



WOKINGHAM
BOROUGH COUNCIL

2017 Air Quality Annual Status Report (ASR)

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

August 2017

Wokingham Borough Council

Local Authority Officer	Suzanne McLaughlin
Department	Public Protection Partnership (Environmental Quality Team)
Address	Wokingham Borough Council, Shute End, Wokingham, RG40
Telephone	0118 974 6000
E-mail	Environmental.health@wokingham.gov.uk
Report Reference number	WOK ASR2017
Date	August 2017

Executive Summary: Air Quality in Our Area

Air Quality in Wokingham Borough

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 billion³.

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 (NO₂) and three Air Quality Management Areas (AQMAs) have been declared for exceedances of the annual mean NO₂ objective. These are located in Wokingham Town Centre, Twyford Crossroads 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).

NO₂ levels in 2016 have generally shown a decrease on 2015 levels for the diffusion tube sites, with 37 levels reduced compared to 2015. 26 sites and the 2 automatic units showed increased compared to the previous year. 2 sites remained the same. There were 5 diffusion tube sites in exceedance of the annual mean NO₂ objective. The automatic monitoring unit in Peach Street Wokingham recorded an exceedance of the annual mean NO₂ objective. There were no exceedances of the 60µg/m³ 1 hour NO₂ objective recorded.

Within the M4 AQMA, an annual mean NO₂ concentration of 34.2µg/m³ was recorded by the Whitley Wood Lane automatic monitoring unit. This was also below the level of concern (i.e. >36µg/m³ - the contour on which the M4 AQMA was declared). There were 2 exceedances of the 1 hour objective level but this did not exceed the 18 exceedances permitted.

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

Wokingham Borough Council

Within the Wokingham Town Centre AQMA, an annual mean NO₂ concentration of 41.3µg/m³ was recorded by the Wokingham automatic monitoring unit. There were 10 exceedances of the 1 hour objective level but this did not exceed the 18 permitted.

The NO₂ annual mean objective was exceeded at 5 of the 59 diffusion tube sites in 2016 where relevant exposure existed. Four of these sites were located within the existing AQMAs. Three were located in the Wokingham Town Centre AQMA which were WOK844 Giggling Spring, Shute End (45µg/m³), WOK844 Buckingham Court (40.5 µg/m³) and WOK 857 1 Rectory Road (45 µg/m³); and the other in the Twyford Crossroads AQMA was WOK850 19 High Street (43µg/m³). The final site of exceedance was located at WOK864 1 Waltham Road, Twyford (43 µg/m³) which is approximately 22m east of the south-eastern boundary of the Twyford Crossroads AQMA.

The outcome of the Updated Detailed Assessment (PBA Feb 2017) was that the Twyford Crossroads AQMA boundary does not need to be amended as the area of exceedance does not include any additional locations of relevant exposure. For the Wokingham Town Centre AQMA, given the extensive road works affecting traffic flows within the Wokingham area, it was recommended that the Council continues to monitor the areas of concern to identify whether or not the annual mean objective is exceeded and on a precautionary basis, the areas of concern would include the locations of relevant exposure within the 36 µg/m³ contour.

The preparation of Air Quality Action Plans for these two areas in commenced in 2016 and is due to be consulted and published in 2017.

As part of a unitary authority 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 decisions. 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. The Local Plan Update (2026-2036) has commenced following which the next Transport Vision review will take place along with the next LTP.

The link between air quality, particularly from PM_{2.5}, and public health in Wokingham Borough requires further exploration however working with the Strategic Berkshire Public Health Team has commenced and a meeting held with the Director of Public Health for Berkshire taken place.

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 2016, 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.

Conclusions and Priorities

One of Wokingham Borough Council's priorities is to "tackle traffic congestion in specific areas of the Borough" and one of its underpinning principles is to "improve health, wellbeing and quality of life".

The following local priorities have been set in Wokingham Borough:

- Exploring the link between public health and PM_{2.5};

- Continuing the 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;
- Complete and publish the AQAP for the Wokingham Town Centre and Twyford Crossroads AQMAs;
- Consider revocation of the M4 AQMA following the opening of the new motorway bridge as part of the Shinfield Eastern Relief Road Scheme;
- Continue the continuous and passive air quality monitoring programmes; and
- Impact of the National Air Quality Plan.

The following challenges have been identified:

- Budget allocation for progressing measures and actions however funding applications will be applied for where possible/appropriate; and
- Linking of the Public Health Outcome Framework and health profiles to air quality to show any causal relationship.

Local Engagement and 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 NO₂ 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-andlicensing>

Table of Contents

Executive Summary: Air Quality in Our Area	i
Air Quality in Wokingham Borough	i
Actions to Improve Air Quality	iii
Conclusions and Priorities	iii
Local Engagement and How to get Involved	iv
1 Local Air Quality Management	1
2 Actions to Improve Air Quality	2
2.1 Air Quality Management Areas	2
2.2 Progress and Impact of Measures to address Air Quality in Wokingham Borough	7
2.3 PM _{2.5} – Local Authority Approach to Reducing Emissions and/or Concentrations	20
3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance	21
3.1 Summary of Monitoring Undertaken	21
3.1.1 Automatic Monitoring Sites	21
3.1.2 Non-Automatic Monitoring Sites	21
3.2 Individual Pollutants	21
3.2.1 Nitrogen Dioxide (NO ₂)	22
3.2.2 Particulate Matter (PM ₁₀)	24
3.2.3 Particulate Matter (PM _{2.5})	24
3.2.4 Sulphur Dioxide (SO ₂)	25
Appendix A: Monitoring Results	26
Appendix B: Full Monthly Diffusion Tube Results for 2016	39
Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC	43
Appendix D: Map(s) of Monitoring Locations and AQMAs	49
Appendix E: Summary of Air Quality Objectives in England	79
Glossary of Terms	80
References	81

List of Tables

Table 2.1 – Declared Air Quality Management Areas	4
Table 2.2 – Progress on Measures to Improve Air Quality	10

1 Local Air Quality Management

This report provides an overview of air quality in Wokingham Borough during 2016. 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 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 compliance with the objectives.

A summary of AQMAs declared by Wokingham Borough can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at maps of AQMA boundaries are available online at

https://uk-air.defra.gov.uk/aqma/local-authorities?la_id=318 and the full list at

<http://uk-air.defra.gov.uk/aqma/list>.

Alternatively, see Short-term to Long-term Data Adjustment

When referring to LAQM.TG(16) the calculations for annualising the monitoring data for Westminster Way Lower Earley (WOK855) has been possible using 2016 data as recommended in this guidance (Box 7.9).

Short term to long term data adjustment – Wokingham Town Centre Unit

Site	Site Type	Annual Mean 2016 ($\mu\text{g}/\text{m}^3$)	Period Mean 2016 ($\mu\text{g}/\text{m}^3$)	Ratio
Reading	Background	31	28	0.903
Canterbury	Background	15.5	13.9	0.897
Average				0.9
Measured mean concentration (18) x average				16.2

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>) with the DEFRA background mapping data for LAs 2013 –based background maps for the year 2016. The following sites were calculated:

WOK11, WOK 19, WOK52, WOK53, WOK57,WOK70, WOK71,WOK503, WOK505, WOK509, WOK601, WOK602, WOK605, WOK803, WOK804, WOK817, WOK827, WOK831, WOK835, WOK 836, WOK 841, WOK844, WOK850, WOK 858/859/860, WOK861, WOK863, WOK867, WOK868, WOK869, WOK871/875/876, WOK872, WOK874, WOK877, WOK878, WOK 879/880/881, and WOK882.

Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMAs.

There are no proposals to declare a new AQMA.

There are no proposals to amend any of the AQMAs, following the outcome of the Updated Detailed Assessment (DA) of nitrogen dioxide concentrations within Twyford Crossroads and Wokingham Town Centre. The 2016 Air Quality Annual Status Report (ASR) identified WOK864 Waltham Road, Twyford, as a diffusion tube monitoring location as relevant exposure outside an AQMA that exceeded the nitrogen dioxide annual mean objective. The report stated that the Twyford Crossroads AQMA boundary may need to be amended and further assessments of air quality required for the Wokingham Town Centre and Twyford Crossroads Air Quality Management Areas (AQMAs). Concentration contours were plotted to determine the maximum area of exceedance of the annual mean objective and compared with the boundaries of the declared AQMAs. The assessment confirmed that the annual mean nitrogen dioxide objective was being exceeded at locations of relevant exposure within both Twyford and Wokingham. The receptors exceeding the objective are all within the declared AQMAs. In Twyford, the contour plot of the annual mean NO₂ concentration of 40 µg/m₃ showed that the area of exceedance of the annual mean objective remains similar to the declared Twyford Crossroads AQMA, except for an extension of the area south along Waltham Road. However, the extended area of exceedance does not include any additional locations of relevant exposure and therefore no alteration to the declared AQMA is required. Given the extensive road works affecting traffic flows within the Wokingham town area, it was recommended that the Council continued to monitor the areas of concern to identify whether or not the annual mean objective was exceeded. On a precautionary basis, the areas of concern would include the locations of relevant exposure within the 36 µg/m₃ contour. Similarly, monitoring should continue within the Twyford area.

Wokingham borough will now consider revocation following 2017 monitoring completed to ensure 3 full years of levels below the objective level of the M4 AQMA following the opening of the new motorway bridge as part of the Shinfield Eastern Relief Road Scheme.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Date of Declaration	Pollutants and Air Quality Objectives	City / Town	One Line Description	Is air quality in the AQMA influenced by roads controlled by Highways England?	Level of Exceedance (maximum monitored/modelled concentration at a location of relevant exposure)		Action Plan (inc. date of publication)
						At Declaration	Now	
M4 AQMA	Declared 28/09/2001 Amended 07/05/2004	Annual mean Nitrogen Dioxide	Wokingham borough	Zone 60m either side of the M4 from Council's boundaries with RBC & RBW&M throughout the borough and 10m either side of the A329(M)/A3290. The AQMA was reduced to the Council's boundaries with RBC & RBW&M throughout the borough and 10m either side of the A329(M)/A3290 including an extended area	YES	69 (2001) 56 (2004)	37.2 (site WOK841)	Refer to LTP3: http://www.wokingham.gov.uk/parking-road-works-and-transport/transport-and-roads-guidance-and-plans/?categoryesctl91f252ff-550d-4cfa-a838-92ef2cb5f83c=7749

Wokingham Borough Council

				along the A329 Reading Rd, where it underpasses the M4.				
M4 AQMA	Declared 28/09/2001 Revoked 07/05/2004	1 hour Nitrogen dioxide	Wokingham borough	Zone 60m either side of the M4 from Council's boundaries with RBC & RBW&M throughout the borough and 10m either side of the A329(M)/A3290	YES	228 (99.8 th percentile of hourly means)	N/A	N/A
Twyford Crossroads AQMA	Declared 09/12/2015	Annual mean Nitrogen Dioxide	Twyford	Residential and commercial properties along parts of High St in the west, Wargrave Rd in the northwest, London Rd in the north-east and Church St the south-east.	NO	54	43	Development in progress
Wokingham Town Centre AQMA	Declared 09/12/2015	Annual mean Nitrogen Dioxide	Wokingham	Residential and commercial properties along a small part of Reading Rd and Station Rd in the northwest,	NO	52	45	Development in progress

				along Shute End and into Broad St and Denmark St in the south-west and Peach St into London Rd in the west.				
--	--	--	--	---	--	--	--	--

☐ Wokingham Borough Council confirm the information on UK-Air regarding their AQMA(s) is up to date

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

DEFRA's appraisal of last year's ASR concluded that the conclusions reached were acceptable for all sources and pollutants. The next step was to finalise the Action Plans for Wokingham and Twyford. To this end a stakeholder workshop was held on 31st January 2017 and the draft Plan sent out for consultation on 14th June 2017. The commentary also noted that there were quite a few monitoring locations that are not representative of relevant exposure. It has not been possible to relocate the tubes in order to achieve this and all of the locations which require to be distance corrected to nearest exposure have been calculated in accordance with TG16 using the fall off with distance calculator.

Wokingham Borough has taken forward a number of direct measures during the current reporting year of 2016 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Key completed measures are: items numbers 1-29 and 31-35, which were predominantly as a result of LSTF funding.

It is expected that the following measures to be completed over the course of the next reporting year: item number 40, the Shinfield Eastern Relief Road this is of significance as the expected impact of this new road is that the M4 AQMA in this location may be revoked as a result of the new bridge over the M4 and the movement of traffic (except buses) away from the residential receptors.

Wokingham Borough Council's priorities for the coming year are continued progress with the north and south Wokingham distributor relief roads construction.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, Wokingham Borough Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Twyford Crossroads and Wokingham Town Centre AQMAs.

Progress on adopting the Draft M4 AQAP stalled in 2015 -2016 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 3 years has also revealed no exceedances of the NO₂ annual mean objective within the M4 AQMA. Reduced monitoring is continuing within the M4 AQMA in 2017 and the outcome may determine if the M4 AQMA can be revoked in 2017 thus removing the requirement for an AQAP for this area. The effect of the Shinfield Eastern Relief Road Scheme, a new bridge over the M4, which opened for southbound traffic at end July 2016 whilst the remaining northbound traffic stayed on the original A327 until 07/09/16.

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 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-andlicensing/>) and the Health and Wellbeing Strategy 2014-2017

(<http://www.wokingham.gov.uk/council-and-meetings/open-data/planspolicies-andstrategies/?assetdet7653806=345516&categoryesctl8486112=7736&assetdet8733745=345516&categoryesctl9084667=7736>)

(<http://www.wokingham.gov.uk/council-and-meetings/open-data/planspolicies-andstrategies/?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. Finalise the AQAP for the Wokingham Town Centre and Twyford Crossroads AQMAs.

The Action Plans are required by mid 2017.

5. 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 2017.

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

Automatic monitoring within the Wokingham Town Centre AQMA in Peach Street will continue during 2017 as well as passive monitoring at 59 diffusion tube sites (which includes 2 co-location studies).

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Organisations involved and Funding Source	Planning Phase	Implementation Phase	Key Performance Indicator	Reduction in Pollutant / Emission from Measure	Progress to Date	Estimated / Actual Completion Date	Comments / Barriers to implementation
1	Miles Road Woodley New Cycle Route	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
2	Cutbush Lane New Cycle Route	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
3	Black Boy RBT Cycleway improvements	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	Yes – unknown	Implementation	2014	Completed 2015/16
4	Barncroft Drive New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
5	Paddick Drive New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base	N/A	Implementation	2014	Completed 2015/16

Wokingham Borough Council

		cture					year				
6	Meldreth Way New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
7	Hurricane Way Woodley New Cycleway	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
8	A329 Cycleway Corridor Phases, 1, 2 & 3	Transport Planning and Infrastructure	Cycle network	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
9	Bike It Officer	Promoting Travel Alternatives	Promotion of cycling	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16
10	Cycle Road shows	Promoting Travel Alternatives	Promotion of cycling	WBC LSTF		2014	19% increase in cycling activity compared to 2013 base year	N/A	Implementation	2014	Completed 2015/16

Wokingham Borough Council

11	Cycle promotion video	Promoting Travel Alternatives	Promotion of cycling	WBC LSTF	Complete	2014	100000 views on youtube	N/A	Implementation	2014	Completed 2015/16
12	Plough Lane New Footway	Transport Planning and Infrastructure	Other	WBC LSTF		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	Completed 2015/16
13	Barn Manor New footway	Transport Planning and Infrastructure	Other	WBC LSTF		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	Completed 2015/16
14	Reading Road, new pedestrian islands	Transport Planning and Infrastructure	Other	WBC LSTF		2014	7.4% increase in walking activity compared to base year 3700 residents involved with Beat the Street and walked	Yes – unknown	Implementation	2014	Completed 2015/16

Wokingham Borough Council

							55,000 miles in a round the world challenge				
15	Rushy Way Pedestrian signal upgrade	Transport Planning and Infrastructure	Other	WBC LSTF		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	Completed 2015/16
16	Active Travel Officer	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC LSTF		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	Yes – unknown	Implementation	2014	Completed 2015/16
17	Community Walking Challenge	Promoting Travel Alternatives	Personalised Travel Planning	WBC LSTF		2014	7.4% increase in walking activity compared to base year 3700 residents involved with Beat the Street and walked	Yes – unknown	Implementation	2014	Completed 2015/16

Wokingham Borough Council

							55,000 miles in a round the world challenge				
18	Beat the Street (Walking 2000 residents)	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC LSTF		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	Yes – unknown	Implementation	2014	Completed 2015/16
19	New walking & Cycle mapping	Public Information	Via leaflets	WBC LSTF		2014		Yes – unknown	Implementation	2014	Completed 2015/16
20	Wokingham Town Personal Travel Planning (4000 residents)	Promoting Travel Alternatives	Personalised Travel Planning	WBC LSTF		2014	10% reduction in Car trips in Woosehill & Emmbrook	Yes – unknown	Completed 2015	2014	Completed 2015/16
21	Wokingham Travel Smart Phone app	Promoting Travel Alternatives	Personalised Travel Planning	WBC LSTF		2014	10% reduction in Car trips in Woosehill & Emmbrook	Yes – unknown	Implementation	2014	Completed 2015/16
22	Job Seekers Personal Travel Planning	Promoting Travel Alternatives	Personalised Travel Planning	WBC LSTF		2014	10% reduction in Car trips in Woosehill & Emmbrook	Yes – unknown	Implementation	2014	Completed 2015/16

Wokingham Borough Council

23	Business Travel Planning	Promoting Travel Alternatives	Workplace Travel Planning	WBC LSTF		2014	10% reduction in Car trips in Woosehill & Emmbrook	Yes – unknown	Implementation	2014	Completed 2015/16
24	Commuter Challenge	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure	WBC LSTF		2014	4 tonnes of CO2 saved	Yes – unknown	Implementation	2014	Completed 2015/16
25	Showcase Cinema - Traffic signal upgrades	Traffic Management	Testing Vehicle Emissions	WBC LSTF		2014	7% increase in the average speed of vehicles travelling along A329 corridor	Yes – unknown	Implementation	2014	Completed 2015/16
26	Traffic Signal improvement	Traffic Management	UTC, Congestion management, traffic reduction	WBC LSTF		2014	7% increase in the average speed of vehicles travelling along A329 corridor	Yes – unknown	Implementation	2014	Completed 2015/16
27	Nine Mile Ride - New bus stops	Transport Planning and Infrastructure	Bus route improvements	WBC LSTF		2014		N/A	Implementation	2014	Completed 2015/16
28	Bus shelter replacement	Transport Planning and Infrastructure	Bus route improvements	WBC LSTF	Complete	2014	14% increase in bus patronage along A329 corridor	Yes – unknown	Implementation	2014	Completed 2015/16
29	Station Travel plans	Promoting Travel Alternatives	Promote use of rail and inland waterways	WBC LSTF	Complete	2014	On average 4% increase in passenger numbers	Yes – unknown	Implementation	2014	Completed 2015/16
30	Micro Park and Rides	Alternatives to private vehicle	Bus based Park & Ride	WBC	TBA	2014	TBA	N/A	Scheme not progressed	2014	Removed

Wokingham Borough Council

		use									
31	Winnersh Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	WBC	Complete	2014	Data not yet available	Yes – unknown	Implementation	2014	Completed 2015/16
32	Mere oak 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	Completed 2015/16
33	Website development	Public Information	Via the internet	WBC		2014	18,000 visits up to end of 2014	N/A	Implementation	2014	Completed 2015/16
34	Coms & PR	Public Information	Via the internet	WBC		2014	Over 100,000 views on youtube for My Journey promotional videos	N/A	Implementation	2014	Completed 2015/16
35	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	Completed 2015/16
36	Thames Valley Park and Ride	Alternatives to private vehicle use	Bus based Park & Ride	WBC	Ongoing	2016	TBA	N/A	Planning permission granted	Works commence 2018	

Wokingham Borough Council

37	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, planning permission being sought in August 2017	TBC	
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	No. of phases completed	2019	2016/17 development ongoing
39	South Wokingham Distributor road	Traffic Management	Strategic highway improvements, Re-prioritising road space away from	WBC		2016	TBA	Yes - unknown	Montague Park completed	Phase 1 by 2018	2016/17 development ongoing

Wokingham Borough Council

			cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane								
40	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	Near completion	2017	Due to be fully open in autumn 2017
41	My Journey Wokingham project	Promoting Travel Alternatives	Intensive active travel campaign & infrastructure			2016 onwards	Delivery of a Borough Wide Travel Plan		Implementation	2036	
42	A329 cycleway Phase 4 & 5 (NCN422)	Transport Planning and Infrastructure	Cycle network	WBC		2017	10% increase in cycling activity compared to 2013 base year	N/A	Implementation	2019	

Wokingham Borough Council

43	Introduction of low emission bus fleet	Transport Planning and Infrastructure	Promoting low emission transport	RBC/Reading Buses		2016 onwards	All fleet to be low emission 2025		Implementation	2025	
44	Bikeability Training	Promotion of travel alternatives	Promotion of cycling	WBC		Yearly	70% of all 10 - 11 year olds trained		Implementation	Ongoing	
45	Bader Way Cycleway Phase 1	Transport Planning and Infrastructure	Cycle network	WBC		2017/18	Base year monitoring to be completed		Implementation	2018	
46	Civil parking enforcement	Traffic management	Workplace Parking Levy, Parking Enforcement on highway	WBC		2017	TBA		Implementation	ongoing	Due to come into effect oct 2017

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 is taking the following measures to address PM_{2.5}:

1. The Health and Wellbeing Strategy (2014-2017) and the Public Health Work Plan 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. Development of a joint action plan between Public Health and Environmental

Health for air quality will consider in detail how Wokingham Borough will consider 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 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 objectives.

Wokingham Borough undertook automatic (continuous) monitoring at 2 sites during 2016. 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/>

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 undertook non- automatic (passive) monitoring of NO₂ at 61 sites during 2016. 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 at the automatic monitoring unit within the Wokingham Town Centre AQMA. A triplicate monitoring site was within the Twyford Crossroads AQMA. Table A.2 in Appendix A shows the details of the sites.

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) for the diffusion tubes, including bias adjustments and any other adjustments applied (e.g. “annualisation” and/or distance correction), are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

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

For diffusion tubes, the full 2016 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO₂ hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m³, not to be exceeded more than 18 times per year.

Whitley Wood Lane, Shinfield

The annual mean NO₂ concentration of 34.2µg/m³ recorded by the Whitley Wood Lane automatic monitoring unit shows that within the M4 AQMA, NO₂ levels have been recorded below both the objective level and below the level of concern (i.e. >36µg/m³ - the contour on which the AQMA was declared). This is fourth year that monitoring has been carried out for a full calendar year at this site and the annual mean concentration for 2016 is lower than the mean concentration for the monitoring carried out in the previous years. There were 2 exceedances of the 200µg/m³ hourly mean objective recorded, therefore not exceeding the 18 times permitted. These were on 20/01/16 at 19:00-20:00 and 20:00-21:00. Hourly levels ranged from 0.2 to 256.1 µg/m³ and monthly levels ranged from 22 to 59 µg/m³. The data capture rate for the unit was good with a rate of greater than 91% being achieved. The monthly average concentrations are slightly lower than the diffusion tube results apart from January and December where the analyser results are higher than the diffusion tube results. The hourly trends are comparable with AURN monitoring stations in Oxford Roadside and Reading New Town.

Wokingham

The annual mean NO₂ concentration of 41.3 µg/m³ was recorded by the Wokingham automatic monitoring unit in 2016. This shows that within the Wokingham Town Centre AQMA, NO₂ levels were exceeding the objective limit. This is an increase on the 2015 annualised result of 35 µg/m³. Data capture was a good rate of 91.9%. The average monthly NO₂ concentrations recorded both on the continuous monitoring unit and diffusion tubes are consistent with each other apart from September and December when the concentrations on the continuous monitoring unit are lower.

There were 10 exceedances of the $200\mu\text{g}/\text{m}^3$ hourly mean objective recorded. These occurred on 19/01/16 at 08:00-09:00 and 09:00-10:00, 06/05/16 at 16:00-17:00, 08/11/16 at 06:00-07:00, 07:00-08:00 and 08:00-09:00, 29/11/16 at 19:00-20:00, 30/11/16 at 18:00-19:00, 05/12/16 at 09:00-10:00, and 28/12/16 at 12:00-13:00. All of the exceedances occurred on weekdays in the morning or evening rush hour periods except for 28/12/16. The hourly levels ranged from 0.9 to $363.5\mu\text{g}/\text{m}^3$ and monthly levels ranged from 30 to $50\mu\text{g}/\text{m}^3$.

The hourly results have been compared to other nearby sites. The trends in concentrations compare well to the Newbury, Whitely Wood and Oxford Centre Roadside sites.

Diffusion Tube Data

The annual mean objective of $40\mu\text{g}/\text{m}^3$ was exceeded at 5 of the monitoring sites, 4 of which were recorded within AQMAs. All mean concentrations were less than $60\mu\text{g}/\text{m}^3$ which therefore does not indicate any exceedance of the 1-hour objective.

The overall trend was that at 37 sites the 2016 result was a reduced level compared to 2015. This could be due to distance correction being applied to all sites where required, ie other than those with /close to AQMAs that had only been calculated previously. 26 sites increased in concentration compared to 2015. 2 sites remained the same. 1 new site was set up and 4 sites ceased on 31/12/15 (WOK63, WOK839, WOK848, and WOK852). Also the triplicate co-location study at Old Whitely Wood Lane Shinfield continuous monitoring site ended on 13/12/16 (WOK858/WOK859/WOK860).

M4 AQMA

There were no exceedances within the AQMA. If the levels continue to decrease the AQMA could be considered for revocation.

Wokingham Town Centre AQMA

Within this AQMA 3 sites exceeded the annual mean objective in 2016. These were:

- WOK 838 Giggling Spring Shute End – this was an increase in concentration on 2015 level to $45\mu\text{g}/\text{m}^3$, and the site has exceeded for the last 5 years

- WOK844 Buckingham Court – this was an increase in concentration on 2015 level to 40.5 $\mu\text{g}/\text{m}^3$, and the site has exceeded for the last 4 of 5 years
- WOK857 1 Rectory Road – this was an increase in concentration on 2015 level to 45 $\mu\text{g}/\text{m}^3$, and the site has exceeded for the last 4 years since monitoring commenced.

The sites all represent relevant exposure.

Twyford Crossroads AQMA

Within this AQMA 1 site exceeded the annual mean objective in 2016. This was:

- WOK850 19 High Street – this was a decrease in concentration from 2015 to 42 $\mu\text{g}/\text{m}^3$ and this site has exceeded for last 5 years.

This site is representative of relevant exposure.

Outside of the AQMAs

WOK864 1 Waltham Road Tywford was the 1 site which exceeded the annual mean level with a result of 43 $\mu\text{g}/\text{m}^3$. This site has increased year on year for the last 3 years since monitoring commenced. This site is not within the Twyford Crossroads AQMA but is only 22m to the south east. The Updated Detailed Assessment: Wokingham and Twyford (February 2017) concluded that in Twyford, the contour plot of the annual mean NO_2 concentration of 40 $\mu\text{g}/\text{m}^3$ shows that the area of exceedance of the annual mean objective remains similar to the declared Twyford Crossroads AQMA, except for an extension of the area south along Waltham Road. However, the extended area of exceedance does not include any additional locations of relevant exposure and therefore no alteration to the declared AQMA is required. In light of this result for 2016 monitoring will continue in 2017 and a decision then made if the AQMA requires extending in this location.

3.2.2 Particulate Matter (PM_{10})

No particulate matter (PM_{10}) monitoring is undertaken.

3.2.3 Particulate Matter ($\text{PM}_{2.5}$)

No particulate matter ($\text{PM}_{2.5}$) monitoring is undertaken.

3.2.4 Sulphur Dioxide (SO₂)

No sulphur dioxide monitoring is undertaken.

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	Old Whitely Wood Lane Shinfield	Roadside	472542	168687	NO ₂	YES	Chemiluminescent	2	18.31	1.5
CM2	Peach Street Wokingham	Roadside	481348	168603	NO ₂	YES	Chemiluminescent	3	1.5	1.5

Notes:

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic 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	Roadside	478133	170598	NO ₂	NO	4	2.4	NO	2.3
WOK19	Thames Street (by bridge) Sonning	Roadside	475583	175704	NO ₂	NO	22	2	NO	2.25
WOK52	Westende Flats London Road Wokingham	Urban Centre	481521	168750	NO ₂	NO	3	1.9	NO	2.35
WOK53	Dunt Lane Hurst	Roadside	479770	171088	NO ₂	YES	28	1.2	NO	2
WOK57	Bill Hill Park Hurst	Roadside	480170	170885	NO ₂	NO	10	0.5	NO	2.4
WOK70	Longdon Road Winnersh	Roadside	478011	170135	NO ₂	YES	25	1.7	NO	2.35
WOK71	38 King Street Lane Winnersh	Roadside	477907	170191	NO ₂	NO	20	3.1	NO	2.4
WOK98	309 Reading Road Winnersh	Roadside	478611	170225	NO ₂	YES	0	11.8	NO	1.65
WOK503	25 Rainworth Close Lower Earley	Suburban	474251	169683	NO ₂	NO	3	0.5	NO	2.1

Wokingham Borough Council

WOK505	23 Church Road Earley	Roadside	474444	172062	NO ₂	NO	10	1.8	NO	2.15
WOK509	Henley Bridge Remenham	Roadside	476414	182648	NO ₂	NO	7	4.7	NO	2.3
WOK601	Sadlers Lane Winnersh	Roadside	478815	170068	NO ₂	NO	15	1.5	NO	1.9
WOK602	2 Green Lane Winnersh	Roadside	478739	170107	NO ₂	YES	3	1.7	NO	1.65
WOK605	33 King Street Winnersh	Roadside	478007	170301	NO ₂	NO	13	2.2	NO	2.2
WOK802	26 Station Road Wokingham	Roadside	480675	168647	NO ₂	NO	0	8.6	NO	2.3
WOK803	3 Wellington Road Wokingham	Roadside	480651	168544	NO ₂	NO	3	1.1	NO	2.3
WOK804	Jewsons Oxford Road Wokingham	Roadside	480583	168622	NO ₂	NO	18	1.6	NO	1.9
WOK805	18 Barkham Road Wokingham	Roadside	480547	168543	NO ₂	NO	0	5.7	NO	1.9
WOK808	Kings Place Station Road Wokingham	Roadside	480807	168743	NO ₂	NO	0	4.5	NO	2.3
WOK817	298 London Road Wokingham	Roadside	483227	168801	NO ₂	NO	11.5	2.1	NO	2.2
WOK824	High Street north Wargrave	Roadside	478510	178476	NO ₂	NO	0	1.96	NO	2.3
WOK825	High Street	Roadside	478541	178634	NO ₂	NO	0	2.2	NO	2.1

Wokingham Borough Council

	south Wargrave									
WOK827	The Old Station Hse Station Rd Twyford	Kerbside	479047	175831	NO ₂	NO	3	1	NO	2.3
WOK829	Long Acre Thames St Sonning	Roadside	475806	175577	NO ₂	NO	0	1.7	NO	2.3
WOK831	69 May's Lane Earley	Roadside	474660	172329	NO ₂	NO	4	2.27	NO	2.3
WOK835	14 Robinhood Ln Winnersh	Roadside	478192	170672	NO ₂	NO	8	1.52	NO	2.2
WOK836	343 Old Whitley Wood Lane Shinfield	Roadside	472321	168688	NO ₂	YES	7.5	1.21	NO	2.3
WOK838	Giggling Spring Shute End Wokingham	Roadside	480979	168979	NO ₂	YES	0	2.81	NO	2.3
WOK840	30 Finbeck Way Lower Earley	Suburban	473128	168776	NO ₂	NO	0	18.4	NO	1.7
WOK841	2 Lane End Villas Shinfield	Roadside	473128	168776	NO ₂	YES	4.5	3.2	NO	2.4
WOK842	Foxglade, Brookers Hill Shinfield	Other	472739	168658	NO ₂	YES	0	35.5	NO	1.6
WOK844	Buckingham Court Wokingham	Roadside	481492	168775	NO ₂	YES	1.32	1.21	NO	2.4
WOK845	16 Mayfields Sindlesham	Roadside	477404	170074	NO ₂	YES	0	21.1	NO	1.4

Wokingham Borough Council

WOK846	4 Hatch Farm Cottages Sindlesham	Roadside	477135	170020	NO ₂	YES	0	39	NO	7.75
WOK847	Wellness Clinic High Street Wargrave	Roadside	478537	178606	NO ₂	NO	0	1.2	NO	2.25
WOK850	19 High Street Twyford	Roadside	478738	175986	NO ₂	YES	0.3	1.2	NO	2.35
WOK853	Shefford Crescent Wokingham	Urban Background	481630	169586	NO ₂	NO	n/a	46	NO	2.35
WOK854	The Manor Shinfield	Urban Background	473100	168220	NO ₂	NO	n/a	25	NO	2.4
WOK855	Westminster Way Lower Earley	Urban Background	475132	170363	NO ₂	NO	n/a	39	NO	2.4
WOK857	1 Rectory Road Wokingham	Roadside	481044	168733	NO ₂	YES	0	2	NO	2.4
WOK858	Whitely Wood Unit 1	Roadside	472542	168697	NO ₂	YES	1.4	18.3	YES	1.4
WOK859	Whitely Wood Unit 2	Roadside	472542	168697	NO ₂	YES	1.4	18.3	YES	1.4
WOK860	Whitely Wood Unit 3	Roadside	472542	168697	NO ₂	YES	1.4	18.3	YES	1.4
WOK861	Mill Lane (by bridge) Shindlesham	Roadside	476981	170120	NO ₂	YES	12.6	1	NO	1.8
WOK862	Marsh Mills Cottage	Roadside	477373	181811	NO ₂	NO	0	1.7	NO	2.4

Wokingham Borough Council

	Remenham									
WOK863	3 Wargrave Road Twyford	Roadside	478768	176012	NO ₂	YES	1.95	0.9	NO	2.35
WOK864	1 Waltham Road Twyford	Roadside	478891	175942	NO ₂	NO	0	3.4	NO	2.35
WOK865	13 Langborough Road Wokingham	Roadside	481159	168275	NO ₂	NO	0	3	NO	2.3
WOK866	58 Denmark Street Wokingham	Roadside	481033	168300	NO ₂	NO	0	5	NO	1.8
WOK867	21 Denmark Street Wokingham	Roadside	481104	168444	NO ₂	YES	0.5	1.45	NO	2.5
WOK868	59 London Road Wokingham	Roadside	481639	168796	NO ₂	YES	3.3	1.4	NO	2.45
WOK869	Mulle 26 High Street Twyford	Roadside	478681	175998	NO ₂	NO	0.5	0.5	NO	2.45
WOK870	Hunt&Nash Church Street Twyford	Roadside	478813	175975	NO ₂	YES	0	1.9	NO	2.5
WOK871	15 London Road Twyford 1	Roadside	478829	176023	NO ₂	YES	0.8	1.6	NO	2.45
WOK872	Old Registry Office Reading Road Wokingham	Roadside	480816	168793	NO ₂	YES	0.3	2.6	NO	2.35
WOK873	27 The Terrace	Roadside	480863	168787	NO ₂	NO	0	0	NO	2.5

Wokingham Borough Council

	Wokingham									
WOK874	Corner Broad St & Rose St Wokingham	Roadside	481027	168721	NO ₂	YES	1.7	1.1	NO	2.35
WOK875	15 London Road Twyford 2	Roadside	478829	176023	NO ₂	YES	0.8	1.6	NO	2.45
WOK876	15 London Road Twyford 3	Roadside	478829	176023	NO ₂	YES	0.8	1.6	NO	2.45
WOK877	Almshouses London Road Twyford	Roadside	478903	176060	NO ₂	NO	1.7	3.2	NO	2.45
WOK878	17 Wargrave Road Twyford	Roadside	478719	176099	NO ₂	NO	4.2	2	NO	2.4
WOK879	Peach Street Wokingham Unit 1	Roadside	481348	168603	NO ₂	YES	3	1.5	YES	1.4
WOK880	Peach Street Wokingham Unit 2	Roadside	481348	168603	NO ₂	YES	3	1.5	YES	1.4
WOK881	Peach Street Wokingham Unit 3	Roadside	481348	168603	NO ₂	YES	3	1.5	YES	1.4
WOK882	341 Whitley Wood Lane Shinfield	Roadside	472298	168679	NO ₂	NO	3	1	NO	2.18

Notes:

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2016 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2012	2013	2014	2015	2016
CM1 Old Whitley Wood Lane Shinfield	Roadside	Automatic	100	92	–	35	36.9	33.5	34.2
CM2 Peach Street Wokingham	Roadside	Automatic	100	92	–	–	–	35	41.3
WOK11	Roadside	Diffusion Tube	92	92	35	35	36	32	31.9
WOK19	Roadside	Diffusion Tube	100	100	28	27	25	27	22.2
WOK52	Urban Centre	Diffusion Tube	100	100	38	38	36	33	30.8
WOK53	Roadside	Diffusion Tube	92	92	32	28	30	27	22
WOK57	Roadside	Diffusion Tube	100	100	23	25	23	21	20.4
WOK70	Roadside	Diffusion Tube	83	83	34	36	33	29	25
WOK71	Roadside	Diffusion Tube	100	100	36	37	37	33	24.3
WOK98	Roadside	Diffusion Tube	100	100	35	33	32	32	29
WOK503	Suburban	Diffusion Tube	100	100	33	32	32	31	27
WOK505	Roadside	Diffusion Tube	100	100	41	42	37	38	31.5
WOK509	Roadside	Diffusion Tube	92	92	29	27	28	27	24.4
WOK601	Roadside	Diffusion Tube	92	92	30	32	25	25	24.8

Wokingham Borough Council

WOK602	Roadside	Diffusion Tube	92	92	28	31	27	28	27.4
WOK605	Roadside	Diffusion Tube	100	100	38	38	35	31	27.3
WOK802	Roadside	Diffusion Tube	100	100	29	30	27	20	21
WOK803	Roadside	Diffusion Tube	100	100	35	33	31	28	29.1
WOK804	Roadside	Diffusion Tube	100	100	33	37	31	21	19.6
WOK805	Roadside	Diffusion Tube	100	100	30	29	26	24	27
WOK808	Roadside	Diffusion Tube	100	100	30	31	29	21	23
WOK817	Roadside	Diffusion Tube	92	92	36	38	35	29	26.1
WOK824	Roadside	Diffusion Tube	83	83	34	33	32	30	29
WOK825	Roadside	Diffusion Tube	100	100	40	38	37	35	36
WOK827	Kerbside	Diffusion Tube	100	100	28	28	27	27	23.4
WOK829	Roadside	Diffusion Tube	100	100	37	34	31	31	33
WOK831	Roadside	Diffusion Tube	100	100	32	31	28	25	25.8
WOK835	Roadside	Diffusion Tube	92	92	36	33	32	33	28.5
WOK836	Roadside	Diffusion Tube	100	100	42	39	42	38	29.6
WOK838	Roadside	Diffusion Tube	100	100	55	57	51	43	45
WOK840	Suburban	Diffusion Tube	100	100	28	26	27	24	24
WOK841	Roadside	Diffusion Tube	92	92	52	48	42	39	37.2

Wokingham Borough Council

WOK842	Roadside	Diffusion Tube	100	100	29	31	27	26	29
WOK844	Roadside	Diffusion Tube	83	83	47	50	46	39	40.5
WOK845	Roadside	Diffusion Tube	100	100	33	30	26	26	28
WOK846	Roadside	Diffusion Tube	100	100	29	31	26	27	29
WOK847	Roadside	Diffusion Tube	100	100	40	40	38	34	35
WOK850	Roadside	Diffusion Tube	100	100	51	57	54	46	43
WOK853	Urban Background	Diffusion Tube	83	83	–	19	18	15	17
WOK854	Urban Background	Diffusion Tube	92	92	–	19	17	16	18
WOK855	Urban Background	Diffusion Tube	67	67	–	17	15	16	16.2
WOK857	Roadside	Diffusion Tube	100	100	–	52	52	41	45
WOK858	Roadside	Diffusion Tube	100	100	–	37	36	35	32.8
WOK859	Roadside	Diffusion Tube	92	92	–	37	37	35	32.8
WOK860	Roadside	Diffusion Tube	100	100	–	37	37	37	29
WOK861	Roadside	Diffusion Tube	83	83	–	48	45	42	29
WOK862	Roadside	Diffusion Tube	100	100	–	–	27	24	25
WOK863	Roadside	Diffusion Tube	100	100	–	–	38	35	33.3
WOK864	Roadside	Diffusion Tube	100	100	–	–	41	42	43
WOK865	Roadside	Diffusion Tube	83	83	–	–	27	26	27

Wokingham Borough Council

WOK866	Roadside	Diffusion Tube	92	92	-	-	34	31	32
WOK867	Roadside	Diffusion Tube	83	83	-	-	-	28	28.2
WOK868	Roadside	Diffusion Tube	100	100	-	-	-	31	27.8
WOK869	Roadside	Diffusion Tube	92	92	-	-	-	32	28.1
WOK870	Roadside	Diffusion Tube	92	92	-	-	-	33	33
WOK871	Roadside	Diffusion Tube	92	92	-	-	-	32	30.7
WOK872	Roadside	Diffusion Tube	100	100	-	-	-	32	36.4
WOK873	Roadside	Diffusion Tube	100	100	-	-	-	24	27
WOK874	Roadside	Diffusion Tube	100	100	-	-	-	23	24.9
WOK875	Roadside	Diffusion Tube	100	100	-	-	-	31	30.7
WOK876	Roadside	Diffusion Tube	100	100	-	-	-	32	30.7
WOK877	Roadside	Diffusion Tube	83	83	-	-	-	27	25.9
WOK878	Roadside	Diffusion Tube	92	92	-	-	-	28	27.4
WOK879	Roadside	Diffusion Tube	92	92	-	-	-	38	35.5
WOK880	Roadside	Diffusion Tube	100	100	-	-	-	36	35.5
WOK881	Roadside	Diffusion Tube	92	92	-	-	-	38	35.5
WOK882	Roadside	Diffusion Tube	100	83	-	-	-	-	30.6

☐ Diffusion tube data has been bias corrected

- ☐ Annualisation has been conducted where data capture is <75%
- ☐ If applicable, all data has been distance corrected for relevant exposure

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 Boxes 7.9 and 7.10 in 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 NO₂ Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2016 (%) ⁽²⁾	NO ₂ 1-Hour Means > 200µg/m ³ ⁽³⁾				
					2012	2013	2014	2015	2016
CM1 Old Whitley Wood Lane Shinfield	Roadside	Automatic	92	92	–	0(101)	0	0	2
CM2 Peach Street Wokingham	Roadside	Automatic	92	92	–	–	–	0(127)	10

Notes:

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2016

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 (factor) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
WOK11	37	46.2	33.1	31.9	39.9	29.7	31.5	—	41	41.6	41.2	47.6	38.2	35.0	31.9
WOK19	36.3	35.6	27.6	24.6	30.5	23.1	26.4	25.3	36.3	31	36.3	50.8	32.0	29.0	22.2
WOK52	36.3	44.1	33.4	30.4	40.3	29.3	23.9	32.3	38.6	43.3	42.9	58.3	37.7	35.0	30.8
WOK53	41.6	—	26.5	27.4	28	22.8	20.1	22.6	36.9	27	33.6	40.7	29.8	27.0	22.0
WOK57	31.6	32.4	26.5	25.3	22.3	17.2	16.2	17.2	23.4	27.9	29.9	34.7	25.4	23.0	20.4
WOK70	42.2	35.9	—	28.3	32.4	23.5	27.7	—	36	28.4	33.5	36.4	32.4	30.0	25.0
WOK71	40.9	42.1	37.4	33.5	39.9	31.5	29.1	31.5	39.5	39.5	40.9	53.5	38.3	35.0	24.3
WOK98	41.9	39.4	26.6	32.1	30.6	25.1	20.9	25.1	33.9	29.3	34.4	41	31.7	29.0	29.0
WOK503	37.6	40.9	29	29.8	32	27.8	28.6	27.5	38	32.8	40.2	44.2	34.0	31.0	27.0
WOK505	42.3	50.8	41.1	44.9	41.3	37.4	37.6	36.4	47.5	43	53.2	55.5	44.3	41.0	31.5
WOK509	—	32.2	23.2	28	28.8	24.9	31.5	28.3	33	29.2	34.7	36.2	30.0	28.0	24.4
WOK601	22.3	33.1	33.2	27.5	34.7	27.7	15.9	21	24.3	38.7	—	59.9	30.8	28.0	24.8
WOK602	25.4	37.6	36.7	35.3	33.4	—	18.4	24.3	27.6	38.5	34.6	35	31.5	29.0	27.4
WOK605	33.8	42.6	33.8	30.3	34.6	27.6	27.2	27.7	35.7	37	38.3	43.8	34.3	32.0	27.3
WOK802	25.3	27.4	24.2	20	19.8	17.1	15.7	17.3	21.5	27.2	28.2	30.4	22.8	21.0	21.0

Wokingham Borough Council

WOK803	31.3	46.7	36.3	30.3	36.6	34.5	23.5	27.5	36.1	48.3	44	45.1	36.7	34.0	29.1
WOK804	27.4	32.8	25.8	22.7	25.2	21.8	16.5	18.4	24.5	31.8	30.6	34.9	26.0	24.0	19.6
WOK805	31	34	30.6	26.2	25.1	25.1	19.3	22.2	30.2	34.2	34	38.7	29.2	27.0	27.0
WOK808	25.9	31.1	26.4	21.7	21.7	18.7	14.6	17.9	23.3	30	29.1	36.7	24.8	23.0	23.0
WOK817	41.7	43.9	—	36.8	36.5	31.8	30	34.7	37.5	38.7	41.9	44.3	38.0	35.0	26.1
WOK824	30	35.4	32.2	29.7	32.9	31	25	25.9	—	36.3	37.3	—	31.6	29.0	29.0
WOK825	34.2	44.8	36.2	32.2	40.6	35.7	32.1	31.1	42.2	38.9	49.2	51.1	39.0	36.0	36.0
WOK827	27.2	35.7	28.7	25.6	27.7	23.6	22.9	22	31.3	16.1	32.5	38.3	27.6	25.0	23.4
WOK829	35.7	36.1	33.6	32.4	33.3	32	29.5	29.9	38	39.2	44.2	44.7	35.7	33.0	33.0
WOK831	28.6	35.2	31.1	23.3	30.6	25.6	21.7	15	29.4	39.3	39.1	43.9	30.2	28.0	25.8
WOK835	36.3	41.7	38.3	28.7	35.4	29.3	27.9	—	38.1	37.3	40.9	45.3	36.3	33.0	28.5
WOK836	46.1	46.2	32.2	34.9	33.7	31.5	38.9	34.5	43.4	38	41.9	56.1	39.8	37.0	29.6
WOK838	46.5	46.7	46.9	42.7	56.4	42.5	33.9	38.4	46.9	67.2	56.9	61.1	48.8	45.0	45.0
WOK840	30	31.1	24.7	25.2	23.9	18.7	21.1	20.5	26.7	27.8	30.2	37.6	26.5	24.0	24.0
WOK841	52.1	52.9	43.8	44.8	52.8	42	38.5	—	18.6	41.2	51.1	51.9	44.5	41.0	37.2
WOK842	26.6	35	36.4	31.4	34.5	27.7	20.3	24.8	27.9	39	35.1	35.1	31.1	29.0	29.0
WOK844	—	54.1	40	33.4	46.7	48.1	36.3	—	59	55.4	56.7	56.5	48.6	45.0	40.5
WOK845	24.8	36.8	36.3	29.1	35.7	30.1	17.7	24.1	28.6	33.9	30.7	31.5	29.9	28.0	28.0
WOK846	26	37.4	37.4	32.8	34.5	27.8	20	26.4	28.8	37.8	34.8	36.9	31.7	29.0	29.0
WOK847	40.7	44.7	36.5	36.8	34.4	33.6	30.3	32.4	39	39.4	49.1	43.3	38.4	35.0	35.0
WOK850	48.1	54.1	45.7	41.8	56.3	23.8	19.1	43.2	63.9	49.9	58.6	57.9	46.9	43.0	42.0
WOK853	20.8	24.3	21.5	16.1	—	12	9.4	12.6	16.9	—	25.3	29.7	18.9	17.0	<u>N/A</u>
WOK854	20.6	20.9	22.1	17	17.7	13.1	10.5	12.8	—	27.1	25.7	29.4	19.7	18.0	<u>N/A</u>
WOK855	—	—	—	15.4	15.5	—	9.6	11.6	16.9	20.8	23.5	30.5	18.0	16.2	<u>N/A</u>
WOK857	50.3	60.5	43	46.7	46.4	41.3	36.9	39.3	52.1	58.3	51.6	65.4	49.3	45.0	45.0
WOK858	40.9	40.4	28.2	34.6	35.5	28.7	34.3	32.9	37.3	33.5	40.1	42	35.7	33.0	32.8

Wokingham Borough Council

WOK859	36.1	37.4	30.7	32.1	37.8	28.5	33.6	—	41.9	33.8	38.8	44.7	35.9	33.0	32.8
WOK860	39.8	38.4	28.4	37.6	39.7	28.8	33.1	32.6	44.4	34.2	37.4	44.9	36.6	34.0	32.8
WOK861	43.9	50.5	38.8	36.8	46.3	40.3	40.1	—	56.2	51.7	55.3	55.3	46.8	43.0	29.0
WOK862	26.4	29.4	26	24.9	28.2	25.1	23.7	21.8	28.8	28.2	31.3	35.1	27.4	25.0	25.0
WOK863	44.5	43.7	37.6	30	42.1	37.1	36.2	34.4	44.8	39.9	48.3	52.1	40.9	38.0	33.3
WOK864	40.3	51.2	41.6	43.4	45.3	35.7	31.9	41.4	67.1	47	55.8	57.6	46.5	43.0	43.0
WOK865	—	33	—	27	26.9	24	18.2	20.8	26.5	35.6	36.7	43.7	29.2	27.0	27.0
WOK866	36.3	33.3	30.5	27.5	35	—	31.5	31.1	38.9	36.4	36.4	41.4	34.4	32.0	32.0
WOK867	28.8	32.4	33	24.5	29.4	—	20.4	—	27.2	35.4	38.1	44.3	31.3	29.0	28.2
WOK868	40.9	41.6	33.6	38.2	35.9	27.3	26.2	27.6	32.3	39.5	38.6	42.3	35.3	32.0	27.8
WOK869	40.3	38.4	27.4	30.7	32.9	18.9	14.8	—	34.9	36.9	38.8	40.9	32.3	30.0	28.1
WOK870	35.5	36.6	32	31.4	38.5	29.9	28.8	30.4	42.1	39.9	—	47.1	35.6	33.0	33.0
WOK871	38	38.6	34.7	31.5	36.9	26.1	26.3	29.7	—	38.1	43.3	45.1	35.3	32.0	30.7
WOK872	45.3	48.4	34.7	34.6	38.6	30.7	33.5	34.4	42.4	45.2	44.5	56.3	40.7	37.0	36.4
WOK873	27.7	34.4	29.2	25.2	30.6	25.8	19.7	22.9	29.1	37.2	33.4	36.4	29.3	27.0	27.0
WOK874	24.6	32.8	30.4	26	32.3	23.7	18.5	23.7	26.8	38	37	43.6	29.8	27.0	24.9
WOK875	33.4	38.5	30.8	32.7	35.9	25.9	25.4	29.1	39.8	37.6	43.8	46.9	35.0	32.0	30.7
WOK876	33.9	37.8	29.2	33.8	32.1	27	25.2	29.3	39.2	37.4	41.4	45.2	34.3	32.0	30.7
WOK877	32.6	35	27	24.3	—	21.6	23	22	—	30.8	35.4	40.7	29.2	27.0	25.9
WOK878	31.6	32.9	27.9	—	30.8	32	31.5	26	37.2	34	37.1	45.5	33.3	31.0	27.4
WOK879	47.8	51.7	—	39.2	45.7	38	33.9	37.5	53.7	48	52.1	56.3	45.8	42.0	35.5
WOK880	43.3	50	40.5	38.4	45	36.1	37.3	37.1	47.4	48.3	46.2	61.7	44.3	41.0	35.5
WOK881	43.7	51.1	35.5	39	44.8	37.1	34.4	—	48.8	48.1	49.8	65.5	45.3	42.0	35.5
WOK882	—	—	31.6	31.6	42.9	34	38	36.5	47.7	37.5	41.1	48	38.9	36.0	30.6

☐ Local bias adjustment factor used

☐ National bias adjustment factor used

☐ Annualisation has been conducted where data capture is <75%

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) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

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 30th June 2016. The analyser was displaying a PMT temperature warning throughout the audit. This fault requires an immediate call-out to your equipment support unit. As a consequence of the PMT temperature fault there may have been an effect on the audit results. The outcome of the equipment support unit's findings will need to be considered within the data management process. A major factor governing the analyser's performance is the NOx analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. Our tests show the converter in this analyser to be 87.1% efficient with NO₂ concentrations of 251 ppb. The analyser was re-tested at a lower NO₂ level and was found to be 89.5% efficient with NO₂ concentrations of 137 ppb. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. This is a poor result and the NOx converter is outside AURN National criteria therefore measurements may not be representative of ambient concentrations. This could be linked to the PMT temperature fault. It was recommended as requiring immediate attention from your equipment support unit. This result and the outcome of the equipment support unit's report will need to be considered within the data management process. To ensure that the analyser is sampling only ambient air the instrument was leak checked. The result was satisfactory, indicating that the analyser sampling systems were free of significant leaks. The analysers exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise). The NOx analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The measured flow rate result was slightly outside the ($\pm 10\%$) and was advised the underlying reason be investigated at the next service, by your Equipment Support Unit. Based on the NOx analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinders have been reassessed. This provides an indication of

the site standards stability. For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the stated concentrations and the results was an increase of 0.5% .

The site audit for the Wokingham Town Centre automatic monitoring unit was carried out on 30th June 2016. A major factor governing the analyser's performance is the NO_x analyser's converter and its ability to reduce the nitrogen dioxide to nitric oxide. Our tests show the converters in these analysers to be 100.5% efficient with NO₂ concentrations of 221 ppb. The recommended range for instrumentation in the national automatic air monitoring network is in the range of 98% - 102% efficient. This is a good result. To ensure that the analyser is sampling only ambient air the instrument was leak checked. The result was satisfactory, indicating that the analyser sampling systems were free of significant leaks. The analysers exhibited good steady state responses to both zero and span (calibration) gases with acceptable levels of variation (noise). The NO_x analyser flow rate was measured using a calibrated flow meter and compared against the analyser's flow rate sensor to evaluate its accuracy. The analysers flow rate sensor was within 10% of the calibrated flow meter and therefore passed this test. Based on the NO_x analyser's response to the audit standard and audit zero, the concentrations of the stations NO cylinders have been reassessed. This provides an indication of the site standards stability. For the purpose of these stability checks, the criteria adopted within the national network, and used here, is that the recalculated concentration should lie within 10% of the stated concentrations and the result was a decrease of 1.5%.

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 NO₂ 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,

Wokingham Borough Council

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 AR012 (Jan 2016 – Feb 2016) was 100% which relates to the % of results which are satisfactory.

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. 06/17 update) suggested a bias adjustment factor of **0.92** be applied. Using the Peach Street Wokingham co-location study within the Wokingham Town Centre AQMA a local bias adjustment factor has been calculated as **0.92**. A copy of the co-location spreadsheet used is provided below.

For the purposes of the ASR 2017 for the 2016 data the bias adjustment factor is **0.92** as the local and national factors are identical.

Adjustment of DUPLICATE or TRIPLICATE Tubes



Diffusion Tubes Measurements										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 Average	Standard Deviation	CV	95% CI mean	Diffusion Tubes Precision Check	
1	06/01/16	03/02/16	47.8	43.3	43.7	44.9	2.51	5.59	6.24	Good	
2	03/02/16	02/03/16	51.7	50.0	51.1	50.9	0.84	1.65	2.09	Good	
3	02/03/16	29/03/16		40.5	35.5	38.0	3.58	9.42	32.15	Good	
4	29/03/16	27/04/16	39.2	38.4	39.0	38.9	0.40	1.03	1.00	Good	
5	27/04/16	25/05/16	45.7	45.0	44.8	45.2	0.47	1.04	1.17	Good	
6	25/05/16	29/06/16	38.0	36.1	37.1	37.1	0.92	2.47	2.28	Good	
7	29/06/16	27/07/16	33.9	37.3	34.4	35.2	1.85	5.26	4.60	Good	
8	27/07/16	24/08/16	37.5	37.1		37.3	0.28	0.74	2.48	Good	
9	24/08/16	28/09/16	53.7	47.4	48.8	50.0	3.31	6.62	8.22	Good	
10	28/09/16	26/10/16	48.0	48.3	48.1	48.1	0.12	0.25	0.30	Good	
11	26/10/16	30/11/16	52.1	46.2	49.8	49.4	2.94	5.96	7.31	Good	
12	30/11/16	04/01/17	56.3	61.7	65.5	61.2	4.61	7.53	11.44	Good	
13											

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

Site Name/ ID:	Peach Street Wokingham
----------------	------------------------

Adjusted measurement (95% confidence level)
Without periods with CV larger than 20%

Bias calculated using 10 periods of data
Tube Precision: 4 Automatic DC: 100%

Bias factor A: 0.92 (0.81 - 1.06)
Bias B: 9% (-6% - 23%)

Information about tubes to be adjusted

Diffusion Tube average: 45 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 41 +/- 6 μgm^{-3}

Adjusted measurement (95% confidence level)
with all data

Bias calculated using 10 periods of data
Tube Precision: 4 Automatic DC: 100%

Bias factor A: 0.92 (0.81 - 1.06)
Bias B: 9% (-6% - 23%)

Information about tubes to be adjusted

Diffusion Tube average: 45 μgm^{-3}
Average Precision (CV): 4
Adjusted Tube average: 41 +/- 6 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 monitoring data for Westminster Way Lower Earley (WOK855) has been possible using 2016 data as recommended in this guidance (Box 7.9).

Short term to long term data adjustment – Wokingham Town Centre Unit

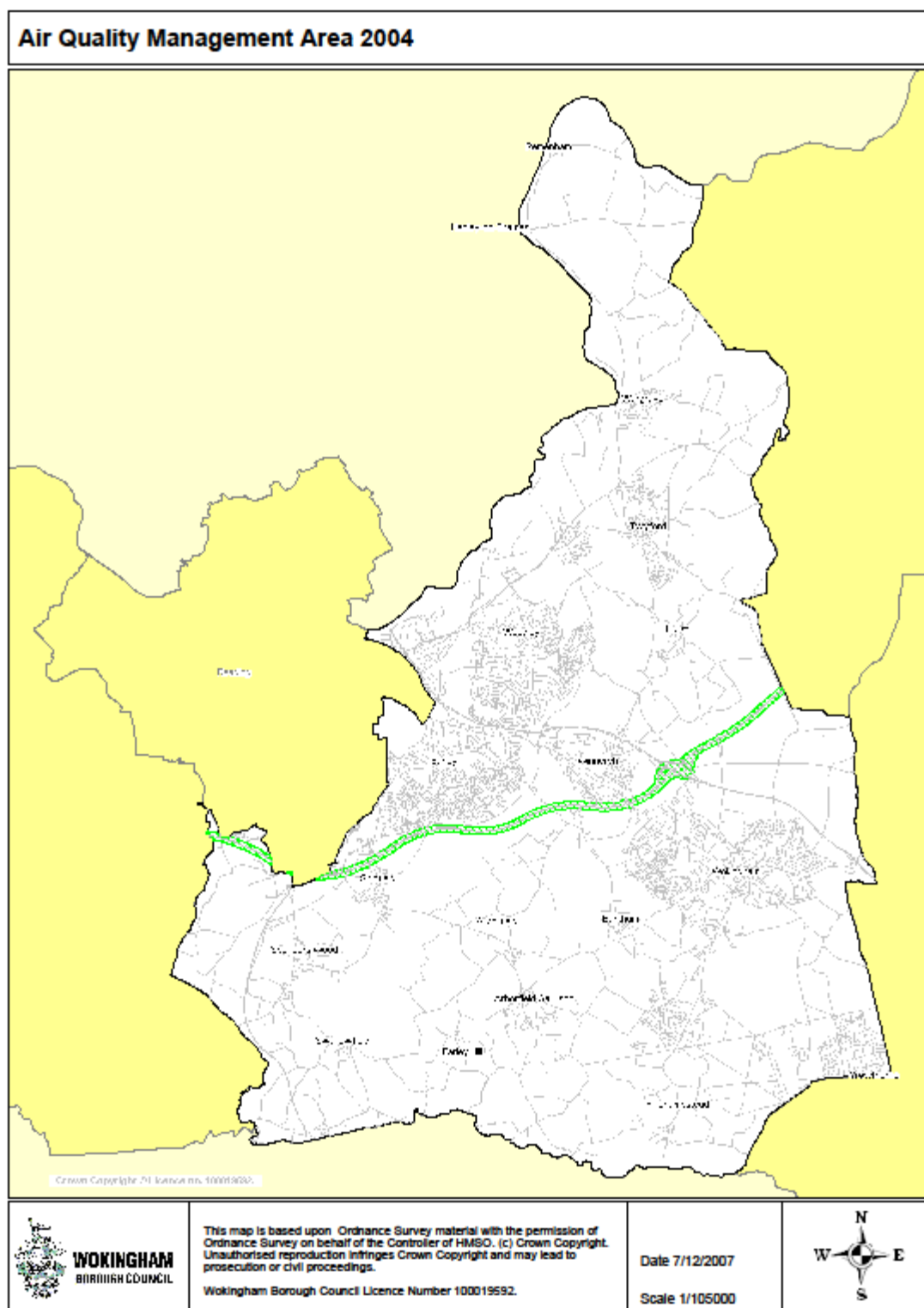
Site	Site Type	Annual Mean 2016 ($\mu\text{g}/\text{m}^3$)	Period Mean 2016 ($\mu\text{g}/\text{m}^3$)	Ratio
Reading	Background	31	28	0.903
Canterbury	Background	15.5	13.9	0.897
Average				0.9
Measured mean concentration (18) x average				16.2

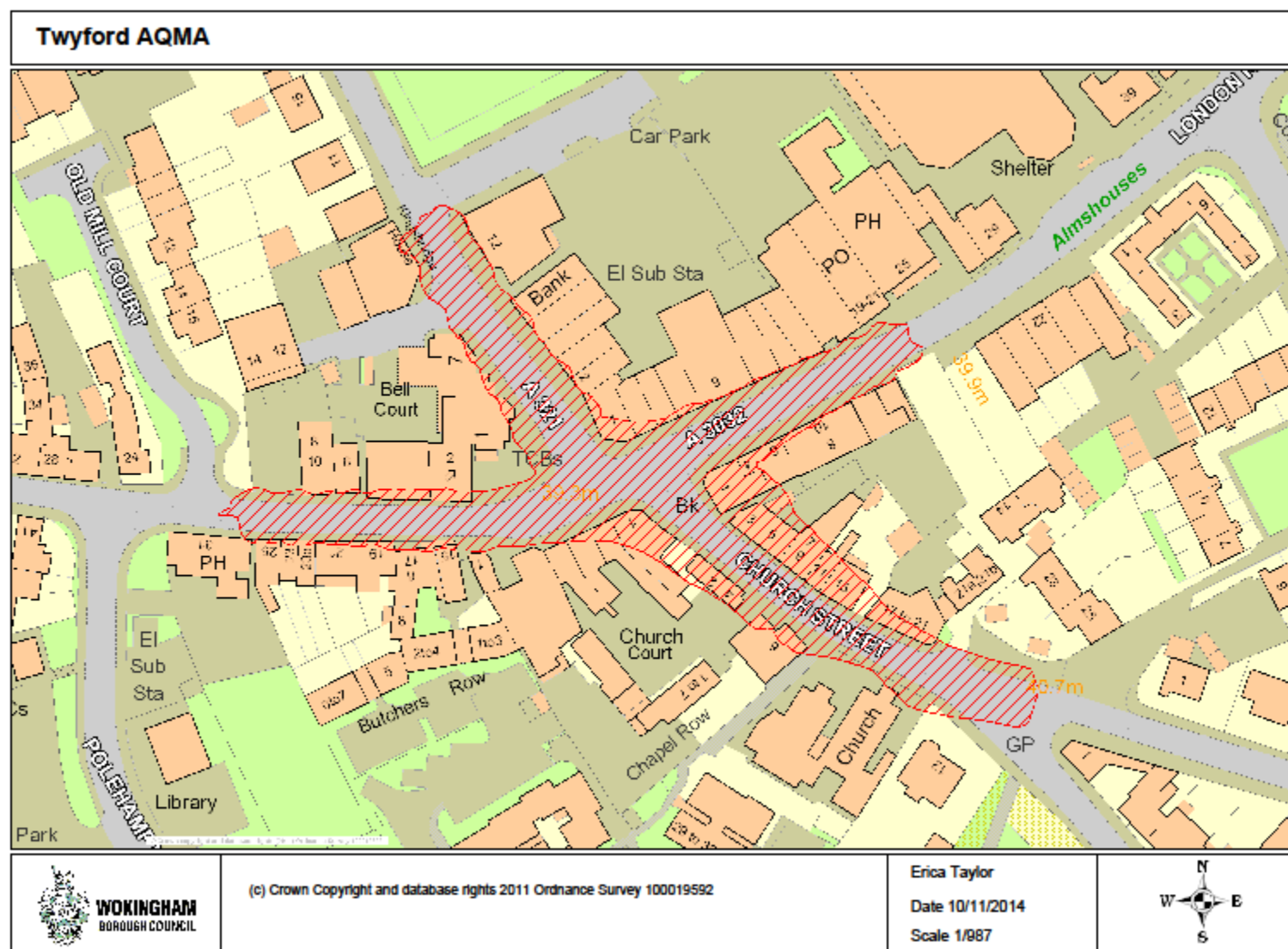
Nitrogen Dioxide Fall Off Distance Calculation

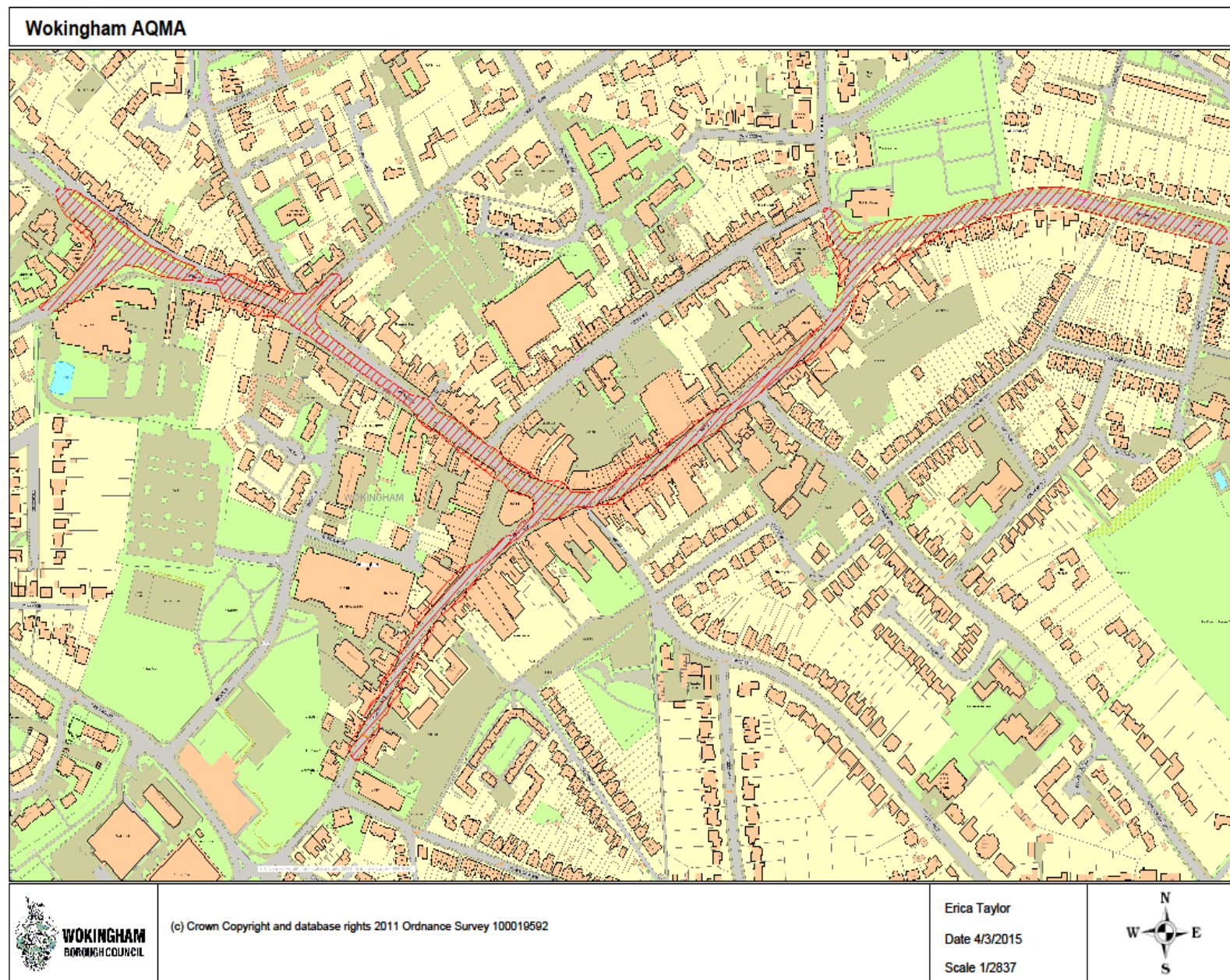
Using the guidance in LAQM.TG(16), fall off distance calculation was carried out the calculator available on the LAQM website (<http://laqm.defra.gov.uk/review-and-assessment/tools/tools.html>) with the DEFRA background mapping data for LAs 2013 –based background maps for the year 2016. The following sites were calculated:

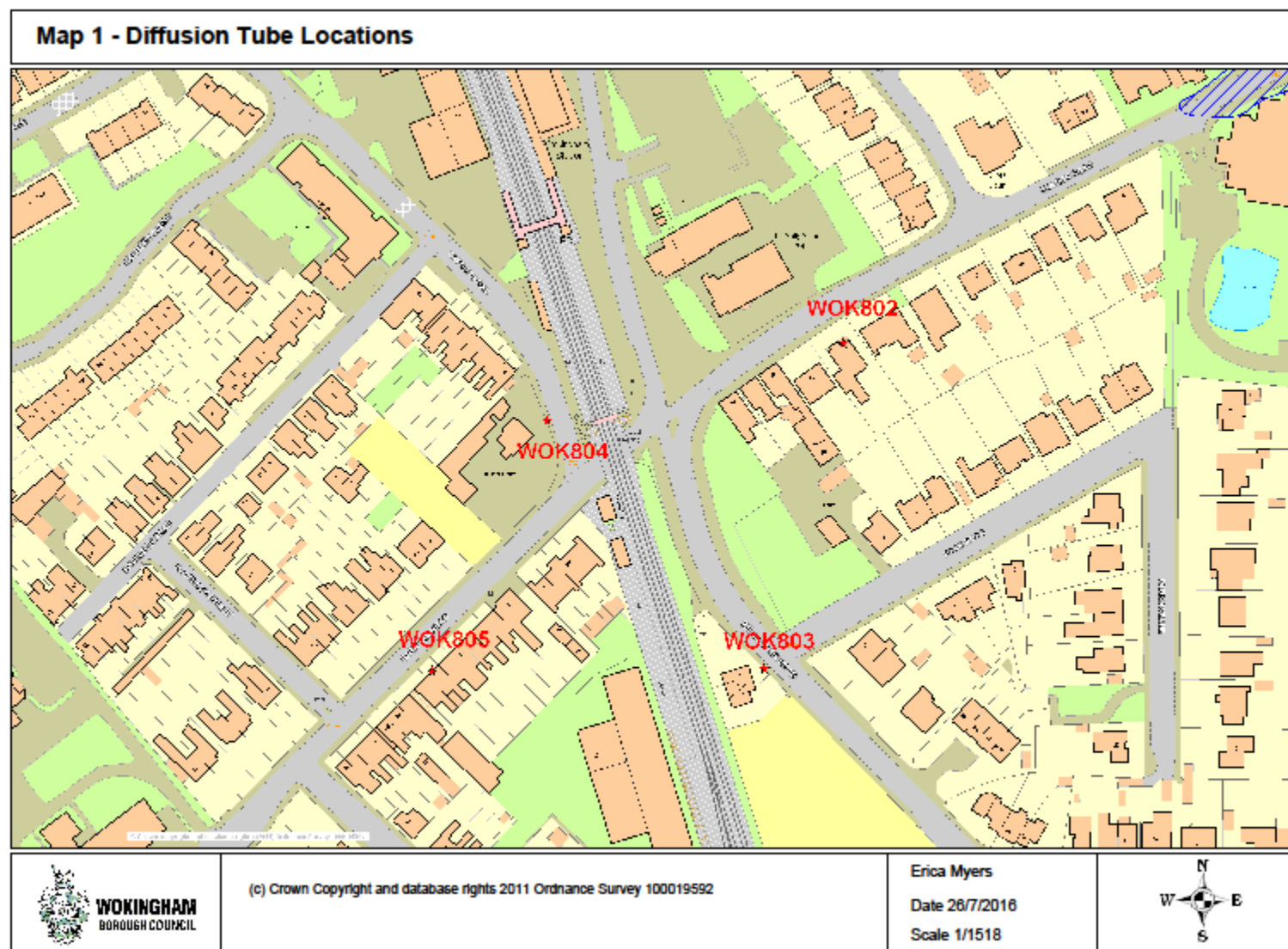
WOK11, WOK 19, WOK52, WOK53, WOK57,WOK70, WOK71,WOK503, WOK505, WOK509, WOK601, WOK602, WOK605, WOK803, WOK804, WOK817, WOK827, WOK831, WOK835, WOK 836, WOK 841, WOK844, WOK850, WOK 858/859/860, WOK861, WOK863, WOK867, WOK868, WOK869, WOK871/875/876, WOK872, WOK874, WOK877, WOK878, WOK 879/880/881, and WOK882.

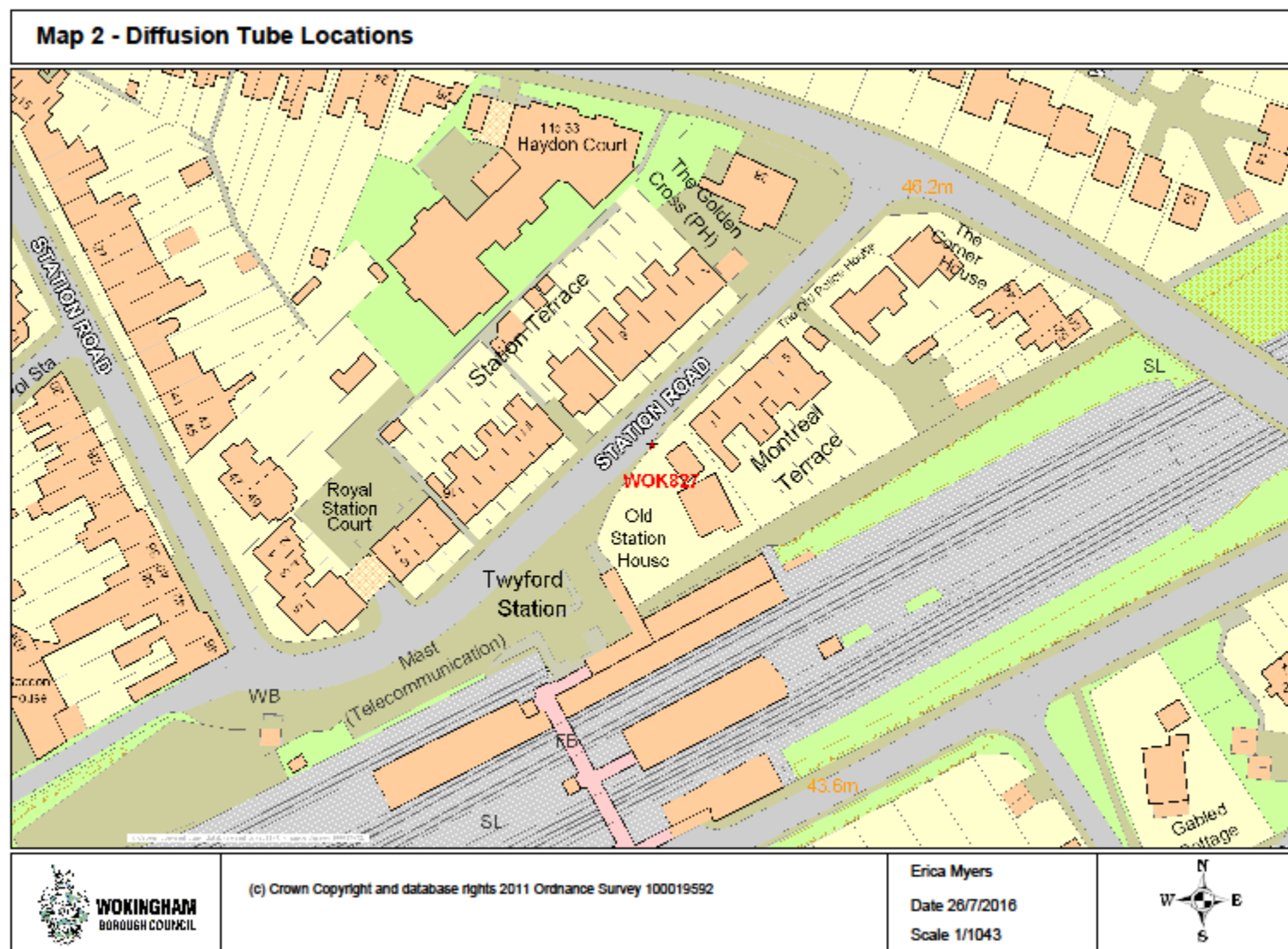
Appendix D: Map(s) of Monitoring Locations and AQMAs

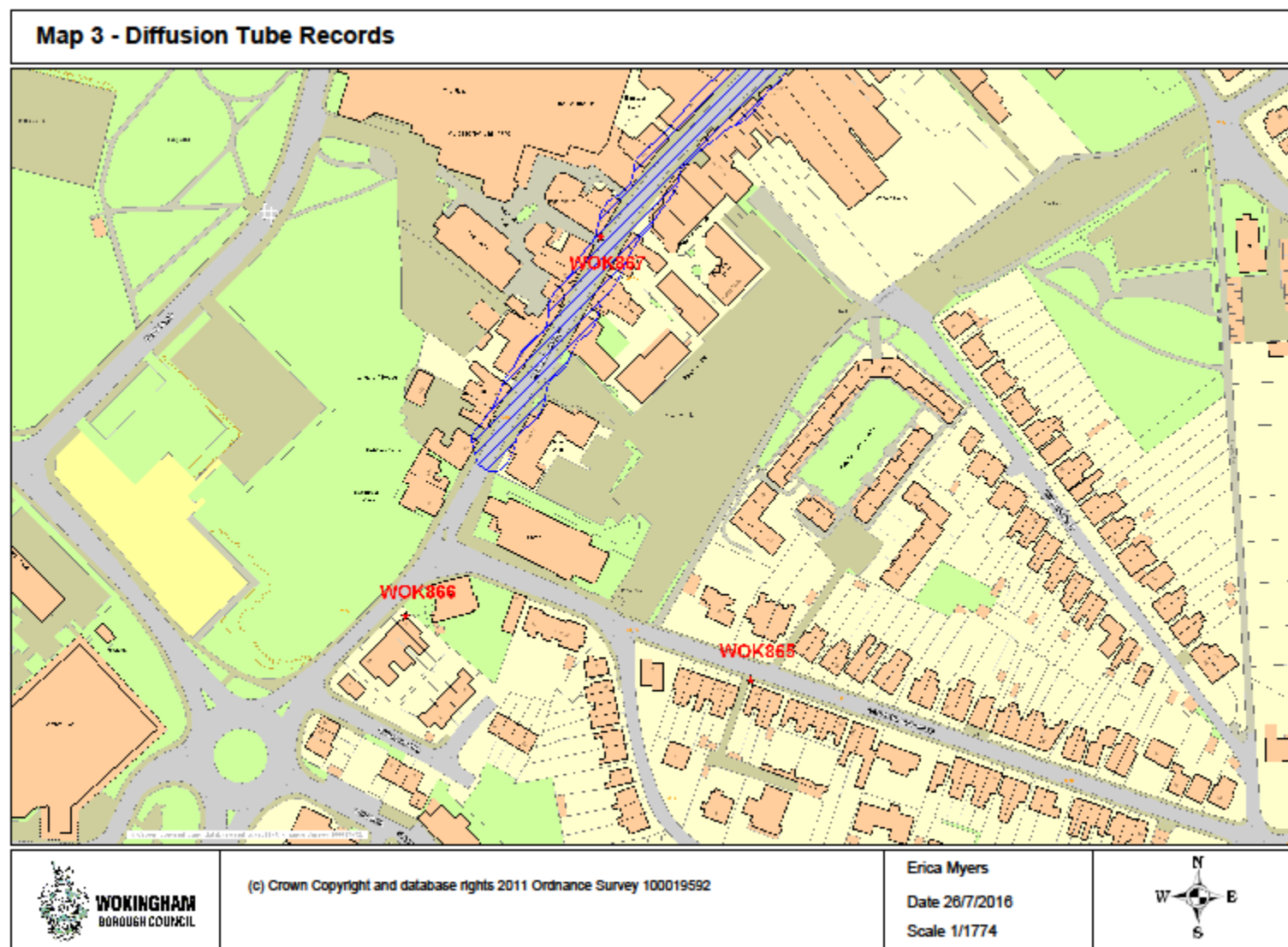


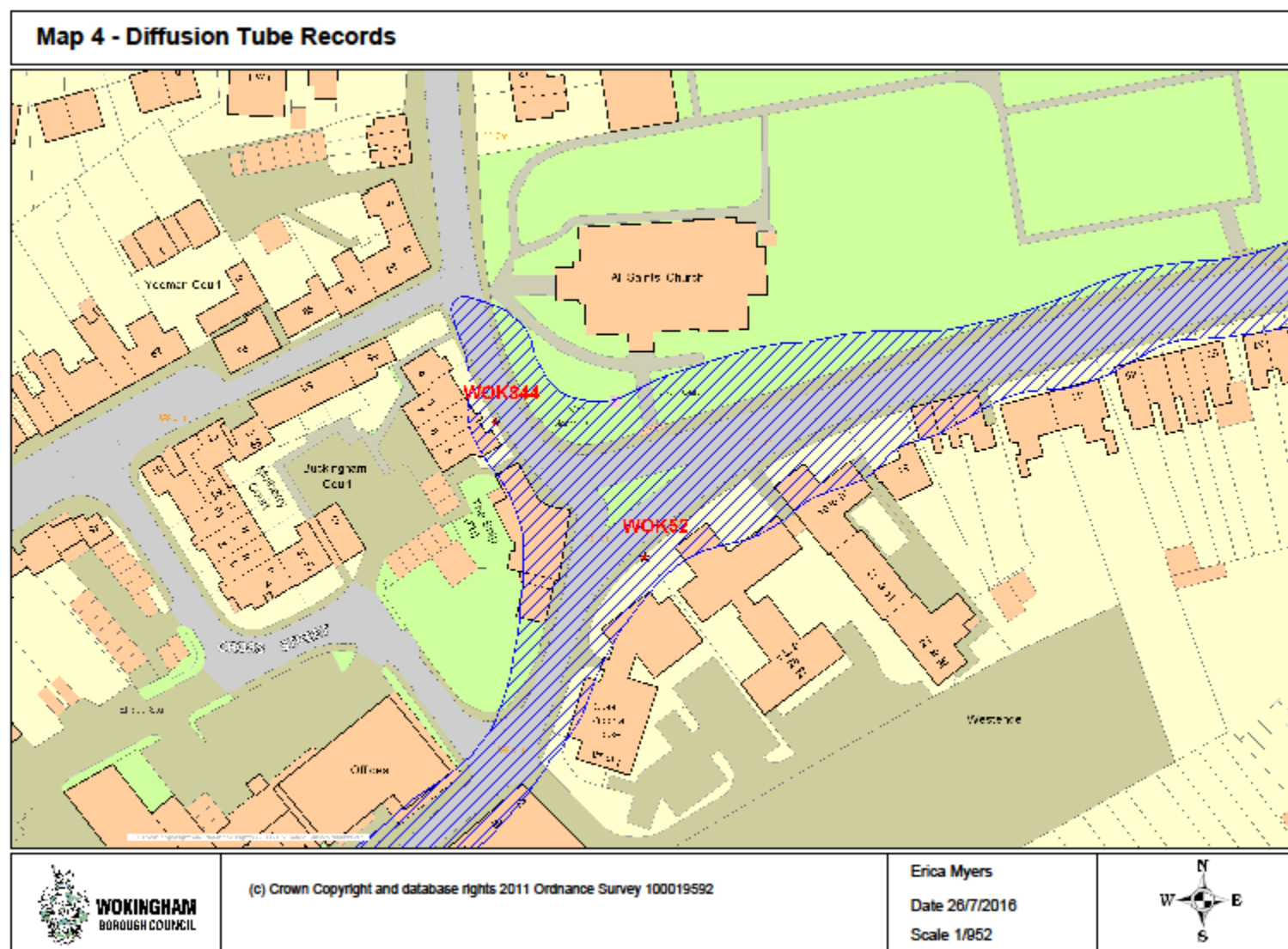


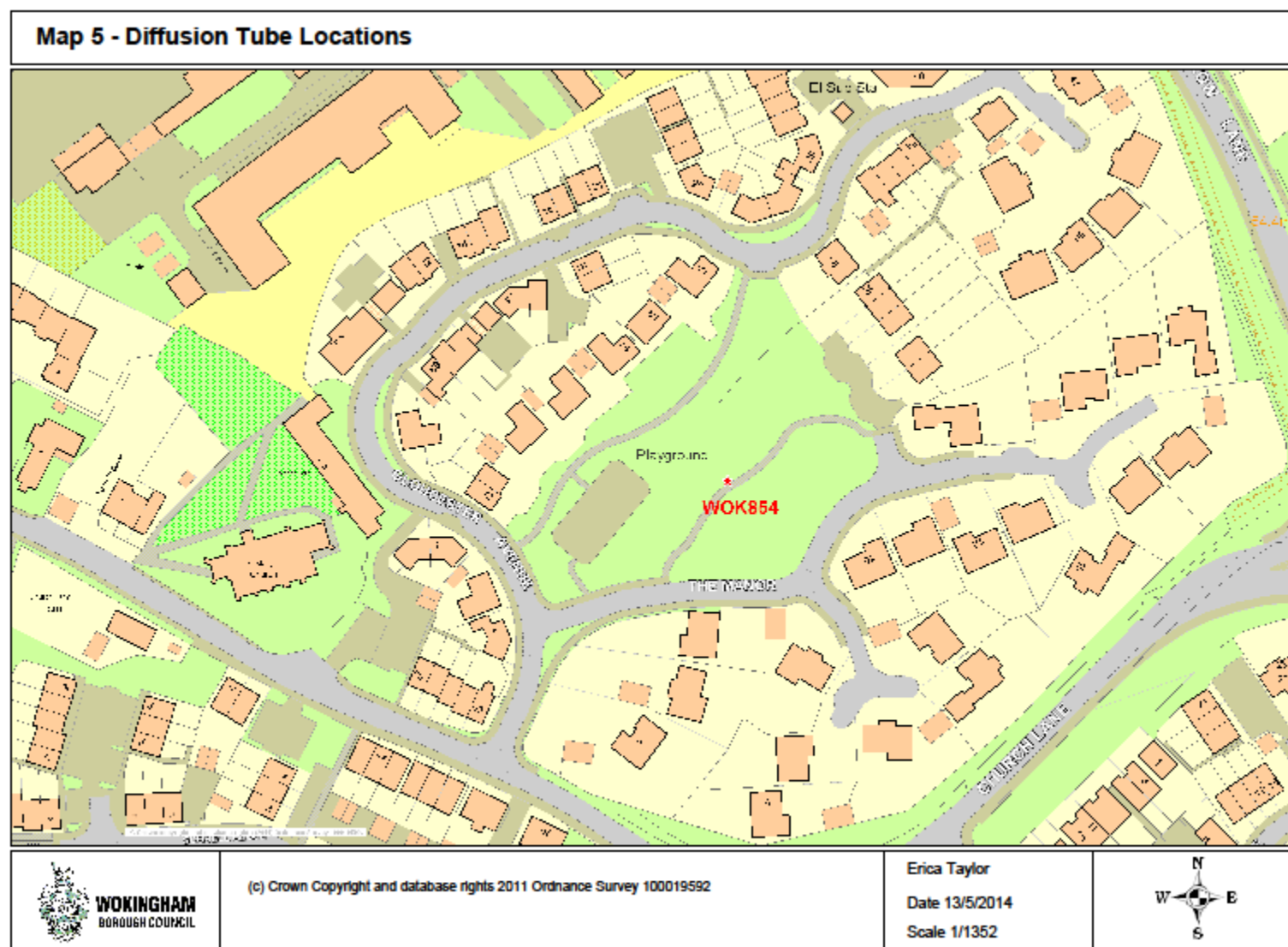


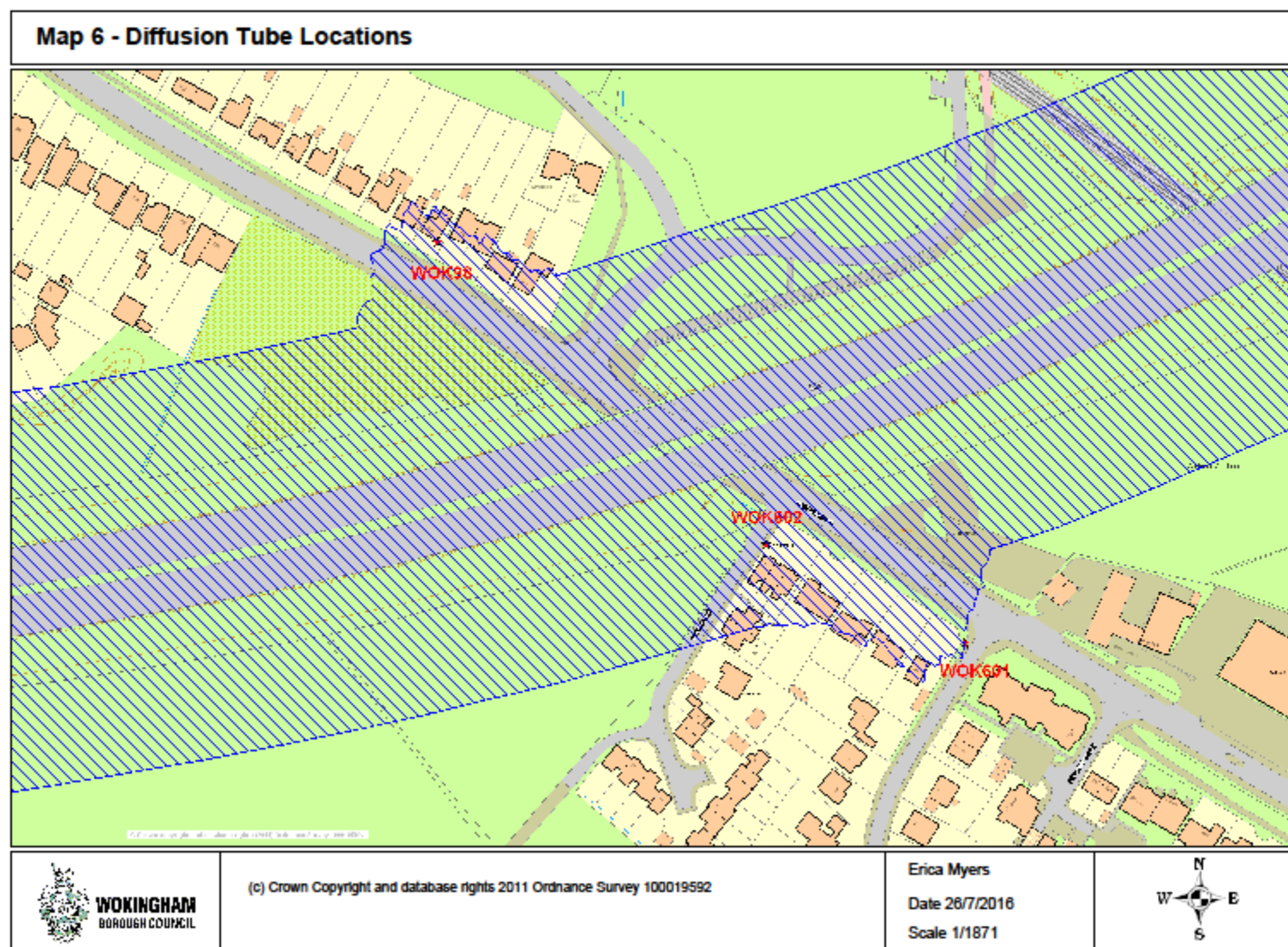


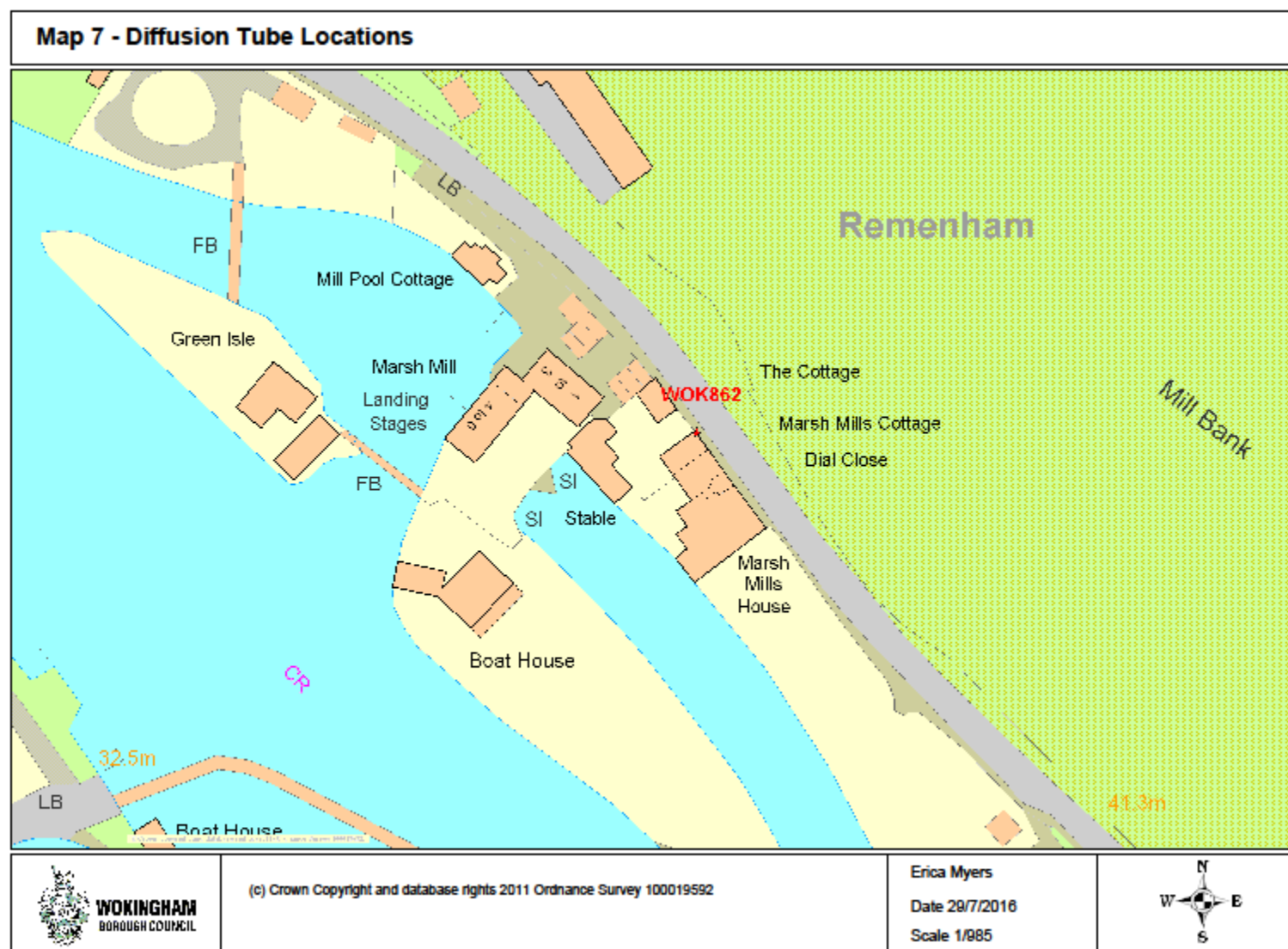


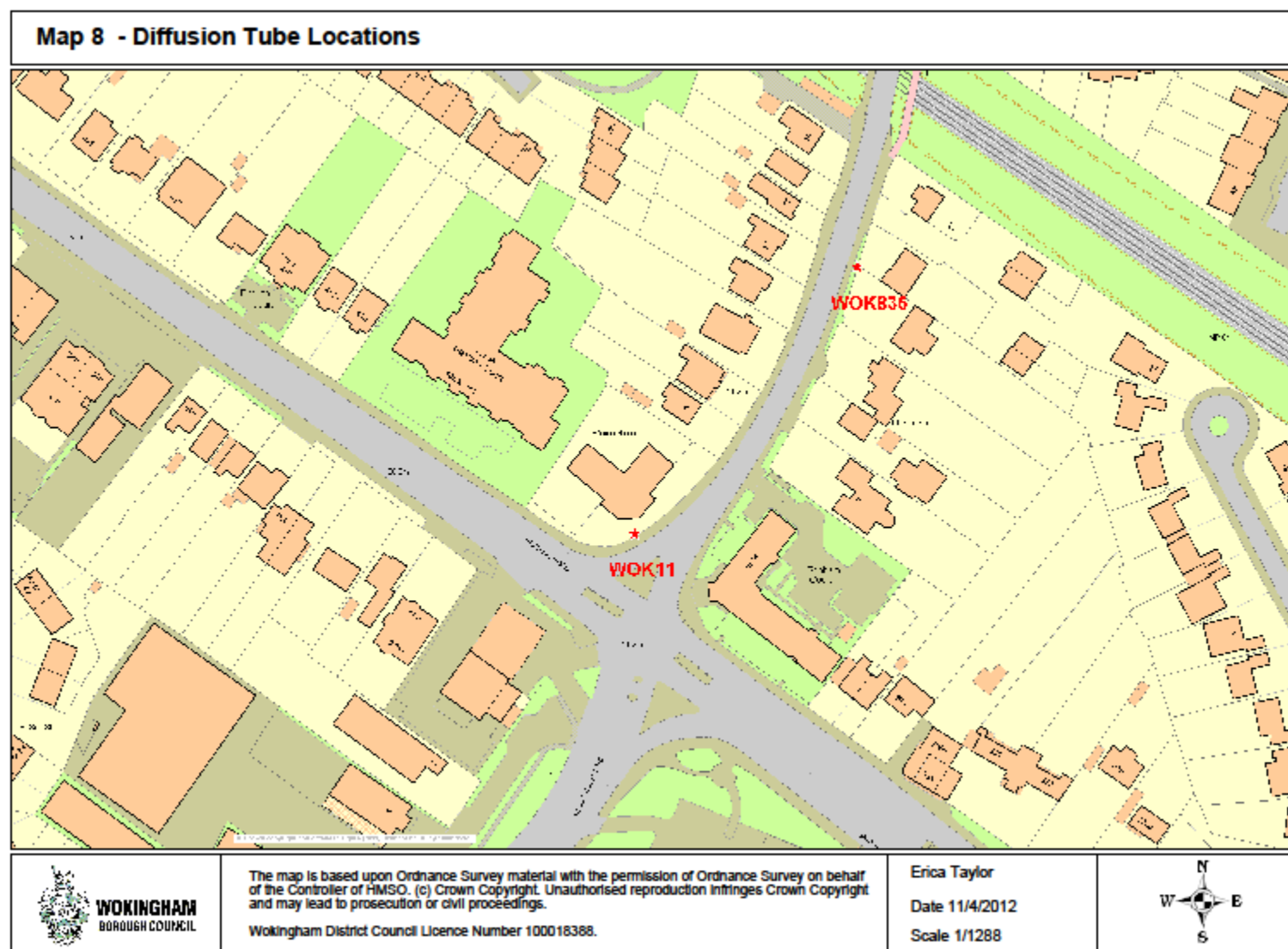


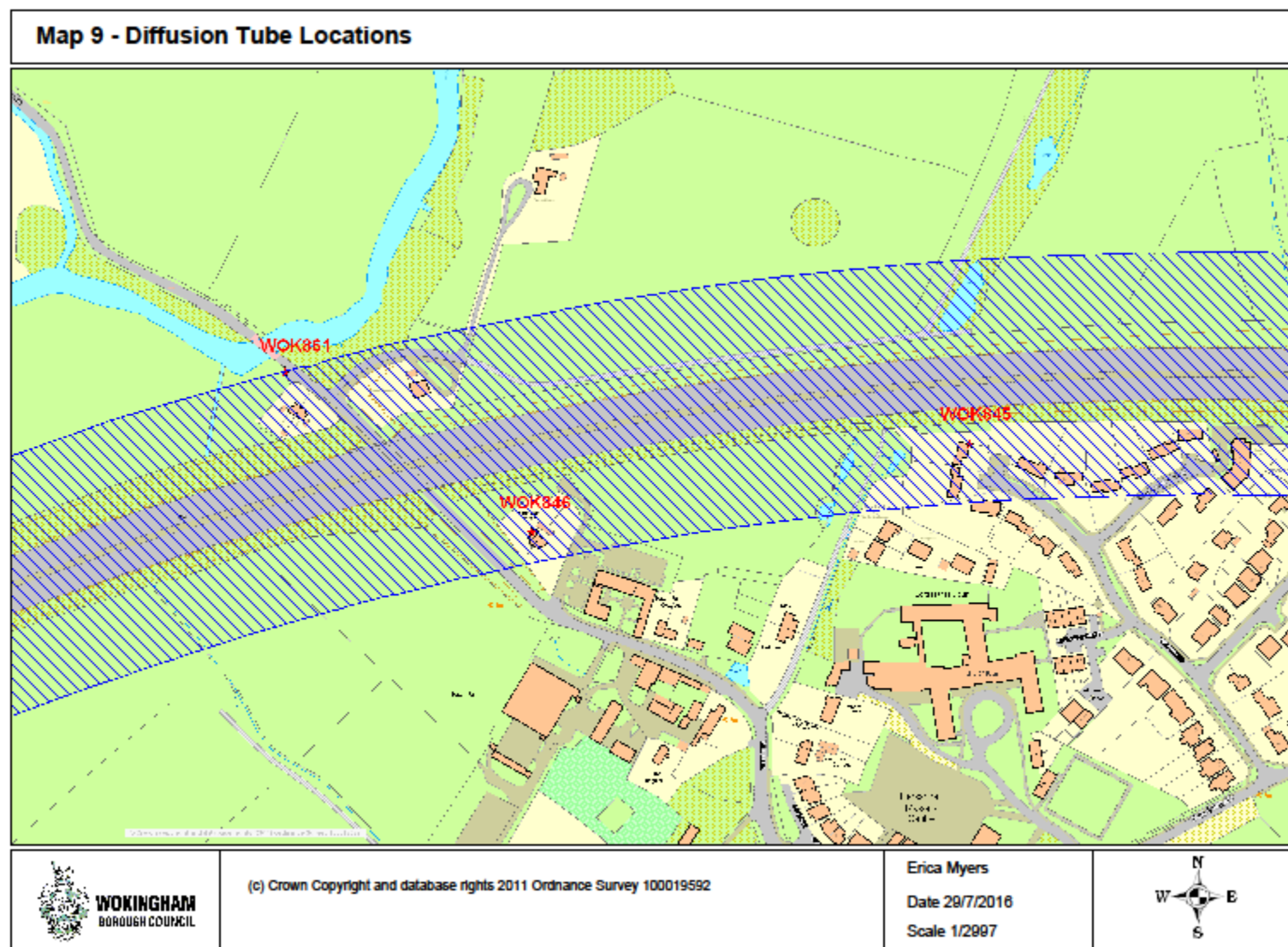


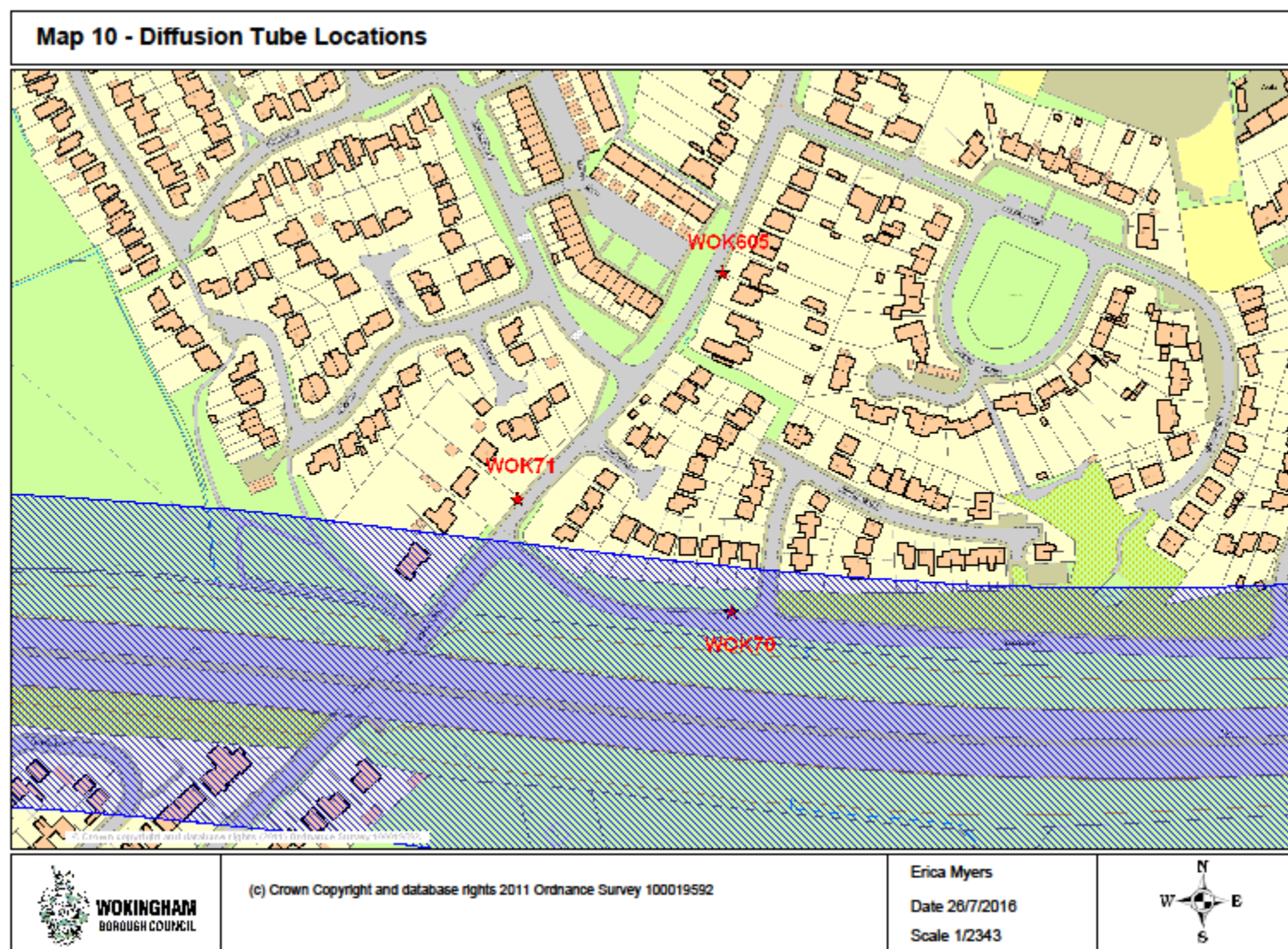


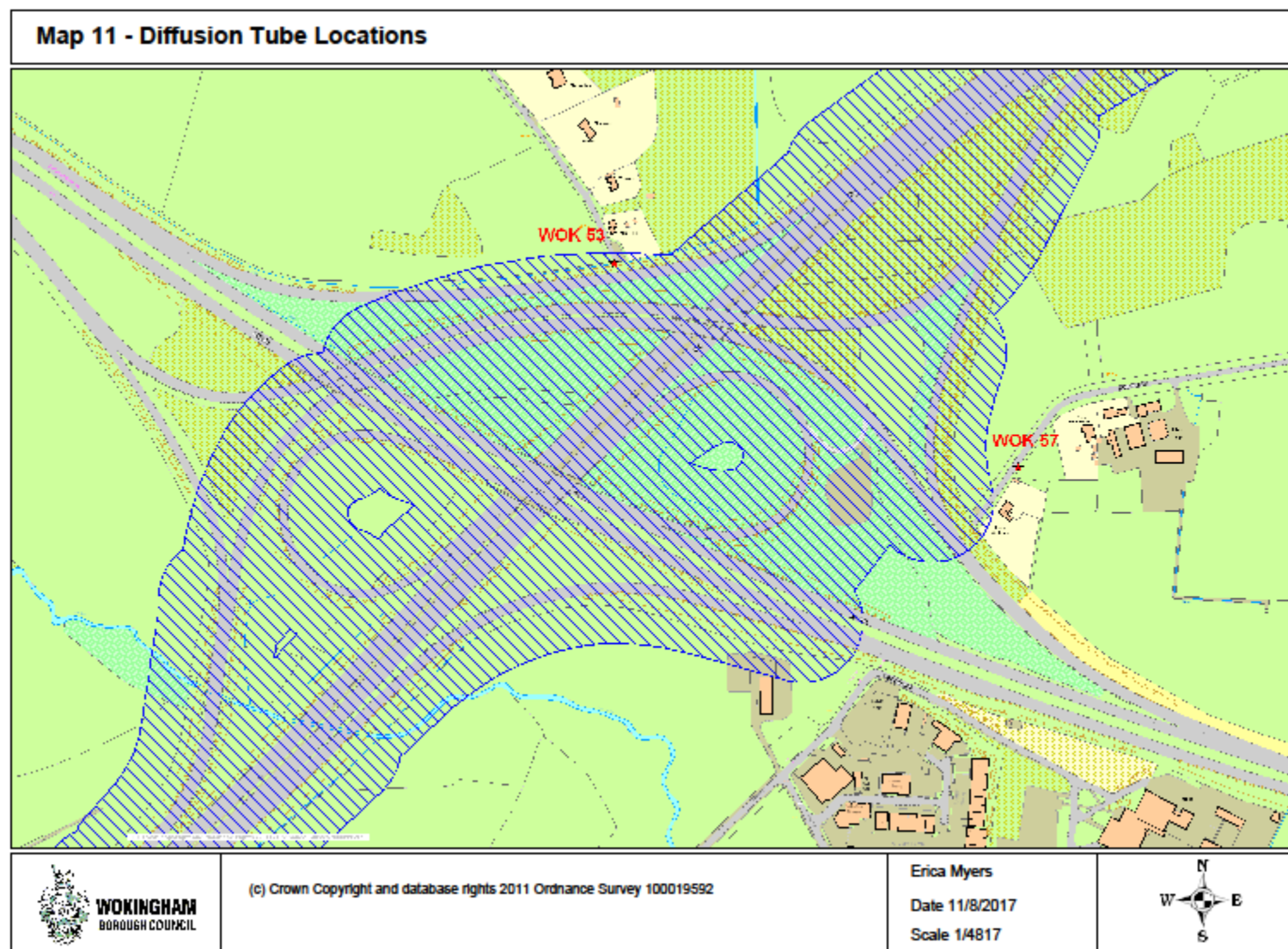


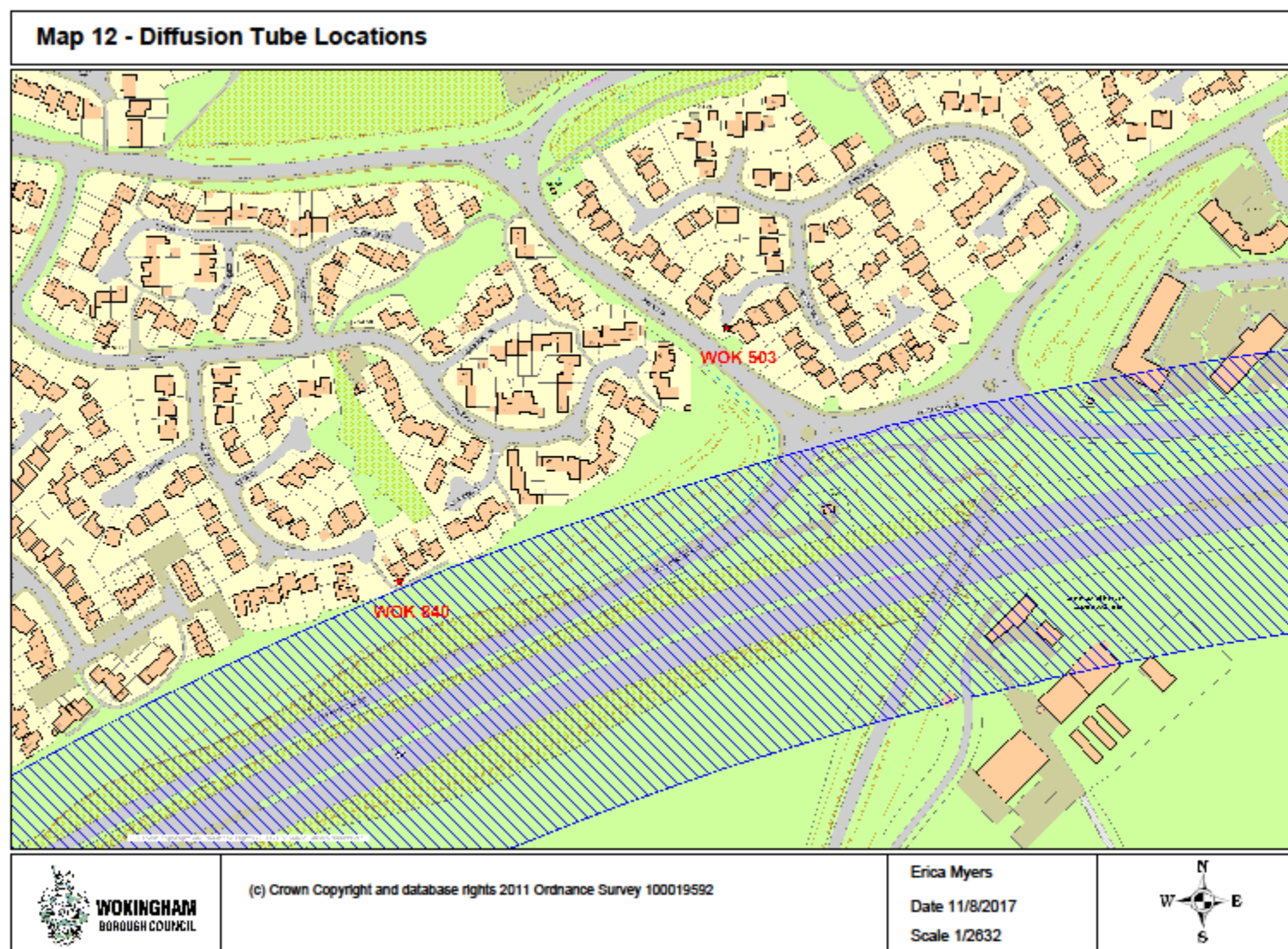


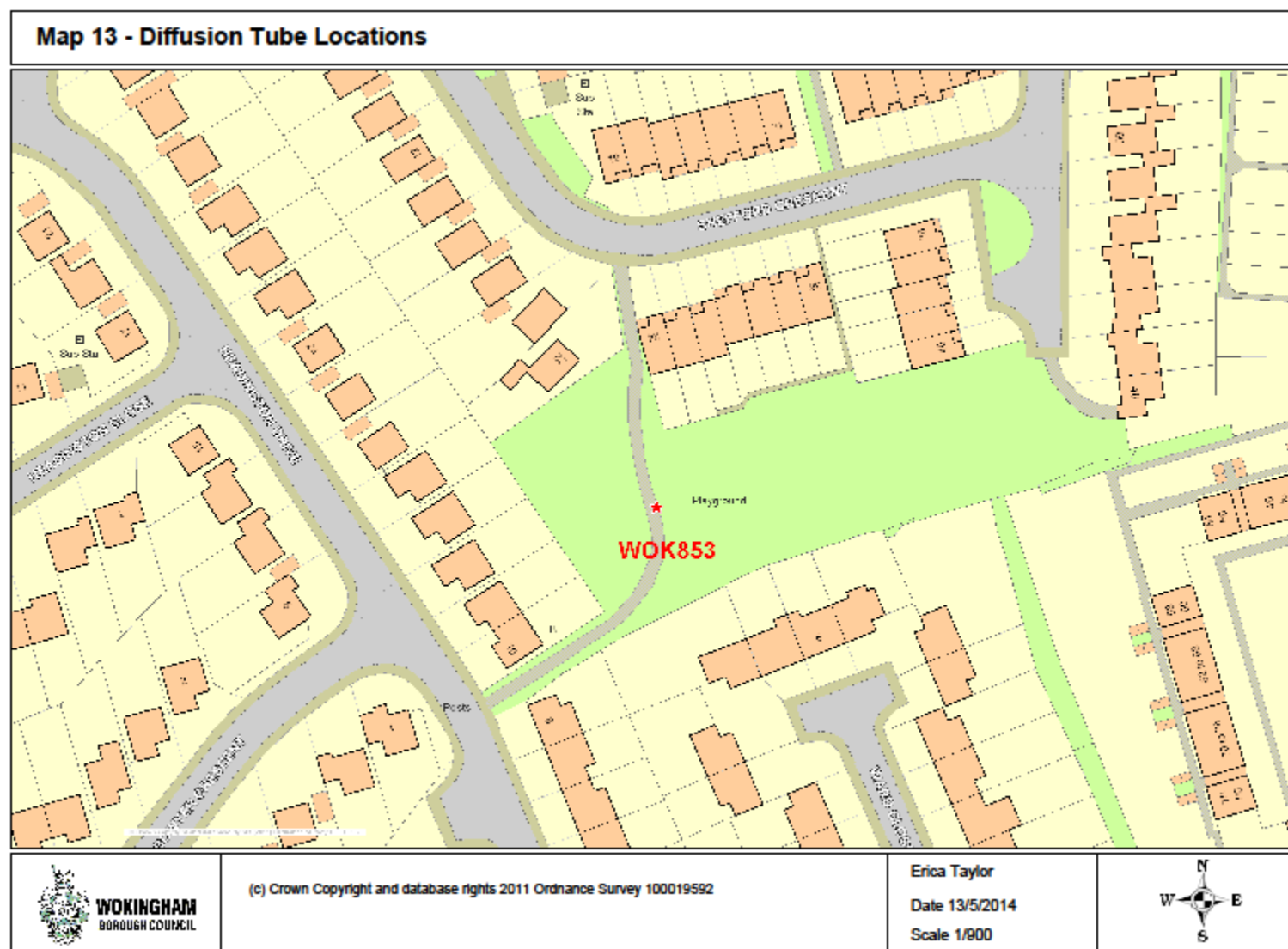


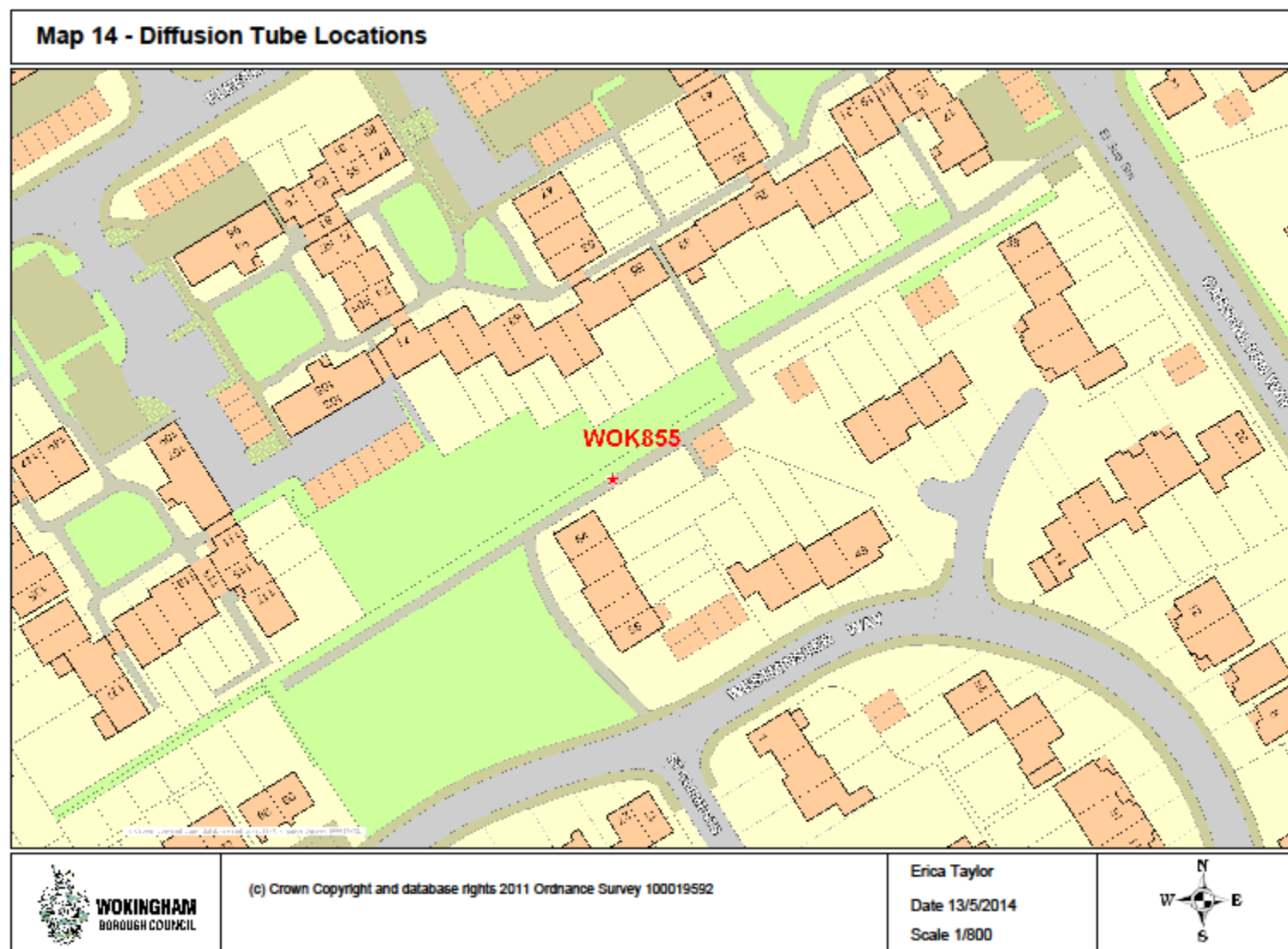


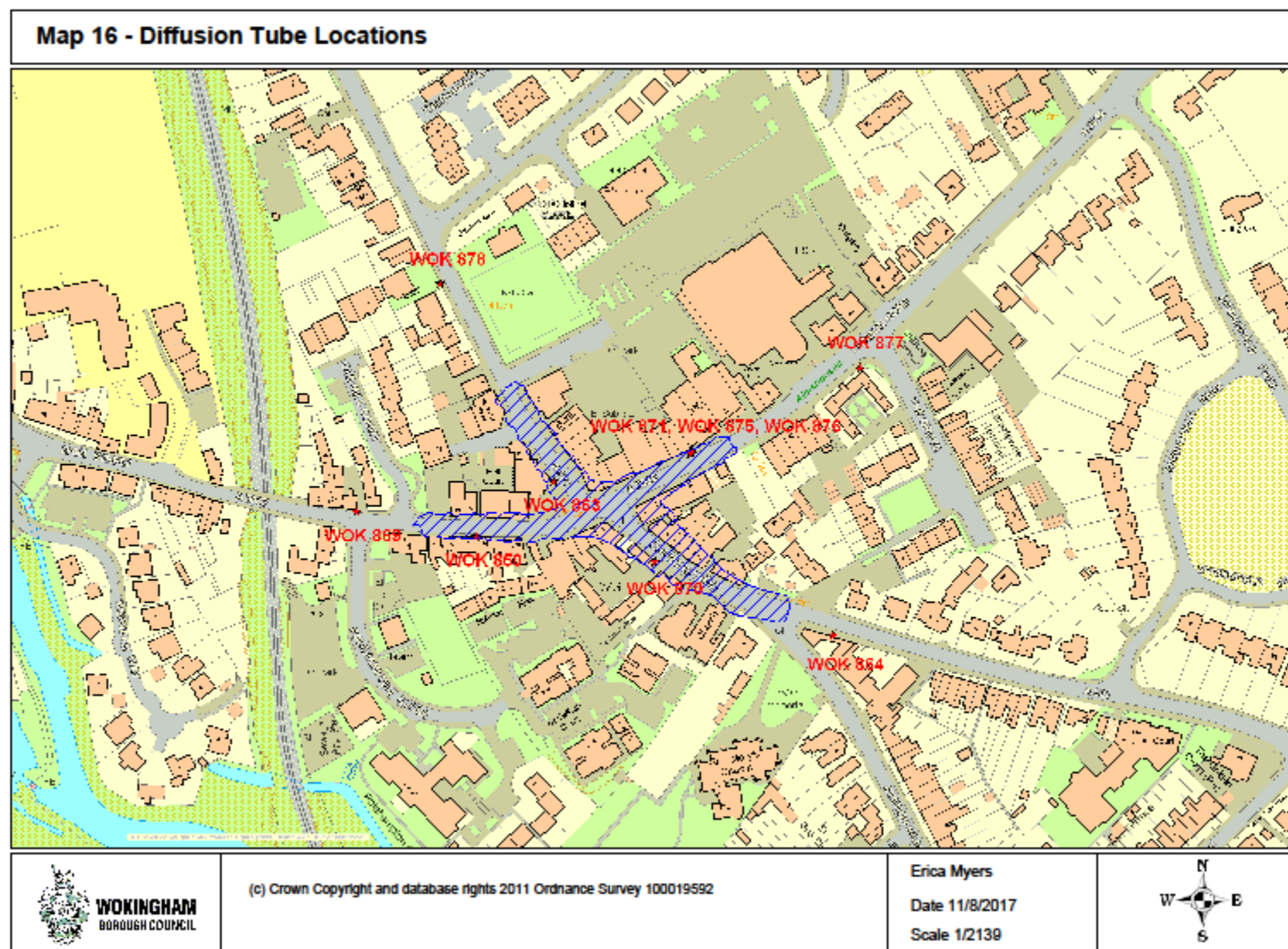


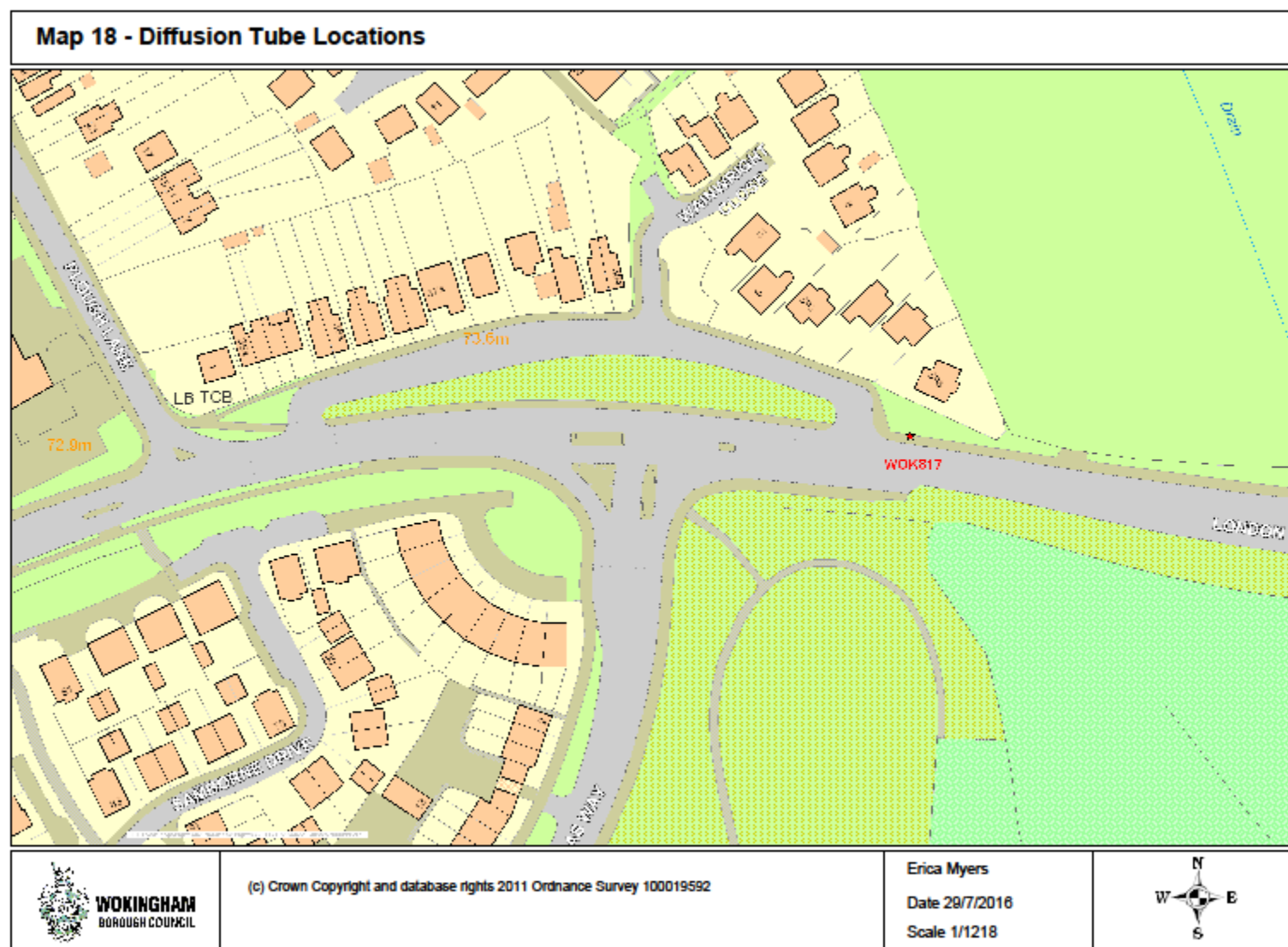


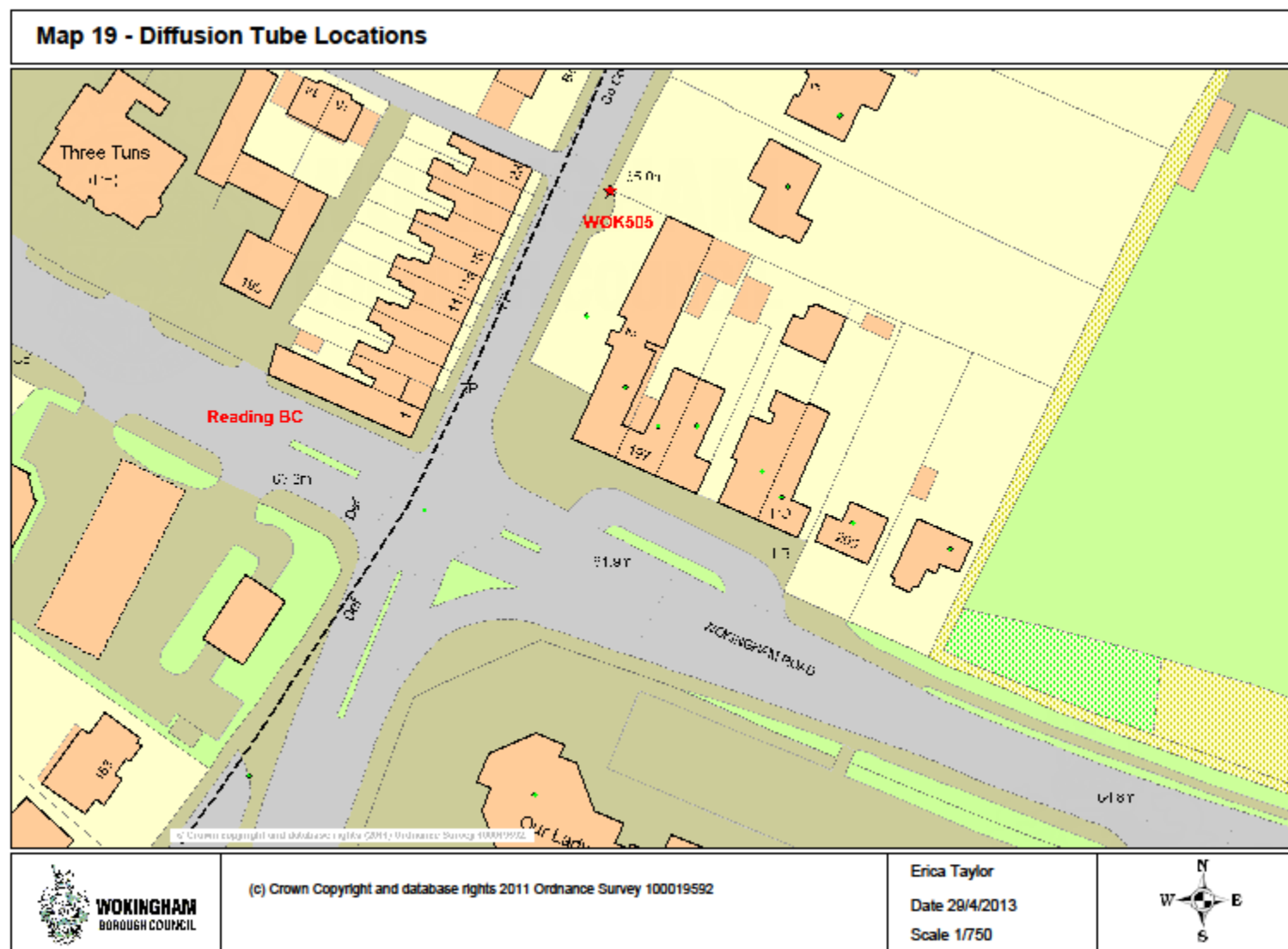


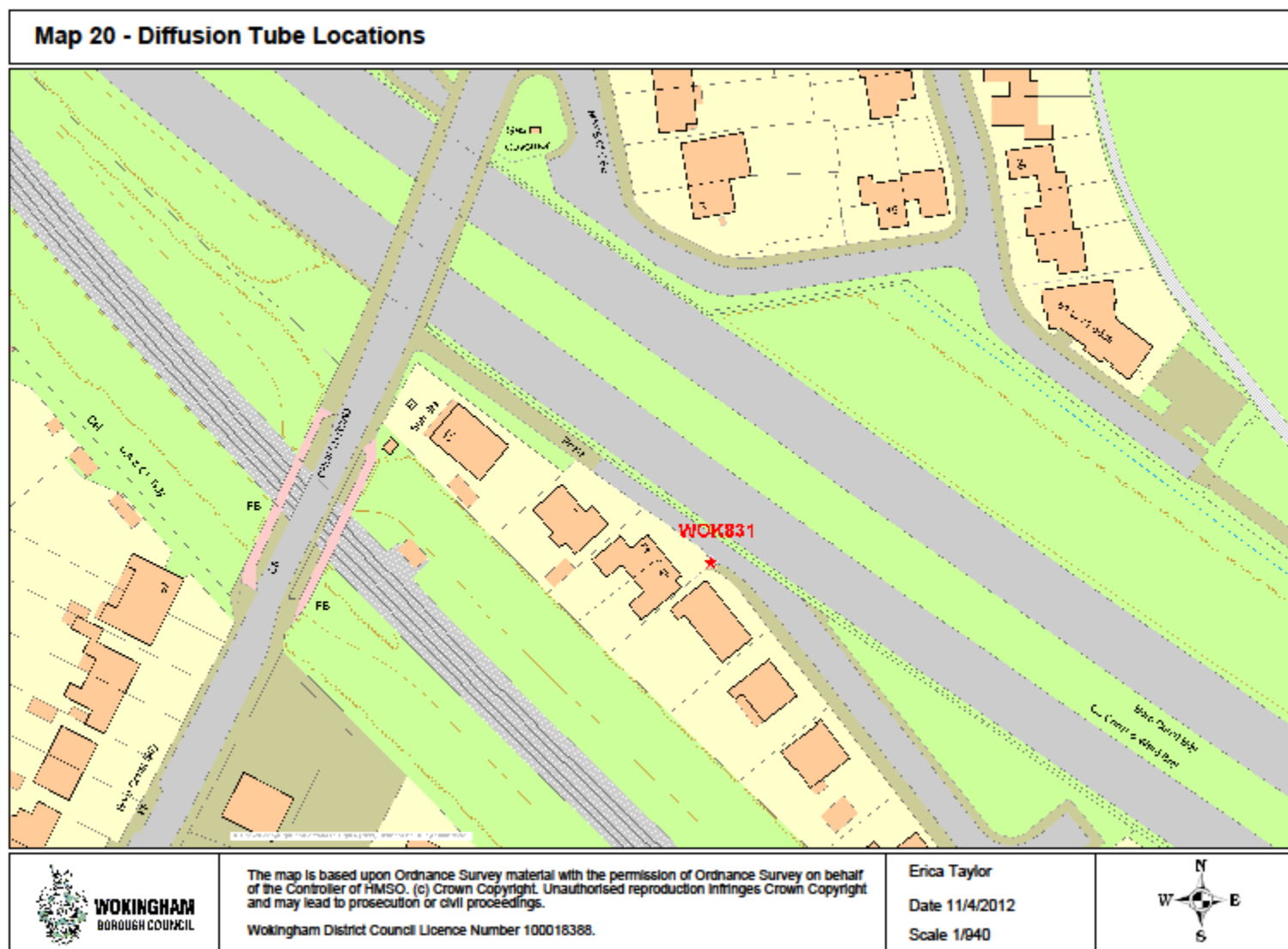


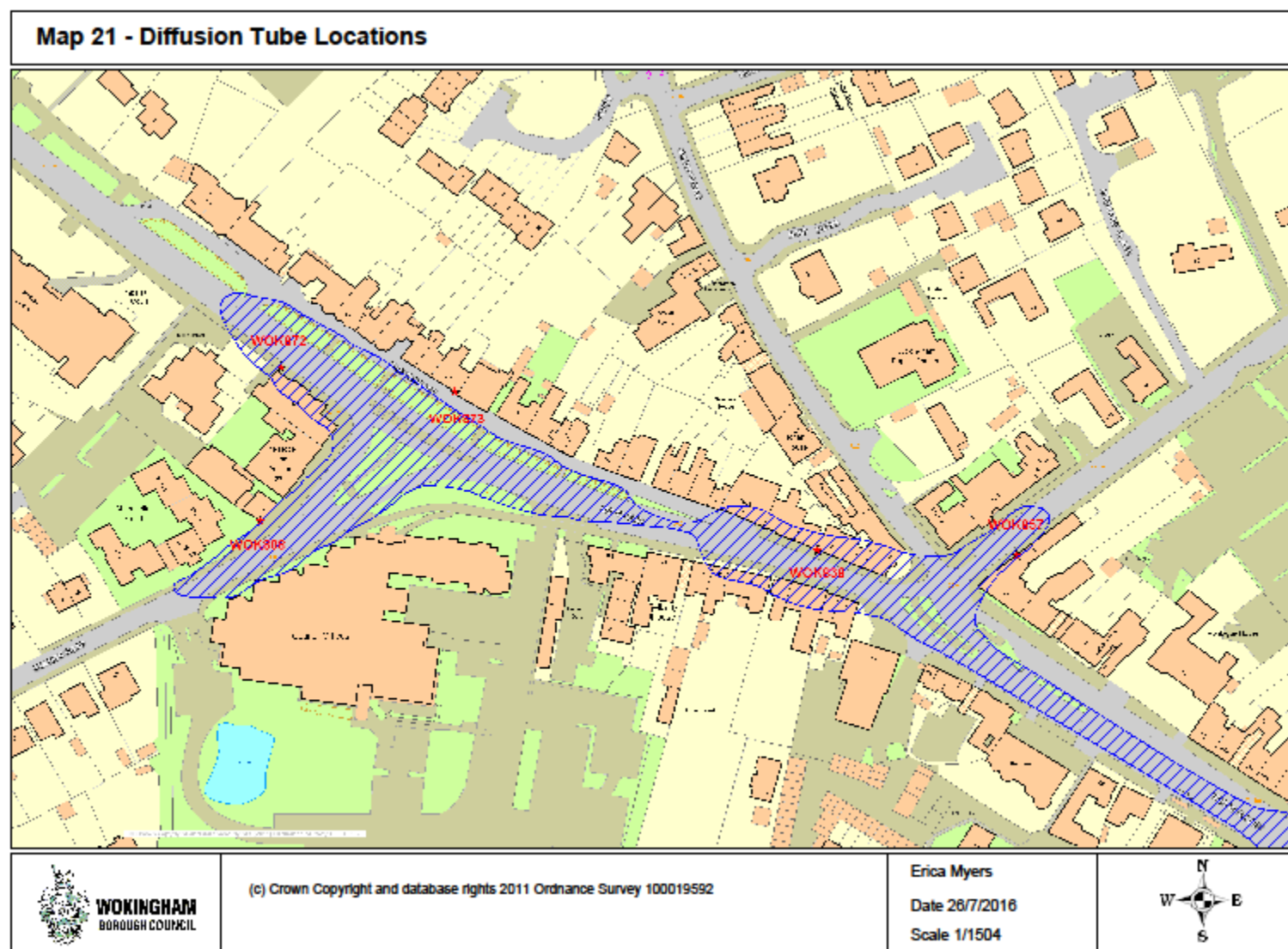


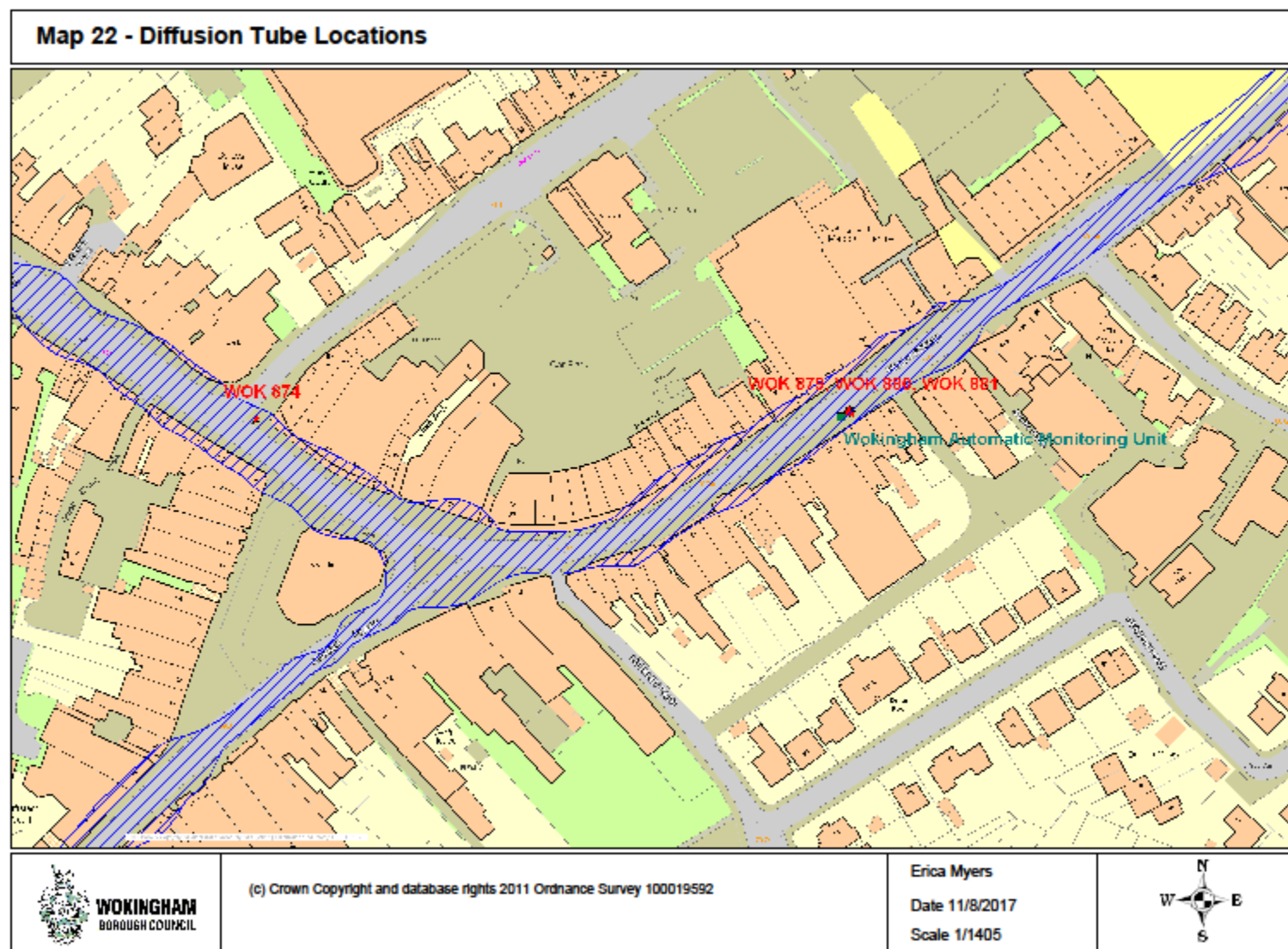


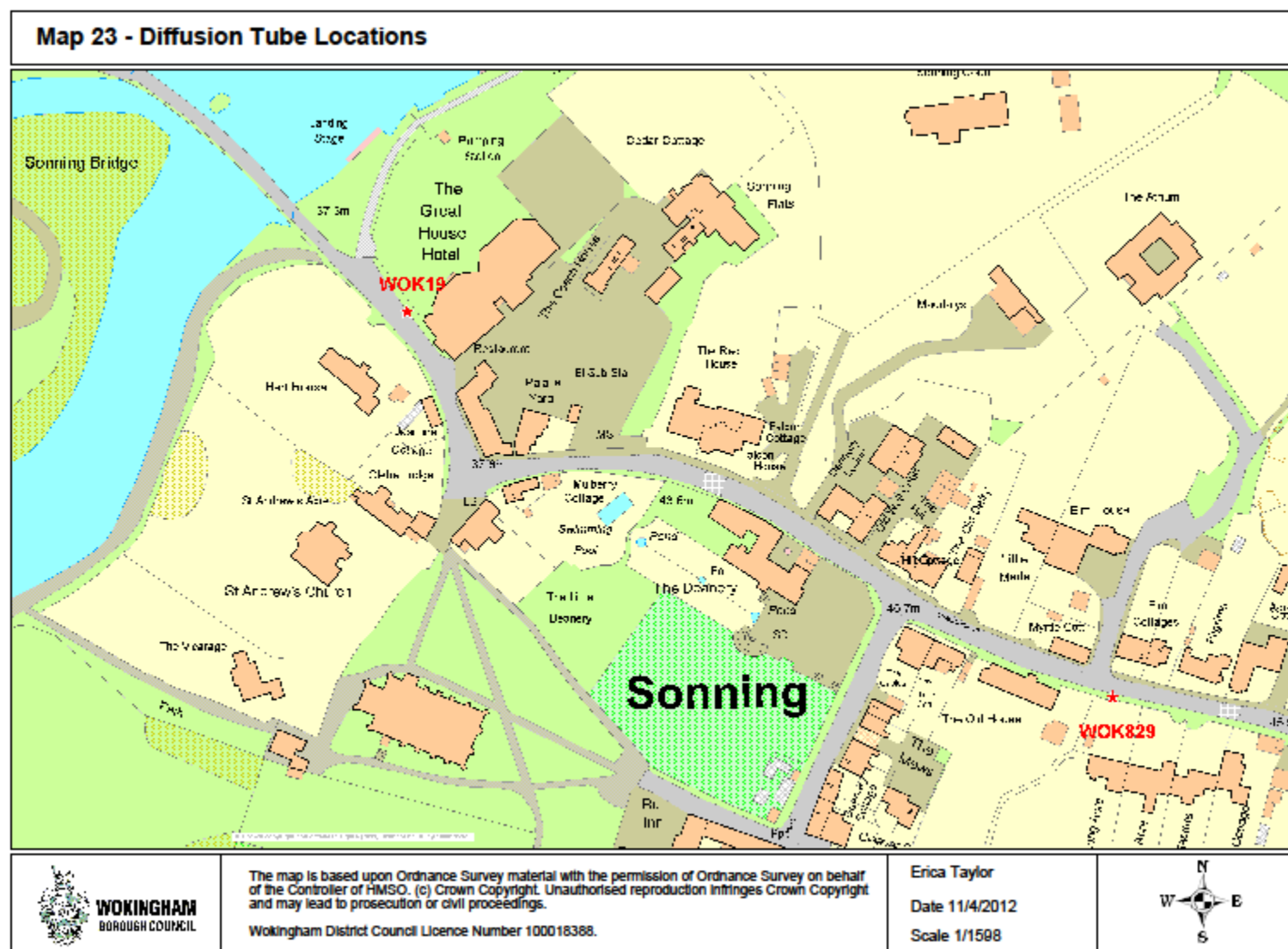


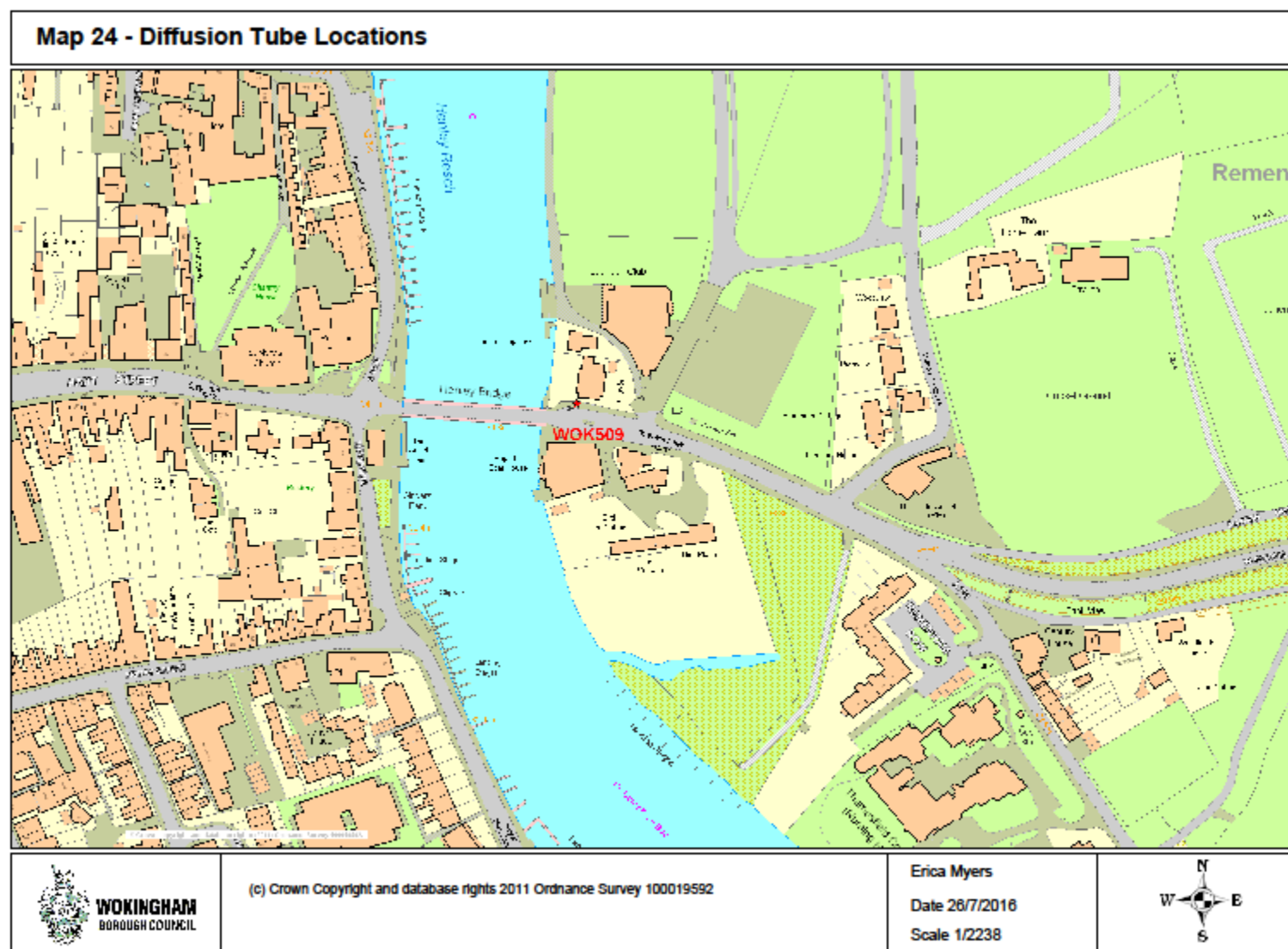


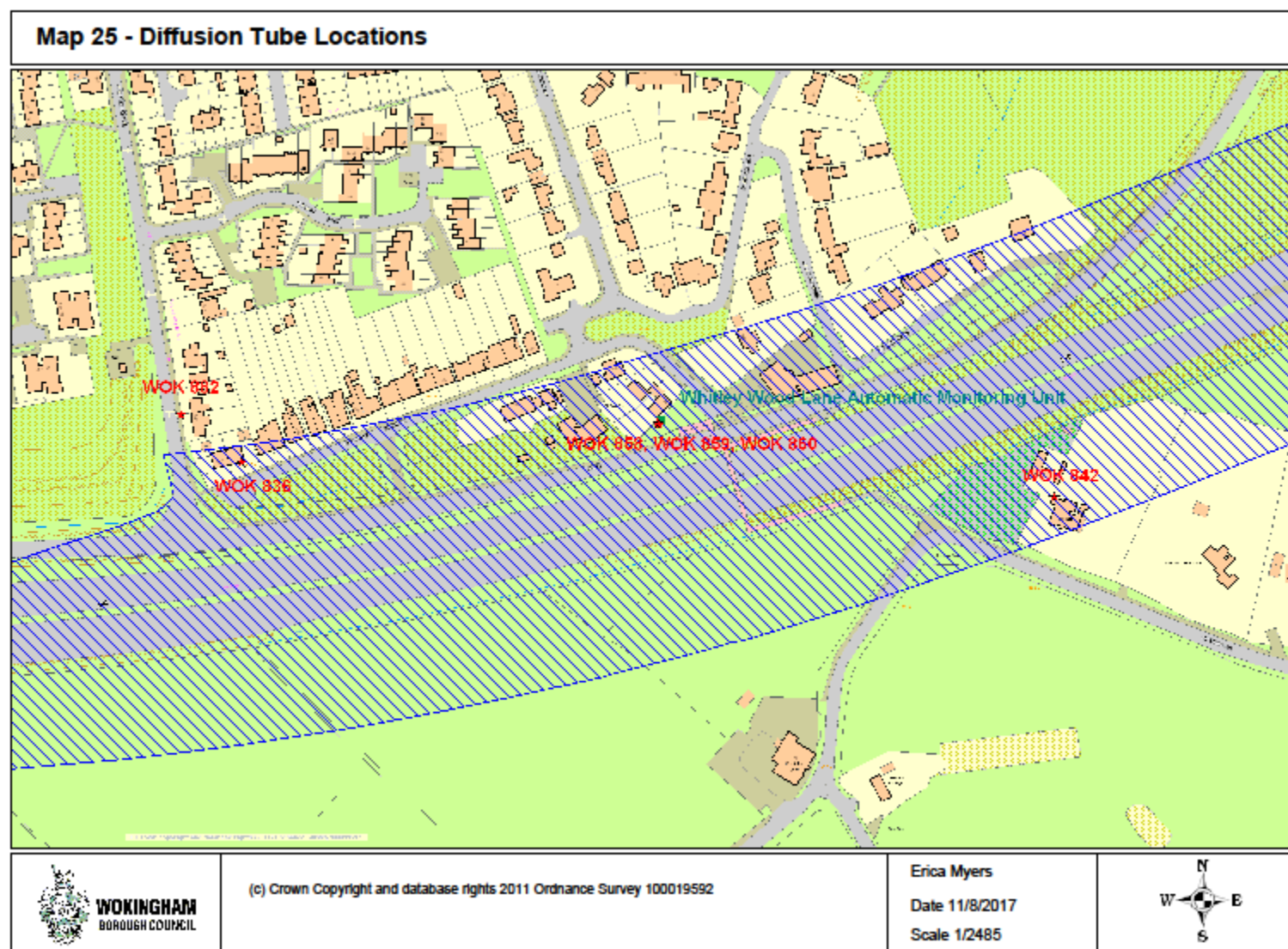












Appendix E: Summary of Air Quality Objectives in England

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/m³).

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

Updated Detailed Assessment Wokingham and Twyford (PBA Feb 2017)