan has been created providing details of the ongoing replacement plan. Due to financial restrictions and vehicle variations the replacement programme will be done on a cost and condition basis. The emphasis of the plan will continue to be the replacement of the oldest and most polluting vehicles.</p>	

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		Promoting Low Emission Transport			Initial discussions for 2013/14 vehicle/plant replacement programme has identified improved emissions as a high priority	2013/14			Summary 2013/14-Replaced over 30 of the oldest hire vehicles in the fleet. . See Measure 7 above		An equivalent number of poorer quality emission vehicles have now been removed from service.
		Vehicle Fleet Efficiency			Participation in ECO Stars Dundee-Fleet Management Recognition Scheme	2013			DCC Fleet Achieved 4-Star Rating in ECO Stars Recognition Scheme as recognition for reducing the environmental impact of the Council's Fleet.	Ongoing	
8	Measure M8: DCC in consultation with the Taxi Liaison Group will explore means of reducing emissions from taxis and private car hire vehicles in AQMA	Promoting low emission transport	<ul style="list-style-type: none"> ▶ Enforce No idling for taxis ▶ Increase cleaner taxis 	<ul style="list-style-type: none"> ▶ DCC Support Services ▶ DCC City Development Department ▶ Tayside Police 			<ul style="list-style-type: none"> ▶ Traffic Regulation Conditions for 'No Idling' of taxis ▶ Explore the potential of introducing Licensing Conditions for minimum taxi Euro category for certain classes of vehicles ▶ Provide 'No Idling' street signage ▶ Monitoring for idling in place 	Medium	<p>▶ Opportunities are being investigated as part of Air Quality Low Emission Charter (See AQAP 2012 Appendix 2). ▶ Education Transport contracts to be let with condition that all vehicles must be Euro 4 compliant.</p> <p>▶ Approximately 400 Taxi / PHC driver training sessions were made available in FY 2013/14 -limited uptake alternative training options being considered</p> <p>Summary 2014-As part of Air Quality Low Emission Charter, opportunities are being investigated for: Traffic Regulation Conditions for 'No Idling' of taxis; Explore the potential of introducing Licensing Conditions for minimum taxi Euro category for certain classes of vehicles; Provide 'No Idling' street signage; Monitoring for idling. Education Transport contracts were let with condition that all vehicles must be Euro 4 compliant. Engaging with taxi operators who are actively investigating electrification of taxi fleet - one operator has indicated desire to convert diesel fleet to all electric (100+ vehicles), currently DCC working with partners to support this major proposal.</p> <p>Summary 2015- ECO Stars fleet recognition scheme for Taxis was launched on the 11th March 2015. There were 11 members in the scheme by the 31st December 2015. DCC also looking at collaborative work with taxi operators in developing an Electric Vehicle trial for taxis in Dundee. Dundee was successful in the 1st stage of bidding to Office of Low Emission Vehicles Ultra Low Taxi Scheme. This awarded us a fully funded feasibility study to be carried out by Energy Savings Trust. This was undertaken in December 2015 and we are waiting on final report.</p> <p>Summary 2016 - The ECO Stars fleet recognition scheme for taxis/private hire vehicles increased its membership to 15 (512 vehicles) by the 31st December 2016. DCC submitted a bid into OLEV for £515,000 to help support the taxi industry to move to zero emission vehicles. This will require match funding of approximately £88,000 from DCC. This will result in a £603,000 project in the city to install infrastructure to support the industry in their switch to plug in vehicles. A decision is expected in March 2017</p>	Ongoing+	Objective to remove poor emission vehicles from service

									<p>Summary 2017. The ECO Stars fleet recognition scheme for taxis/private hire vehicles increased its membership to 17 (519 vehicles) by the 31st December 2017.</p> <p>OLEV Funding application was successful allowing some further steps to be taken to increase the charging infrastructure to meet the high demand by focusing on the completion of the rapid charging hubs. Construction at the Lochee hub is underway and at a point close to completion. Solutions are being explored to stabilise the foundations for construction of the Princes Street hub.</p> <p>Over 10% of Dundee's taxis are now fully electric and over 380 pure electric vehicles are signed up for free parking (with registration increasing after the Drive Dundee Electric campaign was launched).</p>	
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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
8		Transport Management			As part of Air Quality Low Emission Charter, continue to investigate opportunities for: Traffic Regulation Conditions for 'No Idling' of taxis;	2013/2014+			Ongoing		
8		Vehicle Fleet Efficiency			Explore the potential of introducing Licensing Conditions for minimum taxi Euro category for certain classes of vehicles;				2013-Assuming successful implementation of the proposed ECOSTARS scheme for Taxi Operators, the Council will consider making achievement of a certain minimum star rating a pre-requisite for Council Contracted work. In 2015 DCC introduced a condition within the school transport contracts requiring any successful applicant to become a member of the ECOSTARS Scheme for Taxi Operators by July 2016 In 2016 DCC introduced policies that any applications for new Taxi Licences & Private Hire Car would only be granted on the condition that only an electric vehicle from the approved list can be placed on service		
		Traffic Management			Provide 'No Idling' street signage; Monitoring for idling.				No progress as the funding that was provided in 2016/16 was allocated to cover the additional costs of installing permanent infrastructure in Meadowside. No progress in 2016/17 or 2017/18 as not included in funding application. ➤ See Measure 1 2014-Looking at City Wide rapid charger network to support individuals use, where they can't easily home charge and this will support a taxi fleet of EVs (over and above their home / depot charging infrastructure). Up to seven rapid chargers would be located in neighbourhoods city wide 2015- Dundee was successful in the 1st stage of bidding to Office of Low Emission Vehicles Ultra Low Taxi Scheme. This awarded us a fully funded feasibility study to be carried out by Energy Savings Trust. This was undertaken in December 2015 and we are waiting on final report. 2016-Dundee City Council submitted a bid into OLEV for £515,000 to help support the taxi industry to move to zero emission vehicles. This will require match funding of approximately £88,000 from DCC. This will result in a £603,000 project in the city to install infrastructure to support the industry in their switch to plug in vehicles. A decision is expected in March 2017. 2017- OLEV Funding application was successful allowing some further steps to be taken to increase the charging infrastructure to meet the high demand by focusing on the completion of the rapid charging hubs. Construction at the Lochee hub is underway and at a point close to completion. Solutions are being explored to stabilise the foundations for construction of the Princes Street hub.		
8 cont		Promoting low emission transport			DCC also looking at collaborative work with taxi operators in developing an Electric Vehicle trial for taxis in Dundee						

		Vehicle Fleet Efficiency			Expansion of ECOSTARS to include taxi / private hire operators	2014/15			<p>ECO Stars expanded to include taxi operators in 2014/15. Seeking funding in 2015/16 to continue scheme</p> <p>The scheme was launched on the 11th March 2015 and there were 11 members by the 31st December 2015.</p> <p>2016-There were 15 members(512 Vehicles) in our ECO Stars scheme by the 31st December 2016</p> <p>2017- There were 17 members (519 Vehicles) in our ECO Stars scheme by the 31st December 2017</p>		
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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
9	Measure M9: DCC will investigate to initiate a Roadside Emission Testing (RET) scheme inside the AQMA and routes leading to AQMA	Traffic Management	<ul style="list-style-type: none"> ▶ To investigate into the establishment of a programme of RET in the AQMA 	<ul style="list-style-type: none"> ▶VOSA ▶Tayside Police ▶DCC Environment Department. 			<ul style="list-style-type: none"> ▶Approval/no n-approval of RET scheme ▶Traffic Regulation Conditions if necessary. 	Small	Project on hold until funding identified	2013+	
		Traffic Management			To seek funding to undertake feasibility study of introduction of RET	2015/16+			Project on hold		
10	Measure M10: DCC will ensure local air quality is fully integrated into the Local Development Plan (LDP) process and development scenarios are appropriately assessed with respect to the potential impacts on air quality	Policy Guidance And Development Control	<ul style="list-style-type: none"> ▶Provide AQ policy within Local Development Plan with commitment to improve air quality ▶Produce air quality Supplementary Planning Guidance (SPG) 	<ul style="list-style-type: none"> ▶DCC City Development (Planning Division) ▶DCC Environment Department. 			<ul style="list-style-type: none"> ▶Adoption of Local Development Plan ▶Adoption of Air Quality SPG 	Small	<ul style="list-style-type: none"> ▶Main Issues Report Consultation exercise completed 2/12/2011. Proposed Plan by late autumn 2012. ▶Method of integrating AQ into SPG considered. ▶ Air Quality Policy incorporated into draft LDP. Air Quality Supplementary Planning Guidance approved as part of a package of SPGs for adoption of the Local Development Plan. Supplementary Guidance approved at Committee in February 2015. Implications of Cleaner Air for Scotland Strategy is being considered during the development of future LDPs.	2015 +	2017-Supplementary Guidance updated and reviewed as part of Local Development Plan 2, which also takes account of the implications of the Cleaner Air for Scotland Strategy. Both now with Scottish Government Inspectors - response expected by mid-November, 2018.

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
11	Measure M11: DCC will ensure effective co-ordination between climate change and air quality strategies and action plan measures	Policy Guidance And Development Control	► Strategy to be developed to improve co-ordination between climate change and air quality strategies and action plan measures	► DCC Corporate Planning Department ► DCC City Development - (Property Division) ► DCC Environment Department.		2011+	► Implementation of co-ordination strategy ► Reciprocal attendance of air quality and climate change working groups/steering committees	Small	<p>Procedure implemented for exchange of information between the Climate Change Board & Corporate Air Quality Steering Group.</p> <p>All matters (e.g. Action Plan updates) that the Climate Change Board & Corporate Air Quality Steering Group require attention in general, will be dealt with by the Executive Director of Neighbourhood Services and / or the Strategic Management Team. In addition an update on Air Quality progress was presented to the Climate Change Board in December 2014 and the 2015 AQ Update Report included the implications of the Cleaner Air for Scotland Strategy (CAFS).</p> <p>2016- In addition to the above the Council sit on the 'Clean Air for Scotland - Climate Change Subgroup' to provide advice on potential synergies and challenges between climate change and air quality action in Scotland.</p> <p>2017- The Sustainability & Climate Change Manager sits on the Corporate Air Quality Steering Group to ensure synergy between AQ and CC policy. In addition, as required by the Clean Air for Scotland Strategy, AQ implications will be included in the city-wide Sustainable Energy & Climate Action Plan due to be developed during 2018.</p>	2014+	
12	Measure M12: DCC will continue its active involvement and support of TACTRAN	Policy Guidance And Development Control	► Regularly attend meetings ► Provide feedback ► Provide necessary support	► DCC City Development Department. (Transport Division)			► Number of TACTRAN policies and proposals implemented	n/a	DCC continue to support TACTRAN and focus on implementation of Regional Transport Strategy Ongoing.	On-going	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
LEADING BY EXAMPLE MEASURES											
13	<p>Measure M13:</p> <ul style="list-style-type: none"> ▶ DCC will promote the uptake and use of cleaner and/or alternative fuels where possible for transport ▶ DCC will explore the development of electric charging point infrastructure 	Promoting low emission transport	<ul style="list-style-type: none"> ▶ Determine strategy/advise note and annually review content ▶ Install Electric Charging Facilities in Car Parks 	DCC City Development Department (Transportation Division)			<ul style="list-style-type: none"> ▶ List of any promotion campaigns planned / implemented ▶ Number / proportion of cleaner vehicles within fleets or clean fuels infrastructure in each financial year ▶ Number of electric charging points installed 	Small	<p>▶ See also Measures 7 and 14 ▶▶ Electric vehicle charging station infrastructure for council vehicles has been implemented with Electric Charging points installed in underground car park (below City Square.</p> <p>▶ Pool EVs now available for city centre DCC staff and expanded across several DCC Multi Storey Car Parks and out of city centre DCC offices. ▶ Also investigating alternative Low Carbon Vehicle technologies i.e. Hydrogen Fuel cells ▶ 8 Electric vehicle charging stations installed by DCC (double-headed)</p> <p>2014-Electric vehicle charging station infrastructure for council vehicles has been implemented with Electric Charging points installed in underground car park (below City Square. Pool EVs now available for city centre DCC staff and further expansion now being implemented across several DCC Multi Storey Car Parks and out of city centre DCC offices. Also investigating alternative Low Carbon Vehicle technologies i.e. Hydrogen Fuel cells Looking at City Wide rapid charger network to support individuals use and taxi fleet of EVs</p> <p>2015- DCC have submitted final bid to OLEV for their Go Ultra Low City Scheme and are waiting for the announcement which is due in early 2016. Dundee City Council have installed 2 x 22kw chargers within the city funded by Transport Scotland as well as a number of charge points in the city centre which will be shared with Car Clubs. Work is also underway on new car park at the rear of council headquarters which will accommodate 12 of the council's electric pool cars therefore freeing up the spaces in car parks for more use by the public.</p> <p>Four on-street public charging bays were created in Spring 2015. Trades Lane, Dock Street, South Tay Street and Nethergate. Co-wheels introduced 7 EVs into their Dundee fleet – available for hire by Co-wheels members</p> <p>2016 DCC were awarded £1.86 million from OLEV to install a comprehensive charging infrastructure in the city and surrounding area. This plan commits to installing 15 public Rapid Chargers and 22 Fast chargers, 2016 also saw the opening of the new council only charging hub at the rear of Dundee House with 12 dedicated bays for electric vehicle charging infrastructure.</p> <p>2017- Dundee continues to be described as 'leading the way' in electric vehicle uptake. In 2017 some further steps were taken to increase the charging</p>	2012+ on-going	

							<p>infrastructure to meet the high demand by focusing on the completion of the rapid charging hubs. Construction at the Lochee hub is underway and at a point close to completion. Solutions are being explored to stabilise the foundations for construction of the Princes Street hub. With further charging points being installed to support the growing taxi trade. This will add to the existing infrastructure of which Dundee Council own 56 charging posts (these supply 118 charging points to charge your car at). There are a further 29 charging posts (these supply a further 63 charging points) not owned by, but that Dundee City Council are aware of in the council area. This is a total of 75 posts (that supply 181 charging points) in the council area. Dundee Council have the largest fleet of electric vehicles than any other UK local authority at 87 zero-emission vehicles</p> <p>Dundee Council also launched the Drive Dundee Electric campaign and in June. It has been successful in engaging with current and potential EV owners (both in the public and businesses). It has helped raise awareness about EVs and incentives by hosting, talking or exhibiting at events, building an online social media presence and creating and distributing PR material.</p> <p>2017- There was an 18% Increase in electric taxis in Dundee between August and November 2017. 10% of Dundee taxis are pure electric.</p>		
				See also Measure 7-	2013/14+				

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
14	<p>Measure M14: DCC will establish and implement a rolling programme for replacing older more polluting vehicles with newer cleaner vehicles, which comply with the prevailing EURO standard</p>	Vehicle Fleet Efficiency	<ul style="list-style-type: none"> ► Development of Green Procurement Strategy 	<ul style="list-style-type: none"> ► DCC Corporate Fleet Manager 		2011+	Number / proportion of new/improved vehicles within fleets in each financial year	Small	<p>► New Corporate Fleet Manager appointed December 2011. ► Procurement of vehicles through Scotland Excel Framework which gives consideration to Green Credentials. 2011 saw the introduction of 6 electric vehicles with a further 6 by end March 2012</p> <p>► The Fleet section has replaced 60 vehicles 2012/13 all with improved emissions standards</p> <p>2013-The oldest and some of the most polluting vehicles have been identified and will be replaced with the current Euro 5 engines in the 2013/14 replacement plan. ► 2 new Euro 6 engine refuse collection vehicles ordered and will add to the existing rolling programme of replacing older and more polluting vehicles. ► Over 80 vehicles were replaced in 2013</p> <p>2014-A draft asset management plan has been created providing details of the ongoing replacement plan. Due to financial restrictions and vehicle variations the replacement programme will be done on a cost and condition basis. The emphasis of the plan will remain however the oldest and most polluting vehicles.</p> <p>2015- An annual replacement programme has been introduced to replace older and more polluting vehicles. The Fleet Section has spent approximately £1.8 million in 2015/16 replacing 31 vehicles and 45 items of plant.</p> <p>The council spent £1.3 million in 2016 replacing older and more polluting vehicles, with a total of 30 vehicles being replaced. This included 4 new Euro 6 Refuse Collection Vehicles.</p> <p>In 2017 The Fleet Section continues to develop a rolling programme for vehicle and plant replacement which is based on a cost and condition basis. This includes removing assets where possible and downsizing vans to less polluting vehicles.</p> <p>► See also Measure 7</p>	2014+	

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15	<p>Measure M15: DCC will improve the Council's vehicle fuel consumption efficiency by better management of fleet activities</p>	Vehicle Fleet Efficiency	<ul style="list-style-type: none"> ▶ Develop fleet management plan to improve fuel efficiency. 	<ul style="list-style-type: none"> ▶ DCC Corporate Fleet Manager ▶ DCC Environment Department 		2011+	<ul style="list-style-type: none"> ▶ Implementation of smarter driver programme ▶ Preparation / Implementation of Fleet management plan ▶ 10% reduction by 2013 for staff business travel and Corporate Fleet 	Small	<ul style="list-style-type: none"> ▶ New Fleet Section created (2012) ▶ Environment Department LGV drivers have undertaken SAFED (Safe & Fuel Efficient Driving) as part of their decision driving training and there is a proposal to roll this out across all council drivers. ▶ New computerised Fleet Management Systems to be introduced will help monitor fuel use across the council. Fuel saving measures being trialled in vehicles including Throttle Intervention Systems and Gear Box Prognostics. Fleet Section are developing reports to help tackle idling issues, which will improve fuel efficiency. 25 of the new small vans are fitted with stop/start technology which will be monitored to ascertain benefits. ▶ 2013 Summary - Fleet Section are working with other departments and telematics company to develop reporting tools to monitor mileage and driving styles. ▶ Fleet section is beginning to develop action plan for rolling out Routesmart to plan routes for all council vehicles to assist with reducing mileage. ▶ Fuel cards have been introduced to reduce mileage for RCV's in the east of the city. ▶ 2014 Summary-The Routesmart officers introduced the 1st new route in January 2014 and have an extensive programme to look at all refuse collection routes. ▶ 2015 Summary – A recent trial of rev technology failed to produce any noticeable impact. A recent crackdown on speeding events across the council fleet will hopefully help improve fuel consumption. No further developments in the use of the Routesmart technology that would help with AQ improvement. ▶ 2016 Summary - The fleet section continues to look at new technology to try and improve fuel consumption. Waste and Grounds maintenance section will shortly be introducing routes designed by Routesmart which will hopefully reduce the overall mileage travelled by council fleet. ▶ 2017 The Council is currently introducing new telematics equipment which can directly monitor actual fuel usage, this information will be analysed to identify areas for possible fuel savings <p style="text-align: center;">See Also Measures 7,13,14</p>	2014+	

	<p>Vehicle Fleet Efficiency</p>	<p>► Investigate fleet activities in relation to pollution hotspots e.g. waste management fleet routes</p>		<p>Analysis of the information provided by the telematics system in relation to idling time etc.</p>	<p>2014+</p>			<p>Ongoing as above</p>		
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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
16	Measure M16: DCC will promote options for better travel planning amongst Dundee City Council employees	Promoting Travel Alternatives	<ul style="list-style-type: none"> ▶ Review DCC Travel Plan ▶ DCC to investigate use of annual survey on how/what modes of transport employees use to travel to work 	DCC City Development (Transportation Division)	Funding being sought in 2017/18 to review Corporate Travel Plan and update it in line with CAFS actions	2011+	<ul style="list-style-type: none"> ▶ Implementation of DCC Travel Plan & review of progress with targets ▶ 10% reduction by 2013 in staff business travel ▶ % DCC employees walking/cycling to work 	Small	<p>▶ Staff Travel Policy adopted Autumn 2011. This includes CO2 usages for lease vehicles ▶ DCC senior managers monitor effectiveness of staff travel policy</p> <p>The staff travel policy is encouraging innovation in terms of pool fleet, public and active travel by DCC officers / management to support staff travel.(2012).</p> <p>2015 - Office bikes made available at Dundee House from October 2015. Increased engagement with cyclists to be achieved through the development of a Cycling Strategy for Dundee.</p> <p>2016 -- The Dundee Cycling Strategy was adopted in June 2016 and gives a greater focus to all the cycling related work around the Council. The government had requested that all local authorities develop strategies around active travel. In late 2016, the Dundee Cycling Forum was established as a community body whose aims are the encouragement, promotion and support of cycling in the city</p> <p>Subject to the availability of funding the Corporate Travel Plan and reviewed and update in line with CAFS actions in 2017/18</p> <p>2017 - In 2017/18 DCC applied to the Scottish Govt (SG) for funding through the Air Quality Action Plan Support Funding to revise and update the Travel Plan. Following the granting of these funds, consideration was given to bring in external consultants to deliver the work. However, as the council has recently employed a number of graduate staff, the SG was approached and agreed to carry forward the funding into 2018/19 to retain a graduate to undertake this task. This project is scheduled to be completed in early 2018/19</p> <p>Electric Bikes are now available to staff for work journeys. Review of cycle parking/facilities at all locations for Cycle Friendly Employer Award</p> <p>See also Measure 3 ,17 & 22</p>	2015+	

17	<p>Measure M17: DCC will continue to promote and encourage their employees to consider the use of bicycles in their daily duties by providing cycle usage mileage</p>	Promoting Travel Alternatives	<ul style="list-style-type: none"> ▶ Continue to investigate and develop the use of various incentive schemes ▶ Develop cycling strategies ▶ DCC to investigate use of annual survey on how/what modes of transport employees use to travel to work 	DCC City Development (Transportation Division)		2011+	<ul style="list-style-type: none"> ▶ % DCC employees walking/cycling to work ▶ Incorporate cycling measures within DCC Travel Plan in line with the new DCC Cycling Strategy to be developed 	Small	<ul style="list-style-type: none"> ▶ Get Cycling engaged to deliver cycling initiatives at DCC and other major employers in Dundee. ▶ Improved cycling facilities provided at Dundee House (Dundee City Council Headquarters) and other Council properties. ▶ Bike Boost and Cycle to Work initiatives delivered over the summer of 2012 to encourage staff to consider cycling. ▶ 2014 Staff Travel Policy now fully implemented and walking and cycling modes are encouraged for shorter distances. ▶ 2015 Staff Travel Policy now fully implemented and walking and cycling modes are encouraged for shorter distances. No data being collected ▶ 2016 Increased engagement with cyclists through <ul style="list-style-type: none"> • adoption of a Cycling Strategy for Dundee June 2016 • provision of Tax Free Bikes in partnership with Cyclescheme Ltd • promoting cycling to work via monthly Cycling Breakfast • the Dundee Cycle Forum established as a community body ▶ 2017 Increased engagement with cyclists in addition to 2016 measures through: <ul style="list-style-type: none"> • 2 new bikes added to bike pool, electric bike trials for staff to encourage active travel <p>See also Measures 3,16 & 22</p>	2014+	
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No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
18	<p>Measure M18: DCC will assess the Council's energy needs, make recommendations and implement reductions of carbon emissions which result in corresponding reductions of NO₂ and PM₁₀.</p>	Policy Guidance And Development Control	► DCC to implement annual energy reduction action plan	DCC City Development (Property Division)			► 10% reduction by 2013	Small	<p>The Climate Change Board continues to implement the Council's Carbon Management Plan and current energy management projects. However, while there are a number of initiatives that when fully implemented should realise reductions in our CO₂ emission, the current performance is not consistently improving. The agreed procedural arrangements to enable the Council to comply with the new mandatory UK-wide Carbon Reduction Commitment - Energy Efficiency Scheme have been implemented.</p> <p>The Council's recorded Total Footprint Emissions for property in</p> <p>2011/12 - 36,506 tonnes of CO₂ 2012/13 - 39,570 tonnes of CO₂ 2013/14 - 34,645 tonnes of CO₂ 2014/15 - 34,001 tonnes of CO₂ 2015/16 - 31,976 tonnes of CO₂ 2016/17 - 28,264 tonnes of CO₂ 2017/18 data not available until July 2017</p> <p>Fleet transport baseline figure of 5,976 tonnes (i.e. reported 2007 estimate) has reduced to</p> <p>4,164 in 2013/14 3,965 in 2014/15 3776 in 2015/16 3708 in 2016/17 3623 in 2017/18</p>	On-going	
					New annual aspirational reduction target of 5% until 2020	2013+					

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
19	Measure M19: DCC to promote and support localised energy generation that doesn't compromise Air Quality in private households	Promoting Low Emission Plant	<ul style="list-style-type: none"> Determine strategy/advise note and annually review content 	<ul style="list-style-type: none"> DCC Housing Department Solar Cities 		2011+	<ul style="list-style-type: none"> List of any promotion campaigns planned/implemented 	Small	<ul style="list-style-type: none"> In 2012 Solar PV – Annual 25,055kg CO2 (nominated installers calculated figures) Solar thermal – Annual 197 kg CO2 (nominated installers calculated figures)The above figures are all annual savings as not all installation dates have been collected yet to allow calculation of the actual amount saved within the project period. Participant in Maryfield and Coldsides areas CO₂ reduction <ul style="list-style-type: none"> Groups pending start date = 59 Groups working with = 23 Groups Complete= 2 Total number of people engaged = 853 <p>Summary 2013 City-wide Solar PV review carried out following the Westminster Government's resolution of the Feed In tariff (FIT). 25 DCC locations are FIT compliant. A further 18 additional locations being considered based on energy generation and pay back periods. Financial assessment complete. Report to be brought forward recommending approval to proceed.</p> <p>Summary 2014-PV Scheme business plan is being prepared for 28 Feb 2015</p> <p>Summary 2015-Further review of PV Scheme being undertaken due to further reductions in FIT payments.</p> <p>Summary 2016 - The Capital Plan of November 2016 makes allowances of £1.4M against a range of energy conservation measures including PV production.</p> <p>DCC are now also advancing 2 District Energy Generation Centres as part of the overall city-wide district heating and energy strategy.</p> <p>Progress is also continuing with the drafting of the City's SEAP</p> <p>Summary 2017 - Basket 1 of the £1.4 NDEES Projects have been awarded in October 2017 and implementation is being programmed for early 2018.</p> <p>Basket 2 projects are currently being compiled.</p>	2012+	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
20	<p>Measure M20: DCC will provide the public with relevant air quality information.</p>	Public Information	<ul style="list-style-type: none"> ▶ Investigating the potential for uptake of an air pollution information system, such as Air Alert <ul style="list-style-type: none"> ▶ Improvements to AQ website information ▶ Make up to date air quality information available to the public through Councils digital website 	<ul style="list-style-type: none"> ▶ DCC Environment Department ▶ DCC City Development (Transportation Division) 			<ul style="list-style-type: none"> ▶ Investigate funding sources ▶ Implement Air Alert or similar service ▶ Improved rating of website in peer review ▶ Make AQ information available through Council's website ▶ Real Time Travel Information 	Small	<p>▶ Funding to improve air quality pages on the Council Website identified. The Scottish Government took forward their "Know & Respond" service linked to the new air quality index in 2012. This allows people with respiratory conditions to be alerted when moderate and high pollution levels are forecast. The Council have provided a link and information about this service on the web-site.▶ The existing website achieved a higher rating in the 2012 peer review than the previous year.▶ Real-time pollutant monitoring concentrations are available from the Scottish Air Quality Website (www.scottishairquality.co.uk). The Council have provided a link on the web-site to this service.▶ No progress on provision of real-time information on pollution levels to assist traffic management through pollution hotspots.</p> <p>In 2013 -the new air quality webpages completed apart from section on Air Quality Planning due to Supplementary Planning Guidance not yet being finalised. Historical data for all monitoring points for 2006 to 2012 available via interactive map while address search function for smoke control areas also available. LAQM reports available for download including 2013 Progress report. Previous air quality pages have been removed. Air quality information was included on new bus route map that was delivered to 75000 residences in Dundee at end of June to start of July 2013. Workshops held at four primary schools in Broughty Ferry in April / May which included discussions on air quality.</p> <p>In 2014-The air quality webpages on the DCC website have been updated however the section on Air Quality and Planning is still to be finalised as the Supplementary Planning Guidance is awaiting Committee approval. The DCC AQ pages were ranked at number 7 in the UK for local authority AQ webpages in the 2014 peer review, with top marks of 5 stars awarded for the AQ content available on the DCC website.</p> <p>Summary 2015-The Air Quality pages of the DCC website have been upgraded with features available to enable the public to view historical data for the 2006 - 2013 period for all monitoring stations via an interactive map. This page also creates a graph for the monitoring results for those years to provide trend at monitoring location. A link to the Scottish Air Quality website is also present to allow real-time data to be viewed. All LAQM reports are summarised with some available for downloading, with most recent addition being the 2015 USA report.</p> <p>ECO Stars pages updated to ensure that lists of members up to date. The peer review for local authority air quality websites not conducted in 2015. Data base for air quality monitoring data still to be completed so historical monitoring information for 2014 still to be uploaded.</p> <p>Summary 2016- Information on website updated as necessary to ensure that links to external websites remain correct. ECO Stars pages updated regularly to ensure that lists of members up to date. The peer review for local authority air quality websites not conducted in 2016.</p> <p>Summary 2017 - The new Dundee City Council website was launched at the end of October 2017. Further improvements to the new website for maps and search functionality are proposed which should improve availability of information, such as for smoke control areas. ECO Stars member's lists regularly updated to ensure current. The peer review for local authority air quality websites was again not conducted in 2017</p>	2012+	

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20		Public Information			► Complete improvements to AQ website	2013/15			Improvements ongoing (see above)		
		Public Information			► Develop Database to enable DCC staff to better manage large volume of AQ data and make it more readily available to stakeholders	2013/15			<p>Initial discussions held with IT Department in regards to development of a database for the handling and retrieval of air quality monitoring data.</p> <p>2014 Summary -Development of the AQ database has progressed with the DCC IT Department building a specification for the database for AQ monitoring data, However the proposed period for development of the database in November to December 2014 delayed due to be undertaken in early 2015.</p> <p>2015 Summary- Information on website updated as necessary to ensure that links to external websites correct. ECO Stars pages updated to ensure that lists of members up to date. The peer review for local authority air quality websites not conducted in 2015. Data base for air quality monitoring data still to be completed so historical monitoring information for 2014 still to be uploaded.</p> <p>2016 Summary- The data base framework for air quality monitoring data is completed with trial period running until end of 2016 to enable use of system from start of 2017. Historical monitoring information for 2016 has been uploaded for display on website. In addition the Air Quality pages of the DCC website have been upgraded with features available to enable the public to view historical data for the 2006 - 2015 period for all monitoring stations via an interactive map. This page also creates a graph for the monitoring results for those years to provide trend at monitoring location. A link to the Scottish Air Quality website is also present to allow real-time data to be viewed. All LAQM reports are summarised with some available for downloading, with most recent addition being the 2016 Progress report</p> <p>2017 Summary - A new Dundee City Council website was launched at the end of October 2017 see further update above</p>		

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
21	Measure M21: DCC will continue its work to increase uptake and implementation of School and Workplace Travel Plans, particularly where likely to impact on the AQMA	Promoting Travel Alternatives	<ul style="list-style-type: none"> ▶ DCC to ensure all relevant commercial planning applications have travel plan conditions applied in accordance with current best practice. ▶ DCC to produce Travel Plan Strategy which: <ul style="list-style-type: none"> ▶ Details procedure for tracking & possible requirement for enforcement of planning conditions requiring travel plans. ▶ Details procedure for Travel Plan Information storage at DCC 	<ul style="list-style-type: none"> ▶ DCC City Development Department, (Planning Division, Transportation Division) ▶ DCC Education Department 			<ul style="list-style-type: none"> ▶ Develop Business Case for Travel Co-ordinator & identify potential funding streams. ▶ Number of new travel plans (need to show in terms of walking cycling - % of journeys saved). ▶ Identify & report on any Air Quality related Travel Plan targets from travel plan strategy and any relevant Travel Planning Team targets. ▶ Promotion of Travel Plan initiatives e.g. Sustrans' Travel Smart ▶ Implement & regularly review Travel Plan Strategy 	Small	<ul style="list-style-type: none"> ▶ Work in 2011 focussed on reducing the impacts of school traffic on the Lochee Road hotspots. (See AQAP 2012 Appendix 1) ▶ Further work to promote sustainable travel in primary schools across Dundee scheduled for 2012. ▶ Planning applications for significant developments are required to submit travel plans. The submission of travel plans is actively pursued and approved, if appropriate. ▶ In 2012 investigated development of city wide programme of pupil involvement (P5 - 7) in travel behaviour change. Education Department also encouraged to refresh all school travel plans <p>In 2013 Funding secured to commence a city wide programme of pupil involvement (P5 - 7) in travel behaviour change. Education Department agreed that all school travel plans would be reviewed over 13/14. Tender issued 22 November 2013 .Contract Awarded and in class sessions commenced March through to September 2014, all P5 pupils in Dundee reached through in class sessions.</p> <p>Travel Behaviour Change Programme for (P5-P7) now being delivered annually the current contract runs to 2016/17</p> <p>All primary schools were given support during 2015 in updating their school travel plans. A number of primary schools have engaged in active travel initiatives but many have not engaged positively.</p> <p>In 2016 Travel Behaviour Change Programme successfully run in majority of (P5-P7) across the city. Travel Plan Condition placed on some applications but implementation not monitored</p> <p>In 2017 the Travel Behaviour Change Schools Programme was put on hold. However, the Scottish Govt has agreed to any funding underspend from 2017/18 being carried forward into 2018/19 to retain a graduate trainee to undertake the classroom workshops and review the Council's Corporate Travel Plan as outlined in Measure 16</p>	2014+	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
22	Measure M22: DCC will continue working in partnerships with TACTRAN and local active travel networks to ensure that walking and cycling initiatives are promoted and supported in Dundee	Promoting Travel Alternatives	► Identify walking & cycling schemes (such as Park & Cycle). ► Identify walking & cycling promotional opportunities around Dundee City	DCC City Development (Transportation Division)		2011+	► Number of walking and/or cycling initiatives in operation. ► Establish the use of cycle monitoring counts at key points on cycle routes	Small	► Get Cycling engaged to undertake promotion of cycling and delivered Bike Boost. ► Positive Steps implemented Dundee Travel Active Personal Travel Plans in Broughty Ferry ► Cycle to Work Scheme promoted during August 2012 ► City Engineer currently implementing major cycling scheme at Douglas Terrace 2013 Summary - Transportation Division have secured further funding from Sustrans for FY13/14, which will deliver several off and on road cycle schemes. 2014-Working with City Engineers at Riverside Drive / Seabraes Pedestrian Bridge, including pedestrian crossing improvements on Riverside Drive Sustrans officer embedded in TACTRAN will encourage more focus on Community Based active travel initiatives Works all underway and additional 'Safer Routes to School' funds bid for to implement minor improvements to support active travel to and from school 2015 - Key developments in 2015 included the new Seabraes Bridge, improvements on Coupar Angus Road near Camperdown Park, Lower Broughty Ferry Road (west end of Grassy Beach) and Riverside Avenue to Perth Road. 2016- Dundee's Cycling Strategy was approved by councillors in June 2016 and a number of actions are being implemented. 2017- Continued work with Sustrans and Cycling Scotland to provide cycle training and improved infrastructure across the city. The Dundee Cycling forum met regularly throughout 2017. Project to declutter street of unnecessary signage and furniture to enhance pedestrian environment proposed while an audit of all cycle counters is planned for summer 2018. See also Measures 3,16 & 17	2014+	
					Preliminary Works to achieve off-road cycle route around the Port of Dundee	2013/14		Permission to commence on Nynas land to undertake preliminary works to achieve off-road route around Port of Dundee On hold until resolution of land ownership			
					Provide Pedestrian Bridge over the railway at Riverside Drive / Seabraes	2013/14		Transportation Division & City Engineers completed works at Riverside Drive / Seabraes Pedestrian Bridge, including pedestrian crossing improvements on Riverside Drive As above			

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
23	<p>Measure M23: DCC will continue to work with transport providers to support and promote increased uptake of public transport modes</p>	Transport planning and infrastructure	<ul style="list-style-type: none"> ▶ Promote schemes such as the SQUID card including Dundee and surrounding towns. ▶ Introduce smart and integrated ticketing 	<ul style="list-style-type: none"> ▶ DCC City Development (Transportation Division) 		2011+	<ul style="list-style-type: none"> ▶ % uptake schemes ▶ Passenger numbers 	Small	<p>The development of Smart Card based integrated ticketing (National Entitlement Card) is being undertaken by DCC, National Express and Transport Scotland. .</p> <p>2013 Summary -This matter has the support of the Scottish Cities Alliance with a view to proof of concept for a Scottish roll out. Initial smart ticketing has been successfully deployed by National Express Dundee and Dundee College. DCC commenced discussion with other transport operators in support of the Scottish Cities Alliance priority for smart ticketing - Delivery action Group hosted by DCC 06 December 2013. .</p> <p>2014 Summary-Projects now being implemented nationwide, the new Green Buses and the EcoMobility SHIFT assessment, potential Bus Innovation Fund bid with Angus Council, Tactran and NHS Tayside and additional off peak bus services (funded by DCC) will raise profile and attractiveness of travelling by bus in Dundee. Scottish government review of Dundee rail fares will also attract new and retain existing passengers by making rail travel an attractive and more affordable option</p> <p>2015 Summary - DCC continues to promote public transport as an attractive and affordable alternative to private car. Significant work and investment is invested in infrastructure and promotion</p> <p>2017 Summary – DCC continued the promotion of ABC smart integrated ticketing product. Other means of promoting and supporting public transport modes included the:</p> <ul style="list-style-type: none"> • Kids travel for 20p scheme- The initiative saw more than 800 bus journeys a day taken for 20p during the 2017 Easter break, a total of 13,286. • <u>Navi Go Go trial</u>- During the trial from October 2017 to March 2018, the trial participants will be able to access streamlined and personalised information, payment and fulfilment for trains, taxis, bike schemes, buses, car clubs and walking – all in one single hub. 	2012+	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
		Transport planning and infrastructure			NEC SMART Ticketing to Go Live 2014	2014			Completed	July 2014	
24	Measure M24: DCC will continue to work in partnership with other organisations to promote and implement energy efficiency measures in Dundee	Policy Guidance and Development Control	► To implement an Annual Action Plan of energy efficiency measures.	► DCC City Development (Property Division)			► Implementation of Annual Energy Efficiency Action Plan. ► Report reductions in energy use	Small	<p>The Climate Change Board re-introduced the Carbon Management Action Plan in 2013</p> <p>Examples of partnership initiatives undertaken by DCC can be viewed in the Council's annual 'Scotland's Climate Change Declaration' Report: http://www.keepsotlandbeautiful.org/sustainability-climate-change/sustainable-scotland-network/climate-change/scotlands-climate-change-declaration/</p> <p>Examples include: Dundee Energy Advice Project; European ENCLOSE project (Energy Efficiency in City Logistics Services).</p> <p>2015- The Climate Change Board's continuous review of the Carbon Management Action Plan has identified a number of revisions required to support the climate change aspirations and to improve work in partnership with other organisations to promote and implement energy efficiency measures.</p> <p>2016 - Full energy management progress reports are presented to the Council's Climate Change Board (CCB) in Feb and Aug each year for consideration. In addition, actions and initiatives relating to reducing the Council's energy use, carbon emissions and improving energy efficiency of the Council estate are discussed in detail at each CCB meeting as required</p> <p>2017 - The Council is installing energy efficiency measures in a number of properties utilising the Scottish Government's procurement framework for Energy Performance Contracts that is available for all public sector organisations. One of the 12 private contractors was appointed in December 2017 to complete the works after which the savings are guaranteed by the contractor. The works will be completed by June 2018 with a guaranteed saving of £222,000.</p>	2012+	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
MEASURES SECURING AIR QUALITY BENEFITS THROUGH STATUTORY FUNCTIONS											
25	Measure M25: DCC Environment Department will comment upon planning applications to ensure that all relevant air quality issues are highlighted and mitigation measures are considered wherever possible	Policy Guidance and Development Control	▶ The Environment Department (Environmental Protection Division) will continue to work with City Development (Planning Division) as Statutory Consultees	▶ DCC City Development Department (Planning Division) ▶ DCC Environment Department			▶ Total number of planning applications responded to in each calendar year (changed from financial year) ▶ Percentage of the total planning applications responded to with air quality conditions/ assessments	Small	Environment Department Officers check weekly planning lists and comment on all applications which may adversely impact on local air quality. ▶ In 2011 19 planning applications responded to. ▶ 16% had air quality conditions/ assessments (this included smoke control area informatives) ▶ 19 planning applications in 2012. ▶ 38% of the planning applications determined in the calendar year had air quality conditions. ▶ 31 planning applications were responded to in 2013. ▶ 30 planning applications were responded to in 2014. ▶ 37 planning applications were responded to in 2015. ▶ 53 planning applications were responded to in 2016. ▶ 64 planning applications were responded to in 2017	n/a	<i>Suggestions on best practice and mitigation measures advised accordingly.</i>
					see Measure 10 regarding the introduction of Supplementary Planning Guidance						

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
26	Measure M26: DCC will enforce statutory legislation to control smoke, dust, fumes or gas emissions from commercial and domestic premises which are causing a nuisance or are prejudicial to health	N/A	<ul style="list-style-type: none"> ▶ DCC will continue to monitor and enforce statutory legislation in this area 	<ul style="list-style-type: none"> ▶ DCC Environment Department. 			<ul style="list-style-type: none"> ▶ Number of relevant complaints in each financial year. ▶ % resolved 	Small	<ul style="list-style-type: none"> ▶ For period in 2010-11 financial year (01/01/11-31/03/11) a total of 15 relevant complaints were investigated of which 93% were resolved. ▶ For period in 2011-12 financial year (01/04/11 - 31/12/11), a total of 26 relevant complaints were investigated of which 69% had been resolved by 31/12/2011. In 2012, officers investigated 21 relevant complaints, of which 90% were resolved In 2013, officers investigated a total of 10 relevant complaints were investigated of which 90% have been resolved and one complaint is still being investigated. In 2014, officers investigated a total of 22 relevant complaints of which 90.9% have been resolved and two complaints are still being investigated. In 2015, officers investigated a total of 17 relevant complaints of which 94% have been resolved and one complaint is still being investigated. In 2016, officers investigated a total of 17 relevant complaints of which 77% have been resolved and four complaints are still being investigated In 2017, officers investigated a total of 23 relevant complaints of which 83% have been resolved and four complaints are still being investigated 	n/a	

27	<p>Measure M27: DCC will enforce relevant legislation to reduce the burning of commercial and domestic waste</p>	N/A	<p>► DCC will continue to monitor and enforce legislation in this area</p>	<p>► DCC Environment Department</p>		<p>► Number of relevant complaints ► % resolved</p>	Small	<p>► In 2011 - 1 complaint of the burning of commercial waste was investigated under the Environmental Protection Act 1990 (EPA) Section 33 requirements which was resolved. ► 7 complaints of smoke from commercial bonfires were investigated under EPA Section 79 and Clean Air Act legislation. ► 11 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under EPA Section 79 and Clean Air Act legislation in 2011 of which 94% of these complaints had been resolved by 31/12/2011</p> <p>In 2012 Officers dealt with 9 complaints of smoke from commercial bonfires and 17 complaints of smoke from the burning of domestic waste. 92% of these complaints were resolved.</p> <p>In 2013, officers investigated 11 complaints of smoke from commercial bonfires under Environmental Protection and Clean Air legislation. 12 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under the same legislation. 96% of these complaints were resolved.</p> <p>During 2014 officers investigated 9 complaints of smoke from commercial bonfires under Environmental Protection and Clean Air legislation. 13 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under the same legislation. 100% of these complaints have been resolved.</p> <p>During 2015 officers investigated 10 complaints of smoke from commercial bonfires under Environmental Protection and Clean Air legislation. 25 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under the same legislation. 100% of these complaints have been resolved.</p> <p>During 2016 officers investigated 10 complaints of smoke from commercial bonfires under Environmental Protection and Clean Air legislation. 20 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under the same legislation. 100% of these complaints have been resolved.</p> <p>During 2017 officers have investigated 15 complaints of smoke from commercial bonfires under Environmental Protection and Clean Air legislation. 20 complaints of smoke from the burning of domestic waste (domestic bonfires) were investigated under the same legislation. 100 % of these complaints have been resolved.</p>	n/a	
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Dundee City Council

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
28	Measure M28: DCC will promote composting in a bid to reduce pollution from domestic bonfires	Policy Guidance and Development Control	▶ Reintroduce discount/promotion campaign for compost bins	▶ DCC Environment Department		2011+	▶ % uptake composting bins	Small	<p>▶ The Waste Resources Action Programme (WRAP) subsidised discount compost bins ended due to funding cuts in March 2011 with a total of 5243 discounted bins being sold in the DCC area in the period between 2006 and end 2010 representing 2% of the total discounted bins for Scotland. The promotion of home composting continues under the Zero Waste Scotland campaign banner with a Recycling Projects Officer employed in the Environment Department. ▶ Composting is undertaken at the Environment Department's green waste processing facility at Riverside Drive. 37,526 brown bins for garden waste have been issued.</p> <p>In 2013 - The area Zero Waste Scotland Volunteer Co-Ordinator helped to promote the home composting message across Dundee. DCC staff continued to utilise educational talks etc. to reaffirm the message.</p> <p>A total of 48 composting bins (and associated accessories) were purchased through the home composting framework scheme during 2013</p> <p>In 2014 the Council continued to participate in the national home composting framework scheme - an online retail network of subsidised composting bins & accessories to help encourage self-management of organic waste - as well as providing a fortnightly kerbside collection service for garden waste across the city with seasonal additional uplifts for real Christmas trees which may otherwise end up in domestic bonfires. A total of 28 composting bins were purchased through the home composting framework scheme between January - Dec 2014</p> <p>In 2015 -Promotion of the separate collection of garden waste for central composting by Dundee City Council continues throughout the city, with a total of 1821 brown bins being requested between June and December 2015. In addition, we continued to participate in the national home composting framework which allows residents who are keen to compost their own garden waste rather than have this collected by the council, to purchase discounted composting containers and accessories through an online retail network. From June to November 2015 a total of 13 units were purchased by Dundee residents. Both the home composting purchases & garden waste bin requests reflect the work ongoing within the Projects team to promote the composting process as an alternative to burning domestic garden waste.</p> <p>In 2016 - Promotion of the separate collection of garden waste for central composting by Dundee City Council continues throughout the city, with a total of 1957 brown bins being requested between February 2016 and February 2017. The reason for the increase in numbers is due to the creation of additional routes as the service is expanded across the city.</p> <p>In 2017, 2005 bins were requested in the period up to</p>	On-going	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
29	<p>Measure M29: DCC will continue to monitor a range of air pollutants throughout Dundee and make the monitoring information freely available to the public in an easily understandable form</p>	Public Information	<ul style="list-style-type: none"> ▶ Continued support for Dundee Air Quality Monitoring Network 	<ul style="list-style-type: none"> ▶ DCC Environment Department. 			<ul style="list-style-type: none"> ▶ Number of monitoring sites ▶ Identification of sites in new hotspots ▶ Monitoring data via DCC website 	n/a	<p>▶ DCC operate a network of ten real-time monitoring sites. Details & locations can be found in Appendix A, Table A.1 & Figure A.1 respectively. Most are at roadside sites: Logie St (PM₁₀), Lochee Rd (NO₂&PM₁₀), Seagate(NO₂&PM₁₀), Whitehall St (NO₂& PM₁₀), Meadowside(NO₂&PM₁₀), Albert St (PM₁₀), Myrekirk Terr (PM₁₀), and Stannergate(PM₁₀). The Union St (NO₂&PM₁₀) site was decommissioned in January 2016 as NO₂ concentrations had been below the annual mean objective since 2011. There is also a background site at Mains Loan (PM₁₀&NO₂) and an urban industrial location at Broughty Ferry Rd (with collocated PM₁₀ monitors). In 2014 SO₂ monitoring ceased at Broughty Ferry Rd as monitored concentrations were consistently below the AQOs.</p> <p>From 1/4/16 DCC must review and assess PM_{2.5} concentrations in its area.</p> <p>2017- Funding to support the installation of PM_{2.5} monitoring equipment at the Mains Loan background monitoring site and Lochee Road site was secured via the Scottish Government LAQM funding grant for 2017/18. The Mains Loan equipment has been installed with data first collected on 25 October 2017. The PM_{2.5} equipment at the Lochee Road site is due to be installed in early 2018.</p> <p>▶ DCC deploy 95 NO₂ diffusion tubes (PDTs) across a network of 89 sites around the city, located at busy roads and junctions and a number of background locations, which are detailed in Appendix A. Three PDTs are collocated with each of the 4 roadside automatic NO₂ for data accuracy. Locations are reviewed and any necessary changes to the network are reported annually.</p> <p>2017 - The details of diffusion tube changes undertaken in 2017 are detailed in Section 3 of the main report.</p> <p>▶ The location of new relevant exposure next to pollution sources (e.g. busy roads) and dispersion modelling results inform the need for new monitoring locations and hence the potential identification of new hotspots, which are detailed in Section 4 of the APR.</p> <p>Potential new annual mean NO₂ exceedance areas identified at South Road (Denbank) in 2012 and Strathmore Ave in 2009 were below the NAQS in 2015 and 2016 when predicted to façade. NO₂ concentrations exceeded the AQO at West Marketgait / Guthrie St. (PDT installed 2013) and the new tube installed at West Marketgait / Old Mill in 2015. The potential hotspot at West Marketgait is now confirmed.</p> <p>▶ DCC website AQ pages enable the public to view & graph data for the 2006 - 2015 period for all monitoring sites via an interactive map. A link to the Scottish Air Quality website is present to allow real-time data to be viewed. All LAQM reports are also available. See also Measure 20 re' monitoring data on the website</p>	n/a	<p>Annual mean concentrations of NO₂ at Strathmore Avenue and South Road (Denbank) were below the NAQS in 2017 when predicted to façade.</p> <p>West Marketgait /Guthrie Street was just below the objective and West Marketgait / Old Mill was above the NAQS in 2017.</p>

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30	<p>Measure M30: DCC will ensure that all air quality monitoring data reported to the public is both accurate and precise by implementing quality control measures</p>	Public Information	<ul style="list-style-type: none"> ▶ Regular calibrations and filter changing of continuous monitoring equipment in DCC's air quality stations ▶ At least annual audit of air quality stations' equipment ▶ Appropriate use and care of NO₂ diffusion tubes regularly deployed around the City Council area. 	<ul style="list-style-type: none"> ▶ DCC Environment Department/ Tayside Scientific Services 			<ul style="list-style-type: none"> ▶ QA/QC measures adopted ▶ Auditing reports 	n/a	<ul style="list-style-type: none"> ▶ External consultant undertakes calibrations and filter changing of the continuous monitoring equipment in the air quality monitoring stations. In 2017 the NOx analyser at the Mains Loan monitoring site became affiliated with the DEFRA AURN (automatic urban and rural network) monitoring group. As a result, this analyser will be subject to an alternative auditing procedure. ▶ Osiris meters - indicative PM₁₀ meters - filter change undertaken on quarterly basis and annual calibration. ▶ Audits of continuous monitoring stations' equipment undertaken by external consultants and auditing reports received. ▶ Public Analyst participates in AIR PT Scheme and field inter-comparison study. <p>Ongoing, -AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme. AIR NO₂ PT forms an integral part of the UK NO₂ Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM)</p>	n/a	
					Develop Database to enable DCC staff to better manage large volume of AQ data and make it more readily available to stakeholders	2013/15			<p>Initial discussions held with IT Department in regards to development of a database for the handling and retrieval of air quality monitoring data.</p> <p>The DCC IT Department are in the process of development of a database for the handling and retrieval of air quality monitoring data. Specifications of database have been built by the IT Department which were discussed during a meeting held in August 2014. The development of the database was planned to be carried out in November - December 2014 however this has been delayed and is now planned to be carried out in early 2015</p> <p>The database framework has been completed and trialling commenced in 2016 and continued through 2017.</p>	2015	

No.	Measure	Category	Focus	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments relating to emission reductions
31	Measure M31: DCC will establish additional monitoring sites across the City in locations where poor air quality is suspected	N/A	<ul style="list-style-type: none"> ▶ DCC will continue to carry out and report on their statutory duties under the Review & Assessment process for LAQM 	<ul style="list-style-type: none"> ▶ DCC Environment Department 			<ul style="list-style-type: none"> ▶ Poor air quality sites identified monitored and dealt with through the process of Review & Assessment. ▶ Additional monitoring sites established as and when required 	n/a	<ul style="list-style-type: none"> ▶ See Measure 29 ▶ The potential new hotspot identified for NO₂ in Strathmore was assessed and it was determined that monitoring with the additional tubes in the area could cease. ▶ See Measure 29 ▶ A review of the diffusion tube locations was undertaken in 2012 and 21 new sites identified as requiring monitoring during 2013 <p>See Section 3.1; 7 new PDT were added to the network in 2017 where there was a risk of poor air quality.</p>	n/a	
32	Measure M32: DCC will implement road traffic counts to inform the review and assessment process.	Traffic Management	<ul style="list-style-type: none"> ▶ Undertake classified traffic counts 	<ul style="list-style-type: none"> ▶ DCC Environment Department 			<ul style="list-style-type: none"> ▶ Classified traffic counts undertaken 	n/a	<p>Classified Traffic Counts Undertaken at 18 junctions in 2011</p> <ul style="list-style-type: none"> ▶ Classified Traffic Counts undertaken at 18 junctions in Sept 2012. <p>Classified Traffic Counts were undertaken at 9 junctions in 2013.</p> <p>There were no traffic counts undertaken for air quality purposes in 2014 or in 2015</p> <p>In 2016 - New traffic counts were undertaken in the Seagate, Coupar Angus Road, Harefield Rd, Dalkeith Rd/Arbroath Rd, Drumgeith Rd/Whitfield Dve, and the junction of Gray St/Queen Street.</p> <p>In 2017, Transport Scotland Commissioned TRACSIS to undertake a traffic counts across the City to provide the baseline information for the development of the National Modelling Framework for Dundee City Council. The counts were undertaken in September after the completion of major roadworks.</p>	On-going	

2.3 Cleaner Air for Scotland

Cleaner Air for Scotland – The Road to a Healthier Future (CAFS) is a national cross-government strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible. A series of actions across a range of policy areas are outlined, a summary of which is available at <http://www.gov.scot/Publications/2015/11/5671/17>. Progress by Dundee City Council against relevant actions within this strategy is demonstrated below.

2.3.1 Transport Action – “Avoiding travel – T1”

All local authorities should ensure that they have a corporate travel plan (perhaps within a carbon management plan) which is consistent with any local air quality action plan. Dundee City Council has a Council Travel Plan (CTP) to reduce the number of single occupancy car journeys made while on Council business and when commuting to work and to incentivise the use of public transport and walking and cycling and car sharing. However, this needs to be revised to bring it in line with DCC's Air Quality Action Plan, the revised corporate policy covering business travel and CAFS deliverables. Air Quality Action Plan Support Funding was provided from The Scottish Government in 2017/18 and consideration was given to bring in external consultants to take this forward. However as the council had employed a number of graduate staff, the Scottish Government(SG) was approached and agreed to carry forward the funding into 2018/19 to allow the Council to retain one of the graduates to undertake this task. This project is now scheduled to be completed in early 2018/19.

2.3.2 Climate Change Action – “Effective co-ordination of climate change and air quality policies to deliver co-benefits – CC2”

Scottish Government expects any Scottish local authority which has or is currently developing a Sustainable Energy Action Plan to ensure that air quality considerations are covered. Dundee City Council has committed to becoming a signatory to the EU Covenant of Mayors (CoM) and Civic Leaders signed its 'Adhesion Form' on 19th March 2018. Through the Dundee Partnership, the city will develop a 'Sustainable Energy and Climate Action Plan' (SECAP) for Dundee that will aim to reduce area wide emissions and deliver multiple social, economic and environmental benefits. Air quality funding was provided to develop the Baseline Emissions Inventory (BEI) element of SECAP development to identify and quantify the principle sources of CO₂ and GHG emissions and their respective reduction potentials from transport, municipal, tertiary and residential sectors. This work was completed in March 2018. Funding has also been obtained to deliver a community stakeholder engagement event to support the SECAP development and explore the multiple themes of the plan, agree objectives and the necessary policy interventions and actions required to deliver it. The event will be by invitation and designed to attract the green groups in the city as well as the community planning partnership organisations.

2.3.3 Commentary on further actions

Dundee City Council along with the other three major city authorities, is represented on the CAFS Governance Group. DCC is committed to working with the Scottish Government and its partner organisations to deliver CAFS' aim of improving Scotland's air quality to be the best in Europe.

Two critical elements for the delivery of CAFS is the development of a National Modelling Framework (NMF) and National Low Emission Framework (NLEF). SEPA is leading on the development of a standardised two level NMF, for regional and local scales, designed to

inform decisions on potential transport and planning solutions to local air quality issues. While Transport Scotland are leading on the development of the NLEF appraisal process.

Detailed modelling of the four major cities is being progressed. The development of the Dundee City Model commenced in September 2017 to allow the necessary baseline traffic data to be collected after the completion of major roadworks. The development of the Dundee City Model is being progressed and is due to be completed later in 2018. Once completed, the outputs from the modelling exercise will be used in the transport focussed NLEF appraisal process to consider a range of transport related vehicle access interventions, including Low Emission Zones, which will bring further improvements to air quality in the city. The design and implementation of LEZs across Scotland is to be consistent and as such DCC are represented on the LEZ 'Leadership' and LEZ 'Consistency' groups. An LEZ 'Delivery' group will be set-up once the City Model has been completed.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Section 3 sets out what monitoring has taken place and how local concentrations of the main air pollutants compare with the objectives.

Dundee City Council undertook automatic (continuous) monitoring at 10 sites during 2017. **Table A.1** in **Appendix A** shows the details of the sites. There are currently three different PM₁₀ monitors (CM3, CM13, CM16) co-located at the Broughty Ferry Road site to help improve data accuracy and validity. During 2017 (October 25th) the particulate analyser (TEOM) at the urban background site (Mains Loan) was replaced with a new analyser (Palas Fidas 200), which is capable of monitoring both PM₁₀ and PM_{2.5}.

National monitoring results are available at <http://www.scottishairquality.co.uk/>.

Maps showing the location of the monitoring sites are provided in **Appendix A**. Further details on how the monitors are calibrated and how the data has been adjusted are included in **Appendix C.1**.

3.1.2 Non-Automatic Monitoring Sites

Dundee City Council undertook non-automatic (passive) monitoring of NO₂ at 89 sites during 2017. **Table A.2** in **Appendix A** shows the details of the sites.

Maps showing the location of the monitoring sites are provided in **Appendix A**. Further details on how the monitors are calibrated and how the data has been adjusted are included in **Appendix C.1**. Six (6) new diffusion tube sites were added to the network at the start of 2017 at the following locations where new residential properties had been introduced, proposed or identified close to busy roads:

- Muirton Road (2) (DT 222);
- Harcourt Street (CCTV) (DT 221);
- Seagate (99) (DT 217);
- South Marketgait (Lampost 18) (DT 218);
- Strathmartine Road (15) (DT 220); and
- Thomson Avenue (street sign) (DT 219).

During 2017, two diffusion tubes sites were relocated due to the original sites becoming inaccessible. Broughty Ferry Road (Lower) (DT164) became inaccessible due to overgrown vegetation and St. Andrews Street (26) (DT56) because the street sign it was on was removed. As a result, a further two new sites were added to the network during 2017. These are:

- Broughty Ferry Road (Lower) (Cyclesign) (DT 223), and
- Seagate (112) (DT 224)

The new tube in Broughty Ferry Road (Lower) replaces the previous urban background location with another one in a more accessible location. The new site in Seagate is located on the north side of the street canyon where modelling has predicted that air quality may deteriorate once a new flatted development is built on the south side (see **Section 4.1**).

The diffusion tube results for the entire network were reviewed in December 2017 (when 10 months data was available) in order to identify those monitoring locations where: concentrations were well below the AQO; showing a decreasing trend; no longer needed for model verification; or, were unnecessary for long term trend analysis. The following 5 tube locations were discontinued at the end of 2017:

- Arbroath Road (38) (DT147) - decreasing trend below 36 µg/m³
- Broughty Ferry Road Lampost 66 (DT 140)– decreasing trend below 36 µg/m³
- Drumgeith Road (2) (DT206) - well below
- Harcourt Road CCTV (DT 221) – well below
- Strathmartine Road (15) (DT220) – well below

The above five diffusion tubes were redeployed at the beginning of 2018 in areas where new residential developments are planned or have been identified close to busy roads and junctions in Dundee.

- Commercial Street (84) (DT 226)
- Dudhope Crescent Road (40) (DT 227)
- Gray's Lane (3) (DT 225)
- Riverside Esplanade / S. Crichton St. (DT 228)
- Thomson Avenue/S.Crichton St. (DT 229)

The results of the new diffusion tubes deployed in 2018 will be reported in the Annual Progress Report 2019.

3.2 Individual pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for annualisation and bias. Further details on adjustments are provided in **Appendix C**.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.3 in **Appendix A** compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2017 dataset of monthly mean values is provided in **Appendix B**. Locations marked in green were new in 2017.

The procedure specified in paragraphs 7.77 to 7.79 of statutory technical guidance LAQM.TG(16) was used to estimate the concentrations at the nearest receptor. The annual mean background concentration used in the calculation was 21.2 µg/m³ (from DT 185) for city centre sites, and 17.0 µg/m³, (the average of concentrations from five urban background locations (DT 7, DT 164, DT 155, DT 185, and DT 82)) for the remainder. The above methodology has been shown in previous reports to under-estimate NO₂ concentrations at façade in street canyon environments. Potential exceedances (> 36 µg/m³) of the NO₂ annual mean that were identified at relevant locations near the monitoring locations are shown in **Table 3.1**.

Table 3.1 Locations of Potential Exceedances of the NO₂ annual mean AQO in 2017

Site ID	Location	2017 Bias Adjusted NO ₂ Annual Mean (µg/m ³)	2017 Predicted annual mean NO ₂ concentration at Receptor (µg/m ³)
DT 31	Lochee Rd (140) Traffic Lts	48.1	47.3
DT 37	Logie St (114)	47.9	46.1
DT 205	West Marketgait/Old Mill (23)	45.1	45.0
DT 70	Victoria Rd/Hilltown	51.5	44.9
DT 156	Dock St (57)	49.4	43.4
DT 217	Seagate (99)	42.5	42.5
CM 5	Seagate Romon	44.3	39.1
DT 183	West Marketgait / Guthrie St	44.1	39.0
DT 190	Seagate (97)	38.7	38.7
DT 149	Meadowside (Romon) Average	39.3	38.6
DT 30	Lochee Rd (138)	47.3	38.4
DT 49	Rankine St (2)	39.3	38.3
CM 4	Lochee Rd Romon	43.6	37.8
DT 158	Lochee Rd (Romon) Average	42.6	37.7
DT 85	Dock St (21)	36.7	36.3

The highest NO₂ annual mean concentrations predicted at relevant receptors were on the North West arterial route (Lochee Road Corridor); the West Marketgait, which is part of the

inner ring road; the main bus corridor; and, part of the trunk road network close to the city centre (i.e. Dock Street 57). There are no specific measures within the AQAP currently targeting the inner ring road or trunk roads. All of these locations are within the AQMA.

Long term trends in NO₂ concentrations at automatic monitors with at least 5 years data capture are shown in **Figure A.3a**. All show an improvement in the past 5 years except the urban background site at Mains Loan. An analysis of apparent trends in the 77 monitoring locations with at least 5 years data is shown in **Figure A.3b**. Concentrations at the majority of sites (68) show an improving trend or have remained stable. The greatest improvements have been in Meadowside where action plan measures have been successful in reducing concentrations. Small worsening trends are evident on Dock Street close to the trunk road network; on the main bus corridor (at Whitehall Crescent, Whitehall Street and Seagate), and at some urban background sites (Mains Loan and Broughty Ferry Road).

An overview of how NO₂ annual mean concentrations are improving in different areas across the city can be seen in maps and graphs shown in **Appendix C.2**.

Table A.4 in **Appendix A** compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year. No exceedances of the hourly mean objective were identified at automatic monitoring locations in 2017. No exceedances of the hourly mean objective were indicated by the diffusion tube annual mean concentrations in 2017 as none exceeded 60µg/m³. The Lochee Road automatic monitor had six occasions when the concentration was over 200µg/m³. Analysis showed these were all in the winter months, during evening traffic peak times. The pattern of these occurrences are similar to those in previous years.

Previously the hourly mean objective has only been exceeded at the Lochee Road automatic monitor, though there have been no exceedances for the past 4 years. **Figure A.4** shows the long-term trend in the 99.8th percentile concentration of hourly means at Lochee Road. The trend line has been drawn using an Excel simple regression statistical program. Diffusion tube monitoring and dispersion modelling show that the automatic monitor is not sited in the most polluted location. Until there is an established downward trend the AQMA for the hourly mean objective should remain.

3.2.2 Particulate Matter (PM₁₀)

Table A.5 in **Appendix A** compares the ratified and adjusted monitored PM₁₀ annual mean concentrations for the past 5 years with the air quality objective of 18µg/m³.

Table A.6 in **Appendix A** compares the ratified continuous monitored PM₁₀ daily mean concentrations for the past 5 years with the air quality objective of 50µg/m³, not to be exceeded more than 7 times per year.

No exceedances of the PM₁₀ annual mean objective (18µg/m³) were predicted at any of the monitoring locations, within the AQMA during 2017.

Annual mean PM₁₀ concentrations at monitoring sites with at least five years data are shown in **Figure A.5a** and **Figure A.5b**, with an analysis of the trends shown in **Figure A.5c**. An improving trend is evident at the majority of current monitoring locations. The largest decreasing trend has been in Meadowside where action plan measures to increase the separation distance between the active carriageway and receptors may have contributed to the decrease in concentrations. The second largest decreasing trend is evident at Stannergate (Osiris). Traffic is not the only source of PM₁₀ in the Stannergate area, and two nearby SEPA permitted processes surrendered their licences during 2017.

The PM₁₀ daily mean objective (50µg/m³, not to be exceeded more than 7 times per year) was met at all monitoring locations in 2017. A pollution event raised PM₁₀ concentrations across the city and throughout Scotland on 15/02/2017¹. Dry, still and misty conditions along with easterly and south-easterly air masses, bringing pollutants from the rest of the UK and continental Europe are thought to have contributed to this episode. Easterly winds and misty conditions have also been present during many of the other recorded exceedances of the daily mean in Dundee.

Figure A.6a shows the frequency of the daily mean PM₁₀ concentrations greater than 50µg/m³ recorded at the real-time monitors. Where the measured data capture is less than 85%, LAQM.TG(16) advises that, it is more appropriate to express short-term concentrations as percentile values for comparison with the objective. Expressing short-term concentrations as 98.08th percentile values provides easier inter-year comparison of data and examination of possible trends. **Figure A.6b** and **Figure A.6c** shows trends for those analysers with at least 5 years data capture. Trend lines have been drawn using an Excel simple regression statistical program.

The majority of automatic monitoring sites with at least 5 years data capture show an improving trend. The trend in concentrations at Mains Loan background site remains relatively stable with small increasing trends evident at Lochee Road, Myrekirk Terrace, Seagate and Stannergate. However, it is hard to draw conclusions from analysis of trends in short-term PM₁₀ exceedances because apart from the influence of annual trans-boundary events (usually in March and April) most are caused by transient and sometimes unpredictable events such as road works, fires, road gritting and, demolition and construction activities.

¹ http://www.scottishairquality.co.uk/assets/documents/news/PM_episode_15th_feb_2017.pdf

3.2.3 Particulate Matter (PM_{2.5})

As of the 1st of April 2016, the Scottish Government introduced the World Health Organisation guideline value for PM_{2.5} into Scottish legislation with an annual mean objective 10µg/m³ to be achieved by 2020. Scottish local authorities are now required to include PM_{2.5} in the LAQM review and assessment process. Dundee City Council began monitoring for PM_{2.5} at the background site at Mains Loan on the 25th October 2017, consequently, there was insufficient data capture to report a reliable annual average for 2017. The roadside PM₁₀ monitoring locations represent relevant areas for PM_{2.5}, so the methodology described in LAQM.TG(16) (paragraph 7.109) has been used to estimate the PM_{2.5} annual mean concentrations. **Table 3.2** shows those monitoring locations where the PM_{2.5} objective has been estimated to be exceeded (highlighted in **bold**) since the new requirement was introduced.

Table 3.2 Estimated PM_{2.5} Annual Mean Concentrations 2015 to 2017

Year	2015	2016	2017
<i>Scottish Annual Mean Objective</i>	10	10	10
Whitehall St (BAM)		10.6	10.3
Seagate (BAM)	10.2	9.6	11.1
Meadowside (BAM)	11.3	11.5	10.3
Lochee Rd (BAM)	13.9	13.2	12.3
Logie St (Osiris)	10.9	9.7	10.2
Myrekirk Tce (Osiris)	12.9	10.9	8.4
Albert St (Osiris)	13.3	10.8	10.0
Stannergate (Osiris)	18.8	14.6	9.8

Potential exceedances were estimated at the following locations in 2017:

- Lochee Road (BAM);
- Logie Street (Osiris)
- Meadowside (BAM);
- Seagate (BAM); and,
- Whitehall Street (BAM).

Under section 83(1) of the Environment Act 1995, local authorities have a duty to designate any relevant areas where the air quality objectives are not (or are unlikely to be) met as Air Quality Management Areas (AQMAs). No guidance is currently available on how to predict forward PM_{2.5} monitoring concentrations to 2020. However, further evidence is required to determine whether the estimates at these locations are representative of local PM_{2.5} before deciding whether an AQMA is required or not.

Accordingly a second PM_{2.5} analyser was installed at the Lochee Road monitoring station in March 2018 and Dundee City Council have also been successful in obtaining funding from the Scottish Government to establish a further three PM_{2.5} monitors in the city. It is proposed that these will be located at the other at risk roadside sites where potential exceedances are estimated or predicted. Future evidence from these will help to support the decision to declare an AQMA, or not.

3.2.4 Sulphur Dioxide (SO₂)

Dundee City Council does not currently monitor SO₂.

3.2.5 Carbon Monoxide, Lead and 1,3-Butadiene

Dundee City Council does not currently monitor any of these pollutants.

4. New Local Developments

4.1 Road Traffic Sources

As part of the Cleaner Air for Scotland Strategy (2015) discussed in **Section 2.3**, the Scottish Government, Scottish Environmental Protection Agency (SEPA) and Transport Scotland are developing a city model of Dundee as part of the National Modelling Framework (NMF). The NMF will include an air quality assessment tool, guidance documents, data requirements, best practice and 'web-based interactive data products' aimed at providing a standardised approach to modelling air quality at regional and local level. It is expected that the local NMF model will provide a significant proportion of the quantitative evidence required within the detailed options appraisal process for the National Low Emission Framework (NLEF). A comprehensive traffic data collection exercise was undertaken in September 2017 in Dundee as shown in **Figure C.30**, which will provide a new baseline for review and assessment. The results of the local NMF model are expected to be available later in 2018.

Under this section the Council is required to identify any of the following which are new:

- Narrow congested streets with residential properties close to the kerb;
- Busy streets where people may spend one hour or more close to traffic;
- Roads with a high flow of buses and/or HGVs;
- Junctions;
- New roads constructed or proposed;
- Roads with significantly changed traffic flows; and
- Bus or coach stations.

Since the last Annual Progress Report in 2017, there have been no new:

- Busy streets where people may spend one hour or more close to traffic;
- Roads with a high flow of buses and/or HGVs;
- New roads constructed or proposed;
- Roads with significantly changed traffic flows; and
- Bus or coach stations.

Narrow congested streets with residential properties close to the kerb

Planning permission was granted in August 2017 for a new eight storey residential flatted development (with commercial premises on the ground floor) on a vacant site on the corner of Seagate and Trades Lane. Seagate is a street canyon and an existing identified area of exceedance of the NO₂ annual mean objective. The application (16/01058/FULL) was accompanied by an air quality assessment² which predicted that the extension of the Seagate "street canyon" caused by the proposed building will have an adverse impact on NO₂ concentrations at existing receptors on the Seagate to the north of the development site, and potentially cause a new exceedance. The levels of NO₂ on the Seagate elevation of the proposed new building were predicted to exceed the NO₂ annual mean objective at dwellings below the 4th floor level. A new diffusion tube (Seagate 112, DT 224) was introduced to the north of the proposed development at the existing façade in September 2017. The annualised 2017 annual mean NO₂ concentration (34.1 µg/m³) at ground floor was higher than the predicted baseline concentration at first floor in the AQ assessment. This is currently below the annual mean objective.

² http://idoxwam.dundeeccity.gov.uk/idoxpa-web/files/0C0A05716D7F738E466F46E0C8369228/pdf/16_01058_FULL-27_-_AQIA_REPORT-750478.pdf

Junctions (including busy roads and junctions in Scotland)

The APR 2017 identified two relevant locations (roads with greater than 10,000 vehicles per day (vpd) with relevant exposure within 10m) where although diffusion tube monitoring results are below the annual mean objective for NO₂ it has not been possible to assess for PM₁₀. These are:

- Hawkhill (Nr Blackness Primary School); and,
- Dock St close to the busy junction of the A92T and the A991.

The APR 2016 reported the results of modelling studies which identified new exceedances of the annual mean objectives for NO₂ and/or PM₁₀ at relevant receptors at the following six locations (the majority of which are part of the trunk road network):

- A92 (between Broughty Ferry Road and Greendykes Road (PM₁₀ & NO₂);
- Scott Fyfe roundabout (A92/A972/B961/B959/C223) (PM₁₀);
- Claypotts junction (A92/B978) (PM₁₀);
- A972T (Kingsway – Pitkerro Road roundabout) (NO₂);
- A90 (north of the Kingsway) (NO₂); and
- Forfar Road (A929) / Clepington Road (C244) junction (PM₁₀ & NO₂).

NO₂ diffusion tube monitoring in 2016 and 2017 at each of these locations were below the annual mean objective of 40µg/m³.

Each of the eight areas above are within the network of roads and junctions to be studied by the NMF for Dundee, and PM₁₀ will be considered as part of this process. These areas are all within the boundary of the current AQMA. There are no specific AQAP actions, currently being pursued, that target trunk road traffic in these areas. The local authority intends to liaise with Transport Scotland as part of the NLEF process to discuss whether any additional actions are possible to reduce pollutant concentrations at relevant locations close to the trunk road network in Dundee.

Annual road count data (as AADT) from the council's long term Road Traffic Reduction Act (RTRA) Sites from 2005-2017 are presented in **Table C.6**. **Table C.7** shows the percentage growth at each of the sites since 2005; none have experienced a significant increase (>10%) in traffic flows over this time. Consequently updated assessments of NO₂ and PM₁₀ are not required for those RTRA Sites where there is relevant exposure. Generally findings at these sites have been considered indicative of traffic growth for local roads in the city.

New roads constructed or proposed

New junctions and roads have been constructed as part of the Central Waterfront Development Masterplan 2001 - 2031, described previously in the Progress Report 2005. The closest receptors to these roads are currently located on Dock Street, which is already an identified exceedance area. New residential developments and 'street canyons' are proposed within the Central Waterfront Area and the need for review and assessments of the new roads and junctions will be examined in subsequent reports as necessary. Planning applications were approved in 2017 for the 7 storey mixed use developments including new residential exposure at Site 2 (17/00337/FULM³) and Site 6 (17/00113/FULM⁴) within the waterfront area as shown in **Figure 4.1**. The planning consents for these developments included conditions requesting air quality assessments for new and existing residential

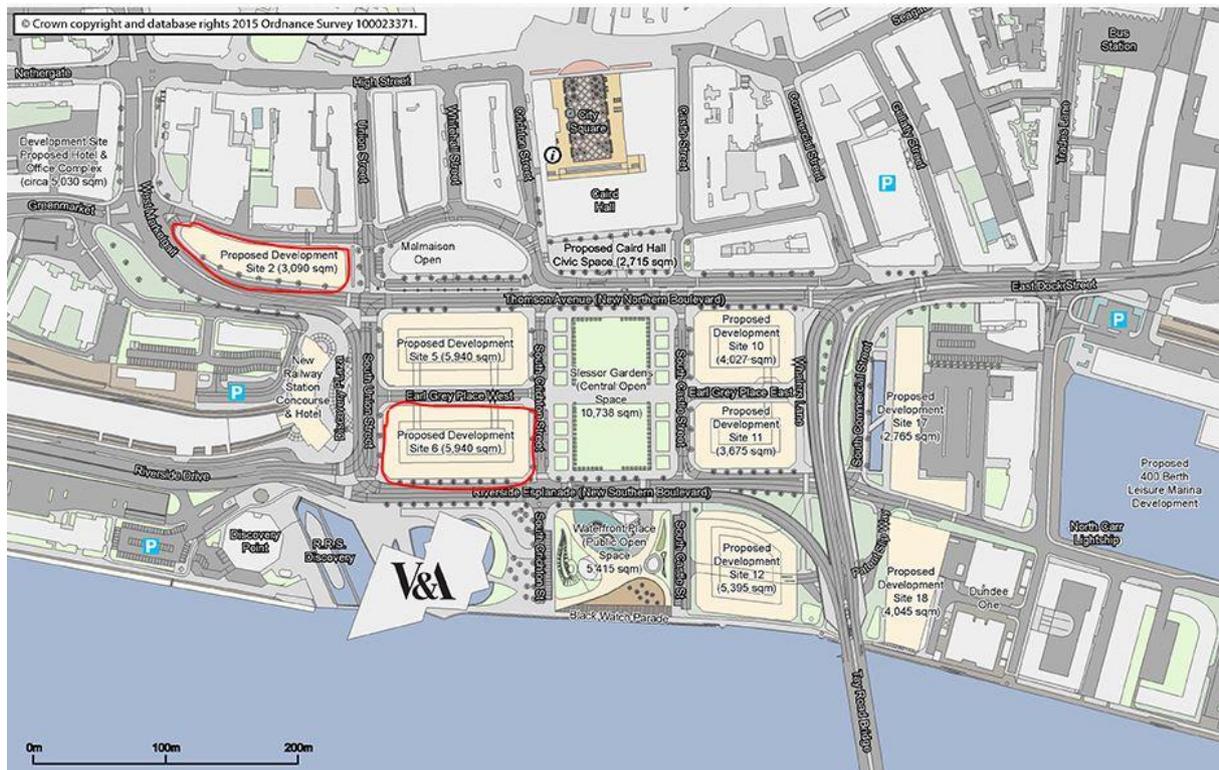
³ http://idoxwam.dundee.gov.uk/idoxpa-web/files/51E78CF29BF1FA7B11FA4846A09E8068/pdf/17_00337_FULM--807610.pdf

⁴ http://idoxwam.dundee.gov.uk/idoxpa-web/files/FE1C82D9CFE9655FE288ACED2CC262BD/pdf/17_00113_FULM--780127.pdf

receptors. The results of these assessments will be included in future APR when they become available.

NO₂ diffusion tube monitoring close to Site 2 began in 2017 (DT 218). The vacant site is currently being used as a ground level temporary carpark. The monitoring result for this site was below the objective in 2017 (30µg/m³). NO₂ diffusion tube monitoring close to Site 6 began in 2018 (DT 229). The results from this site will be reported in 2019.

Figure 4.1 Central Waterfront Site Map



4.2 Other Transport Sources

None of the following transport sources have been identified as new since the Annual Progress Report 2017:

- Airports;
- Locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m;
- Locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m; and
- Ports for shipping.

4.3 Industrial Sources

Under this section the local authority is required to identify any of the following which are new:

- **Industrial installations:** new or proposed installations for which an air quality assessment has been carried out;

- **Industrial installations:** existing installations where emissions have increased substantially or new relevant exposure has been introduced;
- **Industrial installations:** new or significantly changed installations with no previous air quality assessment;
- Major fuel storage depots storing petrol;
- Petrol stations; and
- Poultry farms.

Industrial sources are regulated by the Scottish Environment Protection Agency (SEPA) under the Pollution Prevention and Control Regulations (PPC). Local authorities also have controls over smaller industrial and commercial sources, largely through the Clean Air Act and its associated control of stack heights. As a result of these controls, there should be few sources that may be relevant to local authorities under the Local Air Quality Management (LAQM) regime. The majority of these sources will have been addressed during previous rounds of Review and Assessment and the focus is, therefore, on new installations and those with significantly changed emissions or new exposure.

The technical guidance (LAQM.TG(16)) states that industrial sources are unlikely to make a significant contribution to annual mean concentrations, but may contribute to elevated short-term concentrations, which may lead to exceedances of the short-term air quality objectives (e.g. 15-minute mean for SO₂, 1-hour mean for NO₂ or 24-hour mean for PM₁₀). The assessment should consider the potential impact of specific industrial processes or chemical storage for all of the regulated pollutants. Generally, industrial sources most likely to require further assessment work are those that emit NO₂, PM₁₀ and potentially SO₂.

A list of industrial processes in the city which are regulated by the Scottish Environmental Protection Agency (SEPA) is provided in **Appendix C.4**. This Appendix also includes a screening assessment of all the SEPA regulated processes and contains updated information provided by SEPA.

▪ **New or Proposed Installations for which an Air Quality Assessment has been Carried Out**

SEPA were consulted regarding any changes that meet the above criteria at SEPA regulated sites. The consultation responses are summarised in **Appendix C.4**. In addition, the council were consulted on one proposed installation which was accompanied with an air quality assessment.

Dundee Energy from Waste CHP facility – PPC/A/1158864

An air quality assessment was submitted along with four addendums, in support of the planning application for the proposed Dundee Energy from Waste CHP facility⁵ which received planning permission in 2017. The council also provided comments to SEPA on the PPC Permit Application for the same facility. The proposed facility has a 90m stack and is expected to replace the existing Dundee Energy Recovery Limited (DERL) facility by autumn 2020 and has the potential to reduce emissions from the nearby Michelin Tyre Factory by supplying it with heat and power. The applicant has indicated that the existing incineration plant and proposed new Energy from Waste plant will not operate at the same time.

Local Air Quality Management (LAQM) pollutants are nitrogen dioxide (NO₂), fine particulate matter (PM₁₀), sulphur dioxide (SO₂), carbon monoxide (CO), benzene, lead (Pb) and 1, 3-

⁵ 16/00916/FULM | Construction of an Energy from Waste Combined Heat and Power Facility. | Land At Forties Road Baldovie Industrial Estate Dundee DD4 0NS <http://idoxwam.dundee.gov.uk/idoxpa-web/applicationDetails.do?activeTab=documents&keyVal=OGBVBPGCGP900>

butadiene. The proposed development has the potential to emit all but the final pollutant listed. The proposed development is located within the citywide Air Quality Management Area which encompasses areas where the annual mean objectives for NO₂ and PM₁₀ are currently being exceeded.

Detailed atmospheric dispersion modelling has been used by the applicant to predict the likely process contributions, and cumulative contributions, to pollution concentrations at receptors. The applicant also undertook a 12 month monitoring survey of nitrogen dioxide NO₂ at 11 locations to characterise the receiving environment and baseline pollutants; a traffic survey; a dispersion modelling assessment of road traffic emissions; a construction dust assessment; and, a human health risk assessment.

The results of the dispersion modelling were assessed using Environmental Protection UK (EPUK)/Institute of Air Quality Management (IAQM) guidance and the impacts were judged to be insignificant at all relevant receptors and would not lead to a breach of any of the air quality objectives

The above application has since been withdrawn and a variation to the existing permit has recently been submitted instead (PPC/A/1003157). Any significant changes to emissions or impacts will be reported in subsequent reports where necessary.

- **Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been Introduced**

SEPA were also consulted regarding any changes that meet the above criteria at SEPA regulated sites. The consultation responses are summarised in **Appendix C.4**, and no existing installations with substantially increased emissions or new relevant exposure were identified.

- **New or Significantly Changed Installations with No Previous Air Quality Assessment**

SEPA were consulted regarding any changes that meet the above criteria at SEPA regulated sites. The consultation responses are summarised in **Appendix C.4**, and two new installations with no previous air quality assessment were identified.

PPC/A/1158864 Augean North Sea Services, Riverside Works, Princess Alexandra Wharf, Stannergate Road, Dundee, DD1 3LU
Disposal or Recovery of Hazardous Waste with a capacity exceeding 10 tonnes per day, Chapter 5.3 Part A (b) (ii), (iii), (iv), (vi), (x)

The consultation for the above application was not received by the Community Safety & Protection division of the council and therefore no comments on the application were made. The local SEPA office, have advised that the facility is essentially a waste transfer station with no issues for LAQM pollutants. The activities involved include storage, sorting, segregation, bulking, repackaging, size reduction and decontamination.

The facility is approx. 177m from the nearest residential building and will not result in significant emissions as all wastes will be received and stored in the transfer building preventing atmospheric emissions. The majority of operations are considered unlikely to generate significant fugitive dust emissions. The operation of a shredder is identified as a possible source of fugitive emissions, although the plant is said to have its own local dust

controls and is housed within a building. The permit was granted on the 13th June 2017 but the site is not yet operational.

PPC/B/1155960 Scotscreed Limited, Fishdock Road, Stannergate, Dundee, DD1 3LU
Batching of ready-mixed concrete, Chapter 3; Section 3.1 Part B (a) (ii)

The council were consulted on the above application during 2017. The concrete batching operation is located within the Port of Dundee and within the Air Quality Management Area. The operation includes cement silos, aggregate storage bays, hoppers and loading shovels. The site is approx. 92m from the nearest housing which is located at an elevated position behind a strip of trees to the north-west of the facility. This distance is within the 200m threshold cited under LAQM.TG16 for potential concern regarding fugitive emissions of PM₁₀. The 2017 background PM₁₀ concentrations at the nearest receptors have been estimated from the Scottish Background Maps (Base 2015) to be 9.6 µg/m³. There are no grid squares within 1km of the site with estimated background concentrations above 11 µg/m³, which is the threshold at which track out from the site might be of concern.

Given the non-threshold nature of PM₁₀ and PM_{2.5}, and the proximity of the proposed site to nearby residential receptors, SEPA were asked to ensure that all best practical measures to reduce PM₁₀ and PM_{2.5} emissions were employed by the applicant. The permit was issued by SEPA on 30th June 2017, and included controls on the handling of dusty materials, and wind-blown dust from stockpiles and surfaces. No complaints regarding dust have been received by the council or SEPA to date. The council has several automatic PM₁₀ monitoring around the port (CM3, CM13, CM16, and CM18), none of these recorded an exceedance of the annual mean or daily mean objectives for PM₁₀ during 2017. **Section 4.5** details the work carried out to investigate elevated PM₁₀ concentrations in the port area. It is not considered necessary to proceed to a more detailed assessment at the present time and monitoring will continue around the port.

- **Major Fuel (Petrol) Storage Depots**

The assessment considers benzene, with respect to the 2010 objective. There are no major fuel (petrol) storage depots within the Local Authority area.

- **Petrol Stations**

The assessment considers benzene with respect to the 2010 objective. Large petrol stations, where the annual throughput is more than 2000m³ of petrol (2 million litres per annum) and with a busy road nearby (i.e. >30,000 annual average daily traffic flows) require consideration where there is relevant exposure (e.g. residential properties) within 10m of the pumps. All existing petrol stations have been assessed previously and there are no residences within 10m of the pumps.

Dundee City Council confirms that there are no new petrol stations meeting the specified criteria.

▪ **Poultry Farms**

Farms housing in excess of: 400,000 birds if mechanically ventilated; 200,000 birds if naturally ventilated; and, 100,000 birds for any turkey unit, require consideration if there is residential exposure within 100m of the poultry units. The assessment needs to consider only PM₁₀.

Dundee City Council confirms that there are no poultry farms meeting the specified criteria in Dundee.

4.4 Commercial and Domestic Sources

Under this section the Council is required to identify any of the following which are new since the last Annual Progress Report:

- Biomass⁶ combustion plant – individual installations (50kW to 20MW);
- Areas where the combined impact of several biomass combustion sources may be relevant;
- Areas where domestic solid fuel burning may be relevant; and
- Combined Heat and Power (CHP) Plant.

Since the APR (2017), there have been no new biomass combustion installations nor areas identified where the combined impact of several biomass sources may be relevant. Smoke Control Orders cover most of the local authority area and there are currently no areas identified with significant solid fuel use, though enquiries/complaints to the Council about domestic solid fuel burning, and planning applications for the installation of wood/solid fuel burning stoves are on the increase.

The requirement to consider CHP Plant is a new requirement that local authorities have had to report since the APR (2016). Two proposed gas-fired CHP plant were contained in planning applications received during 2017. One for an existing supermarket on the east of the city and one for the proposed energy centre for the Regional Performance Centre for Sport in Caird Park.

Sainsbury Gas-Fired CHP

An air dispersion modelling report and addendum were submitted in support of the planning application for the gas-fired supermarket CHP and back-up plant (17/00598/FULL)⁷. No exceedances of the NO₂ annual and hourly were predicted at relevant receptors.

Regional Performance Centre for Sport Gas Fired CHP

The proposed Regional Performance Centre for Sport in Caird Park, along with its associated energy centre received planning permission in 2017 (16/00577/FULM), without an air quality assessment being carried out. The proposed energy centre includes ground source heat pumps, a gas-fired CHP, three conventional gas-fired boilers with the potential for a fourth to supply a district heating network for nearby housing. A planning condition was attached to the consent to ensure air dispersion modelling will be carried out for the proposed energy centre⁸. The applicants have appointed consultants to determine the appropriate stack height but at the time of writing the report is not available to review. The assessment results will be reported in a future progress report when available.

⁶ Note (from Defra FAQ 2009): the term 'biomass' strictly applies to all solid fuels made from plants, i.e. coal, smokeless fuels, wood, straw etc... However, the term biomass is now frequently taken to be synonymous with renewable fuels such as wood and straw. For the purposes of air quality review and assessment the strict definition of biomass is applicable.

⁷ http://idoxwam.dundeeecity.gov.uk/idoxpa-web/files/5CA10DCA686A15C58E67496E0A0B0416/pdf/17_00598_FULL-07_-_AIR_QUALITY_IMPACT_ASSESSMENT-792624.pdf

⁸ http://idoxwam.dundeeecity.gov.uk/idoxpa-web/files/04ABD40C8248B0D162FB02690D3AE59B/pdf/16_00577_FULM--791980.pdf

Ninewells Hospital Emergency Diesel Generating Plant

In addition, an air quality assessment was received as part of a planning application for a new emergency diesel generating plant at Ninewells Hospital in Dundee (16/00930/FULL)⁹. A stack height of 15m ensured that no exceedances of the air quality objectives were predicted at relevant locations. Conditions were attached to the planning consent limiting the use of the generators to during power failures within the hospital and for testing¹⁰.

4.5 New Developments with Fugitive or Uncontrolled Sources

Under this section the Council is required to identify any of the following potential sources of fugitive or uncontrolled particulate matter, which are new:

- Landfill sites;
- Quarries;
- Unmade haulage roads on industrial sites;
- Waste transfer stations etc.; and
- Other potential sources of fugitive particulate emissions.

Since the last APR (2017), two new potential sources of fugitive or uncontrolled particulate matter, have been identified within the port area, a waste transfer station and a cement batching plant, these are discussed in **Section 4.3**.

The DCC 2015 USA identified that annual mean PM₁₀ concentrations at the Stannergate roundabout (located at the eastern entrance to the port) were higher than other similar roadside locations suggesting contributions from PM₁₀ sources other than road traffic. There are a number of uncontrolled, transient and unpredictable sources of PM₁₀ in the area which require further investigation to help inform potential action plan measures. Dundee City Council secured funding from the Scottish Government to engage consultants to carry out source identification and characterisation at this location. Ricardo were commissioned to carry out the study in 2017¹¹.

The report compared five years (2012-2016) of monitoring data from 3 locations within the city; the urban background site at Mains Loan, Broughty Ferry Road to the west of the port and Stannergate to the east of the port. The influences of the following factors have been studied in the report:

- the trend in pollutant concentrations;
- wind speed;
- week of the year;
- ambient temperature;
- weekday;
- hour of the day;
- wind direction; and,
- rainfall.

The main factors found to be influencing PM₁₀ concentrations at Stannergate are the underlying trend, ambient temperature and hour of the day. A diurnal plot, within the report shows a typical traffic-related pattern, with the highest concentrations measures at 8 am and 6 pm. This is also mirrored in the weekday plot where increased PM₁₀ concentrations measured Monday to Friday. The analysis also shows that PM₁₀ concentrations increase with

⁹ http://idoxwam.dundee.gov.uk/idoxpa-web/files/8F0017EA1575172A5A3D9194226BE39E/pdf/16_00930_FULL-12_-_AIR_QUALITY_ASSESSMENT-734161.pdf

¹⁰ http://idoxwam.dundee.gov.uk/idoxpa-web/files/09C5D466CCAB9CC9AAA5639D94BA0532/pdf/16_00930_FULL--764805.pdf

¹¹ "De-weathering of Dundee Air Quality Data" Ricardo

https://www.dundee.gov.uk/sites/default/files/publications/2018_dundee_deweathering_issue_2.pdf

rising ambient temperature and at lower wind speeds. Together with diurnal and weekly pattern, the analysis indicates that traffic, which includes resuspension of dust from the road surface and diffuse emissions from activities at the port, are identified as potential sources of PM₁₀ at Stannergate.

An increase in concentrations is also seen at higher wind speeds which shows that there is a source of PM further afield (sea salt and long range atmospheric transport from the continent are mentioned as possible sources). This also ties in with the effect of increasing temperature when the ground is drier and higher wind speeds cause resuspension of dust.

The unchanging trend in PM₁₀ concentrations at Stannergate also indicate that there are additional sources of PM₁₀ compared to Broughty Ferry Road and Mains Loan monitoring locations where a decreasing trend is seen. The report contains polar plots which show that increased PM₁₀ is measured at Stannergate when there are relatively strong winds (10 – 15 ms⁻¹) from the east south east (at approximately 100°) where Dundee Docks and the Firth of Tay are located. The plot also confirms that elevated concentrations are also seen at lower wind speeds with a wind from approximately 85° where the A930 is located relative to the site.

Mapped polar plots of PM₁₀ concentrations for all three sites are shown in **Figure C.31**. Similar polar plot profiles can be seen at all sites with increased PM₁₀ concentrations seen when the wind was from 95° to 135°, and from 190° to 260° (where 360° is north) indicating that there is a common source contributing to PM₁₀ concentrations at the three sites. The port is located to the south of all three sites and handles dry bulk goods which could be a source of PM₁₀ along with sea salt and secondary PM₁₀ associated with long range atmospheric transport from continental Europe.

Since the above analysis was carried out, the eastern entrance to the port has become the main access route into the port and two new potential sources of fugitive PM₁₀ emissions received permits from SEPA in 2017: a waste transfer station and, a cement batching plant. Three other SEPA regulated processes in or near the port also surrendered their permits in 2017, a pet food manufacturing plant, a cement batching plant and a textile treatment facility (see **Figure C:32**). Measured PM₁₀ concentrations at Stannergate (CM 18) reduced in 2017 and are now estimated to be below both the annual mean and daily mean objectives. Monitoring will continue around the port to determine whether further action plan measures are necessary.

5. Planning Applications

Dundee City Council have been advised by the LAQM Helpdesk that this section is not mandatory.

6. Conclusions and Proposed Actions

6.1 Conclusions from New Monitoring Data

Potential exceedances of the NO₂ annual mean objective (40µg/m³) were predicted at the following locations, within the AQMA:

- Dock Street;
- Lochee Road;
- Logie Street;
- Seagate;
- Victoria Road; and
- West Marketgait.

An analysis of trends in NO₂ annual mean concentrations at monitoring locations with at least 5 years data indicates that the majority of sites show an improving trend with the greatest improvements taking place in Meadowside where action plan measures have been successful in reducing concentrations. Small worsening trends are evident on Dock Street close to the trunk road network; on the main bus corridor (at Whitehall Crescent, Whitehall Street and Seagate); and at some urban background sites (Mains Loan and Broughty Ferry Road).

No exceedances of the NO₂ hourly mean objective were identified by automatic monitors or indicated by diffusion tubes in 2017. Lochee Road is the only area of the city where the hourly AQO has been exceeded previously. Although exceedances of the hourly mean continue to be recorded here, for the past 4 years the objective has been achieved (18 exceedances are allowed). . Until there is an established downward trend the AQMA for the hourly AQO should remain.

No Exceedances of the PM₁₀ annual mean objective (18µg/m³) were predicted at any of the monitoring locations within the AQMA during 2017.

An improving trend is evident at the majority of current monitoring locations. The largest decreasing trend has been in Meadowside where action plan measures to increase the separation distance between the active carriageway and receptors may have contributed to the decrease in concentrations. The second largest decreasing trend is evident at Stannergate (Osiris). Traffic is not the only source of PM₁₀ in the Stannergate area, and two nearby SEPA permitted processes surrendered their licences during 2017.

The PM₁₀ daily mean objective was met at all monitoring locations in 2017.

The majority of automatic monitoring sites with at least 5 years data capture show an improving trend in 98.08th percentile concentrations. The trend at Mains Loan background site remains relatively stable with small increasing trends evident at Lochee Road, Myrekirk Terrace, Seagate and Stannergate. However, it is hard to draw conclusions from analysis of trends in short-term PM₁₀ exceedances because apart from the influence of annual trans-boundary events (usually in March and April) most are caused by transient and sometimes unpredictable events such as road works, fires, road gritting and, demolition and construction activities.

Dundee City Council began monitoring for PM_{2.5} at the background site at Mains Loan on the 25th October 2017, consequently, there was insufficient data capture to report a reliable annual average for 2017. Potential exceedances of the PM_{2.5} annual mean objective (10µg/m³) have been estimated from the PM₁₀ annual mean concentrations using the

methodology described in LAQM.TG(16). Potential exceedances were estimated at the following locations:

- Lochee Road (BAM);
- Logie Street (Osiris)
- Meadowside (BAM);
- Seagate (BAM); and,
- Whitehall Street (BAM).

A second PM_{2.5} analyser was installed at the Lochee Road monitoring station in March 2018. Dundee City Council were also successful in obtaining funding from the Scottish Government to establish a further three PM_{2.5} monitors for the other at risk locations in the city. It is intended that these will be located at the roadside sites in Meadowside, Seagate and Whitehall Street during the 2018/19 financial year, to help support the decision on whether an AQMA is required or not.

6.2 Conclusions relating to New Local Developments

The work being undertaken as part of CAFS to set up a city model of Dundee road traffic sources as part of the NMF was highlighted in the review of road traffic sources in **Section 4.1**. The comprehensive traffic data collected as part of this process will provide a new baseline for review and assessment. Air quality assessments are awaited for two proposed mixed use developments (including residential and other receptors) within the Central Waterfront Area. These will be reviewed in subsequent reports when available. There were no new 'other transport' sources identified in 2017.

Three new or proposed industrial sources were discussed in **Section 4.3**: a proposed Energy from Waste plant to replace the existing council facility on the east of the city; along with, a waste transfer station and; a cement batching plant, within the port area. The proposed Energy from Waste plant has the potential to emit all of the LAQM pollutants except for 1, 3-butadiene. The results of the dispersion modelling were assessed using Environmental Protection UK (EPUK)/Institute of Air Quality Management (IAQM) guidance and the impacts were judged to be insignificant at all relevant receptors and would not lead to a breach of any of the air quality objectives. No existing industrial sources had substantially increased emissions, been altered significantly or had new relevant exposure introduced nearby.

Commercial and domestic sources were reviewed in **Section 4.4**, three new commercial sources were identified: a gas fired CHP plant at a supermarket; the proposed gas fired CHP plant for the Regional Centre for Sport; and, an emergency diesel generating plant at Ninewells Hospital. Air quality assessments for supermarket CHP and the hospital generating plant concluded that there would be no breach of the air quality objectives at relevant receptor locations. An air quality assessment for the energy centre for the proposed Regional Centre for Sport will be reviewed in subsequent reports when available.

Two new potential sources of fugitive PM₁₀ emissions received permits from SEPA in 2017, a waste transfer station and a cement batching plant. Three other SEPA regulated processes in or near the port also surrendered their permits in 2017, a pet food manufacturing plant, a cement batching plant and a textile treatment facility (see **Figure C.32**). A study into potential sources of elevated PM₁₀ concentrations to the Stannergate monitoring station (CM 18) to the east of the port east, discussed in **Section 4.5**, identified road traffic, wind-blown dust from road surfaces, port activities, sea salt and secondary PM from the European continent as potential sources influencing PM₁₀ concentrations at this location. Measured PM₁₀ concentrations at Stannergate reduced in 2017 and are now estimated to be below both the annual mean and daily mean objectives. Monitoring will continue around the port to determine if further action plan measures are necessary.

6.3 Proposed Actions

The 2017 monitoring data did not identify the need to declare an AQMA for any additional pollutants or objectives. None of the new diffusion tubes deployed in 2017 identified a new area of exceedance outside the known hotspots. The following actions are proposed following the review and assessment of monitoring data and new developments:

- Take forward the installation of new analysers capable of monitoring PM₁₀ and PM_{2.5} in Meadowside, Seagate and Whitehall Street;
- Continue monitoring of fugitive PM₁₀ around the port area;
- Review the air quality assessments awaited for the mixed use developments in the Central Waterfront Area and the Energy Centre for the Regional Performance Centre for Sport;
- Report on any new or significantly changed SEPA prescribed process; including the substantial variation to the permit for Baldovie Energy from Waste Plant (PPC/A/1003157).
- Provide update on the progress of the NMF model for Dundee;
- Report on the new diffusion tubes installed in 2018. Five diffusion tubes were installed in areas where new residential developments are planned or have been identified close to busy roads and junctions in Dundee;
 - Commercial Street (84) (DT 226)
 - Dudhope Crescent Road (40) (DT 227)
 - Gray's Lane (3) (DT 225)
 - Riverside Esplanade / S. Crichton St. (DT 228)
 - Thomson Avenue/S.Crichton St. (DT 229)
- Monitor planning applications for new pollution sources, relevant exposure and creation of 'street canyons';
- Liaise with Transport Scotland as part of the NLEF process to discuss whether any additional actions are possible to reduce pollutant concentrations at relevant locations close to the trunk road network in Dundee;
- Consider whether specific action plan measures are possible to target the recently identified exceedance areas on the West Marketgait (part of the inner ring road);
- Implement the action plan measures being taken forward in 2018/19;
- Submit the next Air Quality Progress Report in 2019.

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	Pollutants Monitored	In AQMA? (Y/N)	Monitoring Technique	Distance to Relevant Exposure? (m) ⁽¹⁾	Distance to Kerb of Nearest Road (m) ⁽²⁾	Inlet Height (m)
CM 3	Broughty Ferry Road Rollalong	Urban Industrial	341970	730977	PM ₁₀	Y	TEOM	0	6.88	2.93
					NO ₂		Chemiluminesent ^b		6.63	2.97
CM 13	Broughty Ferry Road Partisol	Urban Industrial	341971	730978	PM ₁₀	Y	Partisol	0	6.11	2.84
CM 4	Lochee Road Romon	Roadside	338861	730773	NO ₂	Y	Chemiluminesent ^b	2.24	1.15	1.77
					PM ₁₀		Beta Attenuation (BAM)			2.06
CM 9	Logie Street Osiris	Kerbside	338176	731298	PM ₁₀	Y	Osiris (nephthalometer)	1.65	0.57	3.31
CM 12	Mains Loan	Urban Background	340972	731893	NO ₂	Y	Chemiluminesent ^c	0	n/a	1.80
					PM ₁₀		TEOM/Fidas ^e			1.98/2.43
					PM _{2.5}		Fidas ^e			2.43
CM 5	Seagate Romon	Roadside	340487	730446	NO ₂	Y	Chemiluminesent ^b	2	1.10	1.70
					PM ₁₀		Beta Attenuation (BAM)			2.06
CM 2	Union Street Rollalong ⁽³⁾	Roadside	340235	730091	NO ₂	Y	Chemiluminesent ^b	3.55	1.64	2.92
					PM ₁₀		Beta Attenuation (BAM) ^a		1.64	3.00
CM 6	Whitehall Street Romon	Roadside	340278	730156	NO ₂	Y	Chemiluminesent ^b	1.86	3.26	1.80
					PM ₁₀		Beta Attenuation (BAM) ^a			1.79

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA? (Y/N)	Monitoring Technique	Distance to Relevant Exposure? (m) ⁽¹⁾	Distance to Kerb of Nearest Road (m) ⁽²⁾	Inlet Height (m)
CM 14	Meadowside Romon	Roadside	340243	730653	NO ₂	Y	Chemiluminescent ^d	0.42	1.60	2.26
					PM ₁₀		Beta Attenuation (BAM)		1.63	2.17
CM 15	Albert Street Osiris	Kerbside	341090	731105	PM ₁₀	Y	Osiris (nephthalometer)	1.54	0.89	3.15
CM 16	Broughty Ferry Road Osiris	Urban Industrial	341970	730977	PM ₁₀	Y	Osiris (nephthalometer)	0	7.15	3.00
CM 17	Myrekirk Osiris	Roadside	335438	731740	PM ₁₀	Y	Osiris (nephthalometer)	0.4	14.00	3.11
CM 18	Stannergate Osiris	Roadside	343322	731073	PM ₁₀	Y	Osiris (nephthalometer)	1.93	1.16	3.11

Notes:

- (1) 0 if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property or representative of a residential area).
- (2) N/A if not applicable. 'Kerb' is taken as being the edge of the carriageway with flowing traffic
 - ^a During 2013 equipment was updated from TEOM to BAM
 - ^b During 2013 equipment was updated from model ML 9841A to model API T200
 - ^c Equipment is model Thermo 42i
 - ^d Equipment is model ML 2041
 - ^e During 2017 equipment was updated from TEOM to Palas Fidas 200
- (3) CM 2 Union Street – was discontinued in January 2016

Figure A.1 Automatic Monitoring Sites 2017

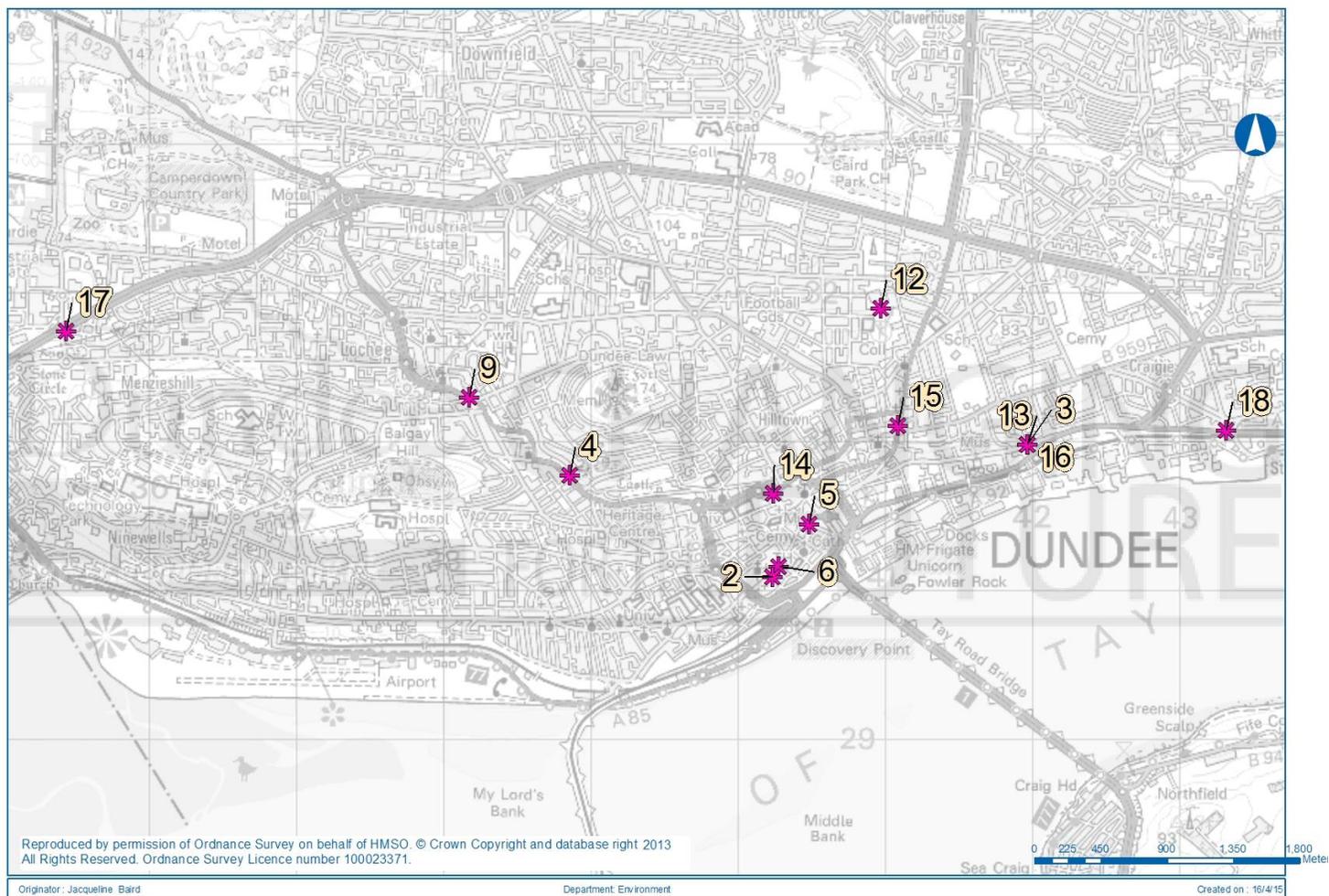


Table A.2 Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type (1)	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ? (Y/N)	Monitoring Technique	Distance to Relevant Exposure ? (m) (2)	Distance to Kerb of Nearest Road (m) (3)	Tube collocated with a Continuous Analyser ?
DT 92	Abertay 2	R	340019	730612	NO ₂	Y	PDT	2.01	1.95	N
DT 179	Albert St (15) (Facade)	R	341092	731121	NO ₂	Y	PDT	0.25	2.04	N
DT 180	Albert St (15) (Rdside)	K	341091	731121	NO ₂	Y	PDT	1.75	0.54	N
DT 167	Albert St (191)	K	341161	731535	NO ₂	Y	PDT	2.70	0.62	N
DT 187	Albert St (81)	K	341113	731265	NO ₂	Y	PDT	2.95	0.47	N
DT 5	Arbroath Rd (13)	K	341111	731070	NO ₂	Y	PDT	2.52	0.73	N
DT 147	Arbroath Rd (38)	K	341202	731097	NO ₂	Y	PDT	2.97	0.50	N
DT 164	Broughty Ferry Rd - Lower	UB	343545	730942	NO ₂	Y	PDT	n/a	3.15	N
DT 223	Broughty Ferry Rd – Lower (Cyclesign)	UB	343530	730937	NO ₂	Y	PDT	n/a	2.84	N
DT 204	Broughty Ferry Rd (129)	R	342244	731066	NO ₂	Y	PDT	3.57	2.27	N
DT 139	Broughty Ferry Rd (141 Downpipe)	R	343317	731072	NO ₂	Y	PDT	0.20	4.32	N
DT 145	Broughty Ferry Rd (Greendykes)	R	342662	731112	NO ₂	Y	PDT	7.72	4.10	N
DT 140	Broughty Ferry Rd (L/P 66)	R	343297	731096	NO ₂	Y	PDT	8.50	2.10	N
DT 7	Balgavies Place	UB	343082	731465	NO ₂	Y	PDT	n/a	n/a	N
DT 9	Birnam Place	UB	337531	730914	NO ₂	Y	PDT	n/a	n/a	N
DT 11	Broughty Ferry Rd (141)	R	343322	731073	NO ₂	Y	PDT	1.98	1.32	N
DT 155	Carolina Court LP6	UB	342353	731058	NO ₂	Y	PDT	n/a	n/a	N
DT 171	Claypotts / Arbroath Rd (502)	R	345347	732080	NO ₂	Y	PDT	5.3	11.2	N
DT 13	Cleington Rd/ Forfar Rd	K	341385	732121	NO ₂	Y	PDT	8.28	0.78	N
DT 188	Commercial St (9)	R	340544	730291	NO ₂	Y	PDT	2.44	2.57	N
DT 84	Commercial St/Dock St (40)	R	340565	730263	NO ₂	Y	PDT	0.17	2.78	N

Site ID	Site Name	Site Type (1)	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ? (Y/N)	Monitoring Technique	Distance to Relevant Exposure ? (m) (2)	Distance to Kerb of Nearest Road (m) (3)	Tube collocated with a Continuous Analyser ?
DT 192	Dock St (12)	R	340389	730079	NO ₂	Y	PDT	4.00	2.49	N
DT 85	Dock St (21)	R	340524	730216	NO ₂	Y	PDT	0.34	5.13	N
DT 156	Dock St (57)	R	340656	730343	NO ₂	Y	PDT	3.25	2.53	N
DT 206	Drumgeith Road (2)	R	343905	733027	NO ₂	Y	PDT	2.31	4.26	N
DT 20	Dura St (100)	K	341150	731576	NO ₂	Y	PDT	1.65	0.57	N
DT 214	East Dock Street (26)	R	340725	730417	NO ₂	Y	PDT	0.2	3.7	N
DT 22	Eastport Roundabout	R	340651	730623	NO ₂	Y	PDT	1.56	1.00	N
DT 83	Forfar Rd (104)	K	341437	732360	NO ₂	Y	PDT	7.68	0.67	N
DT 221	Harcourt Street (CCTV)	R	339795	731687	NO ₂	Y	PDT	1.51	4.7	N
DT 216	King Street (3)	K	340493	730659	NO ₂	Y	PDT	2.89	0.77	N
DT 26	Kingsway East Roundabout	R	343107	731740	NO ₂	Y	PDT	14.30	2.90	N
DT 27	Kingsway/ Mains Loan	R	341124	732468	NO ₂	Y	PDT	15.40	6.20	N
DT 177	Kingsway / Strathmartine Rd (279)	R	339179	732896	NO ₂	Y	PDT	3.63	3.14	N
DT 30	Lochee Rd (138)	K	338936	730680	NO ₂	Y	PDT	2.06	0.44	N
DT 31	Lochee Rd (140) Traffic Lts	R	338927	730685	NO ₂	Y	PDT	0.25	2.22	N
DT 32	Lochee Rd (184)	K	338767	730856	NO ₂	Y	PDT	3.19	0.73	N
DT 158	Lochee Rd (Romon) Average	R	338861	730773	NO ₂	Y	PDT	2.03	1.34	Y
DT 36	Lochee Rd/Polepark Rd	K	339016	730586	NO ₂	Y	PDT	9.21	0.95	N
DT 37	Logie St (114)	R	338184	731293	NO ₂	Y	PDT	0.53	1.73	N
DT 38	Logie St (98)	K	338252	731258	NO ₂	Y	PDT	n/a	0.84	N
DT 39	Loons Rd (1)	R	338211	731293	NO ₂	Y	PDT	0.50	1.90	N
DT 182	Meadowside (28)	K	340298	730550	NO ₂	Y	PDT	2.95	0.80	N
DT 149	Meadowside (Romon) Average	R	340243	730653	NO ₂	Y	PDT	0.33	1.85	Y

Site ID	Site Name	Site Type (1)	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ? (Y/N)	Monitoring Technique	Distance to Relevant Exposure ? (m) (2)	Distance to Kerb of Nearest Road (m) (3)	Tube collocated with a Continuous Analyser ?
DT 222	Muirton Rd (2)	R	338165	731296	NO ₂	Y	PDT	0.14	1.4	N
DT 42	Muirton Rd (6)	R	338156	731294	NO ₂	Y	PDT	0.30	1.11	N
DT 185	Murraygate (46)	UB	340409	730484	NO ₂	Y	PDT	n/a	n/a	N
DT 189	Myrekirk Rd (29)	R	335420	731726	NO ₂	Y	PDT	5.17	2.00	N
DT 45	Nethergate (6)	R	340274	730171	NO ₂	Y	PDT	2.51	1.25	N
DT 47	Nethergate (40)	R	340230	730124	NO ₂	Y	PDT	2.72	1.26	N
DT 44	Nethergate (88)	K	340163	730061	NO ₂	Y	PDT	5.00	0.86	N
DT 213	Nethergate (64)	R	340196	730089	NO ₂	Y	PDT	2.4	4.15	N
DT 48	Nethergate(132) / Marketgait	R	340074	729984	NO ₂	Y	PDT	3.60	1.33	N
DT 46	Nethergate (95)	K	340033	729957	NO ₂	Y	PDT	1.84	0.86	N
DT 49	Rankine St (2)	R	338768	730900	NO ₂	Y	PDT	0.40	1.76	N
DT 207	Pitkerro Road (42)	R	341924	732235	NO ₂	Y	PDT	5.99	2.94	N
DT 54	Seagate (9)	R	340467	730388	NO ₂	Y	PDT	0.90	1.70	N
DT 190	Seagate (97)	R	340516	730499	NO ₂	Y	PDT	0	2.26	N
DT 217	Seagate (99)	R	340535	730522	NO ₂	Y	PDT	0	2.35	N
DT 50	Seagate (101)	R	340545	730532	NO ₂	Y	PDT	0.19	1.94	N
DT 224	Seagate (112)	R	340528	730537	NO ₂	Y	PDT	0	2.64	N
DT 159	Seagate(Romon) Average	R	340487	730446	NO ₂	Y	PDT	1.81	1.29	Y
DT 55	Soapwork Lane	R	340099	730650	NO ₂	Y	PDT	0	3.51	N
DT 218	South Marketgait (Lampost 18)	R	340291	729979	NO ₂	Y	PDT	n/a	2.58	N
DT 151	South Rd (1 Denbank)	R	335188	731528	NO ₂	Y	PDT	0.28	1.79	N
DT 162	St Andrews St / Seagate (116)	R	340532	730548	NO ₂	Y	PDT	0.18	2.53	N
DT 56	St Andrews St (26)	K	340516	730584	NO ₂	Y	PDT	1.77	0.71	N

Site ID	Site Name	Site Type (1)	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ? (Y/N)	Monitoring Technique	Distance to Relevant Exposure ? (m) (2)	Distance to Kerb of Nearest Road (m) (3)	Tube collocated with a Continuous Analyser ?
DT 220	Strathmartine Road (15)	R	339955	731496	NO ₂	Y	PDT	0.24	4.9	N
DT 59	Strathmore Avenue (353)	K	339609	731871	NO ₂	Y	PDT	1.45	0.67	N
DT 219	Thomson Avenue (Street Sign)	R	340542	730194	NO ₂	Y	PDT	1.8	2.2	N
DT 60	Trades Lane (31)	K	340575	730500	NO ₂	Y	PDT	1.82	0.44	N
DT 93	Victoria Rd (10b)	K	340230	730673	NO ₂	Y	PDT	2.70	0.30	N
DT 184	Victoria Rd (104) / William St	R	340697	730950	NO ₂	Y	PDT	1.50	1.36	N
DT 191	Victoria Rd (4) - India Buildings	R	340213	730633	NO ₂	Y	PDT	0	2.77	N
DT 68	Victoria Rd (60)	R	340375	730779	NO ₂	Y	PDT	0.56	2.18	N
DT 70	Victoria Rd/Hilltown	R	340274	730714	NO ₂	Y	PDT	2.01	1.15	N
DT 71	Victoria St/Albert St	K	341071	731072	NO ₂	Y	PDT	1.70	0.75	N
DT 205	West Marketgait/Old Mill (23)	R	339773	730436	NO ₂	Y	PDT	0.05	2.80	N
DT 183	West Marketgait / Guthrie St	R	339805	730338	NO ₂	Y	PDT	2.02	1.16	N
DT 72	Westport (2)	R	339842	730122	NO ₂	Y	PDT	2.50	0.46	N
DT 73	Whitehall Cr (4)	K	340376	730109	NO ₂	Y	PDT	3.00	0.88	N
DT 161	Whitehall Cr /Union St (50)	K	340305	730051	NO ₂	Y	PDT	4.78	0.64	N
DT 76	Whitehall St (1)	K	340265	730153	NO ₂	Y	PDT	5.57	0.88	N
DT 81	Whitehall St (12)	R	340293	730142	NO ₂	Y	PDT	2.67	3.00	N
DT 77	Whitehall St (15)	K	340322	730098	NO ₂	Y	PDT	4.55	0.75	N
DT 74	Whitehall St (40)	K	340330	730106	NO ₂	Y	PDT	3.57	0.78	N
DT 75	Whitehall St (5)	R	340289	730128	NO ₂	Y	PDT	3.17	2.51	N
DT 160	Whitehall St (Romon) Average	R	340278	730156	NO ₂	Y	PDT	1.66	3.49	Y
DT 82	Woodside Ave	UB	340776	732307	NO ₂	Y	PDT	n/a	0.55	N

Notes:

- (1) R=Roadside, K=Kerbside, UB=Urban Background, 'Kerb' is taken as being the edge of the carriageway with flowing traffic
- (2) 0 if the monitoring site is at a location of exposure (e.g. installed on, adjacent to or equivalent to the façade of a residential property, or representative of a residential area).
- (3) n/a if not applicable (e.g.at background).
- (4) New sites are highlighted in green
- (5) Updated grid reference shown in blue – diffusion tube has not moved – was previously digitised in the wrong location

Figure A.2a NO₂ Diffusion Tube Locations (City Centre)

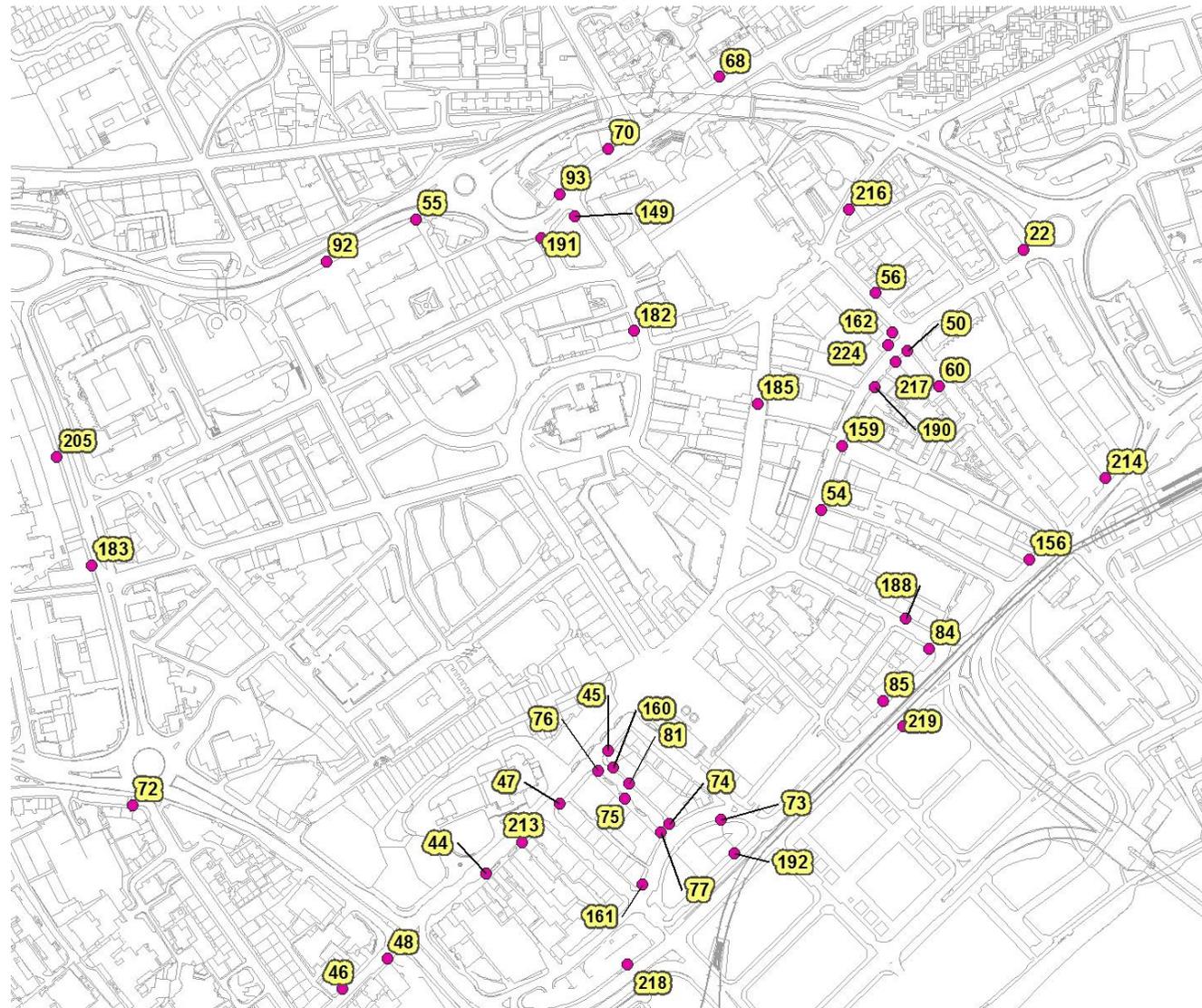


Figure A.2b NO₂ Diffusion Tube Locations (East)

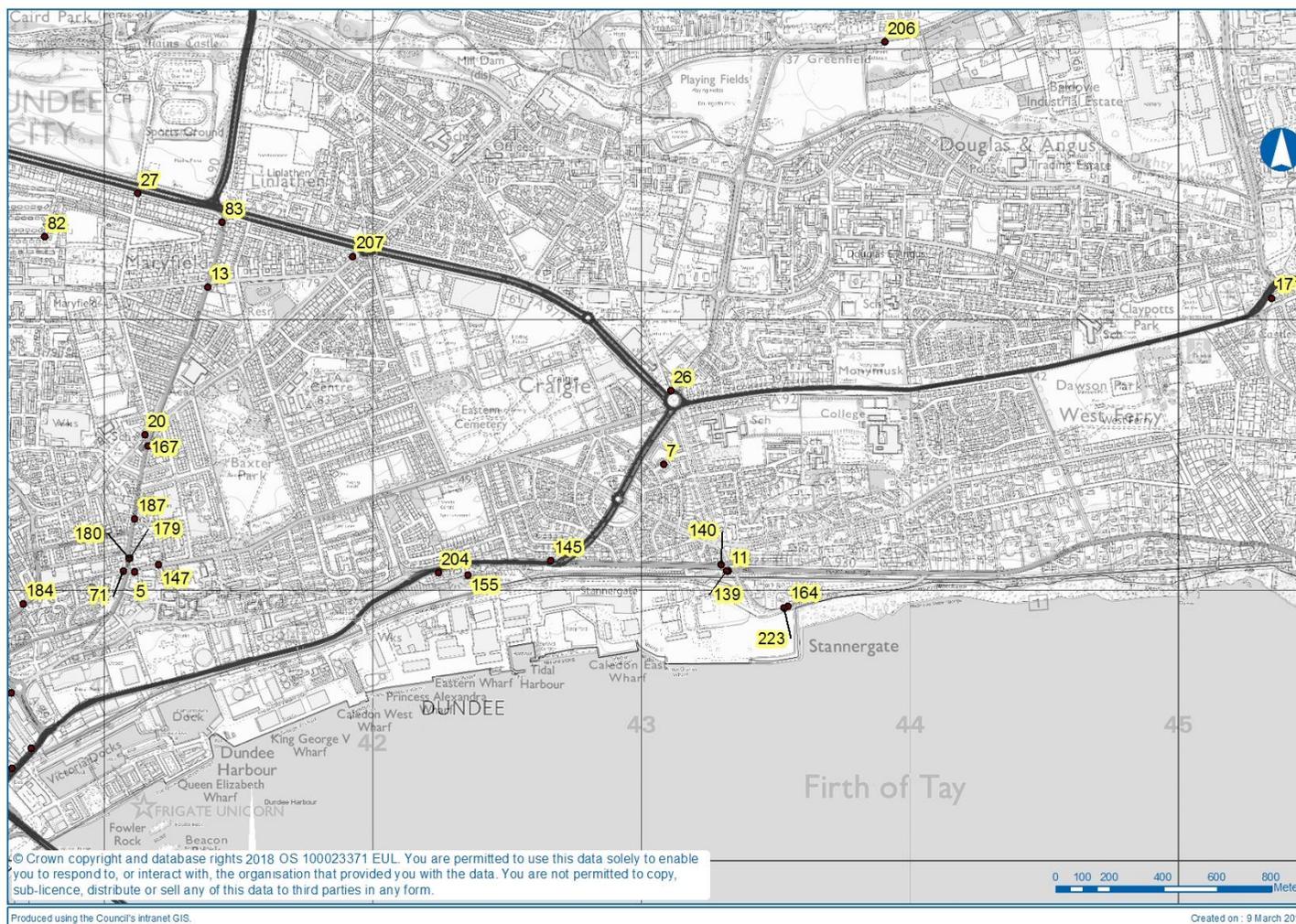


Figure A.2c NO₂ Diffusion Tube Locations (West)

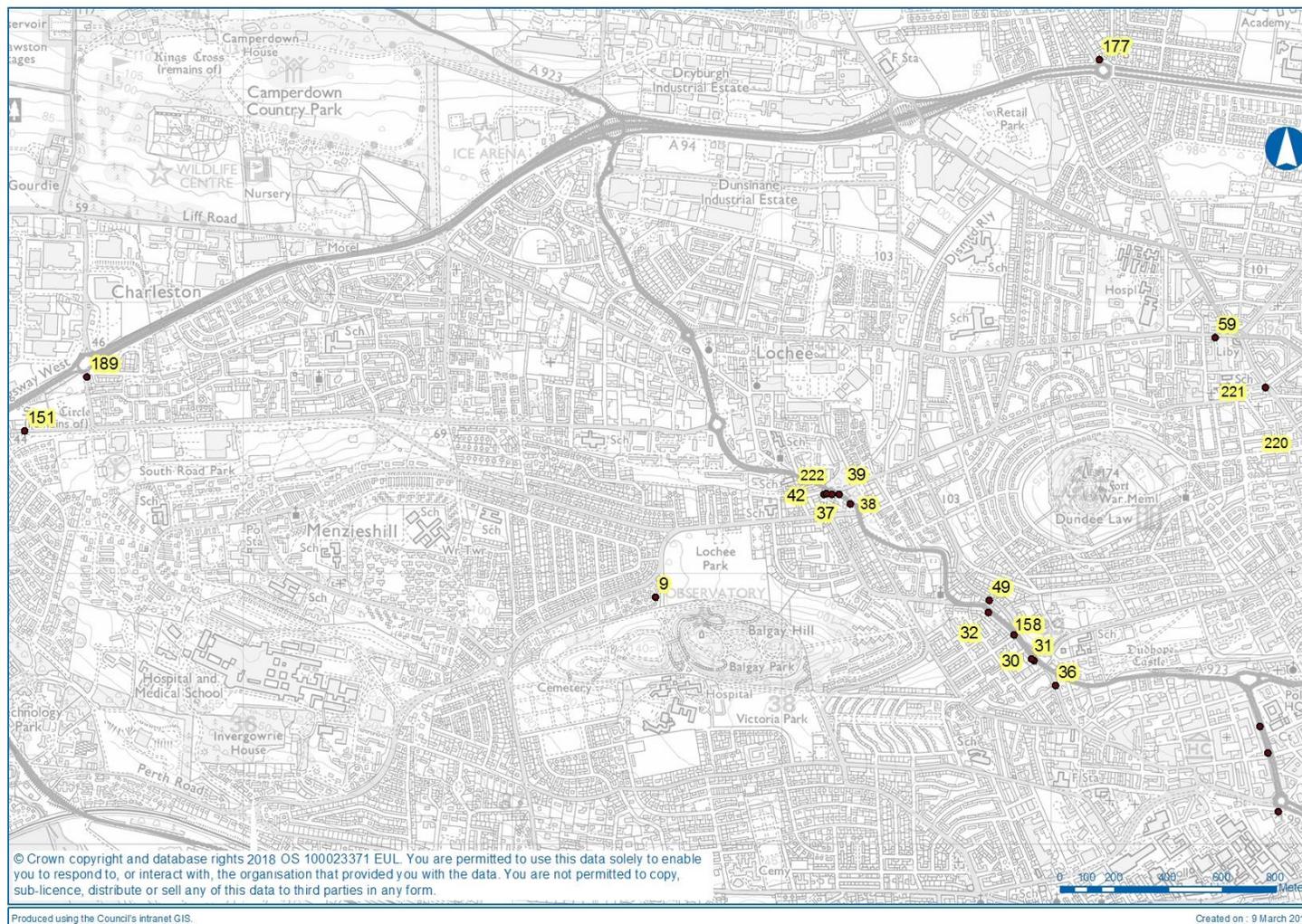


Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
DT 92	Abertay 2	R	PDT	91.7	40.2	39.7	36.3	38.5	35.9
DT 179	Albert St (15) (Facade)	R	PDT	100.0	36.5	36.5	33.4	33.7	31.5
DT 180	Albert St (15) (Rdside)	K	PDT	100.0	38.0	38.0	35.5	35.5	33.0
DT 167	Albert St (191)	K	PDT	91.7	36.5	35.0	31.2	33.5	30.1
DT 187	Albert St (81)	K	PDT	100.0	31.8	31.1	30.3	31.3	27.9
DT 5	Arbroath Rd (13)	K	PDT	100.0	38.3	35.7	34.4	36.5	33.7
DT 168	Arbroath Rd (27)	R	PDT		34.1	32.4	29.5		
DT 147	Arbroath Rd (38)	K	PDT	100.0	37.6	34.3	33.7	35.0	34.3
DT 212	Arbroath Rd (89)	R	PDT					29.4	
DT 7	Balgavies Place	UB	PDT	100.0	17.0	15.5	15.0	16.3	16.7
DT 9	Birnam Place	UB	PDT	100.0	10.1	9.6	8.7	9.5	9.9
DT 140	Broughty Ferry Rd (L/P 66)	R	PDT	100.0	31.8	30.6	32.0	33.1	33.5
DT 164	Broughty Ferry Rd - Lower	UB	PDT	66.7	15.6	14.9	14.9	14.9	18.6
DT 204	Broughty Ferry Rd (129)	R	PDT	91.7			38.3	36.0	38.2
DT 139	Broughty Ferry Rd (141 Downpipe)	R	PDT	100.0	32.4	31.1	32.3	33.3	34.0
DT 11	Broughty Ferry Rd (141)	R	PDT	100.0	39.9	36.5	35.4	40.4	40.0
DT 142	Broughty Ferry Rd (141) (St.Sign)	R	PDT		30.4	29.5	27.6		
DT 145	Broughty Ferry Rd (Greendykes)	R	PDT	100.0	36.4	34.3	31.8	35.0	34.1
DT 166	Broughty Ferry Rd LP 59(2)	R	PDT		25.6	24.0	21.1		
CM 3	Broughty Ferry Road	UI	Automatic	99.3				12.7	19.7
DT 223	Broughty Ferry Road Lower (Cyclesign)	UB	PDT	33.3					24.4
DT 186	Carolina Court 30 mph sign	R	PDT		28.6	25.0			
DT 155	Carolina Court LP6	UB	PDT	100.0	21.6	19.4	18.6	19.1	20.4

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
DT 171	Claypotts / Arbroath Rd (502)	R	PDT	100.0	28.6			26.6	29.1
DT 210	Cleghorn Street (57)	R	PDT					27.1	
DT 174	Clelington Rd (172)	K	PDT		31.4				
DT 13	Clelington Rd/ Forfar Rd	K	PDT	100.0	36.4	33.6	36.5	31.8	30.6
DT 188	Commercial St (9)	R	PDT	100.0	43.1	39.4	35.6	37.4	34.2
DT 84	Commercial St/Dock St (40)	R	PDT	100.0	40.1	35.9	36.4	34.8	34.3
DT 175	Coupar Angus Rd (38)	R	PDT		32.9	29.8			
DT 203	Coupar Angus Rd/Sinclair St	R	PDT				23.1		
DT 17	Dens Rd Crossing	R	PDT		32.1				
DT 192	Dock St (12)	R	PDT	100.0		25.8	25.9	26.1	25.8
DT 85	Dock St (21)	R	PDT	100.0	42.6	38.2	37.4	37.6	36.7
DT 156	Dock St (57)	R	PDT	100.0	53.9	51.7	51.4	49.3	49.4
DT 206	Drumgeith Road (2)	R	PDT	100.0				18.4	19.6
DT 20	Dura St (100)	K	PDT	100.0	36.9	34.4	34.9	37.5	33.5
DT 169	Dura St (30)	R	PDT		29.6				
DT 214	East Dock Street (26)	R	PDT	91.7				34.7	31.8
DT 22	Eastport Roundabout	R	PDT	100.0	35.2	32.9	30.7	31.7	30.0
DT 83	Forfar Rd (104)	K	PDT	100.0	45.9	44.8	45.1	46.3	40.6
DT 211	Forfar Rd (83a)	R	PDT					31.3	
DT 221	Harcourt Street (CCTV)	R	PDT	83.3					17.8
DT 209	Hawkhill (251)	R	PDT					21.4	
DT 178	Hawkhill / Horsewater Wynd	K	PDT		29.6				
DT 202	High St Lochee (22-24)	R	PDT				31.6	30.2	
DT 193	Horsewater Wynd	K	PDT			21.9			
DT 216	King Street (3)	K	PDT	100.0				30.9	28.5

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
DT 177	Kingsway / Strathmartine Rd (279)	R	PDT	100.0	38.3	36.8	36.2	34.8	32.0
DT 26	Kingsway East Roundabout	R	PDT	91.7	39.5	38.8	36.1	37.2	37.9
DT 27	Kingsway/ Mains Loan	R	PDT	100.0	36.4	32.0	29.3	31.5	27.6
DT 30	Lochee Rd (138)	K	PDT	100.0	51.2	49.6	49.6	48.9	47.3
DT 31	Lochee Rd (140) Traffic Lts	R	PDT	100.0	52.8	51.1	50.3	53.0	48.1
DT 32	Lochee Rd (184)	K	PDT	100.0	36.1	34.4	36.2	35.1	34.5
DT 158	Lochee Rd (Romon) Average	K	PDT	100.0	44.4	43.1	44.8	43.8	42.6
CM 4	Lochee Rd Romon	R	Automatic	99.7	51.6	45.8	47.8	44.6	43.6
DT 36	Lochee Rd/Polepark Rd	K	PDT	100.0	29.6	28.9	28.1	27.6	26.7
DT 37	Logie St (114)	R	PDT	100.0	54.8	51.7	51.0	53.8	47.9
DT 38	Logie St (98)	K	PDT	91.7	37.5	33.1	32.3	34.3	32.9
DT 176	Logie St / Grays Lane	R	PDT		24.1				
DT 39	Loons Rd (1)	R	PDT	100.0	40.3	39.1	35.6	38.6	35.6
CM 12	Mains Loan	UB	Automatic	98.6	11.5	12.4	10.3	11.4	12.1
DT 182	Meadowside (28)	K	PDT	91.7	38.4	34.7	37.1	35.9	34.8
DT 149	Meadowside (Romon) Average	R	PDT	100.0	49.9	43.7	41.2	41.0	39.3
CM 14	Meadowside Romon	R	Automatic	93.7	49.1	39.6	38.2	35.9	34.8
DT 170	Monifieth Rd (4)	R	PDT		25.2				
DT 42	Muirton Rd (6)	R	PDT	100.0	30.0	29.2	25.0	26.6	23.4
DT 222	Muirton Road (2)	R	PDT	100.0					24.3
DT 185	Murraygate (46)	UB	PDT	100.0	25.9	23.9	21.4	21.2	20.0
DT 189	Myrekirk Rd (29)	R	PDT	100.0	34.8	31.7	32.2	33.7	30.7
DT 181	Myrekirk Terrace (8)	R	PDT		30.4	27.6			
DT 47	Nethergate (40)	R	PDT	100.0	45.0	42.8	37.4	35.4	33.8
DT 45	Nethergate (6)	R	PDT	91.7	41.7	40.4	38.2	36.8	35.7

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
DT 213	Nethergate (64)	R	PDT	100.0				38.4	34.6
DT 44	Nethergate (88)	K	PDT	100.0	48.4	50.9	42.7	41.9	39.1
DT 46	Nethergate (95)	K	PDT	100.0	34.3	32.2	31.0	30.5	29.0
DT 48	Nethergate(132) / Marketgait	R	PDT	91.7	32.5	29.3	28.6	29.9	27.8
DT 173	Old Glamis Rd(9) / Balgray St	K	PDT		24.3				
DT 91	Perth Rd (320)	K	PDT		37.1	35.1	34.0		
DT 172	Pitkerro Rd (3)	R	PDT		29.6				
DT 207	Pitkerro Road (42)	R	PDT	100.0				32.6	32.5
DT 49	Rankine St (2)	R	PDT	91.7	40.1	38.1	40.2	36.5	39.3
CM 5	Seagate	R	Automatic	98.7	55.0	54.5	49.9	47.0	44.3
DT 50	Seagate (101)	R	PDT	100.0	41.9	40.8	39.6	38.7	35.5
DT 224	Seagate (112)	R	PDT	25.0					34.1
DT 54	Seagate (9)	R	PDT	100.0	38.1	36.0	32.8	33.2	30.3
DT 150	Seagate (95-97)	R	PDT		40.7				
DT 190	Seagate (97)	R	PDT	100.0	59.4	46.5	44.6	41.8	38.7
DT 217	Seagate (99)	R	PDT	91.7					42.5
DT 159	Seagate(Romon) Average	K	PDT	100.0	48.0	45.5	42.3	41.3	38.4
DT 55	Soapwork Lane	R	PDT	100.0	34.7	31.9	32.0	35.4	33.9
DT 218	South Marketgait (Lampost 18)	R	PDT	100.0					30.0
DT 151	South Rd (1 Denbank)	R	PDT	100.0	34.7	33.2	32.5	33.4	33.6
DT 56	St Andrews St (26)	K	PDT	50.0	36.4	35.3	28.9	30.9	29.0
DT 162	St Andrews St PB (façade)	R	PDT	100.0	37.3	36.3	34.9	35.1	32.8
DT 208	St Ann Street (2)	R	PDT					18.3	
DT 220	Strathmartine Road (15)	R	PDT	100.0					17.7
DT 59	Strathmore Avenue (353)	K	PDT	83.3	38.0	38.8	35.9	39.4	33.2

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
DT 219	Thomson Avenue (Street Sign)	R	PDT	100.0					31.1
DT 60	Trades Lane (31)	K	PDT	100.0	31.4	27.3	27.7	27.4	26.3
DT 61	Union St (Rollalong) Average	R	PDT		34.8	32.0	32.4		
CM 2	Union St Rollalong	R	Automatic		30.5	28.4	28.0		
DT 184	Victoria Rd (104) / William St	R	PDT	100.0	33.3	30.7	27.3	29.7	27.4
DT 93	Victoria Rd (10b)	K	PDT	100.0	34.0	30.6	29.3	31.7	29.8
DT 191	Victoria Rd (4) - India Buildings	R	PDT	100.0	32.7	31.8	29.7	30.2	28.6
DT 68	Victoria Rd (60)	R	PDT	100.0	39.8	37.5	34.9	34.7	33.0
DT 70	Victoria Rd/Hilltown	R	PDT	100.0	56.1	51.5	54.1	50.8	51.5
DT 71	Victoria St/Albert St	K	PDT	100.0	32.2	30.0	27.6	30.9	28.0
DT 90	Ward Rd	R	PDT		30.3				
DT 183	West Marketgait / Guthrie St	R	PDT	100.0	50.7	46.1	46.8	46.1	44.1
DT 205	West Marketgait/Old Mill (23)	R	PDT	100.0			54.0	51.6	45.1
DT 72	Westport (2)	R	PDT	91.7	39.0	36.3	33.0	31.2	33.1
DT 73	Whitehall Cr (4)	K	PDT	91.7	39.4	36.3	35.6	33.7	33.2
DT 161	Whitehall Cr /Union St (50)	K	PDT	100.0	30.4	30.5	25.0	24.9	24.4
DT 76	Whitehall St (1)	K	PDT	100.0	49.9	45.9	44.1	43.0	40.9
DT 81	Whitehall St (12)	R	PDT	100.0	41.8	40.8	34.5	35.0	34.5
DT 77	Whitehall St (15)	K	PDT	100.0	40.7	36.1	32.5	32.3	31.8
DT 74	Whitehall St (40)	K	PDT	100.0	39.7	39.5	35.6	35.2	33.7
DT 75	Whitehall St (5)	R	PDT	100.0	46.7	44.1	44.2	40.1	39.5
DT 160	Whitehall St (Romon) Average	R	PDT	100.0	43.1	42.2	36.5	36.6	35.0
CM 6	Whitehall St Romon	R	Automatic	96.7	41.2	42.5	36.3	37.2	35.3
DT 82	Woodside Ave	UB	PDT	100.0	15.4	14.9	13.2	13.7	13.3

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**. Borderline values are shown in **orange**.
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedence of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

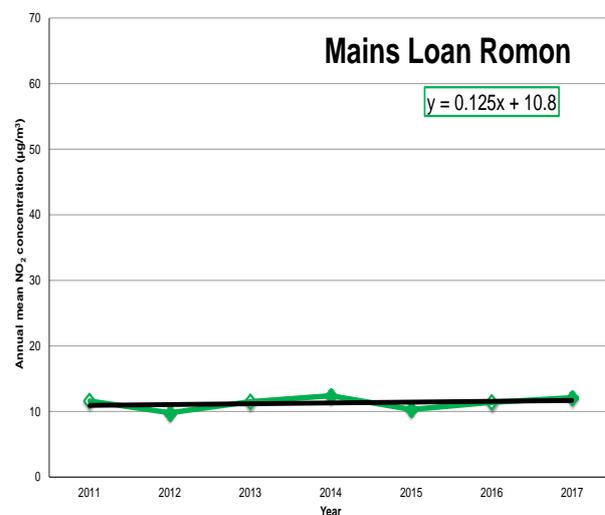
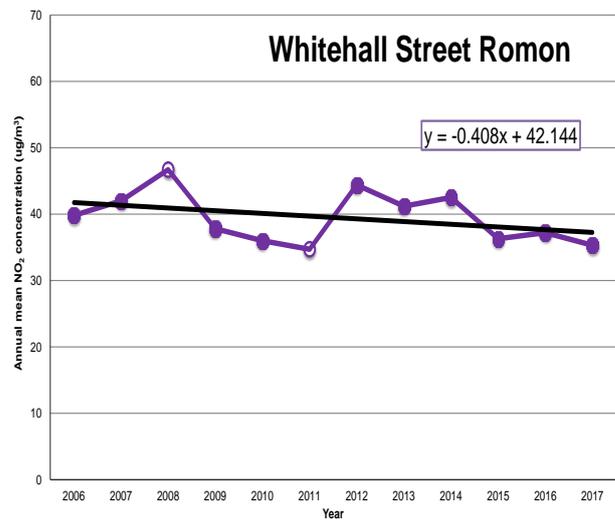
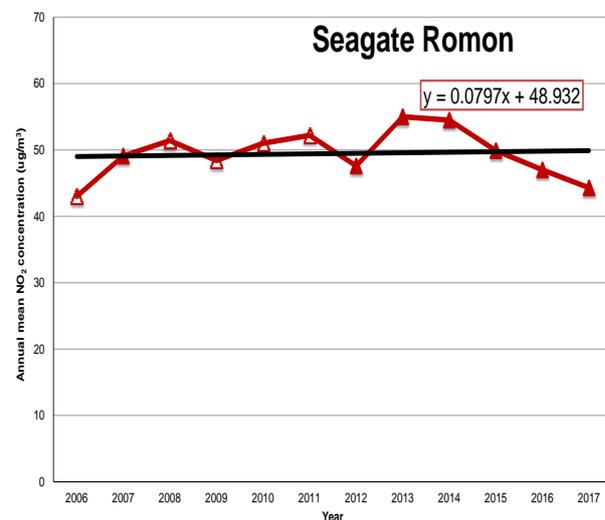
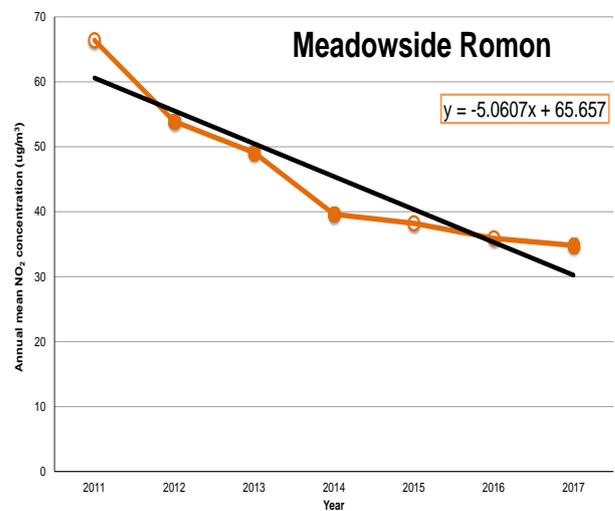
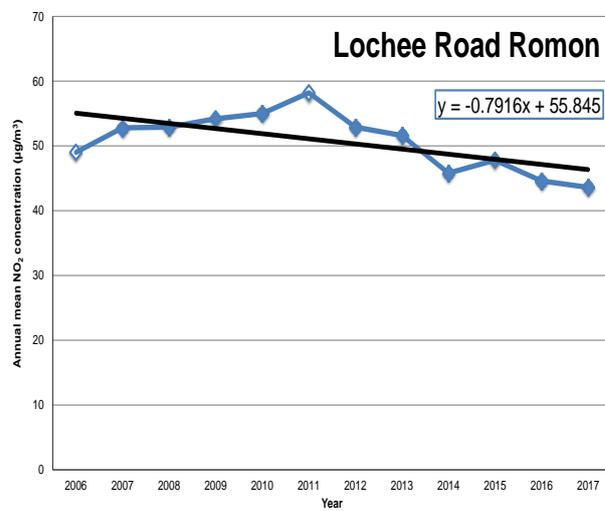
(1) R=Roadside, K=Kerbside, UB=Urban Background

(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.TG(16) if valid data capture for the full calendar year is less than 75% (highlighted by shading).
See **Appendix C** for details.

Figure A.3a Trends in NO₂ at Automatic monitors



Notes:

- 1) Graphs show the trends in the NO₂ annual mean concentrations measured at the continuous monitors (other locations nearby may have higher concentrations.)
- 2) A minimum of five years data is required to show a valid trend. More years (data points) give greater certainty in the trend.
- 3) For strict comparison with the annual mean objective of 40µg/m³, data capture should be greater than 85%. Annual means where data capture were below are shown by a 'hollow' marker.
- 4) Means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See **Appendix C** for details.

Figure A.3b Trend Analysis at Long-term NO₂ Monitoring Locations

Site Id.	Location	Site Type	No. of years for trend	Trend
CM 14	Meadowside	R	7	-5.06
DT 190	Seagate (97)	R	5	-4.59
DT 149	Meadowside (Romon) Average	R	7	-3.27
DT 188	Commercial St (9)	R	5	-1.98
DT 177	Kingsway / Strathmartine Rd (279)	R	5	-1.46
DT 185	Murraygate (46)	UB	5	-1.44
DT 167	Albert St (191)	K	5	-1.42
DT 161	Whitehall Cr /Union St (50)	K	6	-1.39
DT 183	West Marketgait / Guthrie St	R	5	-1.32
DT 179	Albert St (15) (Facade)	R	5	-1.30
DT 184	Victoria Rd (104) / William St	R	5	-1.28
DT 180	Albert St (15) (Rdside)	K	5	-1.26
DT 93	Victoria Rd (10b)	K	9	-1.12
DT 92	Abertay 2	R	9	-1.11
DT 162	St Andrews St PB (façade)	R	6	-1.08
DT 191	Victoria Rd (4) - India Buildings	R	5	-0.99
DT 46	Nethergate (95)	K	12	-0.80
CM 4	Lochee Road	R	12	-0.80
DT 187	Albert St (81)	K	5	-0.76
DT 159	Seagate(Romon) Average	K	12	-0.65
DT 54	Seagate (9)	R	12	-0.65
DT 60	Trades Lane (31)	K	12	-0.63
DT 189	Myrekirk Rd (29)	R	5	-0.62
DT 68	Victoria Rd (60)	R	12	-0.61
DT 75	Whitehall St (5)	R	12	-0.61
DT 182	Meadowside (28)	K	5	-0.60
DT 71	Victoria St/Albert St	K	12	-0.57
DT 56	St Andrews St (26)	K	12	-0.57
DT 139	Broughty Ferry Rd (141 Downpipe)	R	7	-0.56
DT 72	Westport (2)	R	12	-0.54
DT 48	Nethergate(132) / Marketgait	R	12	-0.54
DT 155	Carolina Court LP6	UB	6	-0.54
DT 5	Arbroath Rd (13)	K	12	-0.52
DT 147	Arbroath Rd (38)	K	7	-0.50
DT 50	Seagate (101)	R	12	-0.48
DT 13	Clelington Rd/ Forfar Rd	K	12	-0.47
DT 151	South Rd (1 Denbank)	R	7	-0.43
DT 82	Woodside Ave	UB	12	-0.43
DT 20	Dura St (100)	K	12	-0.43

Site Id.	Location	Site Type	No. of years for trend	Trend
DT 27	Kingsway/ Mains Loan	R	12	-0.43
DT 30	Lochee Rd (138)	K	12	-0.42
DT 84	Commercial St/Dock St (40)	R	12	-0.42
CM 6	Whitehall Street	R	12	-0.41
DT 158	Lochee Rd (Romon) Average	K	12	-0.40
DT 39	Loons Rd (1)	R	12	-0.39
DT 36	Lochee Rd/Polepark Rd	K	12	-0.33
DT 77	Whitehall St (15)	K	12	-0.32
DT 70	Victoria Rd/Hilltown	R	12	-0.32
DT 22	Eastport Roundabout	R	12	-0.30
DT 11	Broughty Ferry Rd (141)	R	12	-0.29
DT 42	Muirton Rd (6)	R	12	-0.29
DT 81	Whitehall St (12)	R	12	-0.25
DT 83	Forfar Rd (104)	K	12	-0.25
DT 47	Nethergate (40)	R	12	-0.24
DT 140	Broughty Ferry Rd (L/P 66)	R	7	-0.24
DT 59	Strathmore Avenue (353)	K	12	-0.22
DT 31	Lochee Rd (140) Traffic Lts	R	12	-0.21
DT 26	Kingsway East Roundabout	R	12	-0.21
DT 32	Lochee Rd (184)	K	12	-0.20
DT 37	Logie St (114)	R	12	-0.20
DT 44	Nethergate (88)	K	12	-0.16
DT 7	Balgavies Place	UB	12	-0.15
DT 9	Birnam Place	UB	12	-0.14
DT 45	Nethergate (6)	R	12	-0.12
DT 145	Broughty Ferry Rd (Greendykes)	R	7	-0.09
DT 38	Logie St (98)	K	12	-0.06
DT 49	Rankine St (2)	R	12	-0.04
DT 55	Soapwork Lane	R	12	0.00
DT 160	Whitehall St (Romon) Average	R	12	0.01
DT 76	Whitehall St (1)	K	12	0.01
DT 85	Dock St (21)	R	12	0.07
CM 5	Seagate	R	12	0.08
DT 74	Whitehall St (40)	K	12	0.10
CM 12	Mains Loan	UB	7	0.13
DT 164	Broughty Ferry Rd - Lower	UB	6	0.21
DT 156	Dock St (57)	R	7	0.28
DT 73	Whitehall Cr (4)	K	12	0.71

Note: (1) Locations where the 2017 NO₂ annual mean is exceeded at the monitor are shown in bold, borderline locations are orange

(2) Blue is an improving trend, red is a worsening trend

(3) Methodology explained after Figure A.5c

Table A.4 – 1-Hour Mean NO₂ Monitoring Results

Site ID.	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2013	2014	2015	2016	2017
CM3	Broughty Ferry Rd	UI	Automatic	99.3	n/a	n/a	n/a	0	0
CM4	Lochee Rd Romon	R	Automatic	99.7	99	0	0	4	6
CM12	Mains Loan	UB	Automatic	98.6	0 (84.8)	0	0	0 (77.2)	1
CM14	Meadowside Romon	R	Automatic	93.7	0	0	0 (109.5)	0 (102.4)	0
CM5	Seagate	R	Automatic	98.7	10	0	0	0	0
CM2	Union St Rollalong	R	Automatic	n/a	0	0	0	n/a	n/a
CM6	Whitehall St Romon	R	Automatic	96.7	0	0	0	0	0

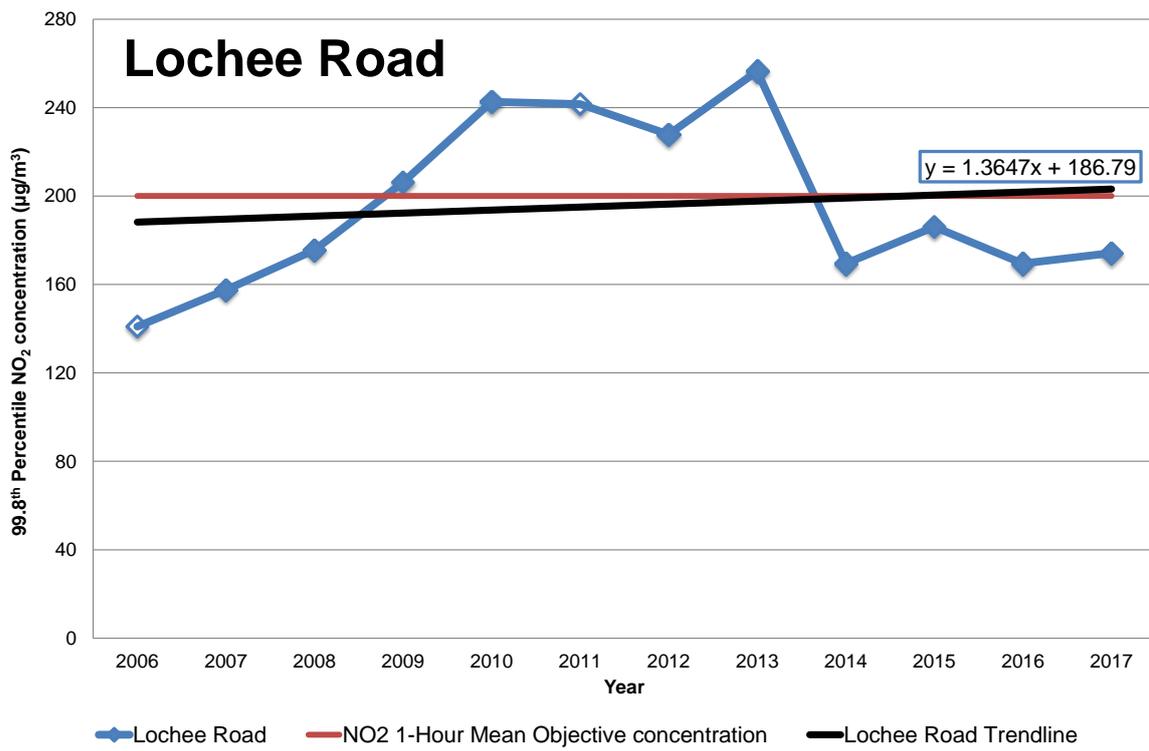
Notes: Exceedances of the NO₂ 1-hour mean objective (200µg/m³ not to be exceeded more than 18 times/year) are shown in **bold**.

(1) R=Roadside, K=Kerbside, UB=Urban Background, UI=Urban Industrial

(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 85%, the 99.8th percentile of 1-hour means is provided in brackets (and shaded grey).

Figure A.4 Trend in 99.8th percentile of hourly mean NO₂ concentrations at Lochee Road



Note: Hollow data points indicate those years when the valid data capture was less than 85%

Table A.5 – Annual Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2013	2014	2015	2016	2017
CM 2	Union St (TEOM/BAM)	R	Automatic	n/a	15.1	16.5	16.8	n/a	n/a
CM 6	Whitehall Street (BAM)	R	Automatic	96.1	n/a	n/a	n/a	15.1	14.7
CM 3	Broughty Ferry Rd (TEOM)	UI	Automatic	94.4	15.9	14.7	12.6	12.1	11.4
CM 13	Broughty Ferry Rd (Partisol)	UI	Automatic	98.4	15.1	14.5	12.6	11.5	11.1
CM 16	Broughty Ferry Rd (Osiris)	UI	Automatic	95.7	15.0	14.6	12.1	11.5	11.1
CM 12	Mains Loan (TEOM)	UB	Automatic	99.9	11.9	12.9	11.9	10.0	9.5
CM 5	Seagate (BAM)	R	Automatic	91.0	16.0	17.7	14.5	13.7	15.8
CM 14	Meadowside (BAM)	R	Automatic	96.2	18.6	16.6	16.1	16.4	14.7
CM 4	Lochee Rd (BAM)	R	Automatic	91.9	17.9	18.6	19.8	18.9	17.5
CM 9	Logie St (Osiris)	K	Automatic	85.9	16.5	16.1	15.5	13.8	14.5
CM 17	Myrekirk Tce (Osiris)	R	Automatic	94.9	15.5	18.3	18.4	15.6	12.0
CM 15	Albert St (Osiris)	K	Automatic	95.1	18.3	21.4	19.0	15.4	14.3
CM 18	Stannergate (Osiris)	R	Automatic	95.9	24.6	26.7	26.9	20.8	14.0

- Notes:**
- (1) Exceedances of the PM₁₀ annual mean objective of 18µg/m³ are shown in **bold** (borderline values are **orange**).
 - (2) R=Roadside, K=Kerbside, UB=Urban Background, UI=Urban Industrial
 - (3) 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%).
 - (4) All means have been “annualised” as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75% (highlighted by shading). See **Appendix C** for details.

Figure A.5a Trends in Annual Mean PM₁₀ concentrations at Automatic monitors

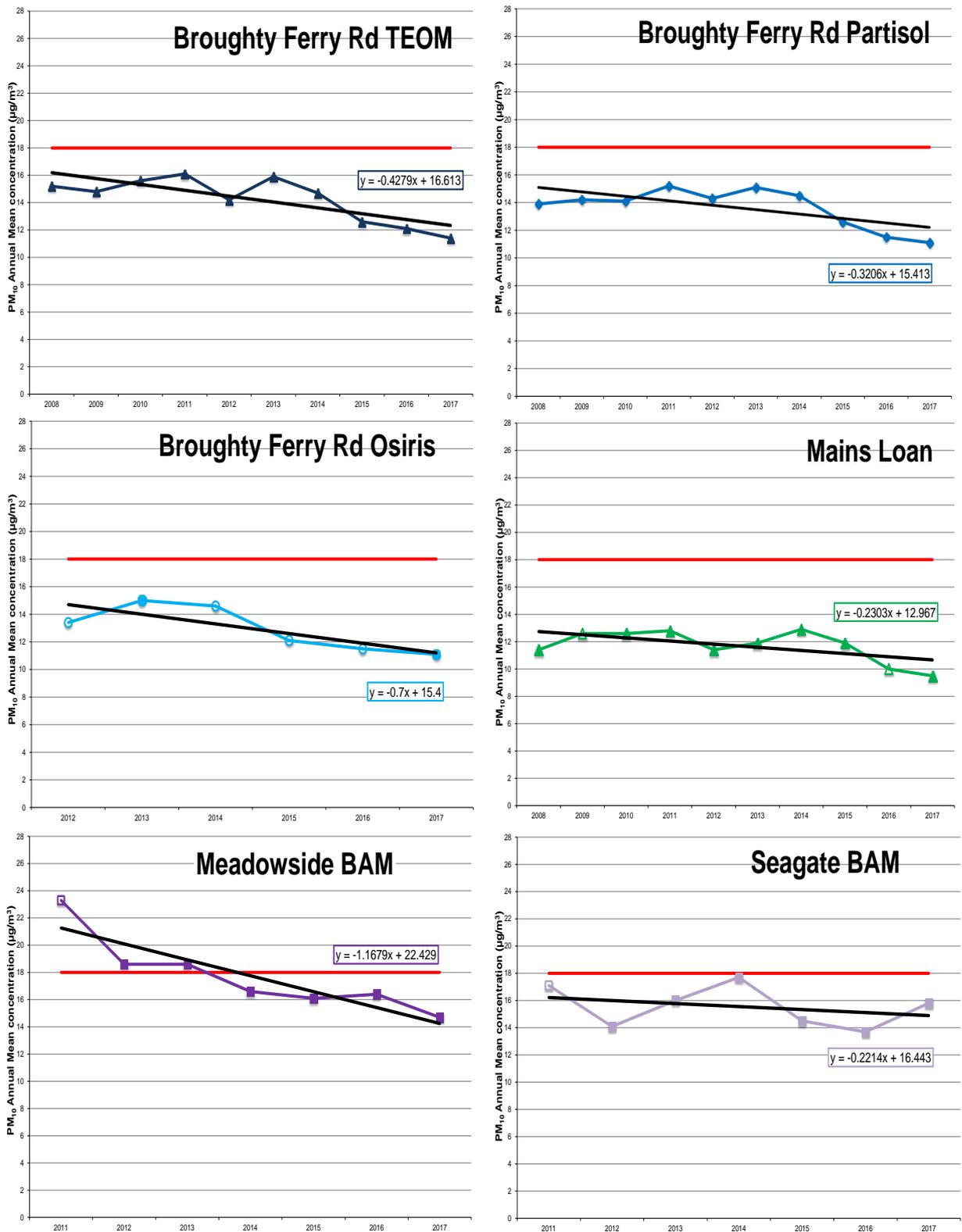
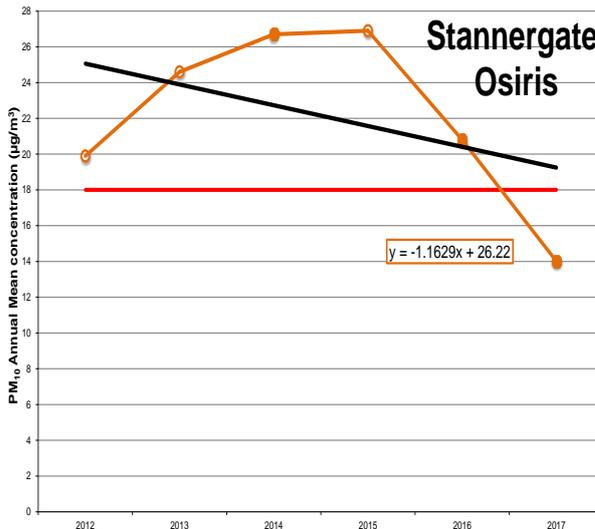
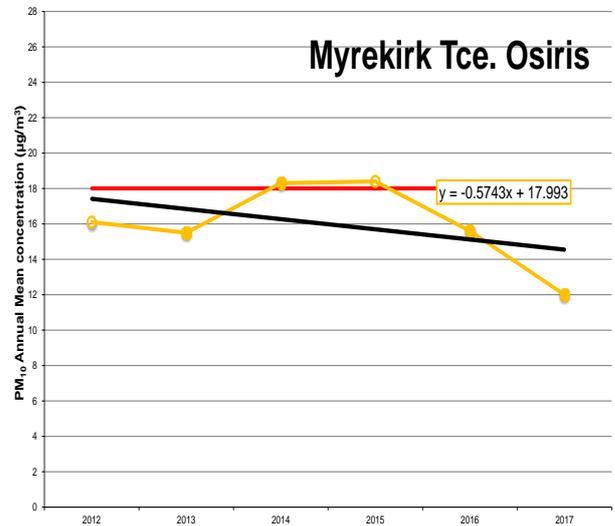
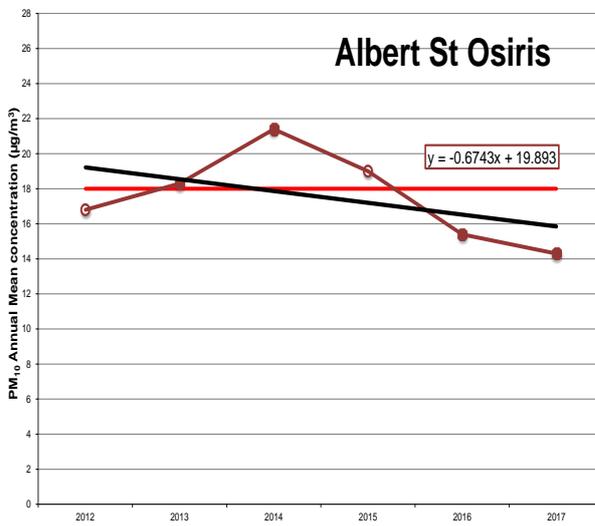
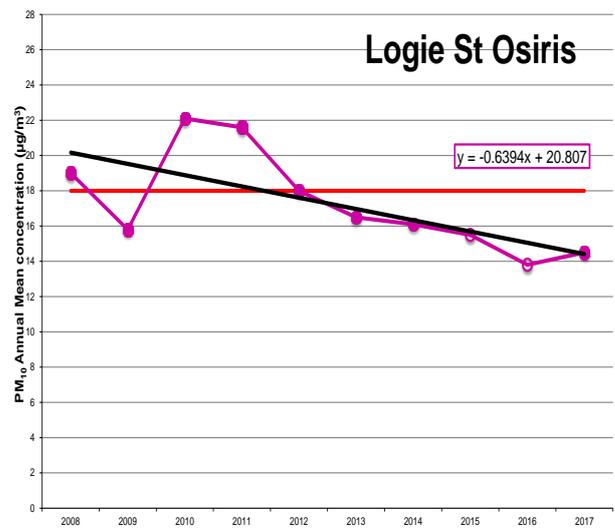
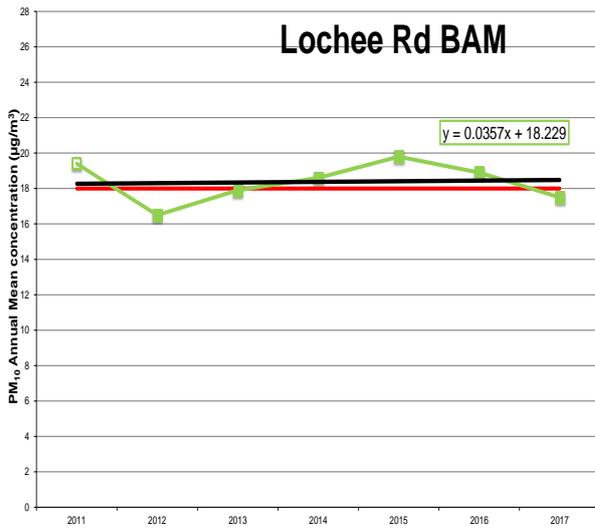


Figure A5.b Trends in Annual Mean PM₁₀ concentrations at Automatic monitors



Notes:

- 1) Graphs show the trends (shown as **black lines**) in the PM₁₀ annual mean concentrations measured by the continuous analysers.
- 2) A minimum of five years data is required to show a valid trend. More years (data points) generally give greater certainty in the trend.
- 3) The trend line equation is shown. Decreasing trends have a negative "x" value, increasing trends a positive "x" value.
- 4) For strict comparison with the annual mean objective of 18µg/m³ (shown as the **red line**), valid data capture should be greater than 85%. Annual means where data capture were below are shown by "hollow" markers.
- 5) Means have been "annualised" as per LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See **Appendix C** for details.

Figure A5.c Trend analysis of PM₁₀ annual means at long term monitoring sites

Site Id.	Location ⁽¹⁾	No. of years for trend	Trend ⁽²⁾
CM 14	Meadowside (BAM)	7	-1.168
CM 18	Stannergate (Osiris)	6	-1.163
CM 16	Broughty Ferry Rd (Osiris)	6	-0.700
CM 15	Albert St (Osiris)	6	-0.674
CM 9	Logie St (Osiris)	9	-0.647
CM 17	Myrekirk Tce (Osiris)	6	-0.574
CM 3	Broughty Ferry Rd (TEOM)	10	-0.428
CM 13	Broughty Ferry Rd (Partisol)	10	-0.321
CM 12	Mains Loan (TEOM)	10	-0.230
CM 5	Seagate (BAM)	7	-0.221
CM 4	Lochee Rd (BAM)	7	0.036

Notes: (1) Locations where the 2017 PM₁₀ annual mean is exceeded are shown in **bold**, borderline locations are **orange**
(2) **Blue** is an improving trend, **red** a worsening trend.

Explanation of Methodology for **Figures A.3b** and **A.5c** have been generated using the LINEST function in Microsoft Excel. This function can be used to return a value that describes the slope of a best fit straight line for a number of points (in this case 5 or more values) i.e. simple linear regression. A negative value denotes a downwards slope hence an improving trend and, a positive value denotes an upwards slope or worsening trend. The magnitude of the number generated by the LINEST function can be used to compare the magnitude of the (improving or worsening) trend.

Table A.6 – 24-Hour Mean PM₁₀ Monitoring Results

Site ID	Site Name	Site Type ⁽¹⁾	Monitoring Type	Valid Data Capture 2017 (%) ⁽²⁾	PM ₁₀ 24-Hour Means > 50µg/m ³ ⁽³⁾				
					2013	2014	2015	2016	2017
CM 2	Union St (TEOM/BAM)	R	Automatic	n/a	1	2	7	n/a	n/a
CM 6	Whitehall Street (BAM)	R	Automatic	94.8	n/a	n/a	n/a	1	1
CM 3	Broughty Ferry Rd (TEOM)	UI	Automatic	94.0	3	1	2	0	0
CM 13	Broughty Ferry Rd (Partisol)	UI	Automatic	98.4	2	1	0	0	0
CM 16	Broughty Ferry Rd (Osiris)	UI	Automatic	95.3	4	3 (40.7)	2 (35.4)	1 (26.2)	0
CM 12	Mains Loan (TEOM)	UB	Automatic	100.0	1	1	1	0 (27.5)	0
CM 5	Seagate (BAM)	R	Automatic	90.7	4	3	3	0	3
CM 14	Meadowside (BAM)	R	Automatic	95.1	4	2	4	3	1
CM 4	Lochee Rd (BAM)	R	Automatic	90.4	3	1	5	2	4
CM 9	Logie St (Osiris)	K	Automatic	85.5	2	2	4 (39.2)	0 (28.6)	2
CM 17	Myrekirk Tce (Osiris)	R	Automatic	94.5	2	3	7 (54.2)	1	0
CM 15	Albert St (Osiris)	K	Automatic	94.5	7	14	8 (63.9)	2	3
CM 18	Stannergate (Osiris)	R	Automatic	95.6	9 (54.1)	16	15 (72.3)	4	2

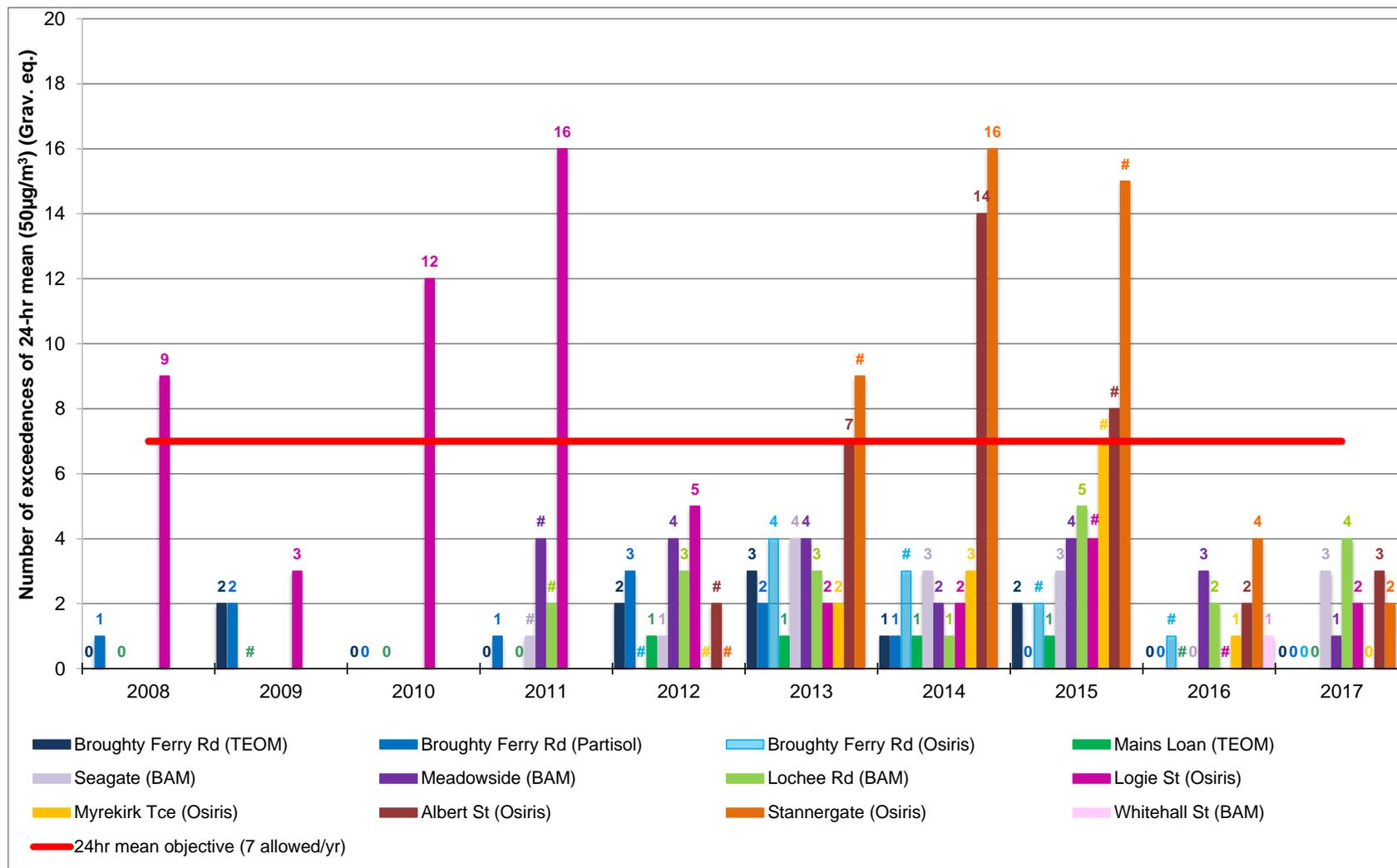
Notes: Exceedances of the PM₁₀ 24-hour mean objective (50µg/m³ not to be exceeded more than 7 times/year) are shown in **bold**.

(1) R=Roadside, K=Kerbside, UB=Urban Background, UI= Urban Industrial

(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 85%, the 98.08th percentile of 24-hour means is provided in brackets (and shaded grey).

Figure A.6a Frequency of Exceedances of PM₁₀ 24 hour Mean Objective (50µg/m³, 7 allowed) 2008-2017



Note: # denotes that the actual number of exceedances is unknown as the data capture was less than 85%

Figure A6.b Trends in 98.08th percentile PM₁₀ concentrations at Automatic monitors

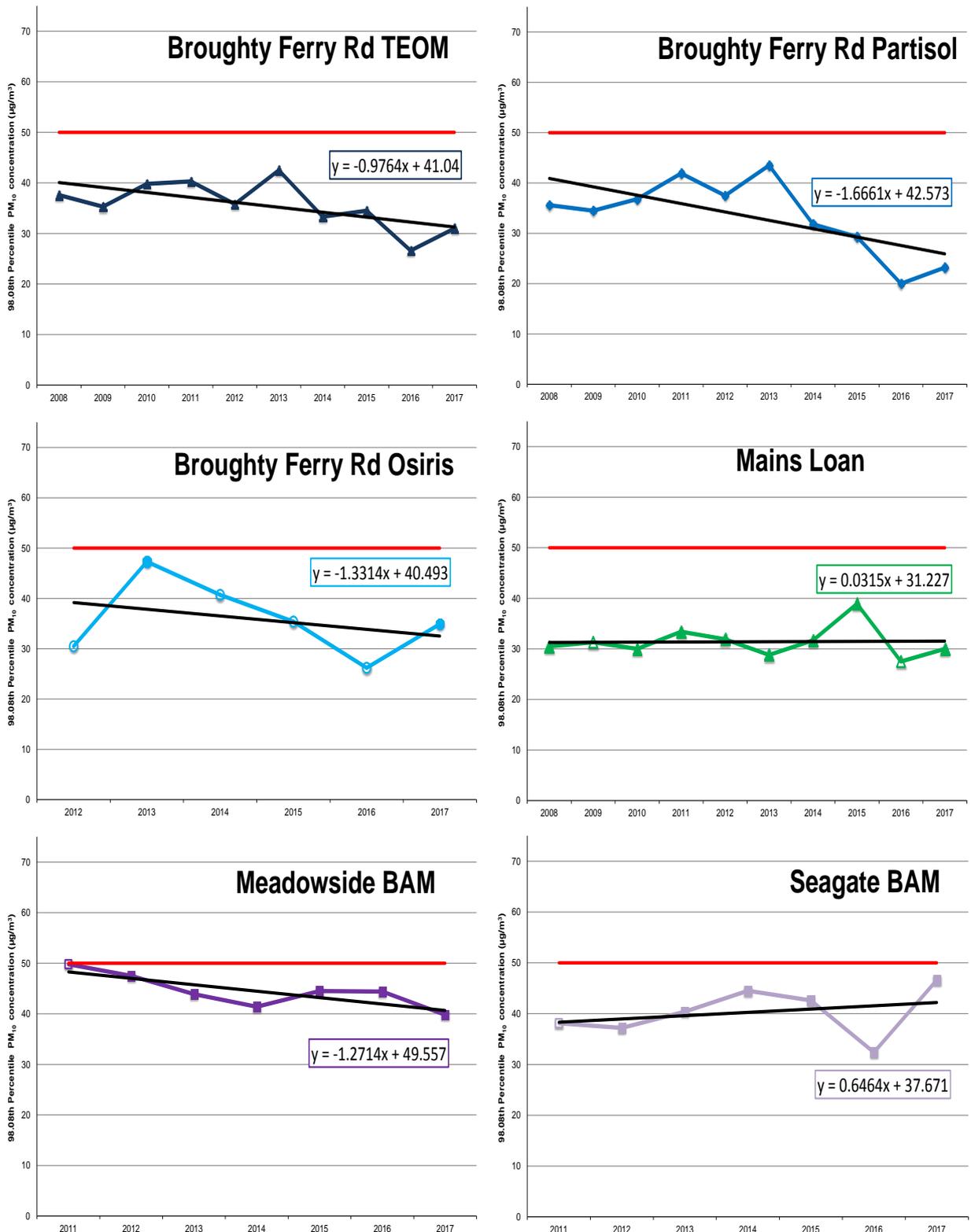
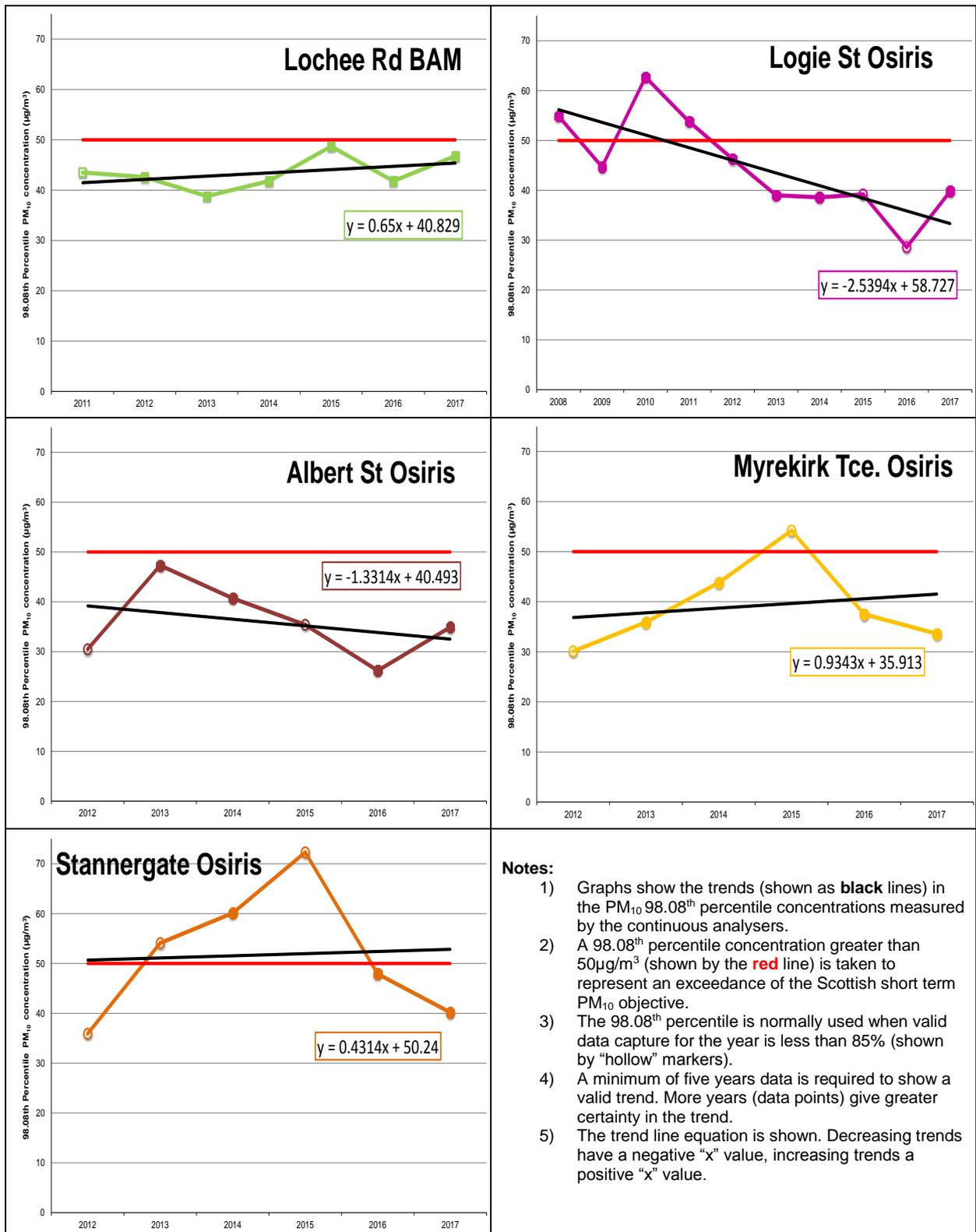


Figure A6.c Trends in 98.08th percentile PM₁₀ concentrations at Automatic monitors



Appendix B: Full Monthly Diffusion Tube Results for 2017

Table B.1 – NO₂ Monthly Diffusion Tube Results for 2017

Site Id. (DT)	Location	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Mean	% Data	Period Adj' Factor	Annual Mean	Annual mean Bias (0.81)
92	Abertay 2	53.8	51.7	52.9	32.8	46.3	41.2	34.6	37.5	46.2	M	44.0	46.3	44.3	91.7	1.0	44.3	35.9
179	Albert St (15)(Façade)	46.4	50.7	45.5	30.2	46.0	34.9	29.4	31.6	41.0	28.2	40.4	41.7	38.8	100.0	1.0	38.8	31.5
180	Albert St (15)(Roadside)	46.6	50.7	49.2	32.8	47.1	36.7	31.2	33.9	41.0	33.5	41.0	44.9	40.7	100.0	1.0	40.7	33.0
187	Albert St (81)	44.5	43.3	40.8	25.0	37.1	29.1	22.7	29.5	35.5	28.9	36.8	40.7	34.5	100.0	1.0	34.5	27.9
167	Albert St (191)	43.9	54.2	46.0	22.6	44.3	30.6	30.0	31.2	38.2	M	33.5	34.9	37.2	91.7	1.0	37.2	30.1
5	Arbroath Rd (13)	51.9	49.4	45.8	35.5	35.9	37.1	32.8	37.3	40.0	37.4	47.4	48.9	41.6	100.0	1.0	41.6	33.7
147	Arbroath Rd (38)	52.9	48.6	48.8	33.2	36.8	35.3	31.5	35.9	39.6	35.9	55.5	53.7	42.3	100.0	1.0	42.3	34.3
7	Balgavies PI	33.2	25.9	24.4	15.8	13.5	14.2	13.8	17.0	15.6	16.3	26.4	31.8	20.7	100.0	1.0	20.7	16.7
9	Birnam PI	18.1	15.0	15.6	7.8	9.2	11.3	8.0	9.4	10.5	11.2	14.9	15.3	12.2	100.0	1.0	12.2	9.9
164	B/ Ferry Rd Lower	32.2	23.8	28.9	23.6	12.5	19.7	17.7	16.0					21.8	66.7	1.053	23.0	18.6
223	B/ Ferry Rd Lower (Cyclesign)									20.9	25.3	39.1	47.3	33.2	33.3	0.910	30.2	24.4
140	B/Ferry Rd Lp66	52.9	45.1	42.9	38.2	33.5	36.3	31.7	39.0	37.5	34.8	48.9	54.9	41.3	100.0	1.0	41.3	33.5
139	B/Ferry Rd (141) Downpipe	55.0	45.1	45.5	41.4	32.7	34.7	30.7	38.0	35.1	36.9	53.2	55.6	42.0	100.0	1.0	42.0	34.0
11	Broughty Ferry Rd (141)	60.7	47.2	57.9	43.1	40.9	45.3	40.2	44.9	45.1	41.9	60.1	65.9	49.4	100.0	1.0	49.4	40.0
145	B/Ferry Rd Greendykes	51.3	50.9	51.1	34.3	37.9	34.1	31.0	38.0	43.5	35.8	48.6	49.2	42.1	100.0	1.0	42.1	34.1
204	B/Ferry Rd (129)	64.8	51.9	51.7	34.1	48.3	41.2	29.9	35.5	M	54.8	47.1	60.0	47.2	91.7	1.0	47.2	38.2
155	Carolina Court Lp6	37.5	30.8	27.3	19.1	18.1	18.1	15.6	22.0	23.2	22.3	31.7	37.2	25.2	100.0	1.0	25.2	20.4
171	Claypotts / Arbroath Rd (502)	52.5	39.4	40.8	25.2	22.8	27.1	23.3	32.2	28.7	33.3	51.2	54.4	35.9	100.0	1.0	35.9	29.1
13	Clepington Rd/ Forfar Rd	52.5	50.5	43.9	33.4	29.7	20.9	21.2	33.2	32.6	37.3	47.9	49.7	37.7	100.0	1.0	37.7	30.6
188	Commercial St (9)	48.6	50.3	52.1	33.0	43.0	36.5	36.9	36.1	41.0	35.9	45.3	47.3	42.2	100.0	1.0	42.2	34.2

Site Id. (DT)	Location	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Mean	% Data	Period Adj' Factor	Annual Mean	Annual mean Bias (0.81)
84	Commercial St /Dock St (40)	50.5	49.7	48.4	34.7	38.9	34.1	34.5	38.0	40.4	39.1	48.9	51.1	42.4	100.0	1.0	42.4	34.3
192	Dock St (12)	38.2	38.8	35.9	29.5	29.4	25.6	25.3	26.1	28.9	27.6	37.6	38.8	31.8	100.0	1.0	31.8	25.8
85	Dock St (21)	54.2	49.9	46.8	38.4	41.0	39.6	37.6	42.0	43.7	40.7	54.2	54.9	45.3	100.0	1.0	45.3	36.7
156	Dock St (57)	77.6	56.8	69.8	52.7	53.2	49.0	46.5	57.0	53.8	60.7	80.1	74.8	61.0	100.0	1.0	61.0	49.4
206	Drumgeith Road (2)	35.9	25.9	37.1	17.4	17.6	13.5	13.6	18.3	19.3	21.3	33.5	37.1	24.2	100.0	1.0	24.2	19.6
20	Dura St (100)	53.8	44.3	52.1	34.5	39.4	35.7	27.4	37.5	40.8	33.2	47.4	50.0	41.3	100.0	1.0	41.3	33.5
214	East Dock St (26)	49.7	M	47.0	36.9	37.4	33.2	32.7	36.5	36.5	33.3	43.8	45.0	39.3	91.7	1.0	39.3	31.8
22	Eastport Roundabout	47.0	41.4	43.9	31.8	34.6	28.3	29.4	32.8	37.3	32.5	43.7	42.4	37.1	100.0	1.0	37.1	30.0
83	Forfar Rd (104)	60.3	55.2	58.7	47.2	44.8	40.0	31.0	50.7	49.9	47.8	62.4	53.1	50.1	100.0	1.0	50.1	40.6
221	Harcourt St (CCTV)	30.4	26.9	25.0	16.8	17.9	14.8	13.1	M	M	17.6	27.9	29.9	22.0	83.3	1.0	22.0	17.8
216	King Street (3)	41.2	36.7	41.7	25.6	41.9	34.5	31.5	31.0	34.9	31.4	35.9	35.2	35.1	100.0	1.0	35.1	28.5
26	Kingsway East Roundabout	53.3	51.5	50.1	38.4	41.0	40.2	M	43.1	42.7	43.2	56.8	54.5	46.8	91.7	1.0	46.8	37.9
27	Kingsway/ Mains Loan	39.4	43.7	42.1	26.9	43.7	31.4	27.4	26.9	32.8	26.1	34.6	33.7	34.1	100.0	1.0	34.1	27.6
177	Kingsway/Strathmartine Rd (N)	56.4	44.5	48.6	33.0	29.5	26.5	22.8	35.1	40.2	36.6	51.5	49.5	39.5	100.0	1.0	39.5	32.0
30	Lochee Rd (138)	70.6	59.5	69.4	51.9	49.2	46.2	43.7	52.9	58.5	55.5	68.9	74.1	58.4	100.0	1.0	58.4	47.3
31	Lochee Rd (140)(Traffic Lts)	68.1	61.1	68.5	47.2	53.2	50.5	44.3	55.0	58.3	55.5	73.5	77.1	59.4	100.0	1.0	59.4	48.1
32	Lochee Rd (184)	53.3	46.6	50.7	33.6	32.7	32.8	28.4	36.3	42.3	40.4	56.1	57.6	42.6	100.0	1.0	42.6	34.5
	Lochee Rd (Romon 1)	65.2	55.6	58.5	50.7	42.7	43.9	36.6	47.0	49.2	53.5	67.6	62.7	52.8	100.0	1.0	52.8	42.7
	Lochee Rd (Romon 2)	70.6	54.2	59.3	49.0	40.5	44.1	36.8	46.6	51.7	42.5	65.0	69.2	52.5	100.0	1.0	52.5	42.5
	Lochee Rd (Romon 3)	64.8	58.3	59.3	44.5	41.5	42.7	37.6	47.2	51.1	M	66.6	70.4	53.1	91.7	1.0	53.1	43.0
158	Lochee Rd (Romon) Average	66.9	56.0	59.0	48.1	41.6	43.6	37.0	46.9	50.7	48.0	66.4	67.4	52.6	100.0	1.0	52.6	42.6
36	Lochee Rd/Polepark Rd	46.6	37.3	37.1	23.4	27.2	24.4	22.2	25.9	30.8	27.2	42.7	50.2	32.9	100.0	1.0	32.9	26.7
37	Logie St (114)	72.6	64.4	69.4	48.6	58.8	52.5	47.8	56.8	59.5	52.9	63.7	62.8	59.2	100.0	1.0	59.2	47.9

Site Id. (DT)	Location	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Mean	% Data	Period Adj' Factor	Annual Mean	Annual mean Bias (0.81)
38	Logie St (98)	49.0	43.7	44.3	33.4	32.2	M	29.9	33.0	38.0	41.0	52.2	50.2	40.6	91.7	1.0	40.6	32.9
39	Loons Rd (1)	51.1	45.8	52.9	36.5	45.1	37.3	33.8	37.8	42.5	39.4	53.2	52.3	44.0	100.0	1.0	44.0	35.6
182	Meadowside (28)	46.8	44.9	49.0	33.4	34.8	36.1	M	40.4	38.2	43.5	53.8	51.8	43.0	91.7	1.0	43.0	34.8
	Meadowside (Romon 1)	57.5	50.7	55.4	44.1	46.9	43.5	38.1	43.5	43.9	40.9	58.1	53.9	48.0	100.0	1.0	48.0	38.9
	Meadowside (Romon 2)	57.7	52.5	51.7	47.0	45.5	42.1	37.4	44.1	47.0	46.9	56.8	53.6	48.5	100.0	1.0	48.5	39.3
	Meadowside (Romon 3)	56.2	54.0	57.2	46.0	47.4	44.5	38.2	43.5	45.1	45.6	54.5	57.0	49.1	100.0	1.0	49.1	39.8
149	Meadowside (Romon) Average	57.1	52.4	54.8	45.7	46.6	43.4	37.9	43.7	45.3	44.5	56.5	54.8	48.6	100.0	1.0	48.6	39.3
222	Muirton Rd (2)	35.9	35.9	36.5	19.1	34.6	28.9	25.3	26.1	31.8	25.3	30.4	29.5	29.9	100.0	1.0	29.9	24.3
42	Muirton Rd (6)	34.6	38.8	31.0	18.5	33.8	26.7	23.6	24.0	30.6	24.6	28.9	31.8	28.9	100.0	1.0	28.9	23.4
185	Murraygate (46)	31.2	30.0	29.8	18.9	22.3	20.7	18.9	21.3	22.2	21.0	28.1	32.2	24.7	100.0	1.0	24.7	20.0
189	Myrekirk Rd (29)	45.3	39.2	42.5	37.3	29.5	28.5	25.9	31.4	35.5	34.8	53.2	51.8	37.9	100.0	1.0	37.9	30.7
45	Nethergate (6)	47.8	47.8	53.3	37.5	41.9	39.2	38.2	41.2	M	41.9	47.6	48.9	44.1	91.7	1.0	44.1	35.7
47	Nethergate (40)	47.2	46.4	48.4	33.2	47.4	39.2	37.8	37.1	44.3	36.4	42.7	39.9	41.7	100.0	1.0	41.7	33.8
213	Nethergate (64)	47.6	51.3	48.0	41.0	43.5	37.8	36.9	41.7	39.2	40.4	39.9	45.2	42.7	100.0	1.0	42.7	34.6
44	Nethergate (88)	49.4	54.4	55.4	44.9	57.8	45.1	41.5	45.1	48.6	44.5	47.1	45.5	48.3	100.0	1.0	48.3	39.1
48	Nethergate (132)/Marketgait	42.9	41.2	33.9	32.4	M	29.8	27.6	26.1	36.3	32.2	36.9	38.0	34.3	91.7	1.0	34.3	27.8
46	Nethergate (95)	41.7	41.7	30.6	34.5	36.6	30.8	27.4	28.3	39.8	33.5	43.2	41.3	35.8	100.0	1.0	35.8	29.0
207	Pitkerro Road (42)	52.1	40.4	47.8	33.6	40.1	34.9	33.5	34.1	38.8	35.0	44.2	47.1	40.1	100.0	1.0	40.1	32.5
49	Rankine St (2)	64.4	45.8	51.9	38.8	M	35.1	29.5	38.0	43.3	44.3	72.6	69.5	48.5	91.7	1.0	48.5	39.3
54	Seagate (9)	43.7	41.9	42.9	32.2	36.4	32.4	31.5	32.6	35.9	32.7	42.7	43.8	37.4	100.0	1.0	37.4	30.3
190	Seagate (97)	53.3	52.3	56.8	40.2	54.5	45.1	41.5	42.3	45.8	44.0	47.3	50.7	47.8	100.0	1.0	47.8	38.7
217	Seagate (99)	57.0	59.3	68.9	43.1	52.2	52.5	47.1	47.6	51.3	45.6	M	52.1	52.4	91.7	1.0	52.4	42.5
50	Seagate (101)	52.9	52.9	51.3	36.7	38.9	40.0	33.0	41.2	40.8	41.4	46.6	50.3	43.8	100.0	1.0	43.8	35.5

Site Id. (DT)	Location	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Mean	% Data	Period Adj' Factor	Annual Mean	Annual mean Bias (0.81)
224	Seagate (112)									40.0	M	53.8	55.3	49.7	25.0	0.846	42.0	34.1
	Seagate (Romon 1)	54.0	55.6	53.6	41.2	51.5	42.7	40.9	43.5	41.7	43.3	48.3	51.5	47.3	100.0	1.0	47.3	38.3
	Seagate (Romon 2)	49.4	54.0	53.8	42.5	49.9	43.5	42.7	43.3	44.9	42.7	48.6	48.6	47.0	100.0	1.0	47.0	38.1
	Seagate (Romon 3)	47.6	56.2	57.9	42.9	56.1	44.1	38.9	43.3	45.8	43.2	47.1	51.8	47.9	100.0	1.0	47.9	38.8
159	Seagate (Romon) Average	50.3	55.3	55.1	42.2	52.5	43.4	40.8	43.4	44.1	43.1	48.0	50.6	47.4	100.0	1.0	47.4	38.4
55	Soapwork Lane	55.0	48.6	47.4	33.4	37.1	34.3	30.0	35.3	37.3	35.8	55.2	52.6	41.8	100.0	1.0	41.8	33.9
218	South Marketgait (Lampost 18)	40.4	50.1	42.7	28.7	41.2	34.5	32.7	29.5	35.7	31.2	38.2	39.4	37.0	100.0	1.0	37.0	30.0
151	South Road (1 Denbank)	54.0	48.4	48.6	38.2	38.6	34.7	30.4	34.9	40.0	37.1	47.9	45.5	41.5	100.0	1.0	41.5	33.6
162	St Andrews St/Seagate(116)	47.4	48.8	49.2	35.7	36.6	35.1	32.5	36.5	38.4	36.1	45.0	45.2	40.5	100.0	1.0	40.5	32.8
56	St Andrews St (26)	41.9	46.0	40.6	25.0	M	31.4	30.5	M					35.9	50.0	0.998	35.8	29.0
220	Strathmartine Rd (15)	27.3	27.5	25.6	14.2	23.3	18.3	16.6	18.1	24.8	18.4	23.3	25.5	21.9	100.0	1.0	21.9	17.7
59	Strathmore Ave (353)	51.9	50.5	50.5	30.2	M	36.7	32.2	34.7	M	32.3	41.9	48.5	40.9	83.3	1.0	40.9	33.2
219	Thomson Avenue (Street Sign)	46.8	41.7	44.7	31.8	38.4	32.4	30.5	33.4	38.0	35.1	45.5	42.1	38.4	100.0	1.0	38.4	31.1
60	Trades Lane (31)	41.0	43.3	38.6	27.7	26.1	26.3	24.1	26.7	30.4	28.6	39.2	38.2	32.5	100.0	1.0	32.5	26.3
191	Victoria Rd (4 India Buildings)	48.4	38.0	42.7	22.4	35.3	30.6	28.1	27.5	34.7	31.2	41.4	42.9	35.3	100.0	1.0	35.3	28.6
93	Victoria Rd (10)	44.3	44.7	43.1	28.1	35.3	28.5	27.6	29.8	34.5	32.3	45.8	47.4	36.8	100.0	1.0	36.8	29.8
70	Victoria Rd/Hilltown	81.7	69.4	64.8	58.3	52.5	52.9	47.3	56.2	55.0	59.4	87.0	79.1	63.6	100.0	1.0	63.6	51.5
68	Victoria Rd (60)	47.2	47.4	49.7	34.1	42.8	36.9	33.8	35.1	36.7	35.8	44.0	45.0	40.7	100.0	1.0	40.7	33.0
184	Victoria Rd (104)/William St	36.7	45.1	39.2	25.4	40.4	31.4	29.5	30.6	34.1	28.7	32.8	32.0	33.8	100.0	1.0	33.8	27.4
71	Victoria St / Albert St	41.0	41.9	39.2	28.3	36.6	29.8	27.2	28.9	35.3	28.1	39.7	38.2	34.5	100.0	1.0	34.5	28.0
72	Westport (2)	45.1	45.3	51.3	37.5	33.5	M	32.0	36.7	34.9	39.2	45.3	49.3	40.9	91.7	1.0	40.9	33.1
183	West Marketgait/Guthrie St	68.5	59.9	61.6	54.6	45.8	41.4	41.4	44.3	49.9	47.9	70.9	66.6	54.4	100.0	1.0	54.4	44.1
205	West Marketgait/ Old Mill (23)	78.0	63.6	33.6	58.7	46.9	47.6	43.7	41.4	49.7	59.7	73.5	71.9	55.7	100.0	1.0	55.7	45.1

Site Id. (DT)	Location	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Mean	% Data	Period Adj' Factor	Annual Mean	Annual mean Bias (0.81)
73	Whitehall Cr (4)	47.6	44.9	47.8	M	38.6	34.1	31.8	36.5	36.3	37.3	45.8	50.6	41.0	91.7	1.0	41.0	33.2
161	Whitehall Cr/Union St (50)	35.9	36.9	35.1	25.2	28.7	24.2	23.3	24.6	27.7	26.6	36.6	37.3	30.2	100.0	1.0	30.2	24.4
74	Whitehall St (40)	46.4	50.5	44.5	29.5	45.8	38.0	35.5	36.1	41.7	37.4	46.8	47.3	41.6	100.0	1.0	41.6	33.7
81	Whitehall St (12)	47.8	53.3	51.5	28.5	54.2	40.2	36.4	38.4	41.7	36.8	40.4	42.3	42.6	100.0	1.0	42.6	34.5
76	Whitehall St (1)	54.0	59.7	59.9	38.8	55.5	47.0	42.5	48.8	48.2	47.8	54.8	48.3	50.4	100.0	1.0	50.4	40.9
75	Whitehall St (5)	55.8	55.6	57.9	38.0	44.3	44.7	40.7	47.4	48.0	46.8	54.8	51.5	48.8	100.0	1.0	48.8	39.5
77	Whitehall St (15)	49.2	43.3	41.7	31.4	36.8	34.1	31.5	33.4	38.0	37.1	46.8	48.3	39.3	100.0	1.0	39.3	31.8
	Whitehall St (Romon 1)	46.2	51.1	51.5	30.2	48.3	40.8	40.1	39.8	42.3	38.6	45.0	44.1	43.2	100.0	1.0	43.2	35.0
	Whitehall St (Romon 2)	47.8	51.1	54.0	32.8	52.9	42.1	38.1	39.4	37.8	37.6	44.5	46.0	43.7	100.0	1.0	43.7	35.4
	Whitehall St (Romon 3)	49.0	46.4	49.0	33.2	45.6	39.2	38.2	40.8	43.1	39.9	43.3	47.3	42.9	100.0	1.0	42.9	34.8
160	Whitehall St (Romon) Average	47.7	49.5	51.5	32.1	48.9	40.7	38.8	40.0	41.1	38.7	44.3	45.8	43.3	100.0	1.0	43.3	35.0
82	Woodside Ave	24.8	21.7	19.9	10.1	12.6	11.1	10.3	11.9	16.0	14.4	20.2	23.6	16.4	100.0	1.0	16.4	13.3

Notes

- (1) Exceedances of the NO₂ annual mean objective are shown in **bold**. (Borderline values are coloured **orange**).
- (2) NO₂ annual means greater than 60µg/m³ are shown in **bold & underlined**, indicating a potential exceedence of the NO₂ 1-hr mean objective
- (3) Sites shaded green were monitoring locations installed in 2017.
- (4) 'M' means that the diffusion tube was either missing or else interference meant that the results were considered invalid.

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Appendix C.1 Air Quality Monitoring Data QA/QC

QA/QC of Automatic Monitoring

All automatic analysers (excluding Osiris units) are audited twice yearly by an external consultant, Ricardo. The gas analysers do not have on-site gases and are manually calibrated every 3 weeks by Ricardo using National Physical Laboratory (NPL) traceable gas.

Dundee City Council secured funding from the Scottish Executive to commission Ricardo to assist with data management and ratification procedures. Dundee joined the 'Calibration Club' run by Ricardo at the end of 2006. Ricardo have ratified all the real-time monitoring data reported on the Scottish Air Quality Website from 2006 onwards under contract from the Scottish Government.

All instruments (excluding Osiris units) are serviced and calibrated every 6 months by the equipment supplier. Osiris units undergo quarterly flow checks and filter changes as well as annual service and calibration by the manufacturer (Turnkey Instruments).

The Partisol is a semi-automatic reference equivalent PM₁₀ analyser. It contains 16 'Emfab' filters, each is exposed for 24 hours allowing for 2 weeks continuous operation (usually with two blanks). The filters are supplied by the equipment manufacturer and conditioned and weighed before and after the sampling period by Tayside Scientific Services using in-house procedures.

The Fidas 200 is a nephelometer, which is calibrated using a HEPA filter and 'CalDust' by Ricardo (Local Site Operator) every 3 weeks for the first 6 months following installation, thereafter it is calibrated during the twice yearly service and audits.

QA/QC of Diffusion Tube Monitoring

Monitoring of NO₂ concentrations using passive diffusion tubes (PDT) is widely used throughout the UK. Provided that care is taken with the storage, handling and analysis of the tubes, and an appropriate "bias-adjustment" factor is applied, the overall uncertainty of the annual mean is expected to be about +/-20%. The key issues to be considered are the performance of the laboratory, the precision of the diffusion tubes, and the application of a suitable bias adjustment factor. These issues are considered in turn below.

Laboratory Performance

The diffusion tubes used by Dundee City Council are supplied by Gradko and analysed by Tayside Scientific Services utilising the 20% Triethanolamine (TEA) in water preparation method. Diffusion tubes are exposed for 4 to 5 weeks in accordance with the recommended dates supplied by Defra. The method for preparing and analysing tubes has remained unchanged since 2001. Two diffusion tubes from each monthly batch are used as blanks. These tubes are not exposed but are taken round during the monthly deployment and collection and stored in the refrigerator during the exposure period. They are analysed along with the appropriate batch of exposed tubes. The purpose of the blanks is to determine whether contamination occurred during the preparation or deployment.

Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the AIR Proficiency Testing (PT) scheme. Laboratory performance in AIR PT

is also assessed, by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Intercomparison Exercise carried out at Marylebone Road, central London.

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme. AIR NO₂ PT forms an integral part of the UK NO₂ Network's QA/QC, and is a useful tool in assessing the analytical performance of those laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, LGC Standards provides summary proficiency testing data to the LAQM Helpdesk for hosting on the webpages at <http://laqm.defra.gov.uk/diffusion-tubes/ga-qc-framework.html>. This information is updated on a quarterly basis following completion of each AIR PT round.

Tayside Scientific Services has demonstrated satisfactory performance in the latest report.¹²

Tube Precision

For the purposes of Local Air Quality Management, tube precision is separated into two categories, "Good" or "Poor", as follows: tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%, and the average CV of all monitoring periods is less than 10%. Tubes are considered to have "poor" precision where the CV of four or more periods is greater than 20% and/or the average CV is greater than 10%.

A spreadsheet tool has been developed to calculate the overall precision of a particular co-location study or any sets of duplicate or triplicate results. The tube precision of each study calculated using this spreadsheet¹³ is summarised in **Table C.1**. The distinction between "good" and "poor" precision is an indicator of how well the same measurement can be reproduced. This precision reflects the laboratory's performance/consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the field. Any laboratory can show "poor" precision for a particular period/co-location study, if this is due to poor handling of the tubes in the field.

Suitable Bias Adjustment Factor

The discussion and calculation of a suitable bias adjustment factor is detailed below:

The diffusion tubes are supplied by Gradko and analysed by Tayside Scientific Services utilising the 20% Triethanolamine (TEA) in water preparation method. The bias adjustment factor available on the LAQM Support Website¹⁴ for Tayside Scientific Services is **0.72** (Spreadsheet version 03/18_final). This is based the kerbside National inter-comparison site at Marylebone Road (0.76) and a mixture of kerbside and roadside sites from Fife Council.

Factor from Local Co-location Studies

Dundee City Council co-locates three nitrogen dioxide diffusion tubes with each of the roadside automatic nitrogen dioxide analysers. Co-location studies were carried out at 4 automatic monitoring locations in 2017. The factor for each study is shown in **Table C.1** along with the factor for the national inter-comparison site at Marylebone Road in London. A minimum of 9 months is required to make a valid bias calculation. All the Dundee City

¹² <https://laqm.defra.gov.uk/assets/AIR-PT-Rounds-13-to-24-Apr-2016-Feb-2018.pdf>

¹³ <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

¹⁴ <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

Council co-location studies met the criteria in 2017. The QA/QC procedures for all the Dundee City Council automatic analysers used in the bias-calculation is equivalent to the Automatic Urban and Rural Network (AURN), which is run by the national government. Tayside Scientific Services have demonstrated satisfactory performance for the analysis of diffusion tubes over the quarterly AIR-PT/WASP rounds up to February 2018. The automatic analyser period means are calculated from mid-day on tube changeover days.

Table C.1 Bias Factors from 2017 Co-location Studies and National Bias Adjustment Spreadsheet (Version 03/18_final)

Site Name	Site Type ¹	Length of Study (months)	PDT ² Mean Conc. (Dm) (µg/m ³)	Analyser Mean Conc. (Cm) (µg/m ³)	%DC ³	Bias (B)	Tube Precision & average CV ⁴	Bias Adjustment Factor (A) (Cm/Dm)
Lochee Road	R	12	53	43	100	22%	G (4%)	0.82
Meadowside	R	11	49	34	97	42%	G (3%)	0.70
Seagate	R	12	47	44	99	7%	G (3%)	0.93
Whitehall Street	R	11	43	35	99	23%	G (4%)	0.81
Marylebone Road Intercomparison	K	12	103	79	n/a	31.2%	G	0.76

1 - R= Roadside, K= Kerbside

2 - PDT = Passive Diffusion Tube for NO₂

3 - %DC = Percentage Data Capture on the automatic analyser for the periods used

4 - Tube precision is determined as follows: **G** = Good precision - coefficient of variation (CV) of diffusion tube replicates is considered G when the CV of eight or more periods is less than 20%, and the average CV of all monitoring periods is less than 10%; **P** = Poor precision - CV of four or more periods >20% and/or average CV >10%; **S** = Single tube, therefore not applicable; **na** = not available.

Discussion of Choice of Factor to Use

The majority of nitrogen dioxide diffusion tubes operated by Dundee City Council are located at roadside or kerbside locations. In view of this it is normally considered appropriate to use an overall factor derived from roadside and kerbside sites. A manual approximate orthogonal regression calculation using Bias B figures (obtained from the precision and accuracy spreadsheets¹⁵) was carried out for the local roadside sites separately and incorporating the national inter-comparison kerbside site at Marylebone Road. The calculation was carried out in accordance with the guidance available on the Defra website prepared by Air Quality Consultants¹⁶ (AQC) (see **Table C.2**). The factor obtained using only local roadside sites was **0.81**, and **0.80** when the kerbside site at Marylebone Road was included. The **0.81** bias correction factor represents a more conservative approach and has been used to bias correct the diffusion tube data presented in this report.

¹⁵ <http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html>

¹⁶ <http://laqm.defra.gov.uk/documents/NO2-Diffusion-Tube-Collocation-Methodology.pdf>

Table C.2 Manual Approximate Orthogonal Regression Calculation 2017

Co-location Sites 2017	Site Type ¹	Bias Factor A	Bias B
Lochee Road	R	0.82	22%
Meadowside	R	0.70	42%
Seagate	R	0.93	7%
Whitehall St	R	0.81	23%
Mean Local		0.82	23.5%

Manual orthogonal regression Calculation as para 2.4 AQC doc ²		
Express as a factor	Add 1	Inverse
0.235	1.235	0.81

National: Marylebone Road Intercomparison	K	0.76	31.2%
-----------------------------------------------------	---	------	-------

Combined Local & National: Mean Combined		0.80	25.0%
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0.25	1.25	0.80
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Notes:

1 - R= Roadside, K= Kerbside

2 - Paragraph 2.4 of AQC's report states, "For most purposes, a reasonable approximation of our method can be derived by averaging the bias values, expressed as a factor, i.e. -16% is -0.16. Next add 1 to this value, e.g. -0.16 + 1.00 equals 0.84 in this example, then take the inverse to give the bias adjustment factor 1/0.84 = 1.19. (This will not be exactly the same as the correction factor calculated using orthogonal regression, but will be reasonably close). IT IS IMPORTANT NOT TO AVERAGE THE ADJUSTMENT FACTORS."

PM Monitoring Adjustment

Dundee utilise several methods for monitoring particulate matter (PM₁₀) within the city. TEOM and Osiris monitors have heated inlets. These tend to drive off volatile organic particulate matter and in consequence the measured concentrations tend to be lower than those measured by gravimetric reference standard monitors. The Partisol is a reference equivalent method and had been used historically to determine a local correction factor for the TEOMs, which were designated as non-equivalent in 2006. TEOM PM₁₀ data presented in this report have been corrected using the Volatile Correction Methodology (VCM) since 2008.

DCC have five Osiris analysers, four of which were re-located during 2012. These are also non-equivalent but their measurements are considered indicative of particulate concentrations. Dundee commenced a yearly study in 2005 to compare the PM₁₀ data measured using an Osiris analyser with that from a TEOM. This study determined that the Osiris generally exaggerates peak values compared to the TEOM. Annually, post service, all 5 Osiris monitors are co-located in-house and their data is compared with that of the designated "master" to derive, if necessary, individual adjustment factors. The factors used to adjust the 2017 data can be made available on request¹⁷. The "master" Osiris unit has been co-located with the Partisol at the urban industrial site at Broughty Ferry Road since September 2012, thus allowing the Osiris results presented in this report to be gravimetrically corrected prior to reporting. The gravimetric factor applied to 2017 data was **1.422**. This methodology although reasonable for annual mean data, has a tendency to over-estimate the number of daily mean exceedances. Consequently, these results should be treated with some caution.

In addition, DCC have four unheated Beta-Attenuation Monitors (BAM), which are gravimetric equivalent monitors. The PM₁₀ data from these have been corrected for slope by Ricardo

¹⁷ T:\Pollution\Air Quality\Progress Reports\Progress Report 2018\PM10

using the factor (0.8333) determined by the UK Equivalence Testing Programme¹⁸. For comparison with the NAQS objectives annual mean concentrations are calculated from an hourly time base. PM₁₀ data from the Fidas does not require to be adjusted, but the PM_{2.5} data is adjusted for slope by the following factor (1/1.06).

Short-term to Long-term Data adjustment

Annualisation of data was required for four diffusion tubes with less than 75% data capture in 2017. The methodology outlined in Box 7.9 of LAQM.TG(16) was used. The urban background sites used are shown in the tables below along with the annualisation factors applied to the data. All of the reference equivalent real-time analysers had greater than 85% data capture in 2017 and the reported annual mean did not require to be annualised.

Table C.3 Period Adjustment Calculation Broughty Ferry Road Lower (DT 164) Jan – Aug 2017

Urban Background Locations	Annual Mean, A _m (µg/m ³)	Period Mean, P _m (µg/m ³)	Ratio, A _m /P _m	Average Ratio, R _a
Balgavies PI	20.66	19.73	1.047	1.053
Carolina Court Lp6	25.24	23.56	1.071	
Murraygate (46)	24.72	24.14	1.024	
Woodside Ave	16.38	15.30	1.071	
Site to be annualised				
B/ Ferry Rd Lower	23.0	21.80		

Table C.4 Period Adjustment Calculation Broughty Ferry Road Lower (Cyclesign) (DT 223) Sept – Dec 2017

Urban Background Locations	Annual Mean, A _m (µg/m ³)	Period Mean, P _m (µg/m ³)	Ratio, A _m /P _m	Average Ratio, R _a
Balgavies PI	20.66	22.53	0.917	0.91
Carolina Court Lp6	25.24	28.60	0.883	
Murraygate (46)	24.72	25.88	0.955	
Woodside Ave	16.38	18.55	0.883	
Site to be annualised				
B/ Ferry Rd Lower (Cyclesign)	30.2	33.15		

Table C.5 Period Adjustment Calculation Seagate (112) (DT 224) Sept, Nov, Dec 2017

Urban Background Locations	Annual Mean, A _m (µg/m ³)	Period Mean, P _m (µg/m ³)	Ratio, A _m /P _m	Average Ratio, R _a
Balgavies PI	20.66	24.60	0.840	0.846
Carolina Court Lp6	25.24	30.70	0.822	
Murraygate (46)	24.72	27.50	0.899	
Woodside Ave	16.38	19.93	0.822	
Site to be annualised				
Seagate (112)	42.0	49.70		

¹⁸ <http://laqm.defra.gov.uk/laqm-faqs/faq104.html>

Table C.6 Period Adjustment Calculation St.Andrews Street (26) (DT 56) Jan-Apr & Jun-July 2017

Urban Background Locations	Annual Mean, A_m ($\mu\text{g}/\text{m}^3$)	Period Mean, P_m ($\mu\text{g}/\text{m}^3$)	Ratio, A_m/P_m	Average Ratio, R_a
Balgavies PI	20.66	21.22	0.974	0.998
Carolina Court Lp6	25.24	24.73	1.021	
Murraygate (46)	24.72	24.92	0.992	
Woodside Ave	16.38	16.32	1.004	
Site to be annualised				
St Andrews St (26)	35.8	35.90		

Note: annualised mean shown in red

Appendix C.2 Overview of NO₂ Annual Mean Concentrations Across the City

Union Street & Whitehall Street

Figure C.1 NO₂ Monitoring Locations in Union Street and Whitehall Street

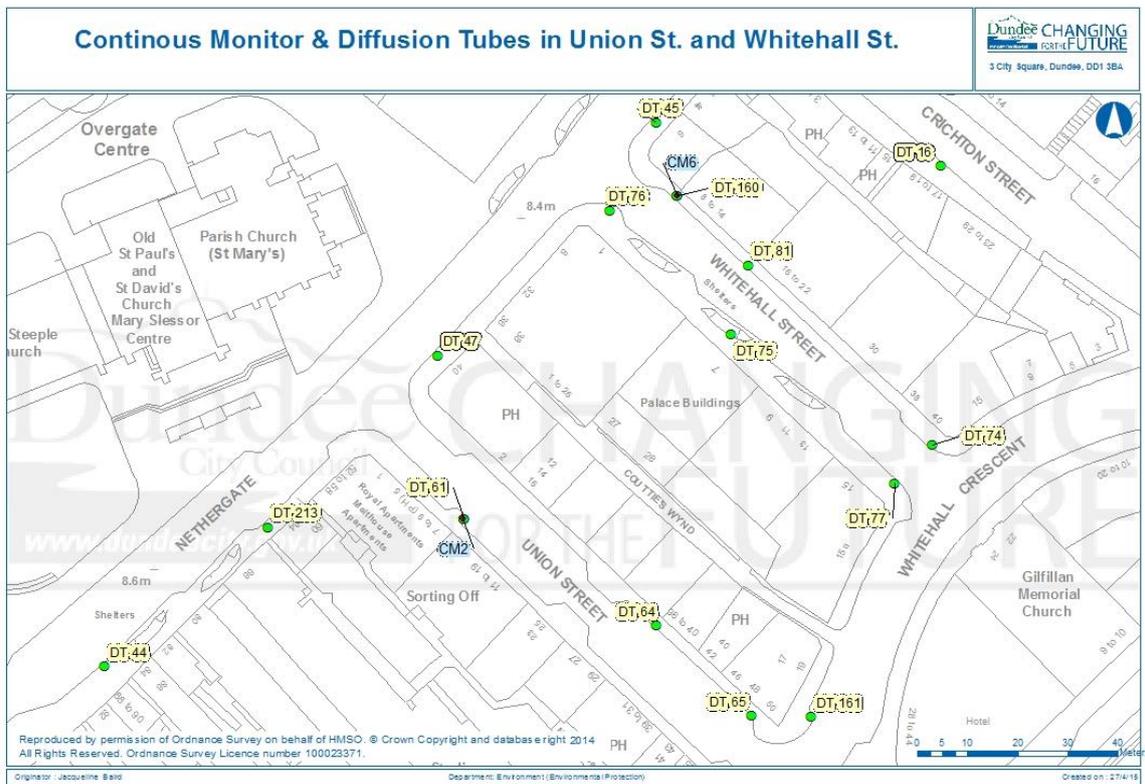


Figure C.2 Overview of NO₂ Concentrations in Union St and Nethergate (east of Marketgait)

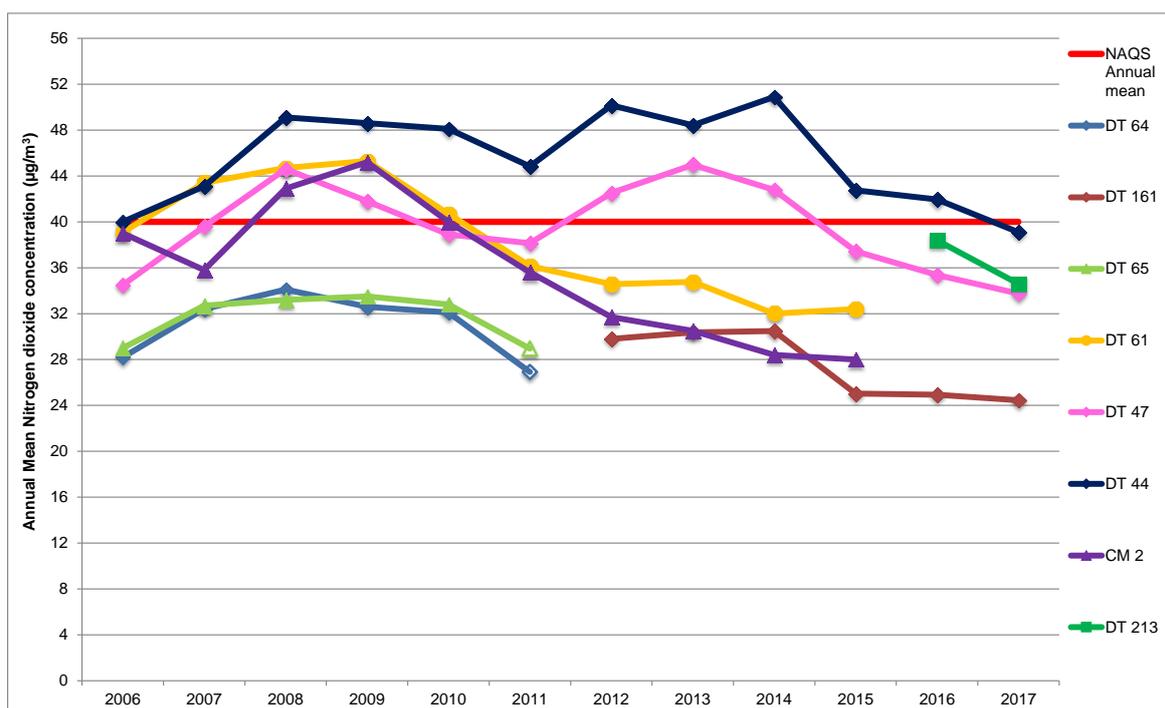
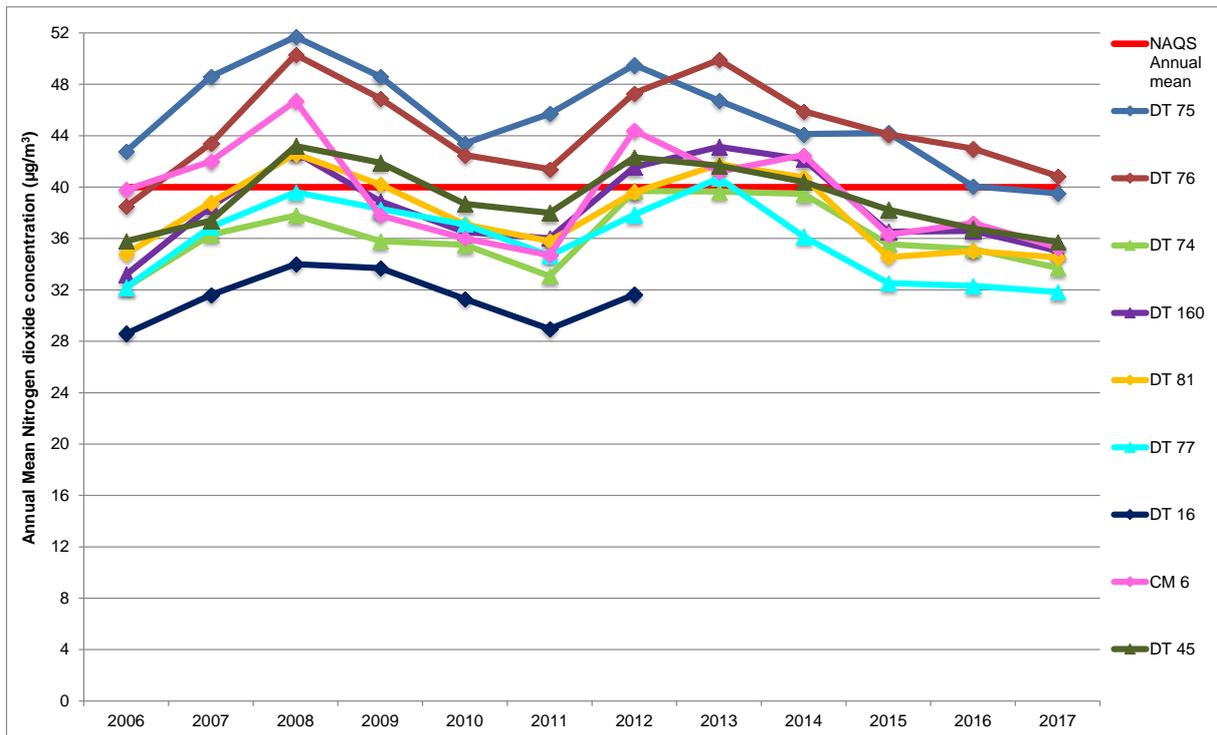


Figure C.3 Overview of NO₂ Concentrations in Whitehall St and Crichton St.



Seagate

Figure C.4 NO₂ Monitoring Locations in Seagate

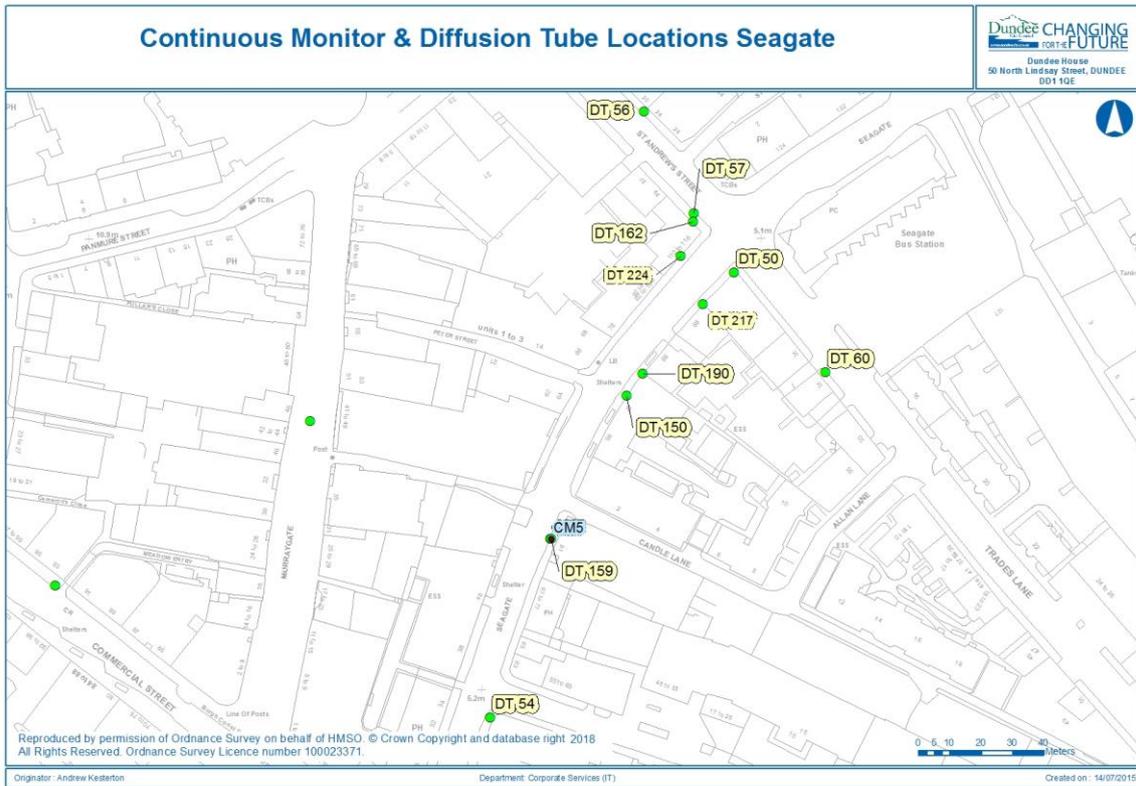
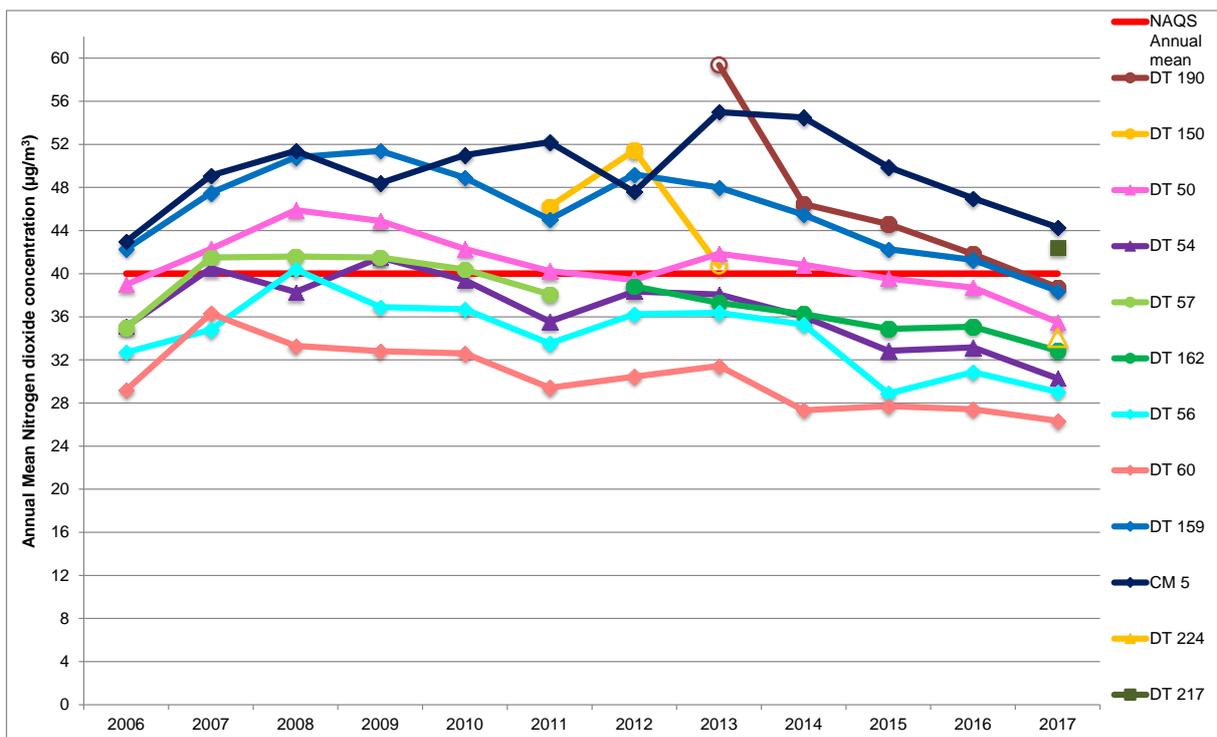


Figure C.5 Overview of NO₂ Concentrations in Seagate.



Nethergate

Figure C.6 NO₂ Diffusion Tube Locations in Nethergate

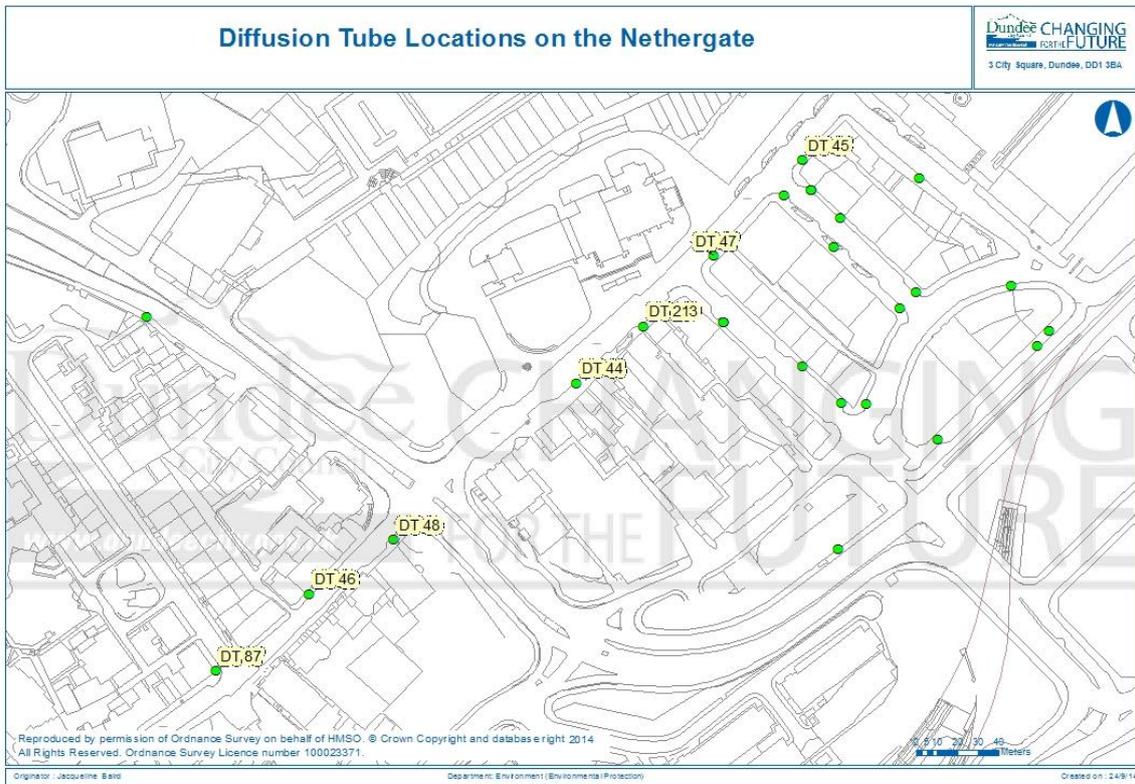
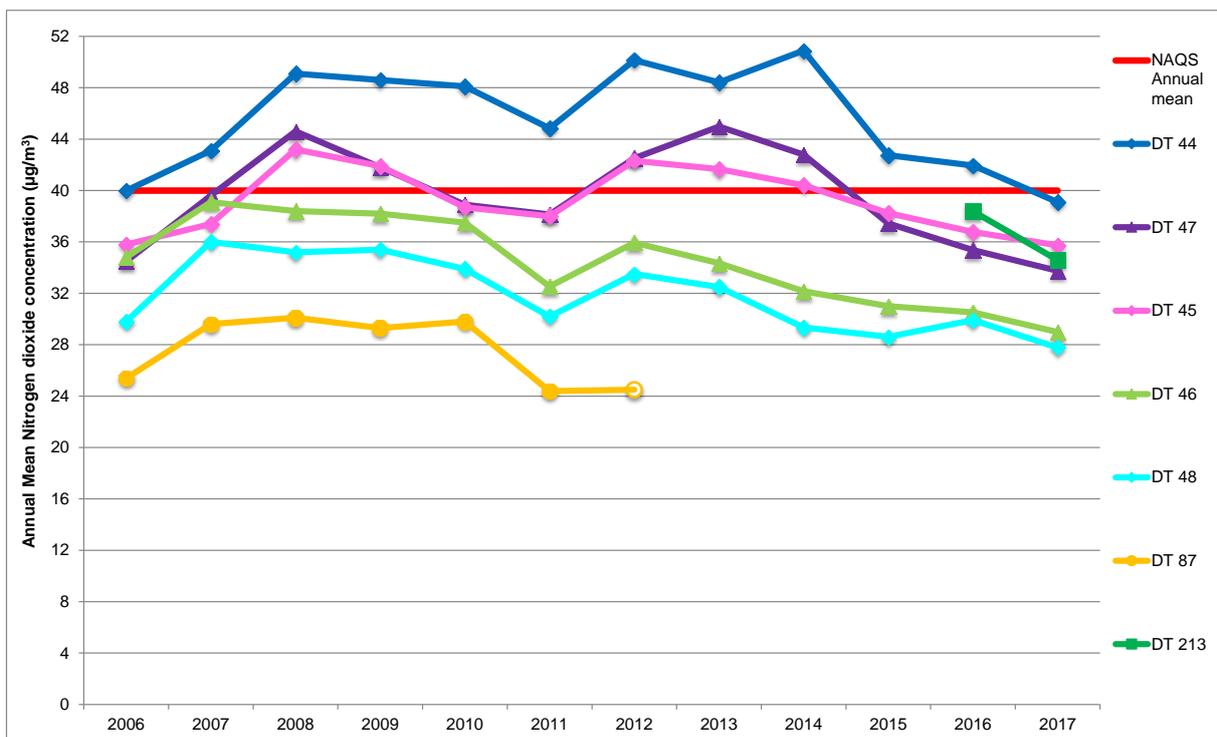


Figure C.7 Overview of NO₂ Diffusion Tube Concentrations in Nethergate.



Victoria Road / Meadowside

Figure C.8 NO₂ Diffusion Tube Locations in Victoria Road / Meadowside

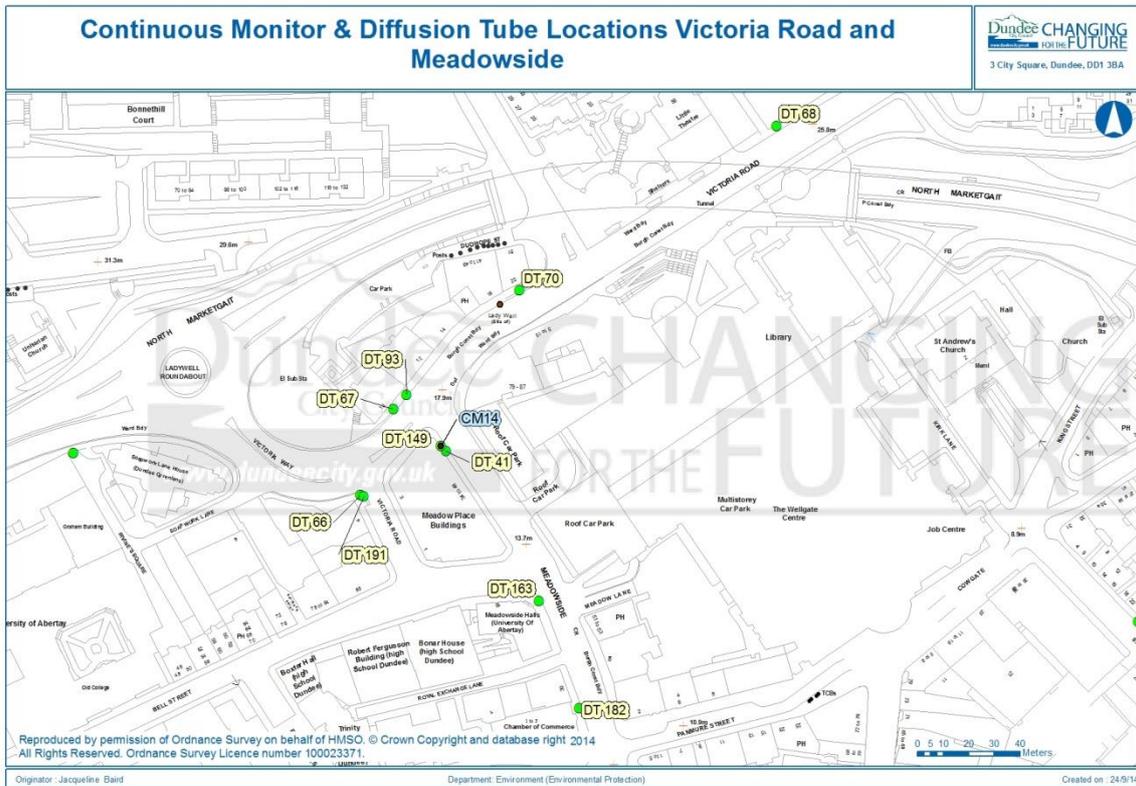
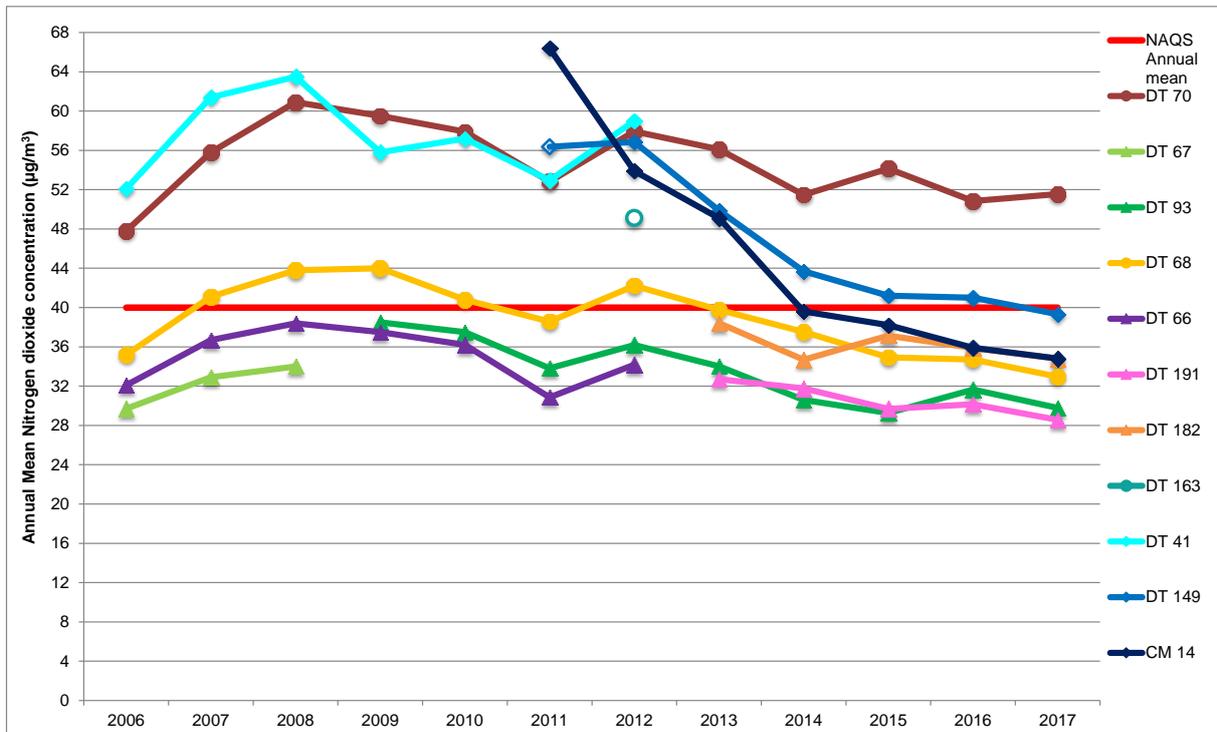


Figure C.9 Overview of NO₂ Diffusion Tube Concentrations in Victoria Road / Meadowside



Albert Street / Dura Street

Figure C.10 NO₂ Diffusion Tube Locations in Albert Street / Dura Street

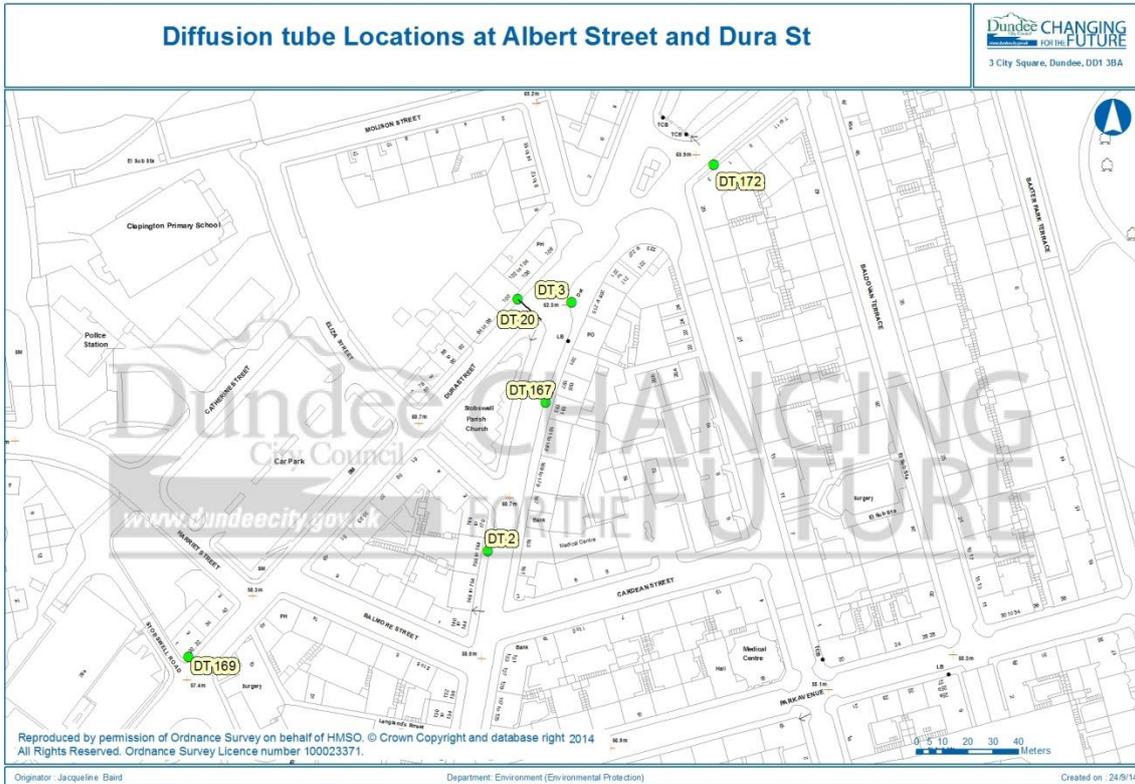
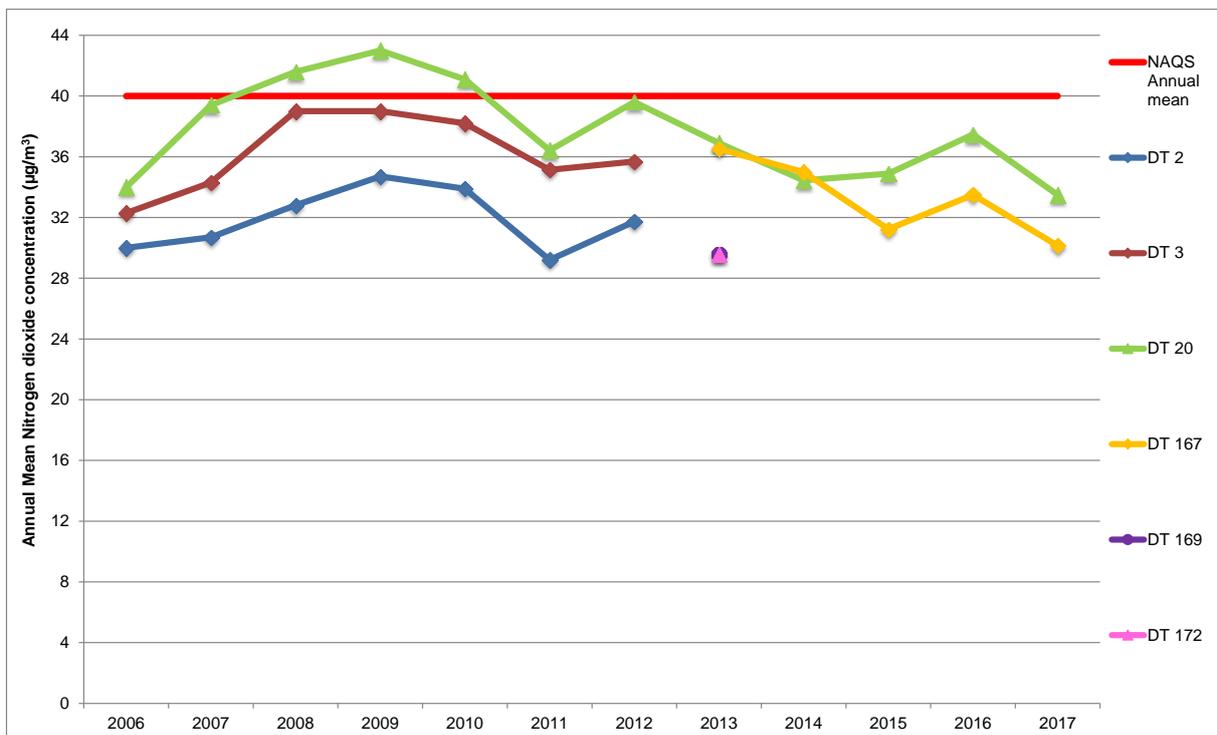


Figure C.11 Overview of NO₂ Diffusion Tube Concentrations in Albert Street / Dura Street.



Lochee Road

Figure C.12 NO₂ Monitoring Locations in Lochee Road

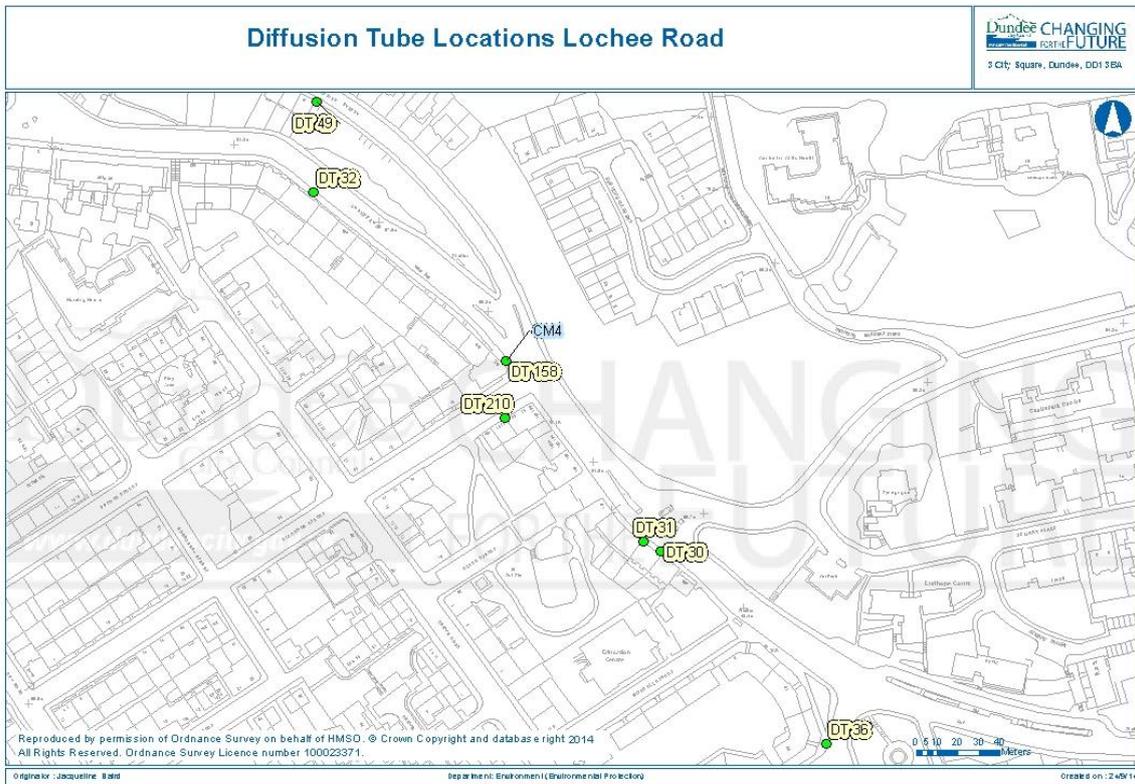
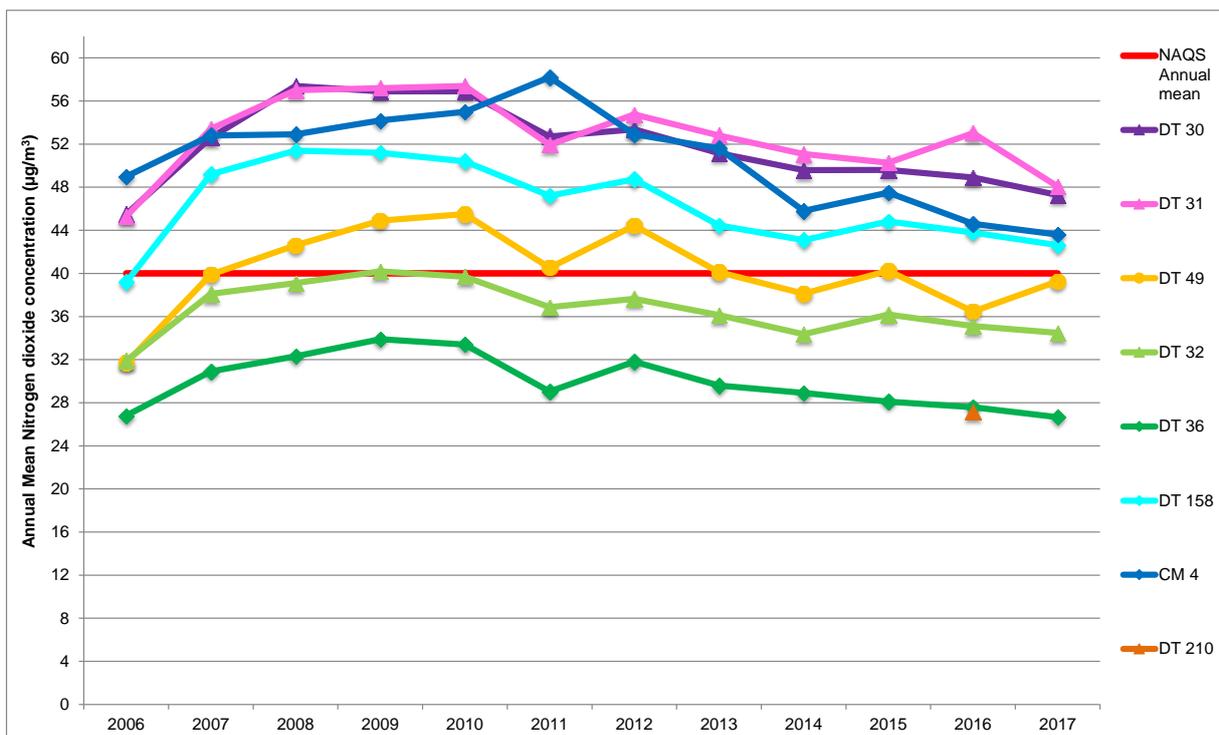


Figure C.13 Overview of NO₂ Concentrations in Lochee Road



Logie Street

Figure C.14 NO₂ Diffusion Tube Locations in Logie Street

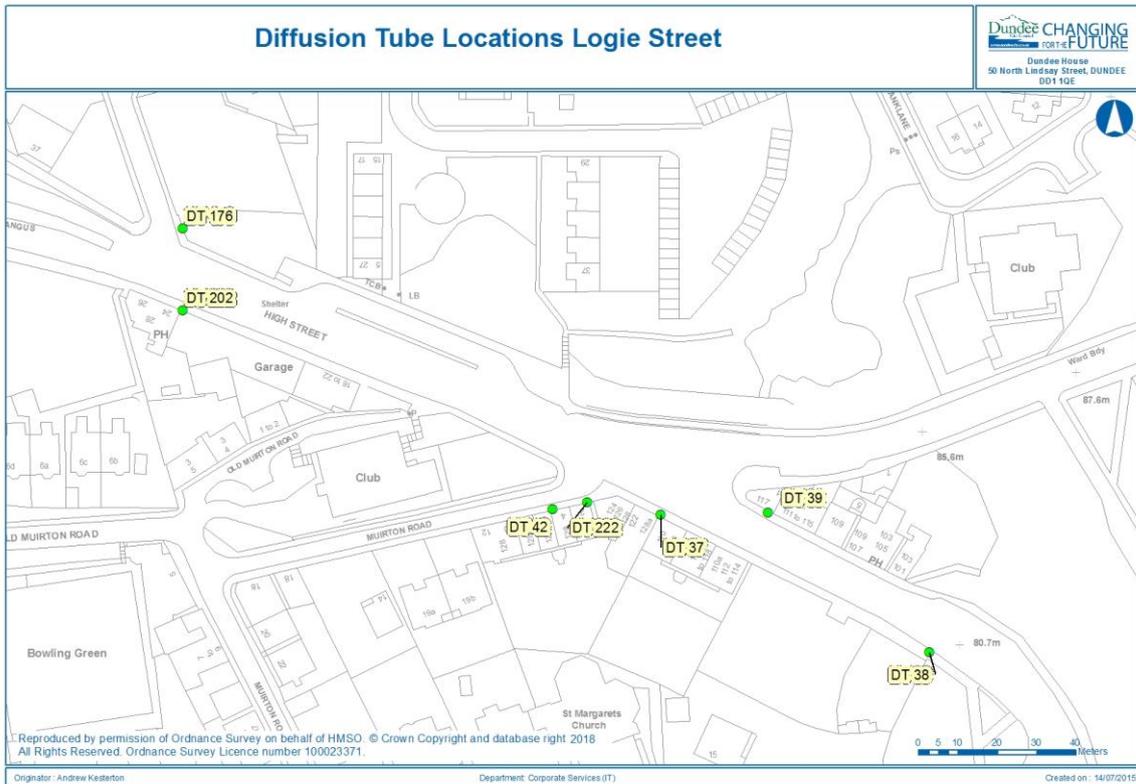
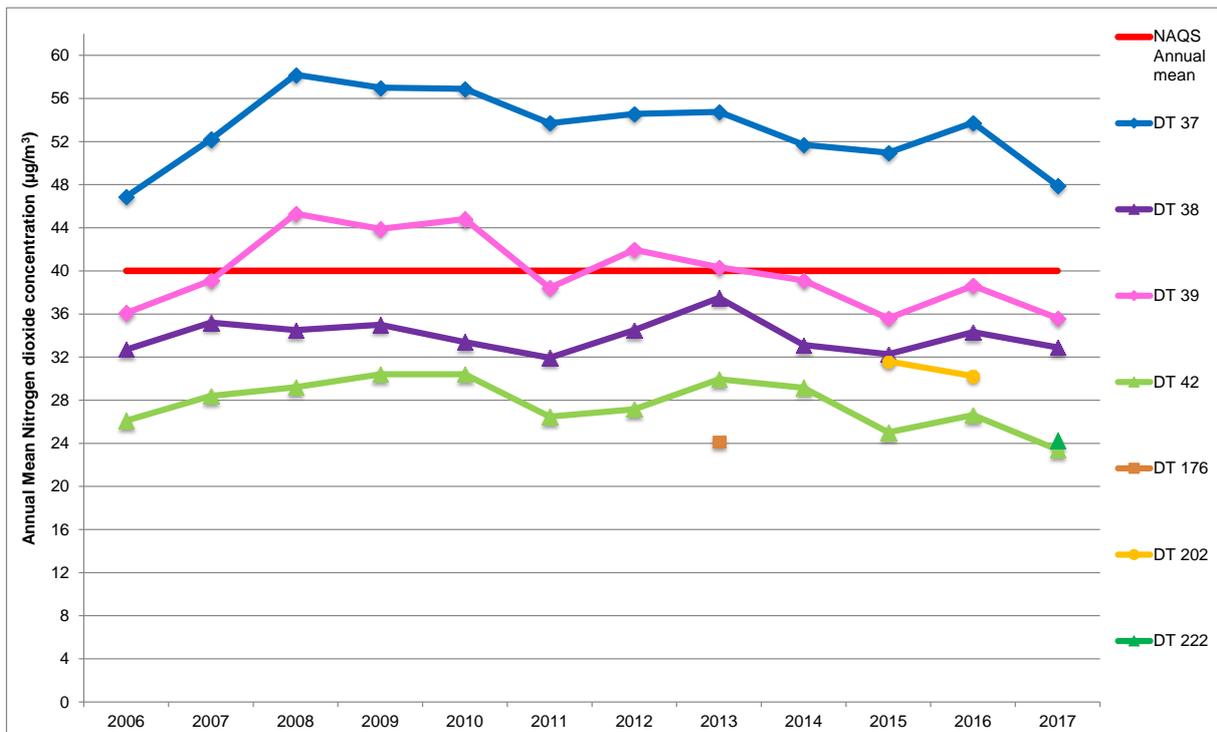


Figure C.15 Overview of NO₂ Diffusion Tube Concentrations in Logie St.



Albert Street / Arbroath Road

Figure C.16 NO₂ Diffusion Tube Locations in Albert St. / Arbroath Road

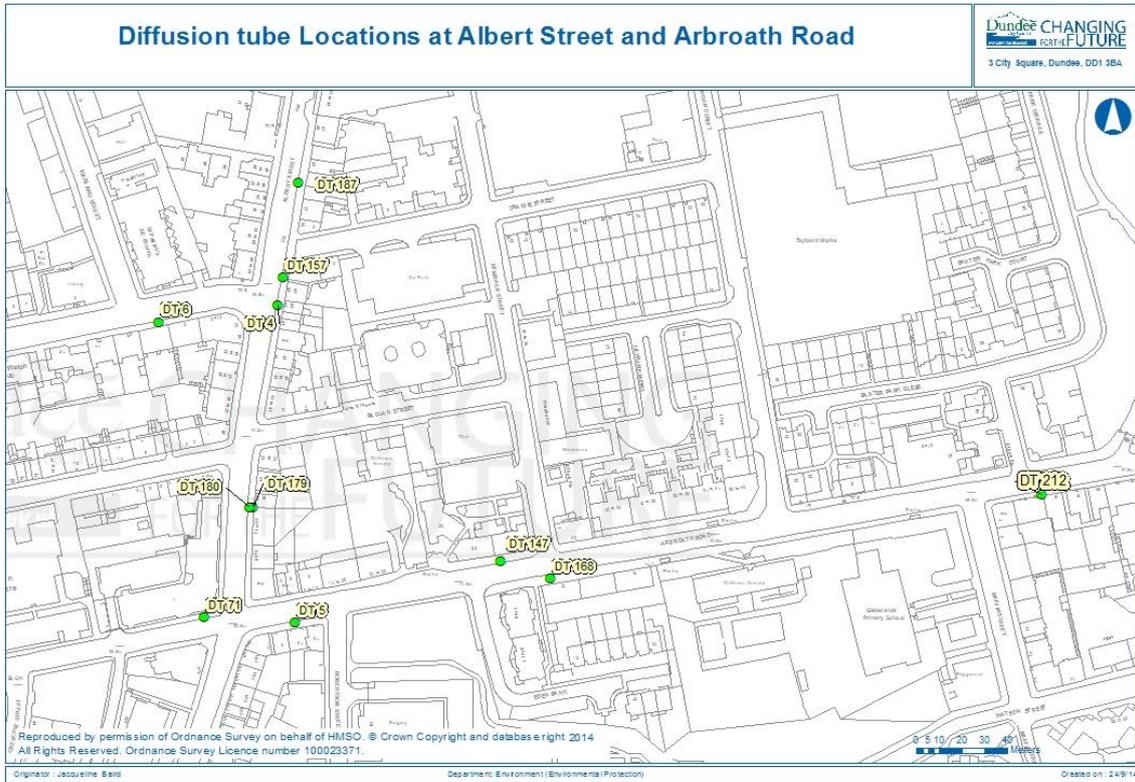
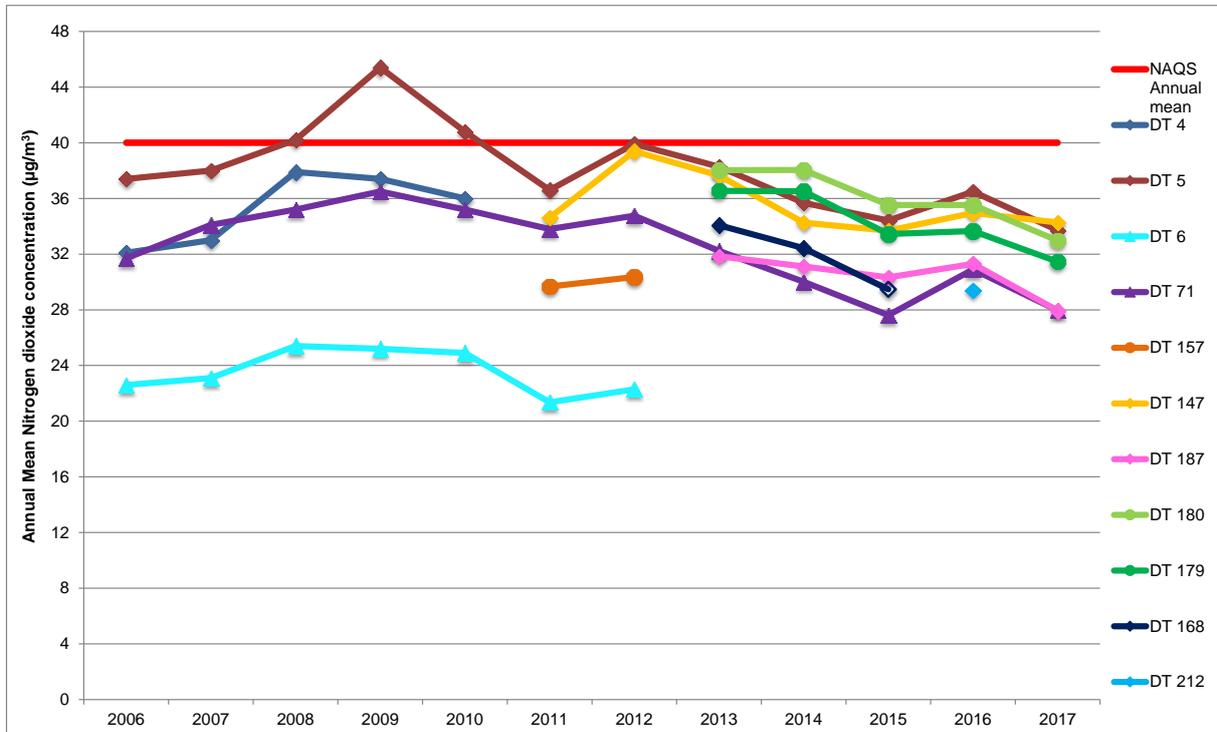


Figure C.17 Overview of NO₂ Diffusion Tube Concentrations in Albert St. / Arbroath Road



Kingsway / Forfar Road.

Figure C.18 NO₂ Diffusion Tube Locations on/near the Kingsway

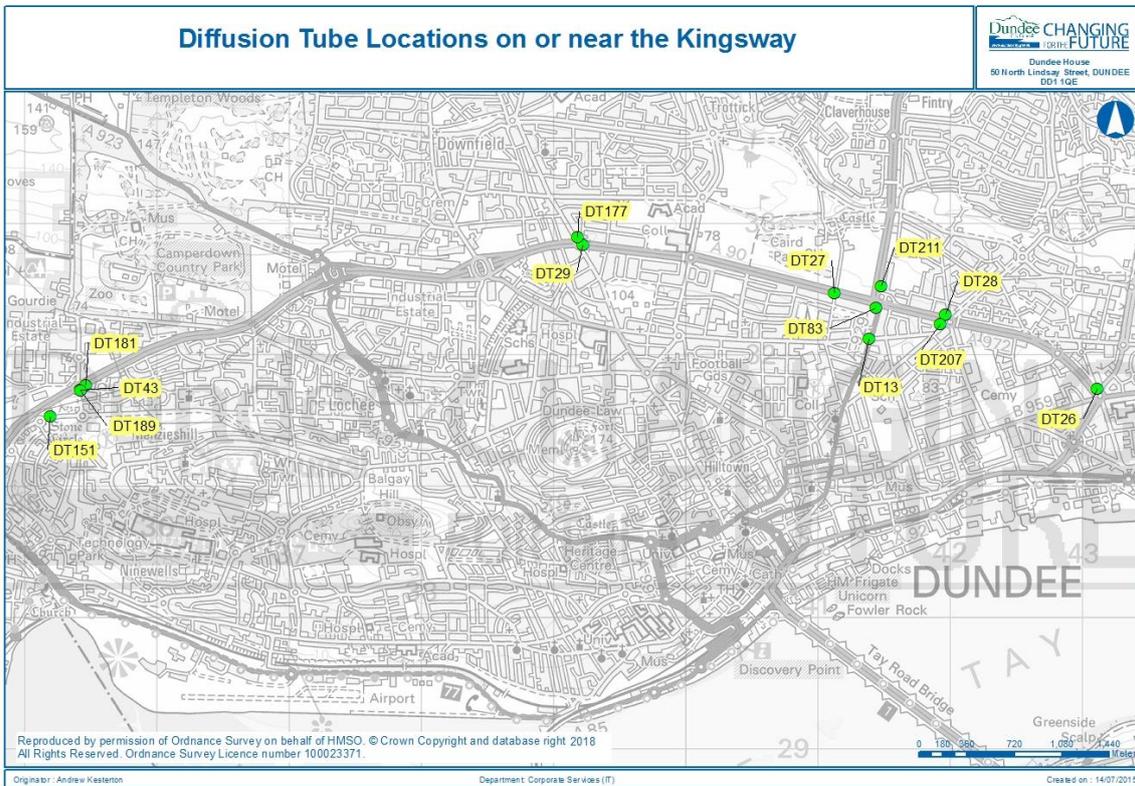
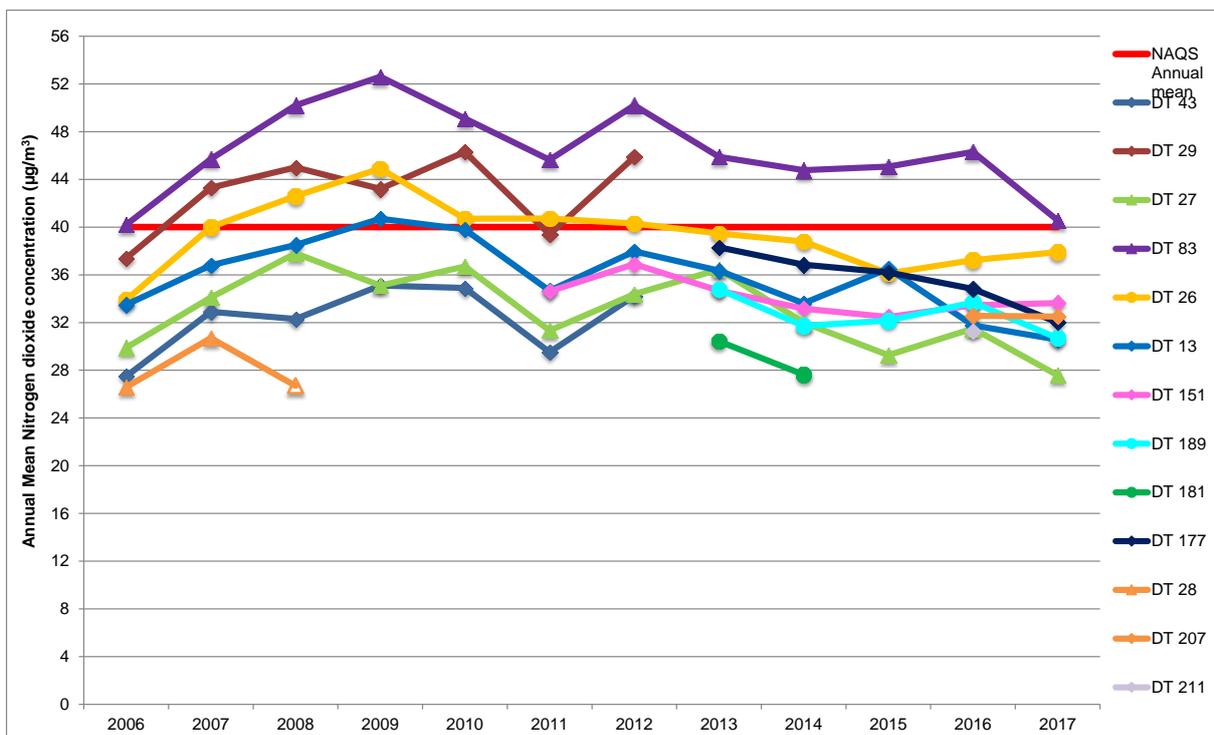


Figure C.19 Overview of NO₂ Diffusion Tube Concentrations on/near the Kingsway



Bus Corridor

Figure C.20 Other NO₂ Diffusion Tube Locations on Bus Corridor

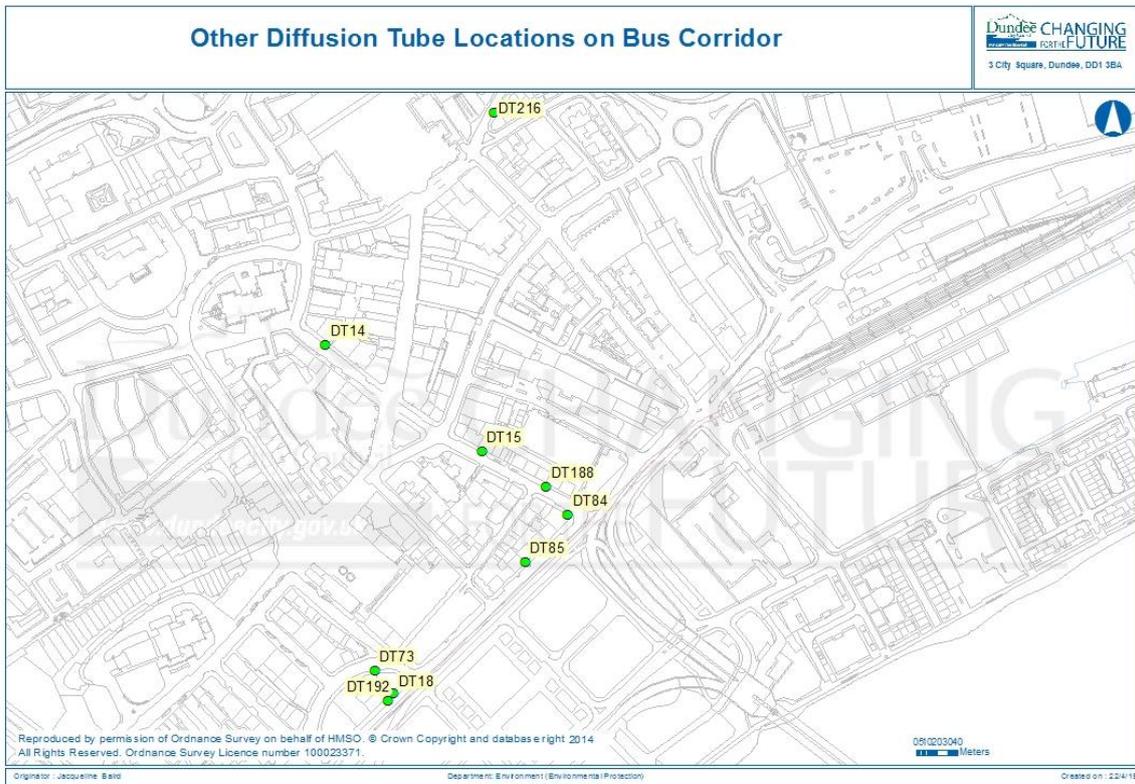
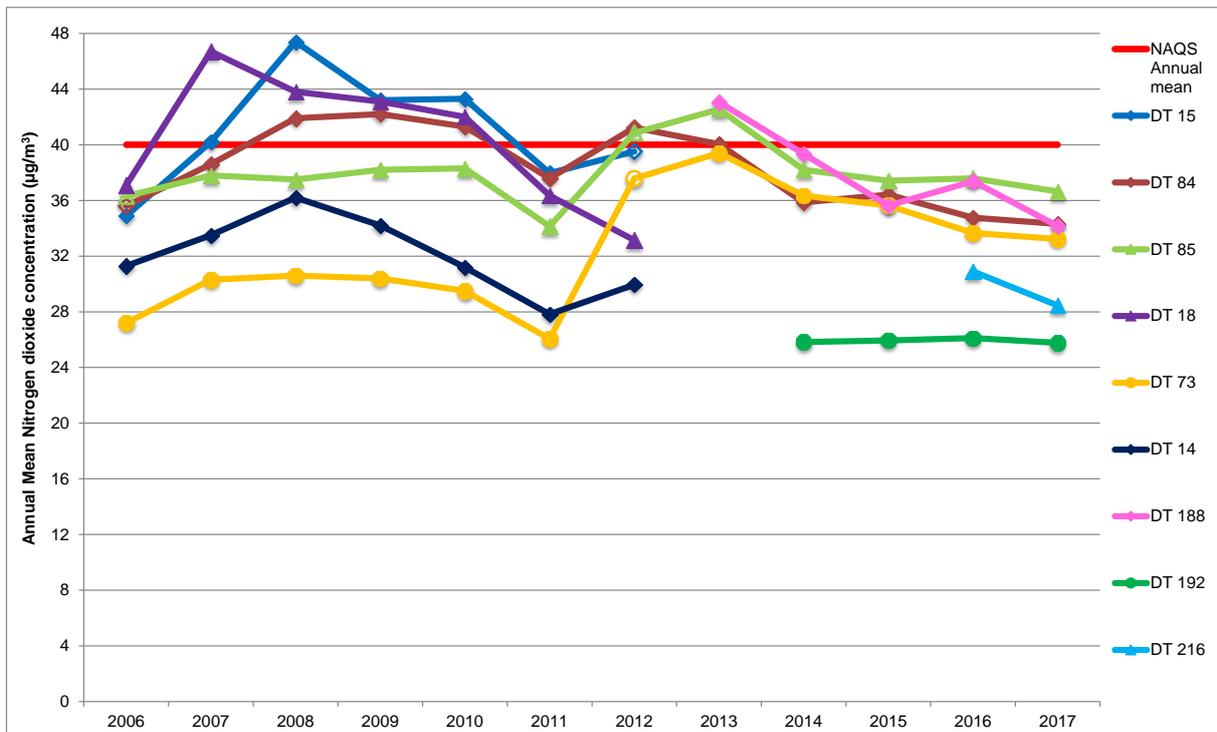


Figure C.21 Overview of Other NO₂ Diffusion Tube Concentrations on Bus Corridor



Inner Ring Road

Figure C.22 NO₂ Diffusion Tube Locations on Inner Ring Road

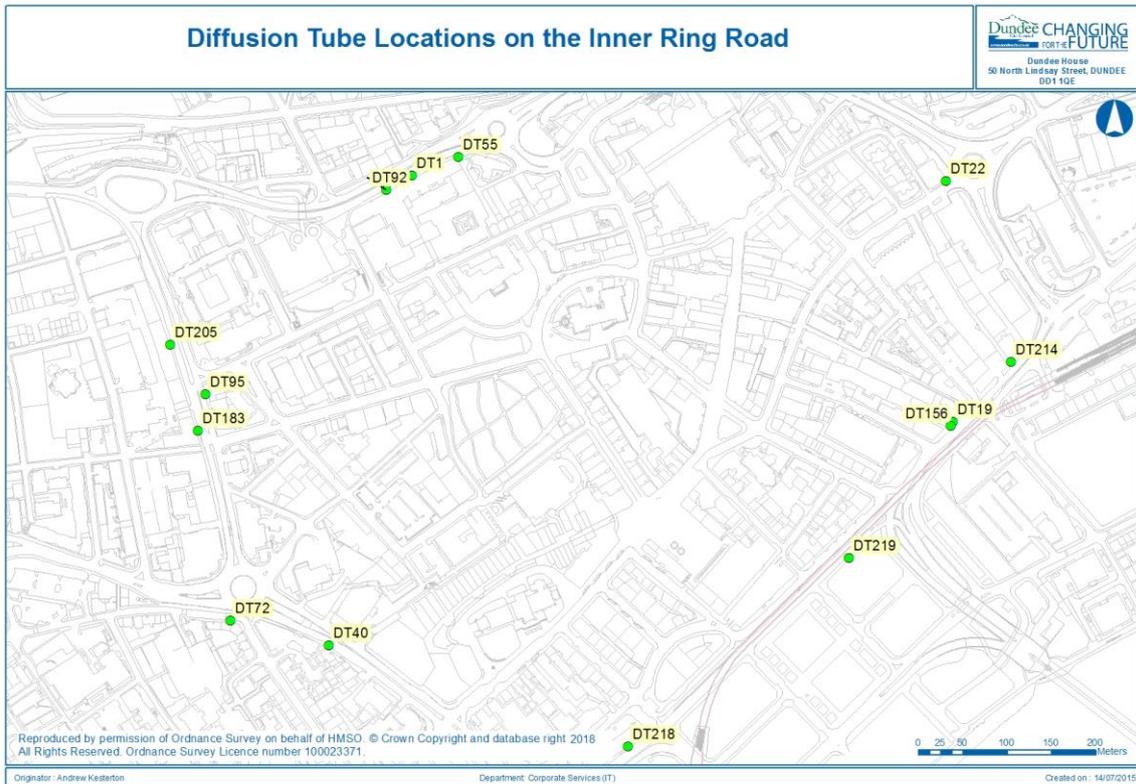
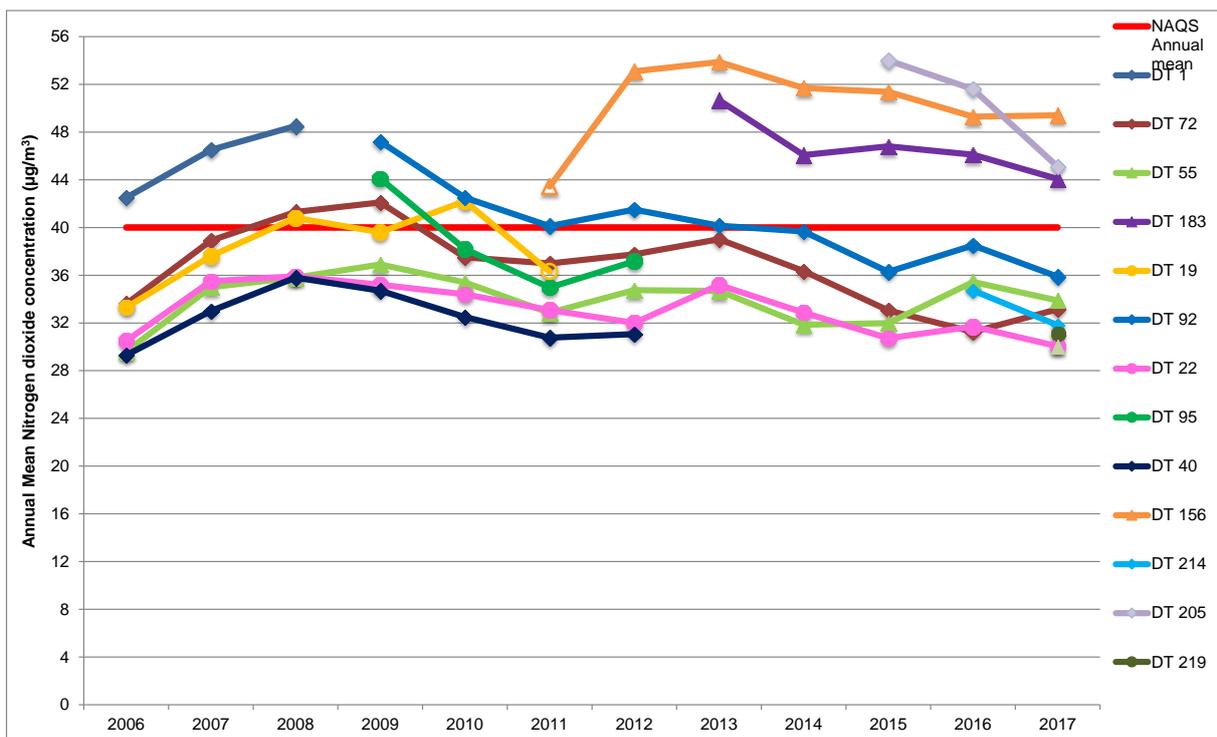


Figure C.23 Overview of NO₂ Diffusion Tube Concentrations on Inner Ring Road



Stannergate Roundabout

Figure C.24 NO₂ Diffusion Tube Location at Stannergate Roundabout

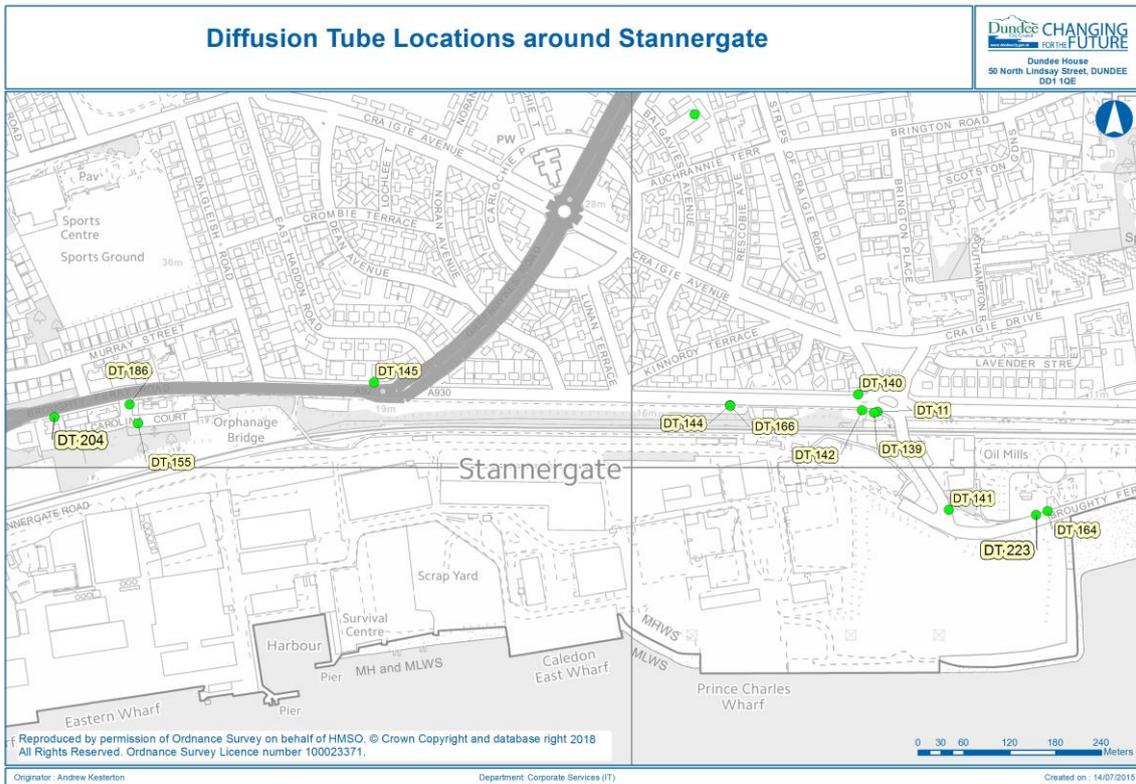
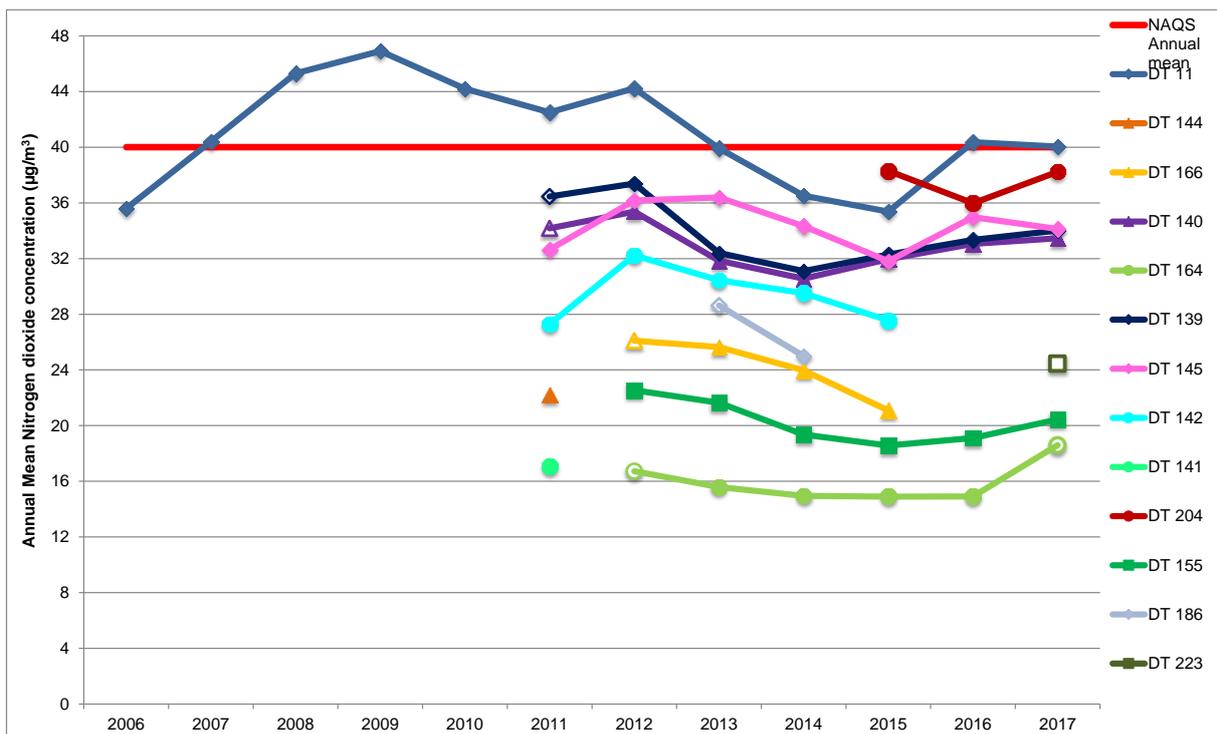


Figure C.25 Overview of NO₂ Diffusion Tube Concentration at Stannergate Roundabout



Strathmore Avenue

Figure C.26 NO₂ Diffusion Tube Location at Strathmore Avenue

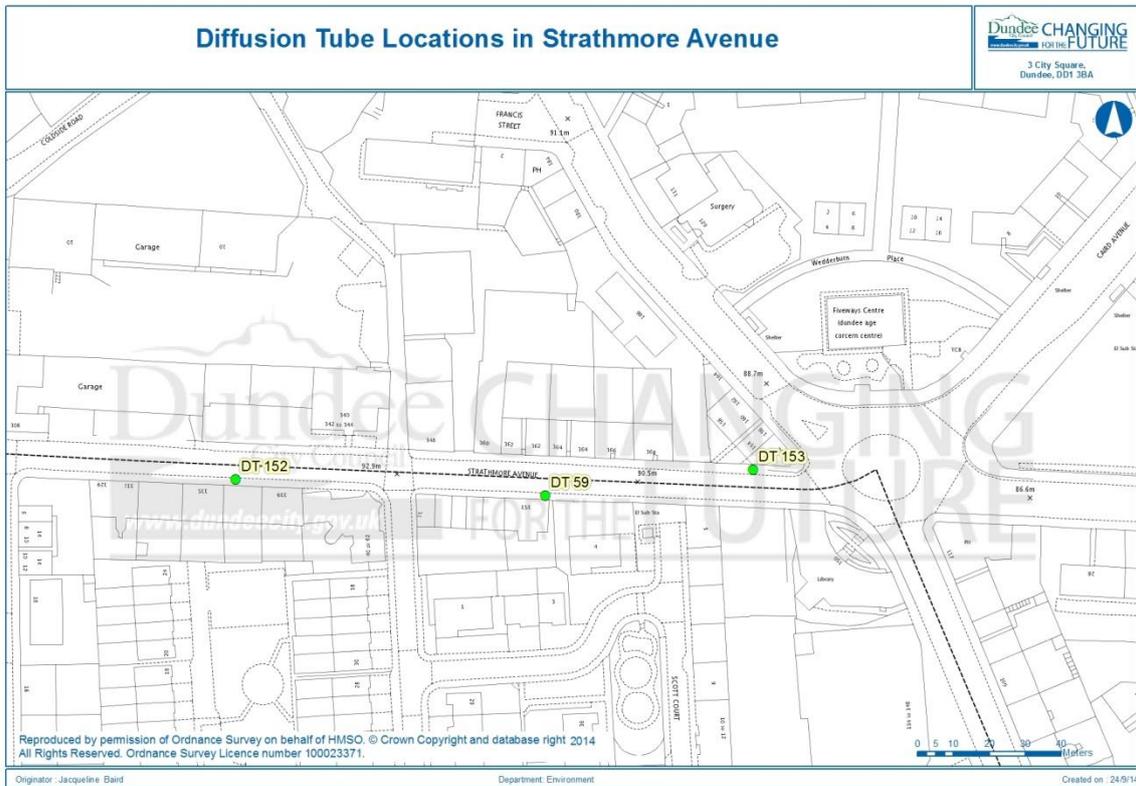


Figure C.27 Overview of NO₂ Diffusion Tube Concentration at Strathmore Avenue

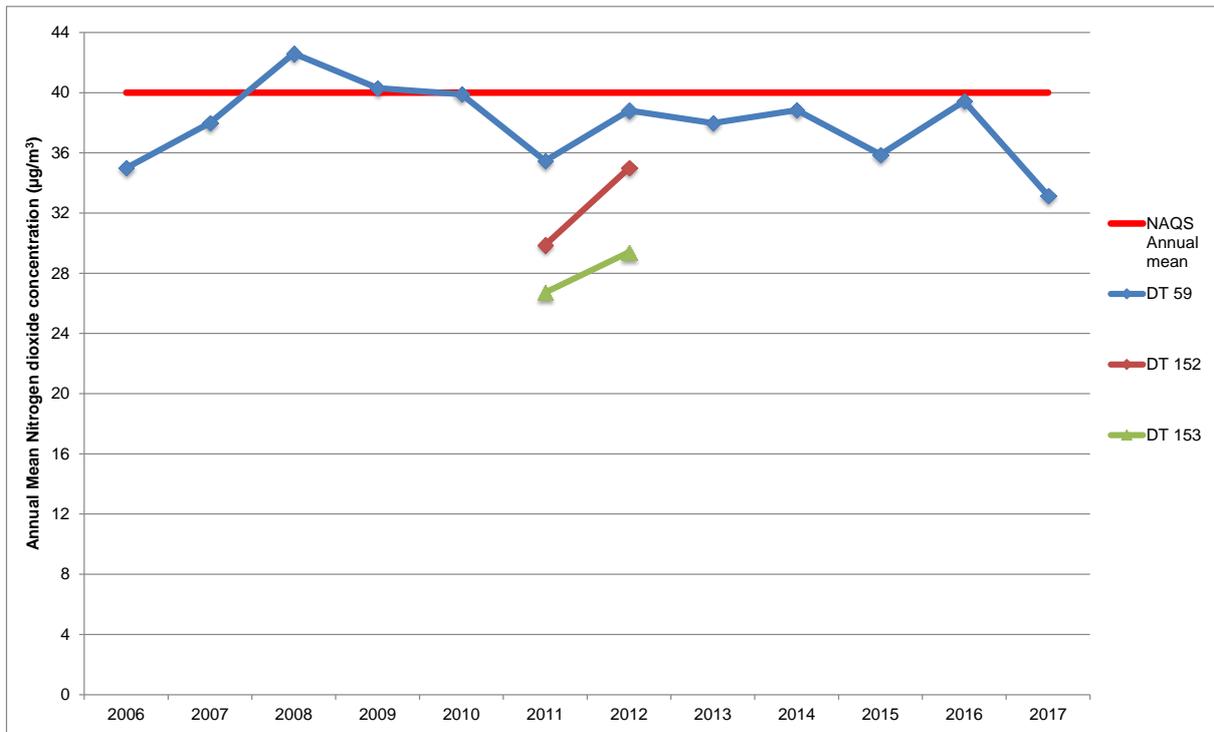


Figure C.28 Urban Background NO₂ Monitoring Locations

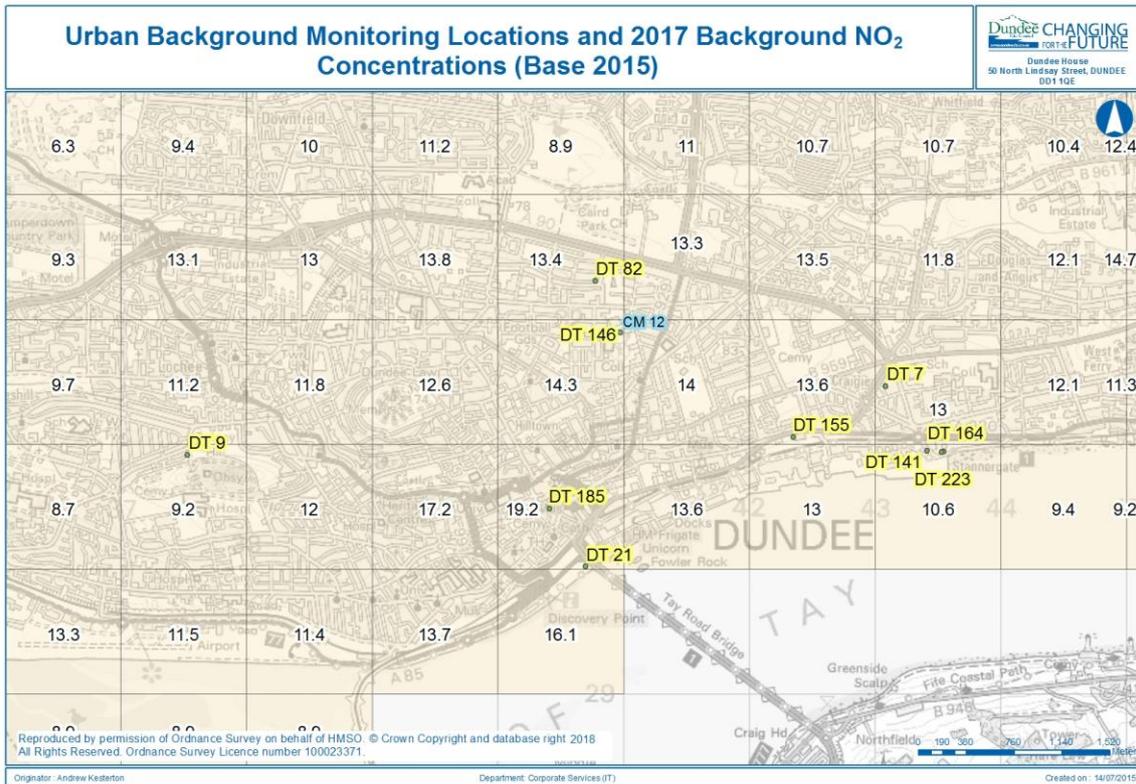
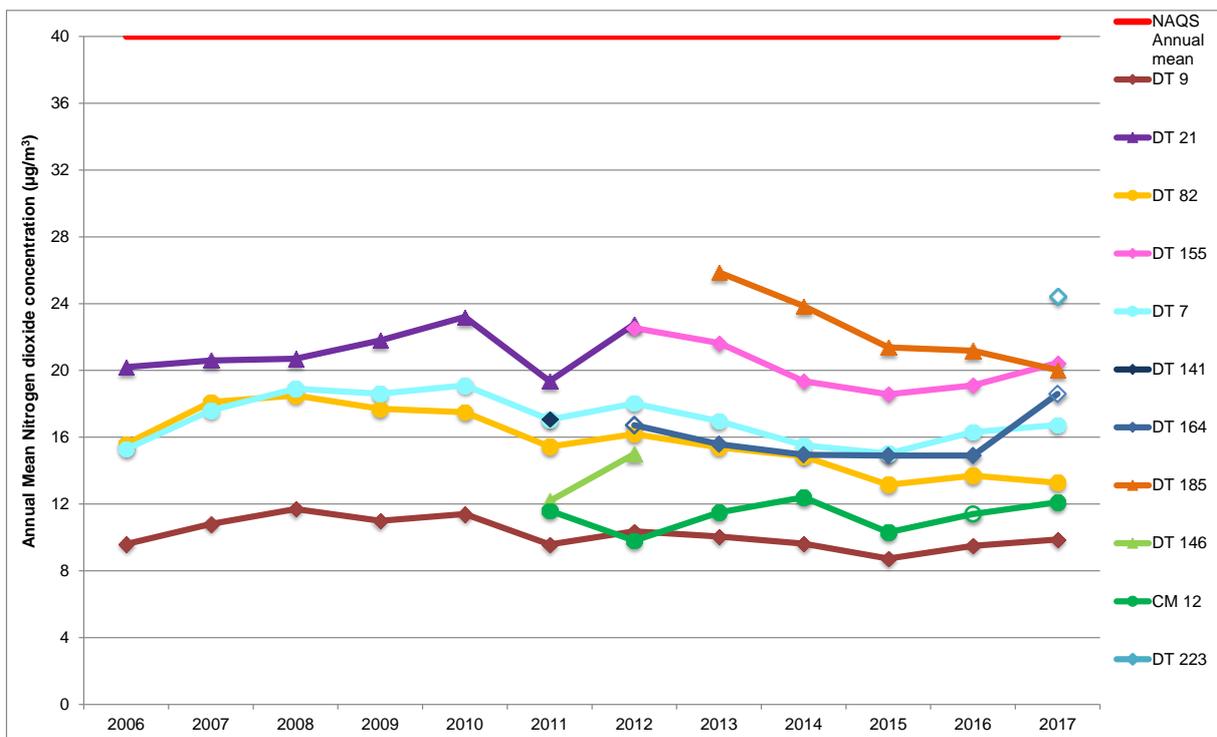
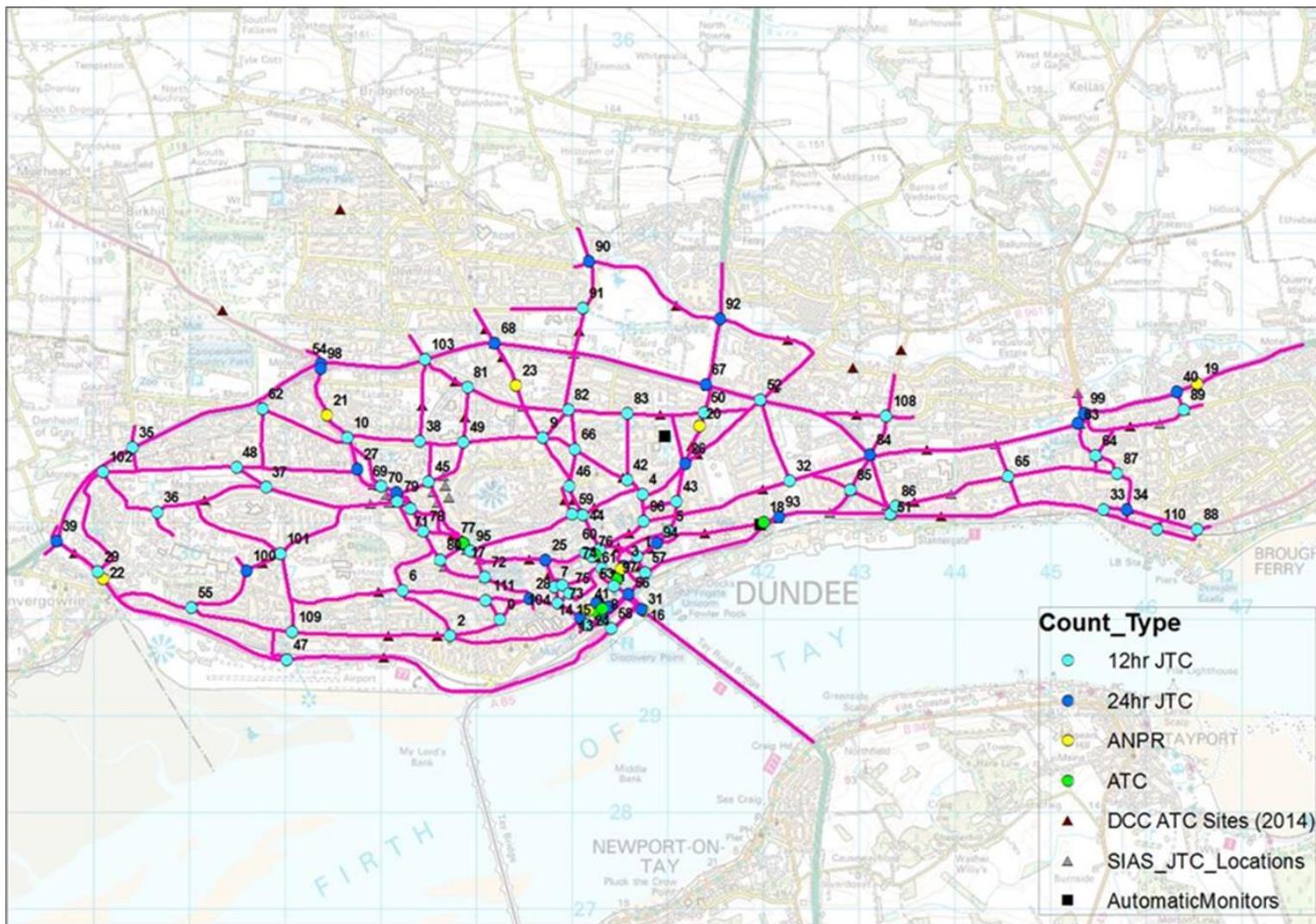


Figure C.29 Overview of NO₂ Concentrations at Urban Background Locations



Appendix C.3 Road Traffic Data

Figure C.30 Road Network and Traffic Count Locations for NMF City Model for Dundee



Note: Picture provided by Mark Williams of Scottish Environment Protection Agency

Table C.6 Road Traffic Reduction Sites – Annual Average Daily Traffic

RTRA count location	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Bar Chart
Arbroath Rd (E of Kenilworth Ave)	13186	13335	14054	13153	13846	12869	13283	13697	13142	13174	13287	13642	13784	
Blackness Rd (W of Marchfield)	6574	6675	6435	6195	6145	5938	5911	5844	5102	5509	5676	6487	5819	
Broughty Ferry Rd (E of Dalglish Rd)	31956	31802	31535	30098	27640	27756	27315	24741	29322	30272	26809	28161	29190	
Dens Rd (S of Hillbank Rd)	10852	10664	10672	11023	10833	10083	10062	10178	9744	9707	10315	10322	10756	
Forfar Rd (N of Janefield Pl)	9278	9640	9880	8222	9224	9213	8861	9053	8768	9063	9209	8876	8991	
Hilltown (N of Stirling St)	6024	5710	5895	5701	5753	5656	5416	5492	5608	4268	5782	5828	5491	
Lochee Rd (N of Rankine St)	13477	13681	13438	13286	13296	12983	12684	11603	11285	11880	11821	11770	12453	
Perth Rd (E of Windsor St)	8341	7434	7583	7531	7695	7352	7053	7184	7180	7214	7328	6650	7316	
Pitkerro Rd (S of Baxter Park)	10107	9522	9975	9950	9789	9359	8623	8608	8827	8899	9085	9126	9584	
Rankine St (N of Lochee Rd)	8098	7294	8069	7927	7605	7121	7115	6862	7188	6939	7118	7035	7043	
Riverside Dr (nr Airport)	18875	19056	18918	19045	17907	17654	17024	15900	16213	15932	15923	17343	17503	
Rosebank St (N of Kinloch St)	4821	4867	4722	4623	4528	4603	4426	4489	4621	4587	4655	4615	4183	
Tay Bridge	24475	24686	24748	25045	25406	25235	25484	24753	24770	24925	21762	25993	26631	

Note: 1) Heights of the bars in the charts are relative to the range of values across all sites.
 2) The red and blue bars are the highest and lowest count, respectively, at that count location.

Table C.7 Road Traffic Reduction Sites – Percentage Growth

RTRA count location	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Bar Chart
Arbroath Rd (E of Kenilworth Ave)	100	101	107	100	105	98	101	104	100	100	101	104	105	
Blackness Rd (W of Marchfield)	100	102	98	94	93	90	90	89	78	84	86	99	89	
Broughty Ferry Rd (E of Dalgleish Rd)	100	100	99	94	86	87	85	77	92	95	84	88	91	
Dens Rd (S of Hillbank Rd)	100	98	98	102	100	93	93	94	90	89	95	95	99	
Forfar Rd (N of Janefield Pl)	100	104	106	89	99	99	96	98	95	98	99	96	97	
Hilltown (N of Stirling St)	100	95	98	95	96	94	90	91	93	71	96	97	91	
Lochee Rd (N of Rankine St)	100	102	100	99	99	96	94	86	84	88	88	87	92	
Perth Rd (E of Windsor St)	100	89	91	90	92	88	85	86	86	86	88	80	88	
Pitkerro Rd (S of Baxter Park)	100	94	99	98	97	93	85	85	87	88	90	90	95	
Rankine St (N of Lochee Rd)	100	90	100	98	94	88	88	85	89	86	88	87	87	
Riverside Dr (nr Airport)	100	101	100	101	95	94	90	84	86	84	84	92	93	
Rosebank St (N of Kinloch St)	100	101	98	96	94	95	92	93	96	95	97	96	87	
Tay Bridge	100	101	101	102	104	103	104	101	101	102	89	106	109	

Note: 1) Heights of the bars in the charts are relative to the range for that location.

2) The red and blue bars are the highest and lowest percentage growth, respectively, for that site.

Appendix C.4 List of Industrial Processes

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Rockwell Solutions, Wester Gourdie, Dundee	Chapter 6: Other Activities Surface treating with organic solvents - Also Chapter 7 SED	6.4.b	No	No	No	No	No	No	Variation in progress. Changes on site mean it's likely there has been a reduction of solvent emissions
MVV Environmental (Baldovie) Ltd Baldovie, Dundee	Chapter 5: Waste Management	IPPC S5.01 & S5.01b	No	No	No	Yes, previously assessed	No	No	No Change, planning application granted for new incinerator. Substantial Variation Likely for replacement plant in 2018 ¹
Nynas UK AB, East Camperdown Street, Dundee DD1 3LG	Chapter 1: Energy Industries	Section 1.2 Part A Paragraph (f) (i)	No	No	No	Yes, previously assessed	No	No	Site is now effectively a Part B process, but a formal surrender of the Part A has not yet been submitted. Site is now solely burning natural gas, with a much reduced inventory of bitumen and oil products..

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Nationwide Crash Repair Centres Ltd, Liff Road, Dundee	Chapter 6: Other Activities vehicle respraying	6.4.b	No	No	No	No	No	No	No Change
Hanson Aggregates Piper Street, Dundee	Chapter 3: Mineral Industries cement batchers	3.1.a.(ii)	No	No	No	No	No	No	Not operating.
Subsea Protection Systems	Chapter 3: Mineral Industries cement batching	3.1.b	No	No	No	Yes, previously assessed	No	No	Permit surrendered.
Discovery Filling Station	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Brochtay Filling Station	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Asda Stores Filling Station Kirkton	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Tesco Stores Ltd, Methven Street, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	Surrendered 2015
BP Kingsway West Filling Station	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Shell Caird Park	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Shell UK Ltd, East Kingsway Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	Closed 2015

Dundee City Council

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Asda Stores Ltd, Milton of Craigie, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Tesco Stores Ltd, Riverside Drive, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Tapedrive Ltd, Marketgait F/S, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Sainsburys Supermarket Ltd, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Jet Petrol Station, Forfar Road, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	Yes, previously assessed	No	No	No Change
Dens Metals Ltd, West Pitkerro, Dundee	Chapter 2: Production and Processing of Metals	2.2.a	No	No	No	Yes, previously assessed	No	No	Surrendered 2015
Mctavish Ramsay Ltd, Barlow Ave, West Pitkerro	Chapter 6: Other Activities Timber Activity	6.6.(i)	No	No	No	No	No	No	Company in administration. Not operating
Johnsons, Asda Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	Surrendered 2015
Breedon Aggregates Ltd, Longtown Street, Dundee	Chapter 3: Mineral Industries Cement Batching	3.1.a.(ii)	No	No	No	No, previously assessed	No	No	No Change
Aberdeen Valet Service Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	Site no longer operating.	Site no longer operating.	No	No	No	Surrendered 2015

Dundee City Council

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment~	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Lochee Dry cleaning Centre Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	No Change
Ferry Laundrette Broughty Ferry	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	Not operating since fire in 2016, may become operational again
Stay-Press Dry Cleaning Centre, Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	Surrendered 2015
Care Clean, Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	No Change
Dignity Ltd, Dundee Crematorium, Dundee	Chapter 5: Waste Management	5.1c	No	No	No	No	No	No	No change
Laundry On Line, Annfield Road, Dundee	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	No Change
Wm Morrison Supermarkets Plc, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	No	No	No	No Change
Wm Morrison Supermarkets plc, 1 Afton Way	Chapter 7: SED Activities	Chapter 7: SED Activities	No	No	No	No	No	No	No Change
Tesco Filling Station, South Road, Dundee	Chapter 1: Energy Industries-Petrol Station	1.2.c.(ii)	No	No	No	No	No	No	No Change
Halley Stevensons (Dyers & Finishers) Limited, Baltic Works, Annfield Road,	Chapter 6: Other Activities	Section 6.4 Part A Paragraph (a)	No	No	No	No	No	No	No Change

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Dundee DD1 5JH									
Discovery Flexibles, Kemback St Dundee	Chapter 6: Other Activities surface treatment using organic solvents also Chapter 7 SED coating flexible packaging	6.4.b	No	No	No	No	No	No	Replacement of one of the process lines with updated equipment. May mean slight change to emissions but not likely to be significant.
J T Inglis, Riverside Works, Dundee	Chapter 6: Other Activities Textile Treatment	6.4.d	No	No	No	No	No	No	Site Closed 2016, surrender application ongoing
Michelin Tyre Plant, Dundee	Chapter 6: Other Activities surface treatment of rubber with organic solvents also Chapter 7	6.4.b	No	No	No	Yes, previously assessed	No	No	No change since extension completed..
Michelin Tyre Plant, Dundee	Chapter 1: Energy Industries, Combustion	1.1.a	No	No	No	Yes, previously assessed	No	No	No change.
D C Thomson Printers, Dundee	Chapter 6: Other Activities printing process	6.4.b	No	No	No	No	No	No	Not operating but still permitted.

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Day International Ltd, Balgray St, Dundee	Chapter 6: Other Activities surface treatment of rubber with organic solvents	6.4.b	No	No	No	Yes, previously assessed	No	No	No update
RMC Readymix Ltd, Dundee	Chapter 3: Mineral Industries, Cement Batching	3.1.a.(ii)	No	No	No	No	No	No	No change
Brown & Tawse Steelstock Ltd, Fowler RD West Pitkerro - Dundee	Chapter 6: Other Activities, paint spraying	6.4.a	No	No	No	No	No	No	No Change
Armitages Pet Products Ltd, Broughty Ferry Road-Dundee	Chapter 6: Other Activities, Pet Food Manufacture	6.8.a	No	No	No	No	No	No	Permit surrender received December 2017
Tesco Stores Ltd, Kingsway Retail Park Dundee	Chapter 1: Energy Industries, Petrol Station	1.2.c.(ii)	No	No	No	No	No	No	No Change
Joinery and Timber Creations (65) Ltd,	Chapter 6: Other Activities, Timber Process	6.6.(i)	No	No	No	No, previously assessed	No	No	Waste wood boiler- permitted but not operating.
Ethiebeaton Quarry	Chapter 3 Mineral Activities - cement batching process 3.1a(ii), roadstone coating 3.5e, crushing and grinding 3.5c	3.1a(ii), 3.5e, 3.5c	No	No	No	Yes, previously assessed	No	No	No change
Health Care Environmental Services, Nobel Road, Wester Gourdie Ind. Estate	Chapter 5 Waste Management Part A Treatment of Clinical waste	5.3a	No	No	No	No, previously assessed	No	No	No change to process since emissions where capped off.

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Petrol Filling Station, Asda, Myrekirk Road	Chapter 1: Energy Industries, Petrol Station	1.2.c.(ii)	No	No	No	Yes, but no relevant receptors	No	No	No change
ASKA Energy, 3B Edison Place, Dundee	Chapter 4. Chemical Industry, Part A, Producing organic chemicals (biodiesel)	Section 4, Part A, sub-section b	No	No	No	No (Emissions aren't LAQM pollutants)	No	No	Permit surrender received December 2017
Sherburn Cement, Shed 1, Eastern Wharf, Port of Dundee, DD1 3LZ	Chapter 3, Part B, section 3.1 (a)(i) Bulk Storage of Cement	PG 3/01(12)	No	No	No	Yes (possible fugitive emissions of particulates)	No	No	Site permitted 2016 and operating PPC/B/1142921
Crown Timber King George V Wharf Road, Dundee Harbour, Dundee, DD1 3LU	Section 6.6 Part A Wood Products Preservation with Chemicals	Sector Guidance Note SG11 (draft status at issue)	No	No	No	No (No LAQM pollutants or fugitive emissions)	No	No	Existing process has come into the PPC regime (SEPA reference PPC/A/1132892) as part of the Industrial Emissions Directive.
Vericore Ltd, Kinnoull Road, Kingsway West, Dundee, DD2 3XR	Schedule 2 (PPC 2012) SED Part B Production of Veterinary Pharmaceuticals		No	No	No	Yes (possible fugitive emissions of particulates)	No	No	Site permitted 2016 and operating – PPC/B/1141206
Augean North Sea Services, Riverside Works, Princess Alexandra Wharf, Stannergate Road, Dundee, DD1 3LU	Chapter 5.3 Part A (b) (ii), (iii), (iv), (vi), (x)		Yes	No	No	Yes (possible fugitive emissions of particulates)	No	No	Site permitted 2017 but not operating – PPC/A/1158864

Process Name/Address	Process Type	PPC Sector	New source since APR 2017?	Existing process with new exposure?	Is change substantial (>30%)?	Process Potentially Requiring Review & Assessment~	Nomogram screening assessment required?	Detailed assessment Required?	SEPA Comments
Scotscreed Limited, Fishdock Road, Stannergate, Dundee, DD1 3LU	Chapter 3; Section 3.1 Part B (a) (ii)		Yes	No	No	Yes (possible fugitive emissions of particulates)	No	No	Site permitted 2017 and operating PPC/B/1155960

Notes: Yes* see Section 4.3
 ~ With reference to Annex 2 Appendix E TG.03
 Part A - Processes shaded purple
 (1) – see Section 4.3 –New or Proposed installations for which an Air Quality Assessment has been carried out

Figure C.31 Mapped Polar Plots of PM₁₀ Concentrations at Mains Loan, Broughty Ferry Road and Stannergate Monitoring Sites

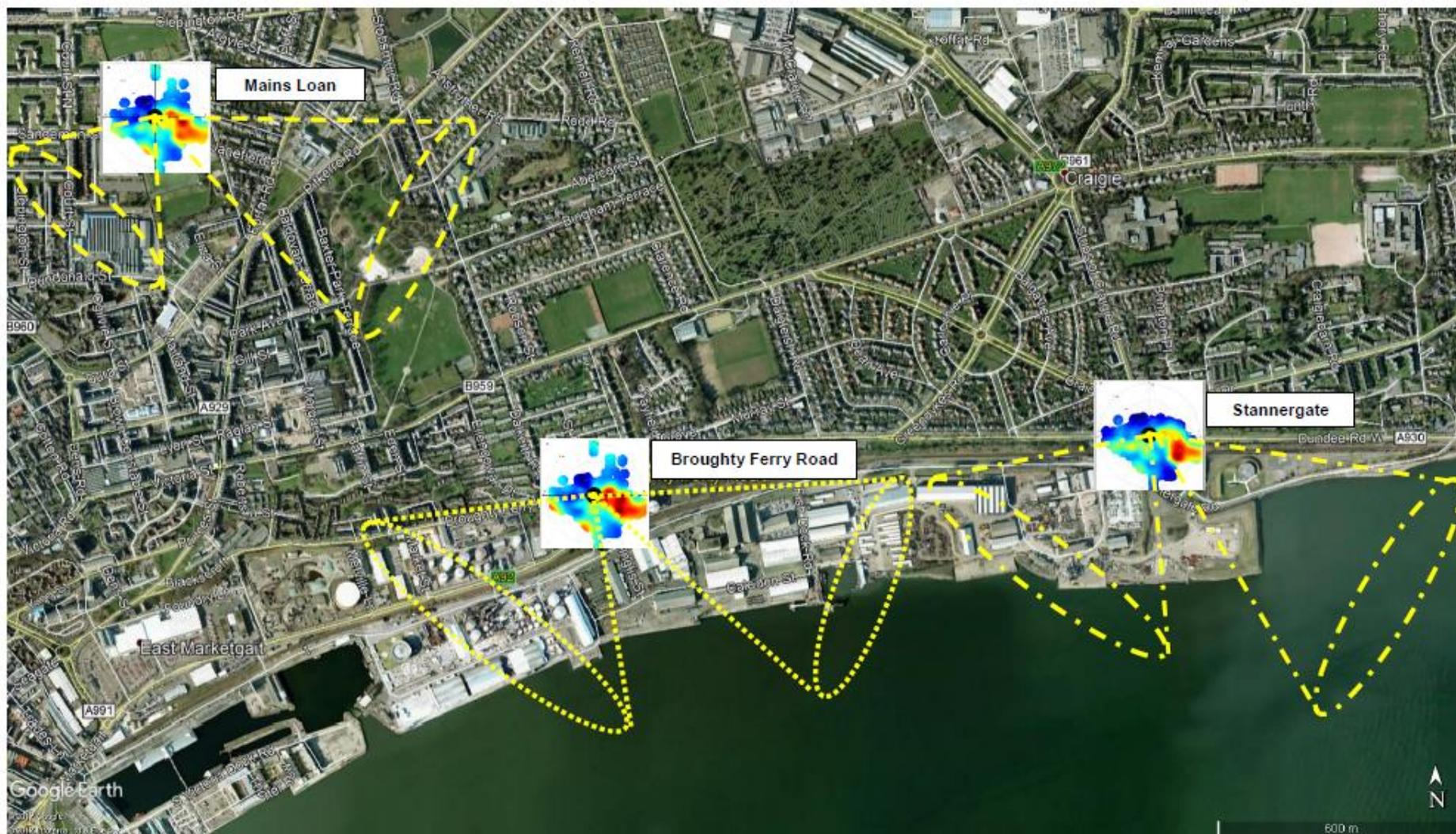


Figure C.32 New and Surrendered Prescribed Processes in the port (2017) and nearby real-time monitors



Appendix C.5 Executive Summary - Review of Dundee City Centre Bus Movements (July 2017)

OVERVIEW

Dundee established itself in the Victorian age and this has led to the infrastructure of tall buildings and narrow streets which has changed little up to the present day. In addition it has a population reliant on a competitive public transport network. This dichotomy of healthy transport demand against restrictive road supply has led to a trapping of road pollutants and subsequent poor air quality.

This review has examined the current bus movements through the city centre, assessing passenger and bus usage of city centre stances, stop dwell time, bus idling and layover while investigating the appropriateness of a Traffic Regulation Condition as well as other statutory measures to tackle the air quality issue.

To identify methods to tackle congestion, passenger boarding issues and poor air quality an extensive data gathering exercise took place of buses actual dwell time, unloading/boarding away from their designated stance, unable to access raised kerb areas and idling for more than one minute. This was supplemented with a review of how other authorities and operators have dealt with air quality issues especially with the implementation of TRCs, along with discussions with the key stakeholders including the main bus operators.

FINDINGS & RECOMMENDATIONS

From the data collection the average mean dwell time (arrival and departure at the stance) was recorded at 1'28". Where there was unscheduled and scheduled layover time the maximum dwell rose to only three minutes. It was, however, once at the stops that the drivers left the engine idling 85% of all journeys observed and 37% of those over a minute. Significant emissions savings can be realised by switching off the engine, also there are cost savings as stopping and starting the engine after a minute will be less than the cost of leaving the engine idling.

It is therefore recommended to introduce an 'engine off' rule. Although technically a one minute or less rule would be more technically appropriate taking into account operational and monitoring factors a two minute rule is recommended. Dwell time should be limited to three minutes with changeovers scheduled within that timeframe.

The data collected showed that buses had little difficulty accessing the raised kerbs provided at stances (2.3% failing to do so) in the city centre although there were some exceptions, the main one being Crichton Street. There was a greater problem with buses gaining access to their designated stances this was particularly a problem again at Crichton Street and Whitehall Street.

It is understood that a reduction in bus capacity is being considered by Xplore in Whitehall Street to ease congestion. If this does not happen then consideration should be given to the withdraw of services as the majority are duplicated in Nethergate just 115m away. In addition it is recommended to ease the congestion in Crichton Street that Xplore & Stagecoach switch stances and the Council provide an additional stance that can accommodate 15m coaches.

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The current stance provision although geared to the operators seemed the most appropriate to meet the current capacity and destination throughout the city centre and therefore no significant changes were proposed.

No significant changes to the stance arrangement

Dundee has a rich history of partnership working in delivering public transport through voluntary quality partnerships and the Bus Punctuality Improvement Partnerships (BPIP)

therefore a partnership approach is considered as the most appropriate method to tackle air quality, The self-enforcement of the proposed 'two minute engine off rule' and maximum dwell time being favoured. Tackling air quality, however, cannot be considered in isolation and levied at an individual cause. In fact, buses should be seen as the solution rather than problem. Vehicle emissions can be tackled by assuring that engines meeting the highest euro standards. From the survey 63% of the journeys observed were being operated by buses meeting the Euro V emission standard or greater, set as a minimum by other authorities who have adopted a formal approach to tackling air quality.

The formal approach to tackling environmental conditions has been open to the authority through Traffic Regulation Orders for many years and latterly through Traffic Regulation Conditions but adoption can be onerous and lengthy in delivery, however it has proven to be effective in other areas generally as part of a Low Emission Zone (LEZ).

The operators have highlighted their commitment to invest in newer vehicles but converting a fleet is a long term solution and this should be reflected in any method to deal with improvement in air quality. A long term solution is to introduce a LEZ to ensure that continual investment is maintained and as a catalyst to other vehicle classifications where a more formal approach is required.

In any partnerships both parties should bring something to the table, significant reductions can be made to bus emissions by improving the flow of vehicles through the city centre, this can be achieved by giving buses signal priority at junctions while this reduces engine idling and consequently bus emissions it has the added value of reducing bus resources and cost savings which can be reinvested in a newer fleet.

It is therefore recommended that follow a partnership approach as a precursor to the introduction of an LEZ by means of a TRC is used to tackle poor air quality. Operators should commit to the adoption of 'two minute engine off' and '3 minute dwell times' instruction, along with continual investment in their fleet by agreeing to reach minimum percentage of low emission vehicles. While the authority should ensure investment in traffic management measures to improve bus access.

Glossary of Terms

AADT	Annual Average Daily Traffic Flow
ADMS	An atmospheric air pollution dispersion model
AEA	AEA Energy & Environment
annualise	the means of estimating an annual mean from a shorter study period mean by comparison with full datasets from background AURN sites
AQ Archive	UK Air Quality Archive
APR	Air quality Annual Progress Report
AQAP	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'
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
AQO	Air Quality Objective
AQS	Air Quality Strategy
ATC	Automatic Traffic Count
AURN	Automatic Urban and Rural Network (Defra funded UK air quality monitoring network)
Borderline	A concentration that is a potential exceedance (e.g. sites above 36µg/m ³ for NO ₂ or 16.2µg/m ³ for PM ₁₀ annual mean)
CAFS	Cleaner Air for Scotland Strategy
CHP	Combined Heat and Power
CO	Carbon Monoxide
DCC	Dundee City Council
Defra	Department for Environment, Food and Rural Affairs
DERL	Dundee Energy Recycling Ltd
DMRB	Design Manual for Roads and Bridges - – Air quality screening tool produced by Highways England
EC	European Community
EPA	The Environmental Protection Act 1990
EPAQS	Expert Panel on Air Quality Standards
EU	European Union
GF	Ground floor
GIS	Geographical Information System
HDV	Heavy goods vehicles and buses
HFO	Heavy Fuel Oil
HGV	Heavy Goods Vehicle
HSL	Health & Safety Laboratory
IPC	Integrated Pollution Control
kerbside	0 to 1 metre from the kerb
LAQM	Local Air Quality Management
LAQM.TG(03)	Local Air Quality Management: Technical Guidance (2003)
LAQM.TG(09)	Local Air Quality Management: Technical Guidance (2009)
LAQM.TG(16)	Local Air Quality Management: Technical Guidance (2016) updated February 2018
LDP	Local Development Plan
LEZ	Low Emission Zone

Limit Value	An EU definition for a mandatory air quality standard of a pollutant listed in the air quality directives
MW	Mega Watts
mg/kg	Milligrams per Kilogram
mg/m ³	Milligrams per cubic metre
NAEI	National Atmospheric Emission Inventory
NAQS	National Air Quality Standard
NLEF	National Low Emission Framework (part of CAFS)
NMF	National Modelling Framework (part of CAFS)
NO	Nitric Oxide
NO ₂	Nitrogen Dioxide
NO _x	Oxides of nitrogen
ng/m ³	Nanograms per cubic metre
NPL	National Physical Laboratory
NRS	National Registers of Scotland
NRTF	National Road Traffic Forecast
OLEV	Office of Low Emission Vehicles
Osiris	the brand name given by Turnkey Instruments Ltd. to their particle measuring nephelometer
PDT	Passive Diffusion Tube
PHV	Private Hire Vehicles
P&T	Planning and Transportation
PM _{2.5}	Legal definition ¹⁹ of Particulate Matter less than 2.5µm aerodynamic diameter
PM ₁₀	Legal definition ²⁰ of Particulate Matter less than 10µm aerodynamic diameter
Pb	Lead
percentile	The percentage of results below a given value
ppb	Parts per billion
ppm	Parts per million
QA/QC	Quality Assurance and Quality Control
receptor	In this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
roadside	1 to 5 m from the kerb
SCA	Smoke Control Area
SED	Solvent Emissions Directive
SEPA	Scottish Environment Protection Agency
SO ₂	Sulphur Dioxide
SPG	Supplementary Planning Guidance
Street Canyon	A relatively narrow street with buildings on both sides, where the height of the buildings is generally greater than the width of the road
SULP	Sustainable Urban Logistics Plan
TEA	Triethanolamine
TEOM	Tapered Element Oscillating Microbalance
UKAS	United Kingdom Accreditation Service
ULEV	Ultra Low Emission Vehicle
USA	Updating and Screening Assessment
µg/m ³	Micrograms per cubic metre
VCM	Volatile Correction Method
VOC	Volatile Organic Compound
vpd	Vehicles per day
WASP	Workplace Analysis Scheme for Proficiency

¹⁹ <http://www.legislation.gov.uk/ssi/2016/162/regulation/2/made>

²⁰ <http://www.legislation.gov.uk/ssi/2000/97/schedule/made>

References

This report includes references where appropriate throughout the text as footnotes.