



2022 Air Quality Annual Status Report (ASR)

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

Date: June 2022

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Executive Summary: Air Quality in Our Area

Air Quality in Test Valley Borough Council

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, the elderly, and those with existing heart and lung conditions. There is also often a strong correlation with equalities issues because areas with poor air quality are also often less affluent areas^{1,2}.

The mortality burden of air pollution within the UK is equivalent to 28,000 to 36,000 deaths at typical ages³, with a total estimated healthcare cost to the NHS and social care of £157 million in 2017⁴.

Due to the importance of the potential impact of poor air quality on health, Test Valley Borough Council (TVBC) is required to review and assess air quality within the Borough on a regular basis. This involves the production of an Annual Status Report by the end of June each year and is intended to maintain continuity in the Local Air Quality Management process. This report includes the results of on-going monitoring of Nitrogen Dioxide (NO₂) within the Borough where emissions from a range of sources could adversely impact sensitive receptors.

This Annual Status Report includes the results of Nitrogen Dioxide (NO₂) diffusion tube monitoring carried out in 2021, with exceptional data recovery achieved throughout the report period and an overall data capture rate of 99%. Monitoring shows variable trends at the 17 monitoring sites, with decreased levels of NO₂ when compared to 2019. Whilst the majority of sites show relatively stable or decreasing trends, 3 localities show a notable increase between 2020 and 2021. This is comparable to national trends, which stabilised or show a slight increase at roadside localities after a rapid drop during 2020 (Defra, 2022).

¹ Public Health England. Air Quality: A Briefing for Directors of Public Health, 2017

² Defra. Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Air quality appraisal: damage cost guidance, July 2021

⁴ Public Health England. Estimation of costs to the NHS and social care due to the health impacts of air pollution: summary report, May 2018

The 21.5 $\mu\text{g}/\text{m}^3$ annual mean concentration of NO_2 for 2021 within the TVBC area (Table A.4 – mean for 2021) is lower than the mean roadside background levels in England of 24.8 $\mu\text{g}/\text{m}^3$ (Defra, 2022). Whilst continued and targeted monitoring will be carried out in the TVBC area, there is no evidence that the annual mean concentration of NO_2 is likely to exceed the specific Air Quality Objective of 40 $\mu\text{g}/\text{m}^3$.

The relatively low concentrations of NO_2 shown in the results from 2021, a continuation of lower values observed in 2020, are most likely linked to decreased vehicle use due to periods of travel restrictions. Based on the findings of this report, TVBC has found no evidence that the levels of any other relevant pollutants are likely to exceed the specific Air Quality Objectives and therefore has not identified the need to designate any Air Quality Management Areas.

Deployment sites for air quality monitoring are periodically reviewed by TVBC, with consideration given to concerns or information provided by the public, keeping in mind that there is benefit from keeping sites unchanged as far as possible for long term trend monitoring purposes. Air quality is also addressed through Environmental Permitting of processes across the TVBC area which may have the potential to cause pollution to the atmosphere and engages with the Environment Agency where such sites fall within their remit.

Through strategic planning we are also working towards accessible and connected communities, in partnership with Hampshire County Council (HCC), who manage local highways infrastructure. TVBC also works alongside HCC, promoting events such as the Clean Air Day and works alongside other organisations, such as Sustrans, on sustainable transport and infrastructure planning.

Actions to Improve Air Quality

Whilst air quality has improved significantly in recent decades, and will continue to improve due to national policy decisions, there are some areas where local action is needed to improve air quality further.

The 2019 Clean Air Strategy⁵ sets out the case for action, with goals to reduce exposure to harmful pollutants. The Road to Zero⁶ sets out the approach to reduce exhaust emissions from road transport through a number of mechanisms; this is extremely important given that the majority of Air Quality Management Areas (AQMA's) are designated due to elevated concentrations heavily influenced by transport emissions.

TVBC takes its responsibilities for air quality very seriously and any proposals within the Borough are carefully assessed in accordance with the Local Plan. Development that would or could generate potentially significant levels of pollution will only be permitted if it can be demonstrated that there would not be any adverse impact on human health, the natural environment or general amenity. Air Quality Assessments (AQA's) including modelling of air quality, are required where infrastructure planning may lead to increased traffic flow (e.g. the Nursling Recycling Centre). TVBC is conscious of the need to keep air quality issues in mind when looking at development within the Borough over time.

Sustainable transport and improved cycling infrastructure is key to promoting a reduction in motor vehicle use, a key source of NO₂ within the TVBC area. Through Transport Development and Infrastructure planning, TVBC are implementing Local Cycling & Walking Infrastructure Plans for both the northern and southern parts of the borough, the latter nearing completion. TVBC also runs annual Get Cycling events for residents of Picket Twenty which promotes cycling and walking and/or public transport use through guided cycling and walking events between Picket Twenty and Andover town centre.

TVBC will also continue to explore with HCC potential strategies to reduce PM_{2.5}s and how to target these and measure any associated impact on public health.

The southern part of the Test Valley Borough is encompassed by the Partnership for Urban South Hampshire (PUSH) Air Quality Impact Assessment, and we will continue to work with our neighbouring authorities on projects, such as the Bargain Farm/Nursling Farm Park and Ride, to improve air quality for urban south Hampshire.

⁵ Defra. Clean Air Strategy, 2019

⁶ DfT. The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy, July 2018

Conclusions and Priorities

In summary the 2022 Air Quality Status Report highlights that:

- Monitoring of NO₂ within the TVBC area indicates that the current Air Quality Objectives have been met, with no current requirement to implement AQMA's.
- The overall trends in the data indicate continued improvement of air quality within the region compared to 2019 - see Figure A.2.
- TVBC will continue to carefully consider future planning applications which may have the potential to impact air quality in Test Valley and within the vicinity of the Southampton Urban Area.
- Monitoring will continue to be directed to areas identified as at risk from poor air quality, or where residents raise concerns.

Following on from the sharp reduction in Nitrogen Dioxide levels due to the restrictions put in place at the beginning of the Covid-19 pandemic in 2020, the implementation of lockdown measures and travel restrictions during the first half of 2021 resulted in a sustained drop in NO₂ levels. This highlights the value of targeting transport methods in order to improve local air quality within the TVBC area, with monitoring focussed on areas of high traffic volume/flow.

Moving forward the predicted uptake of electric vehicle (EV's), with Battery Electric Vehicles (BEV's) accounting for over 25% of new vehicle registrations in England during 2021 (SMMT, 2022), combined with more flexible working arrangements, highlighted by increased working at home arrangements implemented by TVBC, has the potential to sustain the reduction in NO₂ within the TVBC area. However, challenges to air quality as a result of climate change and the return of people to the workplace resulting in increased vehicular traffic will remain.

Local Engagement and How to get Involved

TVBC is actively promoting sustainable travel and flexible working which will help improve air quality. Working at home has reduced the number of vehicular journeys to the TVBC offices, with the overall rate of occupancy during 2021 at approximately 30%. Building on the success of the June 2021 Climate Day of Action, run in partnership with Andover Vision, a second event is planned on 30th September 2022 which also promotes cycling or walking to work as an alternative to driving. The guided cycling and walking events open to residents of Picket Twenty also took place in September 2021, with a further event in June 2022.

Information on wood burning stoves and open fires, which have grown in popularity in recent years and can have an impact on air quality in built up areas relating to particulate matter (PM₁₀'s and PM_{2.5}'s), is also available on the TVBC Air Quality website below.

Further information on aspects relating to air quality and sustainable transport for TVBC, including links to EV charging locations within the TVBC area, are available on the Council's website:

Air Quality:

<https://www.testvalley.gov.uk/housingandenvironmentalhealth/environmentalprotection/air-quality>

Sustainability:

<https://www.testvalley.gov.uk/aboutyourcouncil/corporatedirection/environmentandsustainability>

Travel Planning:

<https://www.testvalley.gov.uk/transportparkingandstreets/traffic-management/travelplans>

Cycling and Walking:

<https://www.testvalley.gov.uk/communityandleisure/cyclingwalking>

With updates for new sustainable travel initiatives such as, bus services, walking and cycling provision and residents travel plans:

<https://www.testvalley.gov.uk/communityandleisure/my-local-area-new/andover-romans/augusta-park/east-anton-augusta-park-community-travel-plan>

and through the My Journey link on the following TVBC webpage

<http://testvalley.gov.uk/transportparkingandstreets>

Local Responsibilities and Commitment

This ASR was prepared by the Housing and Environmental Health Service of Test Valley Borough Council with the support and agreement of the following officers and departments:

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This ASR has been approved by: Mark Lee, Environmental Health Manager

This ASR has not been signed off by a Director of Public Health.

If you have any comments on this ASR please send them to Sean Feist at:

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1 Local Air Quality Management

This report provides an overview of air quality in Test Valley borough Council (TVBC) during 2021. 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 TVBC to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England are presented in Table E.1 (Appendix E).

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

Test Valley Borough Council currently does not have any declared AQMA's, with monitoring data indicating compliance with the Air Quality Objective of 40.0 µg/m³ and no evidence that this will be exceeded.

The Council utilises a number of local and regional plans and strategies in order to minimise and/or reduce potential impacts on air quality within the Borough and pro-actively manage the levels of air pollution in the area. For example:

- Hampshire Local Plan (2011- 2031)
- Hampshire Local Plan (LTP – 4)
<https://www.hants.gov.uk/transport/localtransportplan>
- Test Valley Borough Council Local Plan (2011 – 2029)
[Local Plan | Test Valley Borough Council](#)
- Partnership for Urban South Hampshire Air Quality Impact Assessment (PUSH)
[Home - Partnership for South Hampshire \(push.gov.uk\)](#)

For reference, maps of TVBC's monitoring locations are available in Appendix D.

Table 2.1 – Declared Air Quality Management Areas

Test Valley Borough Council has not declared any Air Quality Management Areas.

2.2 Progress and Impact of Measures to address Air Quality in Test Valley Borough Council

Defra's appraisal of last year's ASR has not at time of finalisation of this report been received.

TVBC has taken forward a number of direct measures during the current reporting year of 2021 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. Fifteen measures are included within Table 2.2, with the type of measure and the progress TVBC have made during the reporting year of 2021 presented. Where there have been, or continue to be, barriers restricting the implementation of the measure, these are also presented within Table 2.2.

More detail on these measures can be found in their respective Action Copies of the main reference plans/strategies can be found via the web-links listed below:

Local Transport Plan (2011 – 2031)

<http://www3.hants.gov.uk/transport/local-transport-plan.htm>

Local Transport Plan (LTP – 4) – *currently under development*

<https://www.hants.gov.uk/transport/localtransportplan>

Test Valley Borough Council's Local Plan (2011 – 2029)

<https://www.testvalley.gov.uk/planning-and-building/planningpolicy/local-development-framework/dpd>

Test Valley Borough Council's Climate Emergency Action Plan

<http://www.testvalley.gov.uk/aboutyourcouncil/corporatedirection/environmentandsustainability/climate-emergency-action-plan>

Test Valley Borough Council's Sustainability Framework

<http://www.testvalley.gov.uk/aboutyourcouncil/corporatedirection/environmentandsustainability/sustainability-framework>

Environmental Health website information

<https://www.testvalley.gov.uk/housingandenvironmentalhealth/environmentalprotection/air-quality>

Test Valley Borough Council expects the following measures to be completed over the course of the next reporting year:

- Bargain Farm & Nursling Park and Ride – reduction of traffic within the Southampton Urban Area Clean Air Zone and neighbouring areas. This site had been utilised as a covid testing location during 2020/2021.
- Southern Test Valley Local Cycling & Walking Infrastructure Plans – reduced traffic in line with increased uptake of active travel.

TVBC's priorities for the coming year are to continue with the proactive strategy for monitoring concentrations of NO₂ across the Borough with flexible deployment of resources where required. To ensure that all proposed development is subject to scrutiny and is compliant with Policy E8 of the Council's Local Plan and to work with our neighbouring local authorities with regards to the non-compliance for NO₂ in the Southampton Urban Area Clean Air Zone.

The principal challenges and barriers to implementation that TVBC anticipates facing are that the main driver for air quality in the borough is traffic. Traffic management within the borough is largely beyond the control of TVBC, and is the responsibility of Hampshire County Council and Highways England.

TVBC anticipates that the measures stated above and in Table 2.2 will help maintain compliance within the Test Valley area and will continue to work with partners in neighbouring authorities, Highways England and Hampshire County Council to monitor and achieve the required Air Quality Objectives.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	Category	Classification	Year Measure Introduced	Estimated / Actual Completion Year	Organisations Involved	Funding Source	Defra AQ Grant Funding	Funding Status	Estimated Cost of Measure	Measure Status	Reduction in Pollutant / Emission from Measure	Key Performance Indicator	Progress to Date	Comments / Barriers to Implementation
1	Pocket Park	Traffic Management	Re-prioritising road space away from cars	2019	2020	Local Authority County Council	Developers & highway infrastructure funding	No	Funded	£500k - £1M	Completed	Reduced Vehicle Emissions	-	Work completed	-
2	Bargain Farm / Nursling Park and Ride	Alternatives to Private Vehicle Use	Bus based park and ride	2021	2022	Local Authority	Developers	No	Funded	Unknown	Implementation	Reduced Vehicle Emissions	-	Site nearing completion	Site used as a Covid testing facility
3	Home Working/Agile Working	Promoting Travel Alternatives	Encourage/Facilitate Homeworking	2020	Ongoing	Local Authority	N/A	No	N/A	Savings	Implementation	Reduced Vehicle Emissions	-	Implementation ongoing	Adoption of flexible working patterns
4	Andover Airfield Business Park	Freight and Delivery Management	Route Management Plans/Strategic Routing	2010	Ongoing	Local Authority	Developers / Operators	No	Funded	Unknown	Implementation	Reduced Vehicle Emissions	TRO	Ongoing	-
5	King Alfreds Cycleway	Transport Planning and Infrastructure	Cycle Network	2020	2020	Local Authorities (Wessex Region)	Mixed	No	Funded	Unknown	Completed	Reduced Vehicle Emissions	-	-	-
6	Environmental Permits	Environmental Permits	Introduction/Increase of environment charges through permit systems and economic instruments	Ongoing	Ongoing	Local Authority	Self-funding	No	Funded	Unknown	Implementation	Reduction in Pollutants/Emissions	Permit compliance	Ongoing	Availability of experienced EHOs
7	Electric Vehicles and Plant	Policy Guidance and Development Control	Sustainable Procurement Guidance	2015	Ongoing	Local Authority	Budgets	No	Funded	Unknown	Implementation	Reduction in Pollutants/Emissions	-	11 electric vehicles, 25 electric plant items and 3 dustcarts with electric bin lifts	-
8	Community travel plans for new neighbourhoods	Transport Planning and Infrastructure	Public transport improvements – interchanges stations and services	2001	Ongoing	Local Authority Developers County Council	Developers	No	Funded	Unknown	Implementation	Reduction in Pollutants/Emissions	-	Services in place for Picket Twenty, Picket Piece and Abbotswood	Phased development
9	Renewable and low carbon energy study	Policy Guidance and Development Control	Other Policy	2019	2020	Local Authority	Local Authority	No	Funded	£37000	Completed	Reduction in Pollutants/Emissions	-	Study completed to highlight capacity in the area and assist sustainable development	-
10	Southern Test Valley Local Cycling & Walking Infrastructure Plans	Transport Planning and Infrastructure	Cycle Network	2020	2022	Local Authority County Council Sustrans	Shared	No	Unknown	Unknown	Planning	Reduced Vehicle Emissions	-	Nearing Completion	-
11	Northern Test Valley Local Cycling & Walking Infrastructure Plans	Transport Planning and Infrastructure	Cycle Network	2020	2023	Local Authority County Council Sustrans	Shared	No	Unknown	Unknown	Planning	Reduced Vehicle Emissions	-	In planning and preparation stage	-
12	Salary Sacrifice for Bicycles	Promoting Travel Alternatives	Promotion of Cycling	2012	Ongoing	Local Authority	Local Authority	No	Funded	Unknown	Implementation	Reduced Vehicle Emissions	-	Available on website, promoted via social media and paper guides	-
13	Walking and Cycling Guides	Promoting Travel Alternatives	Promotion of Cycling/Walking	2010	Ongoing	Local Authority	Local Authority	No	Funded	Unknown	Implementation	Reduced Vehicle Emissions	-	Available on website, promoted via social media and paper guides	-
14	Travel Plan	Promoting Travel Alternatives	Promote use of rail and inland waterways	2015	Ongoing	Local Authority	Local Authority	No	Funded	Unknown	Implementation	Reduction in Pollutants/Emissions	-	Ongoing	-
15	Taxi Licensing	Promoting Low Emission Transport	Taxi Licensing Conditions	2014	Ongoing	Local Authority	Licence Fee	No	Funded	Unknown	Implementation	Reduced Vehicle Emissions	-	Reviewed regularly	-

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.

As part of the Air Quality Annual Summary Report Test Valley Borough Council reviews the latest air quality data on particulates available from the Office for Health Improvement & Disparities (OHID - previously Public Health England). According to the 2019 data, the fraction of mortality attributable to air pollution in the Test Valley area was 4.2% (OHID, 2022^a). This level is one of the lowest in the South East region, where the average is reported as 5.2%, and also lower than the average for Hampshire (4.6%) and the overall average for England (5.1%).

The weighted annual mean concentration of PM_{2.5} estimated for the Test Valley in 2020 was 6.7 µg/m³ (OHID, 2022^b). Again, this compares favourably with the Hampshire average of 6.9 µg/m³, the South East regional average (7.4 µg/m³) and the England overall average (6.9 µg/m³).

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

Publicly available data for PM_{2.5}s is monitored to ensure the TVBC area is not showing an increase. Key sources of PM_{2.5} include road traffic, industrial emissions and wood burning stoves. Whilst TVBC only has a limited role in road traffic management it will continue to work with Hampshire County Council and Highways England in addition to Hampshire County Council's Public Health team and the Office for Health Improvement & Disparities/UK Health Security Agency to reduce PM_{2.5} emissions wherever possible. Guidance on the use of wood burning stoves, particularly relevant to urban areas, is provided on the TVBC website.

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

This section sets out the monitoring undertaken within 2021 by TVBC and how it compares with the relevant air quality objectives. In addition, monitoring results are presented for a five-year period between 2017 and 2021 to allow monitoring trends to be identified and discussed (figure A.1. Appendix A).

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

TVBC does not currently have any automatic (continuous) monitoring sites.

3.1.2 Non-Automatic Monitoring Sites

TVBC undertook non-automatic (i.e. passive) monitoring of NO₂ at 17 sites during 2021. Table A.2 in Appendix A presents the details of the non-automatic sites. These remain in line with the locations monitored in 2019 and 2020, providing the opportunity to compare data over a 3 year period (please refer to figure A.2. Appendix A), with longer term comparisons over a 5 year period available at 6 localities since 2017 (figure A.1. Appendix A).

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 (where the annual mean data capture is below 75% and greater than 25%), and distance correction. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.4 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years with the air quality objective of 40 µg/m³. Note that the concentration data presented represents the concentration at the location of the monitoring site, following the application of bias adjustment and annualisation, as required (i.e. the values are exclusive of any consideration to fall-off with distance adjustment).

For diffusion tubes, the full 2021 dataset of monthly mean values is provided in Appendix B. Note that the concentration data presented in Table B.1 includes distance corrected values, only where relevant.

Annual mean raw and bias corrected NO₂ levels at the 17 monitoring stations within the TVBC area did not exceed the air quality monitoring objectives of 40 µg/m³ during the 2021 monitoring period. Mean annual bias corrected NO₂ concentrations of 21.5 µg/m³ are calculated, with a range from 12.0 to 30.2 µg/m³. A bias correction factor of 0.78 has been applied in line with the appropriate technical guidance for 2021. To place the TVBC results in context they are lower than the national roadside average for England of 24.8 µg/m³ (Defra, 2022).

Trends in the data at the 6 monitoring locations where data is available for 5 years (Figure A.1. Appendix A) show a clear decrease in NO₂ at locations S3, S7, S8 and S13, with levels at sites S6 and S9 more variable. Whilst 5 years of data is required to establish any trend, when comparing mean annual NO₂ concentrations at the 17 sites monitored between 2019 and 2021, the impact of the Covid 19 pandemic can clearly be observed (Figure A.2. Appendix A). Lower levels of NO₂ are observed in 2021 compared to 2019 at 16 of the 17 monitoring locations, with the exception of site S13, however a mean annual NO₂ concentration of 18 µg/m³ at this location remains well below the Air Quality Objective of 40 µg/m³ (45% of the AQO), and below the national roadside average for England of 24.8 µg/m³ (Defra, 2022).

A slight increase of 0.1 µg/m³ in mean annual NO₂ concentrations in the TVBC data between the 2020 and 2021 monitoring periods is lower, but in-line, with general national trends. These show minor increases of 0.2 and 0.8 µg/m³ in rural and urban background NO₂ respectively, with a rise of 1.9 µg/m³ in the national roadside average over the same period (Defra, 2022).

Where annual mean and bias corrected data is available for sites from 2016, simple linear trend analysis reveals an average annual decrease of -1.5 µg/m³ over the six year period to

2021. This is slightly lower than the decrease of $-2.8 \mu\text{g}/\text{m}^3$ in the national average roadside mean over the same period (Defra, 2022), which was partially driven by a significant drop in vehicular traffic and subsequent reduction in NO_2 emissions during 2020.

Monitoring locations where NO_2 values are persistently low during the following 12 month monitoring period (2022 calendar year) and where no increasing trend is observed will be considered for relocation. New sites will be assessed based on potential redevelopment and notable changes in traffic flow compared to the pre-pandemic period.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Test Valley Borough Council does not have any Automatic Monitoring Sites.

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

Diffusion Tube ID	Site Name	Site Type	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Pollutants Monitored	In AQMA? Which AQMA?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube Co-located with a Continuous Analyser?	Tube Height (m)
S1	Winchester Road - East	Roadside	436129	121398	NO ₂	NO	0	1.0	No	1.5
S2	Duttons Road	Roadside	435376	121786	NO ₂	NO	0	1.5	No	2.0
S3	Palmerstons Street - West	Roadside	435474	121089	NO ₂	NO	0	1.3	No	2.0
S4	Romsey (A27) By-pass	Roadside	434927	120689	NO ₂	NO	0	3.0	No	2.0
S5	Palmerstons Street - East	Roadside	435473	121125	NO ₂	NO	0	2.0	No	1.8
S6	Winchester Road - West	Roadside	436075	121387	NO ₂	NO	0	1.5	No	2.0
S7	Alma Road - South	Roadside	435597	121244	NO ₂	NO	0	2.0	No	2.0
S8	Alma Road - North	Roadside	435630	121403	NO ₂	NO	0	2.6	No	2.0
S9	Chilworth Road	Roadside	441760	118091	NO ₂	NO	0	1.0	No	2.0
S10	Nursling Street, Nursling	Roadside	436991	116319	NO ₂	NO	0	0.5	No	2.0
S11	North Baddesley	Roadside	439617	119978	NO ₂	NO	0	2.0	No	1.5
S12	Kings Somborne	Roadside	435869	130958	NO ₂	NO	0	1.5	No	1.5
S13	Weyhill (A342), Andover	Roadside	432084	146585	NO ₂	NO	0	1.5	No	2.5
S14	Humberstone Road (East)	Roadside	436498	144936	NO ₂	NO	0	2.0	No	1.5
S15	Little Ann (A343)	Roadside	433514	143078	NO ₂	NO	0	2.0	No	2.0
S16	Nursling (A3057)	Roadside	437747	116652	NO ₂	NO	0	1.5	No	1.5
S17	New Street, Andover	Roadside	436682	146683	NO ₂	NO	0	2.4	No	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).

Table A.3 – Annual Mean NO₂ Monitoring Results: Automatic Monitoring (µg/m³)

Test Valley Borough Council does not have any Automatic Monitoring Sites.

Table A.4 – Annual Mean NO₂ Monitoring Results: Non-Automatic Monitoring (µg/m³)

Diffusion Tube ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Site Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2021 (%) ⁽²⁾	2017	2018	2019	2020	2021
S1	436129	121398	Roadside	100	100	-	-	35.3	32.2	28.3
S2	435376	121786	Roadside	100	100	-	-	24.5	21.8	21.9
S3	435474	121089	Roadside	100	100	30.7	29.3	30.1	23.9	23.2
S4	434927	120689	Roadside	100	100	-	-	22.5	18.6	17.8
S5	435473	121125	Roadside	100	100	-	-	25.4	21.8	19.6
S6	436075	121387	Roadside	100	100	26.3	26.6	27.9	21.8	26.3
S7	435597	121244	Roadside	100	100	26.4	26.6	24.4	18.8	19.6
S8	435630	121403	Roadside	100	100	26.6	25.9	25.1	18.9	19.2
S9	441760	118091	Roadside	100	100	26.6	30.0	30.3	22.3	24.6
S10	436991	116319	Roadside	100	100	-	-	29.1	26.4	26.2
S11	439617	119978	Roadside	100	100	-	-	30.6	25.4	24.0
S12	435869	130958	Roadside	100	100	-	-	16.5	11.8	12.0
S13	432084	146585	Roadside	83	83	26.4	26.6	16.8	15.4	18.0
S14	436498	144936	Roadside	100	100	-	-	16.5	14.1	13.9
S15	433514	143078	Roadside	100	100	-	-	24.3	18.7	19.0
S16	437747	116652	Roadside	100	100	-	-	26.8	21.3	21.8
S17	436682	146683	Roadside	100	100	-	-	35.4	30.2	30.2

Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.

Diffusion tube data has been bias adjusted.

Reported concentrations are those at the location of the monitoring site (bias adjusted and annualised, as required), i.e. prior to any fall-off with distance correction.

Notes:

The annual mean concentrations are presented as µg/m³.

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**.

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

Concentrations are those at the location of monitoring and not those following any fall-off with distance adjustment.

(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%).

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

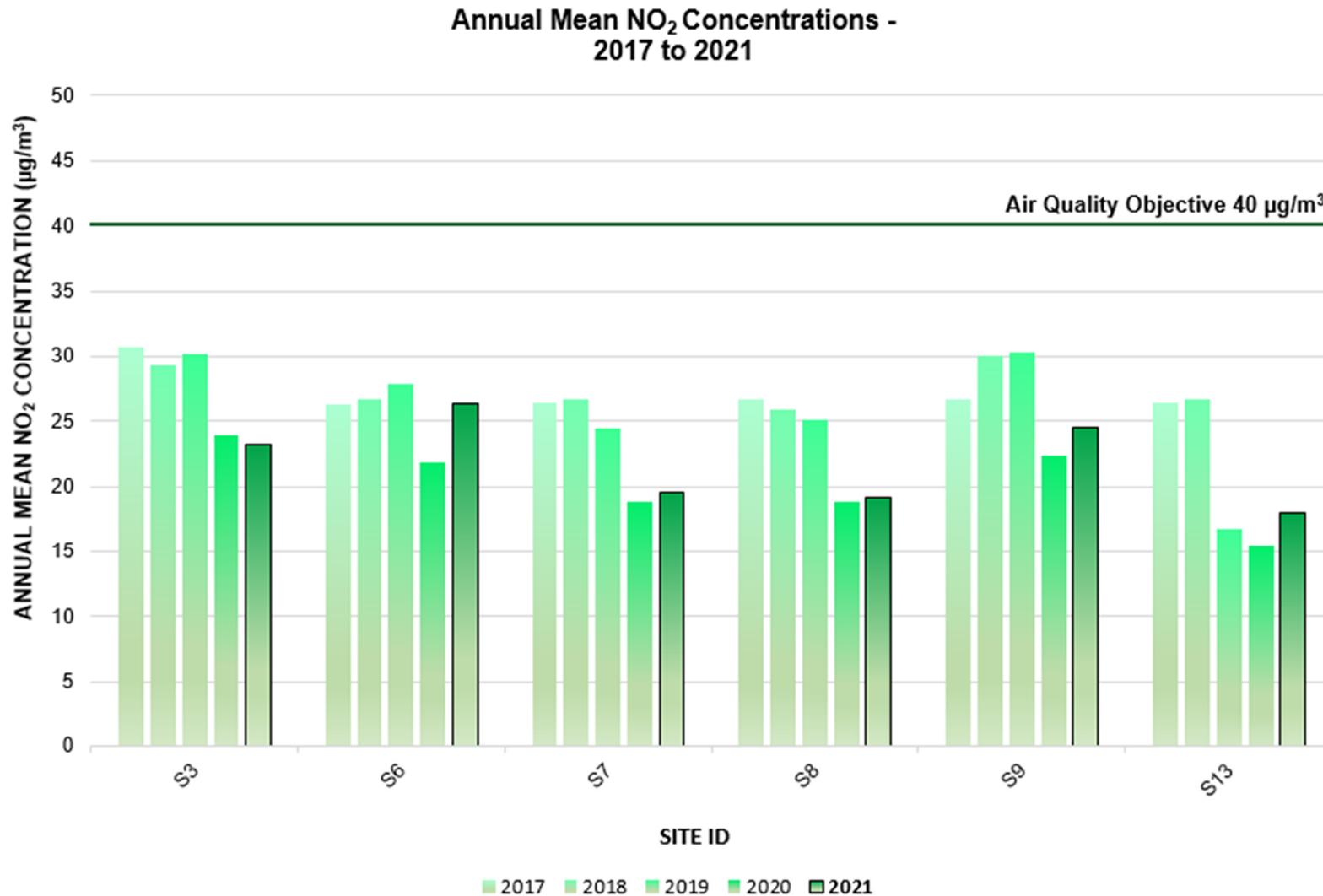


Figure A.1. Annual mean concentrations of NO₂ (in µg/m³) for the 5 year period 2017 to 2021 at 6 monitoring sites where data is available for trend analysis.

Figure A.2 – Annual Mean NO₂ Concentrations 2019 to 2021

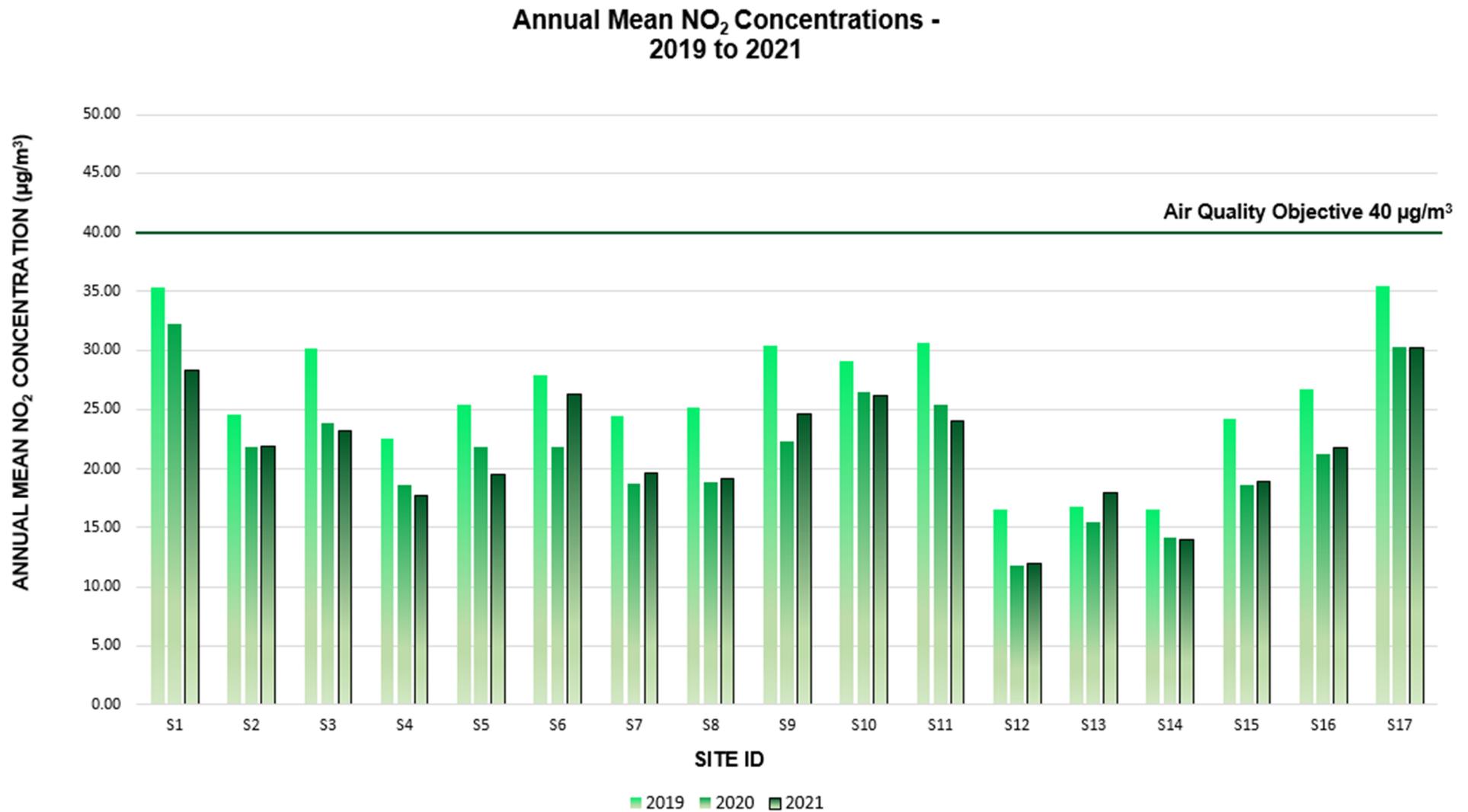


Figure A.2. Annual mean concentrations of NO₂ (in µg/m³) for the 3 year period 2019 to 2021 at all 17 TVBC monitoring sites.

Appendix B: Full Monthly Diffusion Tube Results for 2021

Table B.1 – NO₂ 2021 Diffusion Tube Results (µg/m³)

DT ID	X OS Grid Ref (Easting)	Y OS Grid Ref (Northing)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean: Raw Data	Annual Mean: Annualised and Bias Adjusted (0.78)	Annual Mean: Distance Corrected to Nearest Exposure	Comment
S1	436129	121398	42.9	43.6	43.3	40.5	36.9	33.5	38.3	24.9	33.8	34.3	31.3	31.6	36.2	28.3	-	
S2	435376	121786	29.5	32.7	30.2	24.0	24.1	26.6	29.0	22.5	32.9	29.0	28.6	27.2	28.0	21.9	-	
S3	435474	121089	32.5	30.4	27.9	24.1	15.4	23.7	28.6	17.5	34.5	37.1	50.6	33.9	29.7	23.2	-	
S4	434927	120689	26.6	27.5	22.7	19.7	21.2	18.1	20.5	19.3	21.1	27.6	22.6	26.8	22.8	17.8	-	
S5	435473	121125	28.0	28.7	27.1	25.4	21.9	20.3	23.7	16.9	29.5	25.8	27.5	26.1	25.1	19.6	-	
S6	436075	121387	38.0	33.4	25.4	23.9	24.2	24.0	27.0	37.2	42.1	43.1	45.4	40.9	33.7	26.3	-	
S7	435597	121244	26.9	27.3	29.6	21.4	23.0	21.7	22.7	14.8	28.1	27.8	31.2	27.2	25.1	19.6	-	
S8	435630	121403	25.2	28.1	29.3	25.8	18.3	23.1	21.8	17.2	25.7	24.4	30.5	25.9	24.6	19.2	-	
S9	441760	118091	32.5	36.7	28.0	26.7	26.3	25.4	50.0	23.3	33.4	35.1	26.5	34.1	31.5	24.6	-	
S10	436991	116319	41.8	34.5	35.3	31.6	31.2	29.8	31.9	27.2	35.5	36.3	34.1	33.8	33.6	26.2	-	
S11	439617	119978	36.8	35.0	32.4	25.6	28.2	22.7	28.1	24.3	32.9	33.3	35.3	34.7	30.8	24.0	-	
S12	435869	130958	19.2	15.4	17.0	14.6	13.6	11.5	12.4	11.7	16.5	15.5	19.6	17.7	15.4	12.0	-	
S13	432084	146585	25.0	21.8	21.4	22.0	17.9	37.0		13.9	10.8	21.2		40.0	23.1	18.0	-	Jul & Nov no/poor data
S14	436498	144936	23.5	22.9	20.2	19.9	14.1	12.9	12.6	7.8	17.4	20.6	22.4	20.3	17.9	13.9	-	
S15	433514	143078	27.9	27.0	26.0	22.1	21.6	17.1	17.7	20.5	28.8	30.9	27.3	25.3	24.4	19.0	-	
S16	437747	116652	30.7	30.3	30.8	29.2	22.0	24.0	27.3	19.7	29.1	28.6	36.3	28.0	28.0	21.8	-	
S17	436682	146683	34.9	41.4	32.0	45.5	37.4	34.9	44.4	31.4	45.4	36.0	40.9	40.5	38.7	30.2	-	

- All erroneous data has been removed from the NO₂ diffusion tube dataset presented in Table B.1.
- Annualisation has been conducted where data capture is <75% and >25% in line with LAQM.TG16.
- National bias adjustment factor used.
- Where applicable, data has been distance corrected for relevant exposure in the final column.
- Test Valley Borough Council confirm that all 2021 diffusion tube data has been uploaded to the Diffusion Tube Data Entry System.

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**.

See Appendix C for details on bias adjustment and annualisation.

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

New or Changed Sources Identified Within Test Valley Borough Council During 2021

TVBC has not identified any significant new sources relating to air quality within the reporting year of 2021. The decrease in road traffic associated with the Covid 19 Pandemic observed in 2020 has continued into the current reporting year. However, data from some locations in the last quarter of the year (2021) suggests that road traffic is increasing, bringing monthly recorded NO₂ levels back to pre-pandemic levels. This will be carefully monitored by TVBC over the 2022 period.

Additional Air Quality Works Undertaken by Test Valley Borough Council During 2021

TVBC has not completed any additional works within the reporting year of 2021.

QA/QC of Diffusion Tube Monitoring

The diffusion tubes used by TVBC are supplied and analysed (50% TEA in Acetone) by Socotec Laboratories, Didcot, Oxfordshire. The laboratory is UKAS accredited in accordance with International Standard ISO/IEC 17025:2017, with a score of 100% and the highest ranking of satisfactory from the AIR-PT intercomparison scheme (Jan – March 2021).

Monitoring within TVBC has been completed where practicable in adherence to the 2021 Diffusion Tube Monitoring Calendar (\pm 2Days). The June / July change-over was unavoidably delayed by 8 days, therefore meaning a longer than normal exposure period in June and shorter than normal in July. A single tube at location S13 (A342 – Weyhill, Andover) was not correctly deployed during July 2021 and has been excluded from analysis. An erroneously low result of 0.7 $\mu\text{g}/\text{m}^3$ from the diffusion tube at the same locality (S13) in November has also been excluded from the analysis. Despite these issues, data recovery for the 2021 monitoring period at this site remained at over 80% (Table A4).

Diffusion Tube Annualisation

All diffusion tube monitoring locations within the TVBC network recorded data capture greater than 75% therefore it was not required to annualise any monitoring data.

Diffusion Tube Bias Adjustment Factors

The diffusion tube data presented within the 2021 ASR have been corrected for bias using an adjustment factor. Bias represents the overall tendency of the diffusion tubes to under or over-read relative to the reference chemiluminescence analyser. LAQM.TG16 provides guidance with regard to the application of a bias adjustment factor to correct diffusion tube monitoring. Triplicate co-location studies can be used to determine a local bias factor based on the comparison of diffusion tube results with data taken from NO_x/NO₂ continuous analysers. Alternatively, the national database of diffusion tube co-location surveys provides bias factors for the relevant laboratory and preparation method.

TVBC have applied a national bias adjustment factor of 0.78 to the 2021 monitoring data. A summary of bias adjustment factors used by TVBC over the past five years is presented in Table C.1.

The national bias adjustment factor has been derived from the March 2022 version of the National Diffusion Tube Bias Adjustment Factor Spreadsheet. This utilised a total of 23 studies employing the ESG (50% TEA in Acetone) diffusion tubes during 2021, of which 20 indicated 'Good' precision.

Table C.1 – Bias Adjustment Factor

Monitoring Year	Local or National	If National, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22	0.78
2020	National	03/21	0.77
2019	National	09/20	0.77
2018	National	06/19	0.77
2017	National	09/18	0.77

NO₂ Fall-off with Distance from the Road

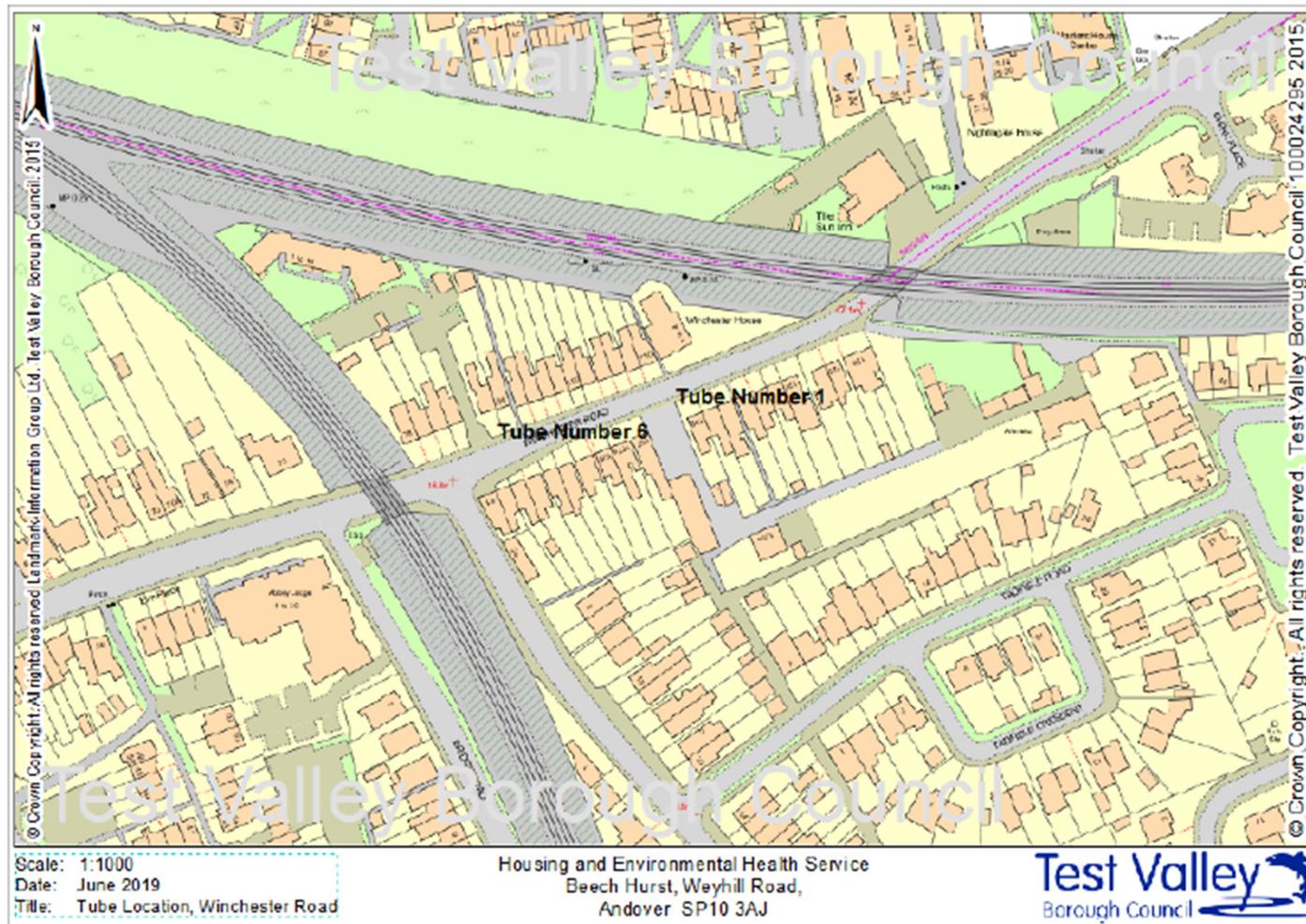
Wherever possible, monitoring locations are representative of exposure. However, where this is not possible, the NO₂ concentration at the nearest location relevant for exposure has

been estimated using the Diffusion Tube Data Processing Tool/NO₂ fall-off with distance calculator available on the LAQM Support website. Where appropriate, non-automatic annual mean NO₂ concentrations corrected for distance are presented in Table B.1.

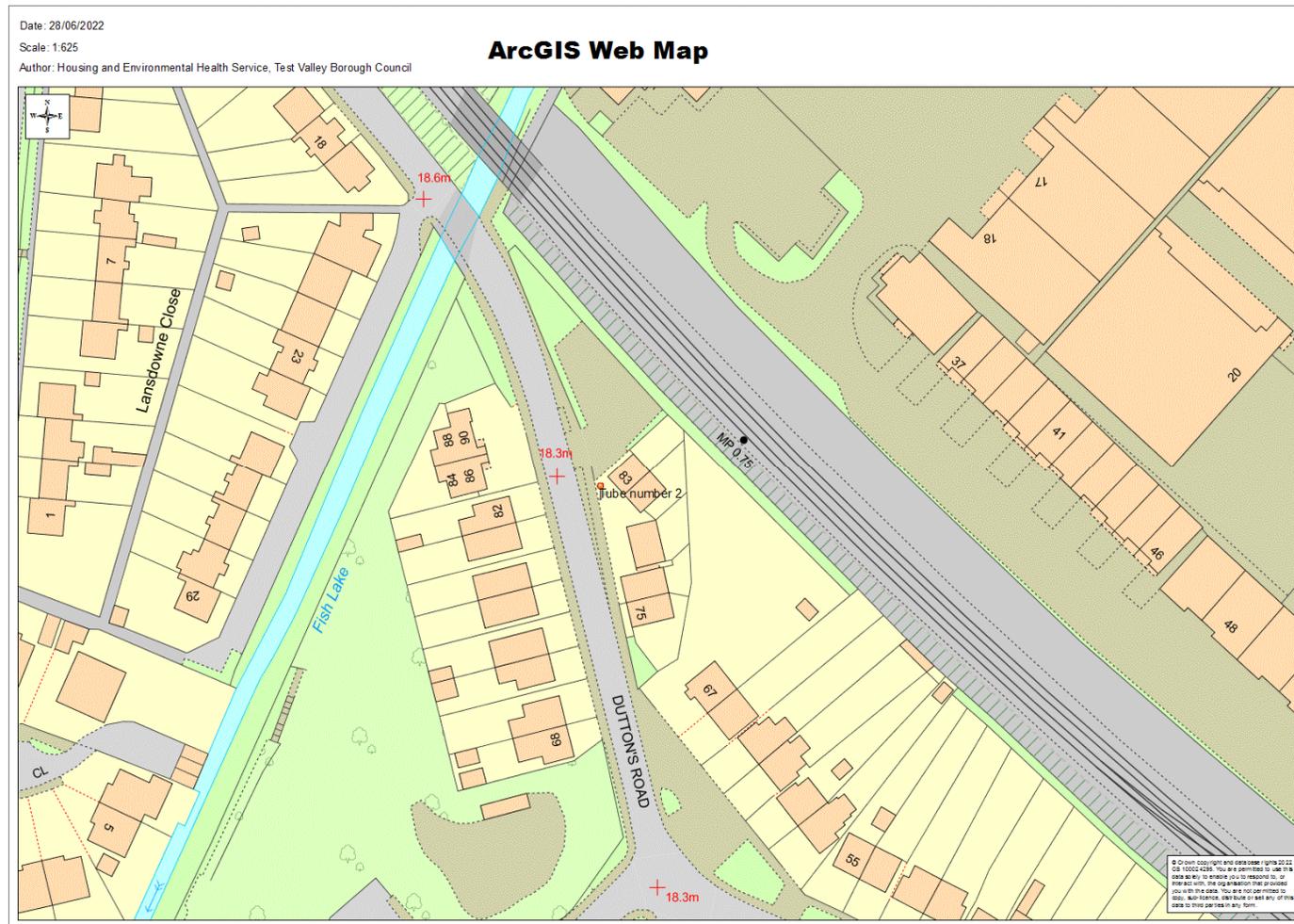
No diffusion tube NO₂ monitoring locations within Test Valley Borough Council required distance correction during 2021.

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

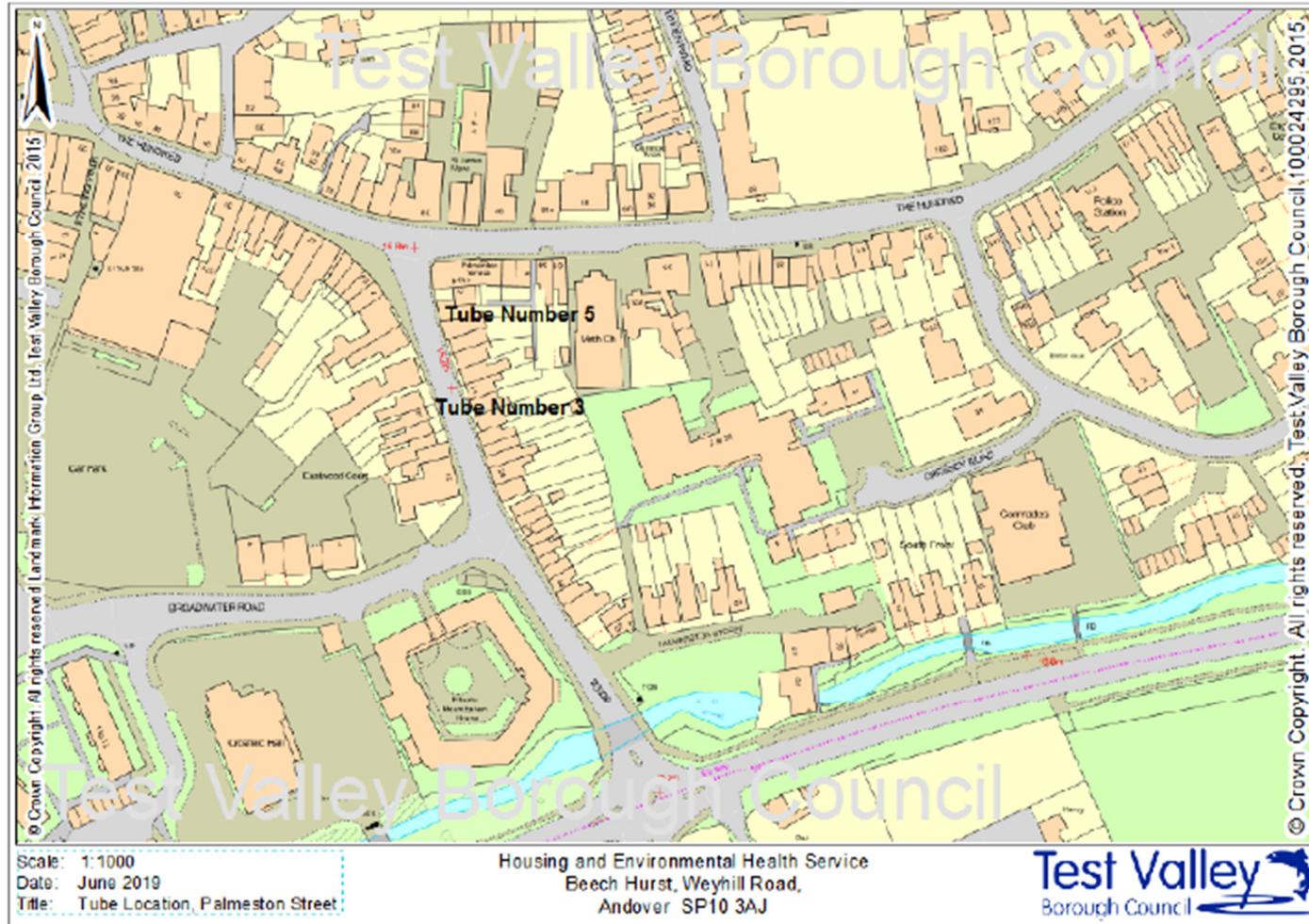
Figure D.1 – Maps of Non-Automatic Monitoring Site



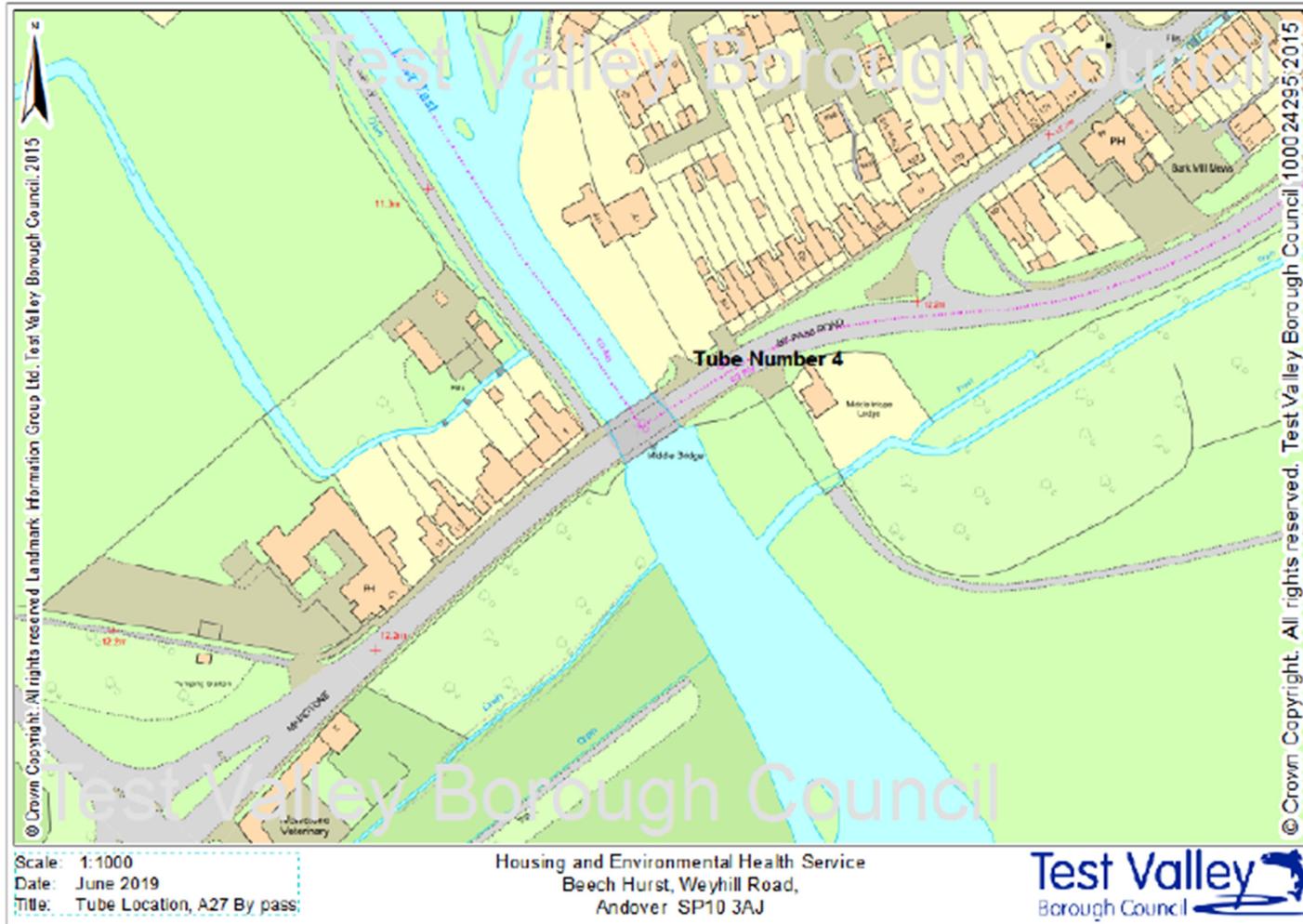
Non-Automatic Monitoring Sites: Numbers 1 & 6, Winchester Road



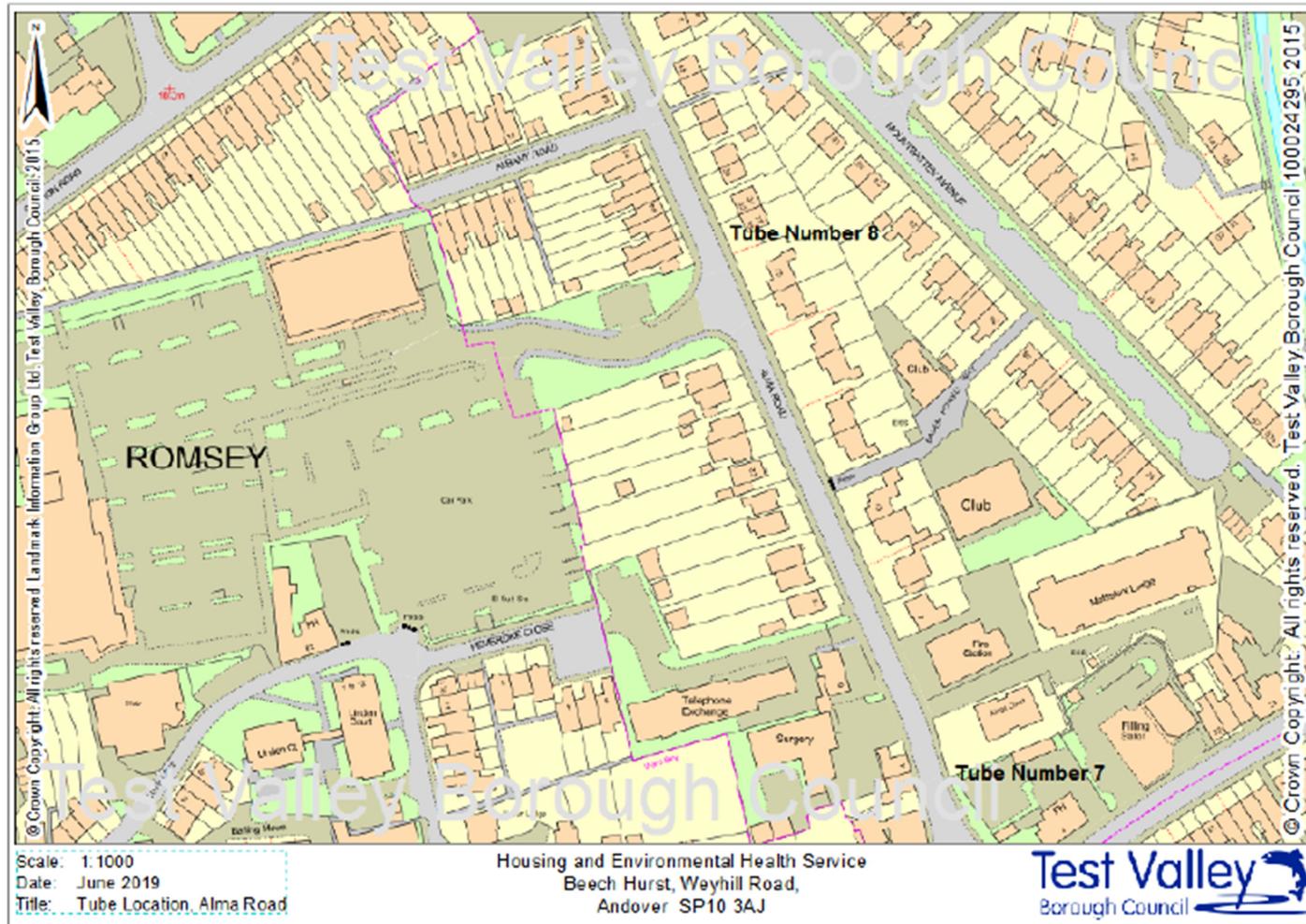
Non-Automatic Monitoring Sites: Number 2, Duttons Road



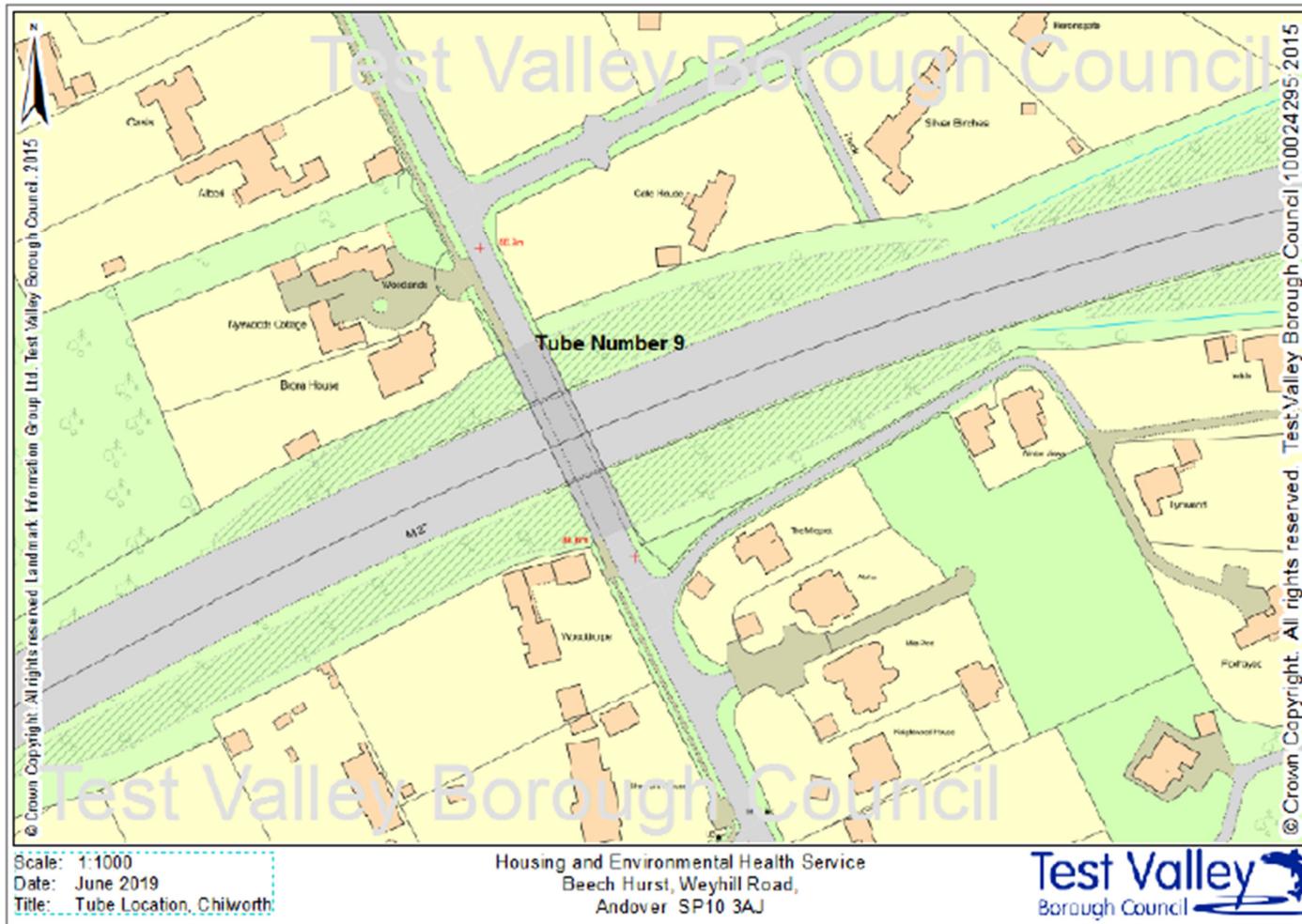
Non-Automatic Monitoring Sites: Numbers 3 & 5, Winchester Road



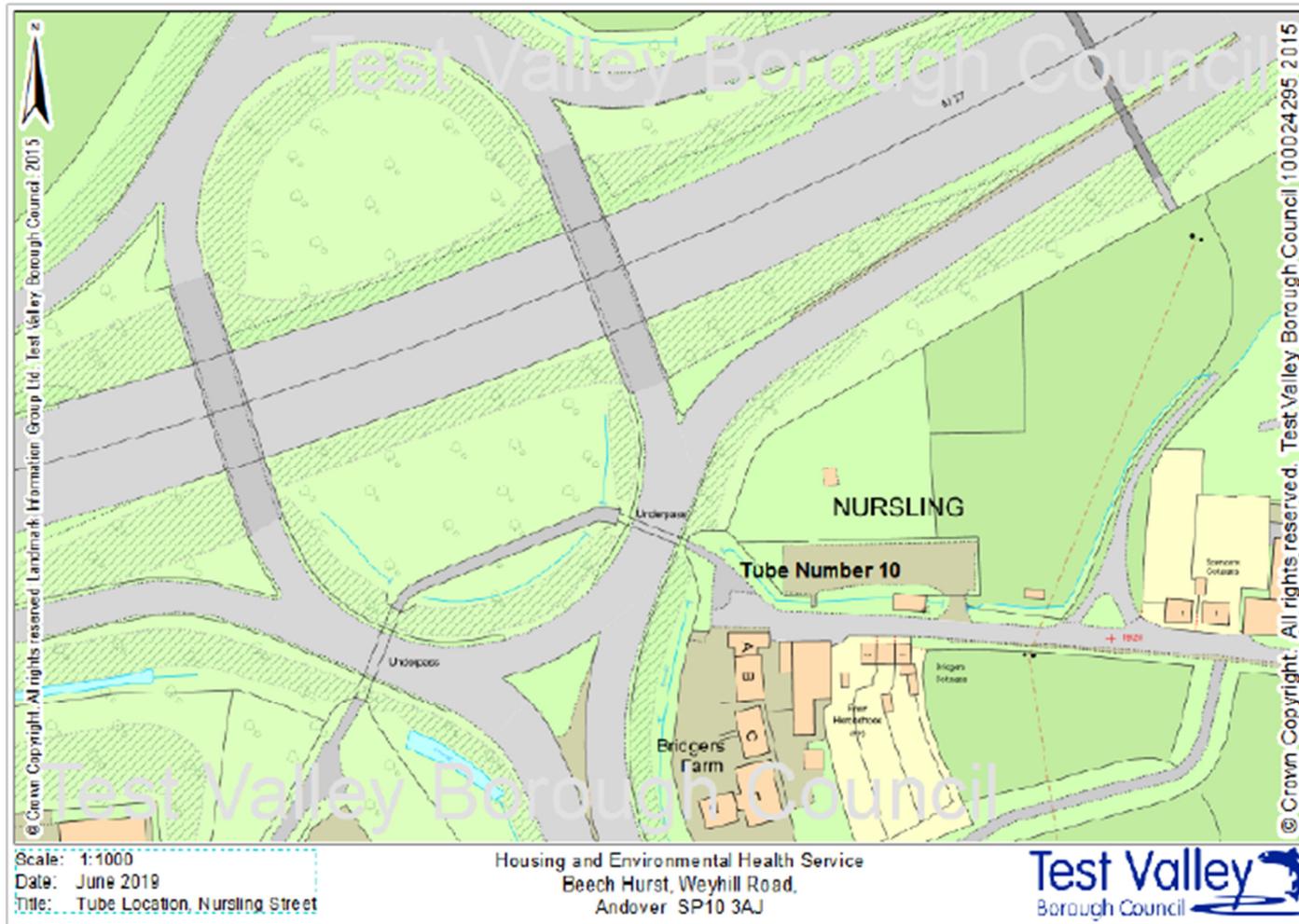
Non-Automatic Monitoring Sites: Number 4, A27 Bypass



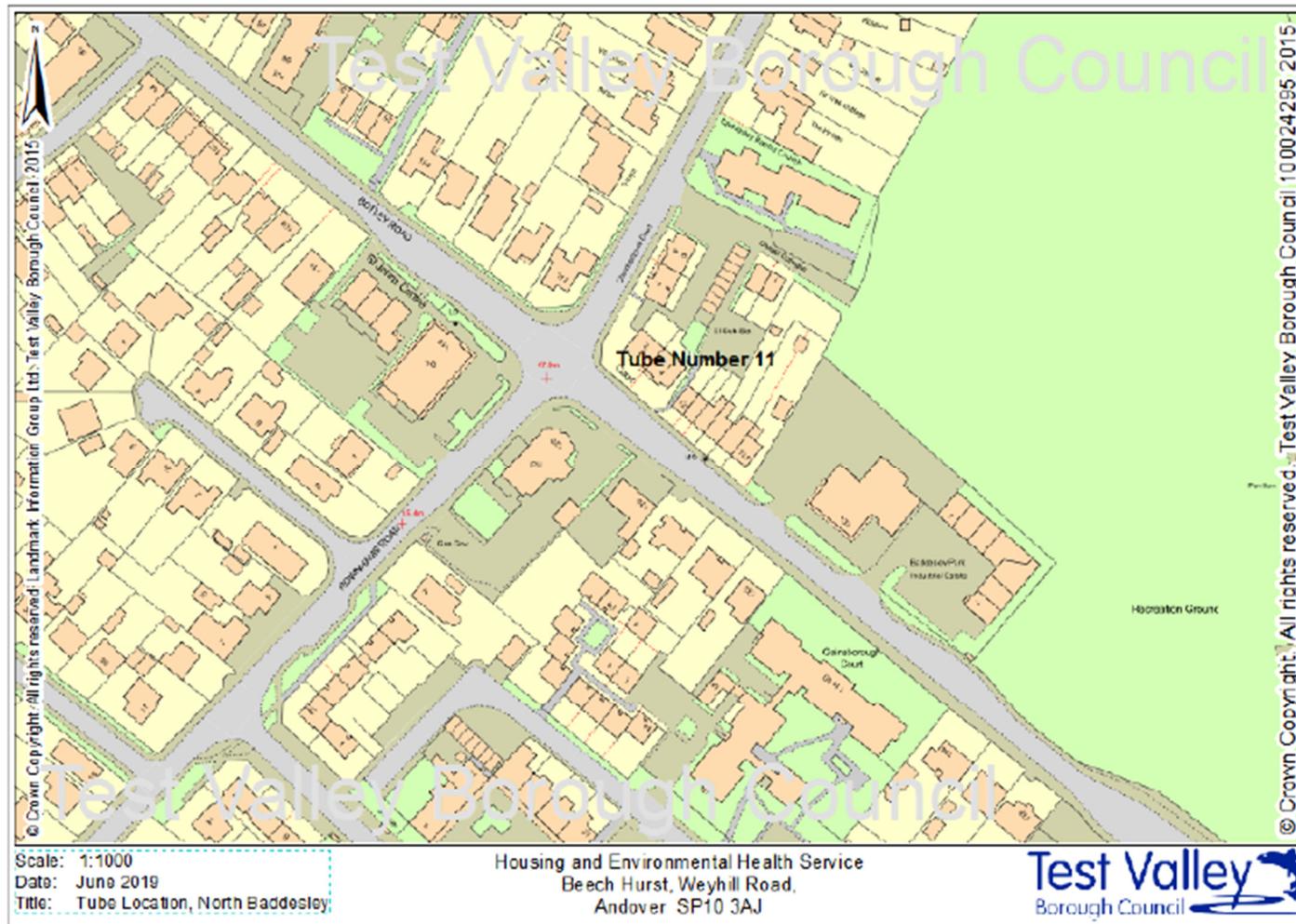
Non-Automatic Monitoring Sites: Numbers 7 & 8, Alma Road



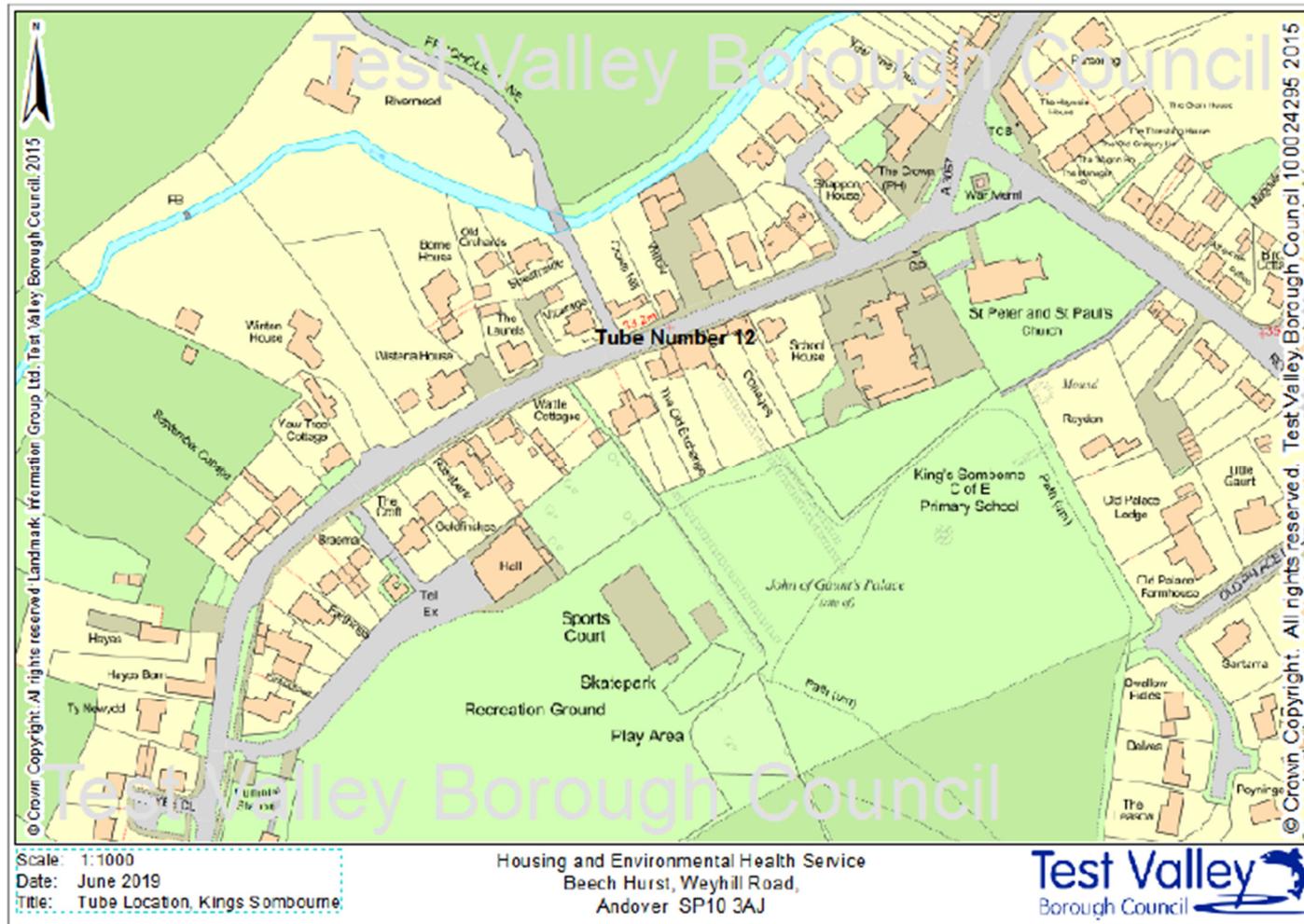
Non-Automatic Monitoring Sites: Number 9, Chilworth



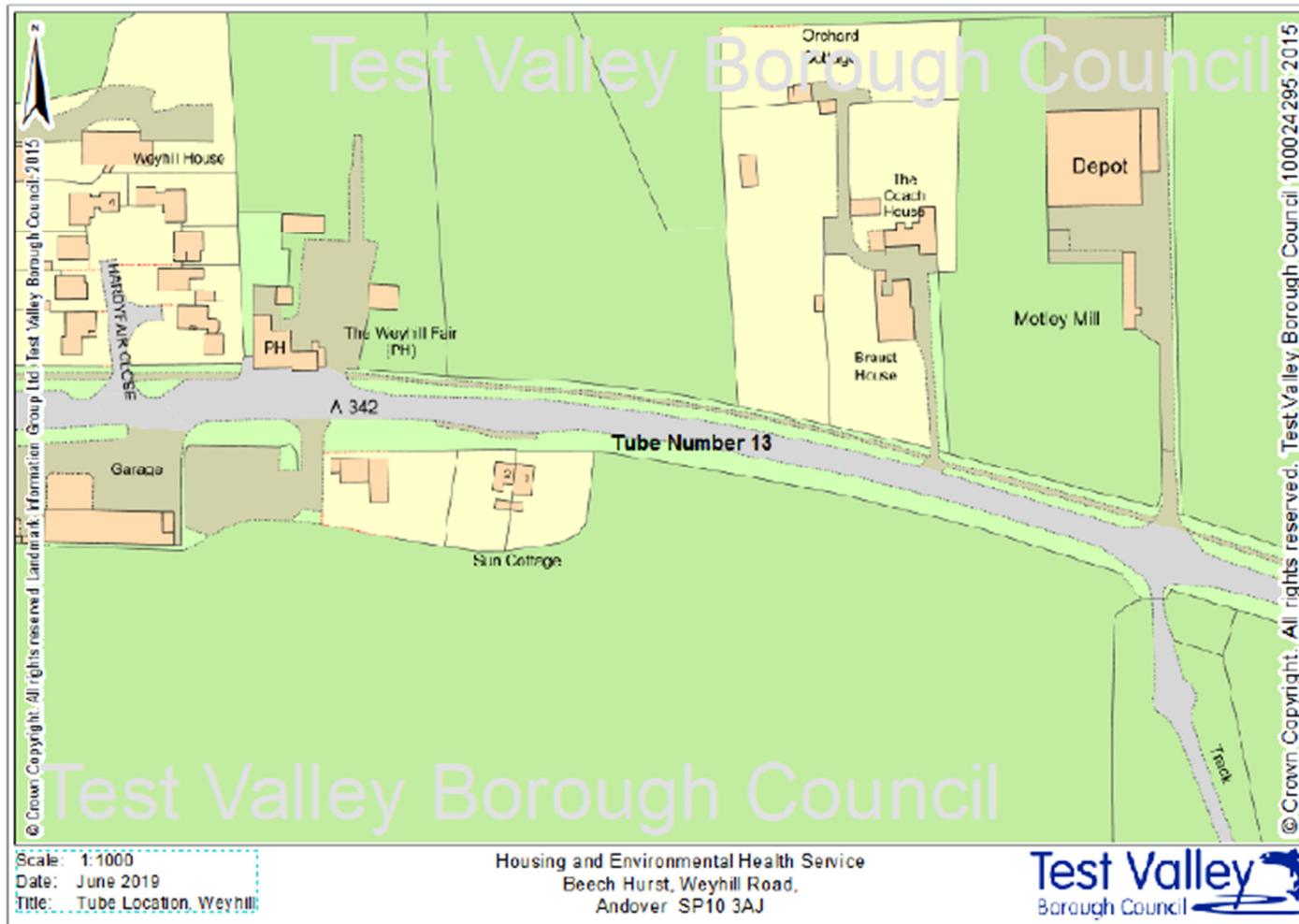
Non-Automatic Monitoring Sites: Number 10, Nursling Street



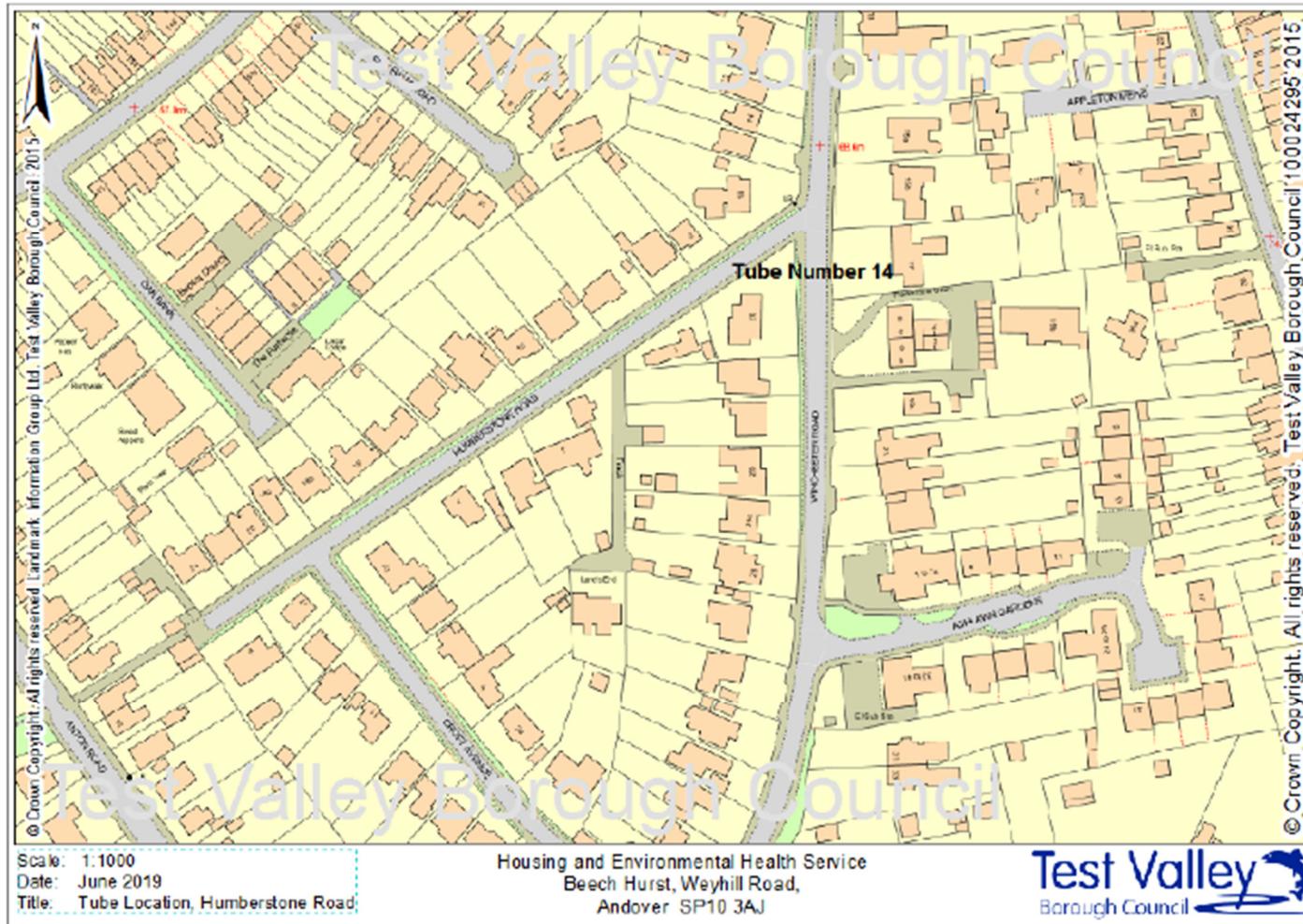
Non-Automatic Monitoring Sites: Number 11, North Baddesley



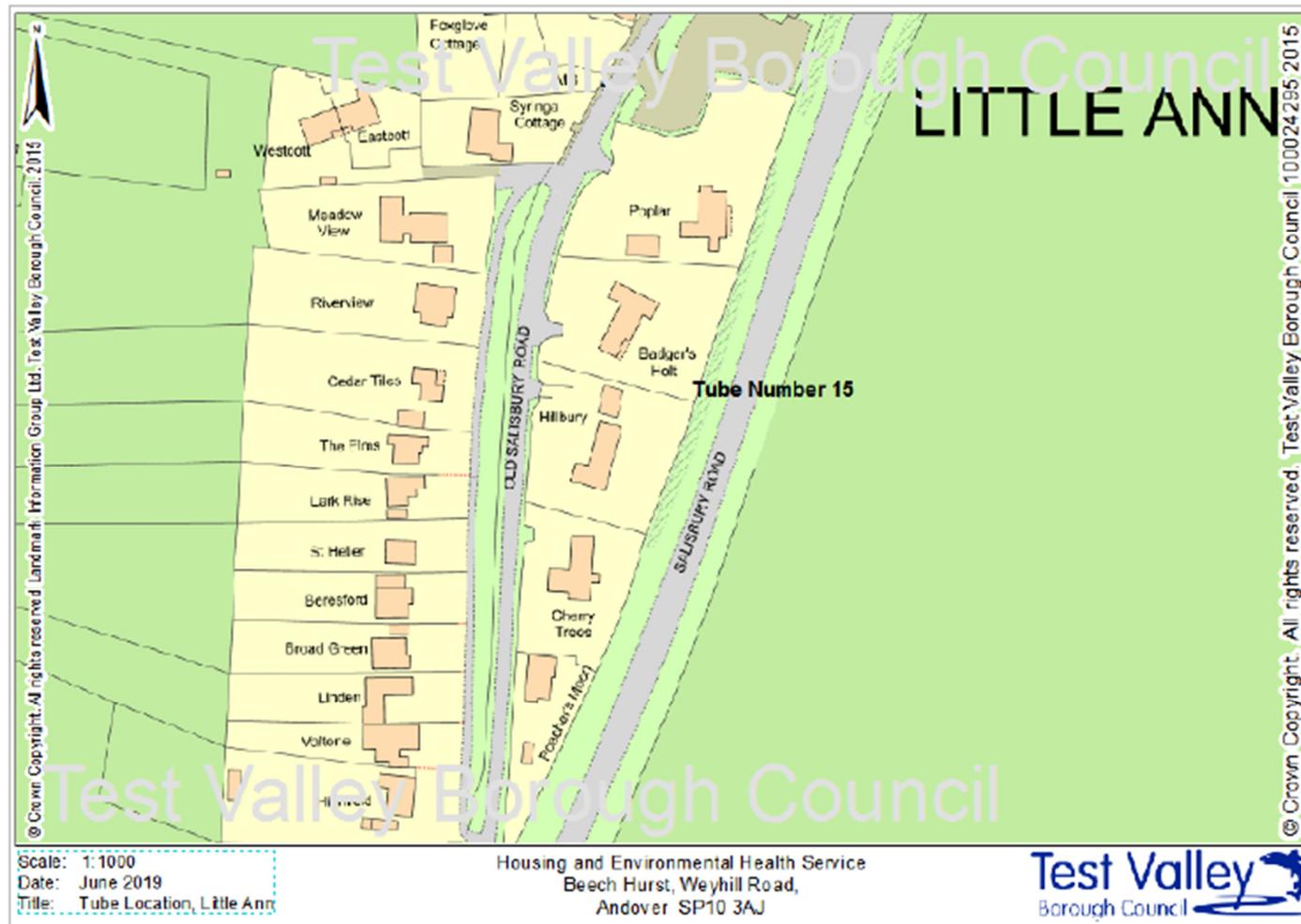
Non-Automatic Monitoring Sites: Number 12, Kings Somborne



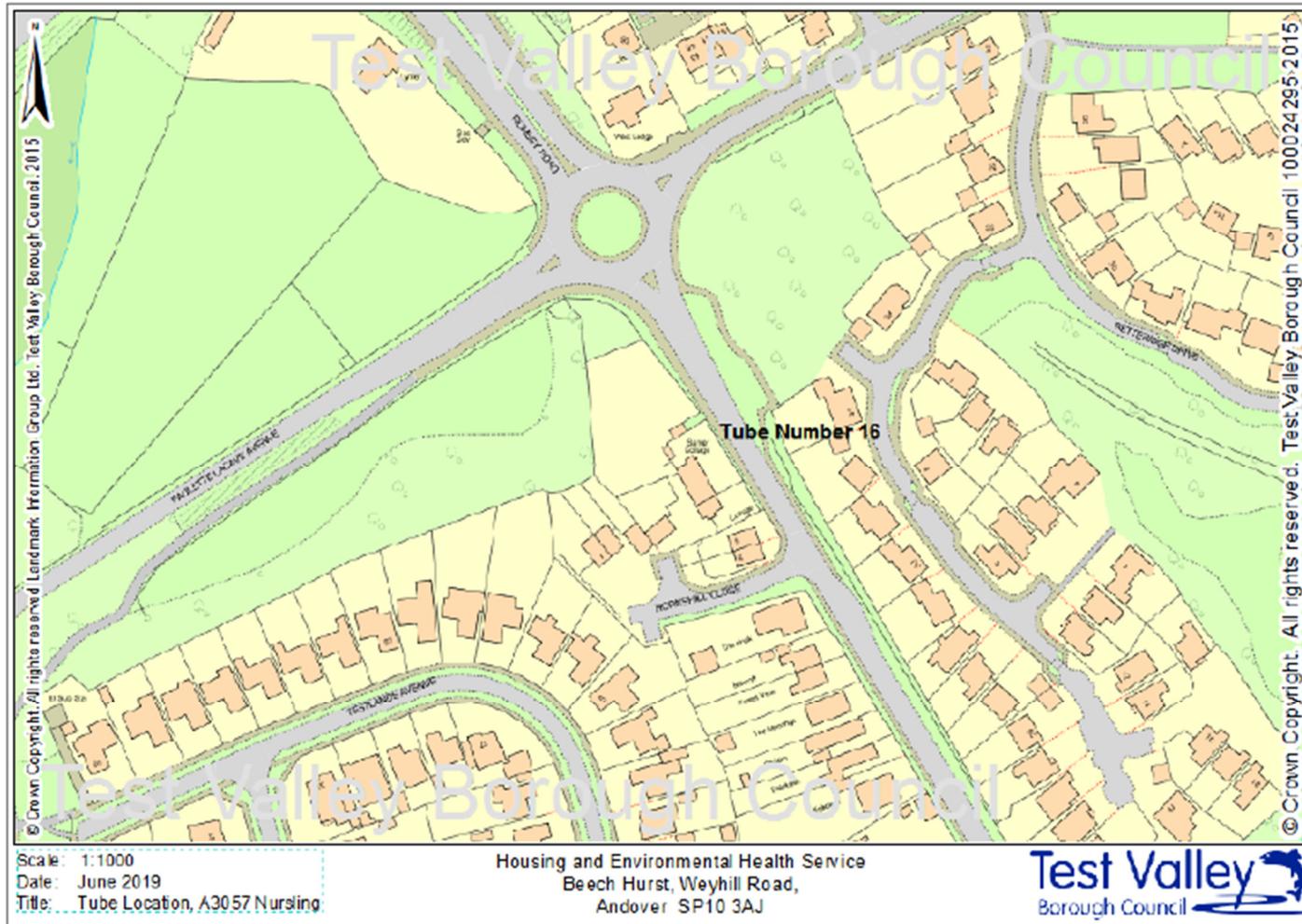
Non-Automatic Monitoring Sites: Number 13, Weyhill



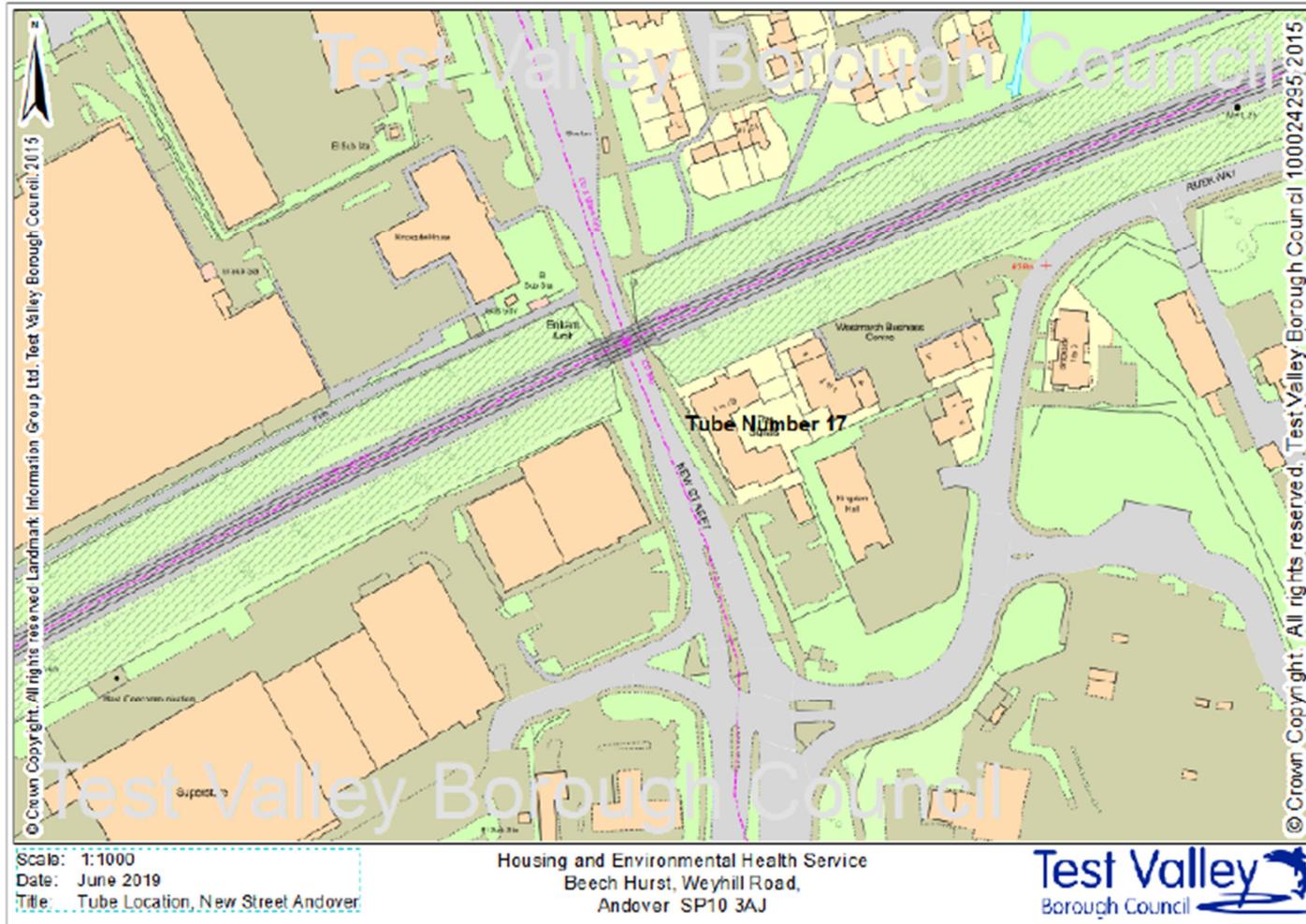
Non-Automatic Monitoring Sites: Number 14, Humberstone Road



Non-Automatic Monitoring Sites: Number 15, Little Ann



Non-Automatic Monitoring Sites: Number 16, A3057 Nursling



Non-Automatic Monitoring Sites: Number 17, New Street Andover

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England⁷

Pollutant	Air Quality Objective: Concentration	Air Quality Objective: Measured as
Nitrogen Dioxide (NO ₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
Nitrogen Dioxide (NO ₂)	40µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
Particulate Matter (PM ₁₀)	40µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
Sulphur Dioxide (SO ₂)	125µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
Sulphur Dioxide (SO ₂)	266µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

⁷ The units are in microgrammes of pollutant per cubic metre of air (µg/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	Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by National Highways
EU	European Union
FDMS	Filter Dynamics Measurement System
HCC	Hampshire County Council
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
OHID	Office for Health Improvement & Disparities
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
PUSH	Partnership for Urban South Hampshire
QA/QC	Quality Assurance and Quality Control
SMMT	Society of Motor Manufacturers and Traders
SO ₂	Sulphur Dioxide
TEA	tri-ethanolamine
TVBC	Test Valley Borough Council
UKHSE	United Kingdom Health Security Agency

References

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