WOKINGHAM
BOROUGH COUNCIL

2016 Air Quality Annual Status Report (ASR)

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

August 2016

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Report Reference number	WOK ASR 2016
Date	19 August 2016

Executive Summary: Air Quality in Our Area

Air Quality in Wokingham

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 major source of air quality pollutants in Wokingham Borough is road transport, and in particular the contribution from the M4 has been identified as significant. The main pollutant of concern is nitrogen dioxide (NO_2) and three Air Quality Management Areas (AQMAs) have been declared for exceedances of the annual mean NO_2 objective. These are located in Wokingham Town Centre, Twyford Town Centre and along, and 60m either side of, the M4 throughout the whole of the borough (https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=318).

NO_2 levels in 2015 have generally shown a decrease on 2014 levels at both the automatic monitoring units and diffusion tube sites. No exceedences of the 40µg/m^3 annual mean NO_2 objective or the 60µg/m^3 1-hour NO_2 objective were recorded at either of the two automatic monitoring units in 2015. Within the M4 AQMA, an annual mean NO_2 concentration of 33.50µg/m^3 was recorded by the Whitley Wood Lane automatic monitoring unit. This was also below the level of concern (i.e. >36µg/m^3 - the contour on which the M4 AQMA was declared). Within the Wokingham Town Centre AQMA, an annual mean NO_2 concentration of 35.04µg/m^3 was recorded by the Wokingham automatic monitoring unit.

The NO_2 annual mean objective was exceeded at three of the sixty-three diffusion tube sites in 2015 where relevant exposure existed. Two of these sites were located within the existing AQMAs. One was located in the Wokingham Town Centre AQMA

[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

(WOK844 Giggling Spring, Shute End - 43µg/m^3) and the other in the Twyford Town Centre AQMA (WOK850 19 High Street - 46µg/m^3). The third site of exceedance was located at WOK864 (Waltham Road, Twyford) which is approximately 22m east of the south-eastern boundary of the Twyford Town Centre AQMA. A mean concentration of 42µg/m³ was recorded at this site during 2015. The Twyford Town Centre AQMA boundary may therefore need to be amended and this will be investigated later this year.

The level of concern (i.e. >36µg/m^3) was marginally exceeded at one monitoring site within the M4 AQMA in 2015 (WOK860 Whitley Wood Unit 1) and it's nearest relevant receptor (312 Old Whitley Wood Lane). This is the level on which the M4 AQMA was declared at that time and the levels have decreased over the last several years. An area of concern had previously existed at WOK841 (Lane End Villas) on the A327 in Shinfield. However, an annual mean NO_2 concentration of 39µg/m^3 was recorded at this site in 2015 decreasing to 34µg/m^3 at the facade of 2 Lane End Villas, the nearest receptor in proximity to the site. This is below both the objective value and the level of concern for the first time since monitoring began at this site in 2012 and NO_2 concentrations at this site are only expected to reduce further. This is because a new motorway bridge was opened in Shinfield in summer 2016 as part of the Shinfield Eastern Relief Road Scheme which will permanently re-direct all vehicles except buses away from the part of the A327 where WOK841 is located. One further area of concern exists both within and just beyond the northern boundary of the M4 AQMA at the Whitley Wood Lane/B3270 T-Junction. Monitoring is taking place at this location in 2016 and the outcome may determine if the M4 AQMA can be revoked in 2017.

Further assessments of air quality are required for the Wokingham Town Centre and Twyford Town Centre AQMAs in 2016. The outcome of these will assist in the preparation of Air Quality Action Plans for these two areas in 2016/2017.

Environmental Health has continued to work in conjunction with the Transport Policy Team with the implementation of Local Transport Plan 3 (2011 – 2026). The Plan includes a Transport Vision setting out the long-term transport strategy for the borough, particularly for the four new communities being created to accommodate the majority of the construction of over 13,000 new houses in Wokingham Borough as identified in the Local Development Framework Core Strategy. The vision is to

provide a cost-effective, inclusive transport network that enhances the economic, social and environmental prospects of the Borough whilst promoting the safety, health and wellbeing of those that use it. Key goals within this vision include increasing and promoting opportunities to walk and cycle, improving the affordability and availability of public transport and enabling people to make informed, safe and sustainable travel decsions. The Plan acknowledges the link with the M4 AQMA and any future AQAP's. There is also a specific Policy on Air Quality (Policy LTP HW10) which states that the Council will continue to develop and implement our Draft Air Quality Action Plan in response to pollution caused by vehicle emissions. Furthermore, a key objective of the Strategic Environmental Assessment for LTP3 was to improve air quality. LTP Strategies continue to be reviewed and/or implemented.

The link between air quality, particularly from $PM_{2.5}$, and public health in Wokingham Borough requires exploration.

Actions to Improve Air Quality

All planning applications are reviewed for their air quality impact and potential to introduce new receptors into areas of existing poor air quality in the borough. Air quality assessments have been provided where necessary and appropriate mitigation requested. Applications have included several major residential and mixed use residential and commercial schemes, traffic flow changes to road schemes, new relief road schemes and any applications which may have an impact to the AQMAs and other hotspot locations.

Wokingham Borough Council has completed all Pollution Prevention and Control inspections as required.

There were no grant funded projects in 2015, however Environmental Health contributed to the collation of traffic data, officers have received appropriate training in fulfilling their LAQM duties and are part of appropriate internal working groups to ensure air quality impacts in specific projects or areas of highways works are considered.

Local Priorities and Challenges

The following local priorities have been set in Wokingham Borough:

- Exploring the link between public health and $PM_{2.5}$;
- Joint working between the Public Health and Environmental Health teams and links within the Berkshire Public Health Shared Team, considering the inclusion of air quality in the Public Health Work Plan and the Health and Wellbeing Strategy;
- Continuing to work within the unitary authority with the Transport Policy and Highways Teams;
- Progress the 'Further Assessments' for the Wokingham Town Centre and Twyford Town Centre AQMAs;
- Develop the AQAPs for the Wokingham Town Centre and Twyford Town Centre AQMAs;
- Consider revocation of the M4 AQMA following the opening of the new motorway bridge as part of the Shinfield Eastern Relief Road Scheme; and
- Continue the continuous and passive air quality monitoring programmes.

The following challenges have been identified:

- Budget allocation for progressing measures and actions; and
- Linking of the Public Health Outcome Framework and health profiles to air quality to show any causal relationship.

How to Get Involved

For further details on air quality in Wokingham Borough please refer to our website at http://info.westberks.gov.uk/index.aspx?articleid=27513.

Individuals or members of local groups are invited to share any ideas they have to cut NO_2 levels in Wokingham Borough by emailing environmental.health@wokingham.gov.uk.

Other useful websites include:

- https://uk-air.defra.gov.uk/
- http://jsna.wokingham.gov.uk/people-and-places/environmental-health-and-licensing/

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1 Local Air Quality Management

This report provides an overview of air quality in Wokingham Borough 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 Wokingham 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 AQMAs declared by Wokingham Borough Council can be found in Table 2.1. Further information relating to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=318 see full list at http://uk-air.defra.gov.uk/aqma/list.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
M4 AQMA	NO_2 annual mean	Wokingham Borough	Along and 60m either side of the M4 throughout the whole Borough.	Work in progress
Wokingham Town Centre AQMA	NO_2 annual mean	Wokingham	Residential and commercial properties along a small part of Reading Road and Station Road in the north-west, along Shute End and into Broad Street and then Denmark Street in the south-west and Peach Street into London Road in the west.	Work in progress
Twyford Town Centre AQMA	NO_2 annual mean	Twyford	Residential and commercial properties along parts of High Street in the west, Wargrave Road in the north-west, London Road in the north-east and Church Street in the south-east.	Work in progress

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

Progress on adopting the Draft M4 AQAP stalled in 2015 as priority was given to declaring the Wokingham Town Centre and Twyford Town Centre AQMAs. These were declared at the beginning of 2016 and further assessments have been commissioned to assist in the development of AQAPs for these two areas in 2016/2017. Monitoring over the last 2 years has also revealed no exceedances of the NO_2 annual mean objective within the M4 AQMA. Monitoring is continuing within the M4 AQMA in 2016 and the outcome may determine if the M4 AQMA can be revoked in 2017 thus removing the requirement for an AQAP for this area.

Wokingham Borough Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of reducing car trips and congestion as part as part of the Local Transport Plan 3. Many of these measures will also have contributed to air quality improvements. 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 Local Transport Plan 3 (2011-2026).

Wokingham Borough Council's priorities for the coming year include:

1. Exploring the link between public health and $PM_{2.5}$
2. Joint working the between Public Health and Environmental Health Teams and links within the Berkshire Public Health Shared Team. These are to follow on from the Joint Strategic Needs Assessment (http://jsna.wokingham.gov.uk/people-and-places/environmental-health-and-licensing/) and the Health and Wellbeing Strategy 2014-2017 (http://www.wokingham.gov.uk/council-and-meetings/open-data/plans-policies-and-strategies/?assetdet7653806=345516&categoryesctl8486112=7736&assetdet8733745=345516&categoryesctl9084667=7736)

   The JSNA uses data and evidence from the current health and wellbeing in Wokingham Borough to highlight the health needs of the whole community. It shows how needs might vary for different age groups and identifies health differences in disadvantaged or vulnerable groups. The JSNA also looks at a wider range of factors that help shape the health and wellbeing of individuals,

families and local communities such as education, employment and the environment. Air Pollution is under the Environmental Health and Licensing section.

3. Continuing to work within the unitary authority with Transport Policy and Highways Teams as well as Development Control

   There are some localised areas of congestion at peak times in Wokingham Borough. These areas require managing and investment where improvements are needed to increase capacity at key junctions or effectively manage traffic flow. New development is planned through the Local Development Framework Core Strategy and additional transport and highway measures are planned alongside this new development. This will help address the impact and manage the additional trips associated with new development.

4. Progress the 'Further Assessments' for the Wokingham Town Centre and Twyford Town Centre AQMAs.

   Following the outcome of the Updating and Screening Assessment 2015 consultants have been commissioned to carry out the modelling work required in 2016.

5. Develop the AQAPs for the Wokingham Town Centre and Twyford Town Centre AQMAs.

   The Action Plans are required by mid 2017.

6. Consider the revocation of the M4 AQMA following the opening of the new motorway bridge as part of the Shinfield Eastern Relief Road Scheme.

   As the levels are below the Objective and the new road is likely to remove the exposure at the relevant receptors the revocation will be considered in early 2017.

7. Continue the continuous and passive air quality monitoring programmes.

Automatic monitoring within the M4 AQMA and the Wokingham Town Centre AQMA will continue during 2016 as well as passive monitoring at fifty-nine diffusion tube sites.

Table 2.2 – Progress on LTP3 Measures to Reduce Car Trips and Congestion

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Miles Road Woodley New Cycle Route	Transport Planning and Infrastructure	Cycle network	WBC		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	
2	Cutbush Lane New Cycle Route	Transport Planning and Infrastructure	Cycle network	WBC		2014		N/A	Implementation	2014	
3	Black Boy RBT Cycleway improvements	Transport Planning and Infrastructure	Cycle network	WBC		2014		Yes – unknown	Implementation	2014	
4	Barncroft Drive New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC		2014		N/A	Implementation	2014	
5	Paddick Drive New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC		2014		N/A	Implementation	2014	
6	Meldreth Way New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC		2014		N/A	Implementation	2014	
7	Hurricane way Woodley New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC		2014		N/A	Implementation	2014	
8	A329 Cycleway Corridor Phases, 1, 2 &3	Transport Planning and Infrastructure	Cycle network	WBC		2014		Yes – unknown	-	2014	
9	Bike It Officer	Promoting Travel Alternatives	Promotion of cycling	WBC		2014		N/A	Implementation	2014	
10	Cycle Road shows	Promoting Travel Alternatives	Promotion of cycling	WBC		2014		N/A	Implementation	2014	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
11	Cycle promotion video	Promoting Travel Alternatives	Promotion of cycling	WBC	Complete	2014	100000 views on youtube	N/A	Implementation	2014	
12	Plough Lane New Footway	Transport Planning and Infrastructure	Other	WBC		2014	7.4% increase in walking activity compared to base year 3700 residents involved with Beat the Street and walked 55,000 miles in a round the world challenge	N/A	Implementation	2014	
13	Barn Manor New footway	Transport Planning and Infrastructure	Other	WBC		2014		N/A	Implementation	2014	
14	Reading Road, new pedestrian islands	Transport Planning and Infrastructure	Other	WBC		2014		Yes – unknown	Implementation	2014	
15	Rushy Way Pedestrian signal upgrade	Transport Planning and Infrastructure	Other	WBC		2014		N/A	Implementation	2014	
16	Active Travel Officer	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC		2014		Yes – unknown	Implementation	2014	
17	Community Walking Challenge	Promoting Travel Alternatives	Personalised Travel Planning	WBC		2014		Yes – unknown	Implementation	2014	
18	Beat the Street (Walking 2000 residents)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC		2014		Yes – unknown	Implementation	2014	
19	New walking & Cycle mapping	Public Information	Via leaflets	WBC		2014		Yes – unknown	Implementation	2014	
19	Wokingham Town Personal Travel Planning (4000 residents)	Promoting Travel Alternatives	Personalised Travel Planning	WBC		2014	10% reduction in Car trips in Woosehill & Emmbrook	Yes – unknown	Completed 2015	2014	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
20	Wokingham Travel Smart Phone app	Promoting Travel Alternatives	Personalised Travel Planning	WBC		2014	10% reduction in Car trips in Wooeshill & Emmbrook	Yes – unknown	Implementation	2014	
21	Job Seekers Personal Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	WBC		2014		Yes – unknown	Implementation	2014	
22	Business Travel Planning	Promoting Travel Alternatives	Workplace Travel Planning	WBC		2014		Yes – unknown	Implementation	2014	
23	Commuter Challenge	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC		2014	4 tonnes of CO2 saved	Yes – unknown	Implementation	2014	
24	Showcase Cinema - Traffic signal Upgrades	Traffic Management	Testing Vehicle Emissions	WBC		2014	7% increase in the average speed of vehicles travelling along A329 corridor	Yes – unknown	Implementation	2014	
25	Traffic Signal improvement	Traffic Management	UTC, Congestion management, traffic reduction	WBC		2014	7% increase in the average speed of vehicles travelling along A329 corridor	Yes – unknown	Implementation	2014	
26	Nine Mile Ride - New bus stops	Transport Planning and Infrastructure	Bus route improvements	WBC		2014		N/A	Implementation	2014	
27	Bus shelter replacement	Transport Planning and Infrastructure	Bus route improvements	WBC	Complete	2014	14% increase in bus patronage along A329 corridor	Yes – unknown	Implementation	2014	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
28	Station Travel plans	Promoting Travel Alternatives	Promote use of rail and inland waterways	WBC	Complete	2014	On average 4% increase in passenger numbers	Yes – unknown	Implementation	2014	
29	Micro Park and Rides	Alternatives to private vehicle use	Bus based Park & Ride	WBC	TBA	2014	TBA	N/A	Implementation	2014	
30	Winnersh Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	WBC	Complete	2014	Data not yet available	Yes – unknown	Implementation	2014	
31	Mereoak Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	WBC	Complete	2014	Data not yet available	Yes – unknown	Opened October 2015	2014	
32	Website development	Public Information	Via the internet	WBC		2014	18,000 visits up to end of 2014	N/A	Implementation	2014	
33	Coms & PR	Public Information	Via the internet	WBC		2014	0ver 100,000 views on youtube for My Journey promotional videos	N/A	Implementation	2014	
34	Electric vehicle charging points	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	WBC		2014	Data not available	Yes - unknown	All installed	2014	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
35	Thames Valley Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	WBC	Ongoing	2016	TBA	N/A	Planning Stage	TBC	
36	East Reading Mass rapid transit - bridge	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	WBC	Ongoing	2016	TBA	Yes - unknown	Planning Stage	TBC	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
38	North Wokingham Distributor road	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	WBC	Ongoing	2016	TBA	Yes - unknown	Planning Phase	TBC	
39	South Wokingham Distributor road	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	WBC	TBA	2016	TBA	Yes - unknown	Planning Phase	Phase 1 by 2018	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
41	Shinfield Eastern Relief Road	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	WBC		Complete Open Summer 2016`	TBA	N/A	Implementation	2016	

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

As detailed in Policy Guidance LAQM.PG16 (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.

Wokingham Borough Council is taking the following measures to address $PM_{2.5}$:

1. The Health and Wellbeing Strategy (2014-2017) and the Public Health Work Plan (in development) both include several actions to increase walking and cycling in order to encourage and increase active travel and reduce obesity and inactivity in the borough. This will lead to a decrease in shorter car trips thus also reducing vehicle pollutants including $PM_{2.5}$.
2. As part of the Heatwave Plan for England and the heat-health watch system Public Health will send messages to at-risk groups to provide advance warnings for hot weather and severe heatwaves along with the associated harm to health (including poorer air quality) and relevant public health protection plans.
3. For 2016 the joint action plan between Public Health and Environmental Health for air quality will consider in detail how Wokingham Borough will be considering the impact on $PM_{2.5}$ throughout the district and its reduction. It is likely that a marketing plan will be set up to raise awareness of how air quality (which includes $PM_{2.5}$) can be improved such as active travel and the uptake of electric vehicles.
4. Work in implementing the actions in the Local Transport Plan and the Local Development Framework Core Strategy. For example, a new housing development might contribute to alterations to nearby junctions to increase capacity whilst also improving cycle and pedestrian links, provision of electric vehicle charging infrastructure, contributing to bus services so that the site is served by public transport and linking many other measures together in a site travel plan to encourage people to choose sustainable travel.

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 the Objectives.

Wokingham Borough Council undertook automatic (continuous) monitoring at two sites during 2015. One of these sites is located on Old Whitley Wood Lane in Shinfield within the M4 AQMA. The second is located on Peach Street within the Wokingham Town Centre AQMA. Table A.1 in Appendix A shows the details of the sites. NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem. National monitoring results are available at https://uk-air.defra.gov.uk/data/exceedence.

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

Wokingham Borough Council undertook non-automatic (passive) monitoring of NO_2 at sixty-three sites during 2015. Table A.2 in Appendix A shows the details of these sites. One of the sites was a co-location study for the whole year at the automatic monitoring unit within the M4 AQMA. Another site was a co-location study for the final four months of the year at the automatic monitoring unit within the Wokingham Town Centre AQMA. A triplicate monitoring site was also established within the Twyford Town Centre AQMA.

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

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

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

Automatic Monitoring Data

No exceedences of the 40µg/m^3 annual mean nitrogen dioxide objective were recorded in 2015.

Whitley Wood Lane, Shinfield

The annual mean NO_2 concentration of 33.50µg/m^3 recorded by the Whitley Wood Lane automatic monitoring unit shows that within the M4 AQMA, NO_2 levels have been recorded below both the objective level and below the level of concern (i.e. >36µg/m^3 - the contour on which the AQMA was declared). This is third year that monitoring has been carried out for a full calendar year at this site and the annual mean concentration for 2015 is lower than the mean concentration for the monitoring carried out in 2014 (36.9µg/m^3) and 2013 (35µg/m^3). No exceedances of the 200µg/m^3 hourly mean objective were recorded. Hourly levels ranged from 0.6 to 159.1µg/m^3 and monthly levels ranged from 26 to 46µg/m^3.

The data capture rate for the unit was very good for the calendar year 2015 with a rate of 97.4% being achieved. The site developed a communication fault on 23rd January and was believed to be repaired on 27th January. The fault re-occurred on 29th January and was resolved on 2nd February. Data was lost between both

periods. An independent site audit was carried out on 18th August and the NOx analyser passed all sections of the audit with no problems identified. The diffusion tube results correlate well with the real time analyser.

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Wokingham

An annual mean NO_2 concentration of 35.04µg/m^3 was recorded by the Wokingham automatic monitoring unit in 2015. This shows that within the Wokingham Town Centre AQMA, NO_2 levels were also recorded below the level of concern. Monitoring however was only carried out for a four month period commencing in September thus missing the worst of the winter and summer months which typically see higher concentrations of NO_2. The monitoring data has been annualised in accordance with guidance in the LAQM.TG(16) but the predicted annual mean concentration should be treated with caution. No exceedances of the 200µg/m^3 hourly mean objective were recorded. Hourly levels ranged from 1.3 to 149.7µg/m^3 and monthly levels ranged from 26 to 46µg/m^3. The monthly results are all consistently near the objective limit indicating that this site may breach the objective limit for the calendar year. The average monthly NO_2 concentrations recorded both on the continuous monitoring unit and diffusion tubes are consistent with each other apart from December when the concentrations on the continuous monitoring unit are lower.

The data capture rate was very good for the monitoring period where the equipment was operational at a rate of 99.1% being achieved. An independent site audit was not carried out on the unit in 2015 as monitoring only took place for four months at the end of the calendar year. An independent audit has been carried out in May 2016 which is within 12 months of the site being set up and monitoring commencing.

Diffusion Tube Data

The annual mean objective of 40 µg/m³ was exceeded at six of the sixty-three monitoring sites in 2015. Five of the six exceedances were recorded within the existing AQMAs. All mean concentrations were less that 60µg/m^3 which therefore does not indicate any exceedance of the 1-hour objective.

M4 AQMA

There were thirteen diffusion tubes at eleven monitoring sites within the AQMA in 2015. One of the sites was a co-location study for the whole year at the Whitley Wood Lane automatic monitoring unit. Within the AQMA the overall trend from 2014 to 2015 is a decrease in annual mean NO_2 in eight of the thirteen monitoring sites. Annual mean NO_2 remained the same at one monitoring site and increased at two.

The annual mean objective of 40µg/m³ was exceeded at one monitoring site within the AQMA in 2015. A concentration of 42µg/m³ was recorded at WOK861 (Mill Lane, Sindlesham) where Mill Lane passes beneath the M4 in Sindlesham. A single-lane bridge is located on Mill Lane approximately 50m north of the M4 resulting in north-facing traffic queuing beneath the motorway and backing up along Mill Lane. These queues can be significant during peak commuting hours. A mean concentration of 42µg/m³ was recorded at this location during 2015 but it is not representative of relevant exposure. Further evaluation has therefore been undertaken of this exceedance using the NO_2 Fall Off Calculator to calculate a predicted value for the façade of Waterside, Mill Lane, the nearest receptor in proximity to the tube. The NO_2 calculator predicted a mean concentration of 28.9µg/m³ at the façade of the identified receptor. This is below the objective value. A copy of the NO_2 calculator is included in Appendix C.

The level of concern (i.e. ≥ 36 µg/m^3 – the contour on which the M4 AQMA was declared) was exceeded at three monitoring sites within the AQMA in 2015 including:

- WOK836 - 343 Old Whitley Wood Lane, Whitley;
- WOK841 - Lane End Villas, Shinfield; and
- WOK860 – one of the triplicate co-located tubes at the Whitley Wood Lane, Whitley automatic monitoring unit.

WOK 836 (343 Old Whitely Wood Lane, Whitley) is located close to the northern extent of the AQMA on the boundary between Wokingham and Reading Borough. The tube is primarily positioned to monitor vehicle emissions from the B3270 and M4 29m to the south but it will also be influenced by vehicle emissions along Whitley Wood Lane 38m west of the site. Queuing is a problem along Whitley Wood Lane particularly during peak commuting hours. The location of WOK836 is not representative of relevant exposure. Further evaluation has therefore been undertaken of this exceedance using the NO_2 Fall Off Calculator to calculate a

predicted value for the façade of 343 Old Whitely Wood Lane, the nearest receptor in proximity to the tube. A mean concentration of 38µg/m³ was recorded at this site during 2015. The NO_2 calculator predicted a mean concentration of 30.6 µg/m³ at the façade of the identified receptor. This is below the level of concern. A copy of the NO_2 calculator is included in Appendix C. A new monitoring site was set up on Whitley Wood Lane in 2016 to assess the potential for elevated NO_2 levels at receptors that are not currently being monitored on this road. The results of this monitoring will be reported in the 2017 Annual Status Report.

WOK841 (Lane End Villas, Shinfield) is located along the A327 just south of where the road passes over the M4 motorway. The site was identified as an area of concern in 2012, 2013 and 2014 as exceedances of the NO_2 annual mean objective had been recorded here. However, a mean concentration of 39µg/m³ was recorded at this monitoring site during 2015 and this is also not representative of relevant exposure. Further evaluation has therefore been undertaken of this exceedance using the NO_2 Fall Off Calculator to calculate a predicted value for the façade of 2 Lane End Villas, the nearest receptor in proximity to the tube. The NO_2 calculator predicted a mean concentration of 34 µg/m³ at the façade of the identified receptor which is below the level of concern. A copy of the NO_2 calculator is included in Appendix C. A new motorway bridge was opened in Shinfield in July 2016 as part of the Shinfield Eastern Relief Road Scheme. This will permanently re-direct all vehicles except buses away from the part of the A327 where WOK841 is located which will significantly reduce NO_2 levels at this receptor even further.

WOK860 is one of the triplicate co-located tubes on the Whitley Wood Lane automatic monitoring unit. This monitoring site recorded a mean concentration of 37µg/m³ in 2015. This is not representative of relevant exposure. Further evaluation has therefore been undertaken of this exceedance using the NO_2 Fall Off Calculator to calculate a predicted value for the façade of 312 Old Whitely Wood Lane, the nearest receptor in proximity to the tube. The NO_2 calculator predicted a mean concentration of 36.4µg/m³ at the rear façade of the property which marginally exceeds the level of concern. A copy of the NO_2 calculator is included in Appendix C.

Monitoring continues in 2016 at all eleven sites and the new site on Whitley Wood Lane. If the levels continue to decrease the AQMA could be revoked during 2017.

Wokingham Town Centre AQMA

There were eleven diffusion tubes at nine monitoring sites within the Wokingham Town Centre AQMA in 2015. One site was a co-location study for the final four months of the year at the Wokingham automatic monitoring unit. Four of the monitoring sites were newly established in 2015. For the five other sites within the AQMA from 2014 to 2015 annual mean NO_2 remained the same at one monitoring site, decreased at three sites and increased at one site. The annual mean objective of 40µg/m³ was exceeded at two monitoring sites within the AQMA in 2015 including:

- WOK839 Peach Street, Wokingham; and
- WOK844 Giggling Spring, Shute End.

WOK839 is located on Peach Street in Wokingham close to the automatic monitoring unit. A mean concentration of 43µg/m³ was recorded at this site in 2015 but this is not representative of relevant exposure. Further evaluation has therefore been undertaken of this exceedance using the NO_2 Fall Off Calculator to calculate a predicted value for the façade of 27 Peach Street, the nearest receptor in proximity to the tube. The NO_2 calculator predicted a mean concentration of 34.5µg/m³ at the façade of the property which is below the objective level. It should be noted however than data capture for this monitoring site was only 50% and, whilst the mean concentration has been annualised, the result should be treated with caution. A copy of the NO_2 calculator is included in Appendix C.

WOK844 is located on the A329 along Shute End in Wokingham towards the eastern boundary of the AQMA. A mean concentration of 43µg/m³ was recorded at this site in 2015 and this is representative of relevant exposure.

NO_2 concentrations at the majority of monitoring locations within the AQMA were significantly lower than those recorded in previous years, most notably WOK844 (Buckingham Court, Wiltshire Road) which recorded an annual mean concentration of 39µg/m^3 in 2015 compared to 50µg/m³ in 2014 and 47µg/m³ in 2013. Station Road was closed for a period of 3 months from 09/02/15 to 02/05/15 in relation to the carriageway works for the Station Link Road Scheme and this will have significantly altered traffic flow along the A329. This forms the majority of the AQMA and the one-way route through Wokingham Town Centre. In November 2015 there were also 20 days of complete road closures on London Road from the junction with Peach Street

and Wiltshire Road to Coppid Beech Roundabout, and 13 days of complete road closures on Peach Street. Both closures were for resurfacing works and will have caused significant reductions in vehicle movements and emissions along Wiltshire Road.

Twyford Town Centre AQMA

There were six diffusion tubes in four monitoring sites within the Twyford Town Centre AQMA in 2015. One of these sites was a triplicate monitoring location. Two of these monitoring sites were newly established in 2015. For the two other sites within the AQMA from 2014 to 2015 annual mean NO_2 decreased. The annual mean objective of 40µg/m³ was exceeded at one monitoring site within the AQMA in 2015. This included WOK850 which is located on 19 High Street, Twyford which is representative of relevant exposure. An annual mean concentration of 46µg/m³ was recorded at this location in 2015.

Outside of the AQMAs

There were thirty-eight monitoring sites outside of the AQMAs in 2015. Four of these sites were newly established in 2015. For the other thirty-four sites outside of the AQMA from 2014 to 2015 annual mean NO_2 decreased at twenty-seven sites, increased at four sites and remained the same at three sites. The annual mean objective of 40µg/m³ was exceeded at one monitoring site (WOK 864 Waltham Road, Twyford) outside of the existing AQMAs in 2015. This location is just to the south of Twyford Town Centre crossroads close to the junction of Church Street, Waltham Road and Station Road. It is also located approximately 22m east of the south-eastern boundary of the Twyford Town Centre AQMA. A mean concentration of 42µg/m³ was recorded at this location during 2015. This monitoring location is located on the side façade of 1 Station Road and is therefore representative of relevant exposure. The Twyford AQMA boundary may therefore need to be amended and this will be investigated later this year.

3.2.2 Particulate Matter (PM10)

No PM_{10} monitoring has been undertaken in Wokingham Borough.

PM_{10} monitoring was discontinued at the former Woodward Close automatic monitoring site in 2011 as monitoring over the past several years demonstrated that PM_{10} concentrations are well below both objective values in the borough and are declining at a steady rate.

3.2.3 Particulate Matter (PM2.5)

No monitoring of $PM_{2.5}$ has been undertaken in Wokingham Borough. However, the background data (source: www.air.defra.gov.uk/dataarchive/maps2011) available for 2015 shows that the range of annual mean $PM_{2.5}$ is generally between 11-13 µg/m^3. The 3 highest levels can be found at:

- 13.70 µg/m^3 at 480500 171500 (north-east of the M4 Junction 10 within). This is located within the M4 AQMA;
- 13.4 ug/m^3 at 481500 172500 (Thames Valley Business Park); and
- 13.14 µg/m^3 at 474500 174500 (South-east of Hurst). This is located close to the norh-west boundary of the M4 AQMA.

3.2.4 Sulphur Dioxide (SO2)

No SO_2 monitoring has been undertaken in Wokingham Borough.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Whitley Wood Lane, Shinfield	Roadside	472542	168697	NO_2	Yes	Chemiluminescent	2	18.31	1.5
CM2	Wokingham	Roadside	481348	168603	NO_2	Yes	Chemiluminescent	3	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 (I) – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WOK11	Robin Hood Lane, Winnersh	R	478133.1	170598.6	NO_2	No	4	2.38	No	2.30
WOK19	Thames Street (by bridge), Sonning	R	475583.0	175704.0	NO_2	No	22	2.00	No	2.25
WOK52	Westende Flats, London Rd, Wokingham	UC	481521.4	168749.9	NO_2	No	3	1.94	No	2.35
WOK53	Dunt Lane, Hurst	R	479770.5	171088.4	NO_2	Yes	28	1.19	No	2.00
WOK57	Bill Hill Park, Hurst	R	480170.8	170885.6	NO_2	No	10	0.51	No	2.40
WOK63	7 Tickhill Close, Lower Earley	S	473870.1	169456.0	NO_2	No	0	9.14	No	2.35
WOK70	Longdon Road, Winnersh	R	478011.0	170134.8	NO_2	Yes	25	1.70	No	2.35
WOK71	King St Lane, Winnersh	R	477907.0	170190.7	NO_2	No	20	3.10	No	2.40
WOK98	309 Reading Rd, Winnersh	R	478611.6	170224.8	NO_2	Yes	0	11.75	No	1.65
WOK503	Rainworth Close, Lower Earley	S	474251.2	169682.8	NO_2	No	3	0.53	No	2.10
WOK505	Church Road, Earley	R	474443.6	172062	NO_2	No	10	1.80	No	2.15
WOK509	Henley Bridge, Remenham	R	476413.7	182648.0	NO_2	No	7	4.70	No	2.30
WOK601	Sadlers Lane, Winnersh	R	478815.0	170068.0	NO_2	No	15	1.45	No	1.90
WOK602	Green Lane, Winnersh	R	478738.5	170106.6	NO_2	Yes	3	1.65	No	1.65

(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.2 (II) – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WOK605	Outside 33 King Street, Winnersh	R	478006.8	170300.9	NO_2	No	13	2.16	No	2.20
WOK802	36 Station Rd, Wokingham	R	480675.4	168646.5	NO_2	No	0	8.57	No	2.30
WOK803	3 Wellington Rd, Wokingham	R	480650.7	168543.8	NO_2	No	3	1.12	No	2.30
WOK804	Oxford Rd, Wokingham	R	480583.0	168622.0	NO_2	No	18	1.60	No	2.30
WOK805	18 Barkham Rd, W'ham	R	480547.0	168543.0	NO_2	No	0	5.68	No	1.90
WOK808	Kings Place, Station Rd, Wokingham	R	480807.1	168743.0	NO_2	No	0	4.45	No	2.30
WOK817	Outside 398 London Rd, Wokingham	R	483227.1	168801.7	NO_2	No	11.5	2.10	No	2.20
WOK824	High Street North, Wargrave	R	478510.7	178475.8	NO_2	No	0	1.96	No	2.30
WOK825	High Street South, Wargrave	R	478541.1	178634.7	NO_2	No	0	2.20	No	2.10
WOK827	Station Road, Twyford	K	479047.8	175831.9	NO_2	No	3	1.00	No	2.30
WOK829	Thames St, Sonning	R	475806.4	175577.4	NO_2	No	0	1.70	No	2.30
WOK831	May's Lane, Earley	R	474660.1	172329.3	NO_2	No	4	2.27	No	2.30
WOK835	14 Robinhood Lane, Winnersh	R	478192.8	170672.0	NO_2	No	8	1.52	No	2.20

(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.2 (III) – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WOK836	343 Old Whitley Wood Lane, Shinfield	R	472321	168688	NO_2	Yes	7.5	1.21	No	2.30
WOK838	Giggling Spring, Shute End, Wokingham	R	480979	168979	NO_2	Yes	0	2.81	No	2.30
WOK839	Peach Street, Wokingham	R	481343	168597	NO_2	Yes	4.2	1.10	No	2.50
WOK840	30 Finbeck Way, Lower Earley	S	474073	169545	NO_2	No	0	18.4	No	1.70
WOK841	Lane End Villas, Shinfield	R	473128	168776	NO_2	Yes	4.5	3.20	No	2.40
WOK842	Foxglade, Brookers Hill, Shinfield	O	472739	168658	NO_2	Yes	0	35.5	No	1.60
WOK844	Buckingham Court, Wokingham	R	481492	168775	NO_2	Yes	1.32	1.21	No	2.40
WOK845	16 Mayfields, Sindlesham	R	477404	170074	NO_2	Yes	0	21.1	No	1.40
WOK846	4 Hatch Farm Cottages, Sindlesham	R	477135	170020	NO_2	Yes	0	39.0	No	7.75
WOK847	Wellness Clinic, High St, Wargrave	R	478537	178606	NO_2	No	0	1.2	No	2.25
WOK848	Traffic Lights, 74 High St, Wargrave	R	478517	178580	NO_2	No	0	3.00	No	2.30
WOK850	19 High St, Twyford	R	478738	175986	NO_2	Yes	0.30	1.20	No	2.35
WOK852	Mereoak Caravan Park	R	471421	168393	NO_2	No	0	14.43	No	1.90
WOK853	Shefford Cr, Wokingham	UB	481630	169586	NO_2	No	N/A	46.54	No	2.35

(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.2 (IV) – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WOK854	The Manor, Shinfield	UB	473100	168220	NO_2	No	N/A	25.0	No	2.40
WOK855	Westminster Way, LE	UB	475132	170363	NO_2	No	N/A	39.0	No	2.40
WOK857	Rectory Rd, Wokingham	R	481044	168733	NO_2	Yes	0	2.0	No	.2.40
WOK858	Whitley Wood Unit 1	R	472542	168697	NO_2	Yes	1.4	18.31	Yes	1.40
WOK859	Whitley Wood Unit 2	R	472542	168697	NO_2	Yes	1.4	18.31	Yes	1.40
WOK860	Whitley Wood Unit 3	R	472542	168697	NO_2	Yes	1.4	18.31	Yes	1.40
WOK861	Mill Lane (new by bridge)	R	476981	170120	NO_2	Yes	12.6	1.0	No	1.80
WOK862	Marsh Mills Cottage, Remenham	R	477373	181811	NO_2	No	0	1.69	No	2.40
WOK863	3 Wargrave Rd, Twyford	R	478768	176012	NO_2	Yes	1.95	0.94	No	2.35
WOK864	Waltham Rd, Twyford	R	478891	175942	NO_2	No	0	3.44	No	2.35
WOK865	13 Langborough Rd, Wokingham	R	481159	168275	NO_2	No	0	3.06	No	2.30
WOK866	58 Denmark St, Wokingham,	R	481033	168300	NO_2	No	0	5.14	No	1.80
WOK867	21 Denmark Street, Wokingham	R	481104	168444	NO_2	Yes	0.52	1.45	No	2.50
WOK868	59 London Road, Wokingham	R	481639	168796	NO_2	Yes	3.30	1.4	No	2.45

(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.2 (v) – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
WOK869	Muille, 26 High Street, Twyford	R	478681	175998	NO_2	No	0.48	0.54	No	2.45
WOK870	Hunt & Nash, Church Street, Twyford	R	478813	175975	NO_2	Yes	0	1.93	No	2.50
WOK871	15 London Road, Twyford 1	R	478829	176023	NO_2	Yes	0.80	1.66	No	2.45
WOK872	Registry Office, Reading Road, Wokingham	R	480816	168793	NO_2	Yes	0.30	2.62	No	2.35
WOK873	27 The Terrace, Wokingham	R	480863	168787	NO_2	No	0	0	No	2.50
WOK874	Broad Street, Wokingham	R	481027	168721	NO_2	Yes	1.76	1.13	No	2.35
WOK875	15 London Road, Twyford 2	R	478829	176023	NO_2	Yes	0.80	1.66	No	2.45
WOK876	15 London Road, Twyford 3	R	478829	176023	NO_2	Yes	0.80	1.66	No	2.45
WOK877	Almshouses, London Road, Twyford	R	478903	176060	NO_2	No	1.76	3.27	No	2.45
WOK878	17 Wargrave Road, Twyford	R	478719	176099	NO_2	No	4.25	2.06	No	2.40
WOK879	Peach Street Unit 1	R	481348	168603	NO_2	Yes	3.00	1.5	Yes	1.40
WOK880	Peach Street Unit 2	R	481348	168603	NO_2	Yes	3.00	1.5	Yes	1.40
WOK881	Peach Street Unit 3	R	481348	168603	NO_2	Yes	3.00	1.5	Yes	1.40

(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 (i) – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2011	2012	2013	2014	2015
CM1	R	Automatic	97.4	97.4	-	-	35	36.9	33.50
CM2	R	Automatic	99.1	29.6	-	-	-	-	35.04
WOK11	R	Diffusion Tube	100	100	37	35	35*	36	32
WOK19	R	Diffusion Tube	100	100	29	28	27	25	27
WOK52	UC	Diffusion Tube	100	100	**40**	38	38	36	33
WOK53	R	Diffusion Tube	92	92	29	32	28	30	27
WOK57	R	Diffusion Tube	100	100	24	23	25	23	21
WOK63	S	Diffusion Tube	83	83	30	26	27	27	25
WOK70	R	Diffusion Tube	83	83	37	34	36	33	29
WOK71	R	Diffusion Tube	100	100	39	36	37	37	33
WOK98	R	Diffusion Tube	100	100	36	35	33	32	32
WOK503	S	Diffusion Tube	83	83	36	33	32	32	31
WOK505	R	Diffusion Tube	100	100	**41**	**41**	**42**	37	38
WOK509	R	Diffusion Tube	83	83	28	29	27	28	27
WOK601	R	Diffusion Tube	100	100	27	30	32	25	25
WOK602	R	Diffusion Tube	100	100	29	28	31	27	28
WOK605	R	Diffusion Tube	100	100	**43**	38	38	35	31
WOK802	R	Diffusion Tube	100	100	31	29	30	27	20
WOK803	R	Diffusion Tube	100	100	34	35	33	31	28

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

$_2$ annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

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

NO (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.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.3 (ii) – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
WOK804	R	Diffusion Tube	92	92	36	33	37	31	21
WOK805	R	Diffusion Tube	100	100	30	30	29	26	24
WOK808	R	Diffusion Tube	92	92	32	30	31	29	21
WOK817	R	Diffusion Tube	92	92	37	36	38	35	29
WOK824	R	Diffusion Tube	83	83	34	34	33	32	30
WOK825	R	Diffusion Tube	100	100	39	**40**	38	37	35
WOK827	K	Diffusion Tube	100	100	29	28	28	27	27
WOK829	R	Diffusion Tube	100	100	36	37	34	31	31
WOK831	R	Diffusion Tube	100	100	29	32	31	28	25
WOK835	R	Diffusion Tube	75	75	32	36	33	32	33
WOK836	R	Diffusion Tube	100	100	-	**42**	39	**42**	38
WOK838	R	Diffusion Tube	100	100	-	**55**	**57**	**51**	**43**
WOK839	R	Diffusion Tube	50	50	-	**44**	**44**	**41**	**41**
WOK840	S	Diffusion Tube	100	100	-		26	27	24
WOK841	R	Diffusion Tube	92	92	-	**52**	**48**	**42**	39
WOK842	R	Diffusion Tube	100	100	-		31	27	26
WOK844	R	Diffusion Tube	92	92	-	**47**	**50**	**46**	39
WOK845	R	Diffusion Tube	100	100	-		30	26	26
WOK846	R	Diffusion Tube	100	100	-		31	26	27

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Notes: Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in **bold**.

NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in **bold and underlined**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.3 (iii) – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
WOK847	R	Diffusion Tube	100	100	-		40	38	34
WOK848	R	Diffusion Tube	92	92	-		32	31	29
WOK850	R	Diffusion Tube	100	100	-	**51**	**57**	**54**	**46**
WOK852	R	Diffusion Tube	83	83	-		25	23	20
WOK853	UB	Diffusion Tube	83	83	-40		19	18	15
WOK854	UB	Diffusion Tube	75	75	-31		19	17	16
WOK855	UB	Diffusion Tube	67	67	-		17	15	16
WOK857	R	Diffusion Tube	100	100	--	-	**52**	**52**	**41**
WOK858	R	Diffusion Tube	100	100	--		37	36	35
WOK859	R	Diffusion Tube	100	100	--		37	37	35
WOK860	R	Diffusion Tube	83	83	--		37	37	37
WOK861	R	Diffusion Tube	100	100	-	-	**48**	**45**	**42**
WOK862	R	Diffusion Tube	100	100	--		-	27	24
WOK863	R	Diffusion Tube	100	100	--		-	38	35
WOK864	R	Diffusion Tube	83	83	--	-	**-**	**41**	**42**
WOK865	R	Diffusion Tube	83	83	-		-	27	26
WOK866	R	Diffusion Tube	92	92	--		-	34	31
WOK867	R	Diffusion Tube	92	92	--		-	**-**	28

Notes: Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in **bold.**

NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in **bold and underlined.**

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.3 (iv) – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
WOK868	R	Diffusion Tube	100	100	-		-	-	31
WOK869	R	Diffusion Tube	100	100	-		-	-	32
WOK870	R	Diffusion Tube	100	100	-		-	-	33
WOK871	R	Diffusion Tube	100	100	-		-	-	32
WOK872	R	Diffusion Tube	58	58	--		-	-	32
WOK873	R	Diffusion Tube	100	100	--		-	-	24
WOK874	R	Diffusion Tube	58	58	--		-	-	23
WOK875	R	Diffusion Tube	100	67	--		-	-	31
WOK876	R	Diffusion Tube	100	67	--		-	-	32
WOK877	R	Diffusion Tube	100	67	--		-	-	27
WOK878	R	Diffusion Tube	100	67	--		-	-	28
WOK879	R	Diffusion Tube	100	33	--		-	-	38
WOK880	R	Diffusion Tube	100	33	--		-	-	36
WOK881	R	Diffusion Tube	100	33	--		-	-	38

Notes: Exceedances of the NO2 annual mean objective of 40µg/m3 are shown in **bold.**

NO2 annual means exceeding 60µg/m3, indicating a potential exceedance of the NO2 1-hour mean objective are shown in **bold and underlined**.

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2011	2012	2013	2014	2015
CM1	Roadside	Automatic	97.4	97.4	**-**	-	0 (101)	0	0
CM2	Roadside	Automatic	99.1	29.6	-	-	-	**-**	0 (126.82)

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 (i) – 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)
WOK11 Robinhood Lane, Winnersh	35.5	39.1	38.7	31.7	28.0	29.2	34.4	36.4	36.9	33.5	33.5	34.7	34.3	32
WOK19 Thames Street, Sonning	31.2	35.0	24.4	26.0	26.3	24.7	28.7	26.9	29.4	31.7	31.5	30.4	28.8	27
WOK52 Westende Flats, Peach St	**40.6**	**47.7**	32.8	31.6	24.7	26.4	30.8	34.1	**44.3**	**46.9**	27.7	38.2	35.5	33
WOK53 Dunt Lane, Hurst	34.2	35.4	27.4	31.1	24.4	22.1	24.5	30.0	27.6	29.4	-	35.3	29.2	27
WOK57 Forest Road, Hurst	32.6	31.3	26.4	22.6	17.5	18.5	16.8	20.2	23.6	24.8	21.5	18.9	22.9	21
WOK63 7 Tickhill Close, L Earley	-	36.7	26.5	30.6	22.9	19.4	23.1	24.2	28.0	26.5	-	32.0	27.0	25
WOK70 Longdon Rd, Winnersh	34.5	36.7	34.2	26.8	-	26.0	30.1	33.1	--	29.3	29.9	34.1	31.5	29
WOK71 King St Lane, Winnersh	36.6	**41.0**	**40.8**	34.5	29.5	29.0	35.5	39.8	36.6	38.5	32.1	36.3	35.8	33
WOK98 309 Reading Road	39.6	38.8	32.0	31.8	28.3	29.8	32.7	32.6	35.4	35.8	34.3	**41.9**	34.4	32
WOK503 Rainworth Close, B3270	38.2	42.7	33.4	29.9	28.8	25.0	30.9	33.9	32.1	-	-	36.6	33.1	31
WOK505 Church Road	**44.5**	**45.8**	**42.2**	**40.1**	35.3	36.1	38.2	**44.2**	**43.1**	**49.0**	35.3	39.3	**41.1**	38
WOK509 Whitehill, Remenham	32.4	30.9	29.2	27.3	26.3	-	30.3	30.2	29.7	29.4	29.1	24.8	29.0	27

(1) See Appendix C for details on bias adjustment

Table B.1 (ii) – 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)
WOK601 Sadlers Lane, Wokingham	32.6	30.4	33.9	30.5	22.2	20.8	18.8	27.2	33.9	38.9	17.8	13.1	26.7	25
WOK602 Green Lane	39.7	35.1	35.3	30.5	23.4	25.2	30.4	43.8	37.0	34.2	18.2	12.2	30.4	28
WOK605 King St, o/s 33	33.8	38.8	36.7	34.3	26.8	27.4	30.6	34.0	36.8	36.2	29.2	32.1	33.1	31
WOK802 36 Station Road	33.4	26.0	22.1	21.7	17.6	16.0	16.9	19.7	23.7	27.0	20.2	17.3	21.8	20
WOK803 3 Wellington Road	39.5	27.0	27.1	29.6	24.5	24.6	24.3	31.0	32.8	39.1	29.4	34.3	30.2	28
WOK804 Oxford Road	24.2	28.0	25.0	14.8	20.2	17.6	18.0	23.8	25.8	28.9	-	19.8	22.4	21
WOK805 18 Barkham Road	30.6	26.6	27.4	29.5	23.5	21.1	22.1	26.8	28.6	31.0	21.9	22.7	26.0	24
WOK808 Kings Church Station Rd	38.1	29.2	19.0	21.6	16.4	16.2	15.2	20.1	23.5	27.4	-	17.4	22.2	21
WOK817 London Rd (298)	35.1	36.5	-	33.5	30.6	27.8	26.9	31.4	32.2	35.3	28.3	24.3	31.1	29
WOK824 100 High St (south)	39.8	37.4	32.9	-	31.7	-	30.3	30.7	32.9	33.3	26.8	26.1	32.2	30
WOK825 54 High St (north)	**45.9**	**44.1**	**43.8**	38.0	33.8	32.0	38.9	39.4	37.7	34.0	34.6	32.0	37.8	35
WOK827 Station Rd, Twyford	34.0	32.3	26.9	26.4	26.3	23.6	27.1	28.4	26.6	29.2	33.7	29.4	28.7	27
WOK829 Thames St	32.2	37.5	36.9	39.2	34.9	33.0	29.4	31.4	31.2	36.9	30.3	25.7	33.2	31

(1) See Appendix C for details on bias adjustment

Table B.1 (iii) – NO2 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)
WOK831 May's Lane	36.9	30.8	31.0	28.8	16.7	21.2	21.7	29.9	33.9	22.4	23.8	21.9	26.6	25
WOK835 14 Robinhood Lane	37.4	38.7	-	33.0	-	26.2	-	32.4	38.2	**42.6**	31.0	35.3	35	33
WOK836 343 Old Whitley Wood Ln	**44.6**	**47.4**	34.0	36.3	34.1	38.6	**47.0**	**44.8**	38.3	34.4	**46.9**	**42.6**	**40.7**	38
WOK838 Giggling Spring, Shute End	**70.4**	**49.5**	**54.3**	**48.5**	36.3	39.1	36.0	**44.6**	**60.1**	**54.4**	34.4	33.4	**46.8**	**43**
WOK839 Peach St	-	36.0	-	**52.4**	30.2	31.3	37.0	43.1	-	-	-	-	38.3	36
WOK840 30 Finbeck Way	28.2	30.2	24.8	27.6	22.2	17.1	23.3	26.4	26.7	25.6	26.3	30.7	25.7	24
WOK841 Lane End Villas	**53.0**	**-**	**45.0**	**40.6**	37.3	34.8	**42.5**	**42.4**	**42.3**	**48.4**	36.2	38.9	**41.9**	39
WOK842 Foxglade, Brookers Hill	33.9	33.3	33.7	31.3	26.7	25.6	24.6	28.7	28.1	34.9	22.2	14.2	28.1	26
WOK844 Buckingham Court	48.0	39.2	59.3	44.7	36.1	33.4	30.7	38.9	54.2	41.0	35.7	38.4	**41.6**	39
WOK845 16 Mayfields, Sindlesham	31.1	34.1	36.5	31.5	25.9	25.6	21.1	28.1	35.2	35.3	19.5	12.6	28	26
WOK846 4 Hatch Farm Cottages	35.0	39.2	36.7	33.9	26.0	27.4	24.0	29.4	33.1	33.4	15.7	13.7	29	27
WOK847 Wellness Clinic, High St	**44.7**	39.0	**40.5**	38.6	31.9	30.7	33.1	36.0	34.5	36.7	37.3	34.3	36.4	34
WOK848 Traffic Lights, 74 High St	36.0	34.5	35.2	35.7	24.9	25.1	24.2	28.2	28.9	34.6	31.0	-	30.8	29
WOK850 19 High St, Twyford	**44.9**	**48.9**	31.9	**49.1**	**46.4**	**55.7**	**55.7**	**59.2**	**54.7**	**47.6**	**49.3**	**45.4**	**49.1**	**46**

(1) See Appendix C for details on bias adjustment

Table B.1 (iv) – NO2 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)
WOK 852 Mereoak Caravan Park	22.0	26.3	24.9	27.3	17.6	16.2	16.4	-	-	27.4	18.7	21.6	21.8	20
WOK853 Shefford Cr, Wokingham	23.8	22.9	17.0	-	11.4	10.8	10.2	14.4	-	20.5	15.2	14.0	16	15
WOK854 The Manor, Shinfield	23.4	24.6	-	20.4	12.8	8.4	-	-	14.6	21.4	14.0	12.1	16.9	16
WOK855 Westminster Way, LE	-	21.7	18.3	17.3	-	5.5	11.7	16.1	-	20.5	15.3		15.8	15
WOK857 Rectory Rd, Wokingham	**54.3**	39.6	**46.6**	**45.3**	37.0	**40.3**	**40.8**	**44.1**	**58.8**	**49.3**	35.6	38.0	**44.1**	41
WOK861 Mill Lane (by bridge)	**42.8**	**47.6**	**50.6**	**47.8**	**40.9**	**40.6**	**47.4**	**57.0**	**43.7**	**44.6**	36.4	**43.9**	**45.3**	42
WOK862 Marsh Mills Cottage, Remenham	29.5	31.1	28.3	23.9	25.7	13.7	26.0	27.4	25.1	30.6	21.7	27.1	25.8	24
WOK863 3 Wargrave Rd, Twyford	**45.1**	**48.8**	**40.4**	35.6	33.0	34.4	36.3	38.9	32.9	**40.8**	30.7	32.8	37.5	35
WOK864 Waltham Rd, Twyford	**58.1**	**44.7**	**43.8**	**41.0**	**-**	-	**44.7**	**49.4**	**40.2**	**46.6**	38.7	**42.2**	**44.9**	**42**
WOK865 13 Langborough Rd	-	**40.1**	33.3	33.2	-	21.3	20.8	31.1	25.1	33.0	25.0	21.5	28.4	26
WOK866 58 Denmark St, Wokingham	37.4	38.5	33.0	29.3	32.8	-	32.9	39.1	34.7	35.3	26.2	31.5	33.7	31
WOK867 21 Denmark St, Wok	38.5	**48.1**	33.0	33.8	22.5	22.0	21.2	24.1	34.5	31.4	-	20.9	30	28
WOK868 59 London Road	**41.0**	**41.2**	37.0	34.9	28.1	28.1	29.0	35.3	31.0	37.2	23.9	29.5	33	31

(1) See Appendix C for details on bias adjustment

Table B.1 (v) – NO2 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)
WOK869 Mullie (26) High Street	39.6	32.5	**48.0**	31.8	30.0	31.2	32.9	32.4	35.2	38.3	27.8	28.1	34	32
WOK870 Hunt & Nash Church St	39.4	45.8	36.4	35.0	28.2	30.5	32.0	37.3	33.3	32.6	37.5	33.3	35.1	33
WOK871 15 London Rd, Twyford 1	**40.5**	39.2	38.5	39.5	31.6	33.4	31.4	34.4	30.6	35.8	31.1	22.7	34.1	32
WOK872 Registry Office, Reading Rd	-	35.8	31.5	33.1	32.0	-	38.9	-	-	**42.8**	31.3	-	35	33
WOK873 27 The Terrace, Wokingham	28.0	32.6	27.9	27.3	23.8	21.4	20.5	25.1	30.5	33.4	22.5	18.7	26	24
WOK874 Broad St, Wokingham	-	-	-		-	22.5	22.8	25.7	27.0	33.2	17.6	19.2	24	22
WOK875 15 London Rd, Twyford 2	-	-	-	-	29.4	31.8	29.5	32.9	32.4	36.2	29.4	25.4	30.9	29
WOK876 15 London Rd, Twyford 3	-	-	-	-	30.9	31.1	33.0	30.8	34.0	37.1	29.4	25.1	31.4	29
WOK 877 Almshouses, London Rd	-	-	-	-	24.9	20.8	25.3	26.5	27.4	31.4	29.8	28.1	26.8	25
WOK 878 17 Wargrave Rd Twyford	-	-	-	-	25.0	24.0	27.4	29.9	27.3	34.4	25.6	27.4	27.6	26

(1) See Appendix C for details on bias adjustment

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

QA/QC of Continuous Monitoring Stations

TRL carry out the QA/QC on behalf of Wokingham Borough Council.

Site operation

Routine instrument calibrations are conducted approximately once per fortnight, which involve zero and span checks, a written record of the gas analyser diagnostics and a general visual inspection of all equipment is undertaken. There is a written operating procedure and a calibration record sheet is completed at every site visit.

Data retrieval and daily data checking

Data from the monitoring station is retrieved and processed on a Campbell CR10x data logger as 15-minute mean data. The logger was interrogated via a Siemens TC35i GSM modem at 8-hourly intervals by the ENVIEW 2000 software hosted at TRL. This was used to retrieve, check and archive data. TRL's internal QA/QC procedures require all data to be backed up on a secure server and all documentation associated with each site to be uniquely identified and securely stored to provide an audit trail. Daily data inspections are undertaken during office hours using the facilities of the Data Management System. Initial observations of the Management System indicate whether the site has been contacted during its nominated ‘poll time’ overnight. If this has not been successful a manual poll of the site may be required. If this is not successful further investigation of the communications integrity will be required to establish contact with the site modem and data logger. Three day plots of recorded data are viewed for the requested site, and these are inspected and assessed for continuity, validity, minimum and maximum values, date and time, power failures and general integrity. All anomalies are recorded on the Daily Check sheet, as required. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation, and initialise any necessary action.

In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team. Any issues identified with equipment

operation will be referred to the client for attention within 24 hours (excluding weekends). On a weekly basis, data are examined using summary statistics and outlier analysis to establish data validity. In the event that unusual data episodes are recorded, these would be routinely examined over longer data periods to establish their impact on trends, but would also be cross referenced with data peaks and troughs recorded at other national monitoring stations. In addition, integrity and validity of data logger clock times are checked, and any significant errors recorded in the Data Management System logbook. All site data recorded through the Data Management System is archived on TRL's Network. The data is backed up daily, and the TRL IT Department maintains these data within their long-term and secure archives. This secures all data in the event of any system failure.

Data calibration and ratification

Data is ratified as per AURN recommended procedures. The calibration and ratification process for automatic gas analysers corrects the raw dataset for any drift in the zero baseline and the upper range of the instrument. This is done using a Microsoft Excel-based calibration and ratification file which incorporates the zero and span check information from the calibration visits. The zero reading recorded during the calibration visits is used to adjust any offset of the baseline of the data. The difference between the span value obtained between one calibration visit and the next visit is used to calculate a factor. This change is assumed to occur at the same rate over the period between calibrations and as such the factor is used as a linear data scaler. This effectively results in the start of the period having no factor applied and the end of the period being scaled with the full factor with a sliding scale of the factor in-between. After applying the calibration factors, it is essential to screen the data, by visual examination, to see if they contain any unusual measurements or outliers. Errors in the data may occur as a result of equipment failure, human error, power failures, interference or other disturbances. Data validation and ratification is an important step in the monitoring process. Ratification involves considerable knowledge of pollutant behaviour and dispersion, instrumentation characteristics, field experience and judgement. On completion of this data correction procedure, these data were converted to hourly means and a summary of these data were provided to Wokingham Borough Council at quarterly intervals and a calendar year annual report is prepared.

Independent Site Audits

In addition to these checks an independent site audit is carried out every 12 months to ensure the nitrogen dioxide analyser is operating correctly. The audits that are carried out utilise procedures that are applied within DEFRA's National Automatic Air Monitoring Networks Quality Control Programme. The efficiency of the analyser's convertor is checked and the analyser is also leak tested. The gas bottle used for calibrations on site is also checked against the auditor's gas bottle to ensure the stability of the gas concentration.

The site audit for the Whitley Wood Lane automatic monitoring unit was carried out on 18th August 2015. The analyser passed all sections of the audit with no problems identified. An audit was not carried out on the Wokingham automatic monitoring unit in 2015 as monitoring only took place for four months at the end of the calendar year. An independent audit has been carried out in May 2016 which is within 12 months of the site being set up and monitoring commencing.

QA/QC of Diffusion Tube Monitoring

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO_2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management. The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte.

The Performance criteria are due to be changed, at present the criteria are based on the z-score method, and equates to the following:

GOOD: Results obtained by the participating laboratory are on average within 13% of the assigned value. This equates to a Rolling Performance Index (RPI) of 169 or less.

ACCEPTABLE: Results obtained by the participating laboratory are on average within 13- 26% of the assigned value. This equates to an RPI of 169 - 676.

WARNING: Results obtained by the participating laboratory are on average within 26 – 39% of the assigned value. This equates to an RPI of 676 - 1521.

FAILURE: Results obtained by the participating laboratory differ by more than 39% of the assigned value. This equates to an RPI of greater than 1521.

However from April 2009, the criteria will be based upon the Rolling Performance Index (RPI) statistic and will be tightened to the following:

GOOD: Results obtained by the participating laboratory are on average within 7.5% of the assigned value. This equates to an RPI of 56.25 or less.

ACCEPTABLE: Results obtained by the participating laboratory are on average within 15% of the assigned value. This equates to an RPI of 225 or less.

UNACCEPTABLE: Results obtained by the participating laboratory differ by more than 15% of the assigned value. This equates to an RPI of greater than 225.

Wokingham Borough Council use Gradko International for the supply and analysis of the nitrogen dioxide diffusion tubes for their non-automatic monitoring programme. Gradko's performance for AIR PT AR004 – AR010 (Jan 2015 – Nov 2015) were as follows: AIR PT AR006 (January to February) = 100%, AIR PT AR007 (April to May) = 100%, AIR PT AR009 (July to August) = 100% and AIR PT AR010 (October to November) = 100%, which relates to the % of results which are satisfactory.

Diffusion Tube Bias Adjustment Factors

Diffusion Tube Bias Adjustment Factors

Gradko International Ltd of St Martins House 77 Wales Street Winchester Hampshire is the supplier and analyst of the nitrogen dioxide diffusion tubes. The tubes are analysed by U.V. spectrophotometry. The limit of detection is 20% TEA/Water.

Factor from Local Co-location Studies and Discussion of Choice of Factor to Use

The national study of bias adjustment factors spreadsheet (ref. 03/16) suggested a bias adjustment factor of **0.91** be applied. Using the Whitley Wood Lane, Shinfield

co-location study a local bias adjustment factor has been calculated as **0.93**. A copy of the co-location spreadsheet used is provided below. The national bias adjustment factor has not been used due to the availability of a local bias adjustment factor and as the local bias adjustment factor is more precautionary.

For the purposes of the ASR 2016 for the 2015 data the bias adjustment factor is **0.93** derived from the Whitely Wood Lane, Shinfield co-location study within the M4 AQMA.

Whitely Wood Lane, Shinfield Co-Location Study Precision and Accuracy

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
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	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	07/01/2015	05/02/2015	35.0	37.8	33.7	35	2.1	6	5.1	46	69	Good	Poor Data Capture
2	05/02/2015	04/03/2015	38.7	38.1	36.8	38	0.9	2	2.3	36	100	Good	Good
3	04/03/2015	02/04/2015	34.4	32.6	35.0	34	1.2	4	3.1	34	100	Good	Good
4	02/04/2015	29/04/2015	34.9	34.5	38.1	36	2.0	6	4.9	38	100	Good	Good
5	29/04/2015	27/05/2015	32.3	30.2	38.4	34	4.3	13	10.7	30	100	Good	Good
6	27/05/2015	01/07/2015	30.1	29.5	31.8	30	1.2	4	2.9	42	100	Good	Good
7	01/07/2015	29/07/2015	37.7	39.5	40.0	39	1.2	3	3.0	30	100	Good	Good
8	29/07/2015	26/08/2015	40.0	38.9	37.3	39	1.4	3	3.4	31	99	Good	Good
9	26/08/2015	30/09/2015	33.7	34.6		34	0.7	2	5.9	26	100	Good	Good
10	30/09/2015	29/10/2015	32.1	32.7		32	0.4	1	3.8	26	104	Good	Good
11	29/10/2015	02/12/2015	35.2	31.5	37.5	35	3.0	9	7.4	32	100	Good	Good
12	02/12/2015	06/01/2016	40.2	40.3	39.2	40	0.6	2	1.5	37	100	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

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

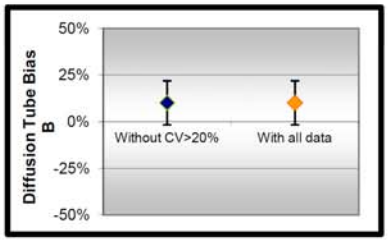
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Old Whitley Wood Lane

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 11 periods of data	
Bias factor A	0.93 (0.84 - 1.04)
Bias B	8% (-4% - 20%)
Diffusion Tubes Mean:	36 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	33 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	33 (30 - 37) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.93 (0.84 - 1.04)
Bias B	8% (-4% - 20%)
Diffusion Tubes Mean:	36 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	33 μgm^{-3}
Data Capture for periods used:	100%
Adjusted Tubes Mean:	33 (30 - 37) μgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

Short-term to Long-term Data Adjustment

When referring to LAQM.TG(16) the calculations for annualising the continuous monitoring data from the Wokingham Town Centre station has been possible using 2015 data as recommended in this guidance.

Table C.1 – Short term to long term data adjustment – Wokingham Town Centre Unit

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	22	24	0.917
Oxford St Ebbes	Background	14	15	0.933
Canterbury	Background	11	12	0.917
Average				0.922
Measured mean concentration (38) x average				**35.04**

Table C.2 – Short term to long term data adjustment – WOK839 Peach Street, Wokingham

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	18.85	1.166
Oxford St Ebbes	Background	14.25	14.47	1.143
Canterbury	Background	10.98	9.54	1.151
Average				1.153
Measured mean concentration (38.33) x average				**44.19**

Table C.3 – Short term to long term data adjustment – WOK855 Westminster Way, Lower Earley

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.12	1.040
Oxford St Ebbes	Background	14.25	14.50	0.983
Canterbury	Background	10.98	11.04	0.994
Average				1.006
Measured mean concentration (15.80) x average				**15.89**

Table C.4 – Short term to long term data adjustment – WOK872 Registry Office, Reading Road, Wokingham

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.31	1.031
Oxford St Ebbes	Background	14.25	14.77	0.965
Canterbury	Background	10.98	11.26	0.975
Average				0.990
Measured mean concentration (35.06) x average				**34.72**

Table C.5 – Short term to long term data adjustment – WOK874 Broad Street, Wokingham

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.79	1.009
Oxford St Ebbes	Background	14.25	13.14	1.085
Canterbury	Background	10.98	10.34	1.062
Average				1.052
Measured mean concentration (24) x average				**25.25**

Table C.6 – Short term to long term data adjustment – WOK875 15 London Road, Twyford

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.17	1.038
Oxford St Ebbes	Background	14.25	12.60	1.131
Canterbury	Background	10.98	10.05	1.093
Average				1.087
Measured mean concentration (30.88) x average				**33.58**

Table C.7 – Short term to long term data adjustment – WOK876 15 London Road, Twyford

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.17	1.038
Oxford St Ebbes	Background	14.25	12.60	1.131
Canterbury	Background	10.98	10.05	1.093
Average				1.087
Measured mean concentration (31.43) x average				**34.17**

Table C.8 – Short term to long term data adjustment – WOK877 Almshouses, London Road, Twyford

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.17	1.038
Oxford St Ebbes	Background	14.25	12.60	1.131
Canterbury	Background	10.98	10.05	1.093
Average				1.087
Measured mean concentration (26.78) x average				**29.11**

Table C.9 – Short term to long term data adjustment – WOK878 17 Wargrave Road, Twyford

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	21.17	1.038
Oxford St Ebbes	Background	14.25	12.60	1.131
Canterbury	Background	10.98	10.05	1.093
Average				1.087
Measured mean concentration (27.63) x average				**30.03**

Table C.10 – Short term to long term data adjustment – WOK879 Peach Street, Wokingham 1

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	24.15	0.910
Oxford St Ebbes	Background	14.25	15.02	0.949
Canterbury	Background	10.98	11.78	0.932
Average				0.930
Measured mean concentration (43.38) x average				**40.36**

Table C.11 – Short term to long term data adjustment – WOK880 Peach Street, Wokingham 2

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	24.15	0.910
Oxford St Ebbes	Background	14.25	15.02	0.949
Canterbury	Background	10.98	11.78	0.932
Average				0.930
Measured mean concentration (41.83) x average				**38.90**

Table C.12 – Short term to long term data adjustment – WOK881 Peach Street, Wokingham 3

Site	Site Type	Annual Mean 2015 (µg/m^3)	Period Mean 2015 (µg/m^3)	Ratio
Reading	Background	21.97	24.15	0.910
Oxford St Ebbes	Background	14.25	15.02	0.949
Canterbury	Background	10.98	11.78	0.932
Average				0.930
Measured mean concentration (43.30) x average				**40.27**

Nitrogen Dioxide Fall Off Distance Calculation

Using the guidance in LAQM.TG(16), fall off distance calculation was carried out the calculator available on the LAQM website (http://laqm.defra.gov.uk/review-and-assessment/tools/tools.html).

Table C.13 Fall off distance calculation for WOK836 343 Old Whitley Wood Lane, Shinfield

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	**How far from the KERB was your measurement made (in metres)?**	(Note 1)	**1.21**	metres
Step 2	**How far from the KERB is your receptor (in metres)?**	(Note 1)	**8.71**	metres
Step 3	**What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**20.00742**	$\mu g/m^3$
Step 4	**What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?**	(Note 2)	**38**	$\mu g/m^3$
Result	**The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor**	(Note 3)	**30.6**	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Issue 4: 25/01/11 Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk

Table C.14 Fall of distance calculation for WOK839 Peach Street, Wokingham

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	1.1	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	5.3	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	16.69341	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	43	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	34.5	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Table C.15 Fall off distance calculation for WOK841 Lane End Villas, Shinfield

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	3.2	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	7.7	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	17.26567	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	39	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	34.0	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Table C.16 Fall off distance calculation for WOK860 Tube 3 Whitley Wood Lane, Shinfield Automatic Monitoring Unit, Shinfield

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	18.31	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	19.71	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	20.00742	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	37	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	36.4	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Table C.17 Fall off distance calculation for WOK861 Mill Lane, Sindlesham

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	13.6	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	17.04421	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	42	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	28.9	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

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Appendix D: Maps of Monitoring Locations

Map 1 - Diffusion Tube Locations

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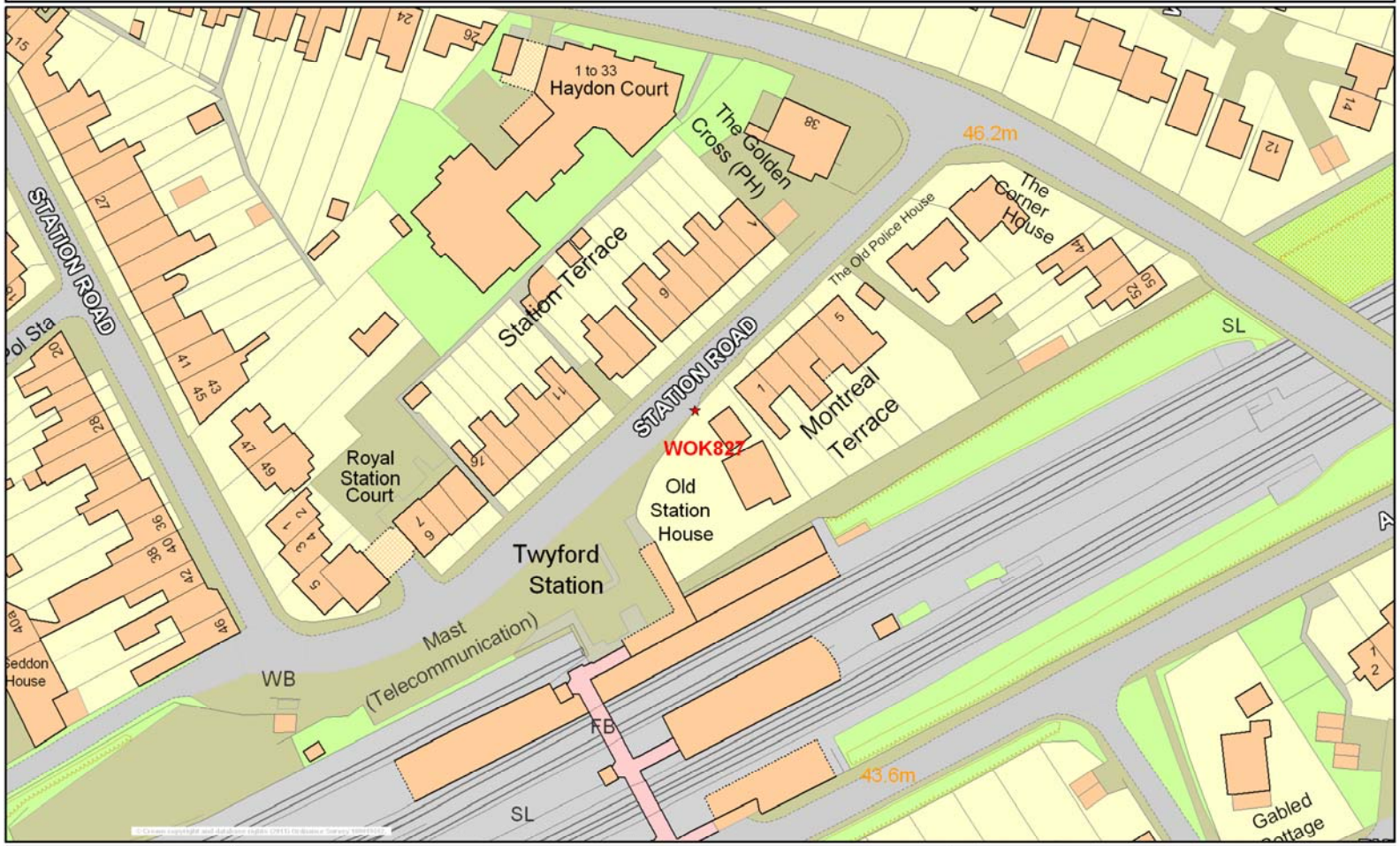
Erica Myers
Date 26/7/2016
Scale 1/1518

N
W E
S

Map 2 - Diffusion Tube Locations



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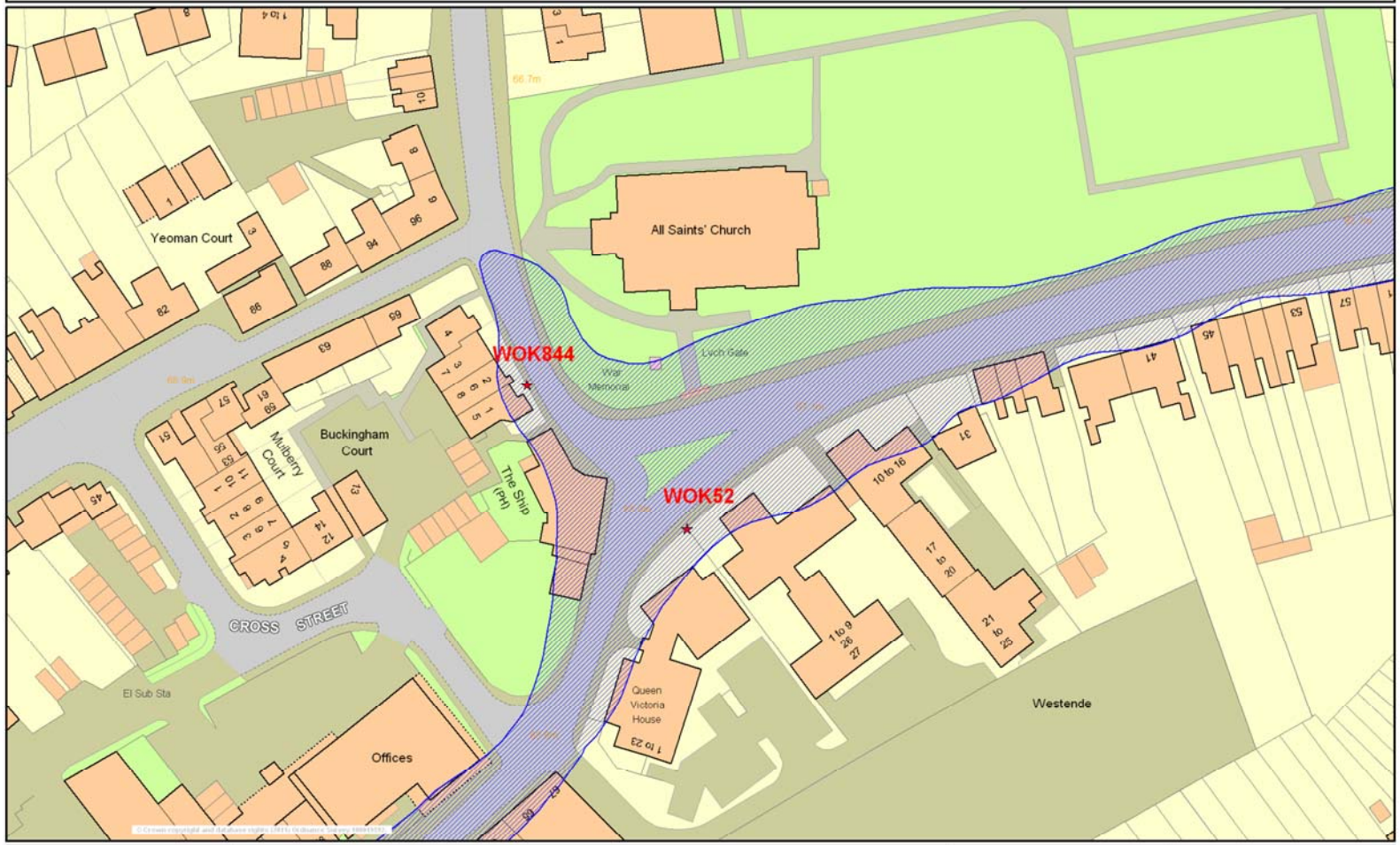
Erica Myers
Date 26/7/2016
Scale 1/1043

N
W E
S

Map 3 - Diffusion Tube Records

Map 4 - Diffusion Tube Records



Map 5 - Diffusion Tube Locations

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Erica Taylor
Date 13/5/2014
Scale 1/1352

N W E S

Map 6 - Diffusion Tube Locations

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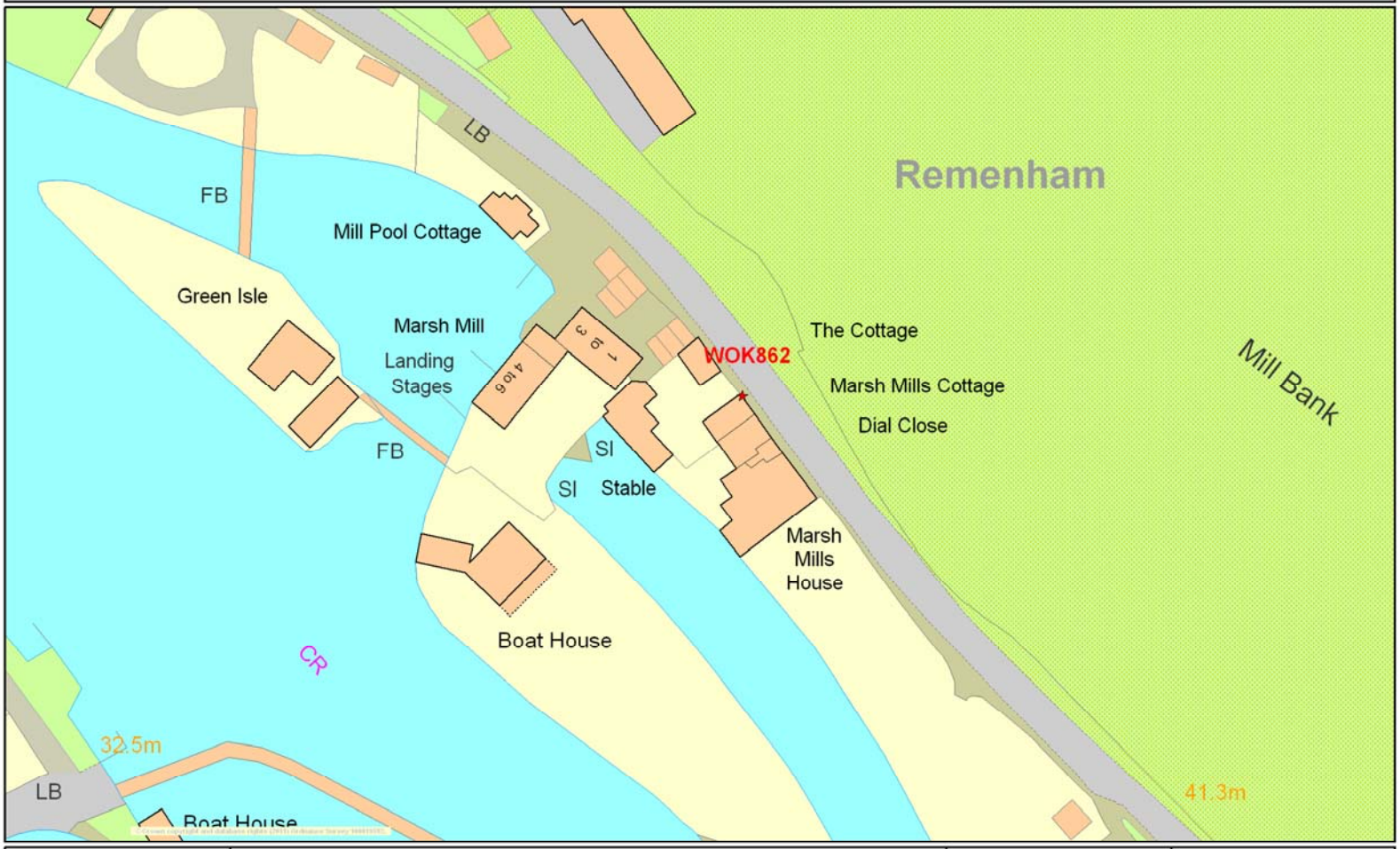
Erica Myers

Date 26/7/2016

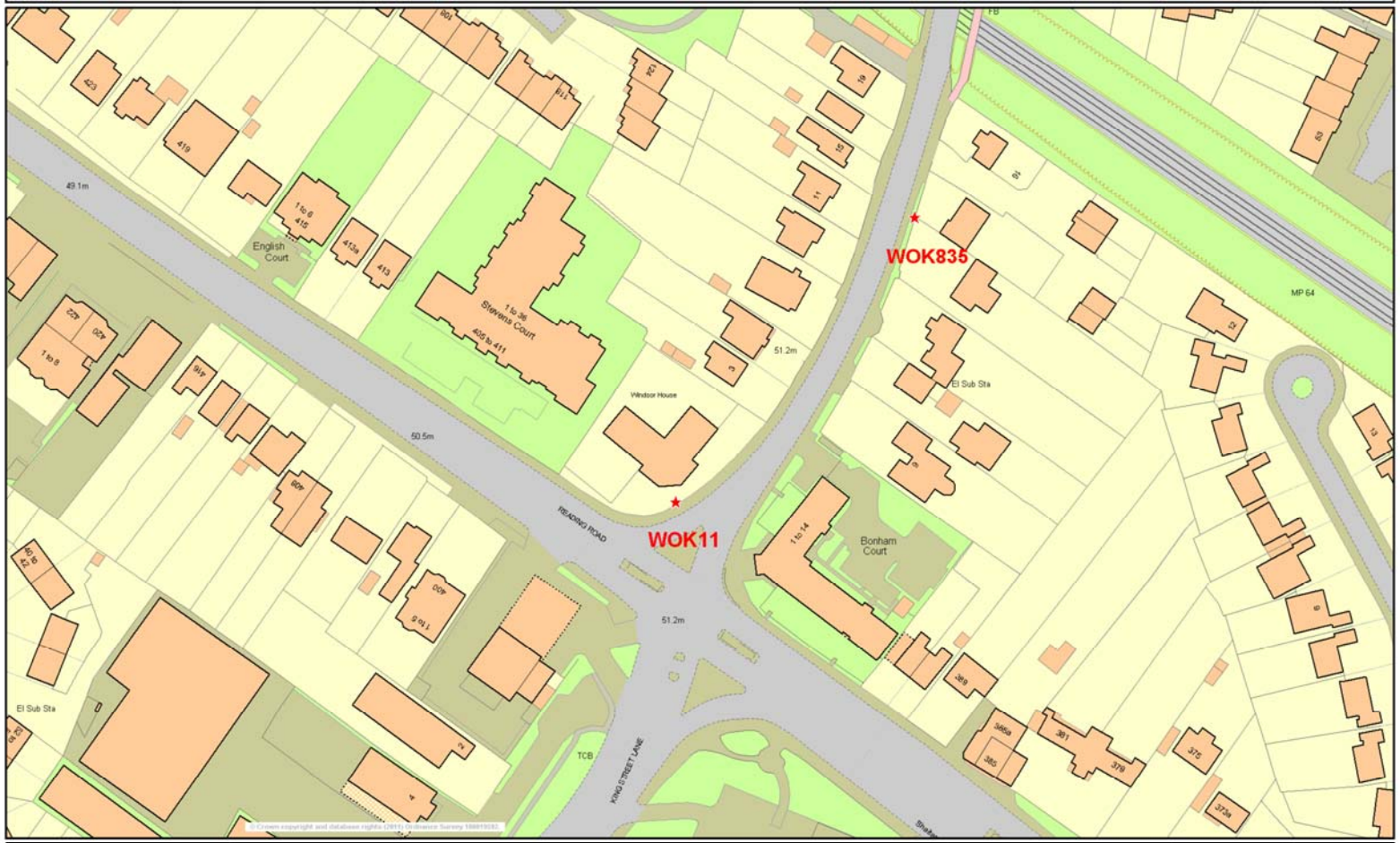
Scale 1/1871

N W E S

Map 7 - Diffusion Tube Locations



Map 8 - Diffusion Tube Locations



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Erica Taylor

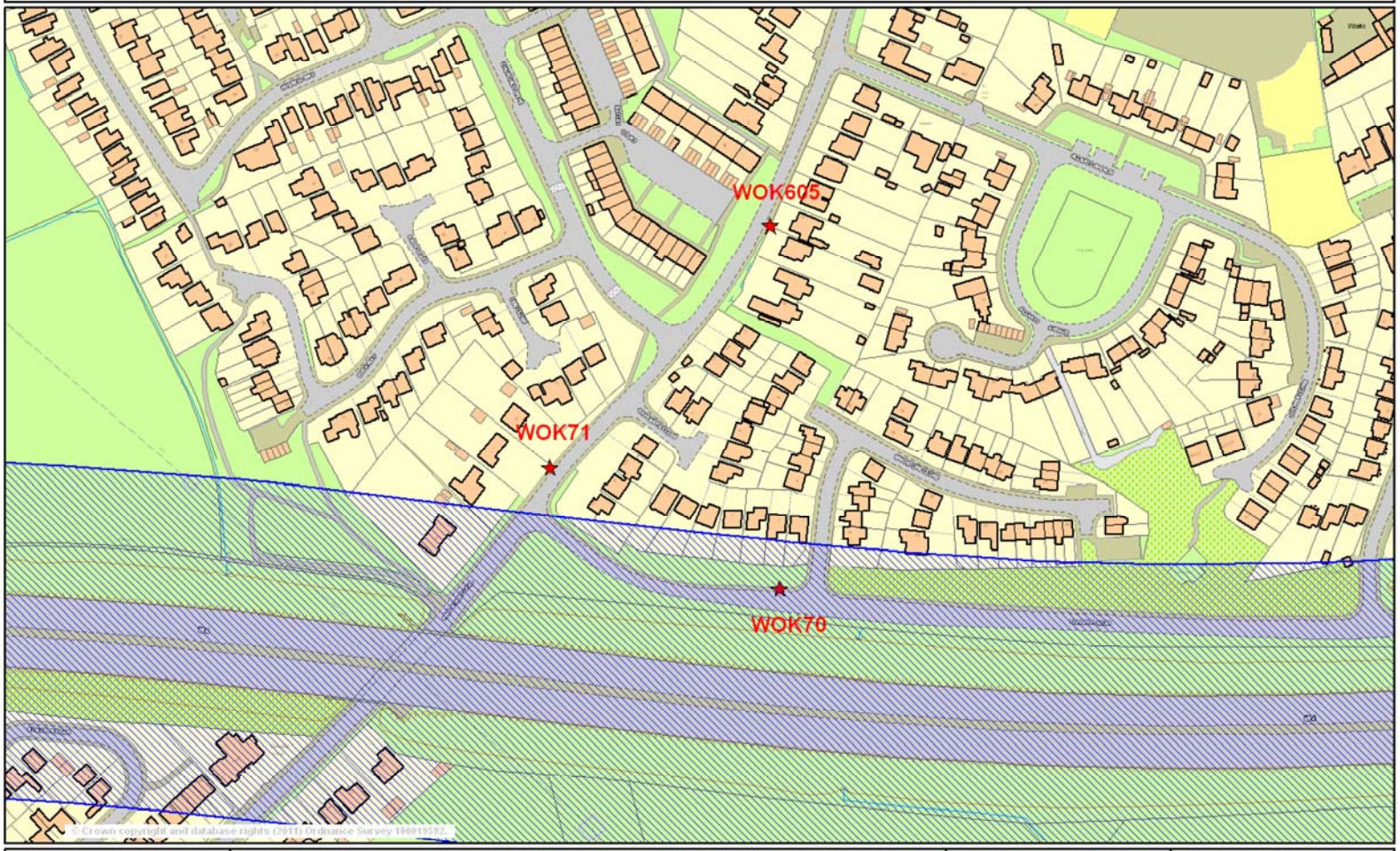
Date 11/4/2012

Scale 1/1288

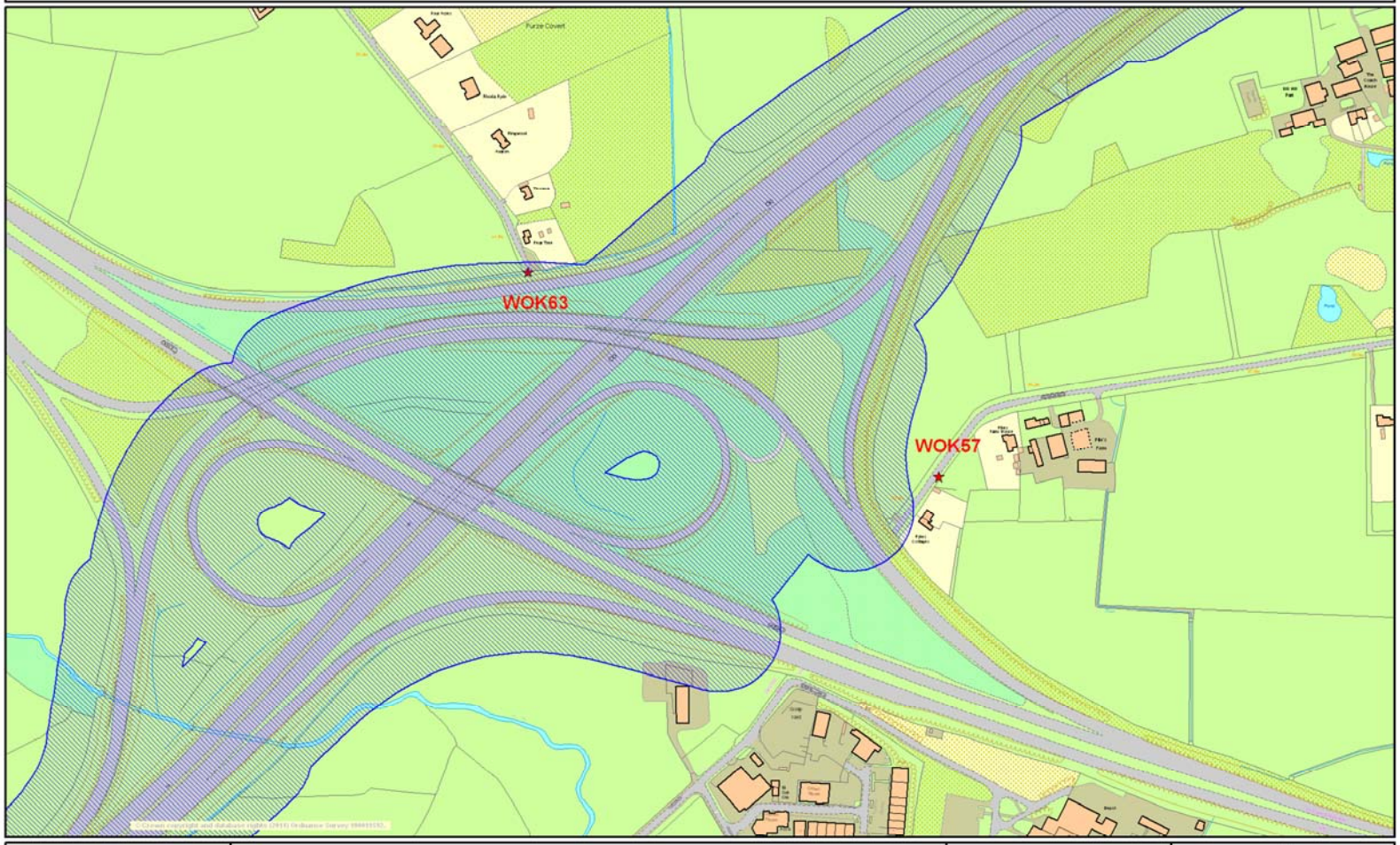
N W E S

Map 9 - Diffusion Tube Locations

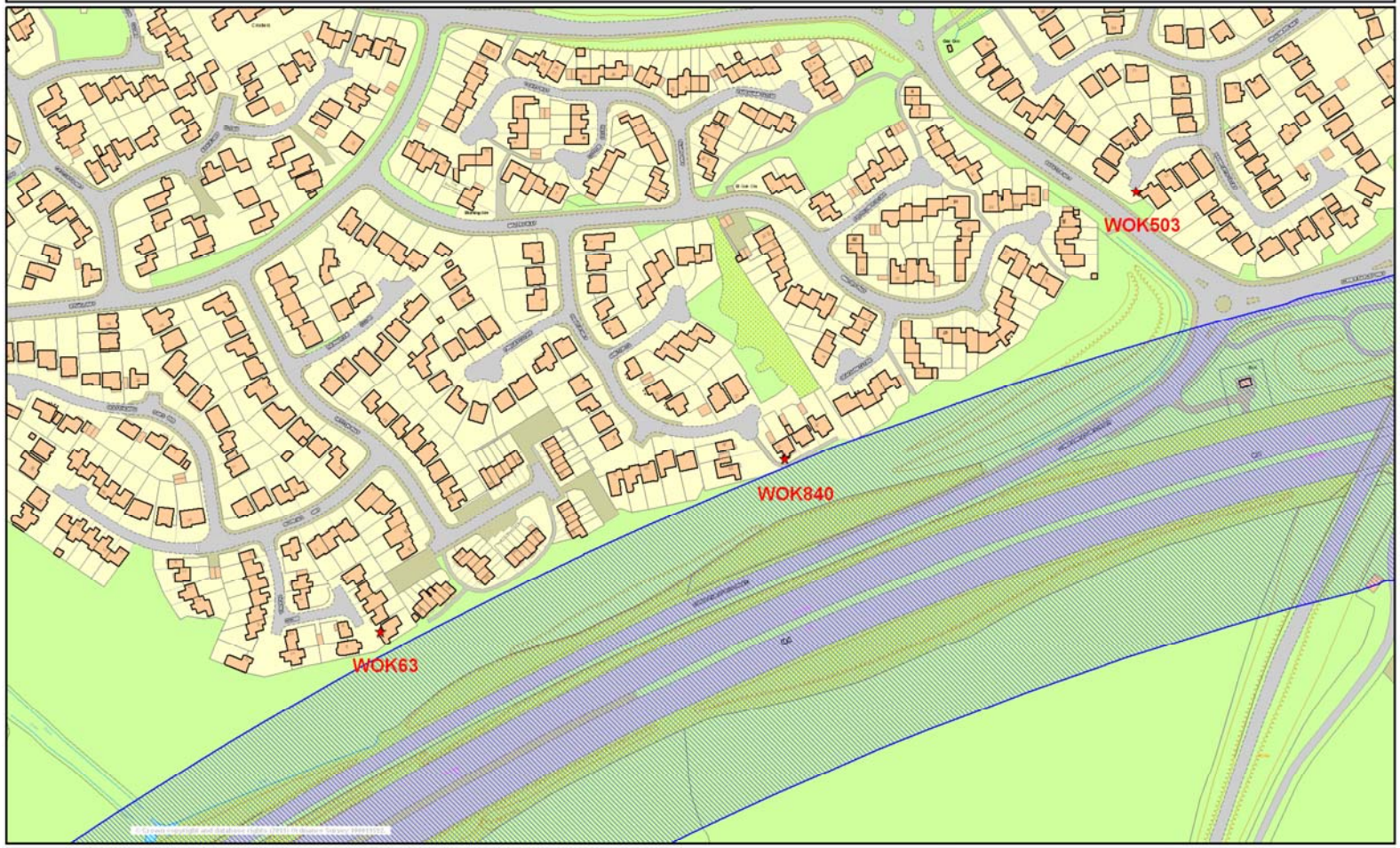
Map 10 - Diffusion Tube Locations



Map 11 - Diffusion Tube Locations



Map 12 - Diffusion Tube Locations



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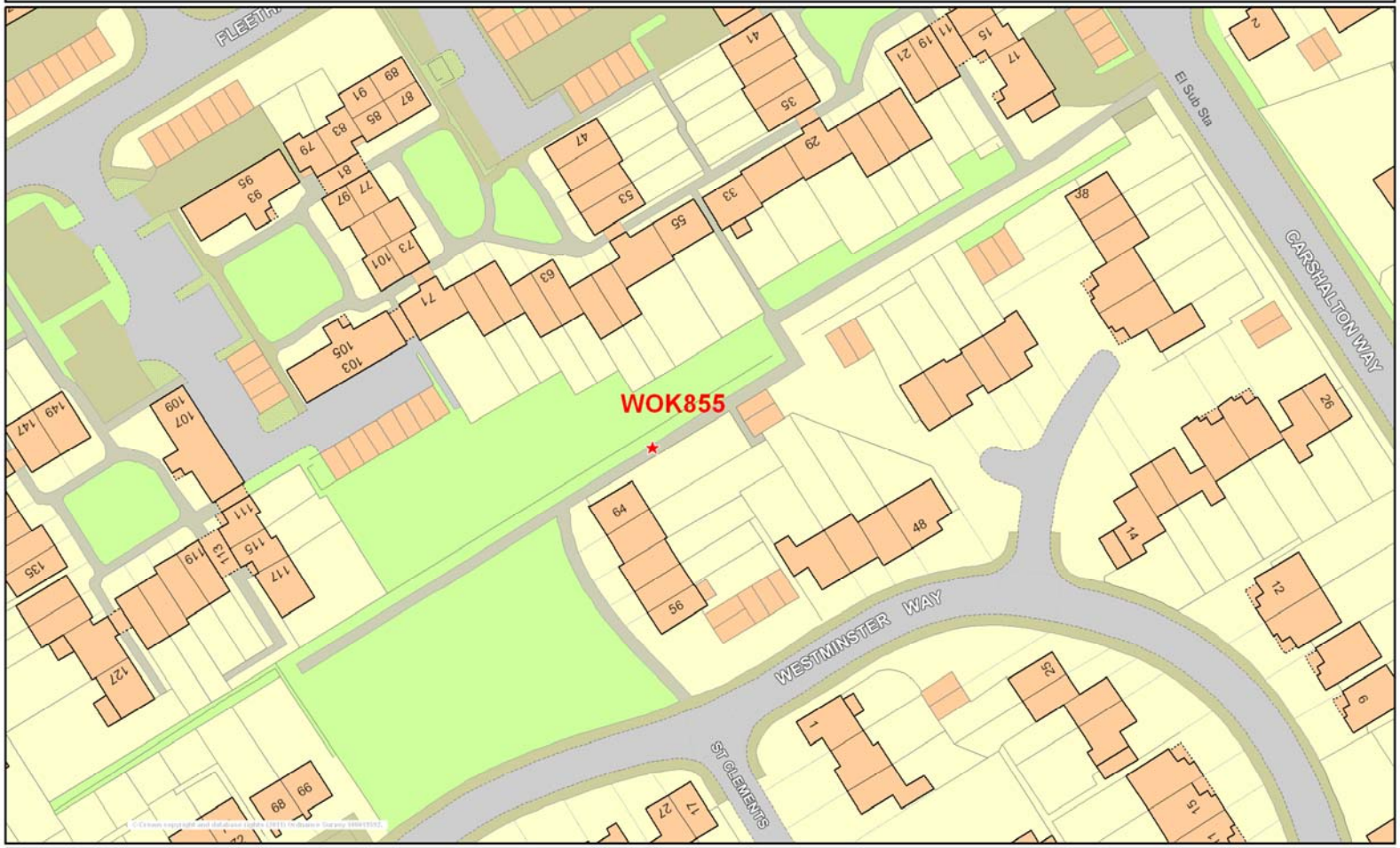
Erica Myers
Date 26/7/2016
Scale 1/2632

N
W E
S

Map 13 - Diffusion Tube Locations

Map 14 - Diffusion Tube Locations



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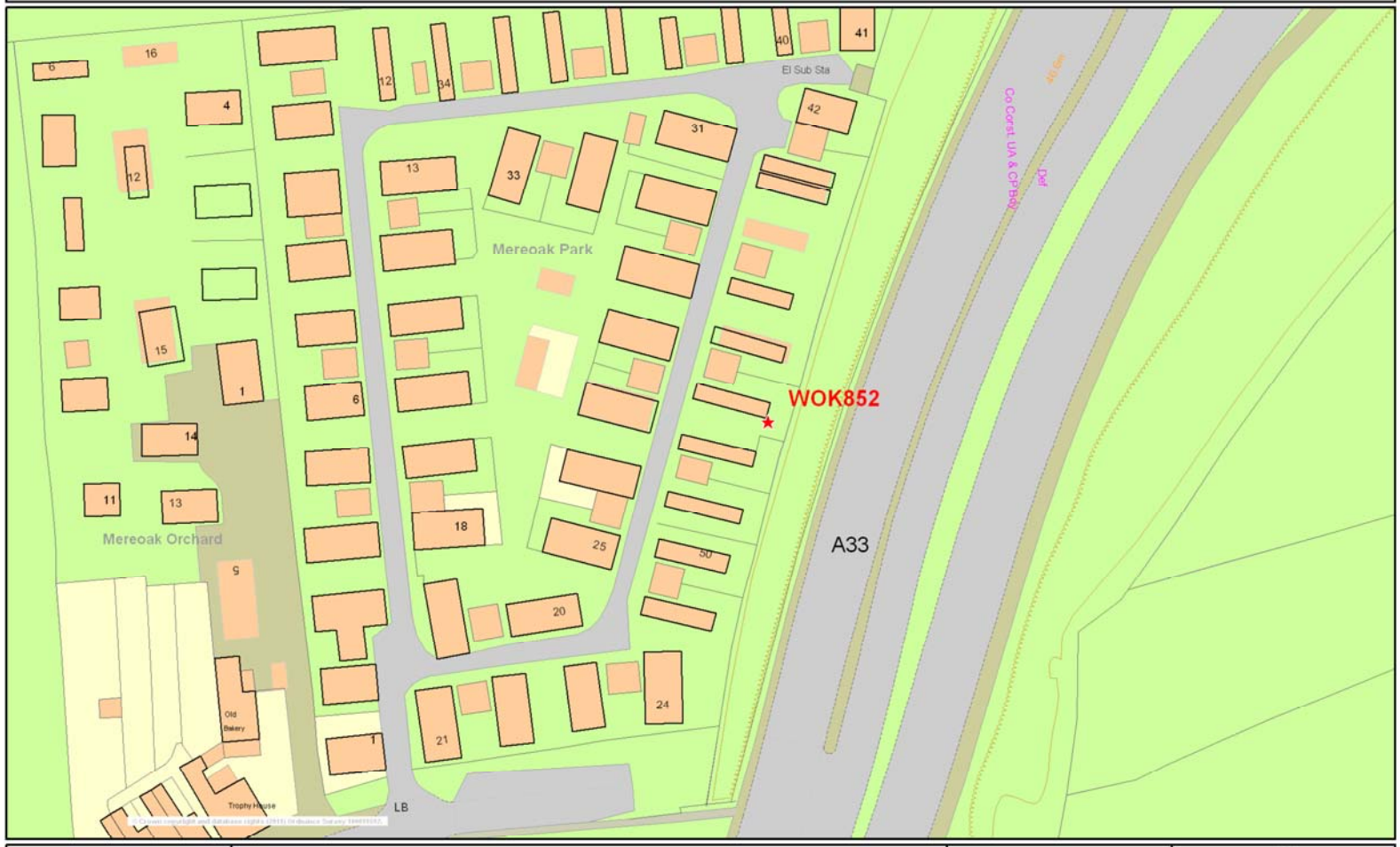
Date 13/5/2014
Scale 1/800

N W E S

Map 15 - Diffusion Tube Locations

Map 16 - Diffusion Tube Locations



Map 17 - Diffusion Tube Locations

Map 18 - Diffusion Tube Locations

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Date 29/7/2016
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N
W E
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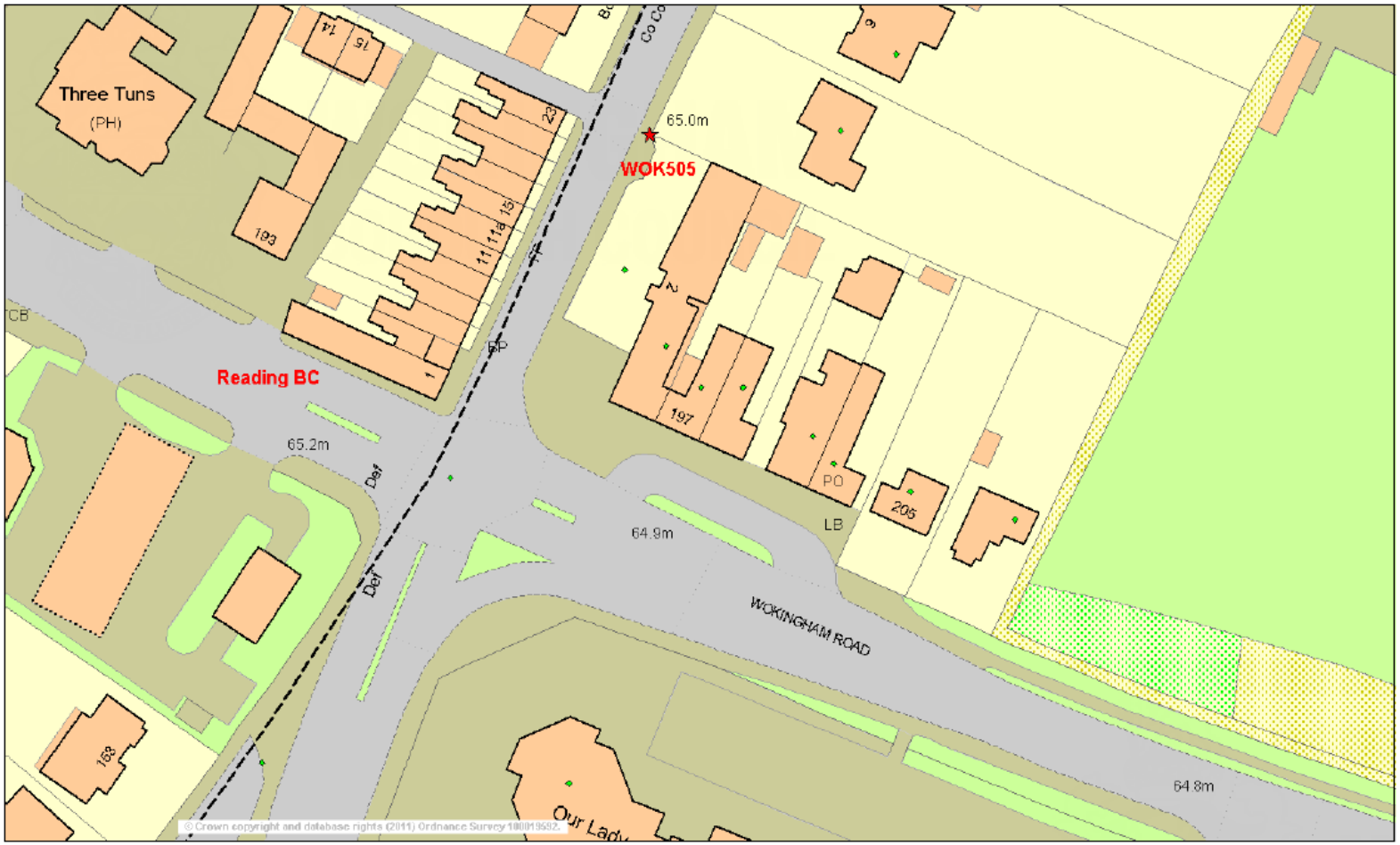
Map 19 - Diffusion Tube Locations



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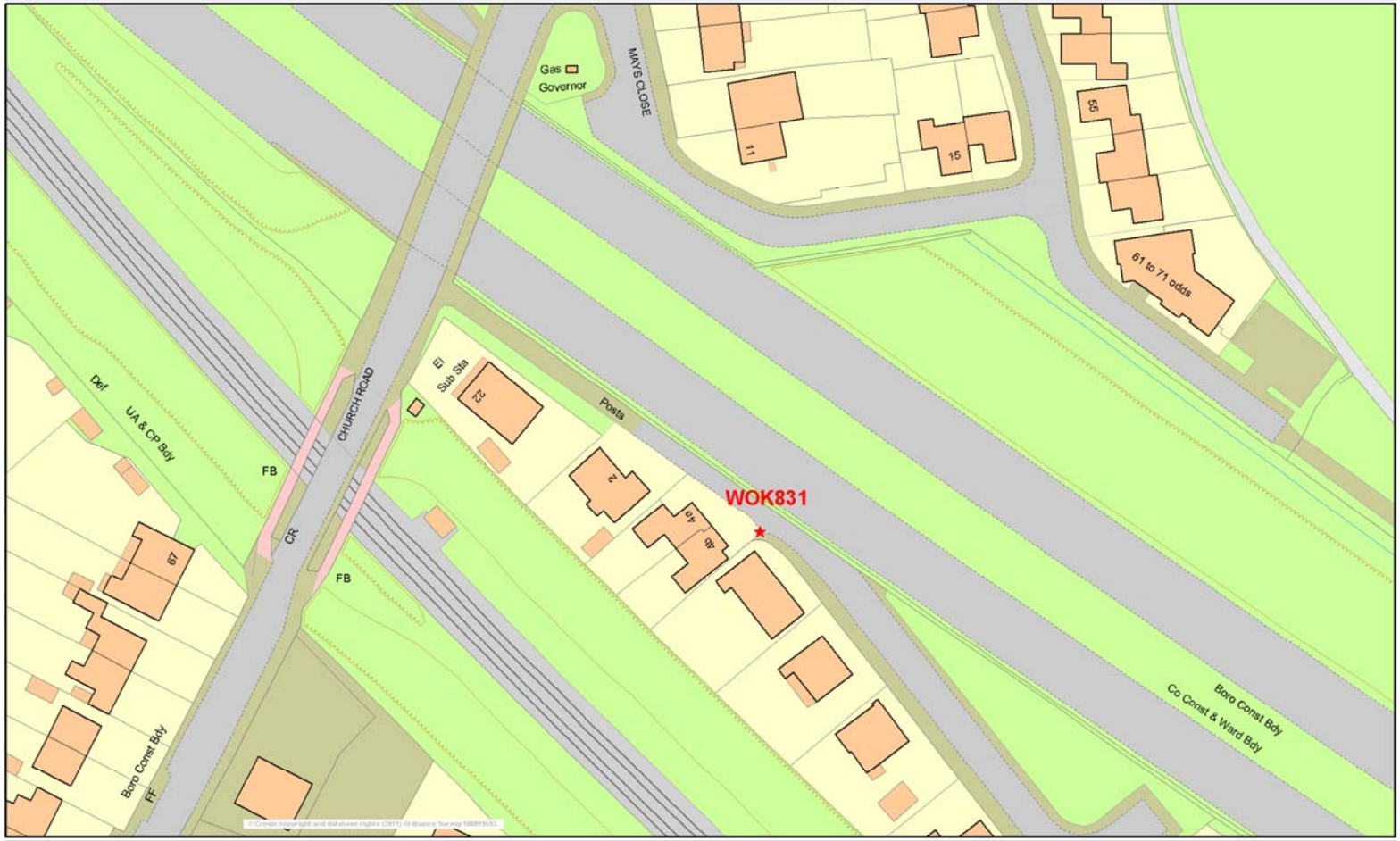
Erica Taylor

Date 29/4/2013

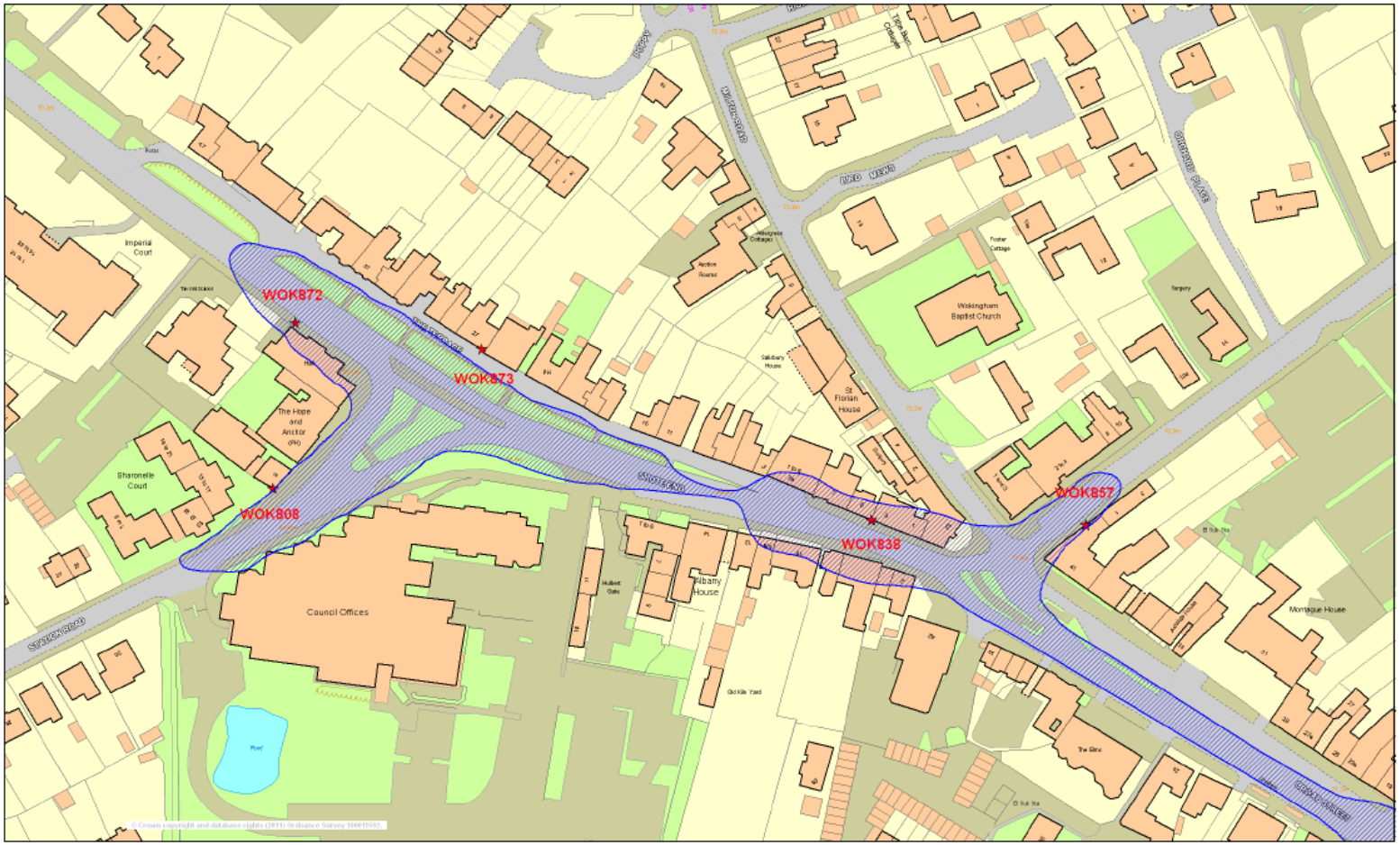
Scale 1/750

N W E S

Map 20 - Diffusion Tube Locations



Map 21 - Diffusion Tube Locations



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Scale 1/1504

N
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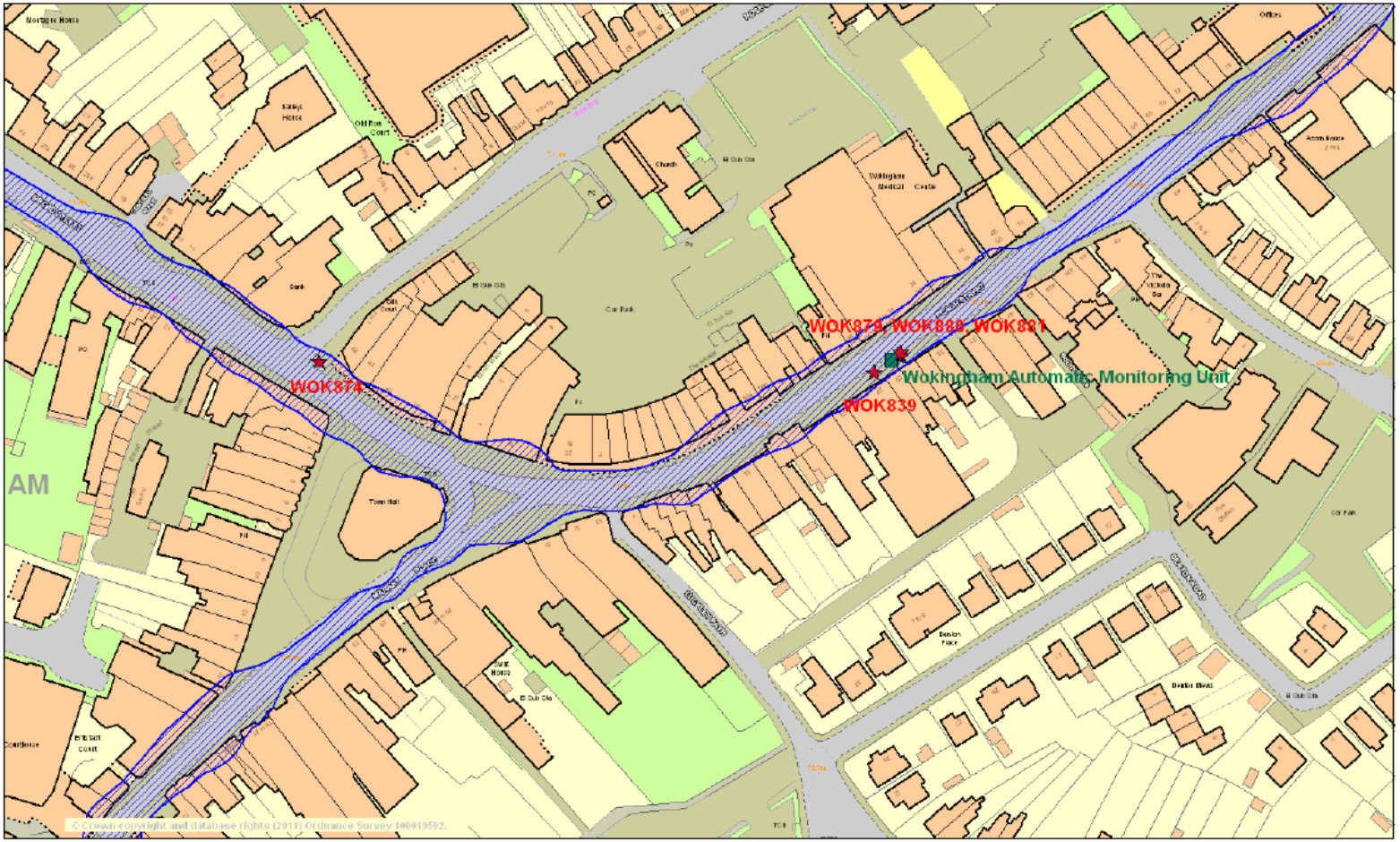
Map 22 - Diffusion Tube Locations



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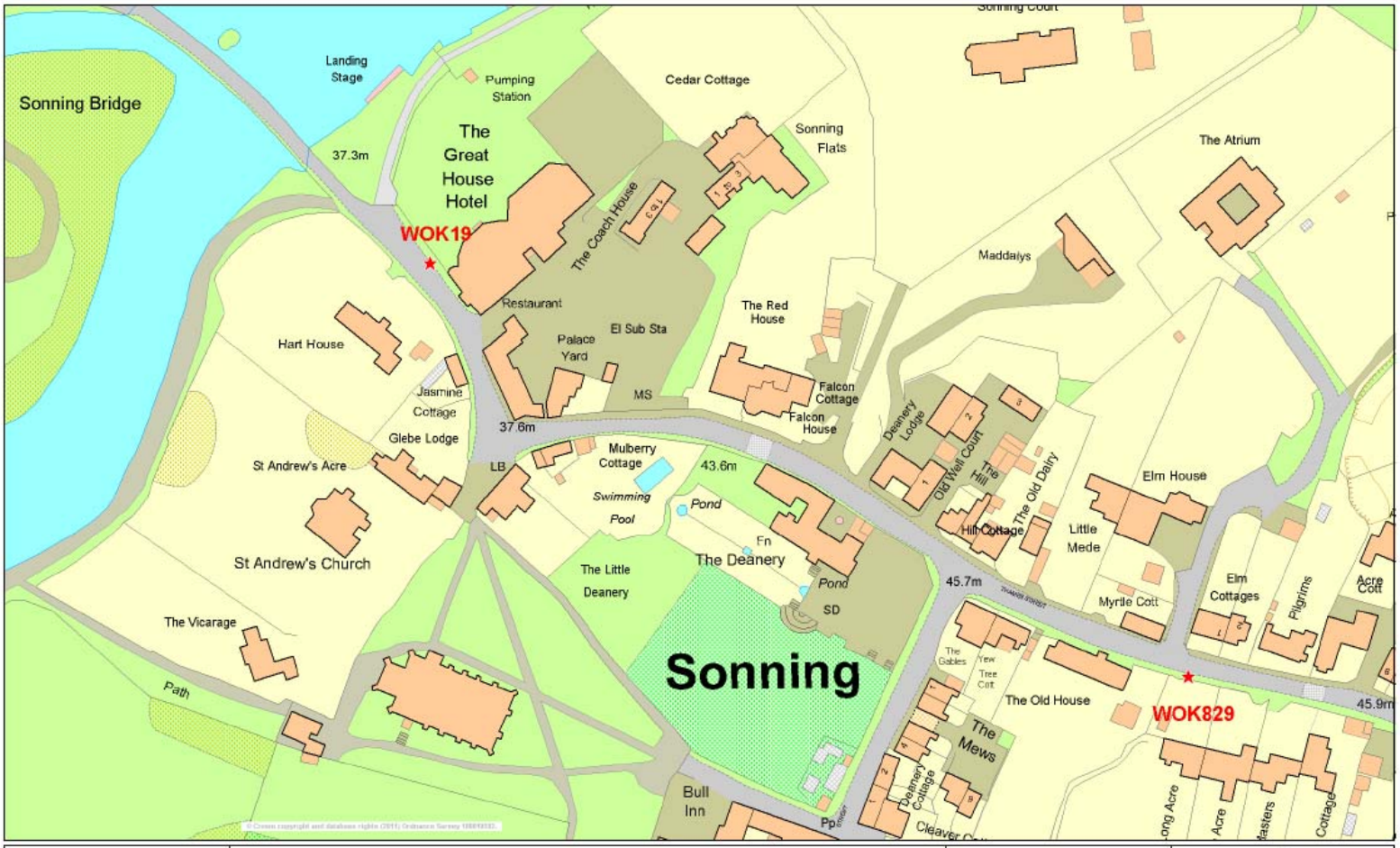
Map 23 - Diffusion Tube Locations



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Date 11/4/2012

Scale 1/1598

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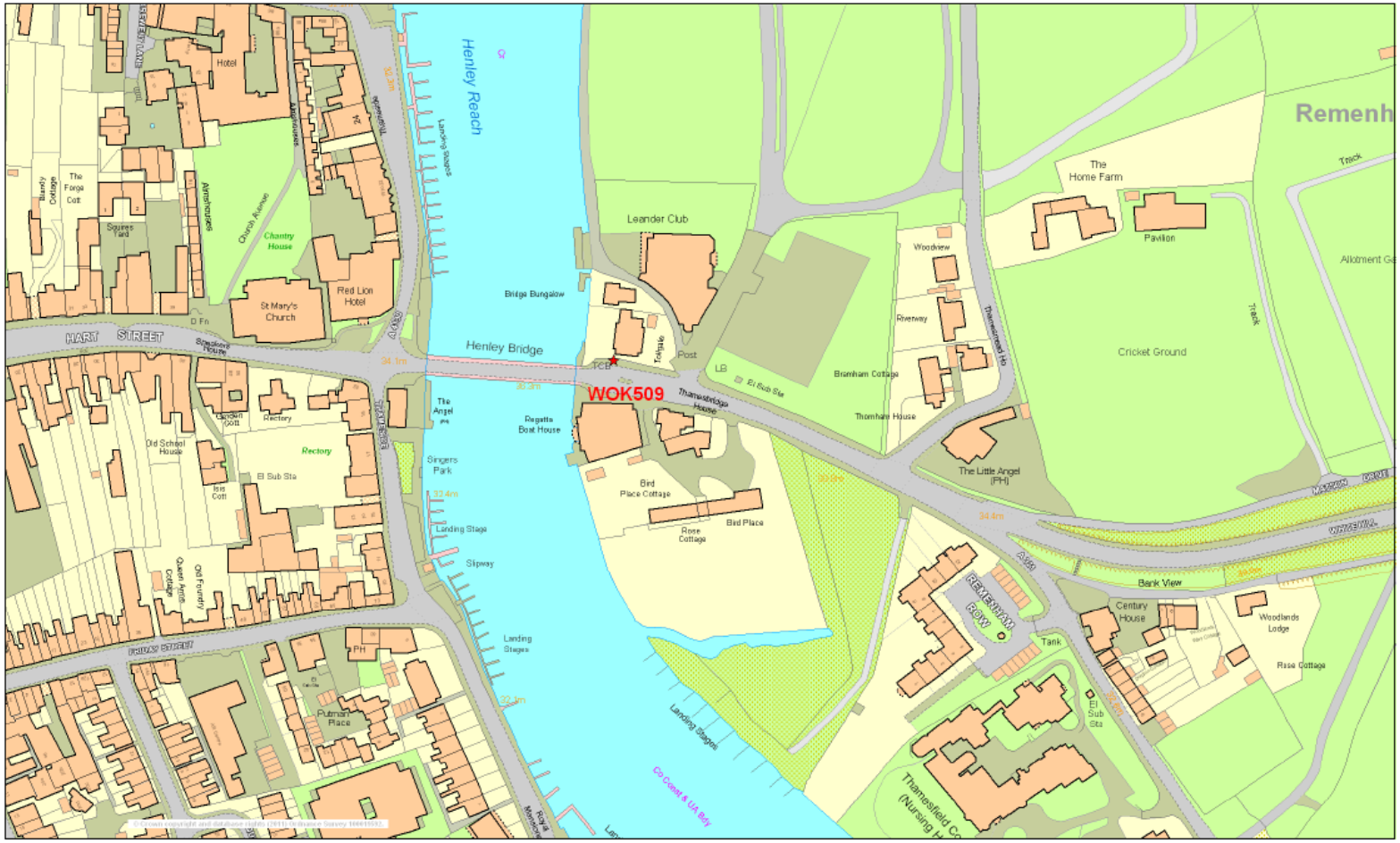
Map 24 - Diffusion Tube Locations



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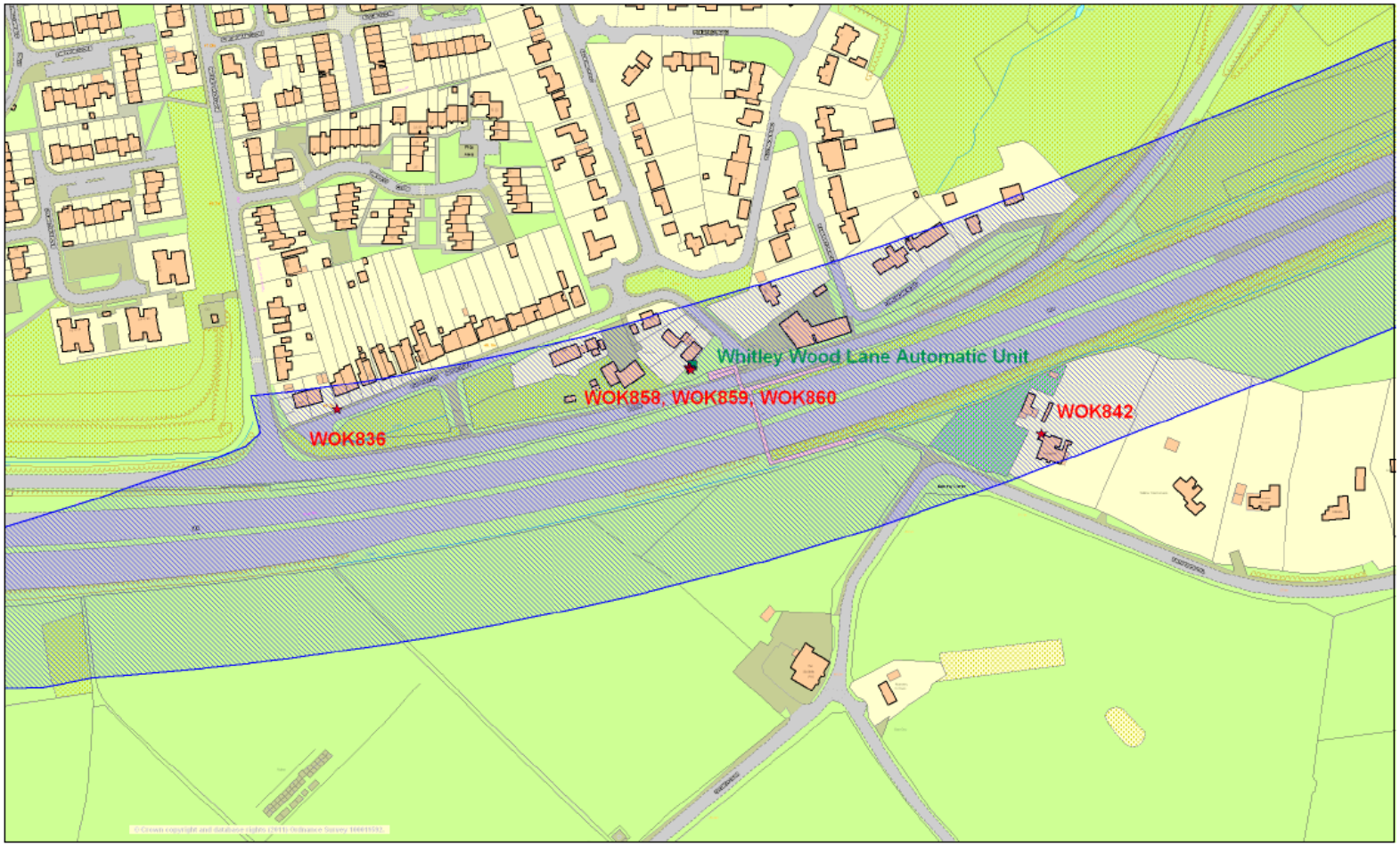
Map 25 - Diffusion Tube Locations



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Date 29/7/2016
Scale 1/3008

N
W E
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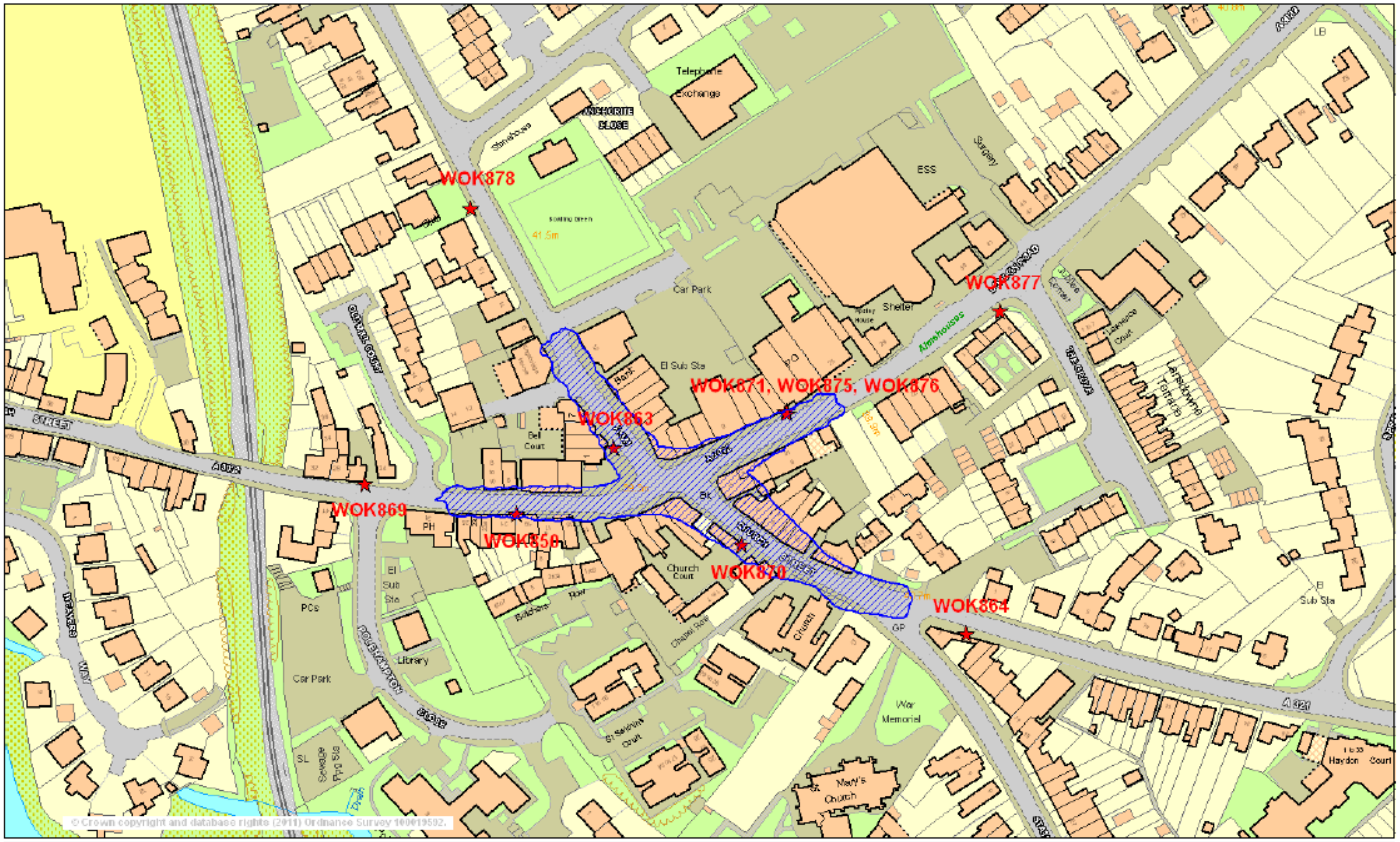
Map 26 - Diffusion Tube Locations



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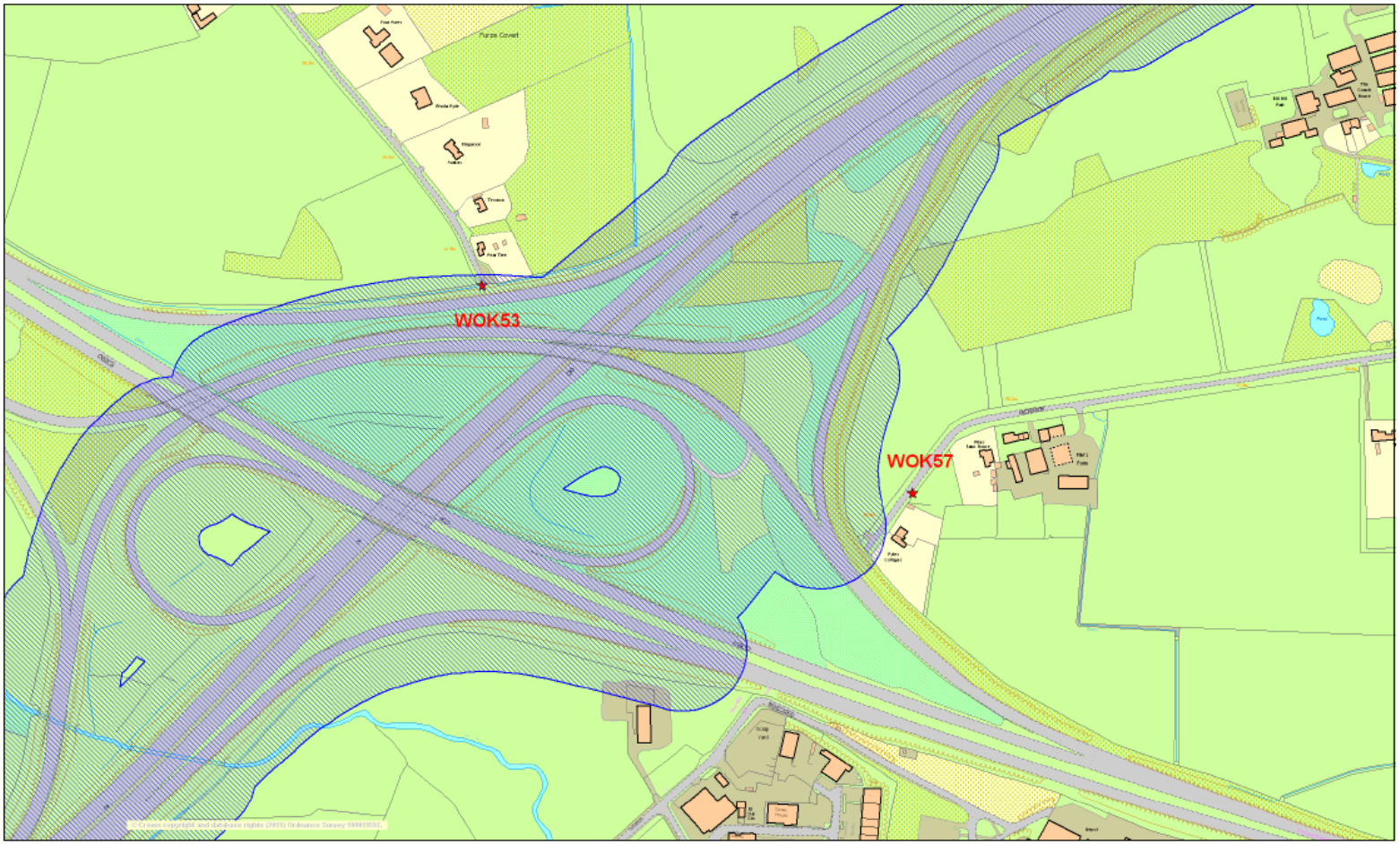
Date 26/7/2016

Scale 1/1822

N W E S

Map 27 - Diffusion Tube Locations



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Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	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
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

[4] The units are in microgrammes 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
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide

References

- Air Quality (England) Regulations 2000 (SI 928)
- Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
- DEFRA (2016) Technical Guidance LAQM.TG (16)
- DEFRA (2016) Policy Guidance LAQM.PG (16)
- WBC (2011) Progress Report
- WBC (2012) Updating and Screening Assessment Report
- WBC (2013) Progress Report
- WBC (2014) Progress Report
- WBC (2015) Updating and Screening Assessment Report
- UK National Air Quality Information Archive, accessed at www.airquality.co.uk

http://laqm.defra.giv.uk/review-and-assessment/tools/tools.html

Nitrogen Dioxide Fall Off with Distance Calculator

Local Diffusion Tube Bias Adjustment Factor Spreadsheet (Version 04)

National Diffusion Tube Bias Adjustment Factor Spreadsheet (Version AEA_DifTPAB_v04/11)

2012 Defra Background Maps

QA/QC Framework: WASP AIR NO_2 PT Rounds AR006, AR007, AR009, AR010 (Jan – Nov 2015)