Fareham and Gosport Environmental Health Partnership

Annual Status Report 2016

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Submitted to	Heather Cusack	Heather Cusack	Heather Cusack	Heather Cusack
Prepared by	Paul Bentley – Consultant	Paul Bentley – Consultant	Paul Bentley – Consultant	Paul Bentley – Consultant
Signature				
Approved by	Jamie Clayton – Senior Consultant	Jamie Clayton – Senior Consultant	Jamie Clayton – Senior Consultant	Jamie Clayton – Senior Consultant
Signature				
Project number	6381546			

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FAREHAM
BOROUGH COUNCIL

GOSPORT
Borough Council

Working in partnership

2016 Air Quality Annual Status Report (ASR) for Fareham and Gosport Environmental Health Partnership

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

January, 2017

Local Authority Officer	Heather Cusack
Department	Regulatory Services
Address	Civic Offices Civic Way Fareham Hampshire PO16 7AZ
Telephone	01329 824759
E-mail	hcusack@fareham.gov.uk
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Executive Summary: Air Quality in Our Area

Air pollution is an issue that affects everyone within the Boroughs of Fareham and Gosport with varying levels of severity. The air that we breathe is essential for health and wellbeing and it shouldn't have to be a cause of detrimental health effects. Where we live, where we work, our travel choices, and the journeys we make can affect the concentrations of certain air pollutants that we are exposed to.

Local authorities have an obligation through the Local Air Quality Management (LAQM) regime to review and assess the air quality within their regions. Specific measures are implemented by way of Air Quality Action Plans (AQAPs) if there are areas of poor air quality shown to exist. Action by community engagement through education and promotion helps to benefit air quality at a local level. Good air quality begins at a local level, with actions being replicated on regional and national scales, benefitting on a wider scale, helping to meet the Air Quality Strategy (AQS) objectives that are set out in European and UK law.

Air Quality in Fareham and Gosport

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

The main source of air pollution within the Boroughs is road traffic emissions from vehicles using the existing road network. Traffic emissions are a major source of nitrogen dioxide (NO_2) and particulate matter of different size fractions (PM_{10} and $PM_{2.5}$) that, in addition to commercial, industrial and domestic sources, contribute to background pollutant concentrations.

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

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an Air Quality Strategy (AQS) objective, which are legally binding pollution limits to which Fareham and Gosport Boroughs must adhere to. There are currently two AQMAs within Fareham that have been declared due to monitored exceedances of the nitrogen dioxide (NO_2) annual mean AQS objective; Gosport Road declared in 2006, and Portland Street declared in 2007.

The current AQMAs can be viewed online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=103, details of the AQMAs are provided in Table 2.1 and boundary maps are presented in Figure D.2 and Figure D.3.

An Air Quality Action Plan (AQAP) was produced in 2008 due to the two AQMAs being designated. This outlined a number of measures and actions that were designed to improve the pollutant concentrations that were being experienced in these areas. The AQAP actions have been updated on a regular basis, initially through the Council's air quality steering group and more recently from direct liaison with representatives of Hampshire County Council's public transport and road network departments. The 2015 Updating and Screening Assessment required Fareham Borough Council to undertake a Detailed Assessment of the air quality in an area between the two existing AQMAs; this Detailed Assessment is included in Appendix F.

Upon completion of the 2016 Detailed Modelling Assessment it has been proposed to extend the boundaries of both the Gosport Road AQMA and the Portland Street AQMA. This decision has been made due to predicted exceedences of the NO_2 annual mean AQS objective being observed outside of the current AQMA boundaries. The AQAP will be updated in due course to recognise the boundary amendments of both AQMA and the additional population numbers that reside within the new boundaries.

Actions to Improve Air Quality

An updated to the AQAP is provided in Table 2.2. A number of the AQAP actions have now been completed and further targets have been set in relation to the same initiative. The detailed updates are as follows:

- The opening of the Eclipse busway in April 2012 as shown in Figure 0.2; latest passenger figures show that there was an increase of 2.5% between April

2015 – September 2015 compared to the same period in 2014. Projections for October 2015 – March 2016 show a further increase of 0.5%. This equates to an overall increase year on year of 1.3% with passenger numbers increasing from 2.1m annually to 2.2m in 2015/16. New Eclipse buses were introduced to services E1 and E2 in 2016;

- The use of the Eclipse busway by cyclists;
- Improved bus shelters including real time information (RTI) screens at bus stops throughout the Fareham-Gosport peninsula;
- Improved cycle paths between Fareham and Gosport;
- The development of the Quay Street "throughabout" reducing the number of vehicles passing close to Portland Street;
- Promotion of the Gosport Ferry between Gosport and Portsmouth as shown in Figure 0.1;
- The provision of a bus lane on Western Way, Fareham;
- The development of the Western Road, Fareham, bus gate, taking buses away from Portland Street;
- The publication of an air quality and health leaflet;
- The provision of two electric vehicle charging points in Fareham;
- Assisting Hampshire County Council with air quality monitoring for the Yew Tree Drive bus gate planning application;
- Sustainable travel banners on lamp posts in Gosport;
- Liaison in Summer of 2015 with the Public Health Team, Hampshire County Council;
- Letter of support from the Council to Hampshire County Council for their Low Emission Bus Scheme application in 2015;
- Air quality assessments through the planning regime e.g Daedalus, Longfield Ave, Furze Court;
- Revised Fareham Borough Council's Non-Residential Parking Standards SPD approved September 2015 which may have an impact on private car use;

- Fareham Borough Council's Design Guidance (excluding Welbourne) adopted in December 2015 covers issues such as the importance of pedestrian and cycle routes in new developments;
- Hampshire County Council's new draft Walking Strategy approved January 2016;
- New staff bike storage facility provided at Fareham Civic Offices in 2014;
- Routine inspections as required by the government to permitted installations including the Crematorium, Polycast foundry, vehicle paint resprayers etc;
- Staff taking part in annual sustainable travel challenges such as My Journey Commuter challenge in May 2015; and
- Improvements in the Council's refuse fleet, e.g 12 Euro V refuse vehicles; provision of vehicle tracking devices etc.

Funding has been secured through Hampshire County Council and planning permission granted for the Stubbington Bypass to be built (P/15/0718/CC) with work potentially starting in 2018. Further funding is required for the bypass amounting to about 75% of the projected cost of £35 million. This has been designed to alleviate the pressure on the highways and will reduce congestion on many of the Boroughs busy roads, reducing the impact of vehicles on the existing AQMAs.

Figure 0.1 – Promotion of Gosport Ferry

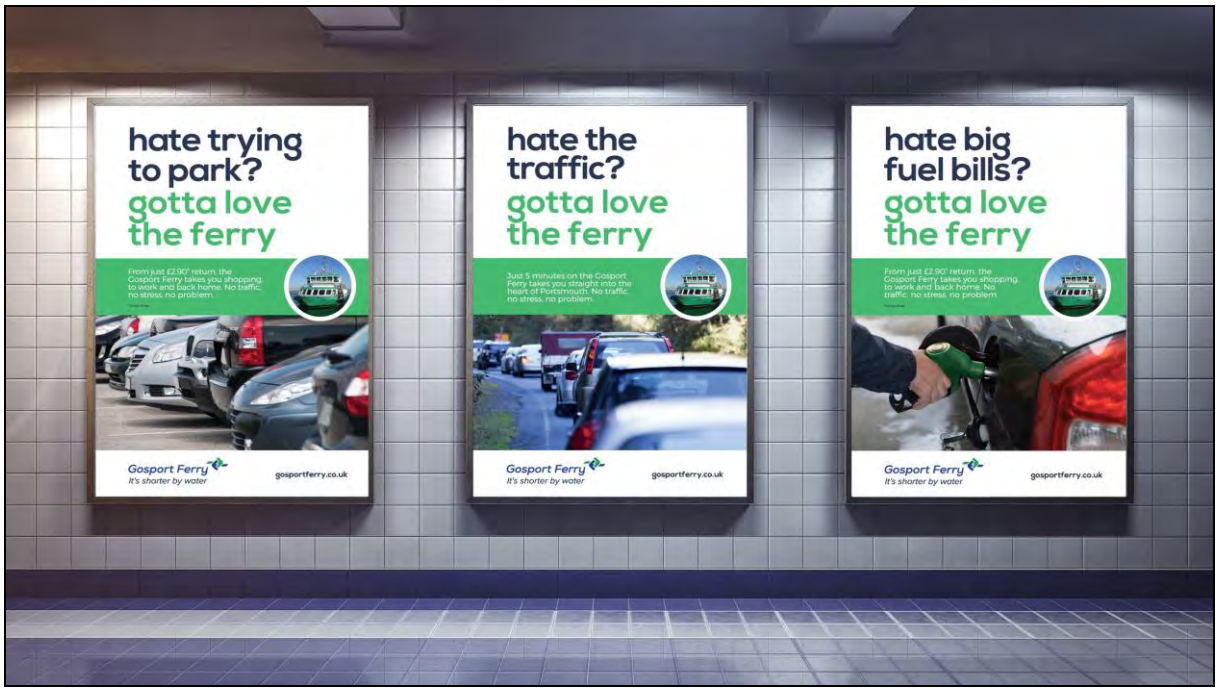

Figure 0.2 – Launch Day of new Eclipse Buses

Local Priorities and Challenges

Due to the conclusions of the 2016 Detailed Modelling Assessment, both the boundaries of the Gosport Road AQMA and Portland Street AQMA have been expanded, this is due to annual mean NO_2 concentrations in exceedence of the AQS objective being predicted outside of the existing AQMA boundaries. Once the boundaries have been amended it will be a priority to update the current AQAP to take these new areas into account and adapt current measures or devise new measures to ensure that actions are taken to reduce NO_2 concentrations within both AQMAs.

How to Get Involved

At an individual level there are a number of ways the public are able to get involved and help improve air quality at a local level. More information can be found out about air quality through the following links:

- https://www.gosport.gov.uk/sections/environment/environmental-health/housing-pollution/environmental-monitoring/air-quality/;
- http://www.fareham.gov.uk/licensing_and_inspections/air_quality/intro.aspx; and
- http://www.airqualityengland.co.uk/

A leaflet has been produced in conjunction with the National Health Service that provides information in relation to different air pollutants, the health effects, and what can be done to combat poor air quality. The leaflet is available at http://www.fareham.gov.uk/pdf/licencing_and_inspections/Airqualityleaflet.pdf.

If residents have a concern regarding air pollution at their home they are able to have an NO_2 diffusion tube fitted at their home for a few months to monitor the concentration.

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1 Local Air Quality Management

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

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

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

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 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

A summary of the AQMAs declared by Fareham Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of the AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=103. An Air Quality Action Plan (AQAP) was completed in 2008 in response to the designation of the AQMAs[4].

It is proposed to amend Gosport Road AQMA and Portland Street AQMA within Fareham Borough Council (see Detailed Modelling Study in Appendix F).

Gosport Borough Council currently does not have any AQMAs.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Portland Street AQMA	NO_2 annual mean	Fareham	An area encompassing residential properties and the Sacred Heart Catholic Church on Portland Street.	Air Quality Action Plan, Gosport Road and Portland Street Fareham, 2008[4]
Gosport Road AQMA	NO_2 annual mean	Fareham	An area encompassing the junction of Gosport Road, Redlands Lane and Newgate Lane, and the surrounding area.	Air Quality Action Plan, Gosport Road and Portland Street Fareham, 2008[4]

[4] Fareham Borough Council, Air Quality Action Plan Gosport Road and Portland Street Fareham, 2008, available online - http://www.fareham.gov.uk/PDF/licencing_and_inspections/aqap-gosportrd-portlandst.pdf

2.2 Progress and Impact of Measures to address Air Quality in Fareham and Gosport

Fareham and Gosport have taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More detail on these measures can be found in the 2008 AQAP[4], the 2015 AQAP Progress Report and other annual reports that can be viewed on the Fareham Borough Council website air quality page.

Key completed measures are set out in the section Actions to Improve Air Quality.

Fareham and Gosport expects the following measures to be completed over the course of the next reporting year:

- To continue to progress the AQAP, seeking updates from Hampshire County Council on a regular basis. Also to liaise with the Director of Public Health, Hampshire County Council, in respect of its new duty for reducing concentrations of $PM_{2.5}$;
- To update the AQAP to include the amended boundaries for both the Gosport Road AQMA and the Portland Street AQMA;
- Continual liaison with Hampshire County Council as the highway authority to work together to identify suitable measures to address air quality issues including those in relation to transport and highways, the main source of NO_2 in the Boroughs;
- Depending on planning constraints/conditions, begin work on the Stubbington Bypass to alleviate traffic flows away from the congested roads associated with the current designated AQMAs; and
- The exploration of sustainable transport links including cycleways to link to the new development of Welborne north of Fareham.

Fareham and Gosport's priorities for the coming year are to complete the amendments to the boundaries of the Gosport Road AQMA and the Portland Street AQMA and to update the AQAP to reflect these changes.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
1	To improve the emission standards of Council fleet vehicles by the use of cleaner and alternative fuelled vehicles	Promoting Low Emission Transport	Company Vehicle Procurement – Prioritising uptake of low emission vehicles	FBC	The number of Euro V refuse vehicles	Low	Target: To replace two refuse vehicles each year with new Euro compliant vehicles. The Council now has 12 Euro V refuse vehicles, the last two being purchased in December 2014. The housing maintenance team has 4 Euro IV vans and street cleaning has 2 Euro VI Vehicles. Although vehicle tracking devices for monitoring speed, harsh braking etc were installed in all FBC vehicles by March 2014, eco drive assistants which limit engine RPM, have only been fitted to 2 vehicles so far. A fuel saver pack is now fitted to 6 refuse vehicles.	2016/17
2	To seek a reduction in emissions from the local bus fleet (also see action 14)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	HCC/Bus Operator	The number of Euro III, IV and V vehicles in the local fleet	Medium	Target: To increase the % of Euro III/IV/V buses from a baseline in 2008/09 of 17% to 33% in 2012/13. Completed April 2013	2012/13
2a	To seek a reduction in emissions from the local bus fleet (also see action 14)	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	HCC/Bus Operator	The number of Euro III, IV and V vehicles in the local fleet	Medium	Target: To increase the % of Euro III/IV/V buses from a baseline in 2013 of 33% to 40% in 2015. Completed 2014 – New target for original action 2 Dec 2013 – With effect from 06/10/13 First added 3 more Euro V buses to the Eclipse fleet. At the same time they have reduced the buses on the A32 through the Gosport Road AQMA to one bus every two hours with a consequent lessening of emissions at the AQMA. From July 2014, First have added 9 x Euro V Optare Solo SR midimuses on service 9 and 9A via Bridgemary and Rowner. From 01/09/14 First will be running 24% Euro 2 and 76% Euro 3-5. October 2015 – FBC wrote a letter of support to Solent Transport in respect of the Low Emission Bus Scheme bid which may result in 17 new low emissions Eclipse busway buses in 2017	2013/14

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
3	To review the regulation of private hire and hackney carriage emissions and where appropriate, integrate improvements into the taxi licensing regime	Promoting Low Emission Transport	Taxi emission incentives	FBC	(a)Provision of "Switch off your engine" signage in taxi ranks and bus station (b)Articles in the taxi and private hire newsletters on air quality issues	Low	Completed	2012/13
4	To continue to implement the FBC Sustainable Travel Plan (STP)	Promoting Travel Alternatives	Workplace traveling planning / school travel plans	FBC	(a)Annual progress reports (b)Payment of employee cycle mileage allowance in 2009/10 (c)Increase membership of FBC's car share scheme from a 2008/9 baseline of 3% to 6% by 2010 (d)Number of bike loans given to employees 2008-10 (e)Number of employees purchasing discounted First travel card in 2008-10	Low	Target: To deliver those measures identified in the Council's STP Action Plan. The Council completed work on phase 1 of improvements to the basement to allow for additional bike storage in the summer of 2014. This involves creating a new access point from the current bike store into the former archives area in the basement, which will be fitted with additional storage facilities. This will improve security of employees" bikes and equipment. Phase 2 will consider the installation of showers and lockers in the basement area and a more efficient bike storage solution to allow cyclists to have the facilities to shower, change and store their clothing/equipment in one location. FBC took part in My Journey Commuter Challenge 2014 and 2015, organised by Sustrans and came third both years, in the large organisation category. Portsmouth CC are currently working on an EASIT project, which is a private-public sector partnership involving a wide group of employers that join together to offer all staff travel discounts, discounts on bikes, car sharing information etc. Visit www.easit.org.uk for more information on the general principles. Whilst Fareham is unlikely to have the critical mass to warrant setting up our own EASIT programme, there is an opportunity to join with the Portsmouth CC scheme if it proves successful. Homeworking is still encouraged where appropriate. Six employees took advantage of the normal cycle loan scheme and 5 took up the salary sacrifice cycle purchase scheme in 2014/15. Over 350 cycling miles were claimed for work journeys and 3 employees purchased season ticket travel loans. The FBC car share scheme still exists.	2016/17

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
5	To pursue voluntary or VOSA vehicle emission testing in or near the AQMAs	Vehicle Fleet Efficiency	Testing Vehicle Emissions	FBC	To confirm date of event	Low	Completed. No action possible at the present time as VOSA does not have mobile resources.	2009/10
6	To seek to reduce emissions from badly maintained vehicles by continuing to promote the smoky diesel hotline	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	FBC	To check website link on an annual basis	Low	Completed	2012/13
7	Signing of waiting areas/bus station/bus stops/taxi ranks etc instructing drivers to “Turn off engines” when stationary	Traffic Management	Ant-idling enforcement	FBC/Bus Operator	Provision of "Switch off your engines" signage at Fareham Bus Station and at the taxi ranks in 2009/10	Low	Completed	2009/10

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
8	To examine the feasibility of erecting signs to identify the AQMAs	Public Information	Other	FBC	To erect air quality awareness signs along the A32 Gosport Road Fareham by 2010	Low	Target: To raise awareness of air quality and inform/educate drivers on the A32 Gosport Road that they are entering an AQMA. A32 Air quality and traffic congestion messages. HCC appointed two Transport planning assistants in 2014. One was given the task of investigating the situation regarding the lighting columns, and gaining the necessary planning and highway authority permissions to display. He will liaise with FBC, GBC, HCC Major schemes and the ferry company to produce some draft messages, and a budget and action programme. Sept 2014 – Unfortunately one of the two assistants didn't take up their post, so the other has been fully occupied working on the Whitely bus gate consultation and response. Once this project is complete then it is envisaged that the member of staff can start work on the AQAP project. Nov 14 – resourcing remains an issue to take this project forward. Feb 2015 – the remaining assistant has now left and resourcing continues to remain an issue. There is an option to join " My Journey" branding, with SolentGo which HCC are investigating but this would require £10k for a paid piece of work. FBC are willing to help assist in this funding issue. Aug 2015 – Some banners have been provided and erected as part of the ongoing MyJourney and SolentGo project. The carry congestion messages and have been funded. It is recommended by HCC that bus signage may be looked at next. July 2016 – Ferry posters are to be displayed this Autumn on routes into Gosport. Oct 2016 – Posters have been erected across Gosport advertising the benefits of the ferry crossing to Portsmouth.	2016/17

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
9	To work in partnership with the Gosport Transport and Sustainability Partnership to identify and assist in the delivery of schemes to reduce road congestion on the A32.	Promoting Travel Alternatives	Other	GBC	(Annual progress against the key measures and timeframes set out in the GTSP (AQAP, 2008).	Low	Completion of the key schemes set out in the Gosport Transport and Sustainability Partnership. Air Quality and AQMA impacts to be assessed quantitatively where possible. See action 8	2016/17

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
10	To assist the Highway Authority in promoting and implementing those schemes identified within the Highway Authority's "Strategic Access to Gosport (2010-2026)" (STAG) transport study for the Gosport peninsula.	Traffic Management	Strategic highway improvements	HCC	Annual progress towards the programmed 19 schemes listed in the study.	Medium	Target: Completion of key schemes set out in the STAG Implementation Plan. Air quality and AQMA impacts to be assessed qualitatively where possible. STAG schemes:- Salterns Promenade Scheme September 2014 – the Marine Parade Scheme is essentially complete. HCC further investigating improvements to the other side of Marine Parade by the Café using similar palette. Update Nov 2014 – Marine Parade schemes are complete and have been generally well received. Reviews of the northern side of Marine Parade are proposed for summer 2015. Salterns and onward sections of NCN2 remain an aspiration to pursue when resources permit. A32 Newgate Lane (northern section) April 2014 - A32 Newgate Lane (northern section) Clearance and utility works have started early 2014. September 2014 – the construction works have begun. November 2014 – the works are progressing well, estimated finish Spring 2015. April 2015 Newgate Lane works are on target and completion expected end of May. August 2015 – Newgate Lane north works to be finished August 2015. The scheme therefore aims to improve journey time reliability by increasing road capacity for drivers and improving accessibly for cyclists and pedestrians. Jan 2016 - Newgate Lane North works complete and works progressing on Peel Common roundabout. Improvement works to the Peel Common Roundabout started August 2015. The works aim to improve the management of traffic at this busy roundabout through the provision of traffic lights and additional traffic lanes as well as improved facilities for pedestrians and cyclists. July 2016 - Peel Common roundabout works essentially complete. A27 Corridor Windhover to Delme September 2014 - Investigations and planning on-going. August 2015 – A27 and junction proposals are out for consultation. Jan 16 - A27 works have started around Gudge Heath Lane and St Margarets roundabout. July 2016 - A27 works continue. St Margarets roundabout operational. Major works related to the A27 and improvements to Gudge Heath Lane and Station roundabout continue.	2016/17

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
10 continued							A32 Newgate Lane (southern section) Update November 2014; Executive decisions available on HCC website, scheme anticipations remain at 2017/18. August 2015 – planning applications submitted for both schemes. The £30 million Stubbington bypass scheme will divert traffic around the outskirts of Stubbington and reduce journey time and peak hour congestion onto and off the Gosport peninsula. Nov 2015 - planning permission given for both schemes. July 2016 - Newgate Lane South works will start to proceed soon. HCC continues to progress the Stubbington Bypass. HCC has announced that it will provide funding of £8.2m towards the bypass. The remaining funding should come from the Government and FBC hopes to hear later this year if this is successful. Cycle route investigation, Fareham-Welboune-Wickham HCC has commissioned a cycle route investigation from Fareham to the proposed site of Welborne, and onwards to Wickham. It is anticipated that this route will follow the current cycle network to Broad cut, with off road verge conversion into the Industrial Estate, and improvements to the existing Bridleway leading onto Pook Lane. April 2014 – preliminary designs have been complete and outline costs are around £240k. The report has highlighted issues of land ownership to resolve. Update April 2015 – no further progress. August 2015 – HCC to restart the Broadcut shared use implementation. Jan 2016 - project ongoing. HCC and FBC officers will also be undertaking a desktop study to identify off-road routes to connect both of the residential and employment centres of Whiteley and the proposed site of Welborne. It is anticipated that the routes will consist mainly of improved bridleways, and provide a shorter, realistic and sustainable connection between the two centres. September 2014 - Investigations and planning on-going. November 2014 – this remains on ongoing piece of work with complex and sensitive land issues.	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
11	To implement those ITS improvements within FBC as detailed in the LTP2 to reduce congestion and improve air quality in the AQMAs	Traffic Management	Strategic highway improvements	HCC	As for action 10	Medium	Deleted – ITS improvements are STAG scheme 5 so will be combined with Action 10	2011/12
12	To undertake appropriate improvements to the Quay Street roundabout in conjunction with the nearby retail development and negotiate with the developer a financial contribution for future air quality monitoring in the area	Traffic Management	Strategic highway improvements	HCC/FBC/ Developer	As for action 10	Improve air quality on Portland Street; negligible negative impact on Gosport Road	Completed	2011/12
13	To develop the climbing lanes between junctions 11 and 12 of the M27	Traffic Management	Strategic highway improvements	HA		Very low	Completed	2008
14	Develop a Quality Bus Partnership for the A32 including a reduction in emissions from local buses	Transport Planning and Infrastructure	Bus route improvements	HCC/Bus Operator	HCC and the local bus company to sign a QBP for the A32 corridor detailing targets for the age of buses, emissions, journey times and ITS by 2010	Medium	Completed – Target achieved as bus patronage rose by 11% between 2003/04 and 2009/10. Replaced by new action 19a.	2010/11

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
15	Provide a bus/rail interchange facility at Fareham rail station	Transport Planning and Infrastructure	Public transport improvements – interchanges, stations and services	HCC/TfSH	Provision of a transport interchange at Fareham rail station	Low	Target: HCC to develop a transport interchange at Fareham rail station. The Western Way bus lane was shortened in September 2013 to ease traffic flow. This had some success and complaints about the bus lane have reduced. Further changes were completed in November 2014 utilising the verge space and returned the original two lanes to normal use. The Western Road Bus gate opened in September 2014. This allows direct access onto the A27 from the bus station for westbound services. August 2015 - The bus/rail interchange facility at the rail station is at the design option stage and potential for some construction 2015/16. Discussions continue with all stakeholders and funding streams are being sought by HCC. Jul 2016 - Improvements to the bus rail interchange announced along with SWT improvements to the station forecourt. Works will run in conjunction with Station roundabout upgrades. A27 Bishopsfield Road to Station roundabout accommodation works to realign the highway boundary and divert utilities between Blackbrook Avenue and Gudge Heath Lane commenced on 16/05/16. Utility works on Station roundabout to accommodate the carriageway widening in this area are underway. Other largely off carriageway works are also underway.	2014/2020

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
16	To provide a suitable alternative to the light rapid transit system linking Fareham, Gosport and Portsmouth	Promoting Travel Alternatives	Other	HCC/TfSH	Annual progress against the key measures and timeframes set out for the BRT phases	High	Target: Build and open the BRT system (HCC to develop the BRT phase 1 route between Gosport and Fareham by 2011/12). ACTION COMPLETED AS AGREED BY THE STEERING GROUP AT THEIR MEETING ON 10 SEPTEMBER 2013 This target was met with the opening of the Eclipse busway Sunday 22 April 2012. Action target and indicator will be updated again once any further phases are clarified eg Fareham to Strategic Development Area. The Welborne Plan has now been produced. It has some very interesting transport concepts, including all-moves junction 10 of the M27, as well as junction improvements in North Fareham. There are numerous references to the importance of linkages for the BRT as well as additional pedestrian and cycle links to Fareham. A FBC planner working on this project attended the April 2014 meeting of the AQAP group. The Better Area Bus Fund (nearly £1.6m of government funding awarded to TfSH in 2012) has provided funding for bus lanes on the Brockhurst roundabout together with new signalisation and a bus contraflow at the Crossways junction. The bus lanes are now operational but improved passenger waiting facilities are still to be provided.	2011/12
17	To monitor the progress of providing real time bus information at bus stops in Fareham and Gosport	Public Information	Other	HCC	Annual reporting progress in line with meeting the target	Low	Target: To have 100% RTI (Real Time Information) when the BRT opens. All 14 sites along Phase 1 of the BRT to be fitted with RTI. Completed. This particular target was met with the opening of the Eclipse busway on Sunday 22nd April 2012. See new action 17a	2011/12

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
17a	To monitor the progress of providing real time bus information at bus stops in Fareham and Gosport	Public Information	Other	HCC	Annual reporting progress in line with meeting the target	Low	Target: To have 100% RTI (Real Time Information) when the BRT opens. All 14 sites along Phase 1 of the BRT to be fitted with RTI. New target agreed at the 16 April 2013 AQAP meeting. Bus Information Departure Screens have been provided at both Fareham and Gosport bus station and are now operational. The Avenue bus stop on Redlands Lane has been fitted with an RTI screen in an Eclipse style shelter for the benefit of students attending Fareham College. RNIB talking fobs are being sent out to blind and partially sighted bus users. Since the summer of 2014, LSTF funding has been used to upgrade 14 stops off the Eclipse busway along the routes of the E1 & E2 with Eclipse style shelters, CCTV and Real Time Passenger Information. July 2016 - 8 shelters have been upgraded reflecting funding available. 8 are complete with RTI operational and 3 are prepared ready to fit RTI very soon. A further 3 are on hold due to insufficient funding to bring them up to Eclipse standards.	2015/16
18	To provide bus priority measures as part of the Vision for West Street	Traffic Management	Selective vehicle priority	TfSH	Reported progress of feasibility traffic modelling and air quality impact review. Subsequent indicators for project implementation to be determined post traffic modelling	Low	Target: Undertake traffic modelling to establish feasibility of scheme, quantifying air quality impacts where possible. The Western Way bus lane was shortened in September 2013 to ease traffic flow. This had some success and complaints about the bus lane reduced. Further changes were completed in November 2014 utilising the verge space and returned the original two lanes to normal use. The Western Road Bus gate opened in September 2014. This allows direct access onto the A27 from the bus station for westbound services. August 2015 - The bus/rail interchange facility at the rail station is at the design option stage and potential for some construction 2015/16. Discussions continue with all stakeholders and funding streams are being sought by HCC. July 2016 – Improvements to the bus rail interchange announced along with SWT improvements to the station forecourt. Works will run in conjunction with Station roundabout upgrades.	2015/16

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
19	To work with local bus operators to provide improved services for people working in Whiteley via the now complete Yew Tree Drive bus link	Transport Planning and Infrastructure	Bus route improvements	HCC	Improved services under development but implementation depends on external funding which has yet to be obtained	Low	Completed. Planning permission for a year's trial for cars to use the Yew tree Drive bus gate was given in September 2013. A need for an air quality and noise assessment was included in this permission. FBC assisted with the air quality monitoring exercise over 5 months at 12 diffusion tube sites. The bus gate is now permanently open. On May 6 2014, a shopping bus for Whiteley was introduced which will be funded by the Whiteley businesses and run between Fareham and Whiteley. HCC proposed a new action 19A below.	2009/10
19a	Increase numbers of people using local bus services	Transport Planning and Infrastructure	Other	HCC/First	Annual number of passenger trips using BRT services	Low	Target: Increase annual bus patronage on BRT services operating between Gosport bus station and Fareham bus station by 10% after one year and an aggregate 15% after two years. Completed July 2016 - The two Eclipse services, E1 and E2, are carrying 65% more passengers that the two services they replaced (82 & 86). There has been an overall increase in bus passengers of over 10% in Fareham and Gosport since Eclipse started. Between April 2012 and April 2016, more than 7.8 million passenger journeys have been recorded on the Eclipse services. Annual passenger numbers showed a year on year increase close to 2.2m (2015/16). New Eclipse buses are likely to arrive later this year.	2011/13
20	To continue to subsidise bus travel beyond the statutory minimum to further encourage bus usage	Transport Planning and Infrastructure	Other	FBC	To provide statutory responsibility for bus subsidies	Low	Completed.	2009/10

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
21	To review progress in respect of the FBC Cycle Strategy 2005-11 and the LTP2 and implement those measures likely to have an impact on air quality in the AQMAs	Transport Planning and Infrastructure	Cycle network	FBC/HCC	(a)To assess progress of the Fareham Cycle Strategy Action Plan (b)To provide specific information on the Council's website of cycle routes in and around the AQMAs	Low	Target: The Cycling Action Plan 2005-11, being in its final year of implementation, is to be reviewed. New targets and indicators will be developed as part of the review. Additionally, the Town Access Plan (TAP) is being developed through the LDF. Relevant measures from the TAP will be detailed in future AQAP Reports. Fareham has completed a Green Infrastructure Strategy (available to view on the Council's website) which highlights potential cycle routes which should be pursued in Fareham, many of which are actively being investigated by HCC. Some of these routes are likely to be achieved in the short term, whilst other are long term options or in some cases, purely aspirational. A scoping document for the new Cycle Strategy has been produced. The HCC Cycling Strategy 2015 was open for public consultation in May 2015 for over 2 months. The strategy aims to cover a wide range of topics including tourism, health and wellbeing, recreation, sport and infrastructure. The strategy is high level in nature with the intention that it links the County Council's broader policies to local strategies, delivery plans and the planning and implementation of cycling measures with local partners. This will reflect and strengthen the importance of any existing cycling and active travel strategies developed by local authorities in the County. This strategy was approved on 15 September 2015. This document will inform the preparation of a Cycle Strategy for FBC. FBC is liaising with HCC on the development of a cycle strategy for the programmed A27 improvement schemes. Feb 2016 – A revised Cycle Strategy is currently being prepared as part of a package of reviews to inform the future Local Plan. Work is being undertaken on aspects of the A27 improvement scheme, with duelling sections due to commence mid-2016. The planned works incorporate improved cycling and pedestrian facilities. July 2016 – The works to the A27 improvement scheme are underway, most notably between Fareham Station roundabout and Gudge Heath Lane. Works are to continue through to mid-2017. Cyclists continue to use the Eclipse busway.	2015/16

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
22	To continue to promote public transport and alternative travel arrangements such as the Gosport Ferry and local bus services on the FBC website	Promoting Travel Alternatives	Other	FBC	To ensure the details of the Gosport Ferry are maintained on the FBC website	Low	Completed and still active. FBC took part in the My Journey Commuter Challenge in May 2014 and 2015 and came third in the large size, organisation category. There was no challenge in 2016.	2008/09
23	Promote the development and implementation of work travel plans amongst companies that use the roads in and around the AQMAs particularly through the use and enforcement of planning conditions	Promoting Travel Alternatives	Workplace Travel Planning	FBC/HCC	Indicators to be developed once success of LSTF bid is known. LSTF is now the primary resource mechanism for travel planning projects	Medium	ACTION COMPLETED AS AGREED BY THE STEERING GROUP AT THEIR MEETING ON 10 SEPTEMBER 2013 Through the Better Connected South Hampshire project, Solent Transport are working with a number of employers in Fareham and Gosport to deliver sustainable transport initiatives. These include developers of the Daedalus site, employers affected by road improvements along Newgate Lane and Fareham Rail Station where a station travel plan has been developed.	2012/13
24	To continue to work with schools in Fareham close to the AQMAs for the development, implementation and the annual review of School Travel Plans	Promoting Travel Alternatives	School Travel Plans	HCC	Indicators to be developed once success of LSTF bid is known. LSTF is now the primary resource mechanism for travel planning projects	Med (depends on location of school	ACTION COMPLETED AS AGREED BY THE STEERING GROUP AT THEIR MEETING ON 10 SEPTEMBER 2013.	2011/12

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
25	To implement the Town Access Plan proposals where they have an impact on air quality in the AQMAs	Traffic Management	Other	HCC/FBC	(a)FBC to adopt HCC Town Access Plan (b)Accessibility target to be developed for Fareham	Low	Target: The Town Access Plan (TAP) is also being developed through the LDF. Relevant cycling measures from the TAP will also be detailed in future Air Quality Action Plan Progress Reports. Hampshire County Council led on the development of the 2012 Town Access Plan for Fareham, working with Fareham Borough Council and other interested groups. This plan will help to improve access to facilities and services, such as shops and schools, within the town. It will identify a list of schemes aimed at improving walking and cycling, public transport and road safety in Fareham, helping people access and move around the town more easily both now and in the future. A number of schemes highlighted in the plan have been re-emphasised through the Green Infrastructure Strategy.	2015/16
26	To continue to inspect premises and take appropriate enforcement action in respect of the Environmental Permit risk assessment regime	Environmental Permits	Other	FBC	DEFRA return	Low	Target: To ensure that premises are inspected in accordance with the risk assessment regime. All due inspections undertaken in 2014/15. Return submitted to Defra on time in May 2016.	Annual inspections
27	To use Environmental Permit inspections to encourage the provision of alternative fuels at petrol stations forecourts	Environmental Permits	Measures to reduce pollution through IPPC Permits going beyond BAT	FBC	Number for alternative fuelling pumps and evidence of continued Council encouragement.	Low	Target: Work towards maximising local uptake of alternative fuels, having leafleted all petrol stations. Original target completed. Two electric vehicle charging points installed in the surface car park in Fareham in November 2014 as part of a Hampshire wide scheme. POSSIBLE NEW ACTIONS: Alternative fuel campaign with reference to ESS; Eco driver training for all essential car users; Low emission pool cars for staff and residents; Pool bikes for staff;	2012/13

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
28	Promote the use of planning policies, alongside other planning and transport measures, to promote sustainable transport choices and reduce reliance on the car	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	FBC/GBC	Examples of where FBC requires higher provision of cycle facilities or lower car parking facilities than the HCC standards for new developments.	High	Target: Implementation of the relevant policies set out in the LDF to influence local and regional air quality. Both the Development Sites & Policies Plan (Local Plan Part 2) and the Welborne Plan (Local Plan Part 3) were submitted to the planning inspectorate end of May 2014. The DSP Plan includes a policy on BRT which safeguards the proposed route through the Borough as well as setting a policy framework for improvements to the strategic road network (Newgate Lane, Stubbington bypass etc). The Welborne Plan has a number of detailed transport policies including setting broad transport principles, providing access to the strategic road network, the parameters for an internal spine network, public transport, encouraging sustainable choices and walking and cycling. The hearing sessions by the Planning Inspector for the Welborne Plan and the Development Sites & Policies Plan were held in October and November 2014 respectively, with transport being discussed for both Plans. The Council has consulted on this additional work and any proposed changes to the Plans and responses have been submitted to the Inspector. The Council is currently awaiting the Inspector's Final Report. If found sound by an independent Planning Inspector the Plans can be adopted by the Council. Both the Development Sites & Policies Plan (Local Plan Part 2) and the Welborne Plan (Local Plan Part 3) were issued as Adopted Versions in June 2015, following receipt of the Inspector's Final Report. The Council is currently working on a Design Supplementary Planning Document (SPD) which will cover issues such as the importance of pedestrian and cycle routes in new developments, proximity to facilities and links to the movement network. The SPD will emphasise that layout and location of new development can have a major role in residents' choices to use the private car. An updated Non-residential Parking Standards SPD, approved in September 2015, will set parking standards for all new non-residential developments in the Borough. The Fareham Borough Design Guidance (excluding Welborne) SPD was adopted on 21/12/15. The SPD sets out the Council's aspirations for high quality design to householders, developers and other interested parties. The principles within the Design Guidance will provide a clear framework through which high quality design can be achieved in the Borough's different settlements whilst having regard to their unique characteristics. July 2016 - no further update.	2015/16

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
29	To ensure that the new LDF incorporates planning policy that will not adversely impact on air quality but furthermore enhances air quality where possible	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	FBC	Examples of LDF provisions related to air quality	Medium	Target: Member of the pollution team to continue to attend the LDF officers' meetings. See 28 above. Ongoing with new Core Strategy policies now being adhered to.	2012/13

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
30	Regulatory Services will continue to work with the Development Control section to ensure that air quality is taken into account in the planning development process	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	FBC	Weekly bulletins, listing planning applications issued to Regulatory Services.	Low	Target: Structured communication between Regulatory Services and Development Control on plans potentially affecting air quality. Update July 2016 - Work is ongoing. Examples include the development work at Daedalus, Longfield Avenue, Stubbington bypass and Welborne, the new development north of Fareham. Daedalus is now named Solent Airport at Daedalus. The small airport is aimed at small aircraft for businesses and leisure visitors. The site has been split into two distinct business parks; new roads have been laid on site to provide for easier access throughout the site including improved pedestrian access to the seafront; the Fareham Innovation Centre has achieved 100% occupancy less than one year after opening and a second Centre is planned for 2018; other new buildings are planned and likely to result in 800 new jobs on site; 1100 students now attend CEMAST, an new engineering & manufacturing skills college; NATS are to build a new radar training facility on site and the National Grid are planning a major new energy infrastructure project, known as IFA2, linking the UK's electricity transmission network to France and the converter station is proposed to be located at Daedalus. Diffusion tubes were recently located at an ex-office development close to the M27 which is now converted to residential development. The NO2 air quality objective was not exceeded. Several residents in Fareham and Gosport have asked for diffusion tubes in the last year but none of these so far have led to more detailed assessments. The work undertaken by FBC on behalf of HCC at the Yew Tree Drive bus gate did not show any exceedences of the NO2 air quality objective at relevant locations for human exposure. In February 2016, the Environmental Health department contributed to Fareham Borough Council's Local Information Requirements for planning applications in respect of the need for an air quality assessment..	2015/16

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
31	To review the new FBC parking strategy and implement any measures that may result in reduced congestion in the AQMAs	Traffic Management	Other	FBC	Number and location of such schemes in 2009/10	-	ACTION COMPLETED AS AGREED BY THE STEERING GROUP AT THEIR MEETING ON 10 SEPTEMBER 2013. A revised Non-Residential Car and Cycling Parking Standards SPD was approved in September 2015. This will apply to new developments in Welborne as well as sites in the rest of the Borough. This follows the County Council's withdrawal of its own standards which formed the basis of previous guidance by FBC, and recent changes in national planning policy which encourage consideration of local circumstances when setting standards.	2012/13
32	To continue to review and consult on air quality in the Borough in line with statutory requirements	Policy Guidance and Development Control	Other	FBC	(a)To submit the further assessment of the AQMA on Portland Street and a USA by April 2009 (b)To maintain air quality reports on the FBC website	Medium	Target: to ensure compliance with the DEFRA timetable. Update July 2016 - USA 2015 approved by Defra; detailed assessment required for a small area of land just outside the existing Gosport Road AQMA. AQAP progress report 2015 compiled in-house and approved by Defra. The AQMAs remain declared as relevant diffusion tubes on houses show exceedences of the annual air quality objective for NO_2. Air quality report to the FBC PPPDR Panel in March 2016. All reports on the FBC website.	2015/16
33	To enhance the nitrogen dioxide monitoring network by providing continuous nitrogen dioxide monitors in the AQMAs	Policy Guidance and Development Control	Other	FBC	Outcomes of the LAQM reporting cc process using diffusion tube and continuous monitoring data from the Gosport Road and possibly Portland Street	Low	Completed. The number of NO_2 diffusion tubes reduced to around 30 in Fareham and 11 in Gosport; resources centred on those tubes over 25 ug/m^3. New three year air quality monitoring partnership contract signed in April 2016 for three monitoring sites, two in Fareham and one in Gosport. Funding still available for AQAP work eg A32 banners.	2011/12

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
34	To continue to work in partnership with neighbouring authorities and others for the control of air pollution and continued improvement of air quality eg to attend HIOW air quality group	Policy Guidance and Development Control	Other	FBC	Minutes of meetings	Low	Target: The HIOW air quality officers' group to meet twice a year as a sub group of the HIOW Environmental Control Advisory Committee (ECAC). Update July 2016 - HIOW air quality group last met in September 2015. The next annual meeting is due September 2016. In October 2015, Environmental Health met with the Public Health Team at Hampshire County Council in respect of air quality issues and this will continue particularly in respect of $PM_{2.5}$. Environmental Health continue to receive updates in respect of road network and public transport improvements from HCC even though the steering group no longer meets. The FBC/GBC Partnership also wrote a letter on behalf of HCC in October 2015 supporting the Solent Transport OLEV low emission bus scheme bid.	2015/16
35	To monitor the performance of the AQAP and review actions having regard to the air quality objectives and implement additional actions where necessary	Policy Guidance and Development Control	Other	FBC	Outcomes of the annual LAQM reporting of annual mean improvements. Also set out a position statement within the annual action plan progress report on any required changes to the existing measures and the need for further actions.	Dependant on the outcome of the AQAP	Target: To meet the AQO annual mean for NO2 and ultimately revoke the AQMA for both locations. Update July 2016 - In April 2015, the AQAP steering group took the decision not to meet again on a formal, regular basis. Funding still available for AQAP work eg sustainable travel banners on the A32. Current work includes the continued monitoring of air quality in the AQMAs. A detailed assessment is under way of an area just outside the current Gosport Road AQMA. The improvement works to Newgate Lane, the Peel Common roundabout and the Longfield Avenue roundabout may all have an effect on the AQMAs. The Stubbington bypass plans will also be of great interest to the air quality in these areas. There is continued use of electric charging points in a Fareham car park, installed in 2014. For the first quarter of 2016, the Department of Transport website, table VEH 0131, shows 79 plug in cars and vans in Fareham. Freedom of Information Request July 2016 answered in respect of air quality monitoring in Fareham. Annual average concentration for nitrogen dioxide at the Gosport Road monitor: 33 ug/m^3 in 2008; 36 ug/m^3 in 2009; 42 ug/m^3 for 2010; 33ug/m^3 in 2011;35 ug/m3 in 2012; 34 ug/m3 in 2013; 32 ug/m3 in 2014; 28 ug/m^3 in 2015. The annual mean for Portland Street for 2013, 34.6 ug/m^3; 2014, 40.4 ug/m^3;2015, 37 ug/m^3.The annual mean for Tichbourne Way Gosport in 2015 was 27 ug/m^3.	Annual progress reports to Defra

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
36	To continue to educate and enforce in respect of domestic, agricultural and industrial smoke nuisances and dark/black smoke	Public Information	Other	FBC	(a)Customer service centre to continue to respond automatically to complaints in the first instance where complaint letters are appropriate (b)Pollution officers to react to more urgent complaints 24 hours a day 365 days a year	Low	Target: To respond to complaints of smoke and odour. Completed but active. Around 50 complaints a year are received on this subject.	2012/13
37	To monitor as a Council data in respect of NI 194 and implement actions to achieve target set	Policy Guidance and Development Control	Other	FBC	Whilst NIs 185 and 194 are no longer to be formally reported, the Council is still to report NI 185.	Low	Target: Whilst NIs 185 and 194 are no longer to be formally reported, the Council is still open to report NI 185. To reduce the Council's target by 20% by 2020 from a 2012 baseline.	2016/17
38	To continue to place air quality reports on the FBC website	Public Information	Via the Internet	FBC	Annually (or as required) e-mail stakeholder bodies and send a message each time there is a website report update	Low	Target: To ensure that all appropriate bodies are kept well aware of LAQM progress. Update July 2016 – The 2015 USA and 2015 AQAP Progress Report are both available for viewing on the FBC website.	2015/16

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
39	To investigate the most effective method of disseminating air quality information to the public and assess the feasibility of employing this method for FBC	Public Information	Other	FBC	(Annual review of information dissemination options in line with UK best practice and discussions with neighbouring authorities	Medium	Target: To raise awareness of local and national air quality matters. Link to all three monitoring stations in FBC and BGC on the FBC website. POSSIBLE NEW ACTIONS:- Local air quality alerts similar to SCC.	2015/16
40	To promote awareness via the FBC website of other air quality information web sites	Public Information	Via the Internet	FBC	Annual review of the Council website content in line with accepted UK best practice	Low	Target: To provide an up to date, useful and informative public resource for air quality and to raise awareness of local and national air quality matters. Ongoing process of updating FBC website.	2015/16
41	Support locally, national campaigns to raise awareness of air quality, alternative transport choices etc	Promoting Travel Alternatives	Promotion of cycling and walking	FBC	Evidence of this action	Low	Target: To support where appropriate, a national air quality campaign at least once a year via the FBC website. No My Commuter Challenge in 2016 POSSIBLE NEW ACTIONS:-Air quality day; Bike campaign; Radio campaign; CAT presentation.	2011/12
42	To promote the use of alternative fuels eg LPG, hybrid	Vehicle Fleet Efficiency	Vehicle Retrofitting programmes	FBC	(a)To provide petrol station operators during EP inspections with a leaflet regarding the benefits of providing alternative fuels (b)To provide appropriate information on the FBC website	Low	Now combined with Action 27. Two electric charging points installed in Fareham car park in July 2014. POSSIBLE NEW ACTIONS:- Alternative fuel campaign; Eco driver training for all essential car users; Low emission pool cars for staff and Residents.	2011/12

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
43	To produce a leaflet on the AQAP and distribute to libraries, GP surgeries etc	Public Information	Via leaflets	FBC	Identifying, implementing and reporting projects to be undertaken by the Council and relevant stakeholders.	Low	Target: To raise awareness and improve understanding of the relationship between poor air quality and ill health. Completed.	2011/12
44	To liaise closely with the PCT in respect of identifying any linkage between areas with poor air quality and ill health	Policy Guidance and Development Control	Other	FBC/HCC/ PCT	To liaise with the PCT before April 2009 to further this aim	Dependant on outcomes of liaison	Covered with action 43. Completed with publication of air quality leaflet. October 2015 - FBC liaison with the Public Health Team at Hampshire County Council.	2009/10
45	To continue to promote energy awareness and efficiency in the Borough	Promoting Low Emission Plant	Other	FBC	To arrange to work in partnership with the Environment Centre as a referral agent for the Fareham Home Energy Insulation Scheme 2008/9	Low	Deleted.	2011/12
46	To reduce car dependency and facilitate transport choice by encouraging alternatives to the car alongside changes in working arrangements through the Smarter Choices regime of the LTP2	Promoting Travel Alternatives	Encourage/Facilitate home-working Promotion of cycling and walking	HCC	Indicators to be developed once success of LSTF bid is known. LSTF is now the primary resource mechanism for travel planning projects. Examples such as LTP3 policy objectives such as 7,10,11 &12.	Medium	Target: Target to be developed once success of LSTF bid is known. LSTF is now the primary resource mechanism for travel planning projects. Examples such as LTP3 policy objectives such as 7,10,11 &12. ACTION COMPLETED AS AGREED BY THE STEERING GROUP AT THEIR MEETING ON 10 SEPTEMBER 2013.	2012/13

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date
47	To continue to promote cycling and walking as healthier alternatives to the car on the FBC website	Promoting Travel Alternatives	Promotion of cycling and walking	FBC		Low	Deleted as now covered with Action 46. HCC's new draft walking strategy approved 2016	2011/12
48	To implement Environmental Sustainability Strategy (ESS) and ensure that NO_2 is considered in the development of the FBC Sustainability Strategy	Policy Guidance and Development Control	Other	FBC	(a) Appoint an ESS coordinator (b) Progress of the ESS action plan	Low	Target: To implement FBC's ESS. Completed. See action 4.	2011/12

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

As detailed in Policy Guidance LAQM.PG(16) (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Currently, neither Council undertakes monitoring of $PM_{2.5}$ concentrations. Therefore, concentrations of $PM_{2.5}$ have been estimated using box 7.7 of LAQM.TG(16) guidance and are presented in section 3.2.3. The estimated $PM_{2.5}$ annual mean of 12.7µg/m^3 is below the 2020 annual mean AQS objective for $PM_{2.5}$ (25µg/m^3) given in Table E.1. The current 2015 background maps for Fareham and Gosport (2013 based)[5] show that all background concentrations of $PM_{2.5}$ within Fareham and Gosport are far below the 2020 annual mean AQS objective for $PM_{2.5}$. The highest background concentration is predicted as 13.1µg/m^3 within the 1 x 1km grid square with the centroid grid reference of 452500, 108500. This is an area of Swanwick where the M27 runs through and the junction of the M27 and A27 is located.

The Public Health Outcomes Framework data tool[6] compiled by Public Health England quantifies the mortality burden of $PM_{2.5}$ within England and also on a county scale and a local authority scale. Currently the fraction of mortality attributable to $PM_{2.5}$ pollution across England is 5.1%, in contrast the fraction within Fareham Borough Council is 4.9% and within Gosport Borough Council it is 4.5%. Both Fareham and Gosport have a fraction lower than the current England figure.

The air quality actions Fareham and Gosport have, and will continue to take have invariably also included benefits for the reduction of $PM_{2.5}$ concentrations and emissions. Although not specifically designed for the reduction of $PM_{2.5}$, many of the actions within the AQAP designed for NO_2 concentration reduction and also the required inspections through the Local Authority Pollution Prevention and Control (LAPPC) regime will lead to a net reduction of $PM_{2.5}$ concentrations from combustion based sources where both NO_2 and particulate matter of varying sizes arise.

[5] Defra Background Mapping data for local authorities (2013-based), available online at https://uk-air.defra.gov.uk/data/laqm-background-maps?year=2013
[6] Public Health Outcomes Framework, Public Health England. Data tool available online at http://www.phoutcomes.info/

Specifically the AQAP measures that promote alternative methods of transport and those aimed at replacing older vehicles with newer more clean models in addition to reducing NO_2 emissions within the Boroughs may also reduce $PM_{2.5}$ emissions as well.

In response to the challenges of reducing $PM_{2.5}$ emissions and concentrations within the Boroughs, an initial meeting is to be arranged in 2017 with a representative of the Director of Public Health (from Hampshire County Council) and environmental health and other team members who have a public health function within their job description. The current concentration of $PM_{2.5}$ within Fareham and Gosport is to be discussed at this meeting and in addition to the current AQAP measures what actions can be taken to reduce both emissions and concentrations of $PM_{2.5}$ in the Boroughs.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Fareham and Gosport undertook automatic (continuous) monitoring at three sites during 2015. Live and historical monitoring data are available for the three automatic monitors online at http://www.airqualityengland.co.uk/. Table A.1 in Appendix A shows the details of the sites.

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

3.1.2 Non-Automatic Monitoring Sites

Fareham and Gosport undertook non-automatic (passive) monitoring of NO_2 at 33 sites during 2015; 24 sites in Fareham Borough Council and 9 sites in Gosport Borough Council. Table A.2 in Appendix A shows the details of the sites.

This is a reduction of 44 monitoring sites from 2014, a reduction of 32 by Fareham Borough Council and a reduction of 12 by Gosport Borough Council. The discontinued sites are listed in Table 3.1 below:

Table 3.1 – Discontinued Diffusion Tube Monitoring Locations

Council	Discontinued Diffusion Tube Monitoring Locations	
	Site ID	Location
Fareham Borough Council	3N	14 Osborne Road
	5N	Grove Road
	7N	Norton Road
	10N	Farrier Way
	10NA	3 Farrier Way
	Av/Bf	Avenue/Bishopfields Road
	G5	275 Gosport Road
	G9	11 Eden Rise
	HR1	Lamppost,8 Hartlands Road
	LH1	41 Bridge Road
	LH3	36 Botley Road
	P1B	3 The Ridgeway
	P2	141 The Crossways
	P4	22 Cams Hill
	P5	Silvermist, Portchester
	P6	169 West Street
	P7A	77 West Street, Portchester
	S2	Stubbington Lane(Erice Road)
	T1	South Street Dental Health, Titchfield
	NL11	11 Newgate Lane
	AQ1	Botley Road/Yew Tree Drive North
	AQ2	Botley Road/Yew Tree Drive South
	AQ3	Botley Road/Ashley Close
	AQ4	Ashley Court
	AQ5	Botley Road/Swanwick Lane
	AQ6	130 Swanwick Lane
	AQ7	Swanwick Lane/Manor Farm
	AQ8	Rosemary House/Botley Road Roadside
	AQ9	Yew Tree Drive/Sweethills Crescent
	AQ10	Yew Tree Drive/Hispano Avenue
	AQ11	Botley Road/Driving School
	AQ12	Yew Tree Drive/Clydesdale Road
Gosport Borough Council	GP1	South Street/Mumby Road
	GP2	Gosport Park
	GP2	No 2 Battery
	GP3	Privett Road/Military Road
	GP4	The Wildgrounds
	GP5	Military Road/Opposite No 68
	GP6	South Street/Mumby Road
	GP8	Elson Recreation Ground
	GP15	Woodside
	GP16	Curlew Walk
	GP19	Marine Parade/Pier Street Junction
	GP20	Lee Recreation Ground

The reduction in monitoring locations is due to the NO_2 concentrations monitored at these locations being below the annual mean AQS objective in previous years. Also

the short term Yew Tree Bus Gate assessment was completed therefore tubes AQ1-12 have been removed. Although the network of NO_2 tubes has been downsized it is still an extremely important tool to map NO_2 concentrations across the Boroughs, this is apparent for the exceedences monitored on Gosport Road resulting in a Detailed Modelling Assessment being completed.

Maps showing the location of the 2015 monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

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 (NO_2)

Table A.3 and Figures A.1-A.3 in Appendix A compare the ratified and adjusted monitored NO_2 annual mean concentrations for the past 8 years with the air quality objective of 40µg/m^3.

Table A.5 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 8 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

There are no sites where the NO_2 annual mean is greater than 60µg/m^3, therefore in accordance with Defra LAQM.TG(16 there are no sites likely to be at risk of exceeding the 1-hour mean AQS objective. In 2015 there were 5 exceedences of the AQS annual mean objective, these were experienced at the diffusion tube monitoring sites BL1, G7, G10, PS3 and PS4/5/6 (triplicate location).

Of these locations; G7 is located within the Gosport Road AQMA, PS3 and PS4/5/6 are located within the Portland Street AQMA, G10 is not currently within the Gosport Road AQMA but a Detailed Assessment included in Appendix F was completed to assess NO_2 concentrations in this area. Following the completion of the Detailed Assessment it was concluded that the Gosport Road AQMA boundary is to be extended to the north, the revised area of the AQMA will include monitoring location G10. The concentration monitored at BL1 has been distance corrected within Table

A.4 to predict the NO_2 concentration at the closest receptor location. Following this correction the concentration falls below the AQS annual mean objective (39.4µg/m^3).

The full 2015 dataset of monthly mean values is provided in Table B.1 in Appendix B.

3.2.2 Particulate Matter (PM_{10})

Table A.6 in Appendix A presents monitored PM_{10} annual mean concentrations for the past 7 years. Table A.7 compares the PM_{10} daily mean concentrations for the past 7 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year. The concentrarions for both tables are presented in Figure A.4.

For the past 7 years of data there have been no exceedences of the AQS objectives for PM_{10}, both the annual mean objective and the daily mean objective. The trend graph shows that in 2014 both the highest annual mean concentration, and highest number of daily means exceeding 50µg/m^3 were experienced. In 2015 both these values have decreased with the annual mean concentration of 20.8µg/m^3 recorded, and 3 exceedences of the daily mean objective experienced.

3.2.3 Particulate Matter ($PM_{2.5}$)

Neither Fareham nor Gosport Borough Councils currently monitor $PM_{2.5,}$ therefore concentrations of $PM_{2.5}$ have been estimated from PM_{10} measurements in line with guidance in Defra LAQM.TG(16). Data from the Automatic and Rural Urban Network (AURN) urban background monitoring station Southampton Centre has been used to calculate an estimated $PM_{2.5}$ concentration at the Tichborne Way monitoring site. Southampton Centre was chosen due to being the closest AURN site to Tichborne Way where both PM_{10} and $PM_{2.5}$ are measured and data capture for both species in 2015 was over 85%.

The methodology within Box 7.7 of LAQM.TG(16) has been followed to calculate a locally derived $PM_{2.5}$ / PM_{10} ratio of 0.61. Applied to the 2015 PM_{10} annual mean (20.8µg/m^3) at Tichborne Way this gives an estimated $PM_{2.5}$ annual mean of 12.7µg/m^3. This estimated annual mean concentration is below the 2020 annual mean AQS objective for $PM_{2.5}$ (25µg/m^3) given in Table E.1.

The concentrations used to derive the $PM_{2.5}$/PM_{10} ratio are presented in Table A.8.

4 Conclusions

Monitoring of NO_2 and PM_{10} is completed within Fareham and Gosport utilising continuous automatic monitors and passive NO_2 diffusion tubes. There are currently three continuous monitors and a total of 33 diffusion tube locations within the monitoring network.

Results from monitoring completed in 2015 indicate that both the annual mean and 1-hour AQS objectives for NO_2 were met at all three automatic monitoring locations. All sites experienced a decrease in annual mean concentration in 2015 compared to 2016 and there were no exceedences of the 1-hour 200µg/m^3 limit at any sites. The annual mean and 24-hour mean AQS objectives for PM_{10} also continue to be met at Tichborne Way monitoring station. The PM_{10} annual mean remains low compared to the 40µg/m^3 annual mean objective, in the period between 2009 and 2015 the highest annual mean concentration recorded was 24µg/m^3 in 2014.

Of the 33 diffusion tube monitoring locations there were 5 locations in 2015 where the NO_2 annual mean AQS objective was exceeded, these were sites BL1, G7, G10, PS3 and PS4/5/6 (triplicate location). Out of the 5 sites that have exceeded, 2 are not within current AQMAs; BL1 and G10. BL1 has been distance corrected due to its location and following this procedure the concentration was found not to exceed the annual mean objective at a location of relevant residential exposure.

Following the recording of exceedances at G10 a Detailed modelling study has been completed to assess NO_2 concentrations. This assessment concluded that the Gosport Road AQMA should be extended north and will encompass site G10 and the area surrounding the location

The completed Detailed Modelling Assessment is included within Appendix F and presents proposed amendments to both the Portland Street AQMA and the Gosport Road AQMA. These amendments are to be implemented during 2017 following approval from Defra and subsequent amendment to the AQMA orders. During 2017 the active AQAP measures are to be advanced and reviewed to ensure that they are relevant for the designated AQMAs.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID and Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
Gosport Borough Council									
GOS1 Tichborne Way	Roadside	458987	102786	NO_2/PM_{10}	N	Chemiluminescence and TEOM	15	5	3
Fareham Borough Council									
FAR1 Gosport Road	Roadside	457594	105280	NO_2	Y	Chemiluminescence	3.5	1.5	2
FAR2 Portland Street	Roadside	457954	106027	NO_2	Y	Chemiluminescence	5	1.5	1.5

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic NO_2 Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	In AQMA ?	Distance to Relevant Exposure (m) [1]	Distance to kerb of nearest road (m) [2]	Tube collocated with a Continuous Analyser?	Height (m)
Gosport Borough Council									
GP7	Military Road/Brockhurst Road	R	459572	101800	N	41	3.5	N	2.7
GP9/10/11	Fareham Way/Tichborne Way	R	458985	102785	N	16	6	Y	2.7
GP12	Fareham Road/Lederle Lane	R	458282	104110	N	46	3	N	2.7
GP13	Wych Lane/Fareham Road	R	458064	104235	N	12	5	N	2.8
GP14	Bus StopWych Lane	R	457977	104185	N	84	4.5	N	2.7
GP18	Daedalus	R	456564	101572	N	15	3	N	2.8
GP21	Bury Cross 1	R	460046	099618	N	2.3	3.3	N	2.5
GP22	Bury Cross 2	R	460061	099604	N	2.3	3.3	N	2.5
GP23	Lees Lane/Forton Road Junction	R	460631	100435	N	11	3	N	2.7
Fareham Borough Council									
BL1	11 Bath Lane	NR	458376	106109	N	10	3.5	N	2.9
G1A	30 Old Gosport Road	R	457732	105625	N	0	10	N	2.3
G2A	138 Gosport Road	NR	457627	105138	Y	0	9.5	N	1.8
G3	202 Gosport Road	R	457726	104869	N	0	9	N	2
G4	122 Gosport Road	R	457598	105213	Y	0	6	N	2.5
G6	171 Gosport Road	R	457599	105410	Y	0	6	N	2.3
G7	193 Gosport Road	R	457583	105354	Y	0	6.5	N	3
G8Z	156 Gosport Road	R	457656	105049	N	0	4	N	1.9
G10	107 Gosport Road	R	457675	105616	N	0	14	N	2.6
G11	2 Earls Road	R	457668	105461	N	0	5	N	2.1
G12	Two Saints,101 Gosport Road	R	457684	105630	N	0	15	N	2.6

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
G14	Bottom of Beaconsfield Road	NR	457631	105494	N	5	6.9	N	2.5
HR2	17 Hartlands Road	R	457822	106107	N	N/A	11	N	1.9
HR3A	7 Hartlands Road	R	457787	106140	N	0	7	N	2.5
HR4	25 Hartlands Road	R	457860	106077	N	0	6.5	N	1.9
PS1/1A/1B	1 Sentinel Cottages	R	457939	106012	Y	0	6.5	N	2.5
PS2	2 Sentinel Cottages	R	457937	106021	Y	0	6.5	N	2.7
PS3	38 Portland Street	R	457935	106033	Y	0	3.5	N	2.3
PS4/5/6	Co-located with Portland St Monitor	R	457954	106027	Y	5	1.8	Y	1.2
E1/2/3	Co-located with Gosport Road Monitor	R	457590	105281	Y	3.5	1.5	Y	1.9
DC1	Maytree Drive Opposite Delme Court	R	457182	106203	N	N/A	0.5	N	2.5
RM1	Runnymede	R	455745	107825	N	N/A	49	N	2.7
GR/RL	Corner of Gosport Rd and Redlands Lane	R	457564	105300	Y	11	1.5	N	2.1
AQ8A	Rosemary House/Botley Road Suburban	S	451618	109015	N	0	8	N	2.1

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]							
				2008	2009	2010	2011	2012	2013	2014	2015
GOS1	R	Auto	95.5	25.3	24.4	24.9	25.0	30.1	37.2	29.5	26.2
FAR1	R	Auto	97.8	-	35.9	**41.8**	33.2	35.5	33.8	32.5	27.6
FAR2	R	Auto	99.7	-	-	-	-	34.9[4]	34.6[4]	**40.4**[4]	37.2
GP7	R	DT	75	-	-	20.4	23.0	36.1	34.6	34.4	30.9
GP9/10/11	R	DT	75/75/75	-	-	22.7[5]	21.7[5]	23.5	28.2	24.7	21.8
GP12	R	DT	75	-	-	32.4	21.5	27.3	**47.5**	39.1	27.4
GP13	R	DT	41.7	-	-	-	-	-	-	26.5	19.1
GP14	R	DT	75	-	-	-	-	-	-	22.4	15.5
GP18	R	DT	58.3	-	-	-	-	16.1	20.1	21.7	14.6
GP21	R	DT	75	-	-	-	-	35.6	36.1	38.9	36.5
GP22	R	DT	66.7	-	-	-	-	37.5	39.3	38.2	37.7
GP23	R	DT	75	-	-	28.7	34.1	36.9	35.1	39.4	29.4
BL1	NR	DT	100	-	-	-	30.7	35.9	38.5	**40.8**	**40.5**
G1A	R	DT	100	-	30.7	34.7	28.5	32.1	33.5	35.8	35.8
G2A	NR	DT	100	-	**40.6**	**41.5**	27.3	29.9	32.1	34.1	33.5
G3	R	DT	66.7	-	26.4	30.7	25.4	30.2	30.8	33.6	31.9
G4	R	DT	100	-	26.4	30.5	24.8	28.8	29.2	32.2	31.5
G6	R	DT	83.3	-	28.3	32.9	29.1	34.2	35.9	37.4	36.2
G7	R	DT	91.7	-	33.2	39.6	33.6	**40.6**	**40.1**	**46.1**	**45.2**
G8Z	R	DT	25	-	25.7	31.0	26.9	32.2	33.4	34.3	30.8
G10	R	DT	100	-	35.5	**40.8**	32.0	37.5	**40.5**	**40.4**	**41.7**

Site ID	Site Type	Monitoring Type	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)							
				2008	2009	2010	2011	2012	2013	2014	2015
G11	R	DT	91.7	-	25.9	28.7	24.3	29.2	29.6	29.0	31.3
G12	R	DT	100	-	-	-	32.2	37.0	37.4	**42.2**	38.2
G14	NR	DT	83.3	-	-	-	29.2	33.3	36.6	37.0	34.8
HR2	R	DT	100	-	28.2	32.5	27.6	32.1	34.0	34.3	33.1
HR3A	R	DT	100	-	25.2	34.8	23.2	27.3	29.5	30.2	29.0
HR4	R	DT	100	-	26.4	30.7	26.0	28.5	31.7	33.8	33.0
PS1/1A/1B	R	DT	100/100/100	-	36.0	**42.0**	34.8	35.1	37.0	38.7	37.2
PS2	R	DT	100	-	38.7	**43.3**	35.8	35.8	36.0	**41.3**	38.1
PS3	R	DT	100	-	**42.0**	**47.9**	35.0	**40.4**	**41.6**	**46.0**	**40.6**
PS4/5/6	R	DT	100/100/100	-	-	-	-	32.6	34.8	**40.2**	**42.9**
E1/2/3	R	DT	100/100/100	-	36.5	**41.8**	33.0	36.7	36.9	39.6	39.2
DC1	R	DT	100	-	25.3	29.1	24.2	28.3	30.3	30.1	30.2
RM1	R	DT	100	-	-	-	21.7	29.0	29.5	29.5	29.6
GR/RL	R	DT	100	-	-	-	-	26.6	28.4	28.6	26.7
AQ8A	S	DT	100	-	-	-	-	-	-	27.8	29.8

Notes: Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

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

R – Roadside, NR – Near Roadside, S – Suburban. Auto – Automatic Monitor, DT – Diffusion Tube

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG(16) if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

(4) Data has been distance corrected to the closest residential receptor location.

(5) The site became a triplicate location in 2012, before this was a single diffusion tube location.

Table A.4 – Fall off with Distance Calculator of Relevant Sites Exceeding the NO_2 Annual Mean AQS Objective

Site ID	Site Type	Within AQMA	Distance to Relevant Exposure (m)	Distance to Kerb of Nearest Road (m)	2015 Annual Mean Concentration ($\mu g/m^3$)	Estimated 2015 Annual Mean Concentration at Exposure Location ($\mu g/m^3$)
BL1*	Roadside	N	21	18.5	40.5	39.4
PS4/5/6	Roadside	Y	5	1.8	42.9	37.6

* - Distances have been taken from the A27 to relevant exposure and to the diffusion tube as this is the source of NO_2 concentrations not Bath Lane.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations at Automatic Monitor Locations

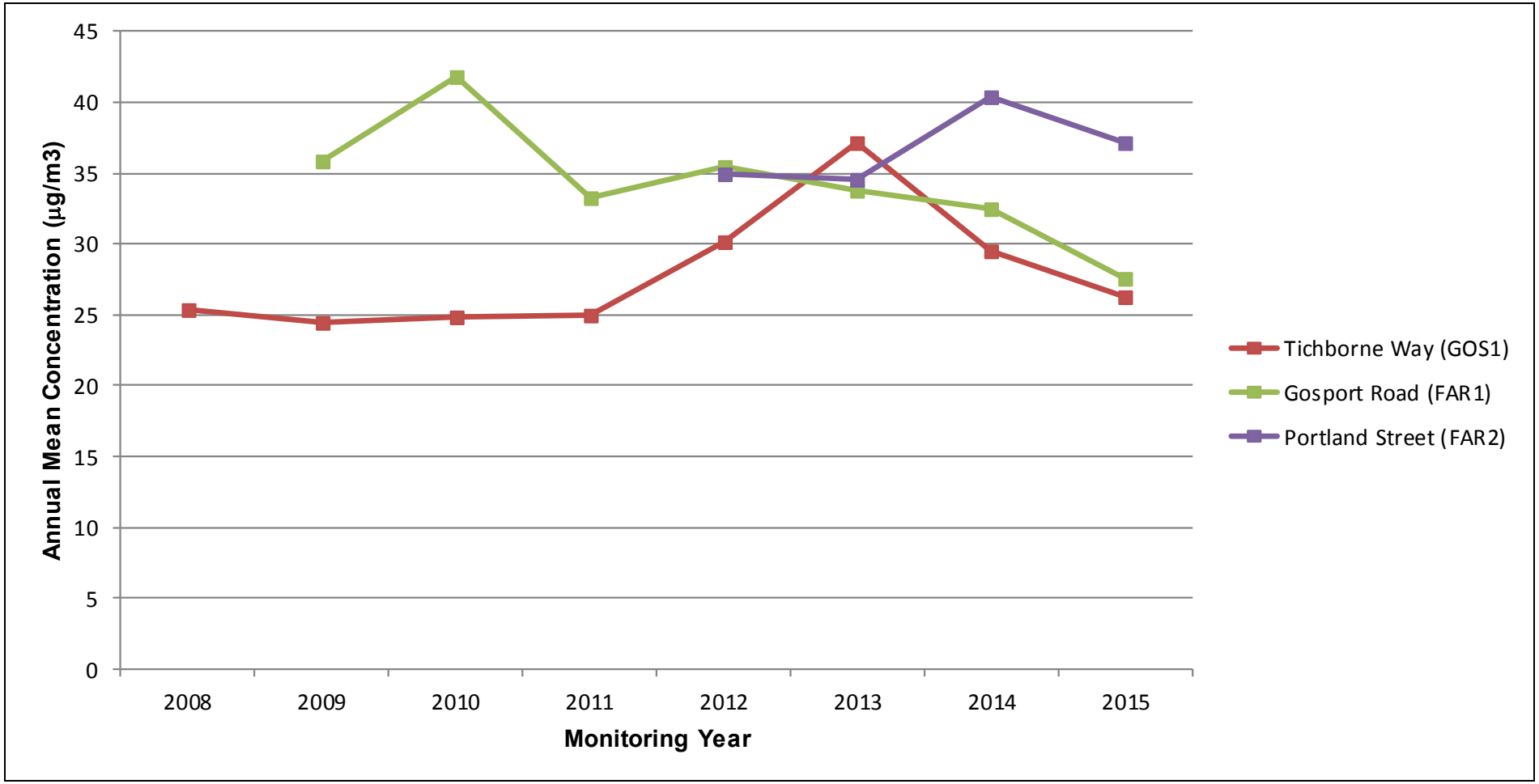


Figure A.2 – Trends in Annual Mean NO_2 Concentrations at Diffusion Tube Locations: Gosport

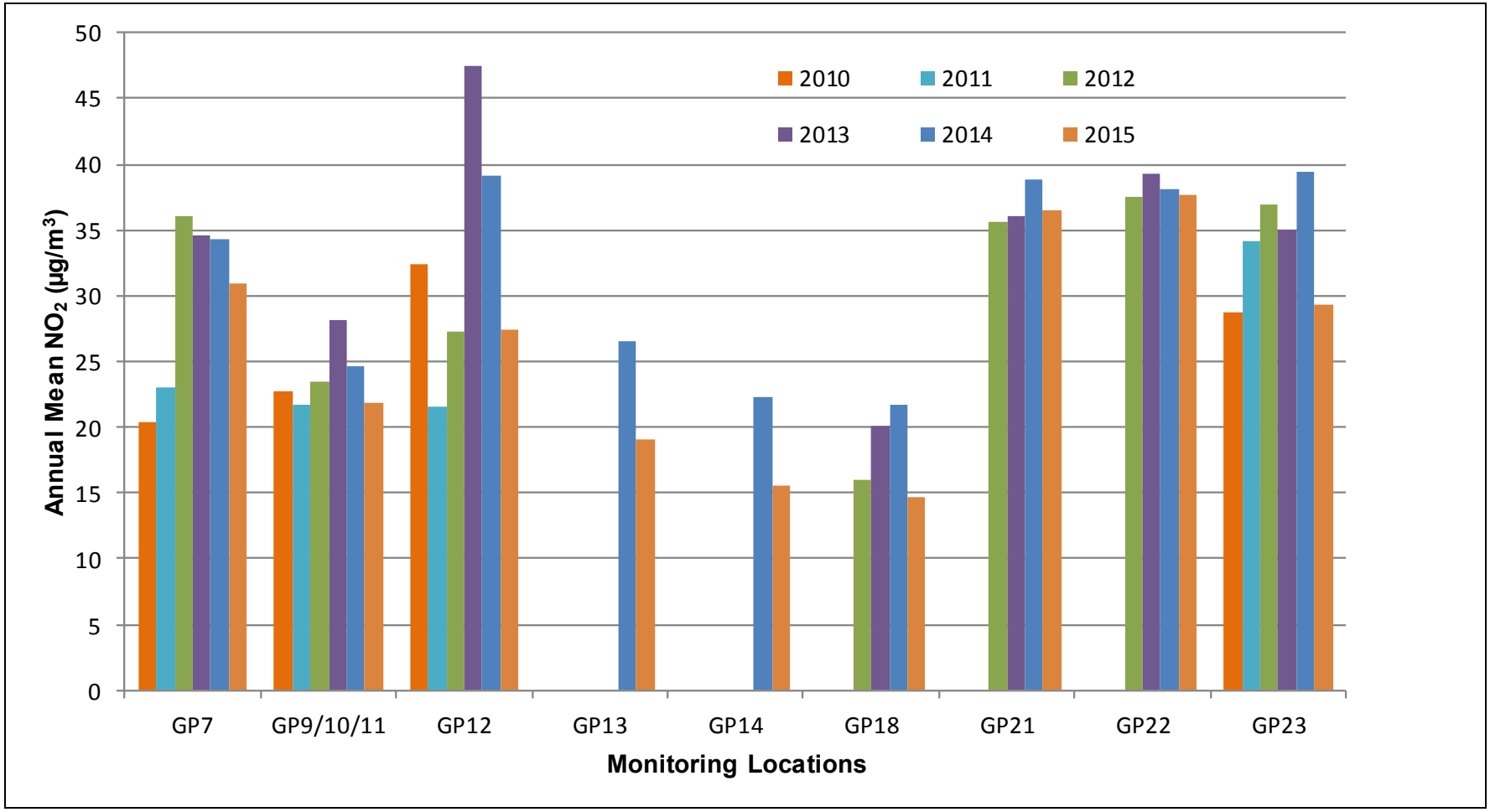


Figure A.3 – Trends in Annual Mean NO_2 Concentrations at Diffusion Tube Locations: Fareham

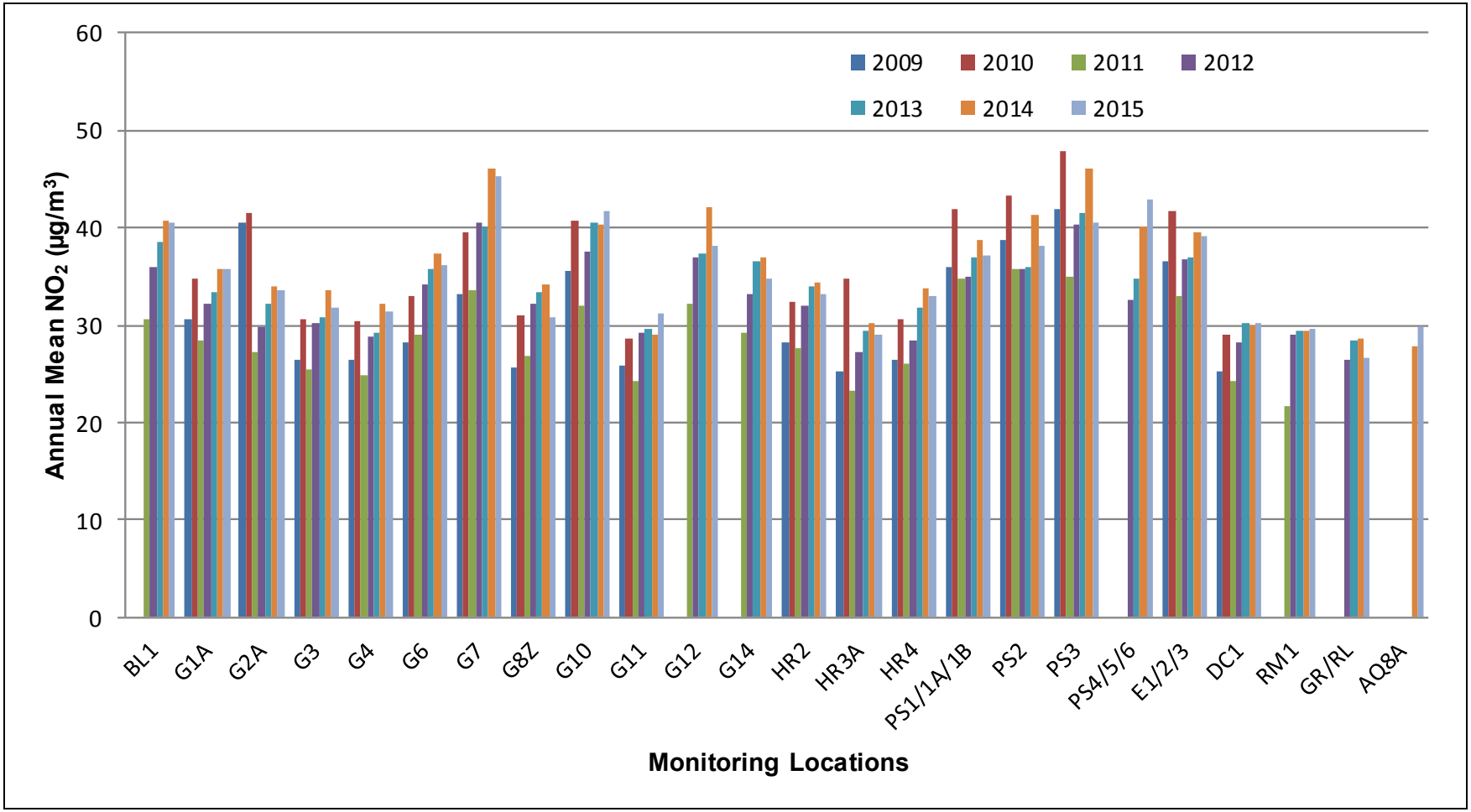


Table A.5 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)							
					2008	2009	2010	2011	2012	2013	2014	2015
GOS1	Roadside	Automatic	95.5	95.5	-	-	-	-	2	7	7	0
FAR1	Roadside	Automatic	97.8	97.8	0	0	0	0	0	0	0	0
FAR2	Roadside	Automatic	99.7	99.7	0	0	0	0	0	0	0 (126)	0

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

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

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

(3) If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

Table A.6 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)						
				2009	2010	2011	2012	2013	2014	2015
GOS1	Roadside	78.6%	78.6%	20.3	20.1	21.4	16.8	21.9	24.0	20.8

Notes: Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold.**

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

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

(3) All means have been "annualised" as per Technical Guidance LAQM.TG(16), valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.7 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50$\mu g/m^3$ (3)						
				2009	2010	2011	2012	2013	2014	2015
GOS1	Roadside	78.6%	78.6%	3	0	12	7	3	15	3

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

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

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

(3) If the period of valid data is less than 85%, the 90.4th percentile of 24-hour means is provided in brackets.

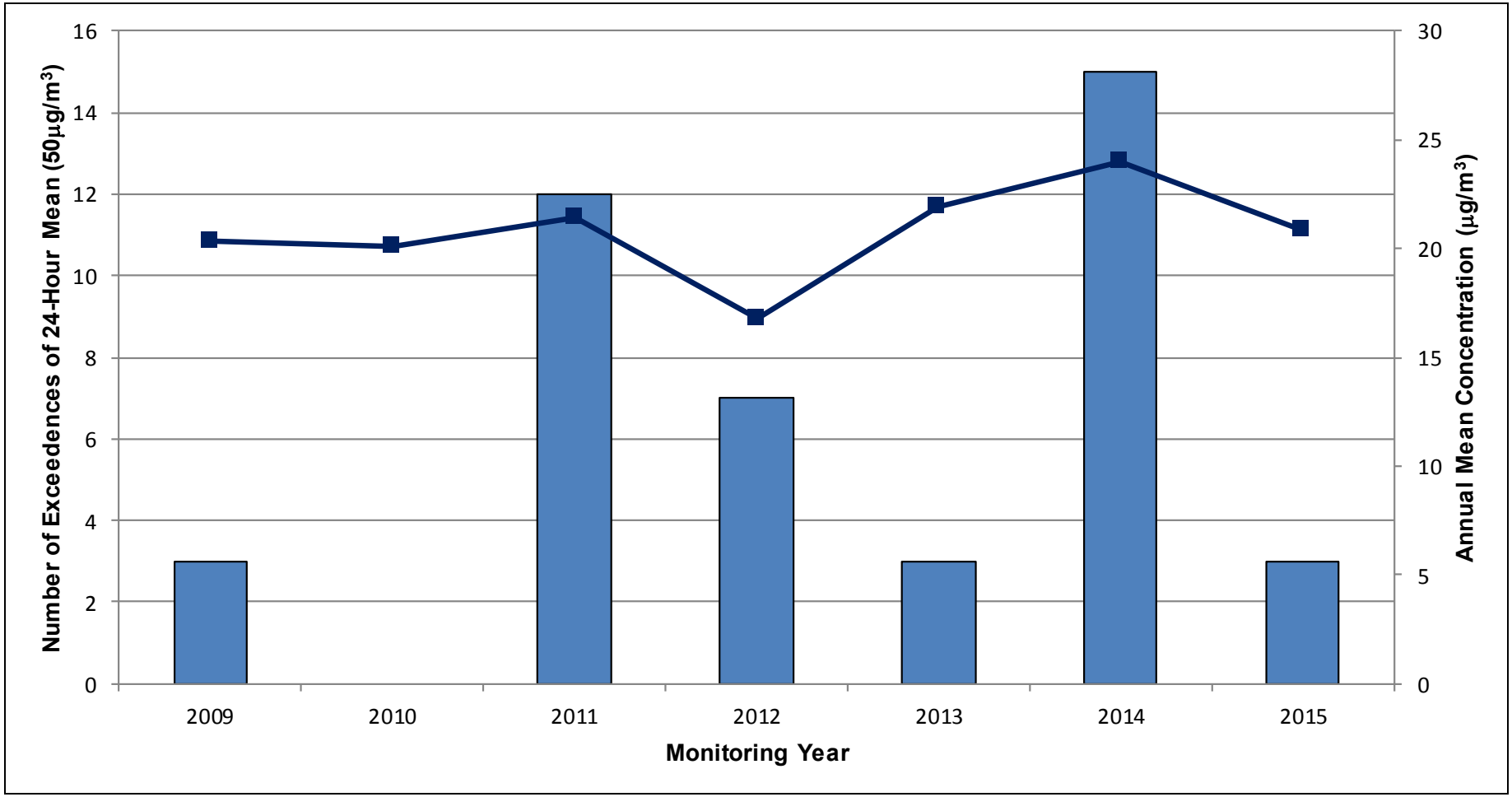
Table A.8 – Estimated Annual Mean $PM_{2.5}$ Monitoring Results: Tichborne Way (GOS1)

Site ID	Site Type	PM_{10} Valid Data Capture 2015 (%)	$PM_{2.5}$ Valid Data Capture 2015 (%)	2015 Annual Mean Concentration (µg/m^3)				Conversion Ratio Used
				SC PM_{10}	SC $PM_{2.5}$	GOS1 PM_{10}	GOS1 $PM_{2.5}$	
Southampton Centre	UB	90.2%	89.1%	16.5	10.1	20.8	12.7	0.61

Notes: UB – Urban Background

Methodology of Box 7.7 within LAQM.TG(16) followed for conversion of PM_{10} to $PM_{2.5}$

Figure A.4 – Trends in PM_{10}Concentrations: Annual Mean and 24-hour Mean Exceedences



Appendix B: Full Monthly Diffusion Tube Results for 2015

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

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)(2)
Gosport Borough Council														
GP7	36.7	-	-	-	35.5	32.1	34.4	39.1	30.0	39.6	41.3	30.7	35.5	30.9
GP9	32.5	-	-	-	18.4	17.7	18.2	27.1	25.3	35.3	25.9	17.2	24.2	21.0
GP10	36.3	-	-	-	19.7	20.2	18.1	27.4	24.0	43.5	25.0	20.4	26.1	22.7
GP11	29.1	-	-	-	19.3	19.9	21.0	26.4	26.7	36.1	24.9	21.0	24.9	21.7
GP12	35.7	-	-	-	26.0	26.1	33.8	35.1	30.8	35.6	32.8	27.8	31.5	27.4
GP13	35.9	-	-	-	19.9	-	-	-	-	12.4	26.0	20.5	22.9	19.1
GP14	22.8	-	-	-	15.4	13.8	14.9	17.6	18.4	22.6	20.3	14.7	17.8	15.5
GP18	20.4	-	-	-	-	11.9	13.1	16.2	16.9	20.1	17.4	-	16.6	14.6
GP21	52.9	-	-	-	36.4	37.5	41.7	48.0	39.7	49.1	39.0	33.6	**42.0**	36.5
GP22	42.2	-	-	-	34.9	34.0	39.3	44.9	37.8	44.2	-	39.0	39.5	37.7
GP23	42.9	-	-	-	27.8	28.0	30.5	39.6	31.1	44.3	34.8	25.0	33.8	29.4
Fareham Borough Council														
BL1	35.4	39.7	44.2	41.7	27.3	29.4	27.6	28.8	34.0	34.9	39.8	39.7	35.2	**40.5**
G1A	41.4	43.0	37.0	33.3	24.8	27.2	26.6	19.3	29.4	37.0	26.7	28.0	31.1	35.8
G2A	37.8	36.3	31.4	28.1	23.2	24.9	24.1	27.5	32.6	32.3	23.5	27.9	29.1	33.5
G3	-	36.5	31.8	25.6	-	21.1	23.8	26.4	25.9	30.9	-	-	27.7	31.9
G4	35.2	34.8	31.0	26.8	21.3	22.2	22.9	24.9	24.3	32.3	27.5	25.2	27.4	31.5

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)(2)
G6	32.7	36.2	38.6	36.6	23.4	26.4	24.9	-	29.4	38.3	28.5	-	31.5	36.2
G7	43.8	44.5	46.9	41.0	31.0	36.7	32.3	35.6	40.0	49.6	30.7	-	39.3	45.2
G8Z	33.3	36.5	31.5	-	-	-	-	-	-	-	-	-	33.8	30.8
G10	40.0	42.6	35.9	44.0	28.2	32.1	33.7	35.0	36.7	43.3	32.2	30.9	36.2	**41.7**
G11	34.2	34.5	29.5	24.7	20.9	21.6	21.9	23.6	29.2	32.4	27.3	-	27.3	31.3
G12	37.6	34.0	38.0	38.4	29.7	30.8	30.3	33.3	31.9	38.6	27.4	29.2	33.3	38.2
G14	30.7	36.1	41.2	-	-	25.8	21.7	28.0	32.6	41.1	23.7	21.9	30.3	34.8
HR2	27.1	33.6	29.6	26.0	16.6	18.8	15.5	20.2	24.6	28.7	20.8	17.2	28.8	33.1
HR3A	44.5	40.3	36.5	32.4	30.2	28.8	29.3	35.5	34.1	41.5	31.4	31.9	25.2	29.0
HR4	38.3	41.9	40.1	30.8	27.0	29.8	28.4	34.6	34.5	42.1	31.2	28.4	28.7	33.0
PS1	38.7	41.2	39.2	30.7	28.3	28.2	26.9	33.3	36.2	42.6	28.1	31.7	32.1	36.9
PS1A	32.0	31.0	30.6	29.7	18.1	22.0	18.8	22.5	31.8	36.2	23.1	13.2	32.6	37.5
PS1B	33.8	34.7	30.7	24.0	21.1	20.8	20.5	24.4	27.5	31.9	22.8	22.8	32.2	37.1
PS2	35.2	34.8	36.3	37.6	25.9	30.7	27.5	31.9	33.0	38.7	26.3	27.4	33.1	38.1
PS3	33.5	35.9	41.2	33.3	27.1	31.3	26.5	32.1	36.0	41.1	28.0	25.3	35.3	**40.6**
PS4	36.1	36.4	40.3	36.4	23.2	27.6	25.9	32.1	36.1	38.7	28.2	26.0	36.7	**42.2**
PS5	36.2	39.5	35.8	36.1	27.2	28.0	28.1	33.7	34.6	39.2	29.7	29.3	37.7	**43.4**
PS6	41.1	41.7	36.6	34.6	27.1	33.8	31.1	37.0	36.4	42.7	25.6	36.3	37.3	**42.9**
E1	42.9	40.0	41.6	36.2	31.1	31.1	31.1	34.6	39.1	47.1	30.7	35.2	34.7	39.9
E2	39.0	45.9	44.2	44.3	24.2	33.8	31.7	35.9	40.6	45.3	31.1	37.2	33.9	39.0
E3	35.6	43.7	36.8	42.7	30.4	32.6	32.3	35.7	38.4	49.5	33.1	36.9	33.7	38.8
DC1	32.1	33.2	36.7	30.4	22.0	26.1	25.0	28.2	28.6	30.4	25.6	27.4	26.2	30.2

Site ID	NO_2 Mean Concentrations (µg/m^3)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)(2)
RM1	29.0	32.6	31.2	29.4	20.2	21.0	19.5	23.8	27.4	29.2	17.9	21.2	25.8	29.6
GR/RL	35.8	36.6	40.4	26.1	22.8	20.6	18.3	24.7	31.7	36.8	24.0	26.9	23.2	26.7
AQ8A	31.4	30.8	26.3	24.5	21.5	22.5	24.0	28.2	22.6	27.2	26.5	25.7	26.0	29.8

(1) See Appendix C for details on bias adjustment.

(2) Data has been annualised due to data capture in 2015 less than 75%

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

Sources of Pollution

Fareham and Gosport Councils have identified no **new sources** within the Borough as described in Chapter 7, Section 1 of the Defra Technical Guidance LAQM.TG(16).

Short-term to Long-term Data Adjustment

For the 2015 diffusion tube data, annualisation was required at a total of five sites; three within Gosport and two within Fareham due to data capture below 75%. The annualisation process has been completed in line with Defra Technical Guidance LAQM.TG(16) Box 7.10 and details of the annualisation have been provided in Table C.1.

Table C.1 – Short-term to Long-term Monitoring Data Adjustment

Site ID	Unadjusted Diffusion Tube Mean (µg/m^3)	Annualisation Factor Southampton	Annualisation Factor Bournemouth	Annualisation Factor Portsmouth	Average Annualisation Factor	Annualised & Bias Adjusted Tube Mean (µg/m^3)
G3	27.7	1.070	0.960	0.971	1.00043	31.9
G8Z	33.8	0.939	0.693	0.749	0.79377	30.8
GP13	22.9	0.889	0.992	0.996	0.95919	19.1
GP18	16.6	0.977	1.049	1.019	1.01487	14.6
GP22	39.5	1.106	1.134	1.049	1.09661	37.7

Diffusion Tube Local Bias Adjustment Factors

There are four triplicated diffusion tube monitoring sites located within Fareham and Gosport, three of these are co-located at the three automatic monitoring stations. Local bias adjustment factors have been calculated from the Precision and Bias Adjustment spreadsheet (v04)[7], and these are shown in and the outputs from the spreadsheet are shown in Figures C.1, C.2 and C.3 and a comparison in Table C.2.

[7] AEA_DifTPAB_v04.xls, available at http://laqm.defra.gov.uk/bias-adjustment-factors/local-bias.html

Table C.2 – Local Bias Correction Factors

Location	Diffusion Tube Data Capture	Continuous Monitor Data Capture	Diffusion Tube Annual Mean (µg/m^3)	Continuous Monitor Annual Mean (µg/m^3)	Ratio
Tichborne Way (GOS1), GP9/10/11	75%	95.65%	25.1	25.9	1.02
Gosport Road (FAR1), E1/2/3	100%	99.40%	34.1	27.7	0.81
Portland Street (GOS2), PS4/5/6	100%	99.65%	37.3	38.0	1.15

Figure C.1 – Local Bias Correction Output – Tichborne Way (GOS1)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	07/01/2015	04/02/2015	32.5	36.3	29.1	33	3.6	11	9.0
2	04/02/2015	06/03/2015							
3	06/03/2015	01/04/2015							
4	01/04/2015	28/04/2015							
5	28/04/2015	27/05/2015	18.4	19.7	19.3	19	0.7	4	1.7
6	27/05/2015	01/07/2015	17.7	20.2	19.9	19	1.4	7	3.4
7	01/07/2015	29/07/2015	18.2	18.1	21.0	19	1.6	9	4.0
8	29/07/2015	28/08/2015	27.1	27.4	26.4	27	0.5	2	1.3
9	28/08/2015	01/10/2015	25.3	24.0	26.7	25	1.4	5	3.4
10	01/10/2015	27/10/2015	35.3	43.5	36.1	38	4.5	12	11.2
11	27/10/2015	02/12/2015	25.9	25.0	24.9	25	0.5	2	1.4
12	02/12/2015	07/01/2016	17.2	20.4	21.0	20	2.0	10	5.1
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
27.373	99.255952	Good	Good
26.0602	99.722222		Good
24.4738	99.839744		Good
27.4718	100		Good
23.0866	66.666667	Good	r Data Capture
28.8394	99.761905	Good	Good
27.6657	84.672619	Good	Good
24.8834	96.805556	Good	Good
22.8518	99.754902	Good	Good
25.9602	99.691358	Good	Good
26.0285	100	Good	Good
27.2363	99.884259	Good	Good
Overall survey -->		Good precision	Good Overall

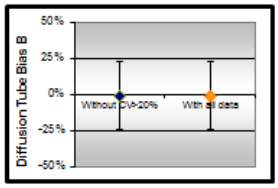
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 9 out of 9 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 8 periods of data
Bias factor A 1.02 (0.82 - 1.35)
Bias B -2% (-26% - 22%)
Diffusion Tubes Mean: 26 µgm^{-3}
Mean CV (Precision): 7
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 97%
Adjusted Tubes Mean: 26 (21 - 35) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 8 periods of data
Bias factor A 1.02 (0.82 - 1.35)
Bias B -2% (-26% - 22%)
Diffusion Tubes Mean: 26 µgm^{-3}
Mean CV (Precision): 7
Automatic Mean: 26 µgm^{-3}
Data Capture for periods used: 97%
Adjusted Tubes Mean: 26 (21 - 35) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Figure C.2 – Local Bias Correction Output – Gosport Road (FAR1)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	07/01/2015	04/02/2015	44.5	38.3	38.7	40	3.5	9	8.6
2	04/02/2015	06/03/2015	40.3	41.9	41.2	41	0.8	2	2.0
3	06/03/2015	01/04/2015	36.5	40.1	39.2	39	1.8	5	4.6
4	01/04/2015	28/04/2015	32.4	30.8	30.7	31	1.0	3	2.4
5	28/04/2015	27/05/2015	30.2	27.0	28.3	29	1.6	6	4.0
6	27/05/2015	01/07/2015	28.8	29.8	28.2	29	0.8	3	2.0
7	01/07/2015	29/07/2015	29.3	28.4	26.9	28	1.2	4	3.0
8	29/07/2015	28/08/2015	35.5	34.6	33.3	34	1.1	3	2.8
9	28/08/2015	01/10/2015	34.1	34.5	36.2	35	1.1	3	2.8
10	01/10/2015	27/10/2015	41.5	42.1	42.6	42	0.6	1	1.4
11	27/10/2015	02/12/2015	31.4	31.2	28.1	30	1.9	6	4.6
12	02/12/2015	07/01/2016	31.9	28.4	31.7	31	2.0	7	5.0
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
21.15	97.2	Good	Good
41.89	99	Good	Good
33.06	99.7	Good	Good
31.05	99.7	Good	Good
24.56	100	Good	Good
28.48	99.6	Good	Good
19.91	99.4	Good	Good
25.76	99.7	Good	Good
27	99.9	Good	Good
31.37	99.8	Good	Good
25.41	100	Good	Good
21.16	100	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.81 (0.71 - 0.93)
Bias B 24% (7% - 40%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 28 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 28 (24 - 32) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.81 (0.71 - 0.93)
Bias B 24% (7% - 40%)
Diffusion Tubes Mean: 34 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 28 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 28 (24 - 32) µgm^{-3}

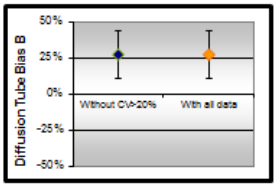


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Figure C.3 - Local Bias Correction Output – Portland Street (FAR2)

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm^{-3}	Tube 2 µgm^{-3}	Tube 3 µgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	07/01/2015	04/02/2015	35.2	33.5	36.1	35	1.4	4	3.4
2	04/02/2015	06/03/2015	34.8	35.9	36.4	36	0.8	2	2.1
3	06/03/2015	01/04/2015	36.3	41.2	40.3	39	2.6	7	6.5
4	01/04/2015	28/04/2015	37.6	33.3	36.4	36	2.2	6	5.5
5	28/04/2015	27/05/2015	25.9	27.1	23.2	25	2.0	8	5.0
6	27/05/2015	01/07/2015	30.7	31.3	27.6	30	2.0	7	4.9
7	01/07/2015	29/07/2015	27.5	26.5	25.9	27	0.8	3	2.0
8	29/07/2015	28/08/2015	31.9	32.1	32.1	32	0.1	0	0.3
9	28/08/2015	01/10/2015	33.0	36.0	36.1	35	1.8	5	4.4
10	01/10/2015	27/10/2015	38.7	41.1	38.7	39	1.4	4	3.5
11	27/10/2015	02/12/2015	26.3	28.0	28.2	27	1.0	4	2.6
12	02/12/2015	07/01/2016	27.4	25.3	26.0	26	1.1	4	2.6
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
38.97	100	Good	Good
41.03	99.7	Good	Good
37.15	99.8	Good	Good
32.59	99.8	Good	Good
26.12	98	Good	Good
34.61	99.9	Good	Good
35.55	99.9	Good	Good
37.69	99.9	Good	Good
41.18	99.6	Good	Good
46.03	99.8	Good	Good
40.22	99.6	Good	Good
34.74	99.8	Good	Good
	Overall survey -->	Good precision	Good Overall

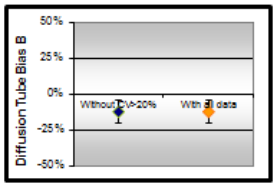
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 1.15 (1.06 - 1.26)
Bias B -13% (-21% - -5%)
Diffusion Tubes Mean: 32 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 37 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 37 (34 - 41) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 1.15 (1.06 - 1.26)
Bias B -13% (-21% - -5%)
Diffusion Tubes Mean: 32 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 37 µgm^{-3}
Data Capture for periods used: 100%
Adjusted Tubes Mean: 37 (34 - 41) µgm^{-3}



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Diffusion Tube National Bias Adjustment Factors

The diffusion tubes for the year 2015 were supplied and analysed by Gradko International Limited, the tubes were prepared using the 20% Triethanolamine (TEA) in water preparation method. The national bias adjustment factor for Gradko 20% TEA is 0.87 (based on 30 studies, version 09_16) as derived from the national bias adjustment calculator[8].

Discussion of Choice of Factor to Use

The diffusion tube data has been corrected using a bias adjustment factor, which is an estimate of the difference between diffusion tube concentration and continuous monitoring, the latter assumed to be a more accurate method of monitoring. The Defra Technical Guidance LAQM.TG(16) provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO_2 continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

[8] National Diffusion Tube Bias Adjustment Factor Spreadsheet version 09/16 available at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

With regard to the application of a bias adjustment factor for diffusion tubes, the Defra Technical Guidance LAQM.TG(16) and the LAQM Helpdesk[9] recommend the use of a local bias adjustment factor where available and relevant to diffusion tube sites.

The national bias adjustment factor of 0.87 derived from the national bias adjustment calculator has been used to adjust the Gosport Borough Council diffusion tubes. This factor has been chosen due to previous LAQM reports using the national bias factor and due to the reduced diffusion tube data capture at the Tichborne Way automatic monitoring site.

The local bias adjustment factor of 1.15 derived from the co-location study at the Portland Street continuous automatic monitor has been used to adjust the Fareham Borough Council diffusion tubes. The Portland Street monitor experienced a slightly greater data capture during 2015 compared to the Gosport Road monitor therefore it was decided to solely used the factor derived from this site. In addition due to this factor being greater than the national factor and the factor derived from the Gosport Street co-location study, the local bias adjustment factor provides a worst case scenario.

PM Monitoring Adjustment

A Tapered Element Oscillating Microbalance (TEOM) is in operation at the Tichborne Way monitoring location to record PM_{10} concentration, TEOM monitors do not meet the equivalence criteria for PM_{10} monitoring therefore the data must be adjusted. The Tichborne Way PM_{10} data has been corrected using the Volatile Correction Model (VCM) methodology. The VCM correction has been completed for the data provided to Gosport Borough Council by We Care 4 Air who were the service agent for the automatic monitors for during 2015.

QA/QC of Automatic Monitoring

Formal Quality Assurance/Quality Control (QA/QC) are currently provided by We Care 4 Air, this ensures reliability and accuracy of the measurements. The monitoring sites are visited and checked every two weeks.

[9] Laqm.defra.gov.uk

QA/QC of Diffusion Tube Monitoring

Gradko International Ltd is a UKAS accredited laboratory and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. Gradko previously participated in the Workplace Analysis Scheme for Proficiency (WASP) for NO_2 diffusion tube analysis and the Annual Field Inter-Comparison Exercise. In April 2014, a new scheme, AIR PT[10], was introduced. This is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

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 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. A laboratory is assessed and given a 'z' score. A score of 2 or less indicates satisfactory laboratory performance.

Gradko International Ltd's performance for 2015 is covered by rounds AR006, AR007, AR009 and AR010 of the AIR-PT scheme, for each round 100% of the laboratories results were deemed to be satisfactory based upon a z score of ≤ ± 2. In 2015, the tube precision for NO_2 Annual Field Inter-Comparison for Gradko International using the 20% TEA in acetone method was 'good' for the results of 29 out of 30 participating local authorities.

[10] http:// http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-4-15-(October-2014-August-2016)-NO2-report.pdf

Appendix D: Maps of Monitoring Locations

Figure D.1 – Map of Automatic Monitoring Location – Tichborne Way

Figure D.2 – Map of Automatic Monitoring Location – Gosport Road

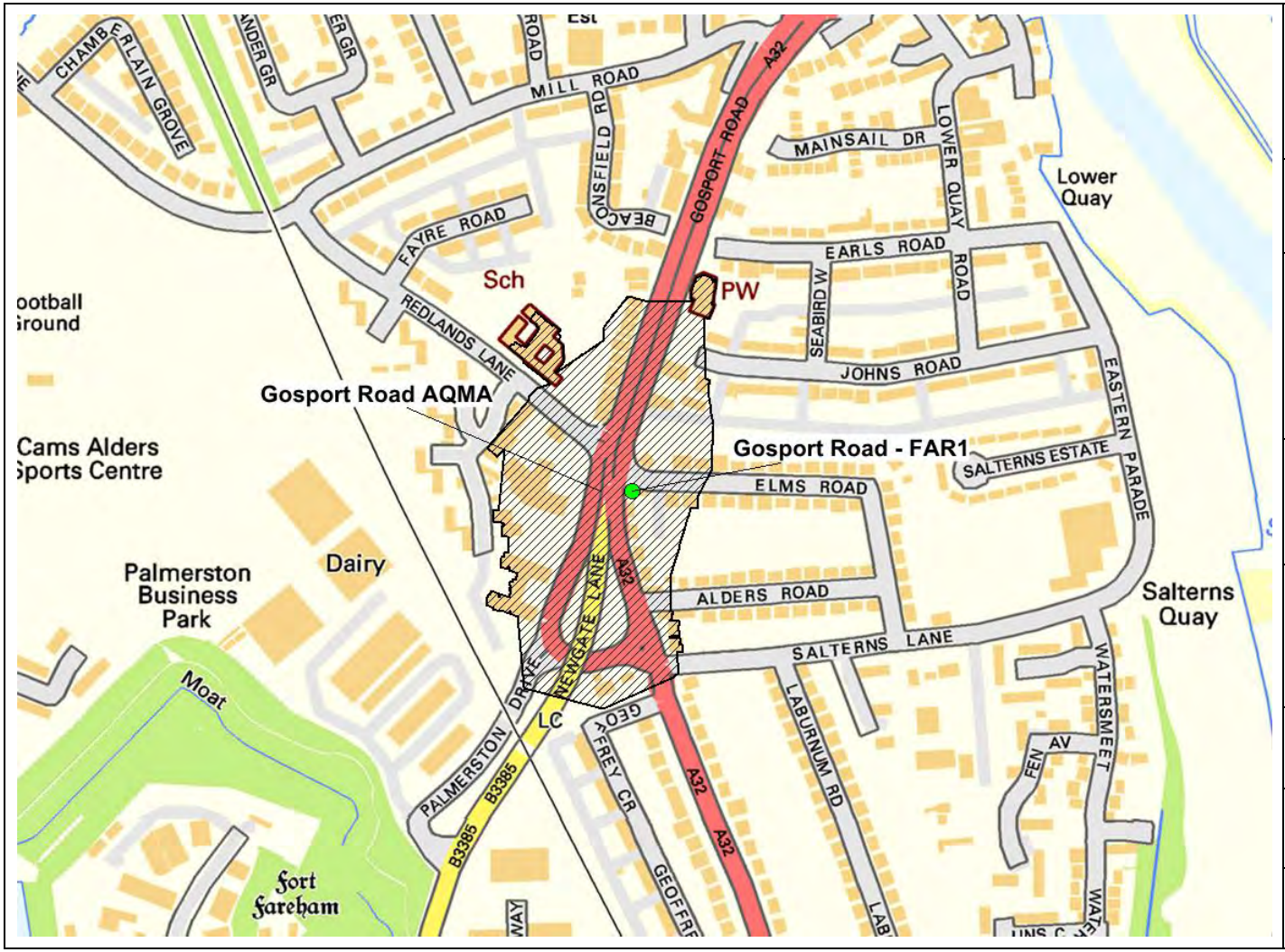


Figure D.3 – Map of Automatic Monitoring Location – Portland Street

Legend

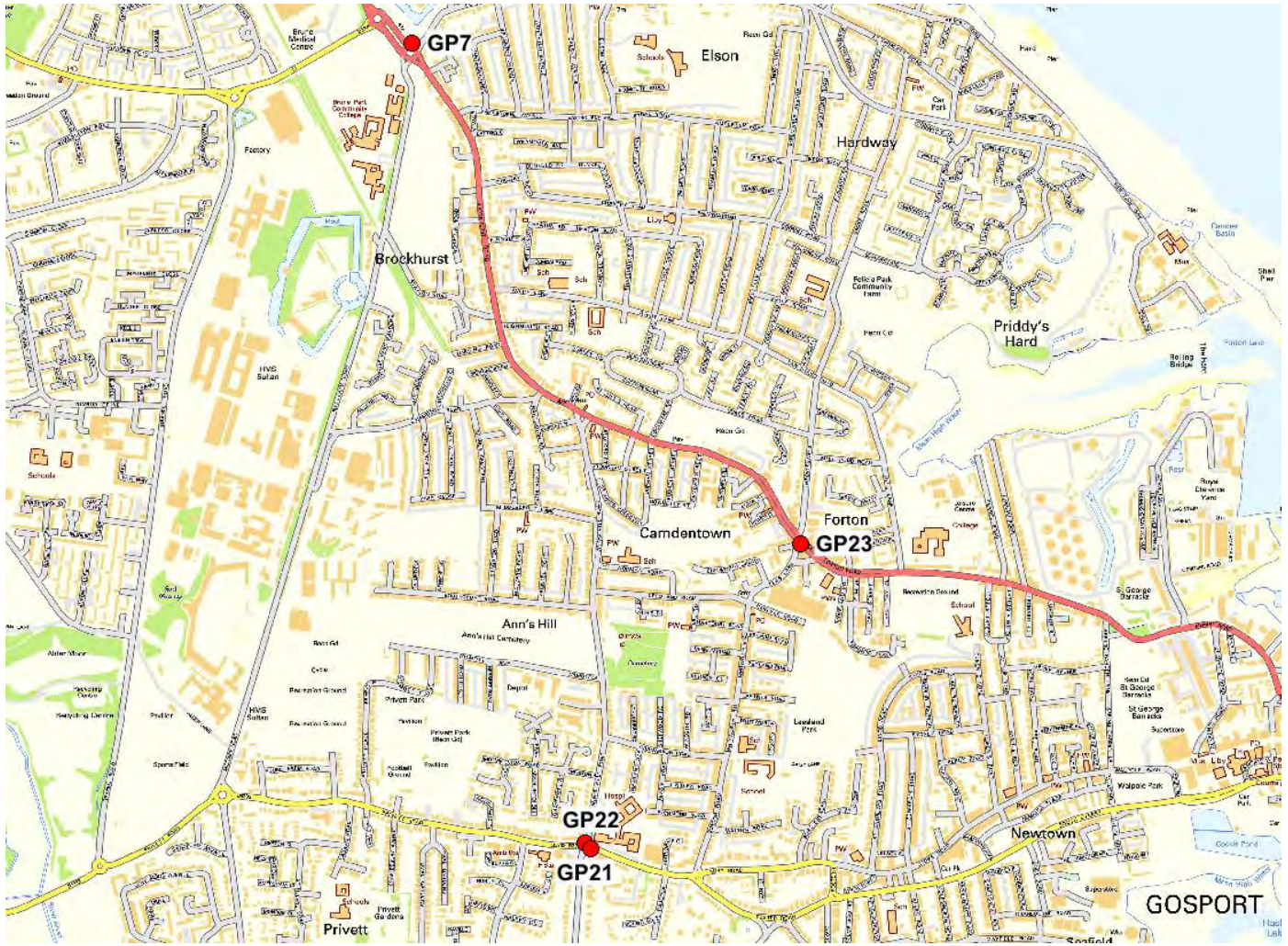
Automatic Monitor

Designated AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Automatic Monitoring Site – Portland Street (FAR2)**
By PB	**Approved** JC
Scale Not To Scale	**Job Ref** 6381546
Date October 2016	**Figure No.** **D.3**

Figure D.4 – Map of Diffusion Tube Monitoring Locations – Gosport



Legend

Diffusion Tube

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location

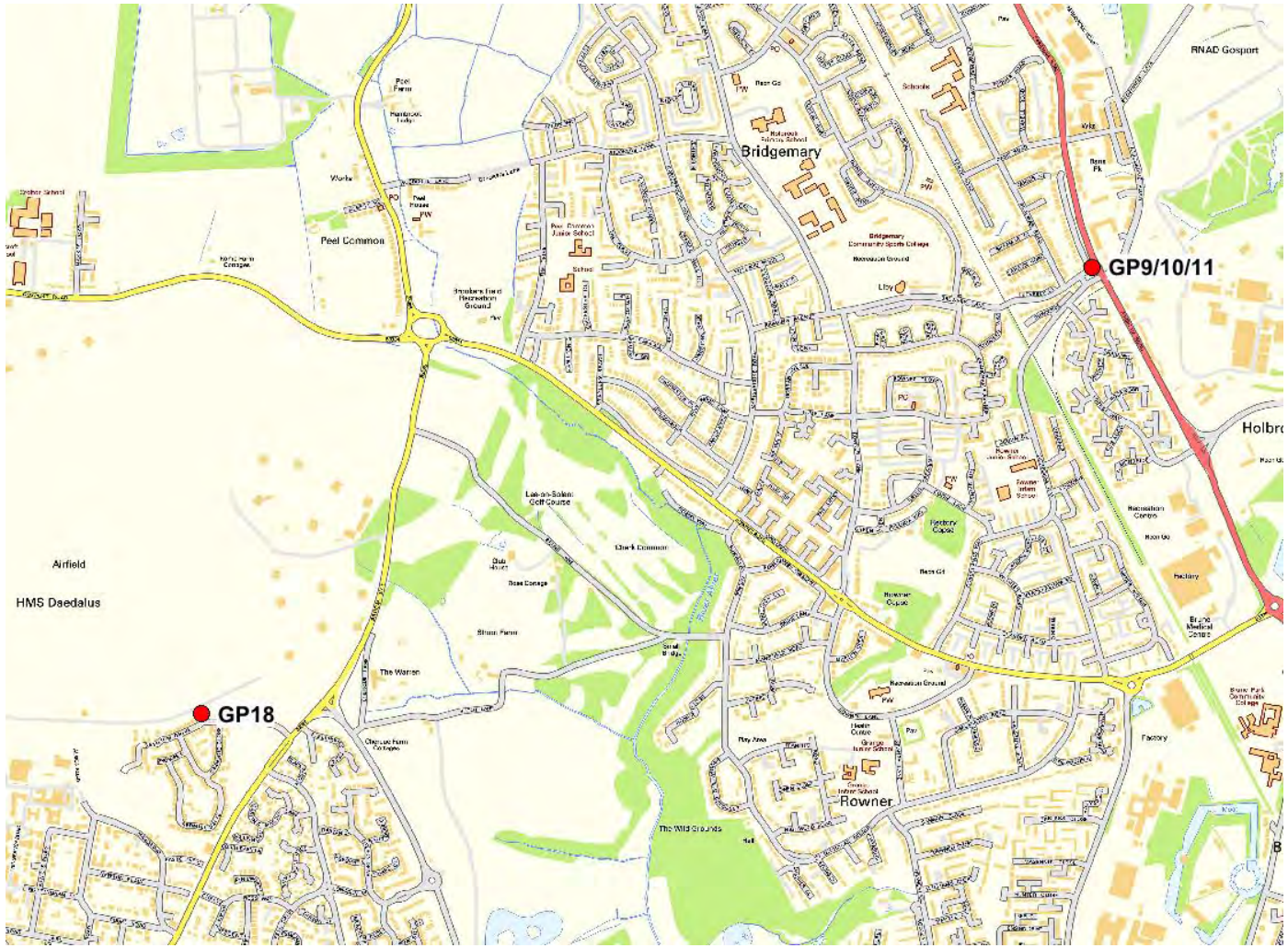
Gosport Borough Council

Title

Diffusion Tube Locations - Gosport

By	Approved
PB	JC
Scale	**Job Ref**
Not To Scale	6381546
Date	**Figure No.**
October 2016	**D.4**

Figure D 5 – Map of Diffusion Tube Monitoring Locations – Bridgemary and Daedalus



Legend

Diffusion Tube

Contains Ordnance Survey Data Crown Copyright and Database Right [2016]

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location

Gosport Borough Council

Title

Diffusion Tube Locations – Bridgemary and Daedalus

By	Approved
PB	JC
Scale	**Job Ref**
Not To Scale	6381546
Date	**Figure No.**
October 2016	**D.5**

Figure D.6 – Map of Diffusion Tube Monitoring Locations – Fleetlands

Legend

Diffusion Tube

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location

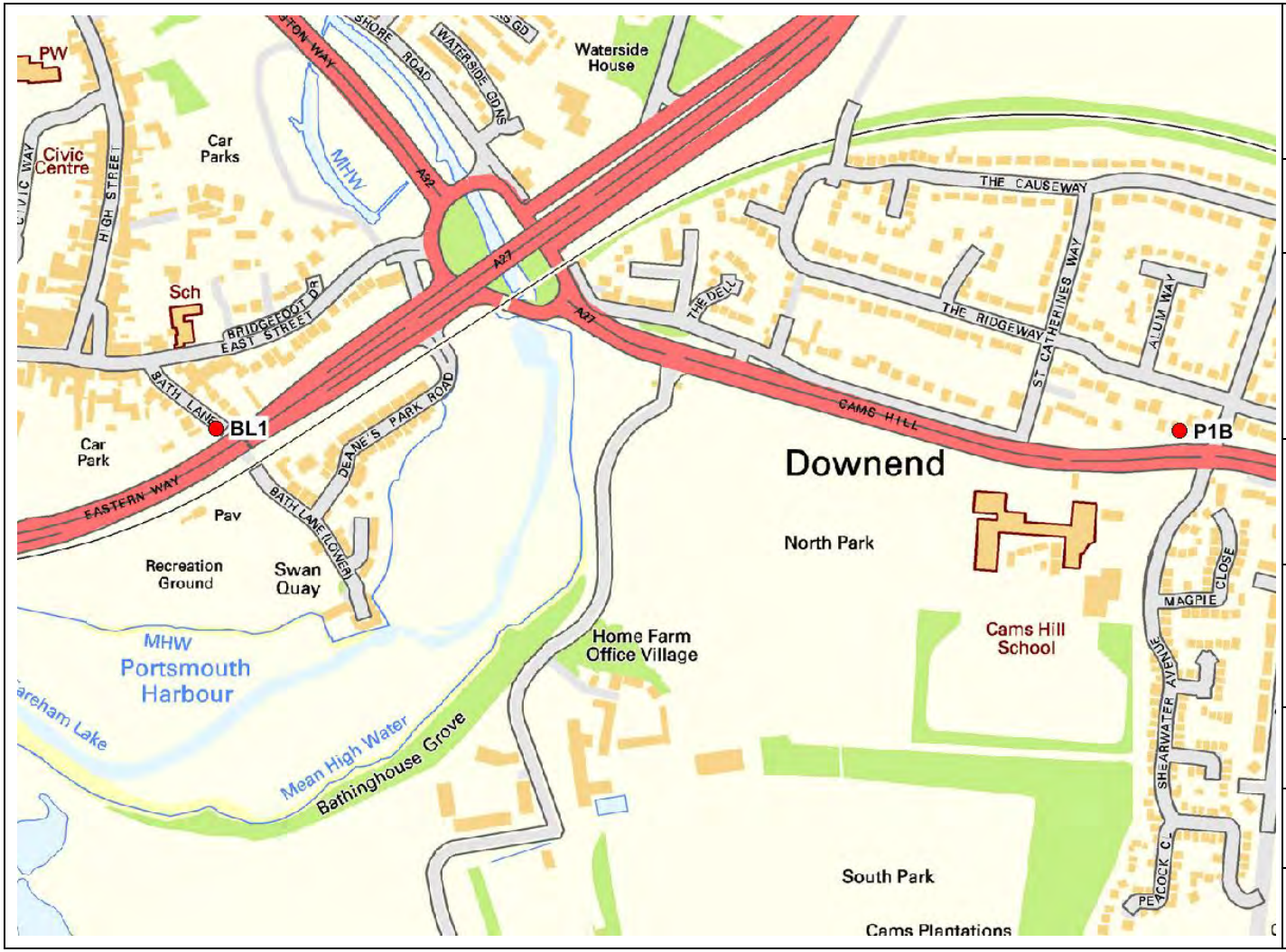
Gosport Borough Council

Title

Diffusion Tube Locations - Fleetlands

By	Approved
PB	JC
Scale	**Job Ref**
Not To Scale	6381546
Date	**Figure No.**
October 2016	**D.6**

Figure D.7 – Map of Diffusion Tube Monitoring Locations – Downend



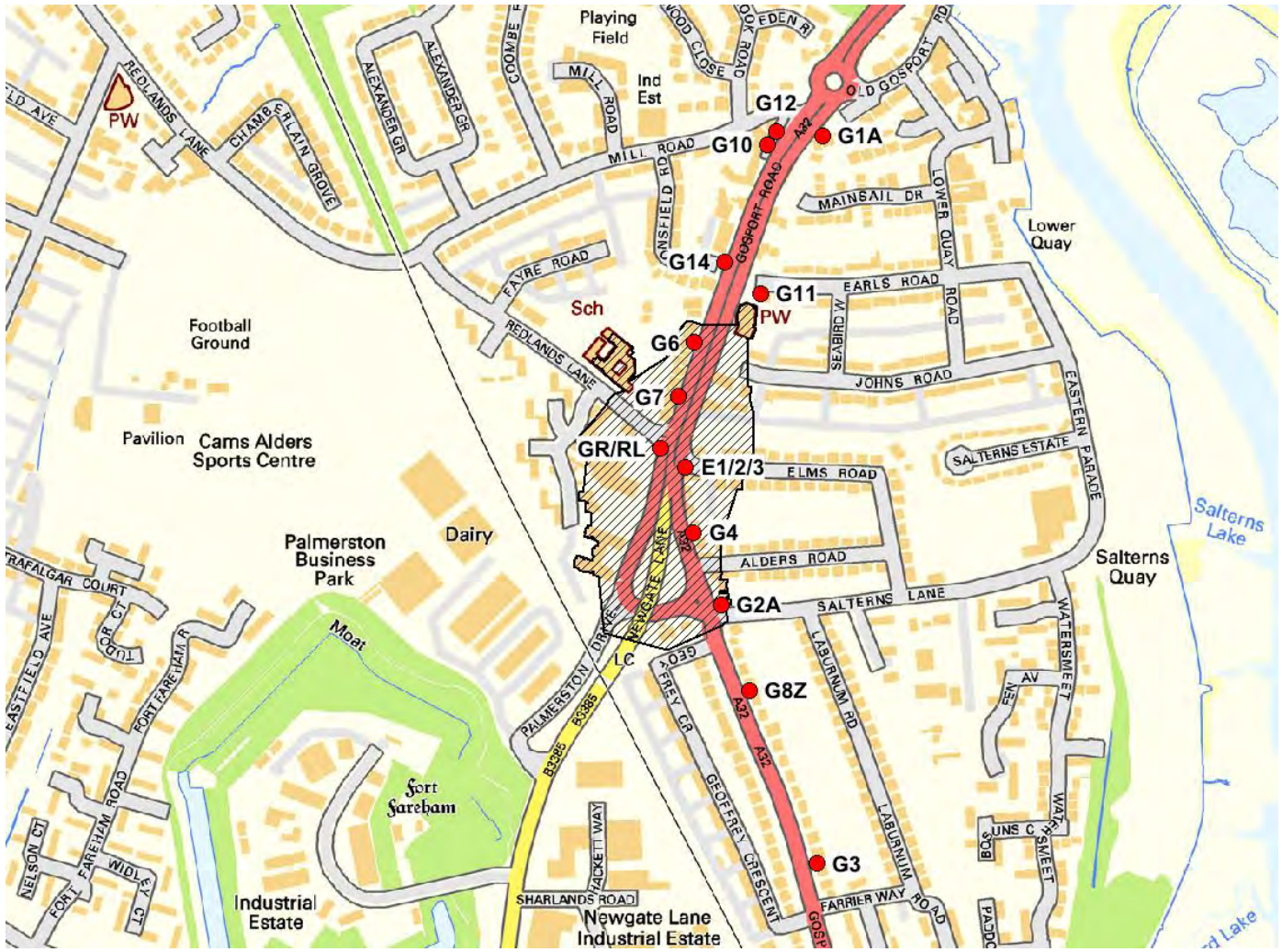
Legend

Diffusion Tube

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Diffusion Tube Locations - Downend**
By PB	**Approved** JC
Scale Not To Scale	**Job Ref** 6381546
Date October 2016	**Figure No.** **D.7**

Figure D.8 – Map of Diffusion Tube Monitoring Locations – Gosport Road



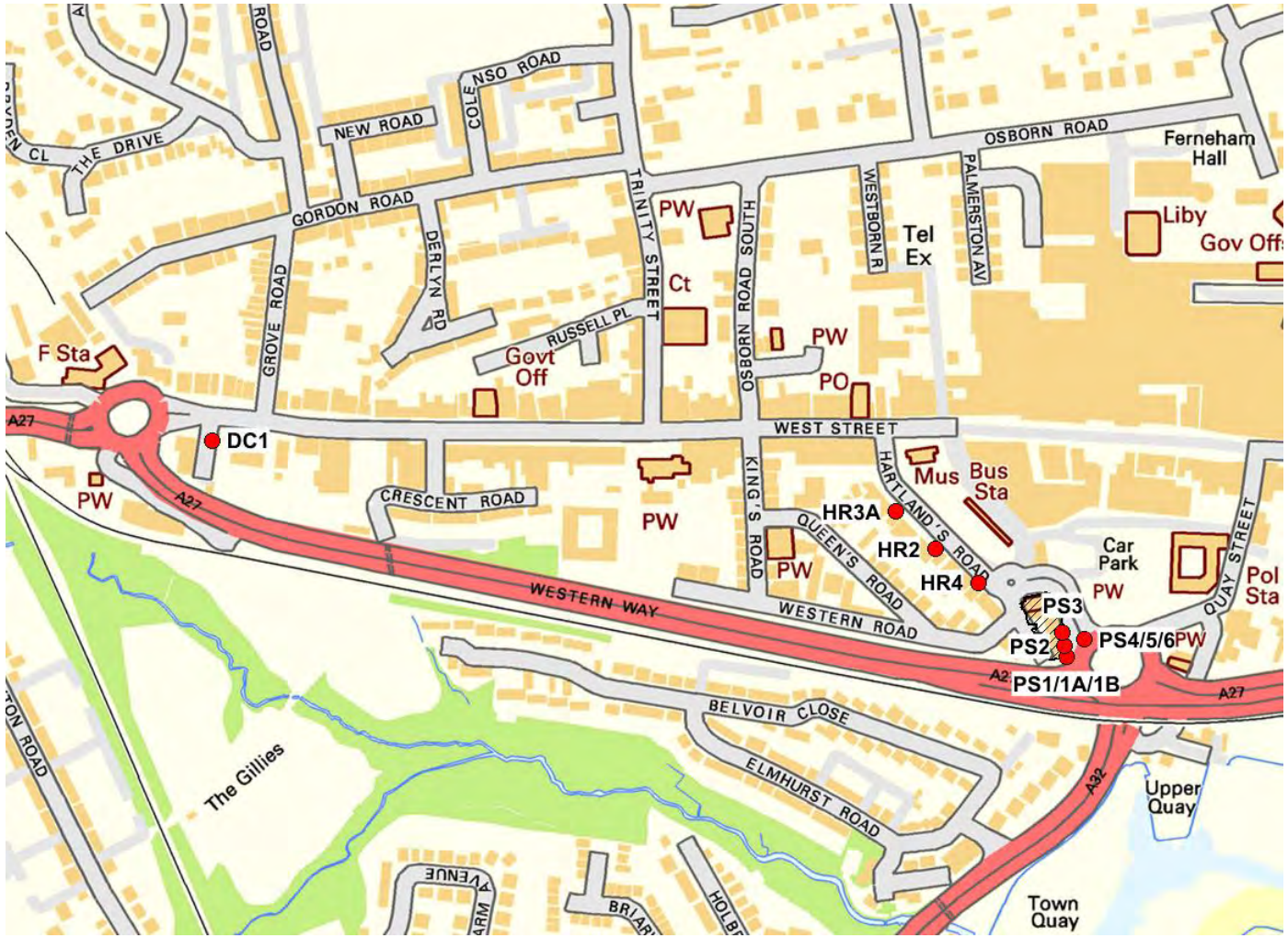
Legend

- Diffusion Tube
- Designated AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Diffusion Tube Locations – Gosport Road**
By PB	**Approved** JC
Scale Not To Scale	**Job Ref** 6381546
Date October 2016	**Figure No.** **D.8**

Figure D.9 – Map of Diffusion Tube Monitoring Locations – Western Way



Legend

Diffusion Tube

Designated AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Diffusion Tube Locations – Western Way**
By PB	**Approved** JC
Scale Not To Scale	**Job Ref** 6381546
Date October 2016	**Figure No.** **D.9**

Figure D.10 – Map of Diffusion Tube Monitoring Locations – Hill Park

Legend

Diffusion Tube

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Diffusion Tube Locations – Hill Park**
By PB	**Approved** JC
Scale Not To Scale	**Job Ref** 6381546
Date October 2016	**Figure No.** **D.10**

Figure D.11 – Map of Diffusion Tube Monitoring Locations – Swanwick

Legend
Diffusion Tube

Air Quality
Bureau Veritas
5th Floor
66 Prescott Street
London, E1 8HG

Location
Fareham Borough Council

Title
Diffusion Tube Locations - Swanwick

By	Approved
PB	JC
Scale	**Job Ref**
Not To Scale	6381546
Date	**Figure No.**
October 2016	**D.11**

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[11]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Particulate Matter ($PM_{2.5}$)	25 µg/m^3 (to be achieved by 2020)	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[11] The units are in micrograms of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority 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
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control

References

- Local Air Quality Management Technical Guidance LAQM.TG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG(16). May 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Fareham Borough Council, Air Quality Action Plan, Gosport Road and Portland Street Fareham 2008.
- Fareham Borough Council 2015 Air Quality Action Plan Progress Report.
- Fareham and Gosport Environmental Health Partnership 2015 Updating and Screening Assessment.
- Fareham Borough Council 2014 Annual Progress Report.
- Gosport Borough Council 2014 Annual Progress Report.
- National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 09/16 published in September 2016.
- NHS Hampshire/Air Quality Steering Group, Poor Air Quality Leaflet.

Appendix F: Fareham Borough Council – Detailed Modelling Study

Fareham and Gosport Environmental Health Partnership

Fareham Borough Council

Detailed Modelling Study

January 2017

Move Forward with Confidence

BUREAU VERITAS

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Document Control Sheet

Issue/Revision	Issue 1	Issue 2	Issue 3
Remarks	Draft for comment	Draft for comment	Final
Date	November 2016	January 2017	January 2017
Submitted to	Heather Cusack	Heather Cusack	Heather Cusack
Prepared by	Paul Bentley (Consultant)	Paul Bentley (Consultant)	Paul Bentley (Consultant)
Signature			
Approved by	Jamie Clayton (Senior Consultant)	Jamie Clayton (Senior Consultant)	Jamie Clayton (Senior Consultant)
Signature			
Project number	6381546		

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List of Tables

List of Figures

Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area. For local authorities that have identified areas where there is a potential risk of exceedence of Air Quality Strategy (AQS) objectives, a Detailed Modelling Study is required.

The conclusions of the Updating and Screening Assessment (USA) 2015 for Fareham and Gosport, conducted as part of the LAQM regime, indicated that Fareham Borough Council (the Council) was required to undertake a Detailed Modelling Study for the area north of the existing Gosport Road Air Quality Management Area (AQMA) for Nitrogen Dioxide (NO_2). This is because the assessment of monitoring in 2014 indicated that two sites outside of the existing AQMAs with relevant exposure had exceeded the annual mean AQS objective for NO_2 on Gosport Road. Bureau Veritas UK Ltd has therefore been commissioned by the Council to undertake a dispersion modelling study of Gosport Road and the area to the north of the existing AQMA.

In order to provide consistency with the Council's own work on air quality, the guiding principles for air quality assessments, as set out in the latest guidance provided by Defra for air quality assessment (LAQM.TG(16)[1]), have been used. However, as this guidance is an update to that which was in publication prior to this report's commission, previous guidance specific to Detailed Assessments is also drawn upon where appropriate.

The area was modelled using the advanced atmospheric dispersion model ADMS-Roads (Version 4.0).

The model suggests that the 40µg/m^3 annual mean AQS objective is observed to be exceeded at a total of twenty-six receptor locations, with a further eight locations within 10% of the objective.

The maximum annual mean NO_2 concentration was predicted at receptor 'R7' on Gosport Road, with a predicted concentration of 56.3µg/m^3. R7 is located north of the current boundary of the Gosport Road AQMA.

A total of nineteen receptor locations outside of the current Gosport Road and Portland Street AQMAs were identified as exceeding the annual mean AQS objective, and therefore the AQMA boundaries require amendment.

The empirical relationship given in LAQM.TG(16)[1] states that an exceedence of the 1-hour mean objective for NO_2 is only likely to occur where annual mean concentrations are 60µg/m^3 or above. Annual mean NO_2 concentrations at all receptor locations are below this limit, and therefore short-term NO_2 exposure from road traffic emissions at the assessed receptor locations is not considered to be significant.

It can be concluded that the existing Gosport Road AQMA and Portland Street AQMA do not cover all areas of exceedence, and either requires amendment, or new AQMAs are required in the area.

An extension to the existing AQMAs is proposed, the extent of which is demonstrated in Figure 5.2 and Figure 5.3. A further estimated 298 residents residing within the additional area of the Gosport Road AQMA, and a further estimated 12 residents reside within the additional area of the Portland Street AQMA. These estimated 310 people are at risk of exposure NO_2 concentrations above the annual mean AQS objective.

Based on the above the above conclusions, the following recommendations are made:

[1] Local Air Quality Management Technical Guidance LAQM.TG(16). April 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

- Amendment the Gosport Road AQMA, to cover the area suggested by Figure 5.2;
- Amendment the Portland Street AQMA, to cover the area suggested by Figure 5.3;
- Proceed to amending/updating the relevant action plan, such that it encompasses measures to target all incorporated roads; and
- Continue to implement extensive NO_2 monitoring across Fareham, with an emphasis to include monitoring on the northern section of Gosport Road approaching the junction with the A27.

1 Introduction

1.1 Scope of Assessment

Fareham Borough Council (The Council) have declared two Air Quality Management Areas (AQMAs) under the Local Air Quality Management (LAQM) regime. These two AQMAs are:

- Gosport Road AQMA:
  The AQMA was designated in April 2006 due to exceedences of the annual mean Air Quality Standard objective for nitrogen dioxide (NO_2) due to road traffic. The AQMA covers an area encompassing the junction of Gosport Road, Redlands Lane and Newgate Lane, and the surrounding area.

- Portland Street AQMA:
  The AQMA was designated in December 2007 due to exceedences of the annual mean Air Quality Standard objective for NO_2. The AQMA covers an area encompassing residential properties and the Sacred Heart Catholic Church on Portland Street.

The conclusions of the Council's Updating and Screening Assessment (USA) 2015, conducted as part of the LAQM regime, indicated that the Council was required to undertake a Detailed Assessment (DA) for Gosport Road (A32) to the north of the current Gosport Road AQMA for NO_2. In Fareham, the 2014 monitoring data indicated that two monitoring sites located outside of the existing AQMAs were found to be exceeding the annual mean Air Quality Strategy (AQS) objective for NO_2. Bureau Veritas UK Ltd has therefore been commissioned by the Council to undertake a dispersion modelling DA of the roads associated with the identified exceedences.

It was agreed with the Council that the study area of the assessment would be extended to north of the A27 to include the road network surrounding the Portland Street AQMA. This was completed to assess the concentrations of NO_2 over a wider study area within Fareham and identify if the Portland Street AQMA was still relevant.

The area considered as part of this study is illustrated in Figure 1.1.

It is the general purpose and intent of this assessment to determine, with reasonable certainty, the magnitude and geographical extent of any exceedence so that the Council can have confidence in the potential declaration or amendment of an AQMA.

The following are the main objectives of the assessment:

- To assess the air quality at selected locations ("receptors") at the façades of the existing residential units, representative of worst-case exposure, based on modelling of emissions from road traffic on the local road network;

- To determine the geographical extent of the potential exceedence;

- To attempt to quantify the number of residents exposed to exceedences of the NO_2 annual mean AQS objective; and

- To put forward conclusions and recommendations as to the extent of any proposed AQMA and necessary future monitoring.

The approach adopted in this assessment to assess the impact of road traffic emissions on air quality utilised the atmospheric dispersion model ADMS-Roads version 4.0, focusing on emissions of NO_2.

In order to provide consistency with the Council's own work on air quality, the guiding principles for air quality assessments, as set out in the latest guidance provided by Defra for air quality assessment (LAQM.TG(16)[1]), have been used.

Figure 1.1 – Detailed Assessment Study Area

Legend

Modelled Roads

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Detailed Assessment Study Area**
By PB	**Approved** JC
Scale As shown	**Job Ref** 6381546
Date November 2016	**Figure No.** 1.1

2 Air Quality – Legislative Context

2.1 Air Quality Strategy

The importance of existing and future pollutant concentrations can be assessed in relation to the national air quality standards and objectives established by Government. The Air Quality Strategy[2] (AQS) provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the UK Government and Devolved Administrations to protect human health. The air quality objectives incorporated in the AQS and the UK Legislation are derived from Limit Values prescribed in the European Union (EU) Directives transposed into national legislation by Member States.

The CAFE (Clean Air for Europe) programme was initiated in the late 1990s to draw together previous directives into a single EU Directive on air quality. The CAFE Directive[3] has been adopted and replaces all previous air quality Directives, except the 4th Daughter Directive[4]. The Directive introduces new obligatory standards for $PM_{2.5}$ for Government but places no statutory duty on local government to work towards achievement of these standards. In relation to $PM_{2.5}$ concentrations, within LAQM.PG(16)[5] new Local Authority actions for reducing levels of $PM_{2.5}$ have been introduced. Local Authorities are expected to work towards reducing emissions and concentrations of $PM_{2.5}$ in their local area as practicable. Any decisions made should be based on local needs and priorities.

The Air Quality Standards (England) Regulations[6] 2010 came into force on 11 June 2010 in order to align and bring together in one statutory instrument the Government's obligations to fulfil the requirements of the new CAFE Directive.

The objectives for ten pollutants – benzene (C_6H_6), 1,3-butadiene (C_4H_6), carbon monoxide (CO), lead (Pb), NO_2, sulphur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3) and Polycyclic Aromatic Hydrocarbons (PAHs), have been prescribed within the AQS[2].

The EU Limit Values are considered to apply everywhere with the exception of the carriageway and central reservation of roads and any location where the public do not have access (e.g. industrial sites).

The AQS objectives apply at locations outside buildings or other natural or man-made structures above or below ground, where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period. Typically these include residential properties and schools/care homes for long-term (i.e. annual mean) pollutant objectives and high streets for short-term (i.e. 1-hour) pollutant objectives. Table 2.1 taken from LAQM TG(16)[1] provides an indication of those locations that may or may not be relevant for each averaging period.

This assessment focuses on NO_2 as this is the pollutant of most concern within the Council's administrative area. Moreover, as a result of traffic pollution the UK has failed to meet the EU Limit Values for this pollutant by the 2010 target date. As a result, the Government has had to submit time extension applications for compliance with the EU Limit Values. Continued failure to

[2] Defra (2007) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

[4] Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic hydrocarbons in ambient air.

[5] Local Air Quality Management Technical Guidance LAQM.TG(16). April 2016. Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.

[6] The Air Quality Standards Regulations (England) 2010, Statutory Instrument No 1001, The Stationary Office Limited.

achieve these limits may lead to EU fines. The AQS objectives for these pollutants are presented in Table 2.2.

Table 2.1 – Examples of where the Air Quality Objectives should apply

Averaging Period	Objectives should apply at:	Objectives should generally not apply at:
Annual mean	All locations where members of the public might be regularly exposed Building facades of residential properties, schools, hospitals, care homes etc.	Building facades of offices or other places of work where members of the public do not have regular access. Hotels, unless people live there as their permanent residence. Gardens of residential properties. Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term
24-hour mean and 8-hour mean	All locations where the annual mean objectives would apply, together with hotels Gardens or residential properties*	Kerbside sites (as opposed to locations at the building façade), or any other location where public exposure is expected to be short term.
1-hour mean	All locations where the annual mean and 24 and 8-hour mean objectives would apply. Kerbside sites (e.g. pavements of busy shopping streets). Those parts of car parks, bus stations and railway stations etc. which are not fully enclosed, where the public might reasonably be expected to spend one hour or more. Any outdoor locations at which the public may be expected to spend one hour or longer.	Kerbside sites where the public would not be expected to have regular access.
15-minute mean	All locations where members of the public might reasonably be expected to spend a period of 15 minutes or longer.	

Note * - For gardens and playgrounds, such locations should represent parts of the garden where relevant public exposure is likely, for example where there is seating or play areas. It is unlikely that relevant public exposure would occur at the extremities of the garden boundary, or in front gardens, although local judgement should always be applied.

Table 2.2 – Relevant AQS Objectives for the Assessed Pollutants in England

Pollutant	AQS Objective	Concentration Measured as:	Date for Achievement
Nitrogen dioxide (NO_2)	200 µg/m³ not to be exceeded more than 18 times per year	1-hour mean	31 December 2005
	40 µg/m³	Annual mean	31 December 2005

2.2 Local Air Quality Management (LAQM)

Part IV of the Environment Act 1995 places a statutory duty on local authorities to periodically review and assess air quality within their area, and determine whether they are likely to meet the AQS objectives set down by Government for a number of pollutants – a process known as Local Air Quality Management (LAQM). Guidance documents[1] and online resources[7] have been produced on behalf of Defra to aid local authorities in these duties.

The AQS objectives that apply to LAQM are defined for seven pollutants: benzene, 1,3-butadiene, CO, Pb, NO_2, SO_2 and PM_{10}. Local Authorities were formerly required to report on all of these pollutants, but following an update to the regime in 2016[1], the core of LAQM reporting is now focussed around the objectives of three pollutants; NO_2, PM_{10} and SO_2.

Where the results of the Review and Assessment process highlight that problems in the attainment of the health-based objectives pertaining to the above pollutants will arise, the authority is required to declare an AQMA – a geographic area defined by high concentrations of pollution and exceedences of health-based standards.

The areas in which the AQS objectives apply, as per Table 2.2 are defined in the AQS as locations outside (i.e. at the façade) of buildings or other natural or man-made structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed [to pollutant concentrations] over the relevant averaging period of the AQS objective.

Following any given declaration, the Local Authority is subsequently required to develop an Air Quality Action Plan (AQAP), which will contain measures to address the identified air quality issue, and bring the location into compliance with the relevant objective as soon as possible.

[7] http://laqm.defra.gov.uk/

3 Review and Assessment of Air Quality Undertaken by the Council

3.1 Local Air Quality Management

Table 3.1 provides a detailed summary of the LAQM work conducted by The Council since 2003.

The Council currently has declared two AQMAs under the LAQM regime. These two AQMAs are:

- Gosport Road AQMA, and
- Portland Street AQMA.

Both current AQMA's have been declared due to exceedences of the annual mean AQS objective for NO_2, the boundaries of Gosport Road AQMA and Portland Street AQMA are shown in Figure 3.1 and Figure 3.2 respectively.

Table 3.1 – Summary of LAQM work in Fareham Borough Council

Year	Report(s)	Result
2015	USA	DA required due to monitored NO_2 concentrations above the AQS annual mean objective outside of the Gosport Road AQMA.
2014	Progress Report	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place.
2013	Progress Report	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place.
2012	USA	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place. New continuous NO_x analyser installed at Portland Street via a section 106 agreement.
2011	Progress Report	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place.
2010	Progress Report	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place.
2010	DA	DA concluded that the boundary of the current Gosport Road AQMA did not need to be amended due to there being no predicted exceedences at residential receptor locations.
2009	USA	DA required due to monitored NO_2 concentrations above the AQS annual mean objective outside of the Gosport Road AQMA.
2009	FA	FA for Portland Street AQMA concluded that the current AQMA should remain in force.
2008	AQAP	AQAP developed for both AQMAs which presented mitigation measures to help reduce concentrations of NO_2.
2008	Progress Report	AQS annual mean NO_2 objective being exceeded within designated AQMAs, designations to remain in place.
2007	FA and DA	The FA concluded that there was no need to extend the current boundary of the Gosport road AQMA. The DA concluded that a new AQMA was required in Portland Street which was declared in 2007.
2006	USA	Further Assessment (FA) required outside of the boundaries of the Gosport Road AQMA, DA required for Hartlands Road/Portland Street due to exceedences of the AQS annual mean objective for NO_2.
2005	DA	No exceedence predicted at Osbourne Road or Hartlands Road, continuous NO_x monitor installed on Gosport Road and an AQMA was declared in 2006.
2004	Progress Report	DA required at Osbourne Road, Hartlands Road and Gosport Road (A32) due to exceedences of the AQS annual mean objective for NO_2
2003	USA	All AQS objectives met, DA not required.

Figure 3.1 – Gosport Road AQMA

Legend

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Gosport Road AQMA**
By	PB
Approved	JC
Scale	As Shown
Job Ref	6381546
Date	November 2016
Figure No.	3.1

Figure 3.2 – Portland Street AQMA

Legend

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Portland Street AQMA**
By PB	**Approved** JC
Scale As shown	**Job Ref** 6381546
Date October 2016	**Figure No.** 3.2

3.2 Review of Air Quality Monitoring

3.2.1 Automatic Pollutant Monitoring

In 2014, air quality was monitored automatically at two locations within Fareham. The Council operates two roadside monitoring stations, one located on Gosport Road (FAR1) and one located on Portland Street (FAR2), each of which use chemiluminescent analysers to measure NO_2, NO (nitric oxide) and NO_x (oxides of nitrogen).

A further monitoring location, Tichborne Way (GOS1), located within Gosport Borough Council monitors both NO_2 and PM_{10} using a chemiluminescent analyser and a Tapered Element Oscillating Microbalance (TEOM) monitor.

The details and results of the LAQM monitoring relevant to this assessment are presented in Table 3.2.

Of the above, sites FAR1 and FAR2 are located within the modelled area.

Table 3.2 – LAQM Automatic Monitoring undertaken for NO_2 Relevant to the Detailed Modelling Study

Site ID	Site Location	Site Type	OS Grid Ref (X Y)	Annual Mean NO_2 Concentration ($\mu g/m^3$) 2014	Data Capture 2014 (%)
FAR1	Gosport Road	Roadside	457590, 105281	32.5	79.3
FAR2	Portland Street	Roadside	457954, 106027	46.8	99.5

3.2.2 Passive Pollutant Monitoring

During 2014 the Council's non-automatic monitoring network comprised of fifty six NO_2 diffusion tubes, this included three locations where monitoring was undertaken in triplicate, and twelve locations where a short-term 5-month survey was undertaken to investigate a newly installed bus gate within Yew Tree, Fareham.

Within Fareham ten monitoring locations were observed to have exceeded the annual mean NO_2 objective in 2014, two of which were outside of the current Gosport Road AQMA and were located at sites with relevant exposure.

The details and results of the LAQM monitoring relevant to this assessment are presented in Table 3.3, whilst their locations are illustrated in Figure 3.3 and Figure 3.4.

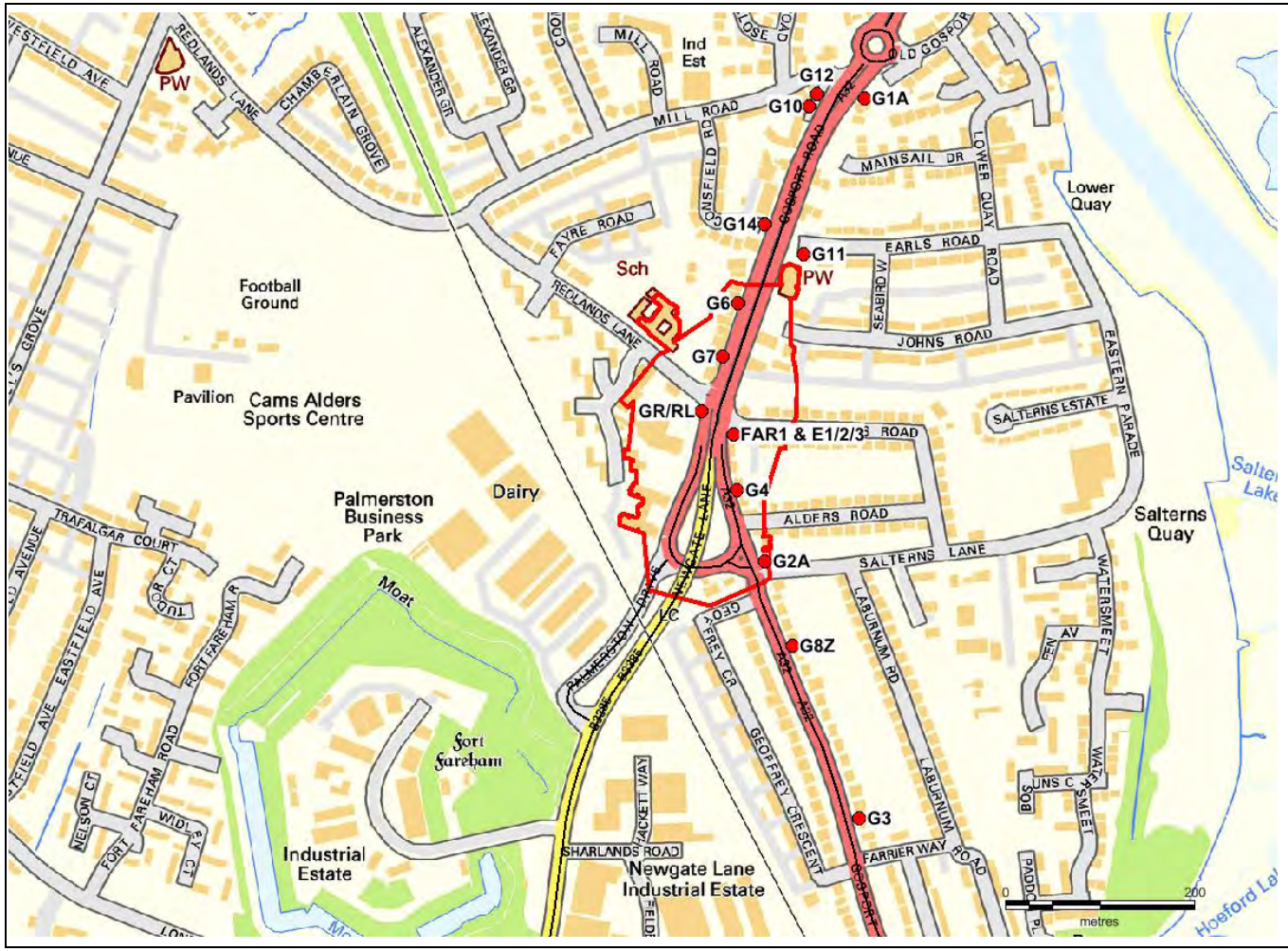
All diffusion tube locations listed had a data capture greater than 75% therefore annualisation was not required.

Table 3.3 – LAQM Diffusion Tube Monitoring undertaken for NO_2 relevant to the Detailed Modelling Study

Site ID	Site Location	Site Type	OS Grid Ref (X Y)	Annual Mean NO_2 Concentration ($\mu g/m^3$) 2014[a b]	Data Capture 2014
BL1	11 Bath Lane	NR	458376, 106109	**40.8**	100%
PS1/1A/1B	1 Sentinel Cottages	R	457939, 106012	38.7	97%
PS2	2 Sentinel Cottages	R	457937, 106021	**41.3**	100%
PS3	38 Portland Street	R	457935, 106033	**46.0**	83%
PS4/5/6	Co-located with Portland Street Automatic Monitor	R	457954, 106027	**46.6**	100%
HR1	Lamppost, 8 Hartlands Road	R	457870, 106071	**41.6**	100%
HR2	17 Hartlands Road	R	457822, 106197	34.3	100%
HR3A	7 Hartlands Road	R	457787, 106140	30.2	100%
HR4	25 Hartlands Road	R	457860, 106077	33.8	100%
G1A	30 Old Gosport Road	R	457732, 105625	35.8	92%
G2A	138 Gosport Road	NR	457627, 105138	34.1	100%
G3	202 Gosport Road	R	457726, 104869	33.6	92%
G4	122 Gosport Road	R	457598, 105213	32.2	100%
G6	171 Gosport Road	R	457599, 105410	37.4	100%
G7	193 Gosport Road	R	457583, 105354	**46.2**	100%
G8Z	156 Gosport Road	R	457656, 105049	34.3	100%
G10	107 Gosport Road	R	457675, 105616	**40.4**	100%
G11	2 Earls Road	R	457668, 105461	29.0	92%
G12	Two Saints, 101 Gosport Road	R	457684, 105630	**42.2**	100%
G14	Bottom of Beaconsfield Road	R	457631, 105949	37.0	100%
GR/RL	Corner of Gosport Road and Redlands Lane	R	457564, 105300	28.6	100%
E1/2/3	Co-located with Gosport Road Automatic Monitor	R	457590, 105281	39.6	100%

R= Roadside, NR – Near Roadside
In **bold**, exceedence of the NO_2 annual mean AQS objective of 40 $\mu g/m^3$
[a] All concentrations are those monitored, prior to distance correction to receptors
[b] All diffusion tube results bias corrected using a factor of 1.09

Figure 3.3 – Local NO_2 Monitoring Locations – Gosport Road



Legend

NO2 Monitoring Location

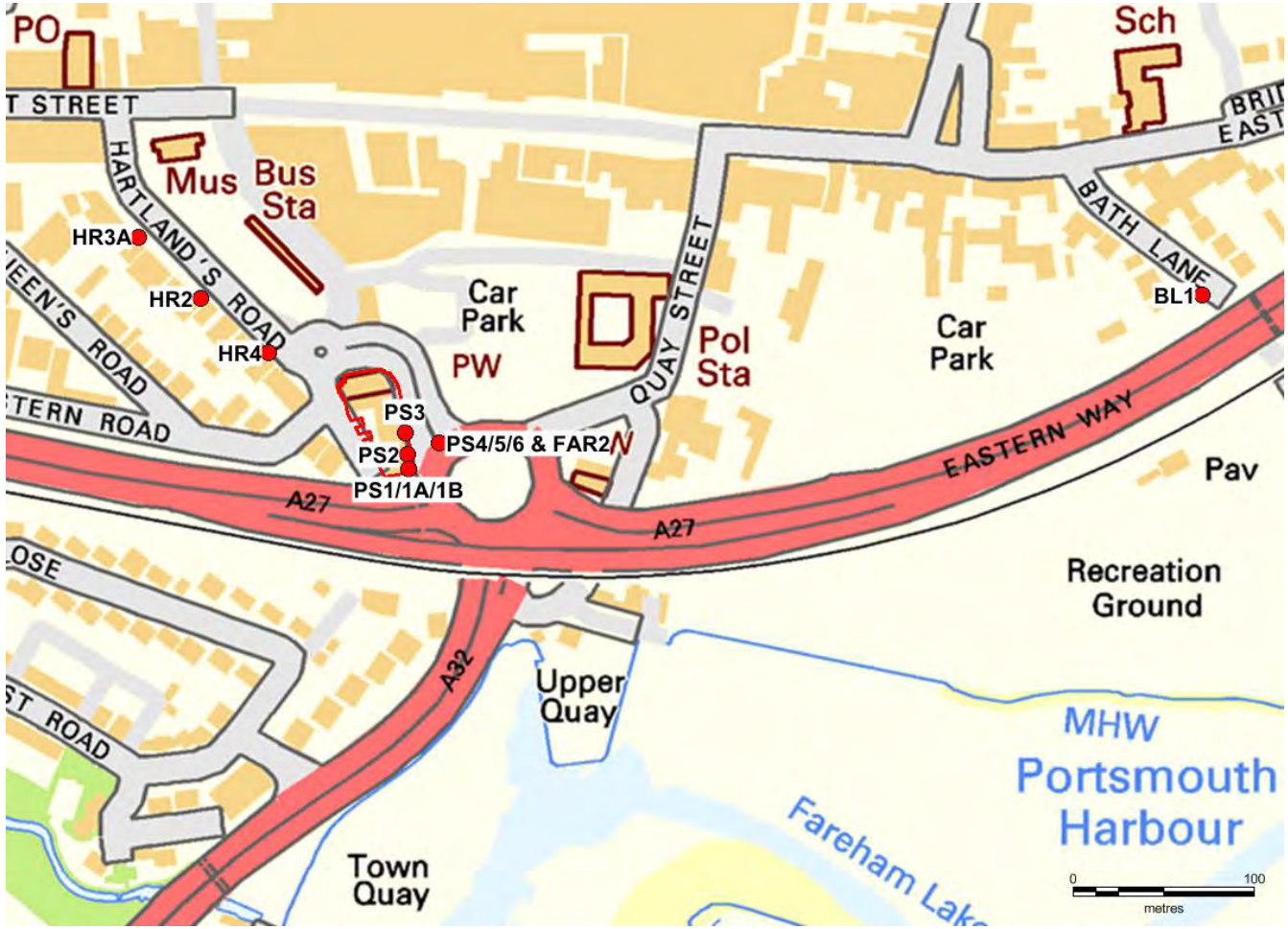
Modelled Roads

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Local NO_2 Monitoring Locations – Gosport Road**
By PB	**Approved** JC
Scale As Shown	**Job Ref** 6381546
Date November 2016	**Figure No.** 3.3

Figure 3.4 – Local NO_2 Monitoring Locations – Portland Street



Legend

NO2 Monitoring Location

Modelled Roads

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Local NO_2 Monitoring Locations – Portland Street**
By PB	**Approved** JC
Scale As Shown	**Job Ref** 6381546
Date November 2016	**Figure No.** 3.4

3.3 Background Concentrations used in the Assessment

Defra maintains a nationwide model of existing and future background air quality concentrations at a 1km grid square resolution. The data sets include annual average concentration estimates for NO_x, NO_2, PM_{10} and $PM_{2.5}$, using a base year of 2013. The model used is semi-empirical in nature; it uses the national atmospheric emissions inventory (NAEI) emissions to model-predict the concentrations of pollutants at the centroid of each 1km grid square, but then calibrates these concentrations in relation to actual monitoring data.

Annual mean background concentrations have been obtained from the Defra published background maps[8], based on the 1km grid squares which cover the modelled area and the affected road network. The Defra mapped background concentrations for 2014 are presented in Table 3.4.

Table 3.4 – Background Pollutant Concentrations (Defra Background Maps)

Grid Square (E,N)	2014 Annual Mean Background Concentration (µg/m^3)	
	NO_x	**NO_2**
458500, 106500	33.3	22.6
458500, 105500	24.0	16.8
457500, 106500	29.3	20.1
457500, 105500	29.3	18.8
457500, 104500	26.4	18.1
AQS objective	-	***40***

These mapped background levels are below the respective annual mean AQS objectives.

The predicted annual mean road contributions are added to the relevant annual mean background concentration in order to predict the total pollutant concentration at each receptor location. The total pollutant concentration can then be compared against the relevant AQS objectives to determine the event of an exceedence.

[8] Defra Background Maps (2014). http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html

4 Assessment Methodology

The approach used in this assessment has been based on the following:

- Prediction of ambient NO_2 concentrations, to which existing receptors may be exposed and comparison with the relevant AQS objectives; and
- Determination of the geographical extent of any potential exceedences.

4.1 Assessment of Emissions From Road Traffic

Emissions from road traffic have been predicted using version 7.0 of the Emissions Factor Toolkit[9]. Road-NO_x contributions for each source type at receptor locations were modelled using the ADMS-Roads (Version 4.0) atmospheric dispersion model developed by Cambridge Environmental Research Consultants (CERC).

4.1.1 Model Inputs

The ADMS-Roads assessment incorporates numbers of road traffic vehicles, vehicle speeds on the local roads and the composition of the traffic fleet. The traffic data for this assessment has been collated using a combination of data provided by the Council and figures taken from Department for Transports (DfT), Traffic Counts web resource[10], and is outlined in Table 4.1. Traffic data from 2014 has been used where possible within the assessment. There were limitations in the availability of data for the road network close to the Portland Street AQMA; 2006 data for Quay Street, Portland Street and Hartland Street has been taken from previous Council databases as there is no more recent data available for these links. Having data from 2006 is a limitation within the model and should be taken into account when the results are interpreted.

Traffic speed data was taken from the provided data where possible; where speed data for free flowing links was not provided, the speed limit is assumed. Where appropriate, speeds have been reduced to simulate queues at junctions and traffic lights.

Table 4.1 – Traffic Data used in the Detailed Modelling Study

Source ID	24-hour AADT	% Car	% LGV	% HGV	% Bus/ Coach	% Motorcycle	Speed(kph)
NewgateLn_RA	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF16	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF9	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF8	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF5	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF3	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF4	21288	85.26	9.25	2.29	2.18	1.03	46
PalmerDrN_A	14274	75.24	14.67	3.86	4.72	1.51	20
PalmerDrS_A	14274	75.24	14.67	3.86	4.72	1.51	20
PalmerDr_FF	14274	75.24	14.67	3.86	4.72	1.51	45
A32N-S_FF1	17637	77.80	12.66	3.15	3.41	2.99	45
A32S-A32N_L	52797	81.04	14.45	2.19	0.58	1.75	48
NewgateLn_FF	21288	85.26	9.25	2.29	2.18	1.03	46
A32N-A32S_L2	15508	84.70	6.38	4.06	4.25	0.61	39
A32S-GeoffCl_FF	29742	90.70	-	9.30	-	-	40
A32S_RA	52797	81.04	14.45	2.19	0.58	1.75	25
A32S_RA1	52797	81.04	14.45	2.19	0.58	1.75	15
A32_R	52797	81.04	14.45	2.19	0.58	1.75	20
A32N_RA1	52797	81.04	14.45	2.19	0.58	1.75	20
A32N_RA	52797	81.04	14.45	2.19	0.58	1.75	30

[9] EFT_v7.0 available at - http://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

[10] Department for Transport – Traffic Counts (2014) http://www.dft.gov.uk/traffic-counts/

Source ID	24-hour AADT	% Car	% LGV	% HGV	% Bus/ Coach	% Motorcycle	Speed(kph)
A32-A27_A1	52797	81.04	14.45	2.19	0.58	1.75	20
A32N_FF	52797	81.04	14.45	2.19	0.58	1.75	48
A32-A27_A	52797	81.04	14.45	2.19	0.58	1.75	30
A32S_TL	52797	81.04	14.45	2.19	0.58	1.75	20
A32S_FF	52797	81.04	14.45	2.19	0.58	1.75	40
A32N-GeoffCl_FF	20680	77.59	17.43	2.59	0.38	2.01	40
NewgateLn_FF1	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF2	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF6	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF7	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF10	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF11	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF12	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF13	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF14	21288	85.26	9.25	2.29	2.18	1.03	46
NewgateLn_FF15	21288	85.26	9.25	2.29	2.18	1.03	46
A32N-A32S_L1	15508	84.70	6.38	4.06	4.25	0.61	38
A32N-S_L	1206	76.67	11.27	5.64	1.67	4.75	45
A32N-S_FF	1206	76.67	11.27	5.64	1.67	4.75	45
A32N-A32S_LS	15508	84.70	6.38	4.06	4.25	0.61	20
A32N-GeoffCl_TL	20680	77.59	17.43	2.59	0.38	2.01	25
A32N-S_L1	1206	76.67	11.27	5.64	1.67	4.75	20
A32S_FF2	52797	81.04	14.45	2.19	0.58	1.75	48
A32S_FF1	52797	81.04	14.45	2.19	0.58	1.75	40
Hartlands_R_N	5279	79	9	2	6.5	3.5	16
Hartlands_R_S	4365	77	9	1.4	10	2.6	16
Harlands_RS	4365	77	9	1.4	10	2.6	16
Hartlands_RN	5279	79	9	2	6.5	3.5	16
Portland_R1S	4365	77	9	1.4	10	2.6	16
Portland_R1N	5279	79	9	2	6.5	3.5	16
Portland_FFS	4365	77	9	1.4	10	2.6	32
Portland_FFN	5279	79	9	2	6.5	3.5	32
Portland_R2S	4365	77	9	1.4	10	2.6	16
Portland_R2N	5279	79	9	2	6.5	3.5	16
Quay_FFN	3890	79	14.8	1	3.2	2	32
Quay_FFS	1054	70	11	1.6	13.2	4.2	32
Quay_RN	3890	79	14.8	1	3.2	2	16
Quay_RS	1054	70	11	1.6	13.2	4.2	16
A27_R	51260	80.52	14.4	2.53	0.55	2	16
A27W_A3	51260	80.52	14.4	2.53	0.55	2	16
A27W_A2	51260	80.52	14.4	2.53	0.55	2	32
A27E_A1	51260	80.52	14.4	2.53	0.55	2	48
A27E_FF	57596	80.52	14.4	2.53	0.55	2	64
A27W_A1	51260	80.52	14.4	2.53	0.55	2	48
A27W_FF	57596	80.52	14.4	2.53	0.55	2	64
A27E_A3	51260	80.52	14.4	2.53	0.55	2	16
A27E_A2	51260	80.52	14.4	2.53	0.55	2	32
Flyover6	6336	80.52	14.4	2.53	0.55	2	64
Flyover3	6336	80.52	14.4	2.53	0.55	2	64
Flyover5	6336	80.52	14.4	2.53	0.55	2	64
Flyover4	6336	80.52	14.4	2.53	0.55	2	64
Flyover2	6336	80.52	14.4	2.53	0.55	2	64
Flyover1	6336	80.52	14.4	2.53	0.55	2	64
Flyover11	6336	80.52	14.4	2.53	0.55	2	64
Flyover10	6336	80.52	14.4	2.53	0.55	2	64
Flyover9	6336	80.52	14.4	2.53	0.55	2	64
Flyover7	6336	80.52	14.4	2.53	0.55	2	64
Flyover8	6336	80.52	14.4	2.53	0.55	2	64
Hartlands_A	9644	78	9	1.8	8.1	3.1	16
Hartlands_FF1	9644	78	9	1.8	8.1	3.1	32
Hartlands_FF2	9644	78	9	1.8	8.1	3.1	32

Background pollutant concentrations have been taken from the estimated background concentrations compiled by Defra[8], as discussed in Section 3. Background concentrations used in the assessment of road traffic emissions are shown in Table 3.4.

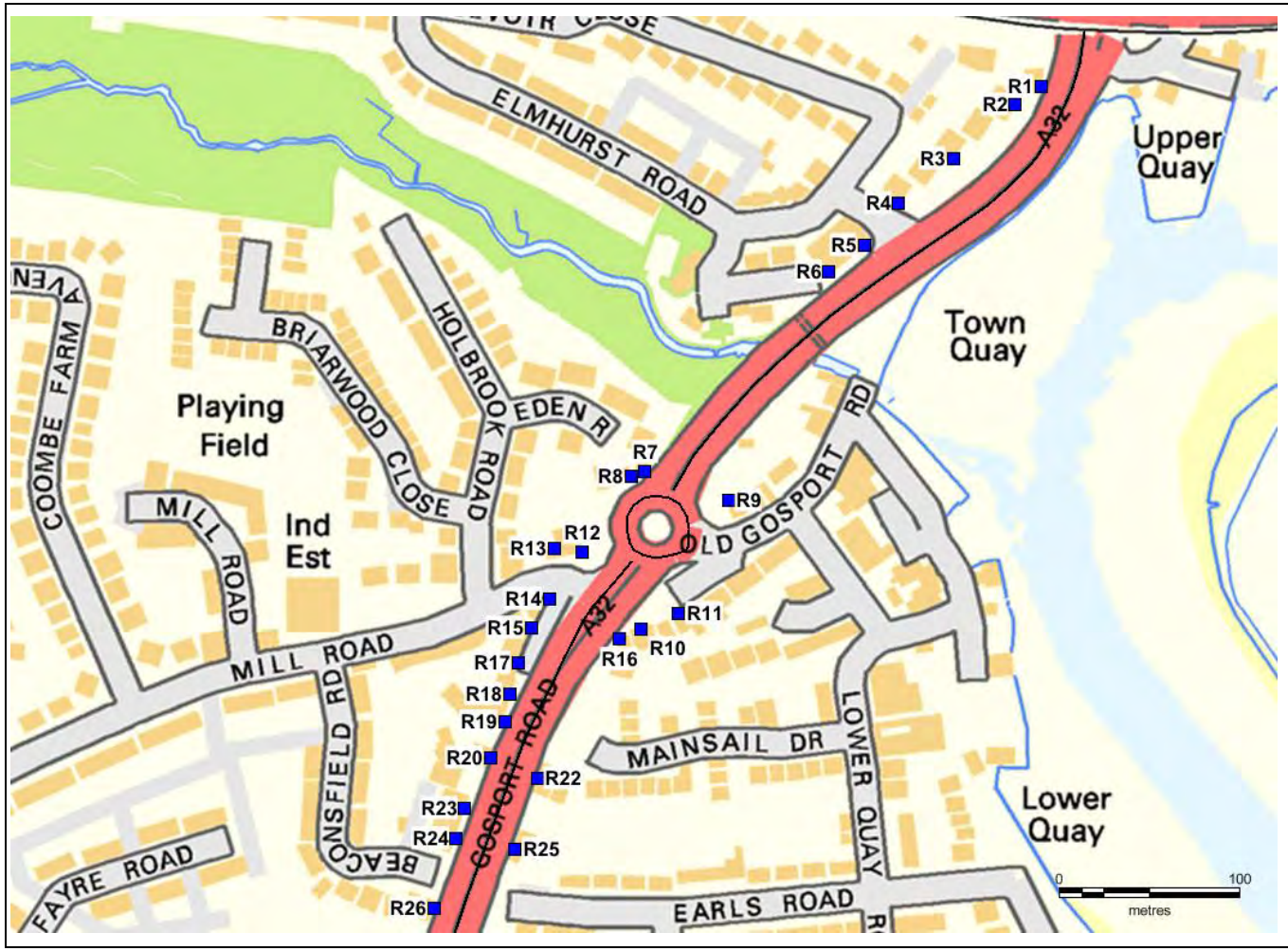
The receptors considered in the assessment of emissions from road traffic are shown in Table 4.2, and their location illustrated in Figure 4.1, Figure 4.2 and Figure 4.3. Concentrations were also modelled across a regular gridded area and additional receptor points were added close to the modelled road links, using the intelligent gridding tool in ADMS-Roads, for the purposes of producing NO_2 concentration isopleths.

Table 4.2 – Receptor Locations considered in the Detailed Modelling Study

Receptor ID	Street Name	X	Y	Height
R1	Gosport Road	457958	105924	1.5
R2	Gosport Road	457943	105914	1.5
R3	Gosport Road	457909	105884	1.5
R4	Gosport Road	457879	105859	1.5
R5	Gosport Road	457860	105836	1.5
R6	Gosport Road	457840	105821	1.5
R7	Gosport Road	457739	105711	1.5
R8	Gosport Road	457731	105709	1.5
R9	Old Gosport Road	457785	105696	1.5
R10	Old Gosport Road	457736	105625	1.5
R11	Old Gosport Road	457757	105633	1.5
R12	Gosport Road	457704	105667	1.5
R13	Gosport Road	457688	105669	1.5
R14	Gosport Road	457686	105641	1.5
R15	Gosport Road	457676	105625	1.5
R16	Gosport Road	457725	105619	1.5
R17	Gosport Road	457669	105606	1.5
R18	Gosport Road	457664	105588	1.5
R19	Gosport Road	457661	105574	1.5
R20	Gosport Road	457654	105554	1.5
R21	Gosport Road	457603	105199	1.5
R22	Gosport Road	457679	105542	1.5
R23	Gosport Road	457639	105526	3
R24	Gosport Road	457634	105509	3
R25	Gosport Road	457667	105503	1.5
R26	Gosport Road	457622	105471	1.5
R27	Gosport Road	457607	105438	1.5
R28	Gosport Road	457603	105423	1.5
R29	Gosport Road	457597	105402	1.5
R30	Gosport Road	457594	105392	1.5
R31	Gosport Road	457589	105375	1.5
R32	Gosport Road	457575	105329	1.5
R33	Gosport Road	457558	105291	1.5
R34	Gosport Road	457551	105263	1.5
R35	Gosport Road	457591	105268	1.5
R36	Gosport Road	457592	105251	1.5
R37	Gosport Road	457594	105233	1.5
R38	Gosport Road	457527	105200	1.5
R39	Gosport Road	457514	105167	1.5
R40	Gosport Road	457639	105098	1.5
R41	Gosport Road	457615	105070	1.5
R42	Gosport Road	457653	105059	1.5

Receptor ID	Street Name	X	Y	Height
R43	Gosport Road	457631	105026	1.5
R44	Gosport Road	457669	105019	1.5
R45	Gosport Road	457649	104986	1.5
R46	Gosport Road	457684	104986	1.5
R47	Gosport Road	457665	104950	1.5
R48	Gosport Road	457697	104953	1.5
R49	Gosport Road	457675	104920	1.5
R50	Gosport Road	457712	104915	1.5
R51	Gosport Road	457685	104891	1.5
R52	Gosport Road	457720	104889	1.5
R53	Gosport Road	457694	104863	1.5
R54	Gosport Road	457733	104844	1.5
R55	Gosport Road	457704	104819	1.5
R56	Gosport Road	457711	104790	1.5
R57	Gosport Road	457722	104757	1.5
R58	Gosport Road	457734	104727	1.5
R59	Gosport Road	457745	104698	1.5
R60	Hartlands Road	457894.3	106009.8	1.5
R61	Portland Street	457937.1	106016.4	1.5
R62	Portland Street	457935.5	106026.9	1.5
R63	Portland Street	457928.9	106052.2	1.5
R64	Hartlands Road	457871.6	106063.2	1.5
R65	Hartlands Road	457841.3	106093.1	1.5
R66	Hartlands Road	457801.9	106125.1	1.5
R67	Hartlands Road	457775.4	106152.8	1.5
R68	Hartlands Road	457769.5	106187.5	1.5
R69	Quay Street	458101.2	106115	1.5
R70	Quay Street	458106.6	106137.6	1.5

Figure 4.1 – Receptor Locations Gosport Road North



Legend

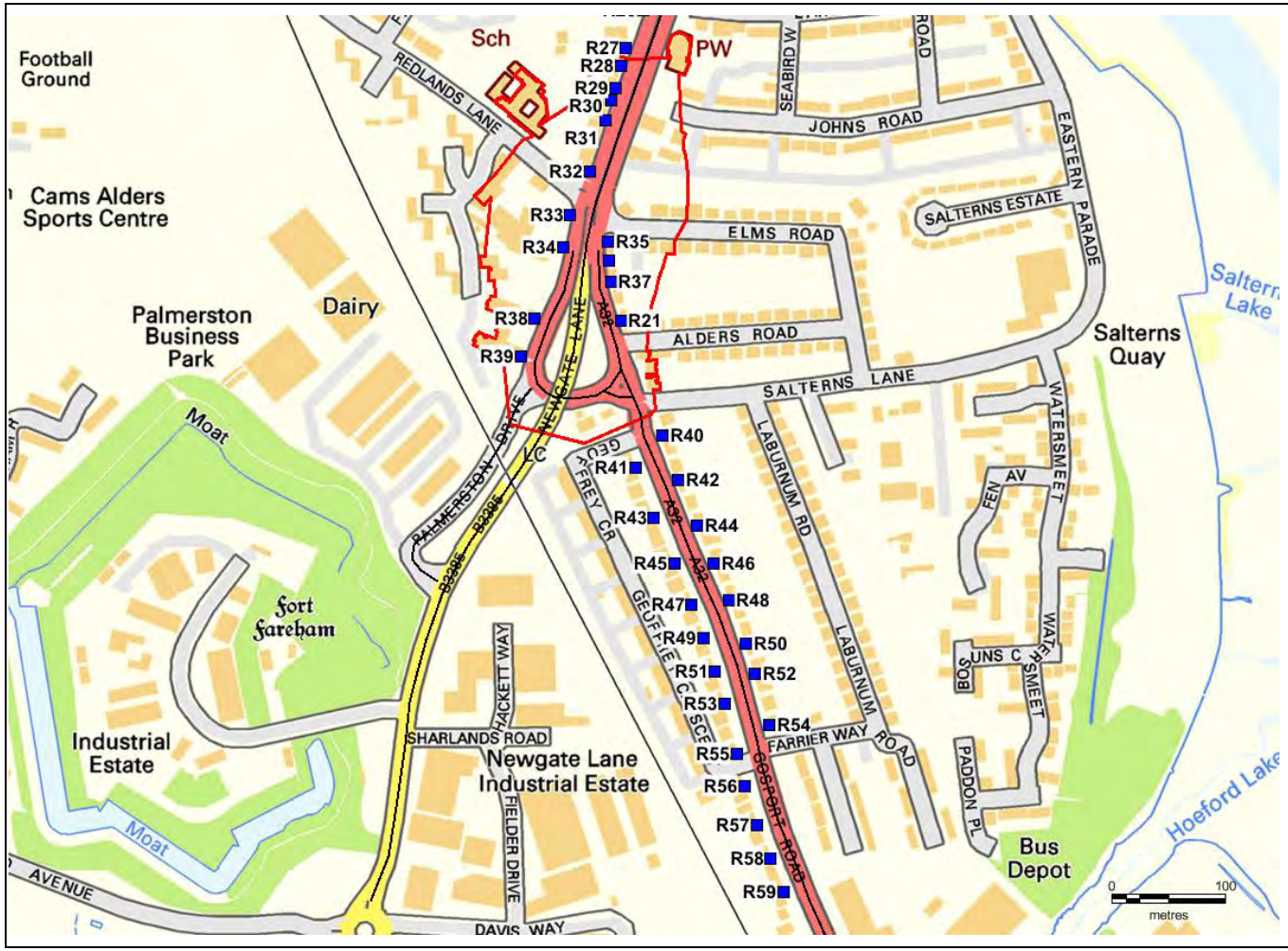
Receptor Location

Modelled Roads

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Receptor Locations – Gosport Road North**
By	PB
Approved	JC
Scale	As Shown
Job Ref	6381546
Date	November 2016
Figure No.	4.1

Figure 4.2 – Receptor Locations Gosport Road South



Legend

Receptor Location

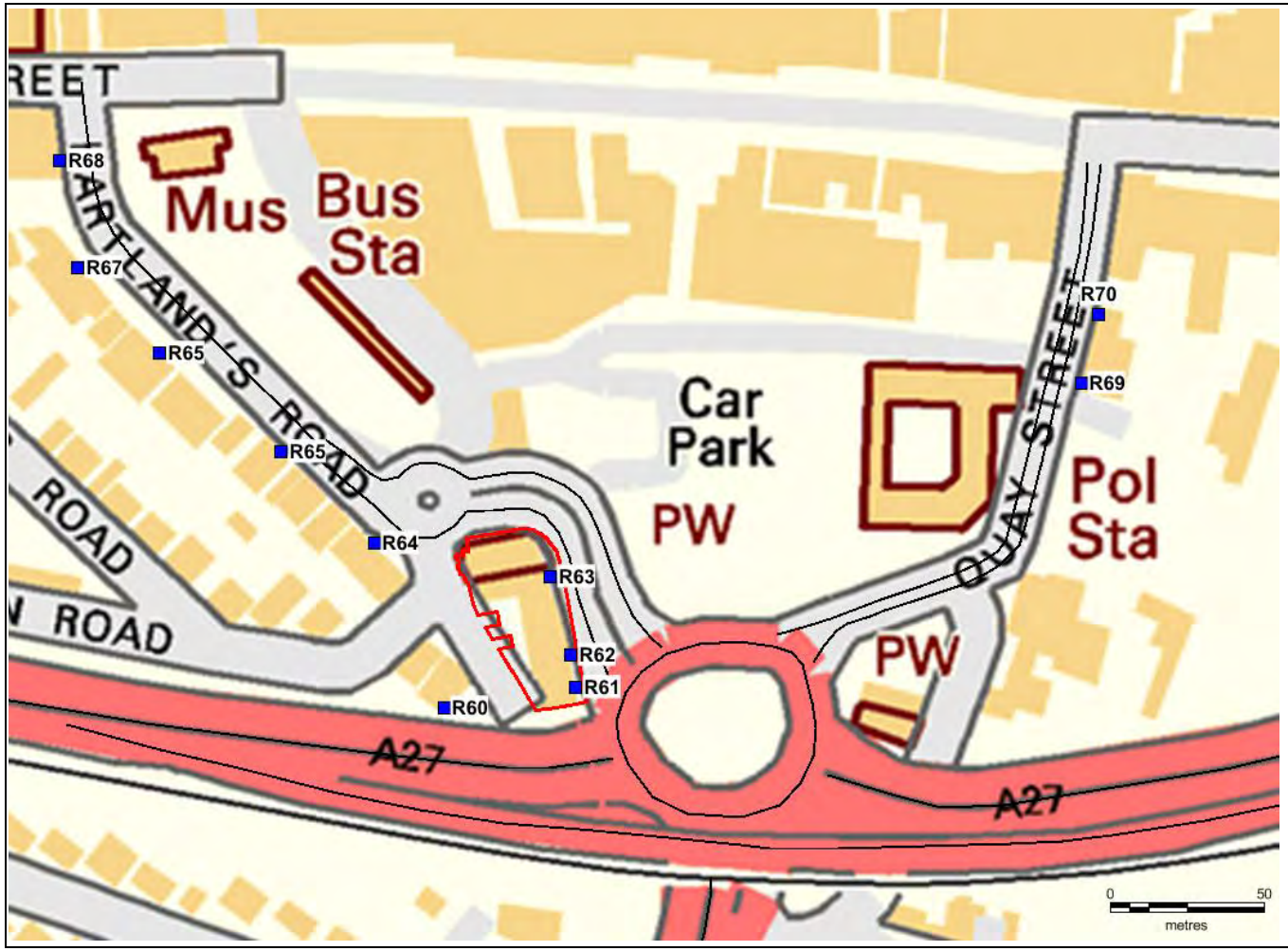
Modelled Roads

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Receptor Locations – Gosport Road South**
By	PB
Approved	JC
Scale	As Shown
Job Ref	6381546
Date	November 2016
Figure No.	4.2

Figure 4.3 – Receptor Locations Portland Street



Legend

Receptor Location

Modelled Roads

AQMA

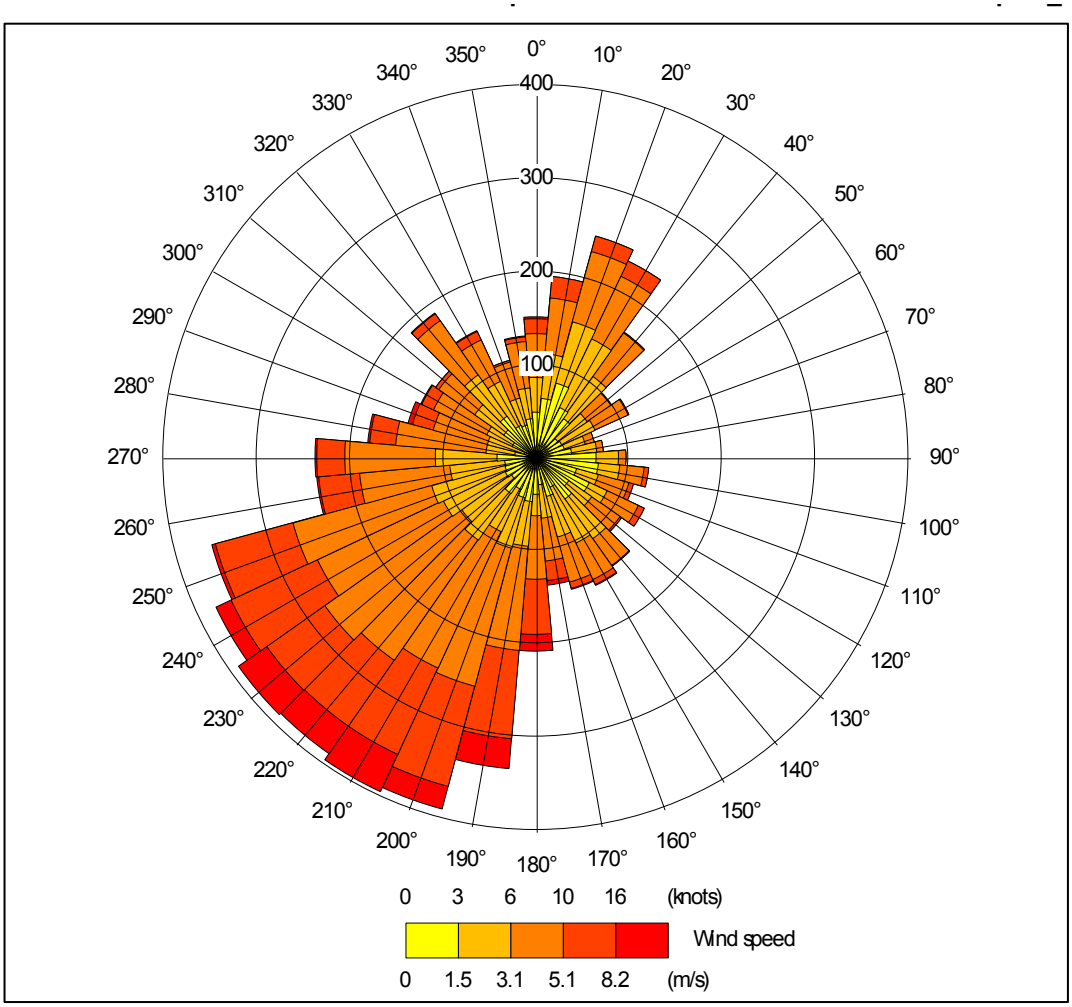
Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	
Fareham Borough Council	
Title	
Receptor Locations – Portland Street	
By	**Approved**
PB	JC
Scale	**Job Ref**
As Shown	6381546
Date	**Figure No.**
November 2016	4.3

Meteorological data from a representative station is required by the dispersion model. 2014 meteorological data from Southampton weather station has been used in this assessment. A wind rose for this site for the year 2014 is shown in Figure 4.4.

Most dispersion models do not use meteorological data if they relate to calm winds conditions, as dispersion of air pollutants is more difficult to calculate in these circumstances. ADMS-Roads treats calm wind conditions by setting the minimum wind speed to 0.75m/s. It is recommended in LAQM.TG(16)[1] that the meteorological data file be tested within a dispersion model and the relevant output log file checked, to confirm the number of missing hours and calm hours that cannot be used by the dispersion model. This is important when considering predictions of high percentiles and the number of exceedences. LAQM.TG(16)[1] recommends that meteorological data should only be used if the percentage of usable hours is greater than 75%, and preferably 90%. 2014 meteorological data from Southampton includes 8,002 lines of usable hourly data out of the total 8,760 for the year, i.e. 91.3% usable data. This is therefore suitable for the dispersion modelling exercise.

Figure 4.4 – Wind rose for Southampton Meteorological Data 2014



4.1.2 *Model Outputs*

The background pollutant values available from Defra[8] have been used in the ADMS-Roads model to calculate predicted total annual mean concentrations of NO_x and NO_2. These background pollutant concentrations are based upon all of the sources of air pollutants in the 1km grid square and any air pollutants from adjacent grid squares which may be of relevance.

For the prediction of annual mean NO_2 concentrations for the modelled scenario, the output of the ADMS-Roads model for NO_x has been converted to NO_2 following the methodology in LAQM.TG(16)[1] and using the NO_x to NO_2 conversion tool developed on behalf of Defra[11]. This tool also utilises the total background NO_x and NO_2 concentrations. This assessment has utilised version 5.1 (June 2016) of the NO_x to NO_2 conversion tool. The road contribution is then added to the appropriate NO_2 background concentration value to obtain an overall total NO_2 concentration.

For the prediction of short term NO_2 impacts, LAQM.TG(16)[1] advises that it is valid to assume that exceedences of the 1-hour mean AQS objective for NO_2 are only likely to occur where the annual mean NO_2 concentration is 60µg/m^3 or greater. This approach has thus been adopted for the purposes of this assessment.

Verification of the ADMS-Roads assessment has been undertaken using the local authority monitoring locations which are located adjacent to the affected road network. All NO_2 results presented in the assessment are those calculated following the process of model verification, using three separate factors of 0.854, 1.225 and 1.756, dependent on location. Full details of the verification process are provided in Appendix 2.

4.1.3 Uncertainty

Due to the number of inputs that are associated with the modelling of the study area there is a level of uncertainty that has to be taken into account when drawing conclusions from the predicted concentrations of NO_2. The predicted concentrations are based upon the inputs of traffic data, background concentrations, emission factors, meteorological data and availability of monitoring data from the assessment area(s).

Within the assessment traffic data has been taken from both Hampshire County Council and Department of Transport databases. Not all of the data available was from 2014, the data for a number of the road links close to the Portland Street AQMA have been taken from 2006 traffic counts. For this data the 2006 data has been used without the factorisation of any of the values or vehicle type percentage due to a factor not being available.

In addition a vehicle by lane split was not available for the A27 flyover link so the % of vehicles moving over this link has been estimated from the previous Further Assessment completed for the Portland Street AQMA in 2009[12]. It has been calculated that 11% of total traffic travelling on the A27 passed over the flyover and this figure has been applied to the 2014 traffic data available for the assessment.

There is a railway line that runs adjacent to the A27 within the study area; any diesel trains using this line will emit NO_2 through combustion and this will contribute to the overall NO_2 contributions within the local area. LAQM.TG(16)[1] provides guidance on railway lines with a heavy traffic of diesel passenger traffic. The railway line passing through Fareham is not listed in LAQM.TG(16)[1], therefore the influence of any diesel fuelled trains that may be using this line has not been taken into account within this study.

[11] NO_x to NO_2 Calculator available at - http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

[12] Fareham Borough Council, Local Air Quality Management – Portland Street, AQMA Further Assessment, April 2009

5 Results

This assessment has considered emissions of NO_x from road traffic at existing receptor locations.

5.1 Modelled Concentrations

The results of the dispersion modelling are provided below, for those receptor locations detailed and illustrated in Table 4.2 and Figures 4.1-4.3 respectively.

Table 5.1 presents the annual mean NO_2 concentrations predicted at existing residential receptor locations for 2014.

The model suggests that the 40µg/m^3 annual mean AQS objective is exceeded at a total of twenty six receptor locations, nineteen of which are located outside of the currently designated AQMAs. Eight further locations are within 10% of the objective, seven of which are at locations outside of the current AQMAs.

The maximum annual mean NO_2 concentration was predicted at receptor 'R7' on Gosport Road, with a predicted result of 56.3µg/m^3. This location is not within the Gosport Road AQMA.

The empirical relationship given in LAQM.TG(16)[1] states that exceedences of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60µg/m^3 or above. Annual mean NO_2 concentrations at all receptor locations are below this limit, and therefore short-term NO_2 exposure from road traffic emissions at the assessed receptor locations is not considered to be significant.

Table 5.1 – Predicted Annual Mean NO_2 Concentrations for 2014

Receptor ID	Street Name	X	Y	Height	Annual Mean NO_2 (µg/m^3)		% of AQS objective
					AQS objective	2014	
R1	Gosport Road	457958	105924	1.5	*40*	**53.6**	134.0
R2	Gosport Road	457943	105914	1.5	*40*	**44.0**	110.0
R3	Gosport Road	457909	105884	1.5	*40*	37.5	93.7
R4	Gosport Road	457879	105859	1.5	*40*	36.6	91.5
R5	Gosport Road	457860	105836	1.5	*40*	**40.2**	100.4
R6	Gosport Road	457840	105821	1.5	*40*	39.9	99.7
R7	Gosport Road	457739	105711	1.5	*40*	**56.3**	140.6
R8	Gosport Road	457731	105709	1.5	*40*	**51.9**	129.6
R9	Old Gosport Road	457785	105696	1.5	*40*	**49.4**	123.5
R10	Old Gosport Road	457736	105625	1.5	*40*	**44.9**	112.3
R11	Old Gosport Road	457757	105633	1.5	*40*	**40.8**	102.0
R12	Gosport Road	457704	105667	1.5	*40*	**45.0**	112.5
R13	Gosport Road	457688	105669	1.5	*40*	35.3	88.3
R14	Gosport Road	457686	105641	1.5	*40*	**41.0**	102.5
R15	Gosport Road	457676	105625	1.5	*40*	39.3	98.3
R16	Gosport Road	457725	105619	1.5	*40*	**48.9**	122.4
R17	Gosport Road	457669	105606	1.5	*40*	39.4	98.4
R18	Gosport Road	457664	105588	1.5	*40*	**40.9**	102.2
R19	Gosport Road	457661	105574	1.5	*40*	**44.8**	112.0
R20	Gosport Road	457654	105554	1.5	*40*	**45.1**	112.7
R21	Gosport Road	457603	105199	1.5	*40*	30.6	76.4
R22	Gosport Road	457679	105542	1.5	*40*	**50.7**	126.7

Receptor ID	Street Name	X	Y	Height	Annual Mean NO_2 ($\mu g/m^3$)		% of AQS objective
					AQS objective	2014	
R23	Gosport Road	457639	105526	3	*40*	37.8	94.5
R24	Gosport Road	457634	105509	3	*40*	38.9	97.4
R25	Gosport Road	457667	105503	1.5	*40*	**48.0**	120.1
R26	Gosport Road	457622	105471	1.5	*40*	**46.2**	115.5
R27	Gosport Road	457607	105438	1.5	*40*	**42.3**	105.8
R28	Gosport Road	457603	105423	1.5	*40*	**43.0**	107.4
R29	Gosport Road	457597	105402	1.5	*40*	**44.3**	110.8
R30	Gosport Road	457594	105392	1.5	*40*	**43.4**	108.6
R31	Gosport Road	457589	105375	1.5	*40*	**43.6**	108.9
R32	Gosport Road	457575	105329	1.5	*40*	**43.1**	107.7
R33	Gosport Road	457558	105291	1.5	*40*	28.3	70.7
R34	Gosport Road	457551	105263	1.5	*40*	29.1	72.7
R35	Gosport Road	457591	105268	1.5	*40*	32.9	82.3
R36	Gosport Road	457592	105251	1.5	*40*	33.6	83.9
R37	Gosport Road	457594	105233	1.5	*40*	32.8	81.9
R38	Gosport Road	457527	105200	1.5	*40*	34.7	86.8
R39	Gosport Road	457514	105167	1.5	*40*	33.4	83.6
R40	Gosport Road	457639	105098	1.5	*40*	35.9	89.7
R41	Gosport Road	457615	105070	1.5	*40*	30.8	77.0
R42	Gosport Road	457653	105059	1.5	*40*	34.5	86.3
R43	Gosport Road	457631	105026	1.5	*40*	28.9	72.3
R44	Gosport Road	457669	105019	1.5	*40*	32.9	82.2
R45	Gosport Road	457649	104986	1.5	*40*	28.2	70.4
R46	Gosport Road	457684	104986	1.5	*40*	31.5	78.8
R47	Gosport Road	457665	104950	1.5	*40*	27.7	69.2
R48	Gosport Road	457697	104953	1.5	*40*	32.2	80.5
R49	Gosport Road	457675	104920	1.5	*40*	27.0	67.5
R50	Gosport Road	457712	104915	1.5	*40*	31.4	78.6
R51	Gosport Road	457685	104891	1.5	*40*	27.1	67.7
R52	Gosport Road	457720	104889	1.5	*40*	31.6	79.0
R53	Gosport Road	457694	104863	1.5	*40*	27.3	68.1
R54	Gosport Road	457733	104844	1.5	*40*	32.1	80.3
R55	Gosport Road	457704	104819	1.5	*40*	27.8	69.6
R56	Gosport Road	457711	104790	1.5	*40*	29.9	74.8
R57	Gosport Road	457722	104757	1.5	*40*	31.7	79.4
R58	Gosport Road	457734	104727	1.5	*40*	32.4	81.1
R59	Gosport Road	457745	104698	1.5	*40*	32.1	80.3
R60	Hartlands Road	457894.3	106009.8	1.5	*40*	**44.0**	110.1
R61	Portland Street	457937.1	106016.4	1.5	*40*	**52.0**	130.0
R62	Portland Street	457935.5	106026.9	1.5	*40*	**46.5**	116.3
R63	Portland Street	457928.9	106052.2	1.5	*40*	39.1	97.7
R64	Hartlands Road	457871.6	106063.2	1.5	*40*	35.1	87.7
R65	Hartlands Road	457841.3	106093.1	1.5	*40*	32.9	82.2
R66	Hartlands Road	457801.9	106125.1	1.5	*40*	28.9	72.3
R67	Hartlands Road	457775.4	106152.8	1.5	*40*	27.6	69.0

Receptor ID	Street Name	X	Y	Height	Annual Mean NO_2 ($\mu g/m^3$)		% of AQS objective
					AQS objective	2014	
R68	Hartlands Road	457769.5	106187.5	1.5	*40*	30.2	75.4
R69	Quay Street	458101.2	106115	1.5	*40*	32.0	80.0
R70	Quay Street	458106.6	106137.6	1.5	*40*	31.1	77.8

In Bold – exceedences of the AQS objective

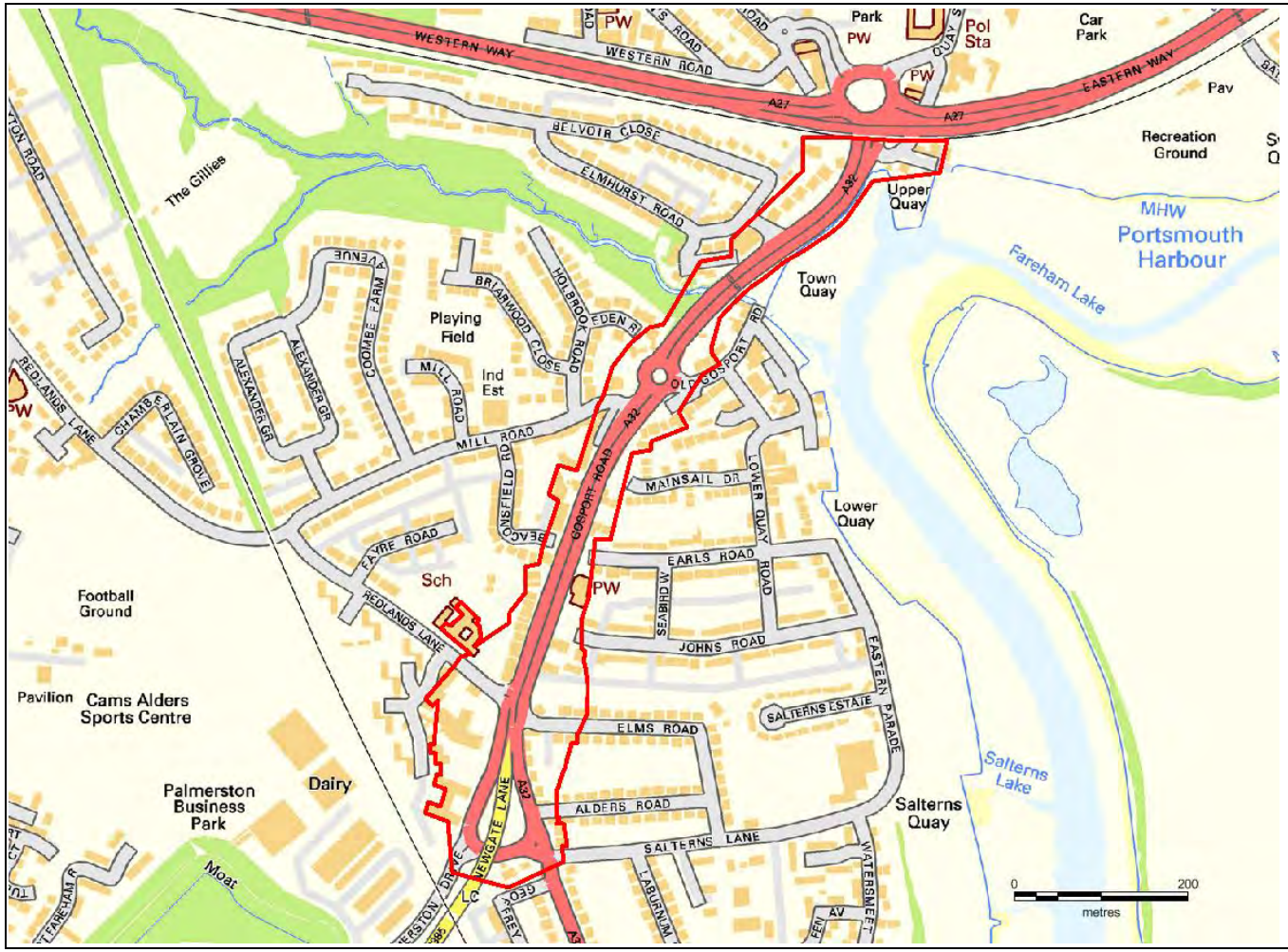
Annual mean NO_2 concentrations were also predicted at generic receptor locations at a height of 1.5m within a grid with a maximum spatial resolution of 18m, covering the modelled area. This was in addition to employing the intelligent gridding option in ADMS-Roads, which adds receptors with a finer spatial resolution of 2.9m close to the road sources. This enables the generation of concentration isopleths.

Figure 5.1 illustrates the annual mean NO_2 concentration isopleths for the study area. To mitigate against the uncertainty of modelled exceedences, 40µg/m^3 and 36µg/m^3 contours (i.e. within 90% of the AQS objective) are presented. The 60µg/m^3 contour is also displayed, to indicate areas potentially at risk of exceedence of the 1-hour mean AQS objective, in line with LAQM.TG(16)[1].

A suggestion of the amendment to the boundaries of both of the AQMAs is subsequently presented in Figure 5.2 and Figure 5.3.

Figure 5.1 – Annual Mean NO_2 Concentration Isopleths (µg/m^3) in Fareham

Figure 5.2 – Proposed Gosport Road AQMA Amendment



Legend

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Receptor Locations – Portland Street**
By PB	**Approved** JC
Scale As Shown	**Job Ref** 6381546
Date November 2016	**Figure No.** 5.2

Figure 5.3 – Proposed Portland Street AQMA Amendment

Legend

AQMA

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Proposed Gosport Road AQMA Amendment**
By PB	**Approved** JC
Scale As Shown	**Job Ref** 6381546
Date November 2016	**Figure No.** 5.3

5.2 Population Exposure

The proposed AQMA extent in Figure 5.2 has been used in conjunction with land registry GIS information supplied by the Council[13] to estimate the population exposed to potential exceedence of the annual mean NO_2 AQS objective. The Office for National Statistics[14] provides an average number of 2.4 people per UK household in 2016.

Based on the number of properties located within the extended boundaries proposed for the AQMAs, the number of additional residents exposed to potential exceedences of the annual mean NO_2 due to the proposed amendments of both AQMAs is approximately 310. This is an additional 12 residents within the Portland Street AQMA and 298 residents within the Gosport Road AQMA.

[13] GIS, Chester NLPG (2016) ©Crown Copyright, Licence 100049046

[14] http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2016

6 Conclusions and Recommendations

Following the assessment of monitoring results for 2014, two sites outside of the existing AQMAs with relevant exposure were found to have exceeded the annual mean AQS objective for NO_2 in Fareham. Bureau Veritas UK Ltd has been commissioned by Fareham Borough Council to undertake a Detailed Modelling Study of the area surrounding the current AQMAs of Gosport Road and Portland Street.

6.1 Predicted Concentrations

The ADMS-Roads dispersion model (Version 4.0) has been used to determine the likely NO_2 concentrations at existing receptor locations.

The model suggests that the 40µg/m^3 annual mean AQS objective is observed to be exceeded at a total of twenty-six receptor locations, with a further eight locations within 10% of the objective.

The maximum annual mean NO_2 concentration was predicted at receptor 'R7' on Gosport Road, with a predicted result of 56.3µg/m^3. This location is located north of the current boundary for the Gosport Road AQMA. A total of nineteen receptor locations outside of the current AQMAs were identified as exceeding the annual mean AQS objective.

The empirical relationship given in LAQM.TG(16)[1] states that exceedences of the 1-hour mean objective for NO_2 are only likely to occur where annual mean concentrations are 60µg/m^3 or above. Annual mean NO_2 concentrations at all receptor locations are below this limit, and therefore short-term NO_2 exposure from road traffic emissions at the assessed receptor locations is not considered to be significant.

Therefore, on the basis of the above, it can be concluded that the existing Gosport Road and Portland Street AQMAs do not satisfactorily cover all areas of exceedence within Fareham, and these either require amendments and extensions, or new AQMAs are needed within the study area.

Preference is to extend the existing AQMA and this is proposed, the extent of which is illustrated in Figure 5.2. Due to the amendments of the AQMA boundaries, a further estimated 310 residents will be at risk of exposure to exceedences of the NO_2 annual mean AQS objective.

6.2 Future Recommendations

Following the above conclusions, the following recommendations are made:

- Amendment the Gosport Road AQMA, to cover the area suggested by Figure 5.2;
- Amendment the Portland Street AQMA, to cover the area suggested by Figure 5.3;
- Proceed to amending/updating the relevant action plan, such that it encompasses measures to target all incorporated roads; and
- Continue to implement extensive NO_2 monitoring across Fareham, with an emphasis to include monitoring north on Gosport Road approaching the junction with the A27.

Appendices

Appendix 1 – Background to Air Quality

Emissions from road traffic contribute significantly to ambient pollutant concentrations in urban areas. The main constituents of vehicle exhaust emissions, produced by fuel combustion are carbon dioxide (CO_2) and water vapour (H_2O). However, combustion engines are not 100% efficient and partial combustion of fuel results in emissions of a number of other pollutants, including carbon monoxide (CO), particulate matter (PM), Volatile Organic Compounds (VOCs) and hydrocarbons (HC). For HC, the pollutants of most concern are 1,3 - butadiene (C_4H_6) and benzene (C_6H_6). In addition, some of the nitrogen (N) in the air is oxidised under the high temperature and pressure during combustion; resulting in emissions of oxides of nitrogen (NO_x). NO_x emissions from vehicles predominately consist of nitrogen oxide (NO), but also contain nitrogen dioxide (NO_2). Once emitted, NO can be oxidised in the atmosphere to produce further NO_2.

The quantities of each pollutant emitted depend upon a number of parameters; including the type and quantity of fuel used, the engine size, the vehicle speed, and the type of emissions abatement equipment fitted. Once emitted, these pollutants disperse in the air. Where there is no additional source of emission, pollutant concentrations generally decrease with distance from roads, until concentrations reach those of the background.

This air quality assessment focuses on NO_2 as this pollutant is the least likely to meet the respective Air Quality Strategy (AQS) objectives near roads. This has been confirmed over recent years by the outcome of the Local Air Quality Management (LAQM) regime. Recent statistics[15] regarding Air Quality Management Areas (AQMAs) show that approximately 640 AQMAs are declared in the UK. The majority of existing AQMAs have been declared in relation to road traffic emissions.

In line with these results, the reports produced by the Council under the LAQM regime have confirmed that road traffic within their administrative area is the main issue in relation to air quality.

An overview of this pollutant, describing briefly the sources and processes influencing the ambient concentrations, is presented below.

Nitrogen Oxides (NO_x)

NO and NO_2, collectively known as NO_x, are produced during the high temperature combustion processes involving the oxidation of N. Initially, NO_x are mainly emitted as NO, which then undergoes further oxidation in the atmosphere, particularly with ozone (O_3), to produce secondary NO_2. Production of secondary NO_2 could also be favoured due to a class of compounds, VOCs, typically present in urban environments, and under certain meteorological conditions, such as hot sunny days and stagnant anti-cyclonic winter conditions.

Of NO_x, it is NO_2 that is associated with health impacts. Exposure to NO_2 can bring about reversible effects on lung function and airway responsiveness. It may also increase reactivity to natural allergens, and exposure to NO_2 puts children at increased risk of respiratory infection and may lead to poorer lung function in later life.

In the UK, emissions of NO_x have decreased by 62% between 1990 and 2010. For 2010, NO_x (as NO_2) emissions were estimated to be 1,106kt. The transport sector remained the largest source of NO_x emissions with road transport contribution 34% to NO_x emissions in 2010.

[15] Statistics from the UK AQMA website available at http://aqma.defra.gov.uk – Figures as of April 2016

Appendix 2 – ADMS Model Verification

The ADMS-Roads dispersion model has been widely validated for this type of assessment and is specifically listed in the Defra's LAQM.TG(16)[1] guidance as an accepted dispersion model.

Model validation undertaken by the software developer (CERC) will not have included validation in the vicinity of the proposed development site. It is therefore necessary to perform a comparison of modelled results with local monitoring data at relevant locations. This process of verification attempts to minimise modelling uncertainty and systematic error by correcting modelled results by an adjustment factor to gain greater confidence in the final results.

The predicted results from a dispersion model may differ from measured concentrations for a large number of reasons, including uncertainties associated with:

- Background concentration estimates;
- Source activity data such as traffic flows and emissions factors;
- Monitoring data, including locations; and
- Overall model limitations.

Model verification is the process by which these and other uncertainties are investigated and where possible minimised. In reality, the differences between modelled and monitored results are likely to be a combination of all of these aspects.

Model setup parameters and input data were checked prior to running the models in order to reduce these uncertainties. The following were checked to the extent possible to ensure accuracy:

- Traffic data;
- Distance between sources and monitoring as represented in the model;
- Speed estimates on roads;
- Background monitoring and background estimates; and
- Monitoring data.

The traffic data for this assessment has been collated using a combination of automatic count data provided by the Council and figures taken from Department for Transports (DfT), Traffic Counts web resource as outlined in Section 4.1.1.

There were fifty six diffusion tubes and two automatic monitoring sites within Fareham in 2014, of these twenty two diffusion tubes and two automatic sites were within the modelled road network so could be considered for model verification. The data capture at all of these sites was more than 75%, therefore no sites required annualisation. Sets of triplicate diffusion tubes are co-located with both the Gosport Road (FAR1) and Portland Street (FAR2) automatic monitors. When undertaking model verification the data from the automatic monitor has been used rather than the triplicate diffusion tube data. This is due to the higher degree of accuracy in measurements made by an automatic monitor that is in calibration and routinely serviced compared to passive diffusion tubes.

The details of the all the LAQM monitoring sites used for the purposes of model verification are presented in Table 3.3 of the main report.

Verification calculations

The verification of the modelling output was performed in accordance with the methodology provided in Chapter 7 of LAQM.TG(16)[1].

For the verification and adjustment of NO_x/NO_2, the LAQM diffusion tube monitoring data was used as in Table 3.3. Data capture for 2014 was good (i.e. above 75%) in all cases. Table A1 below shows an initial comparison of the monitored and unverified modelled NO_2 results for the year 2014, in order to determine if verification and adjustment was required.

Table A1 – Comparison of Unverified Modelled and Monitored NO_2 Concentrations

Site ID	Background NO_2	Monitored total NO_2 (µg/m^3)	Unverified Modelled total NO_2 (µg/m^3)	% Difference (modelled vs. monitored)
G1A	18.8	35.80	33.95	-5.17
G2A	18.8	34.05	28.55	-16.15
G3	18.1	33.64	24.95	-25.83
G4	18.8	32.23	30.70	-4.75
G6	18.8	37.40	31.44	-15.94
G7	18.8	46.16	30.21	-34.55
G8Z	18.8	34.26	27.03	-21.10
G10	18.8	40.40	30.17	-25.32
G11	18.8	28.96	28.97	0.03
G12	18.8	42.20	31.56	-25.21
G14	18.8	36.95	29.80	-19.35
GR/RL	18.8	28.62	30.05	5.00
FAR1	18.8	32.50	34.31	5.57
PS1/1A/1B	20.1	40.20	44.37	10.37
PS2	20.1	41.31	40.38	-2.25
PS3	20.1	45.99	37.88	-17.63
FAR2	20.1	40.40	59.77	47.95
HR1	20.1	41.62	31.55	-24.20
HR2	20.1	34.33	27.46	-20.01
HR3A	20.1	30.15	25.96	-13.90
HR4	20.1	33.79	34.07	0.83
BL1	22.6	40.82	28.47	-30.25

The model was under predicting at certain sites by up to 48% and over predicting at other sites by up to 35%, between the modelled and monitored concentrations. At a number of sites, the difference between modelled and monitored concentrations was greater than ±25%, meaning adjustment of the results was necessary. The relevant data was then gathered to allow the adjustment factor to be calculated.

Model adjustment needs to be undertaken based for NO_x and not NO_2. For the diffusion tube monitoring results used in the calculation of the model adjustment, NO_x was derived from NO_2; these calculations were undertaken using a spreadsheet tool available from the LAQM website[16].

Table A2 provides the relevant data required to calculate the model adjustment based on regression of the modelled and monitored road source contribution to NO_x.

[16] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html#NOxNO2calc

Table A2 – Data Required for Adjustment Factor Calculation

Site ID	Monitored total NO_2 ($\mu g/m^3$)	Monitored total NO_x ($\mu g/m^3$)	Background NO_2 ($\mu g/m^3$)	Background NO_x ($\mu g/m^3$)	Monitored road contribution NO_2 (total - background) ($\mu g/m^3$)	Monitored road contribution NO_x (total - background) ($\mu g/m^3$)	Modelled road contribution NO_x (excludes background) ($\mu g/m^3$)
G1A	35.8	63.5	18.8	27.3	17.0	36.2	35.3
G2A	34.1	59.5	18.8	27.3	15.2	32.2	22.0
G3	33.6	59.2	18.1	26.4	15.5	32.8	15.2
G4	32.2	55.3	18.8	27.3	13.4	28.0	27.2
G6	37.4	67.3	18.8	27.3	18.6	40.0	29.0
G7	46.2	89.4	18.8	27.3	27.3	62.1	26.0
G8Z	34.3	60.0	18.8	27.3	15.4	32.6	18.4
G10	40.4	74.6	18.8	27.3	21.6	47.3	25.9
G11	29.0	48.1	18.8	27.3	10.1	20.8	23.0
G12	42.2	79.1	18.8	27.3	23.4	51.8	29.3
G14	37.0	66.3	18.8	27.3	18.1	38.9	25.0
GR/RL	28.6	47.4	18.8	27.3	9.8	20.0	25.6
FAR1	32.5	55.9	18.8	27.3	13.7	28.6	36.2
PS1/1A/1B	40.2	73.4	20.1	29.3	20.1	44.1	60.3
PS2	41.3	76.1	20.1	29.3	21.2	46.8	49.2
PS3	46.0	88.1	20.1	29.3	25.9	58.8	42.5
FAR2	40.4	73.9	20.1	29.3	20.3	44.6	108.0
HR1	41.6	76.9	20.1	29.3	21.5	47.6	26.4
HR2	34.3	59.4	20.1	29.3	14.2	30.1	16.6
HR3A	30.2	50.1	20.1	29.3	10.1	20.8	13.1
HR4	33.8	53.0	20.1	29.3	13.7	23.7	26.9
BL1	40.8	73.4	22.6	33.3	18.3	40.1	13.4

Figure A1 provides a comparison of the Modelled Road Contribution NO_x versus Monitored Road Contribution NO_x, and the equation of the trend line based on linear regression through zero. The Total Monitored NO_x concentration has been derived by back-calculating NO_x from the NO_x/NO_2 empirical relationship using the spreadsheet tool available from Defra's website. The equation of the trend lines presented in Figure A1 gives an adjustment factor using all verification points for the modelled results of 0.904.

Figure A1 – Comparison of the Modelled Road Contribution NO_x versus Monitored Road Contribution NO_x across all verification points

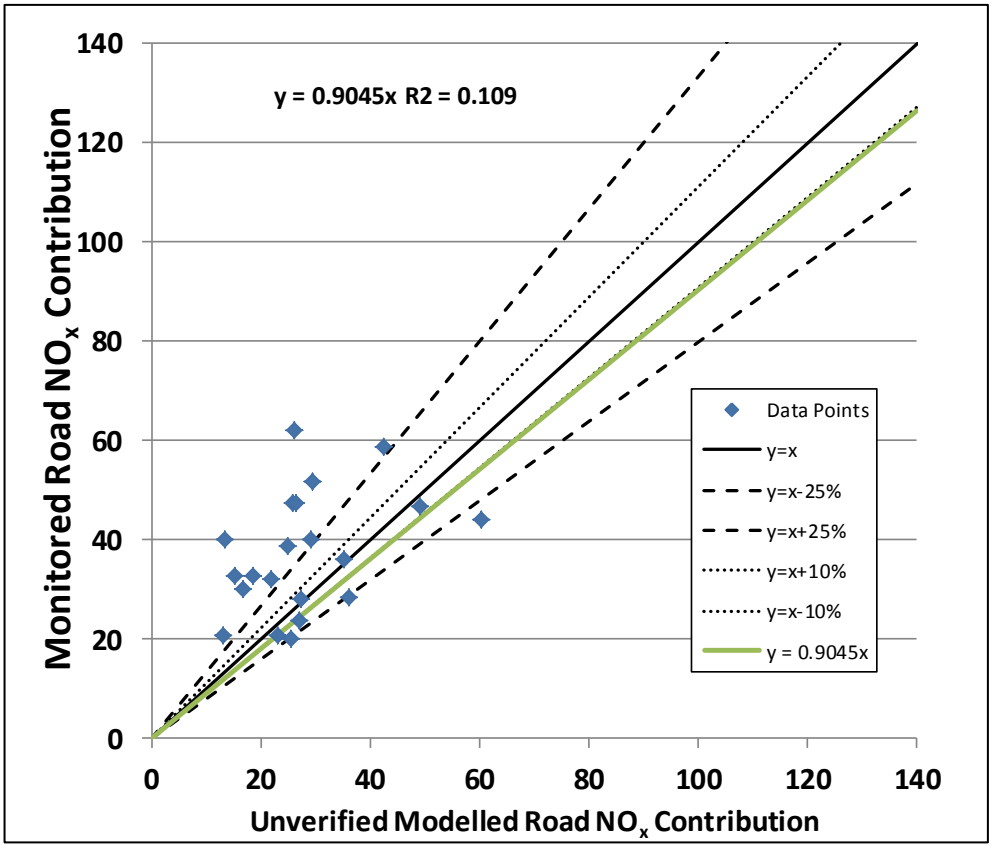


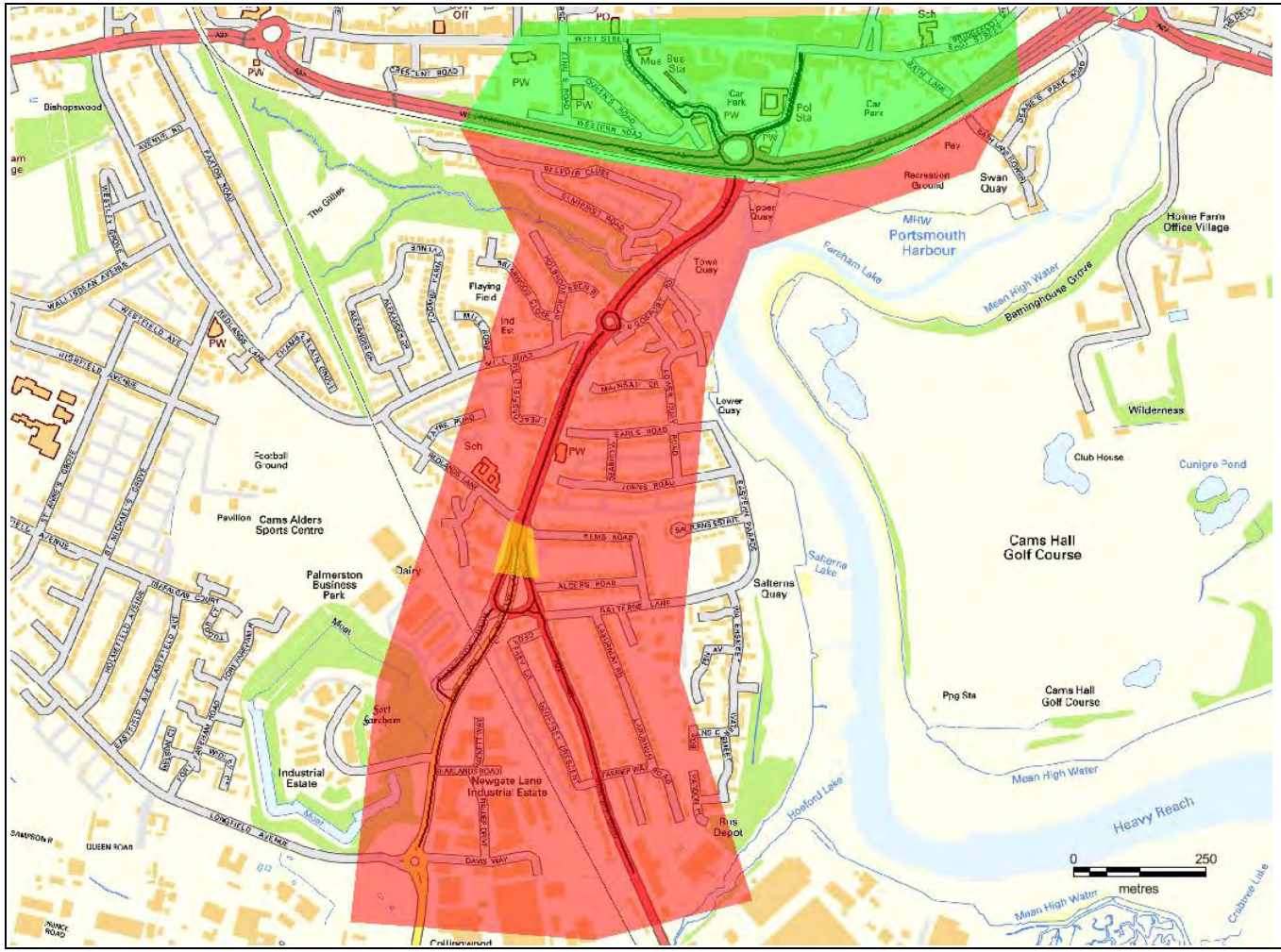
Table A3 shows the ratios between monitored and modelled NO_2 for each monitoring location based on the above adjustment factor. Using a factor of 0.904, there are a number of results outside of the 25% threshold deemed acceptable in TG.16. In addition there are significant variations between the adjustment ratios across the verification points. Ideally, concentrations should be within ±10%, but fifteen sites were outside of this range. Therefore, it was deemed that 0.904 was not a suitable verification factor.

Table A3 – Adjustment Factor and Comparison of Verified Results Against Monitoring Results across all verification points

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x ($\mu g/m^3$)	Adjusted modelled total NO_x (including background NO_x) ($\mu g/m^3$)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) ($\mu g/m^3$)	Monitored total NO_2 ($\mu g/m^3$)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
G1A	1.03	0.904	31.9	59.3	34.0	35.8	-5.2
G2A	1.46		19.9	47.2	28.6	34.1	-16.2
G3	2.16		13.7	40.1	25.0	33.6	-25.8
G4	1.03		24.6	51.9	30.7	32.2	-4.7
G6	1.38		26.2	53.6	31.4	37.4	-15.9
G7	2.39		23.5	50.8	30.2	46.2	-34.6
G8Z	1.77		16.6	44.0	27.0	34.3	-21.1
G10	1.83		23.4	50.8	30.2	40.4	-25.3
G11	0.90		20.8	48.1	29.0	29.0	0.0
G12	1.77		26.5	53.8	31.6	42.2	-25.2
G14	1.56		22.6	49.9	29.8	37.0	-19.4
GR/RL	0.78		23.2	50.5	30.1	28.6	5.0
FAR1	0.79		32.7	60.1	34.3	32.5	5.6
PS1/1A/1B	0.73		54.5	83.8	44.4	40.2	10.4
PS2	0.95		44.5	73.8	40.4	41.3	-2.3
PS3	1.38		38.4	67.7	37.9	46.0	-17.6
FAR2	0.41		97.7	127.0	59.8	40.4	47.9
HR1	1.80		23.9	53.2	31.6	41.6	-24.2
HR2	1.82		15.0	44.3	27.5	34.3	-20.0
HR3A	1.59		11.8	41.1	26.0	30.2	-13.9
HR4	0.88		24.3	53.6	34.1	33.8	0.8
BL1	3.00		12.1	45.4	28.5	40.8	-30.3

In order to provide more confidence in the model predictions, the model was split into three verification domains, the A32/Newgate Lane junction (Domain 1), the area north of the A27 (Domain 2) and the remainder of the modelled area (Domain 3), as illustrated in Figure A2.

Figure A2 - Model Verification Domains



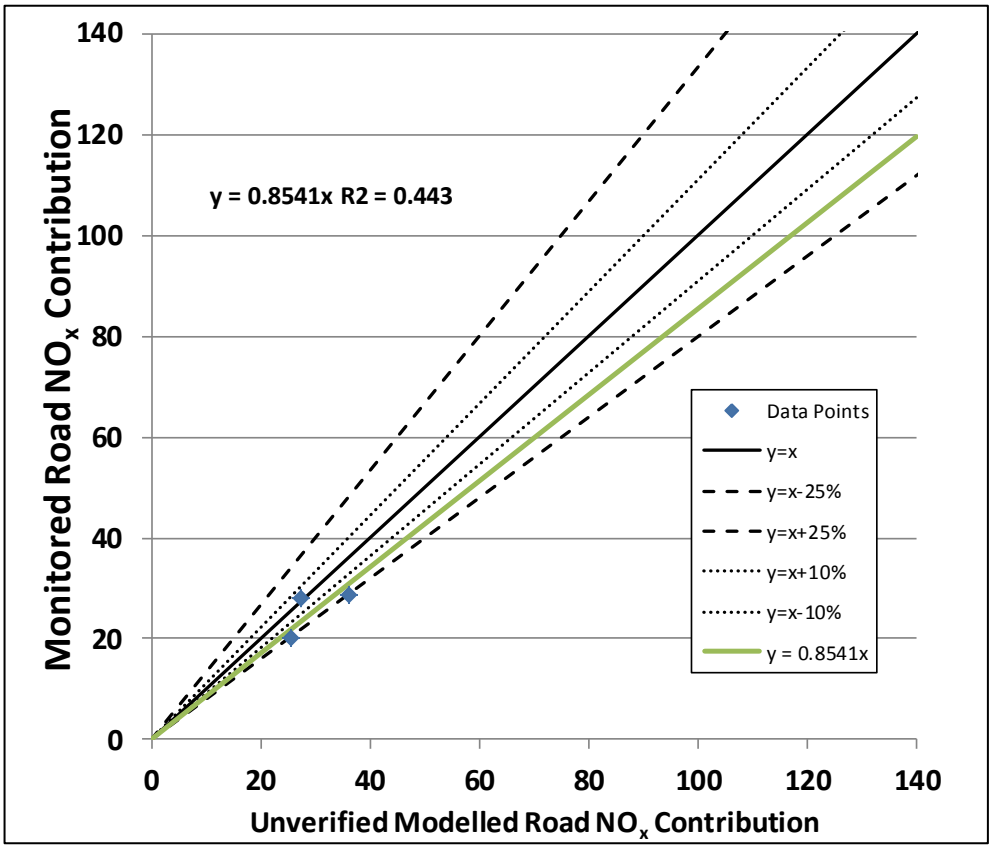
Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Fareham Borough Council**
Title	**Model Verification Domains**
By PB	**Approved** JC
Scale As Shown	**Job Ref** 6381546
Date November 2016	**Figure No.** A2

Domain 1

By splitting the modelled domain into three areas, an increase of the model verification factor for Domain 1 and an increased alignment between monitored and modelled values is realised, as shown in Table A4 and Figure A3. The equation of the new trend line presented gives an adjustment factor for the modelled results in Domain 1 of 0.854.

Figure A3 – Comparison of the Modelled Road Contribution NO_x versus Monitored Road Contribution NO_x in Domain 1

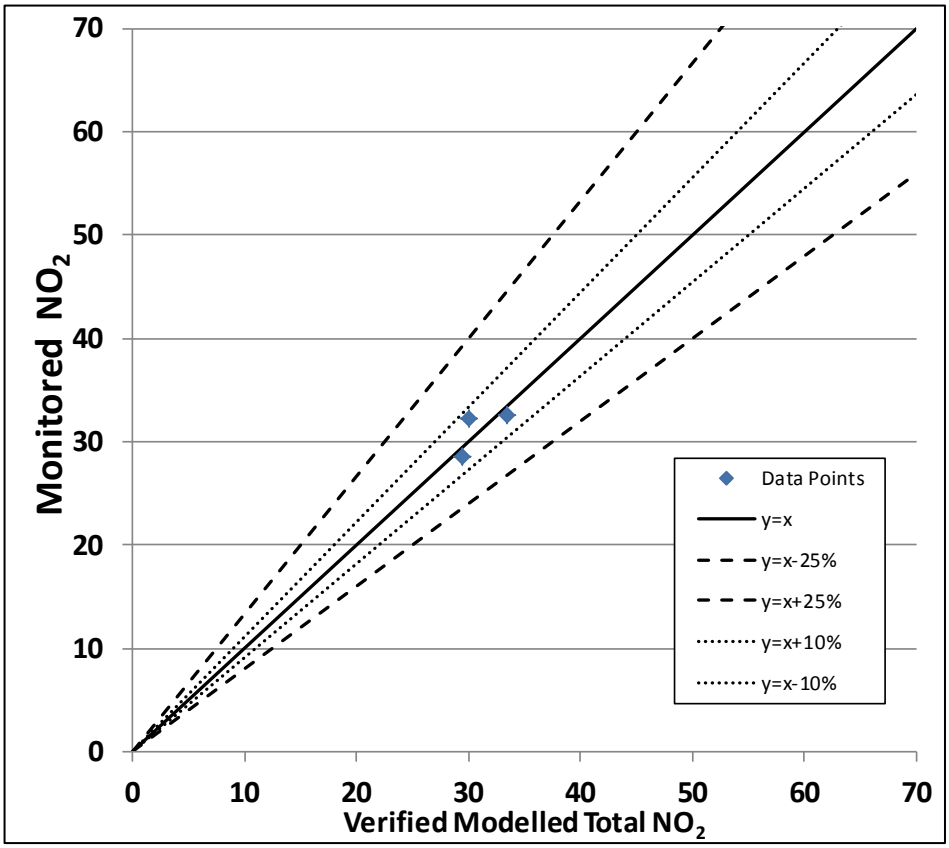


The adjustment factor of 0.854 was applied to the road-NO_x concentrations predicted by the model in Domain 1 to arrive at the final NO_2 concentrations. The sites then show acceptable agreement between the ratios of monitored and modelled NO_2, all sites within within ±10%, as shown in Figure A4. A factor of 0.854 in Domain 1 also reduces the Root Mean Square Error (RMSE) from a value of 2.4 to 1.5.

Table A4 – Adjustment Factor and Comparison of Verified Results Against Monitoring Results in Domain 1

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x ($\mu g/m^3$)	Adjusted modelled total NO_x (including background NO_x) ($\mu g/m^3$)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) ($\mu g/m^3$)	Monitored total NO_2 ($\mu g/m^3$)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
G4	1.03	0.854	23.2	50.6	30.1	32.2	-6.7
GR/RL	0.78		21.9	49.2	29.5	28.6	2.9
FAR1	0.79		30.9	58.2	33.5	32.5	3.1

Figure A4 – Comparison of the Modelled NO_2 versus Monitored NO_2 in Domain 1

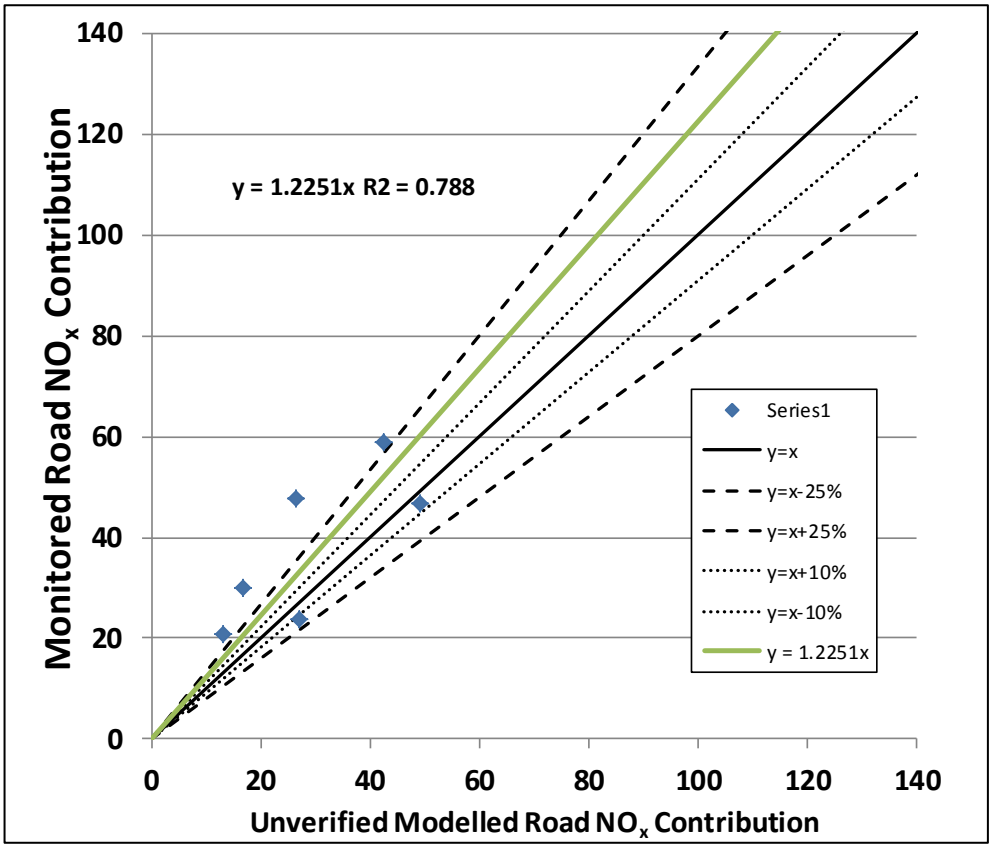


All NO_2 results in Domain 1 presented and discussed herein are those calculated following the process of model verification using an adjustment factor of 0.854.

Domain 2

The equation of the new trend line presented gives an adjustment factor for the modelled results in Domain 2 of 1.225, as shown in Table A5 and Figure A5. Within Domain 2 a number of monitoring results have been excluded from the verification process; BL1, FAR2 and PS1/1A/1B. BL1 was removed as it is located on the edge of the modelled area and is not representative of the specific area around the Portland Street AQMA being assessed. Locations FAR2 and PS1/1A/1B are located within the Portland Street AQMA but were removed due to the model over predicting NO_2 concentrations at these locations. Removing these two locations has led to an increased verification factor for Domain 2 this provides a worst case assessment of the area as the verification factor is higher without these two monitoring locations included.

Figure A5 – Comparison of the Modelled Road Contribution NO_x versus Monitored Road Contribution NO_x in Domain 2

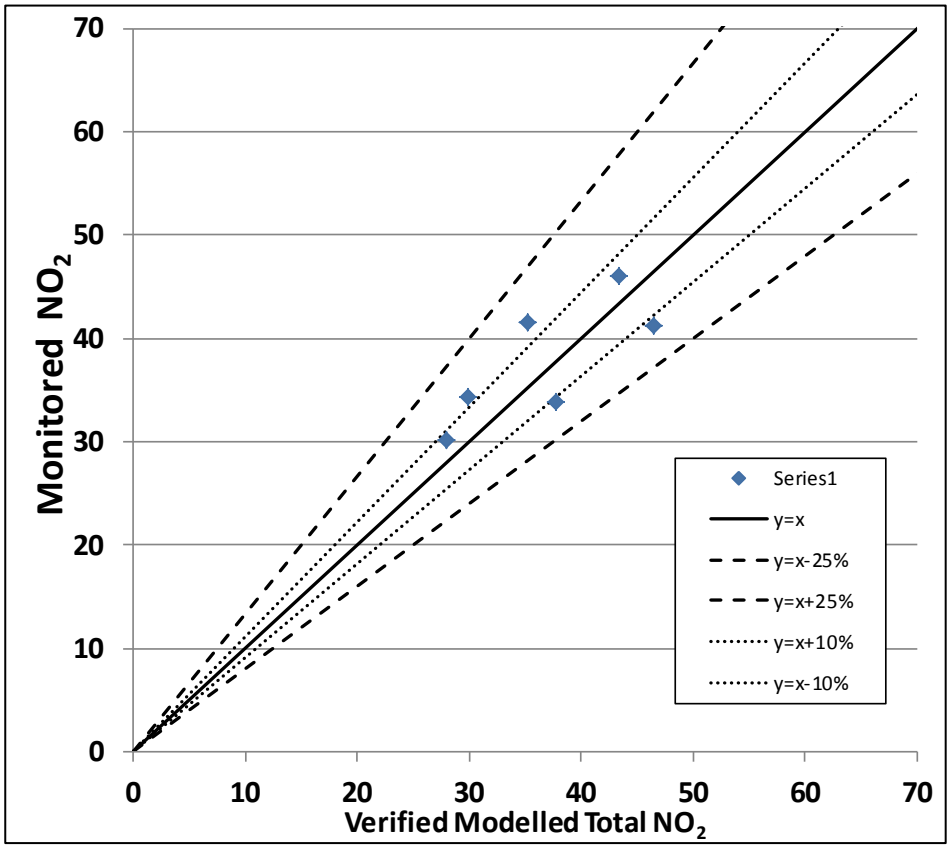


The adjustment factor of 1.225 was applied to the road-NO_x concentrations predicted by the model in Domain 2 to arrive at the final NO_2 concentrations. The sites show acceptable agreement between the ratios of monitored and modelled NO_2, with most close to ±10%, as shown in Figure A8. A factor of 1.225 in Domain 2 also reduces the Root Mean Square Error (RMSE) from a value of 5.4 to 4.4.

Table A5 – Adjustment Factor and Comparison of Verified Results Against Monitoring Results in Domain 2

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
PS2	0.95	1.225	60.3	89.6	46.6	41.3	12.7
PS3	1.38		52.1	81.4	43.4	46.0	-5.6
HR1	1.80		32.3	61.6	35.3	41.6	-15.2
HR2	1.82		20.3	49.6	29.9	34.3	-12.8
HR3A	1.59		16.0	45.4	28.0	30.2	-7.3
HR4	0.88		33.0	62.3	37.8	33.8	11.9

Figure A6 – Comparison of the Modelled NO_2 versus Monitored NO_2 in Domain 2

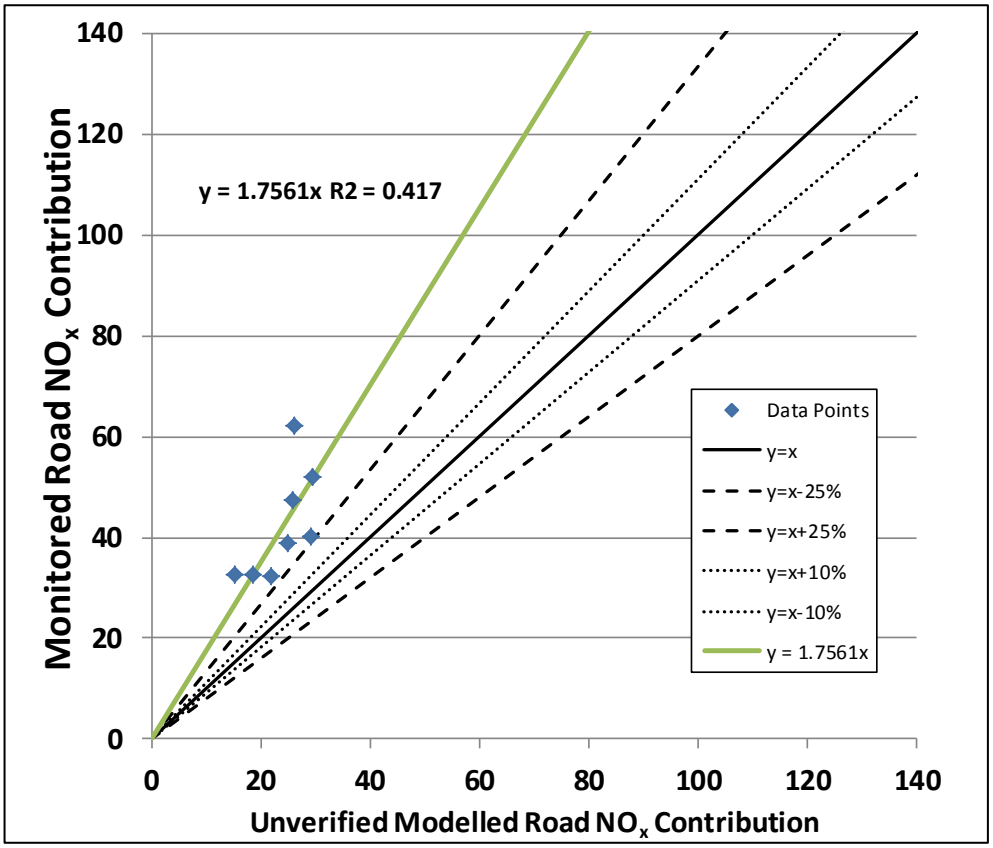


All NO_2 results in Domain 2 presented and discussed herein are those calculated following the process of model verification using an adjustment factor of 1.225.

Domain 3

The equation of the new trend line presented gives an adjustment factor for the modelled results in Domain 3 of 1.756, as shown in Table A6 and Figure A7. Within Domain 3 two diffusion tubes have been excluded from the verification process; G1a and G11. Both of these locations have been removed due to being located a greater distance from Gosport Road and therefore less representative of the modelled area compared to all other monitoring locations included in the Domain 3 verification.

Figure A7 – Comparison of the Modelled Road Contribution NO_x versus Monitored Road Contribution NO_x in Domain 3

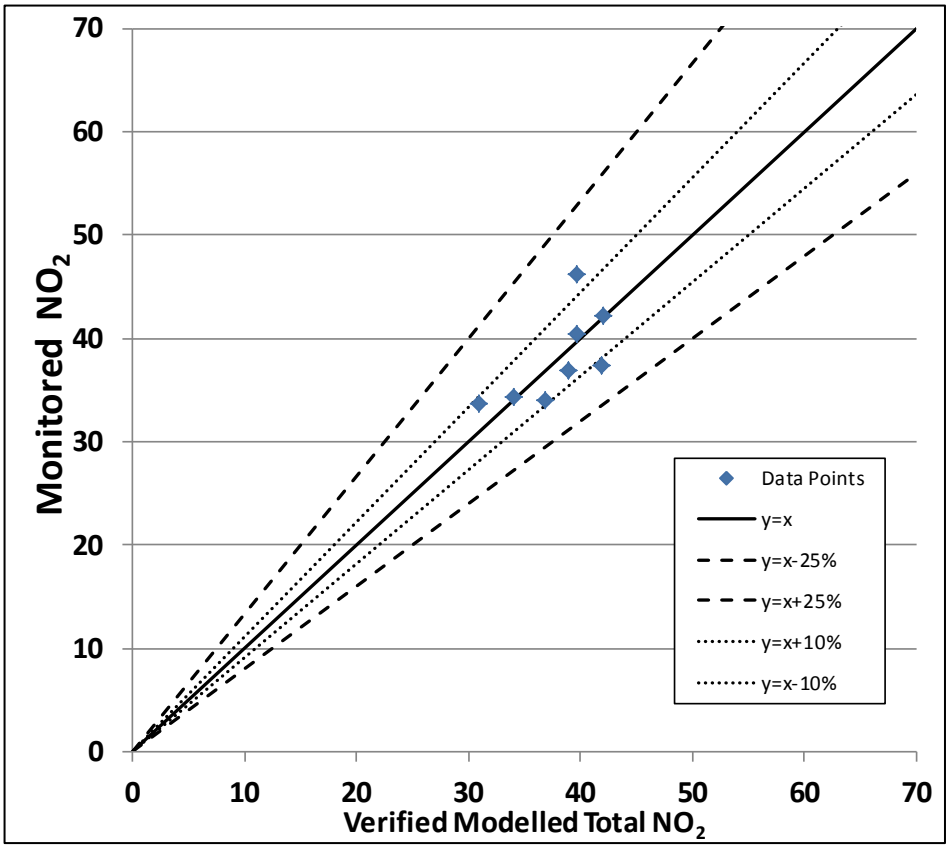


The adjustment factor of 1.756 was applied to the road-NO_x concentrations predicted by the model in Domain 3 to arrive at the final NO_2 concentrations. The sites show acceptable agreement between the ratios of monitored and modelled NO_2, with most within ±10%, as shown in Figure A8. A factor of 1.807 in Domain 3 also reduces the Root Mean Square Error (RMSE) from a value of 8.5 to 3.2.

Table A6 – Adjustment Factor and Comparison of Verified Results Against Monitoring Results in Domain 3

Site ID	Ratio of monitored road contribution NO_x / modelled road contribution NO_x	Adjustment factor for modelled road contribution NO_x	Adjusted modelled road contribution NO_x (µg/m^3)	Adjusted modelled total NO_x (including background NO_x) (µg/m^3)	Modelled total NO_2 (based upon empirical NO_x / NO_2 relationship) (µg/m^3)	Monitored total NO_2 (µg/m^3)	% Difference (adjusted modelled NO_2 vs. monitored NO_2)
G2A	1.46	1.756	38.6	66.0	36.8	34.1	8.1
G3	2.16		26.7	53.1	31.0	33.6	-8.0
G6	1.38		50.9	78.3	41.9	37.4	11.9
G7	2.39		45.7	73.0	39.7	46.2	-13.9
G8Z	1.77		32.3	59.6	34.1	34.3	-0.4
G10	1.83		45.5	72.8	39.7	40.4	-1.8
G12	1.77		51.5	78.8	42.1	42.2	-0.4
G14	1.56		43.9	71.2	39.0	37.0	5.6

Figure A8 – Comparison of the Modelled NO_2 versus Monitored NO_2 in Domain 3



All NO_2 results in Domain 3 presented and discussed herein are those calculated following the process of model verification using an adjustment factor of 1.756.