St.Helens Council

2019 Air Quality Annual Status Report (ASR)

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

June 2019

Local Authority Officer	Lucy Northey
Department	Place Services
Address	Wesley House, Corporation Street, St Helens, WA10 1HE
Telephone	07823553273
E-mail	lucynorthey@sthelens.gov.uk
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Reviewed by	Tony Smith
Reviewed by	
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Executive Summary: Air Quality in Our Area

Air Quality in St Helens

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

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

St Helens is a metropolitan borough of Merseyside and covers an area which includes the settlements of Sutton, St Helens, Earlestown, Rainhill, Rainford, Eccleston, Clockface, Haydock, Billinge and Newton-le-Willows.

St Helens consists has large areas of agricultural land and some industry, having a long association with glassmaking. There are two motorways that run within the Borough, the M6 and M62. The predominant source of pollution within the Borough is nitrogen dioxide from traffic.

St Helens monitors nitrogen dioxide using four continuous monitors and 33 passive diffusion tubes. Particulate matter is measured at one location via a continuous monitor.

The general overall trend within St Helens is decreasing levels of nitrogen dioxide and particulate matter over the last 5 years. Three of the four AQMAs now have levels of nitrogen dioxide below the national objective at the closest sensitive receptors.

St Helens work with other Local Authorities and key stakeholders through groups such as the Merseyside and Cheshire air quality group, Cheshire and Merseyside Public Health Collaborative (CHAMPS) and the newly formed Liverpool City Region (LCR) air quality task force.

[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

St Helens has declared four air quality management areas (AQMAs) which can be viewed using the following link https://www.sthelens.gov.uk/business/environmental-health/environmental-protection/air-quality/ . There have been no new AQMAs declared since 2011 and there are no further areas which have been identified as requiring declaration.

A preliminary options study for the Liverpool City Region was completed in February 2019 and identified and prioritised key interventions for the LCR. Many of these are being taken forward in 2019.

Actions to Improve Air Quality

Many core actions were undertaken in 2018 to target pollution within the Borough and these are briefly outlined below

The update local plan referenced air quality in a number of policies, this will enable better consideration of air quality within the Borough https://www.sthelens.gov.uk/media/9525/local-plan-written-plan-web.pdf.

The Council invested a total of £730,000 to replace council fleet heavy goods vehicles and welfare coaches with Euro VI replacement vehicles.

Improvements were made to Windle Island to increase the capacity and reduce congestion. The work also incorporates upgraded pedestrian crossings, including toucan crossings for cyclists to cross the junction. The work was started in August 2018 and completed in May 2019. www.sthelens.gov.uk/news/2018/july/27/7m-investment-in-windle-island-junction-improvement-works-to-start-in-august/

The new Newton-le-Willows interchange, funded by the Local Growth fund and Merseytravel, was opened in January 2019 to encourage sustainable transport. The works include a bus interchange, park and ride, EV charge points and increased cycle parking. (https://www.merseytravel.gov.uk/about-us/local-transport-delivery/Pages/Newton-le-Willows.aspx)

St Helens Council is continuing to deliver cycling and walking improvements through the Local Growth Fund STEP programme, including a new pedestrian crossing and improved pedestrian crossings in the Clipsley Lane area and path upgrading through

Parr Stocks, providing an good quality off-road route from Parr Stocks Road to Redgate Drive and Boardmans Lane.

The Liverpool City Region Combined Authority is part of a consortium that was awarded £6.4m in March 2019 from the Office fo Low Emission Vehicles to trial hydrogen buses. The bid includes the creation of a new hydrogen refuelling station at the BOC plant in St Helens. Up to 25 hydrogen-powered buses will be funded with the first trial expected to take place in 2020. The buses emit nothing but water, so will contribute to improving air quality and establishing a zero carbon economy. (https://www.liverpoolcityregion-ca.gov.uk/liverpool-city-region-launches-6-4m-hydrogen-bus-project/).

St Helens Council have taken part in numerous campaigns to increase cycling and walking activity. The 'Arrive Happy' campaign encourages people to walk and cycle to work, providing information on cycle maps and city bike hire.

Living Streets charity funds an officer to provide outreach in Schools around St Helens to encourage walking and active travel. This includes activities like school route audits to identify barriers to walking. Last year this included working intensively with St Peter & St Paul, St Julie and St Bartholemew Catholic Primary Schools in St Helens. The end of year report for 2018-19 showed a shift in active travel (walking, cycling, scooting and park and stride) in St Helens was from 58% to 66%.

There are numerous led bike rides available across St Helens led by both community groups and The Healthy Living Team. Bikeability cycle training was also offered to schools within St Helens through the National Cycle training programme. Organised through schools, training is free and offered to every school in Merseyside. Between April 2018-April 2019 in St Helens over 1000 children received Level 2 training, 52 SEN training and 325 Level 3 training.

Merseyside cycle monitoring - St Helens has 8 automatic cycle counter included in this monitoring report which is used as evidence for the cycling target in the Merseyside Local Transport Plan. As there has been a 2.97% increase in cycle usage from April 2017 to March 2018, when included with previous growth since 2011/12, the LTP3 based overall indicator is currently at 45%, over triple that of the set target.

St Helens Council was awarded £74k to deliver a public-facing and educational air quality website. Development has been ongoing during 2018-19 working with the 6 local authorities, Merseytravel and the Liverpool City Region Combined Authority to develop public facing web pages and an educational site and teaching resources for use in schools. The launch event is planned for September 2019 to tie in with the start of the new school year.

Conclusions and Priorities

Exceedances are still seen in two of the four AQMAs. M6 and Borough Road, however at the M6, levels of Nitrogen dioxide at the closest receptor are an average of 33.9µg/m^3, and therefore below the national objective. The annual average for Nitrogen dioxide is still being exceeded at the façade of the closest receptors on Borough Road measured by passive diffusion tubes.

No new exceedances have been identified within the Borough and the general overall trend this year is decreasing levels of Nitrogen dioxide. Particulate matter has increased slightly during 2018 from 16 to 18µg/m^3.

Due to ongoing major developments, the status of the AQMAs has been reviewed and there are no plans to revoke any of the AQMAs at this time.

Further actions have been added to the action plan in conjunction with interested stakeholders.

The priorities for addressing air quality in the coming year is the implementation of IT systems within the council to facilitate home working, continue to promote alternative travel, such as public transport, walking and cycling. During 2019-20 St Helens Council will be implementing anti-idling enforcement, upgrading traffic lights on the junction with Borough Road and continuing to strive for better transport planning and infrastructure on new developments. We will be increasing availability of public information on air quality issues to both adults and children using the new LCR air quality website, promotion through social media, leaflet and newspapers.

Local Engagement and How to get Involved

Links to the new LCR air quality website will be available from the Council website from September 2019, Current and past Annual Status reports and monitoring data are also accessible on the website.

The public can get involved by helping to make informed choices about their method of transport. By choosing to make shorter journeys on foot or using cycling and public transport you can reduce your own emissions. Consider car sharing, getting a lift with others is a sociable way to save money and emissions, you can register on sites such as Liftshare (https://liftshare.com/uk) to find others in your area.

For longer journeys the bus or train can be a more economical and eco-friendly option. If you need help planning a journey, Merseytravel's journey planner is a useful tool
http://jp.merseytravel.gov.uk/nwm/XSLT_TRIP_REQUEST2?language=en

When buying a new car think about fuel consumption and emissions data, the Vehicle Certification Agency (VCA) can help you with this http://www.dft.gov.uk/vca/fcb/index.asp. You could consider a lower emission vehicle, for example an electric car or hybrid. Choosing a petrol car over a diesel will save emissions and help to improve air quality.

When driving there are certain smarter driving techniques that you can use to reduce your fuel consumption and many of these are displayed on the VMS signs around the Borough. For further eco driving tips the AA is a helpful source http://www.theaa.com/motoring_advice/fuels-and-environment/drive-smart.html

If you are travelling around the Liverpool city region, you can use https://www.citybikeliverpool.co.uk/ . Bike hire is available at many locations in and around Liverpool including bus and train stations.

Parents and children can get involved by walking, cycling or by decreasing the car journey by parking further away and walking to school to reduce congestion at school gates. Many schools are involved with living streets https://www.livingstreets.org.uk/ and arrive happy campaigns https://www.arrivehappy.org/ .

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1 Local Air Quality Management

This report provides an overview of air quality in St Helens during 2018. 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 St Helens 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 **Error! Reference source not found.** 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 St Helens Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://www.sthelens.gov.uk/business/environmental-health/environmental-protection/air-quality/. Alternatively, see Appendix D: Map(s) of Monitoring Locations and AQMAs, which provides for a map of air quality monitoring locations in relation to the AQMA(s).

The actions within the action plan has been updated but the full report is not yet available, however updated actions are included within the report.

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		
						At Declaration		Now		Name	Date of Publication	Link
AQMA 1 M6 Motorway	23rd April 2009	NO2 Annual Mean	St Helens	An area encompassing the M6 running its entire length through the Borough	YES	65	µg/m3	33.9*	µg/m3	Action Plan	2013	Action plan
AQMA 2 Newton le Willows High Street	23rd April 2009	NO2 Annual Mean	St Helens	Residential properties along High Street Newton le Willows (A49) between the junctions of Ashton Road and Church Street	NO	40.1	µg/m3	35	µg/m3	Action Plan	2013	Action plan
AQMA 3 Borough Road	25th November 2011	NO2 Annual Mean	St Helens	An area encompassing residential properties along Borough Road between the junctions of Westfield	NO	64*	µg/m3	47.4*	µg/m3	Action Plan	2013	Action plan

				Street and Prescot Road, including 5-9 Alexandra Drive and 1-17 Prescot Road								
AQMA 4 Linkway	25th November 2011	NO2 Annual Mean	St Helens	Residential development adjacent to the Linkway (A570)	NO	42.11	µg/m3	33	µg/m3	Action Plan	2013	Action plan

***average of diffusion tube data**

☒ **St Helens 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 St Helens

Defra's appraisal of last year's ASR concluded AQMAs 1, 2 and 4 should remain in place and the revocation of AQMA 3 should be informed by the local developments. A decision has been taken not to revoke this AQMA at the present time, despite the monitored levels being once again below the objective. It suggested that the diffusion tube monitoring network be reviewed and relocated where necessary, this has been taken into consideration when planning the 2019 tube allocation. The actions for the action plan have been reviewed and updated in line with the appraisal comments.

St Helens Council has taken forward a number of direct measures during the current reporting year of 2019 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2.

More detail on these measures can be found in their respective Action Plans. Key completed measures are:

- Tender and procurement of new air quality website for St Helens and the wider LCR, including educational webpages for use in schools.
- Smart motorway – in the planning stage with Highways England (HE). Diffusion tube monitoring completed for HE by St Helens Council to help ensure full account is taken of air quality impacts
- Progressing various travel awareness campaigns
- Improvements to major junctions – Pewfall and Windle Island
- Upgraded planning policy to include further policies on air quality
- Upgrading Newton-le-Willows Rail Interchange to include EV charge points and extra car parking.
- Facilitate home working

St Helens Council expects the following measures to be completed over the course of the next reporting year. Implement changes to traffic lights from linking up AQ monitoring to prioritise HGVs and to implement 'green waves' to reduce congestion at major junctions, including Linkway and Borough Road. Further roll out home working across the Council and encourage other business within the Borough to do the same

to reduce traffic on the roads at peak time and minimise unnecessary journeys. Adopt anti-idling legislation and raise awareness and implement anti-idling legislation through existing posts.

Design and promote public facing and educational website to increase general awareness of air quality issues. Hydrogen bus project to purchase 25 hydrogen buses and refuelling station within St Helens. Continue rolling out the agile working programme within the Council, implementing updated IT systems and working practices.

St Helens' priorities for the coming year are delivering the website to schools across the LCR. Working with the LCR air quality taskforce to prioritise and deliver measures across the Liverpool City Region.

The principal challenges and barriers to implementation that St Helens Council anticipates facing are Highways Agency implementing the Smart Motorway and the associated effects on air quality. Impacts on existing AQMAs from large planned developments such as Florida Farm logistics development and Parkside Employment Park.

Progress on the following measures has been slower than expected due to:

Greening of the taxi fleet requires updates to the licensing policy. Introduction of supplementary planning policy is delayed due to lack of resource.

St Helens Council anticipates that the measures stated above and in Table 2.2 will achieve compliance in High Street, M6 and Linkway AQMAs.

Whilst the measures stated above and in Table 2.2 will help to contribute towards compliance, St Helens Council anticipates that further additional measures not yet prescribed will be required in subsequent years to achieve compliance and enable the revocation of Borough Road AQMA.

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	Acoustic/AQ barrier on M6 flyover	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Highways England	2019/2020	2021	Monitored NO2 levels	Emissions dispersed	In planning phase	2021/2022	Highways England have not identified this section of the M6 as one of the 101 priority areas for the control of air pollution around the national strategic road network, which impedes the delivery of this measure
2	Use of hard shoulder running (M6 J21a to J24)	Traffic Management	UTC, Congestion management, traffic reduction	Highways England	2019/2020	2021	Monitored NO2 levels	Reduced congestion	In planning phase	2021/2022	Other studies have shown hard shoulder running to increase pollutants at close by receptors, needs to be done in conjunction with mitigating measures/
3	Anti-idling campaign	Traffic Management	Anti-idling enforcement	St Helens Council	2019	2020	Reducing background emissions	<1%	Soft approach being taken at present. Wardens speaking to drivers and adverts on VMS	2020	None

4	Optimise flow on key routes (SCOOT)	Traffic Management	UTC, Congestion management, traffic reduction	St Helens Council	Complete	Complete	Reducing emissions on key routes. Reduction of between 2.1-3.3ug/m3 at key receptors over last 5 years.	2-3ug/m2	Completed	Complete	None
5	Travel awareness campaign	Promoting Travel Alternatives	Promotion of walking	St Helens Council, Living Streets	Ongoing	Ongoing	Number of children walking to school/work	Implementation ongoing	Participate in Arrive Happy and Living Streets campaigns.	Ongoing	Funding streams for future years.
6	Cycling promotion	Promoting Travel Alternatives	Promotion of cycling	St Helens Council. STEP funding	2018	2019	Number of people using cycle hubs and purchasing bikes through the cycle to work scheme.	Ongoing	Off road cycle programme extended. Cycle hub in Sherdley Park. Participants in cycle to work scheme.	Ongoing	Funding streams for future years.
7	Major Junction Improvements at Windle Island, Pewfall and St Helens Junction	Traffic Management	UTC, Congestion management, traffic reduction	St Helens Council	2018	2019	Queue times, NO2 reduction	Reduced queue times	Completed	Complete	Funding streams for future years.
8	Eco driving	Vehicle Fleet Efficiency	Driver training and ECO driving aids	St Helens Council, Energy Saving Trust, DEFRA funding	Complete	Complete	Fuel efficiency	Improved fuel efficiency of between 10 and 30%	Completed	Complete	None
9	Fleet Efficiency improvements	Promoting Low Emission Transport	Company Vehicle Procurement - Prioritising uptake of low emission vehicles	St Helens Council	Ongoing	Ongoing	Fuel efficiency	Fuel usage	Ongoing	Ongoing	Funding streams for future years.
10	Green the taxi fleet	Promoting Low Emission Transport	Taxi Licensing conditions	St Helens Council	2018	2020	Reduce emissions on major routes	<1%	Dependent upon licensing policy	2020	Implementation phase

11	Supplementary planning guidance	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	St Helens Council	2019	2020	Mitigation measures, more sustainable development	More sustainable development	Planning policy upgraded to include references to EVs and offsetting	2020	None
12	Inspection of regulated processes. Finding unpermitted activities	Environmental Permits	Other measure through permit systems and economic instruments	St Helens Council	2019	2020	Number of permitted activities. Setting of emission limits	Number of permitted activities/ changes in emissions	Ongoing	Ongoing	Resource restraints
13	Investigation of air pollution complaints	Other	Other	St Helens Council	Ongoing	Ongoing	Response times met	<1%	Ongoing	Ongoing	Resource restraints
14	Linking air quality monitoring to Siemens Stratos system signalling	Traffic Management	UTC, Congestion management, traffic reduction	St Helens Council	2019	2020	Reduce congestion, reduce NO2 on affected routes	0.5-1ug/m2	Planning phase	2021	Implementing technology changes
15	Newton le Willows Interchange	Transport Planning and Infrastructure	Public transport improvements- interchanges stations and services	St Helens Council and Merseytravel	2018	2019	Increase use of bus/ train	Reduction in NO2 within St Helens and other Boroughs	Completed	Complete	n/a
16	Hydrogen Bus Project	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Liverpool City Region consortium	2019	2020	Service user uptake	Reduction in background emissions and along major arterial routes	Planning phase	2021	User uptake

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.

St Helens Council is taking the following measures to address $PM_{2.5}$:

Some of the measures within the action plan will address PM2.5 emissions, however additional measures put in place to specifically tackle emissions from PM2.5 are the enforcement of the Smoke control areas within St Helens. Most of the Borough is designated as a Smoke Control area. Officers give out advice and information to residents on DEFRA approved exempt appliances and the correct fuels to use.

Raise awareness of the correct disposal routes for waste, not to burn waste, also to compost green waste and we provide a green waste collection service.

Each year we have operation Good Guy to remove combustible materials, waste and bonfire materials from all public space, open ground and gardens to limit the number of bonfires. We advertise this and residents are able to report build ups of waste to the council for removal.

We respond to complaints about commercial premises using burning as a method of waste disposal and also respond to nuisance complaints about neighbours consistently burning waste under the Environmental Protection Act 1990.

St Helens Council actively promotes eco driving which include the reduced braking and tyre wear which is a cause of PM2.5.

All permitted premises and planning applications are encouraged to utilise gas fired boilers instead to diesel powered boilers to reduce the PM2.5 and PM10 emissions.

As a statutory consultee on planning applications we ask for dust management plans to limit the amount of dust on site, and to stop burning of any waste arisings.

Information is available on the council website and will also be included in the new educational website aimed at children and schools.

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.

St Helens Council undertook automatic (continuous) monitoring at 4 sites during 2018. Table A.1 in Appendix A shows the details of the sites. National monitoring results are available at

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

St Helens Council undertook non- automatic (passive) monitoring of NO_2 at 33 sites during 2018. 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 (NO_2)

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

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B.

Table A.4 in Appendix A compares the ratified continuous monitored NO_2 hourly mean concentrations for the past 5 years with the air quality objective of 200µg/m^3, not to be exceeded more than 18 times per year.

The national objective is being met at all locations apart from one located on the façade of a terraced house on Borough Road. T19 and T24 had an 46.7 and 48.1 µg/m^3 respectively which is an increase on the monitored levels in 2017.

There are no exceedances of the 60µg/m^3 which indicates that the 1-hour mean objective is not being exceeded at any locations within the Borough.

3.2.2 Particulate Matter (PM_{10})

Error! Reference source not found. in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

Table A.5 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations for the past 5 years with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

St Helens Council monitors PM_{10} at one location on the Linkway. The annual mean concentration was 18µg/m^3 and there are was one instance where the 24 hour mean objective was exceeded.

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)
AN1	St Helens Linkway	Roadside	350815	395260	NO2; PM10	YES	Chemiluminescent; BAM	165	5.35	2.44
AN2	St Helens Southworth Road	Roadside	360045	395643	NO2	YES	Chemiluminescent	10	3.2	2
AN3	St Helens High Street	Roadside	358975	395804	NO2	YES	Chemiluminescent	1.06	3.65	2
AN4	St Helens Borough Road	Roadside	350403	394961	NO2	YES	Chemiluminescent	23	2.5	1.48

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)
T1	170 Southworth Road	Roadside	360109	395661	NO2	NO	0	16.3	NO	1.95
T2	1 Skitters Grove	Roadside	356549	399577	NO2	YES	0	22.8	NO	2.02
T3	Taylor Park	Urban Background	349485	394766	NO2	NO	32.15	N/A	NO	2.44
T4	27 Syston Avenue	Suburban	352451	396735	NO2	NO	0	12.85	NO	1.74
T5	151 West End Road	Suburban	353891	396714	NO2	NO	0	4.5	NO	1.93
T6	Parkside	Suburban	359498	394646	NO2	NO	45.35	1.65	NO	2.36
T7	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T8	157 High Street	Roadside	358774	395880	NO2	YES	0	10.6	NO	1.91
T9	3 Waterworks Cottages	Roadside	359915	395639	NO2	YES	0	11.5	NO	1.83
T10	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T11	13 Nutgrove Road	Roadside	349694	393449	NO2	NO	0	4.6	NO	1.88
T12	24 Norlands Lane	Roadside	350239	389824	NO2	NO	0	12.8	NO	1.98
T13	22 Union Bank Lane	Roadside	352391	390301	NO2	NO	0	7.55	NO	1.83

T14	19 High Street	Roadside	359147	395705	NO2	YES	0	5.9	NO	2.43
T15	2 Parkside Cottages	Roadside	358220	397077	NO2	YES	0	27.4	NO	1.74
T16	297 Liverpool Road	Roadside	354377	397475	NO2	NO	0	14.3	NO	2.06
T17	446 Liverpool Road	Roadside	354403	397561	NO2	NO	0	7.9	NO	1.76
T18	Linkway Monitor	Roadside	349107	397197	NO2	NO	165	5.35	YES	2.35
T19	55 Borough Road	Roadside	350438	395005	NO2	YES	0	2.55	NO	2.33
T20	22-24 North Road	Roadside	351009	395806	NO2	NO	0	2.6	NO	2.34
T21	24 Greenfield Road	Roadside	350135	396128	NO2	NO	0	6.2	NO	1.79
T22	Linkway Monitor	Roadside	350815	395265	NO2	YES	165	5.35	YES	2.34
T23	19 High Street	Roadside	359147	395705	NO2	YES	0	5.9	NO	2.43
T24	55 Borough Road	Roadside	350438	395005	NO2	YES	0	2.55	NO	2.33
T25	High Street Monitor lamppost	Roadside	358975	395804	NO2	YES	1.1	3.65	YES	2.6
T26	33 Blackbrook Road	Roadside	353129	396240	NO2	NO	0	6.4	NO	1.88
T27	51 Carr Mill Road	Roadside	352336	397653	NO2	NO	0		NO	1.2
T28	206 Borough Road	Roadside	350156	394848	NO2	YES	0	6.4	NO	1.93

T29	25 Prescot Road	Roadside	350457	395165	NO2	NO	0	1.9	NO	2.43
T30	4 Union Bank Lane	Roadside	352262	390226	NO2	NO	0	7.5	NO	1.94
T31	160 Southworth Road	Roadside	360055	395638	NO2	YES	0	11.1	NO	1.9
T32	High Street Monitor lamppost	Roadside	358975	395804	NO2	YES	1.1	3.65	YES	2.6
T33	Warrington Road	Roadside	350386	389936	NO2	NO	5.1	11.9	NO	1.88

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 NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 Annual Mean Concentration (µg/m³) (3)				
					2014	2015	2016	2017	2018
AN1	Roadside	Automatic	98	98	37	38	38	34	33
AN2	Roadside	Automatic	99.7	99.7	**47**	**53**	**51**	**50**	**45**
AN3	Roadside	Automatic	93.5	93.5	33	33	38	31	35
AN4	Roadside	Automatic	97.7	97	35	38	39	29	30
T1	Roadside	Diffusion Tube	91.6	91.6	32.8	32.77	29.2	26.5	25
T2	Roadside	Diffusion Tube	100	100	34.6	35.8	30.5	25	25.9
T3	Urban Background	Diffusion Tube	83	83	15.5	13.6	14.9	13.5	13.2
T4	Suburban	Diffusion Tube	100	100	23.6	22.8	22.8	22.6	20.5
T5	Roadside	Diffusion Tube	100	100	25	24.2	23.5	21.9	22.3
T6	Roadside	Diffusion Tube	100	100	24	23.6	24.3	23.6	21.3
T7	Roadside	Diffusion Tube	100	100	**41.4**	**40.3**	36.4	37.6	33.16
T8	Roadside	Diffusion Tube	100	100	28.5	26.5	25.5	22.5	24.1
T9	Roadside	Diffusion Tube	100	100	25.9	24.1	24.1	20.9	21.8
T10	Roadside	Diffusion Tube	100	100	**40.1**	**41.7**	37.3	37.9	33.6
T11	Roadside	Diffusion Tube	100	100	32.5	28.4	31.4	27.9	28.2
T12	Roadside	Diffusion Tube	100	100	28.2	24.1	25.3	23.5	22.8

T13	Roadside	Diffusion Tube	100	100	26.7	26.1	25.1	24.6	24.4
T14	Roadside	Diffusion Tube	75	75	36.7	34.9	33.3	33.3	31.3
T15	Roadside	Diffusion Tube	100	100	33.9	32.8	32.3	31.4	28.4
T16	Roadside	Diffusion Tube	100	100	24.3	24.5	23.7	22.3	22.2
T17	Roadside	Diffusion Tube	100	100	30.8	28.9	31.4	29.3	27.5
T18	Roadside	Diffusion Tube	91.6	91.6	-	31.5	35.6	35.1	30.5
T19	Roadside	Diffusion Tube	75	75	**43.5**	**41.3**	**48.9**	**45.1**	**46.7**
T20	Roadside	Diffusion Tube	83	83	29.5	27.3	29.2	28.6	29.9
T21	Roadside	Diffusion Tube	91.6	91.6	25.5	22.7	25.1	23.7	23.4
T22	Roadside	Diffusion Tube	100	100		29.8	33.5	33.9	30.4
T23	Roadside	Diffusion Tube	75	75	34.4	34.1	33.7	33.3	31.6
T24	Roadside	Diffusion Tube	83	83	**42.6**	**42.1**	**46.8**	**42.9**	**48.1**
T25	Roadside	Diffusion Tube	100	100	-	32.5	34.2	31.4	30.8
T26	Roadside	Diffusion Tube	100	100	26.4	27	29.4	27.2	27.5
T27	Roadside	Diffusion Tube	75	75					19.5
T28	Roadside	Diffusion Tube	100	100		25.5	25.8	25.9	25.7
T29	Roadside	Diffusion Tube	91.6	91.6	28.7	24.5	26.5	25	25.5
T30	Roadside	Diffusion Tube	100	100	26	23.5	22.6	22.8	20.7

T31	Roadside	Diffusion Tube	100	100	-	39.8	34.7	37.7	34.9
T32	Roadside	Diffusion Tube	100	100	-	32	32.59	30.7	31.5
T33	Roadside	Diffusion Tube	91.6	91.6	**40.7**	36.7	33.1	30.2	33.41

☒ **Diffusion tube data has been bias corrected**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

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

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

(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.

Figure A.1 – Trends in Annual Mean NO_2 Concentrations

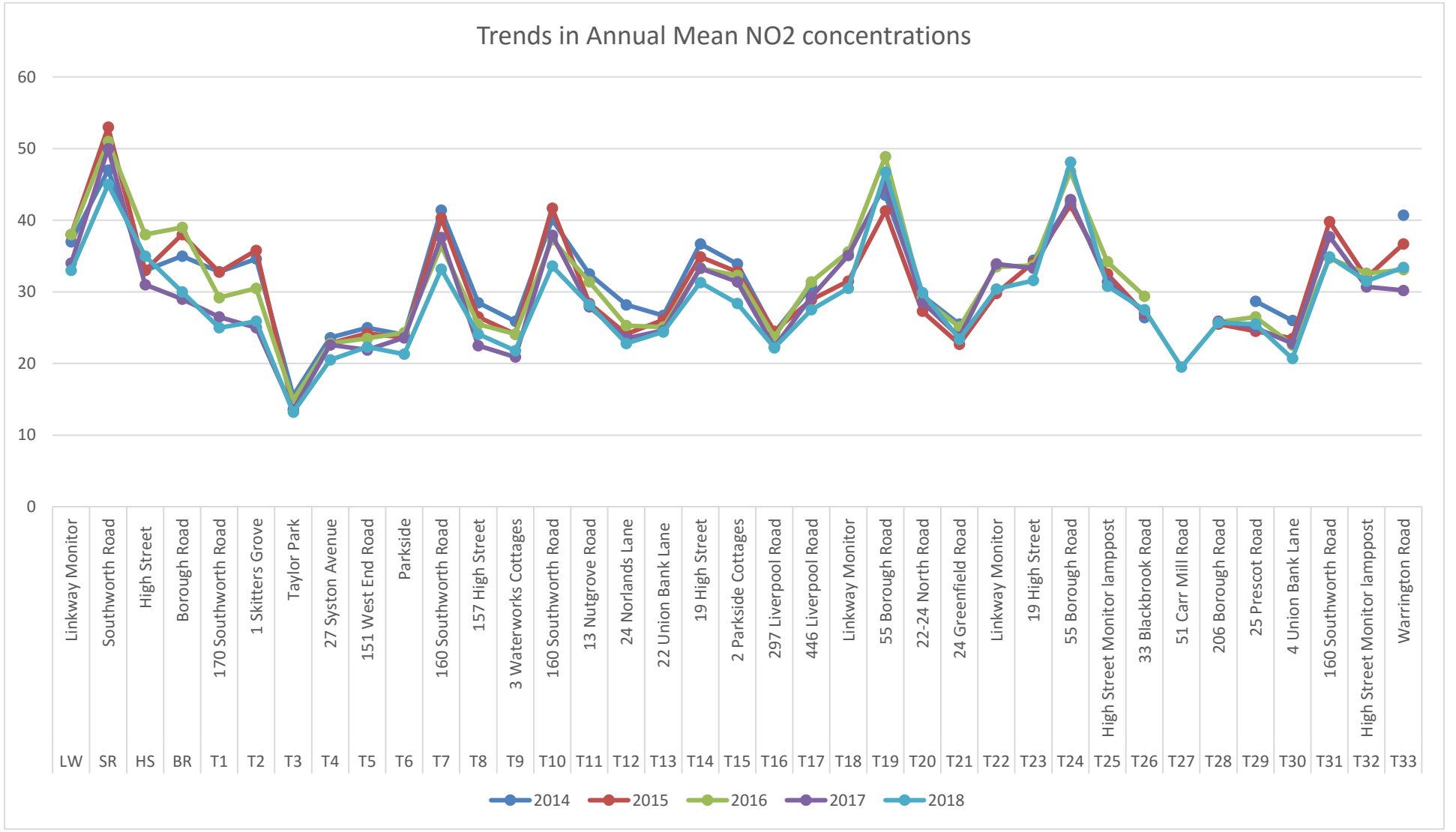


Table A.4 – 1-Hour Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	NO_2 1-Hour Means > 200µg/m^3 (3)				
					2014	2015	2016	2017	2018
AN1 (Linkway)	Roadside	Automatic	98	98	**0**	0	0	0	**0**
AN2 (Southworth)	Roadside	Automatic	99.7	99.7	**2**	0	3	3	**0**
AN3 (High St)	Roadside	Automatic	93.5	93.5	**0**	0	0	0	**0**
AN4 (Borough)	Roadside	Automatic	97.7	97.7	**0**	0	0	0	**0**

Notes:

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

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

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

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

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} Annual Mean Concentration (µg/m^3) (3)				
				2014	2015	2016	2017	2018
Linkway	Roadside	92	92	**21**	**19**	**19**	**16**	**18**

☒ **Annualisation has been conducted where data capture is <75%**

Notes:

Exceedances of the PM_{10} annual mean objective of 40µg/m^3 are shown in **bold.**

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

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

(3) All means have been "annualised" as per Boxes 7.9 and 7.10 in LAQM.TG16, valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Figure A.2 – Trends in Annual Mean PM_{10} Concentrations

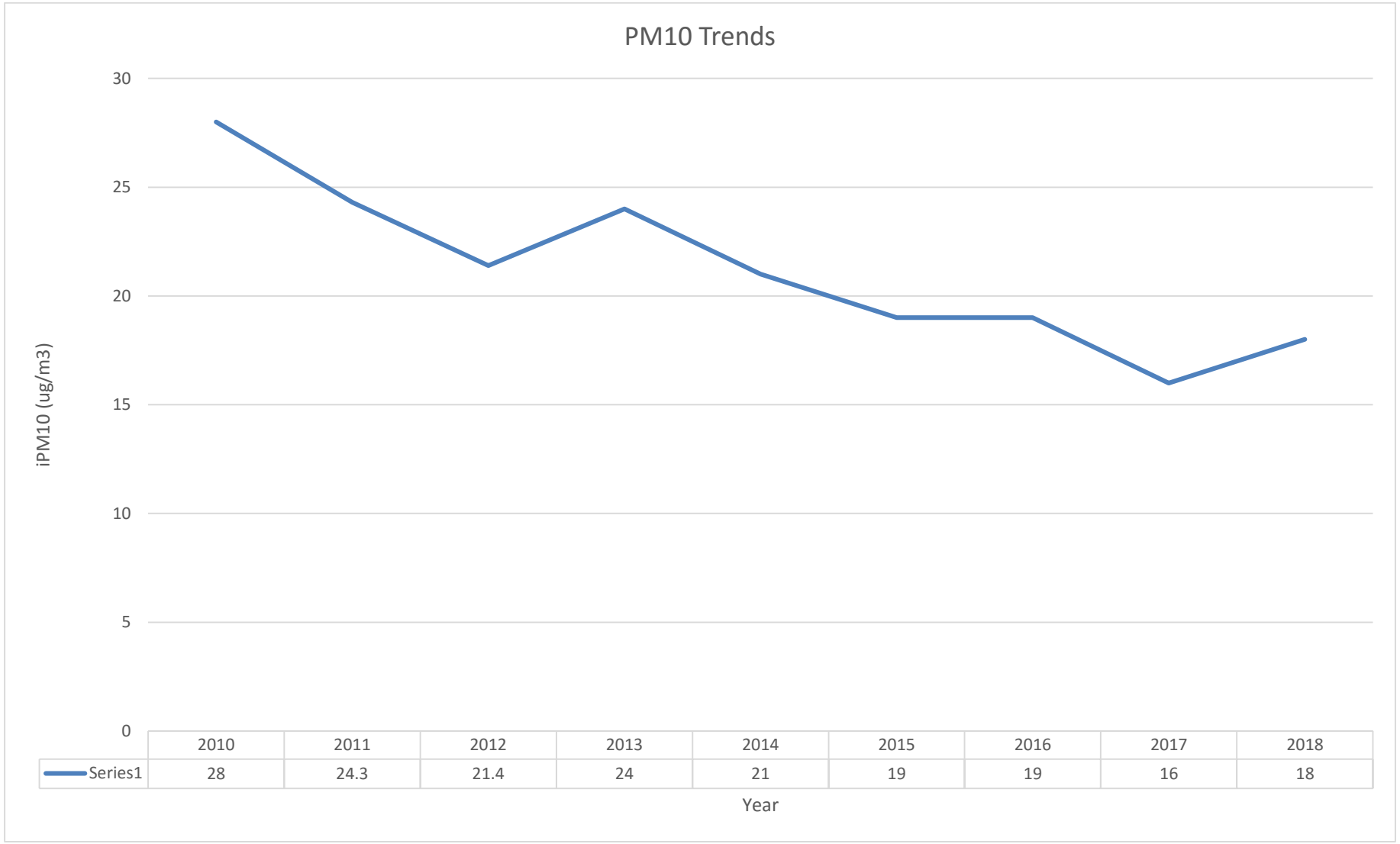


Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2018 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2014	2015	2016	2017	2018
Linkway	Roadside	92	92	**5**	8	3	0	1

Notes:

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

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

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

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

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2018

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean		
													Raw Data	Bias Adjusted (0.76) and Annualised (1)	Distance Corrected to Nearest Exposure (2)
T1	31.2	42.6	37.7	32.2	27.4	23.5	30.7	32.2	35	34.4	34.6		32.9	24.98	
T2	43.7	40.3	42.4	41.6	40.1	32.7	20.9	19.2	16.2	30.9	45	35.3	34.0	25.86	
T3		23.2	22	18.3	19.9	14.1	13.5	12.9	12.3	20.2			17.4	13.21	
T4	32.7	39.8	35.4	24.2	19.4	16.4	19.2	20.4	21.8	29.9	29.1	35.4	27.0	20.50	
T5	35	36.4	34	27.7	20	23.8	21.6	23.8	24.8	28	35.4	41.2	29.3	22.27	
T6	35.5	34.4	33.3	25.9	23	20.9	22.1	23.2	24.6	30.4	28.8	34.3	28.0	21.31	
T7	45.4	50.8	41.8	42.2	35.9	33	42.6	47.1	48.5	42.4	46.4	47.5	43.6	33.16	
T8	37.1	36.7	39.3	30.5	28.5	23.9	27	24.4	25.3	33.1	34.9	39.7	31.7	24.09	
T9	31.8	36.5	34	31.8	30	27.4	19.6	21.9	17.3	29.7	34.1	30.3	28.7	21.81	
T10	48.6	51.2	43.9	45.9	36	28.3	43	48.1	46.6	44.6	44.8	49.3	44.2	33.59	
T11	42	38.9	48.4	35.2	42	27.1	28.1	28.4	26.5	39.9	43.9	44.7	37.1	28.19	
T12	44.8	36.8	36.1	29.2	23.5	23	22.5	25.3	17.8	27.9	37	35.6	30.0	22.77	
T13	32.4	38.1	38.4	30.6	37.3	26	30.2	26.6	28.4	36.5	26.6	33.9	32.1	24.38	
T14	44.6	50.1	48.3	37.6	33.4	30.5	34.9				40.3	50.5	**41.1**	31.26	
T15	43.8	53.7	40.8	37.2	27.3	25.5	32.5	36.1	37	40	40.2	34.5	37.4	28.41	

T16	34.1	38	37.1	27.7	27.2	23.4	27.4	23.8	24.6	29.4	27.5	30.9	29.3	22.24	
T17	44.9	47.2	44.6	36.4	28.1	29	26.5	28.5	30	36.4	37.1	44.7	36.1	27.45	
T18	48.3	54.5	43.7	38	31.4	35.6	35.4	32.2	36.8	42.2		42.8	**40.1**	30.46	34.5
T19	72.3	82.4	59.5	55.8	50.3	50.5	47.6			62.3		71.9	**61.4**	**46.66**	
T20	42.9	40.9	43.7	40.5			28.9	30.5	26	43.5	48.6	48.1	39.4	29.91	
T21	38.3	41.1	37.5	32.8	27.4	22.8	19.8	23.6	20.7	32.8		41.5	30.8	23.37	
T22	47.6	52.5	41.9	41.3	32.9	28.7	34.4	37.4	31.8	43	40.1	49.1	**40.1**	30.44	34.5
T23	49.5	44.4	45.2	39.9	32.5	27.1	34.7				47.8	52.8	**41.5**	31.57	
T24	67.9	86	59.8	64	59.3	46.1	49.4			60.3	70.4	70.2	**63.3**	**48.14**	
T25	47.7	55.8	47.4	40	38.5	38.2	30.5	30.2	30.9	38.5	42	46.2	40.5	30.77	
T26	37	44.9	43.7	35.3	35.2	29.4	29.5	29.6	29.8	37.9	39.9	41.9	36.2	27.49	
T27				31.1	30.1	27.5	19.3	21.8	19	26.5	19.8	36	25.7	19.52	
T28	36.8	41.4	41.4	31.8	31.2	26.6	27.9	27.3	28.8	35.4	34.7	42.2	33.8	25.68	
T29	40.3	44.2	26.9	27.4	31.4	28.3	20.5		23.5	37.2	48.7	41.1	33.6	25.53	
T30	30.5	34.3	34.2	28.8	28.4	22.5	23.6	23.9	26.2	30.1	28	16.8	27.3	20.73	
T31	50.7	53.1	43.9	46.4	36.4	34.7	43.5	46.7	49.9	47.4	46.5	51.7	**45.9**	34.89	
T32	45.5	51.9	50.7	36.8	45.2	38.6	29	30.2	31	40.2	47.6	50.1	**41.4**	31.46	
T33	53.5	62.3	43.4	49.2	43.1	38.6	33.7	34.3	33.9	43.5		48.1	**44.0**	33.41	31.1

☐ **Local bias adjustment factor used**

☒ **National bias adjustment factor used**

☒ **Annualisation has been conducted where data capture is <75%**

☒ **Where applicable, data has been distance corrected for relevant exposure**

Notes:

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

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

(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

Diffusion Tubes (Nitrogen Dioxide)

- Diffusion tubes are supplied and analysed by Socotec (formerly ESG Scientifics). The tubes are prepared using a 50% Triethanolamine : 50% Acetone solution. The tubes are exposed on site for one month before being returned for laboratory analysis.

- The laboratory is UKAS accredited and is required to take part in other proficiency schemes. ESG Scientifics participate in a number of QA/QC monitoring systems to demonstrate satisfactory performance:

- The Workplace Analysis Scheme for Proficiency (WASP) programme ensures uniformity in data throughout the year. Only laboratories that are in the WASP scheme are used for analysing tubes from the National Nitrogen Dioxide Diffusion Tube Network. The scheme is operated by HSL (The Health and Safety Laboratory)

- The monthly field inter-comparison exercises with other laboratories enable assessment of bias and precision undertaken by HSL on behalf of NETCEN.

- An external QC scheme to check solutions run by NETCEN.

Below is the information sheet provided by ESG Scientifics.

Information Sheet – NO_2 Diffusion Tubes

50% TEA:50% Acetone (Blue Cap) Alternate Holder

20% TEA:80% Water (Black Cap)

50% TEA: 50% Acetone –

Overview;

It has been shown (*Palmes et al 1976*) that the principle of molecular diffusion can be utilised for the indicative measurement of ambient nitrogen dioxide in the atmosphere. Using this research, a cost effective passive sampler was developed for the diffusive monitoring of NO_2.

Diffusion Tube Performance:

Uncertainty: Under European guidelines, diffusion tubes are considered an indicative method, and as such the uncertainty is defined as <20%. (In field intercomparisons Scientifics' diffusion tubes perform at <10% uncertainty.)

Analytical Repeatability: ± 1.9%

LOD: 0.03µg NO_2 on the tube. Over a 4-week exposure this would equate to 0.6µg/m^3, or 0.3ppb

Shelf-life: Tubes should be analysed within 4 months of manufacture

Storage: Ideally, tubes should be stored in a fridge. A cool dark location is an acceptable alternative.

Exposure: 2-6 Weeks

Diffusion Coefficient: 0.1361cm^2s^{-1} at STP (*Massman 1998*)

Quality Assurance:
- The manufacture and analysis of NO_2 diffusion tubes is covered by our UKAS accreditation

- The method meets the requirements laid out in DEFRA's "Diffusion Tubes For Ambient NO2 Monitoring: Practical Guidance."

- The laboratory has taken part in the WASP proficiency scheme since it's inception, and has the ranking of 'Satisfactory'

Manufacture:

Description: Two stainless steel grids coated in the absorbent are located within a coloured polyethylene end cap. The cap is placed on a polypropylene tube and the open end sealed with a white polyethylene cap.

Quality Control: 2% of manufactured tubes are analysed to check the tubes are free from contamination.

Tubes:	Material:	Natural Polypropylene
	Internal Diameter:	10.8 ± 0.2 mm
	Outer Diameter:	13.8 ± 0.4 mm
	Length:	71.0 ± 1.0 mm

Stainless Steel Grids:	**Type:**	**304**
	Diameter:	12mm
	Weave:	Plain
	Mesh Number:	100
	Wire Diameter:	0.112mm
	Aperture:	0.142mm

Open Area: 31.3%
Weight: 0.62 kg/m^2

End Caps (Grid End): Material: LDPE (Low Density Polyethylene)
Colour: Blue or Black
Internal Diameter: 13.70mm ± 0.25mm
Height: 14.99mm ± 0.25mm

End Cap: Material: LDPE (Low Density Polyethylene)

Colour: White

Absorbent: 50% Triethanolamine : 50% Acetone Dipping Method
(Blue Caps) 20% Triethanolamine : 80%
Ultrapure Water Pipette Method (Black Caps)

Dispatch:

- Each tube is labelled with a unique ID, and each batch placed in an airtight bag before being dispatched to the customer.
- An exposure sheet, pre-printed with the tube IDs and manufacturing lot number, is included with each batch of tubes.
- Site names can be pre-printed on the exposure sheet on request.
- Each bag of tubes is marked with a use by date.
- Tubes will normally be dispatched 7 days prior to the changeover date.
- Upon receipt the tubes should be checked, and then left in the airtight bag prior to use.

Exposure:

- A monitoring site should be selected that best meets current guidelines.
- Clips or similar should be used to position the tubes, so that they are approximately 5cm from any flat surface, and ideally 1.5m from the ground. However, it is not uncommon practice to position the tubes higher to prevent vandalism.
- To begin exposure, remove the white end cap, and position the tube perpendicular to the ground with the open-end facing down.
- Note the time and date in the ‘On Time’ column of the exposure sheet.
- If required, a brief description of the tube location should be entered in the ‘Site’ column.
- Once the exposure is complete the process should be reversed – Remove the tube, replace the white cap, and note the date and time in the ‘OFF time’ column. Return the tube to the airtight bag.

- Where applicable, additional observations should be annotated on the exposure sheet e.g. spider in tube, water in tube etc,
- The tubes should then be returned to the laboratory for analysis as soon as possible.

Note 1: Insects should be removed before the white cap is replaced.

Note 2: The tubes should be put out for exposure no later than the use-by date given on the tubes.

Analysis:

Analytical Technique:	Colorimetric
Instrument:	Continuous Flow Auto-analyser
Principle:	Nitrite ions react with Sulphanilamide to form a diazonium compound. In acidic conditions, this couples with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a purple azo dye. Utilising spectrophotometric analysis at 540nm, the NO_2 concentration is calculated by quantification of the colour change in comparison to that produced by known standards.
Extraction:	To ensure complete, homogeneous extraction, a vortex mixer is used.
Quality Control:	A quality control sample of known concentration is run every 10 samples. The data generated is compared to acceptable limits as determined statistically using a Shewhart Chart control system. The laboratory takes part in inter-comparison schemes, to monitor data accuracy.

Reporting & Calculations:

- Data is imported directly from the analytical software, eliminating the possibility of transcription errors
- As per current guidelines, air volumes are calculated assuming an average exposure temperature of 11^{o}C, and a pressure of 101.3kPa
- Final results are converted to an equivalency at 20^{o}C, to allow direct comparison to EU guidelines
- The report lists;
    - The amount of the Nitrite (NO_2) on the tube in µg. This is the analytically derived value.
    - The µg/m^3 of gaseous NO_2 at the sampling location. Knowing the tube dimensions and gas diffusion coefficient, the sampling rate of the tube can be calculated. In turn, knowing the sampling rate, the length of exposure and the total µg of NO_2 on the tube allow the µg/m^3 of NO_2 to be calculated.
    - Parts Per billion (ppb) NO_2. The ppb levels are calculated from the µg/m^3 value, using the known relationship that

      ppb = 24.04 x Concentration (µg/m^3) / Molecular Weight . For NO_2, 1ppb = 1.91 µg/m^3, or 1 µg/m^3 = 0.52ppb (at 20^{o}C, 101.3kPa)

- A soft copy of the report is emailed to the customer (for ease of data handling), and a signed hardcopy is posted.

NOTE: The reported values are NOT bias adjusted. The guidance is for the end user to select and use the bias factor best suited to their monitoring program.

Contact Details:

Contact:	Andy Parish	Address:	Diffusion Tube Laboratory Unit 12, Moorbrook
Direct Tel:	+44 (0) 1235 750733		Southmead Industrial Estate, Didcot,
Switchboard:	+44 (0) 1235 750730		Oxfordshire. OX11 7HP
Fax:	+44 (0) 1235 750739		
Email:	andy.parish@esg.co.uk		
Group Email:	HarDiffusionTubes@esg.co.uk		

Discussion of Choice of Factor to Use

The bias adjustment factor used is 0.76 based on 50% TEA : 50% Acetone from Socotec based on 28 co-location studies, as provided by version 06/19 of the National Diffusion Tube Bias Adjustment Spreadsheet available on the Review and Assessment Helpdesk website http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

It has been decided to use the nationally derived bias adjustment factor, in the absence of a locally derived bias adjustment factor.

QA/QC of Diffusion Tube Monitoring

According to the summary of precision results for Nitrogen dioxide collocation studies available via the DEFRA website. 100% of the results from the collocations studies on 50:50 TEA in Acetone for SOCOTEC found 'Good' precision.

According to Table 1: Laboratory summary performance for AIR NO2 PT rounds AR0019, 21, 22,24, 25, 27, 28 and 30, SOCOTEC were found to be Satisfactory based upon a z score of +/- 2.
https://laqm.defra.gov.uk/assets/laqmno2performancedatauptofebruary2019v1.pdf

QA/QC of Automatic Monitoring

- All of the Council's automatic continuous analysers are of the approved type as recommended in LAQM TG1 (00) Review and Assessment; Monitoring Air Quality and LAQM TG4 (00) Review and Assessment; Pollutant specific Guidance.
- The Council's automatic monitoring stations are operated and run by officers trained in all aspects of the monitoring processes including routine site operations, field calibrations and data ratification. All instruments used have a daily automatic calibration within the operating system, which is serviced every six months under a contract from ESU 1 to ensure correct operation. Data is collected and ratified by Geoff Broughton at Air Quality Data Management.

Routine Site Operations

- The Council's monitoring sites have a program of routine operational checks and programmed fortnightly site visits which include: -

✓ Daily communications checks on lines, data transfer and analyser operation;
✓ Daily checks of data quality;
✓ Repairs of faulty equipment under arrangements with the equipment suppliers;
✓ Fortnightly site inspections of the equipment's operational status, site safety, security and calibration checks;
✓ Planned six monthly servicing and re-calibration of all analysers by equipment suppliers under contract to the council.

- All analysers are maintained in accordance with the manufacturers' instructions. The six monthly full service and re-calibration is conducted under servicing contracts with ESU 1. Results of the servicing, calibrations and repairs are fully documented and stored centrally. Routine maintenance of equipment is also conducted during regular two-weekly site visits where all associated equipment such as sample lines, modem, and the electrical system are examined and sample inlet filters are changed. Any faults, repairs or changes made to the equipment are also recorded and stored centrally.

Calibration Methods

- The calibration procedures for the councils NO_2, continuous analysers include a two point zero/span calibration check being performed at regular fortnightly intervals. The methodology for the calibration procedure is derived from the suppliers and manufactures handbooks and is as follows:

✓ Pre-calibration check – the site condition and status of the analyser is recorded prior to the zero/span check being conducted;
✓ Zero check – the response of the analyser to the absence of the gas being monitored;
✓ Span check – the response of the analyser to the presence of the gas of a known concentration;
✓ Post calibration check – the site condition and status of the analyser upon completion of all checks.

- Each analyser's zero/span check is fully documented with records being kept centrally. The documentation then forms a record of analyser response over time and is used for data ratification and for scaling the data gathered for zero and span drift

- The gases used for calibration checks are purchased from Air Liquide UK and BOC. Both are traceable through European Accreditation DIN EN 45001 & DIN EN ISO 9001. The tolerances of the nitrogen dioxide and nitric oxide mixes being typically + or – 5%. Due to high usage rates it is normal for the gases to be exhausted well before their respective stability time limits are reached, the bottles being changed when pressure falls below 300 psi. The TEOM analyzer is operated and calibrated in accordance with the manufacturers and suppliers information.

Data Validation and Ratification

- All data collected is thoroughly scrutinised by visual examination to ensure that there are no spurious and unusual measurements. The dedicated software used for handling the data allows data to be edited but ensures that raw data is always maintained. Air Quality Data Management team also check the information to ensure no errors occur.

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

T8 – Newton High Street

St Helens Council

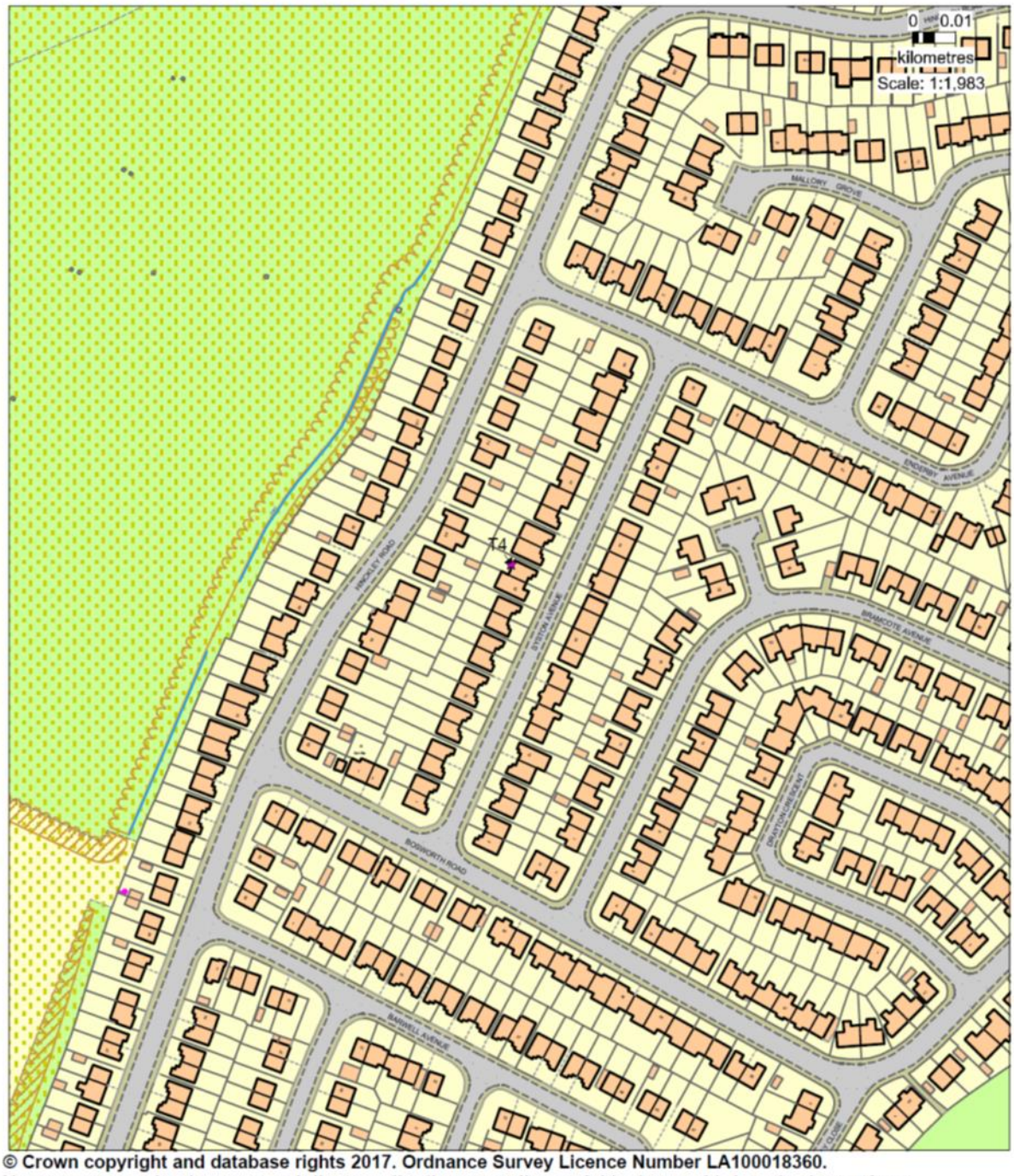
T3 – Taylor Park

St Helens Council

T20 – North Road

St Helens Council

T4 – Syston Avenue



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T11 – Nutgrove Road

T14 and T23 – 19 High Street, Newton

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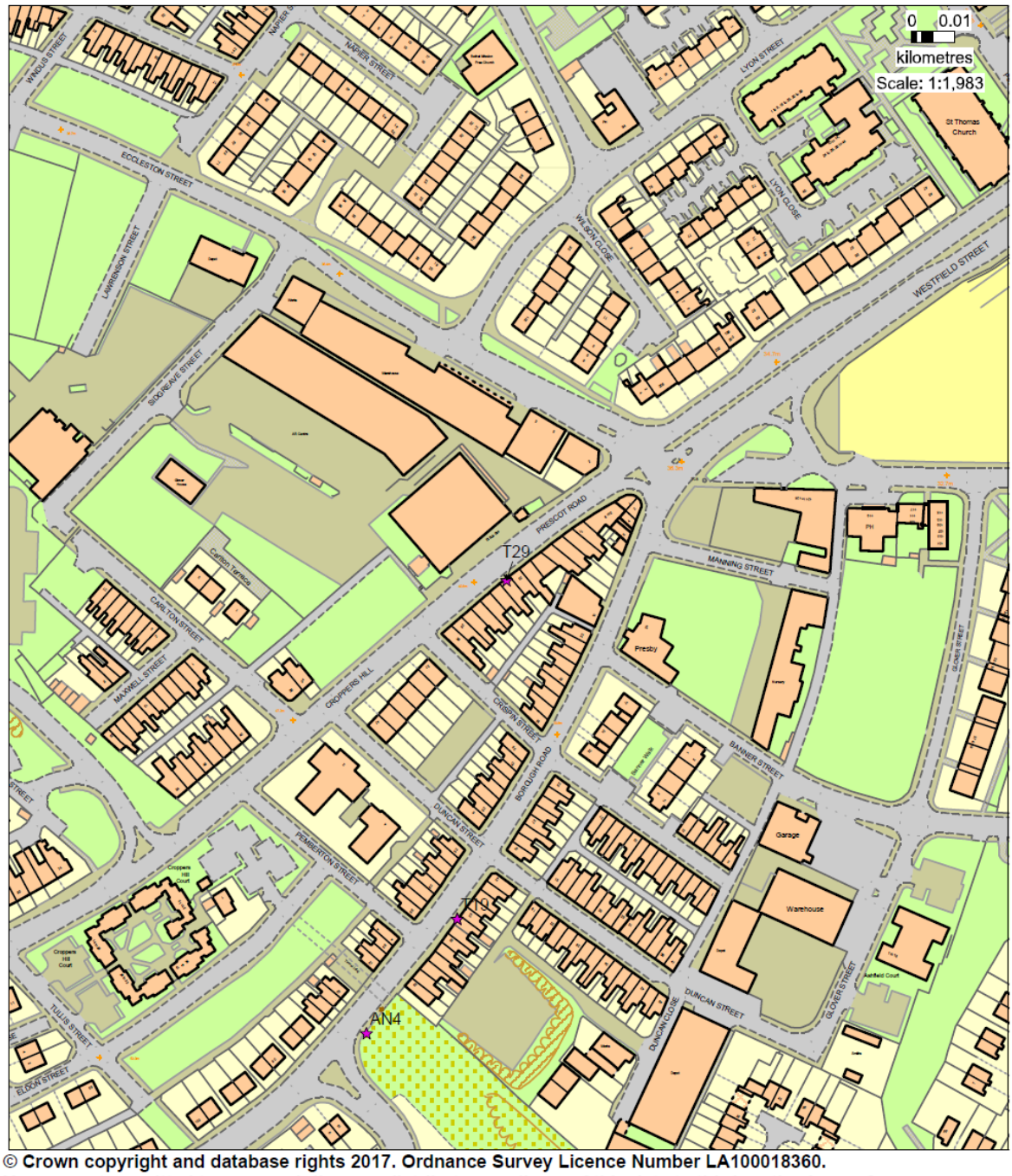
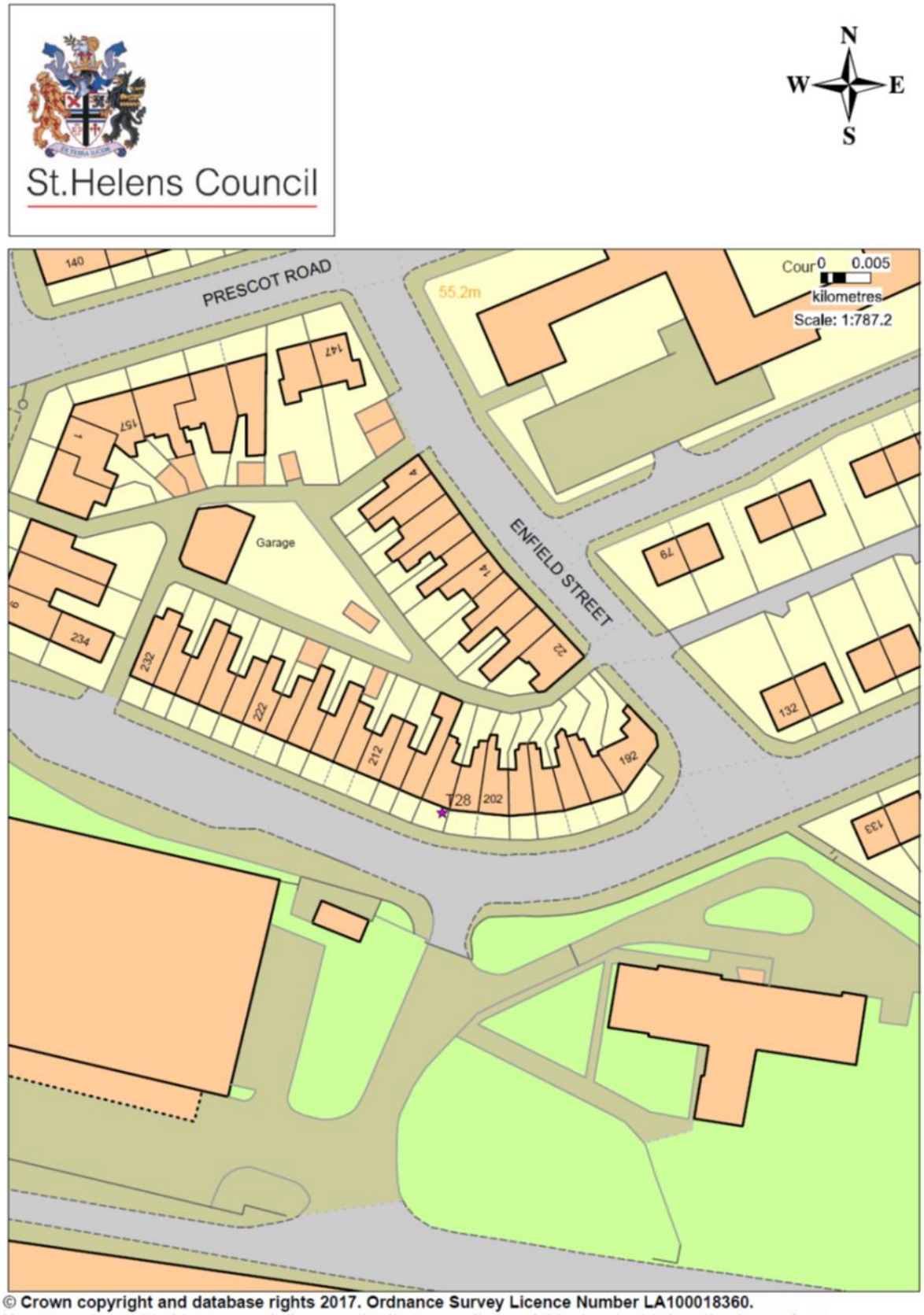
T29 – Prescot Road
T19 and 24 – Borough Road
AN4 – Borough Road monitoring station

St.Helens Council

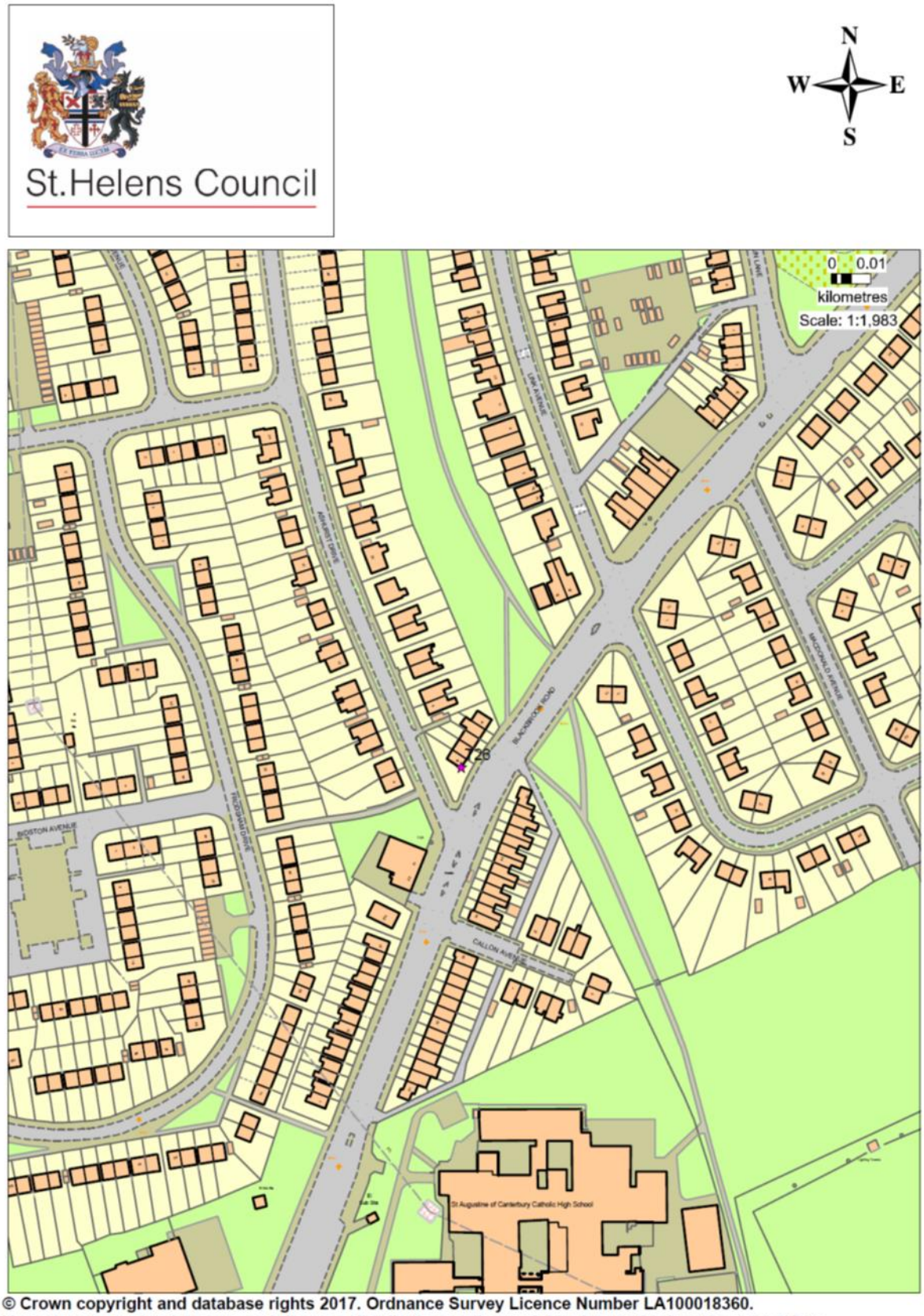


T28 – 206 Borough Road

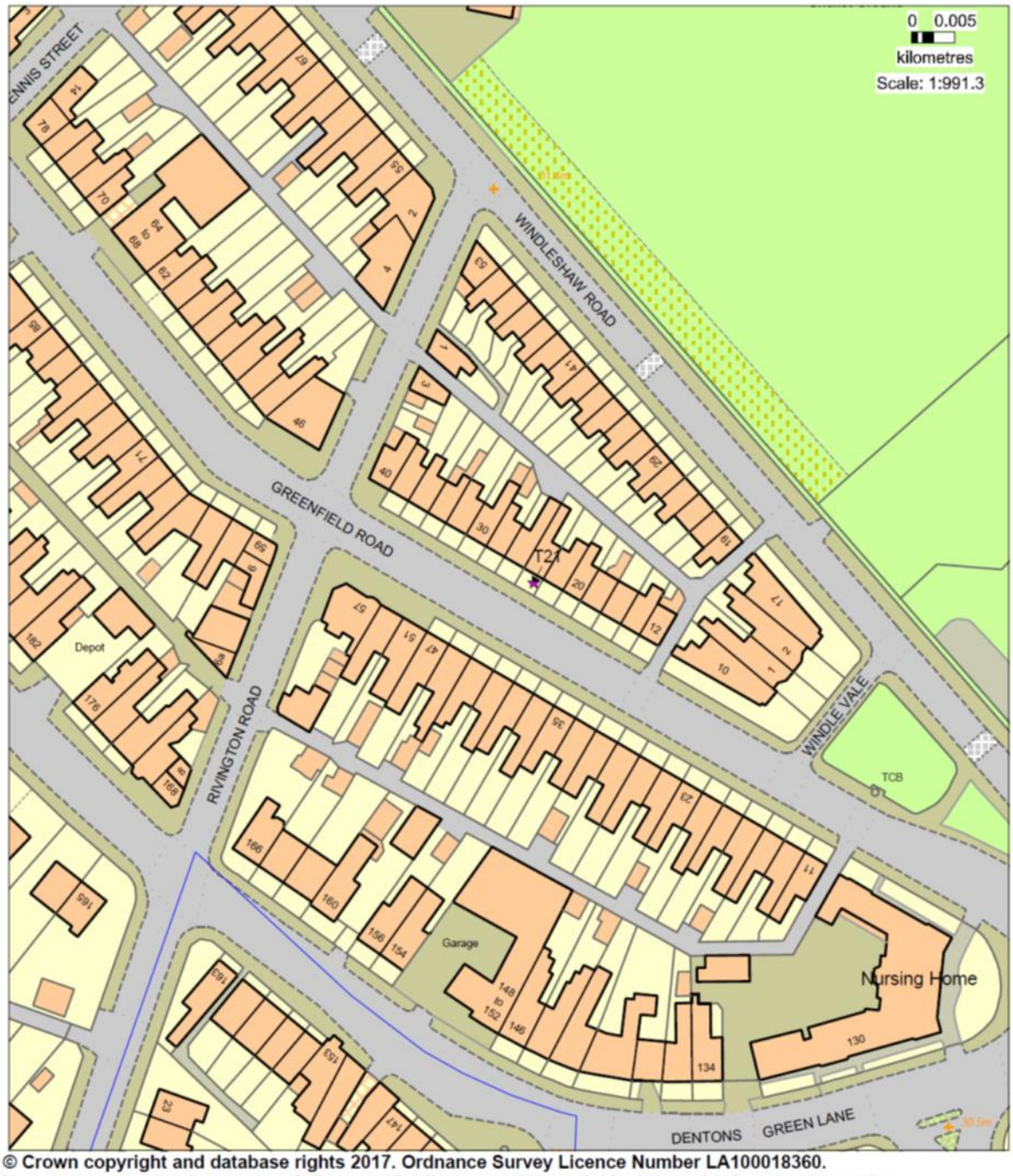


St Helens Council

T26 Blackbrook Road



T21 – Greenfield Road



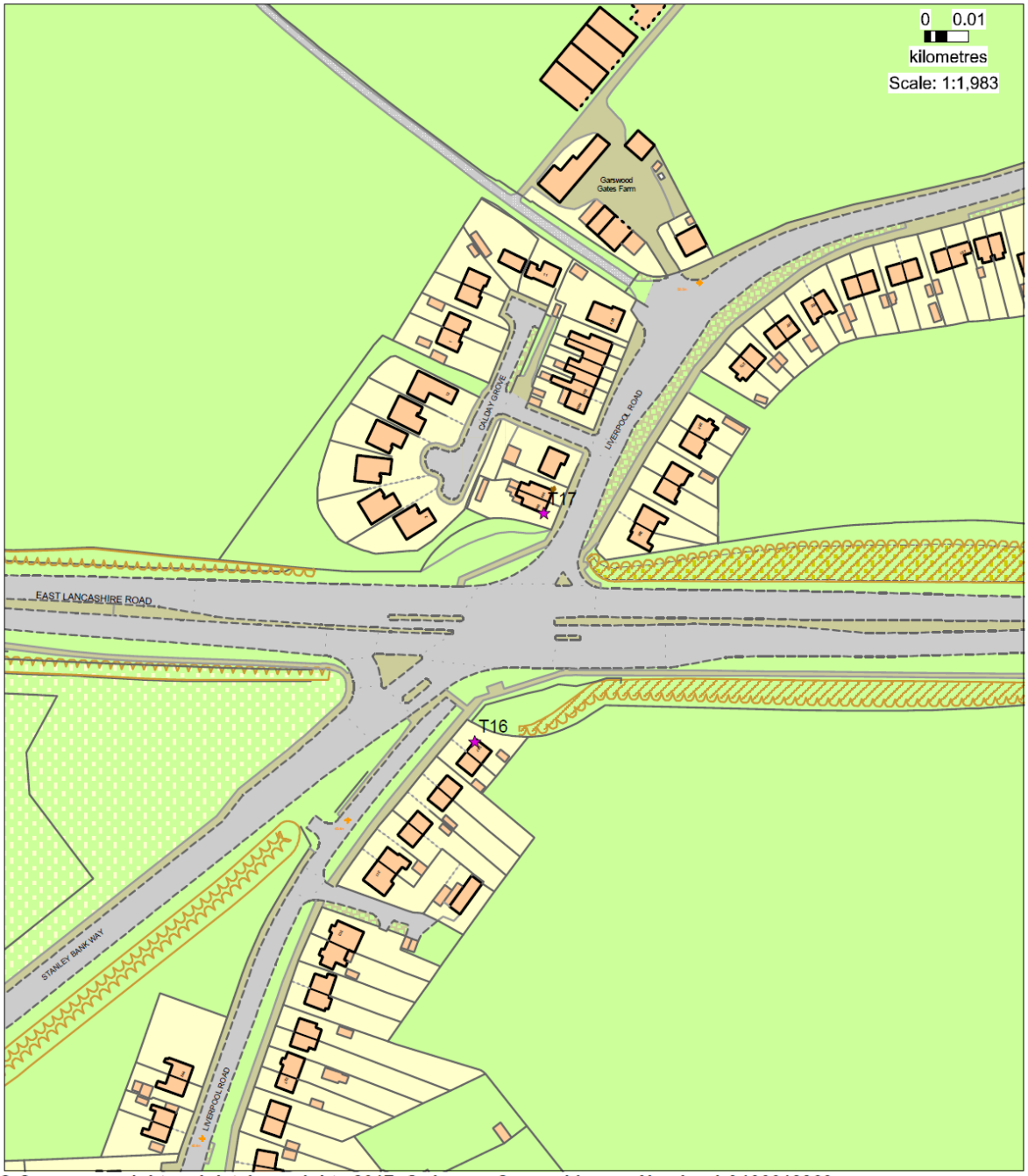
AN3, T25 and T32 – High Street, Newton

AN1, T18 and T22 – Linkway monitor

T16 and T17 – Liverpool Road

St.Helens Council

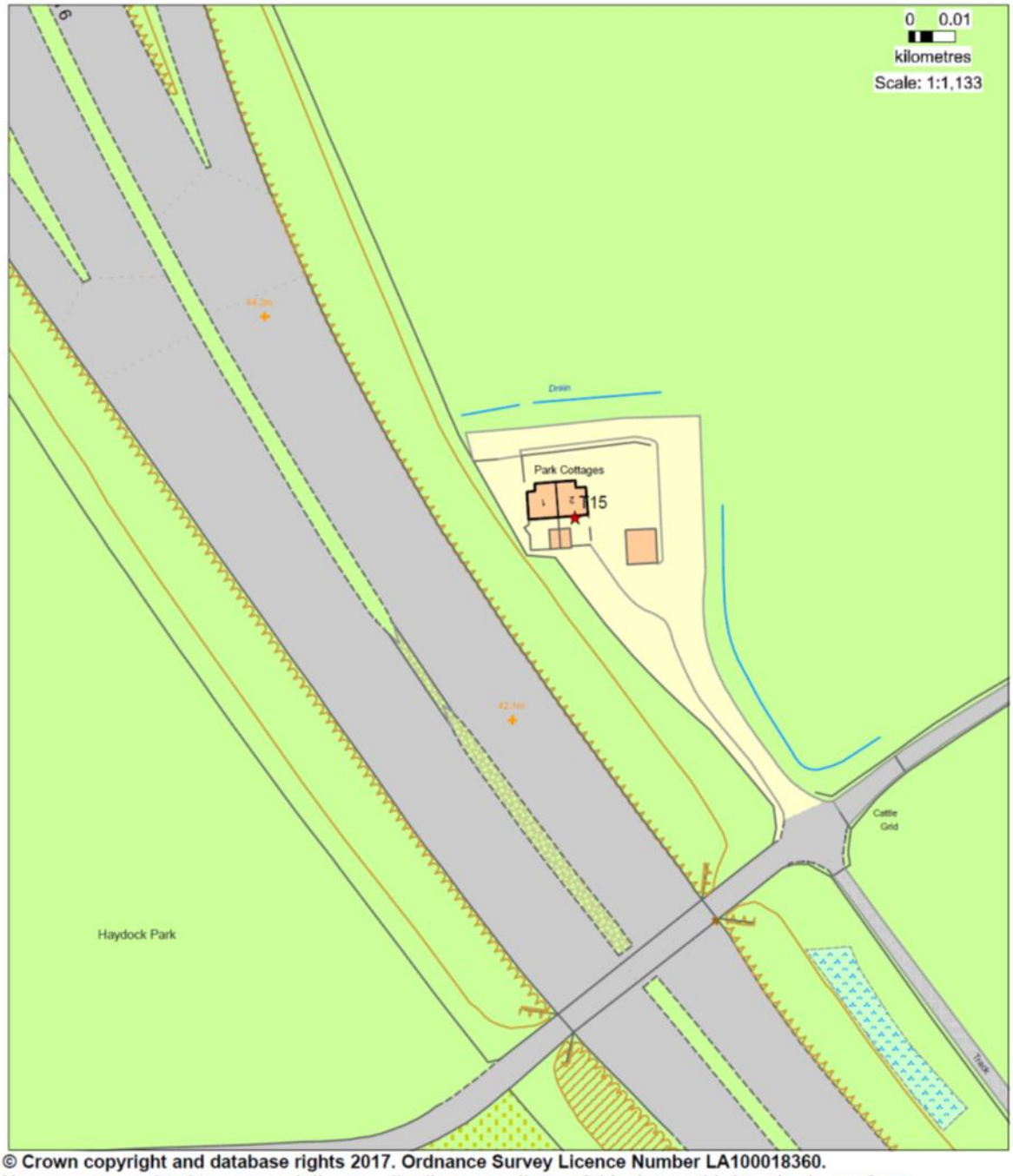
N
W E
S



T15 – Parkside Cottages

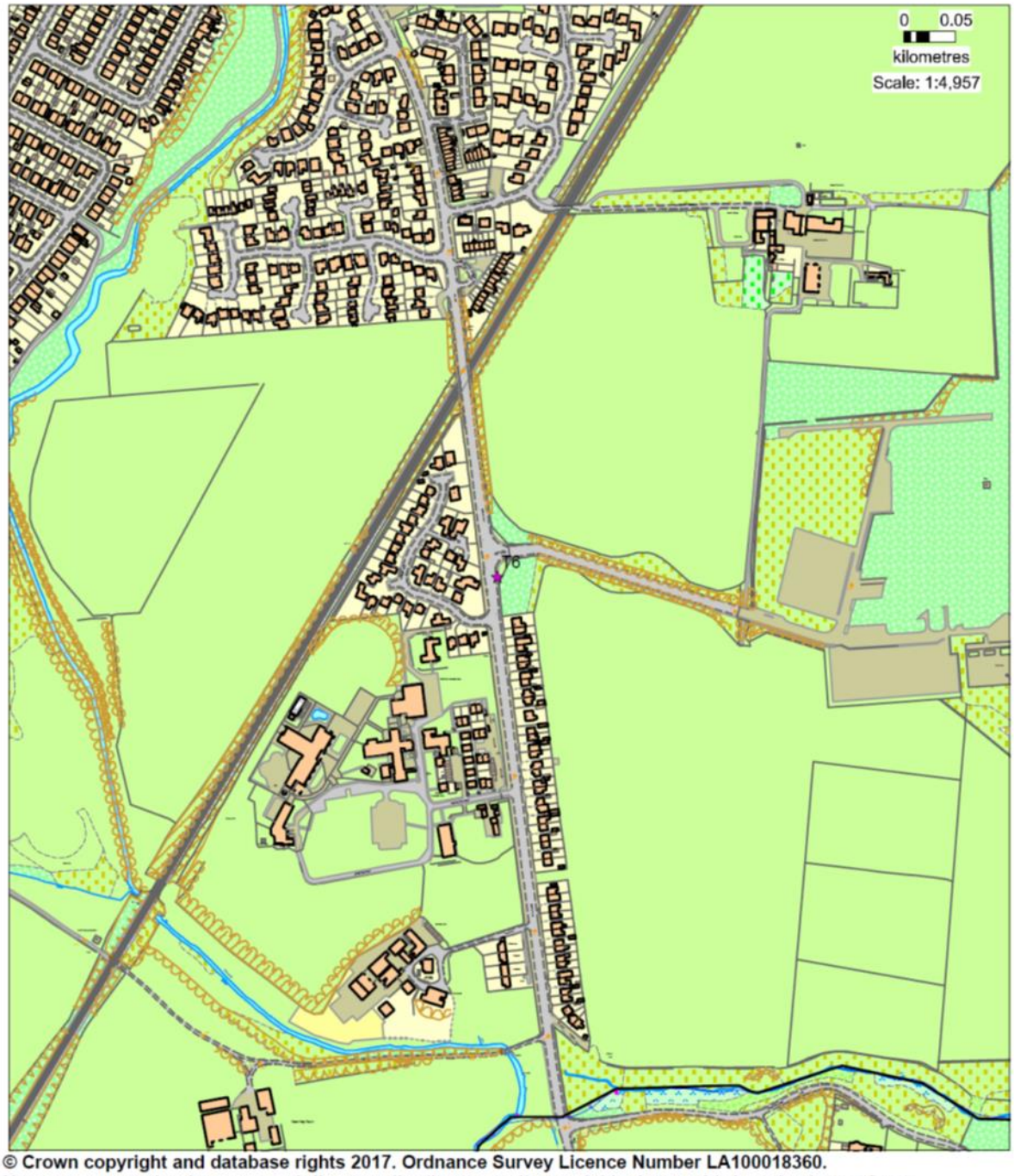
St.Helens Council

Annual Screening Report - diffusion tube locations

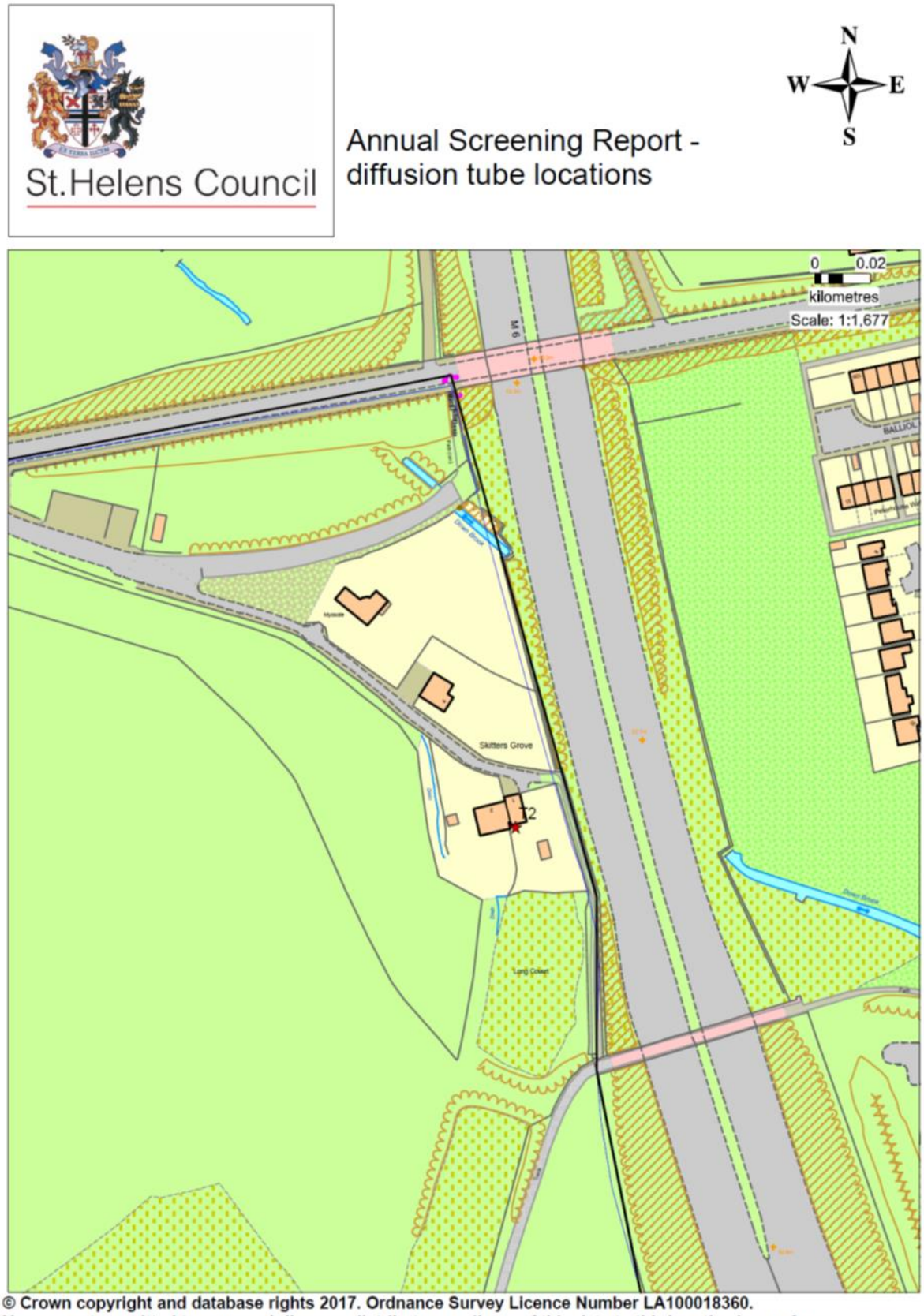


St Helens Council

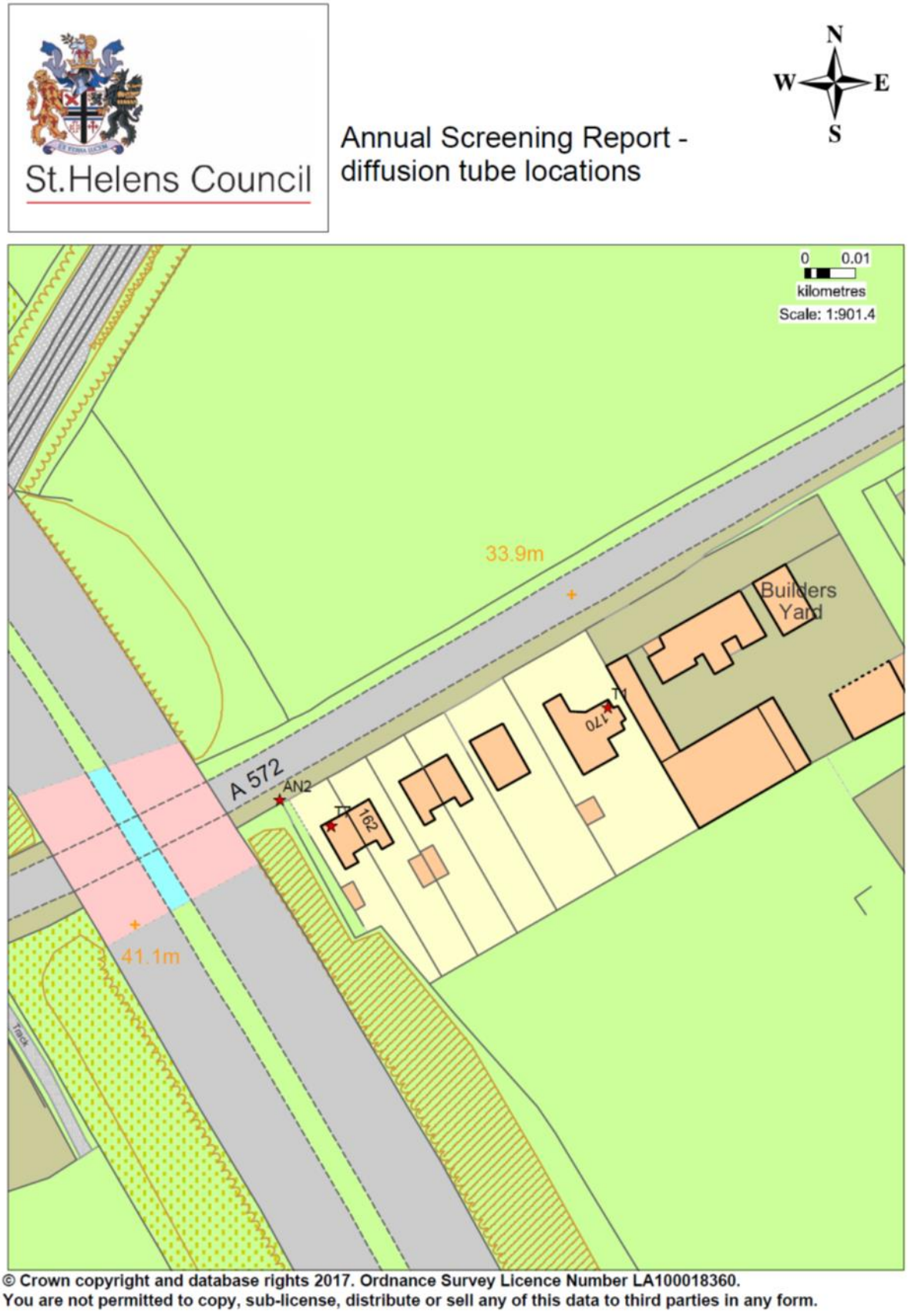
T6 – Parkside lamp post



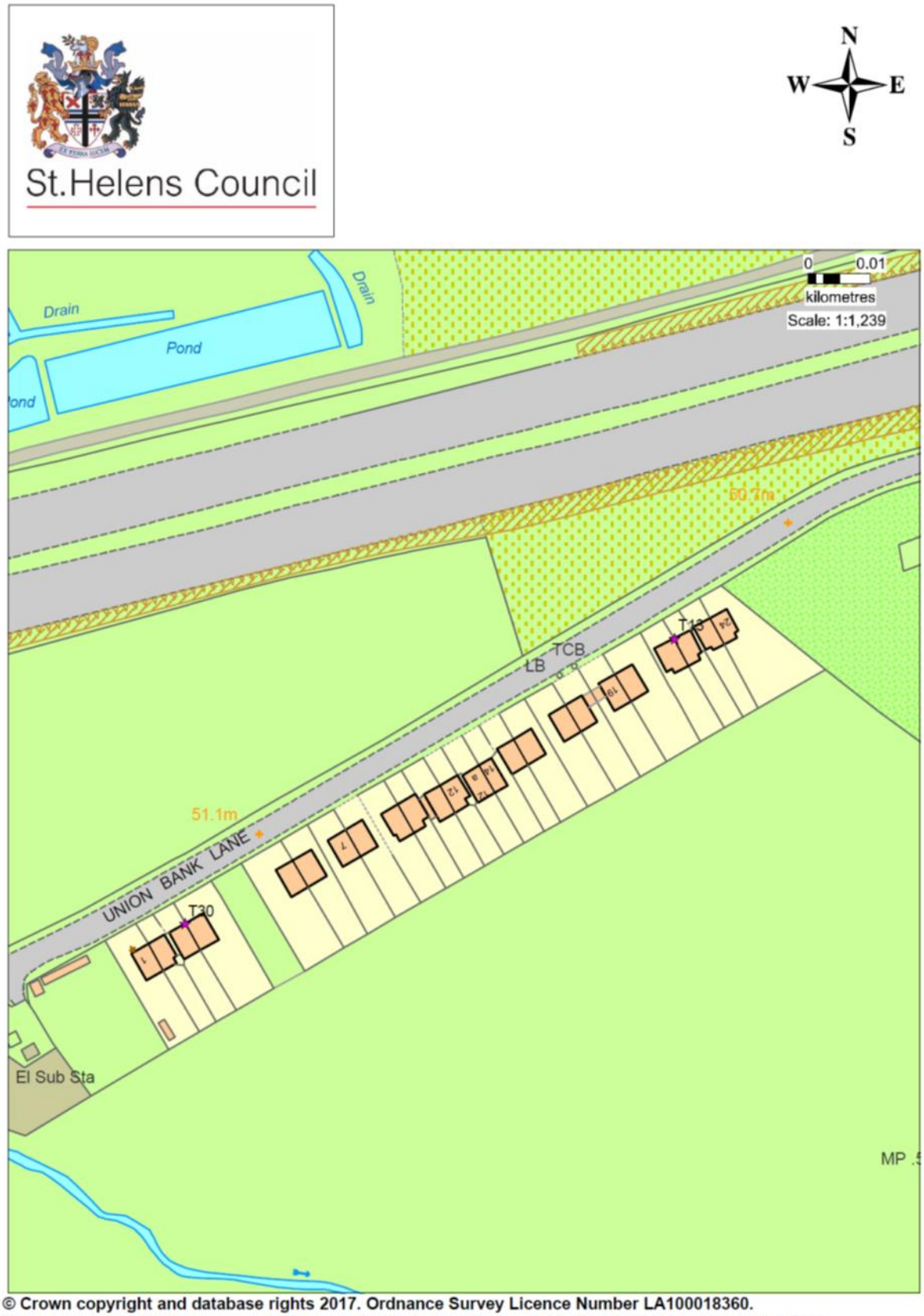
T2 – 1 Skitters Grove



M6/Southworth Road
T7, T10, T31 (collocated) – 160 Southworth Road
T1 – 170 Southworth Road
AN2 Southworth Road monitor

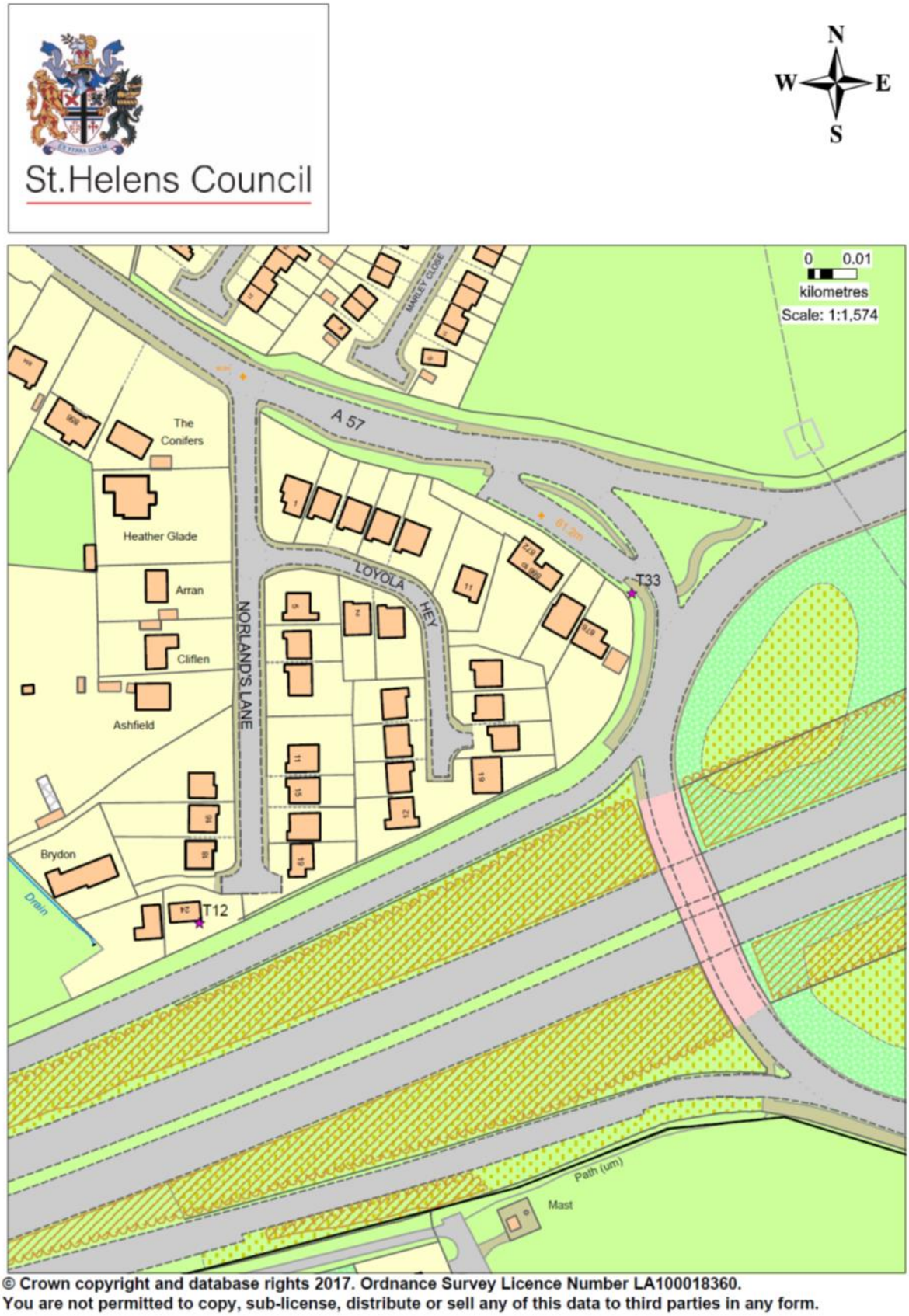


T13 and T30 – Union Bank Lane

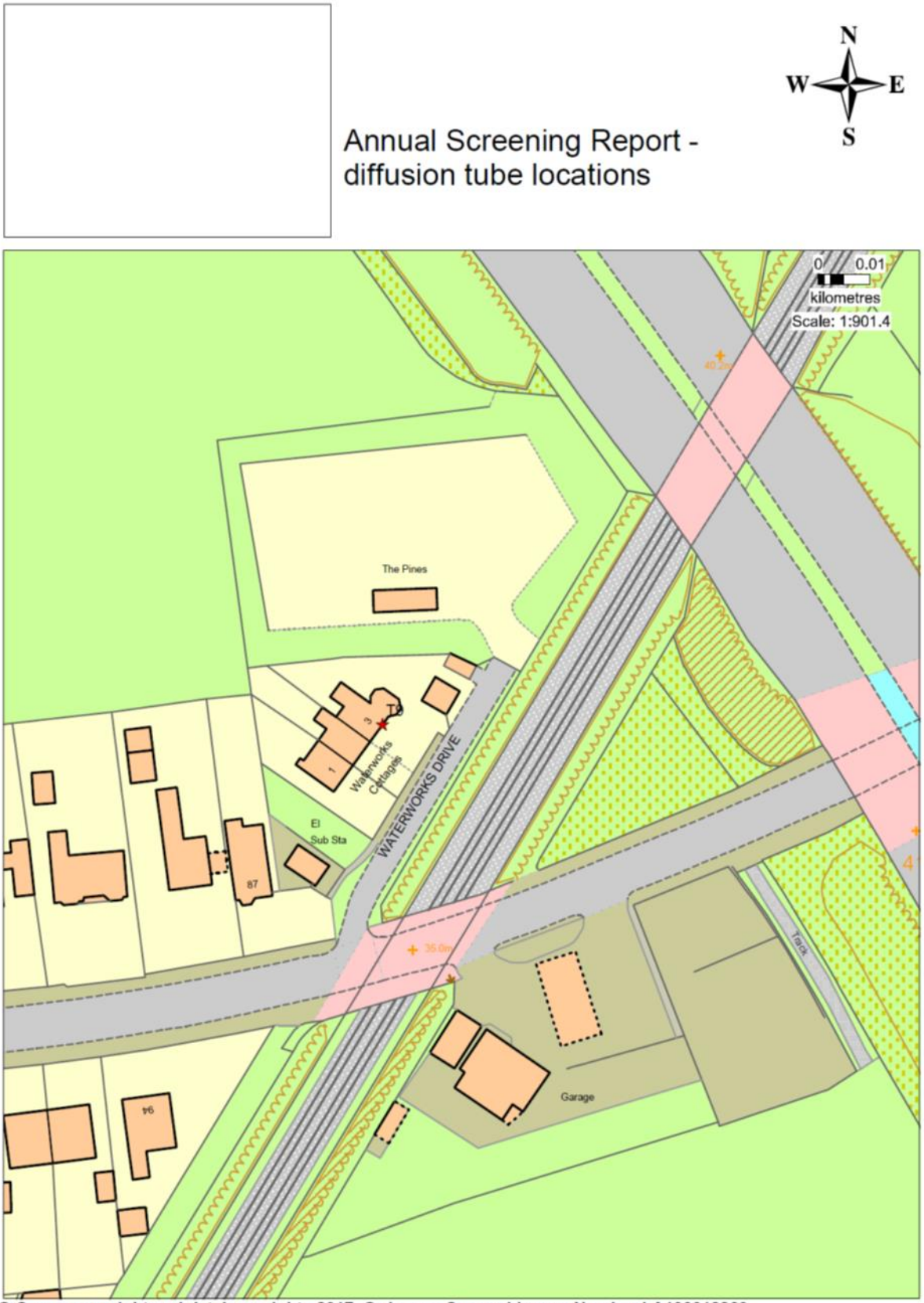


T12 – Norland Lane

T33 – Warrington Road Roundabout



T9 – Waterworks cottages



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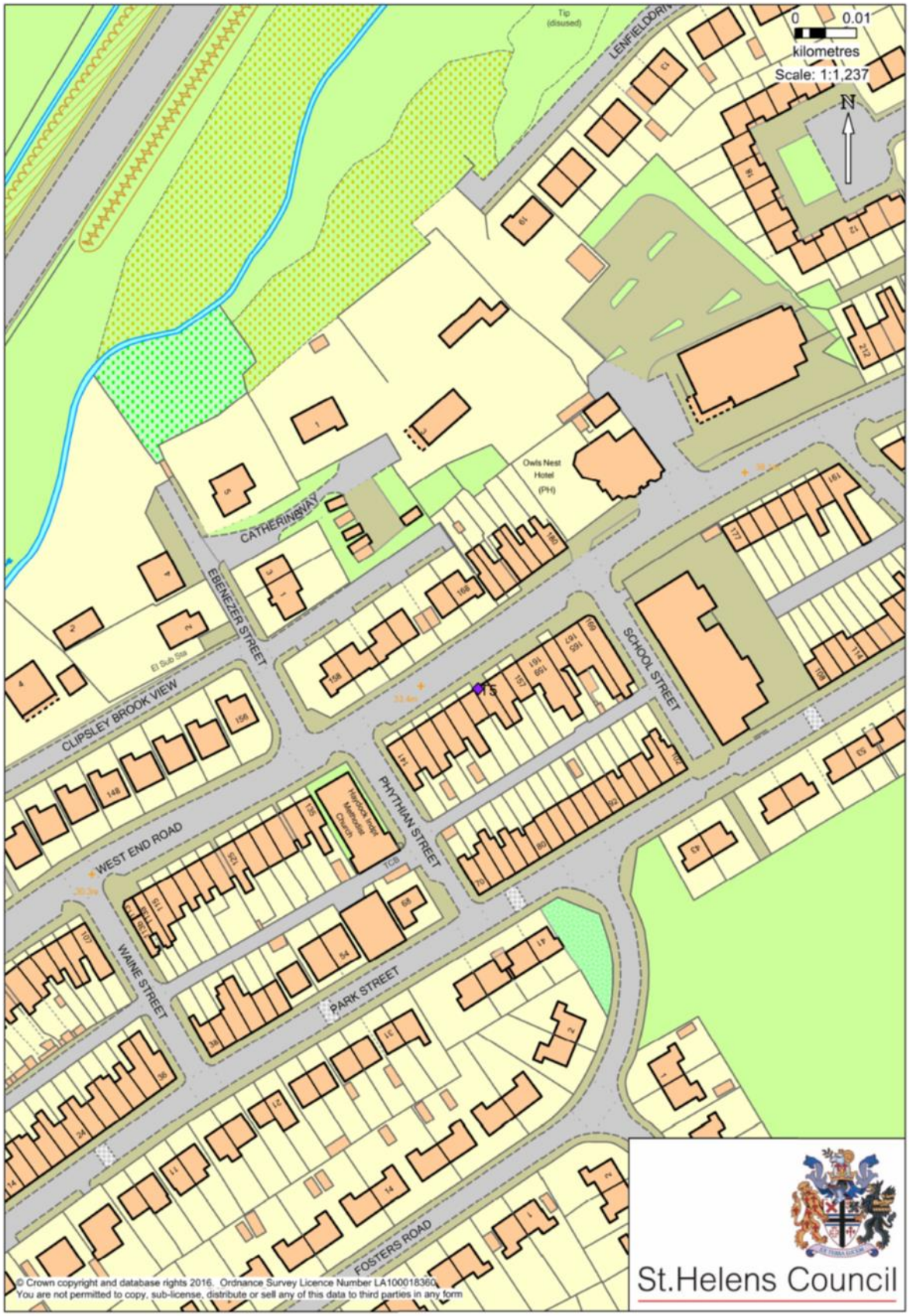
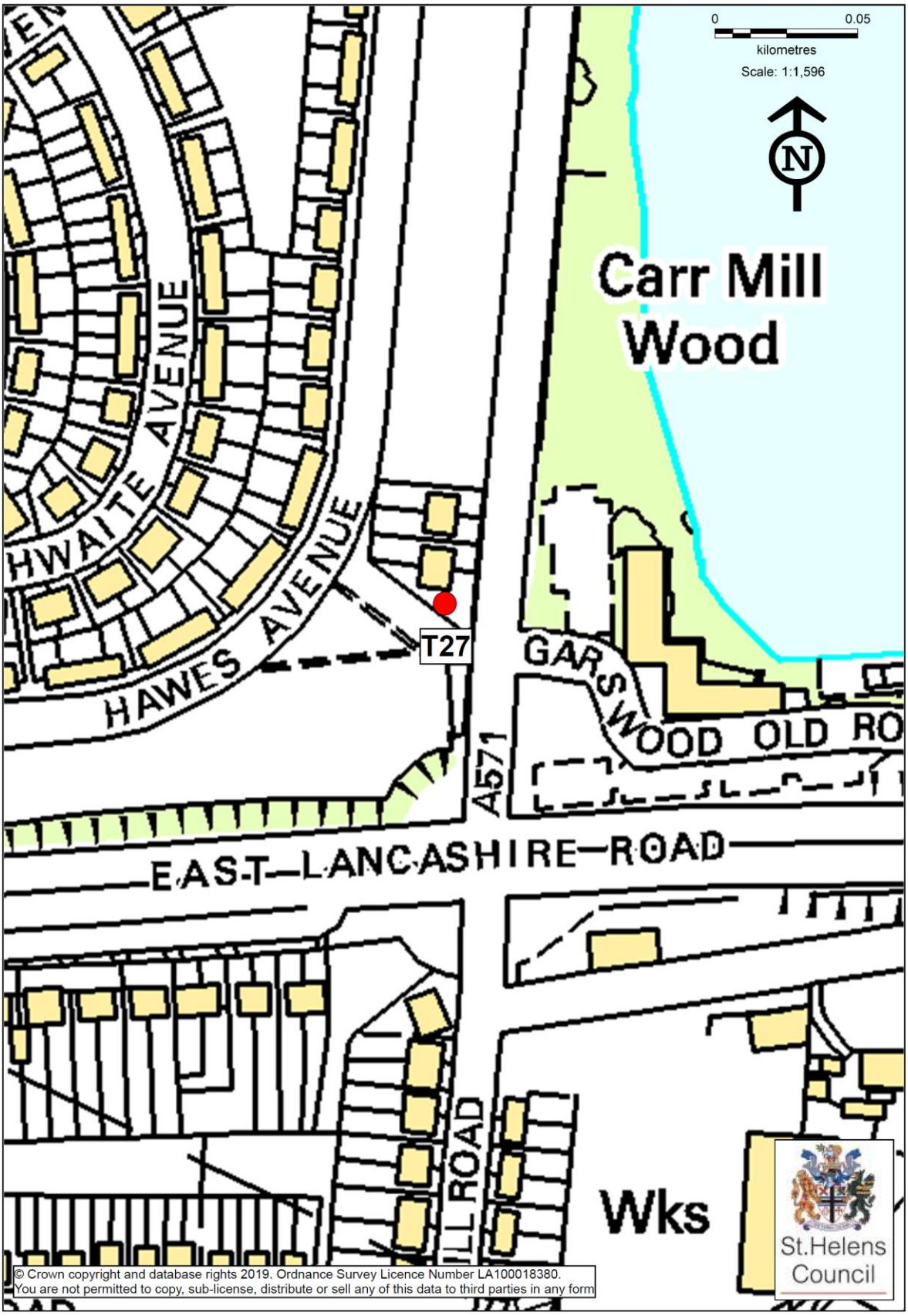
T5 – 151 West End Road



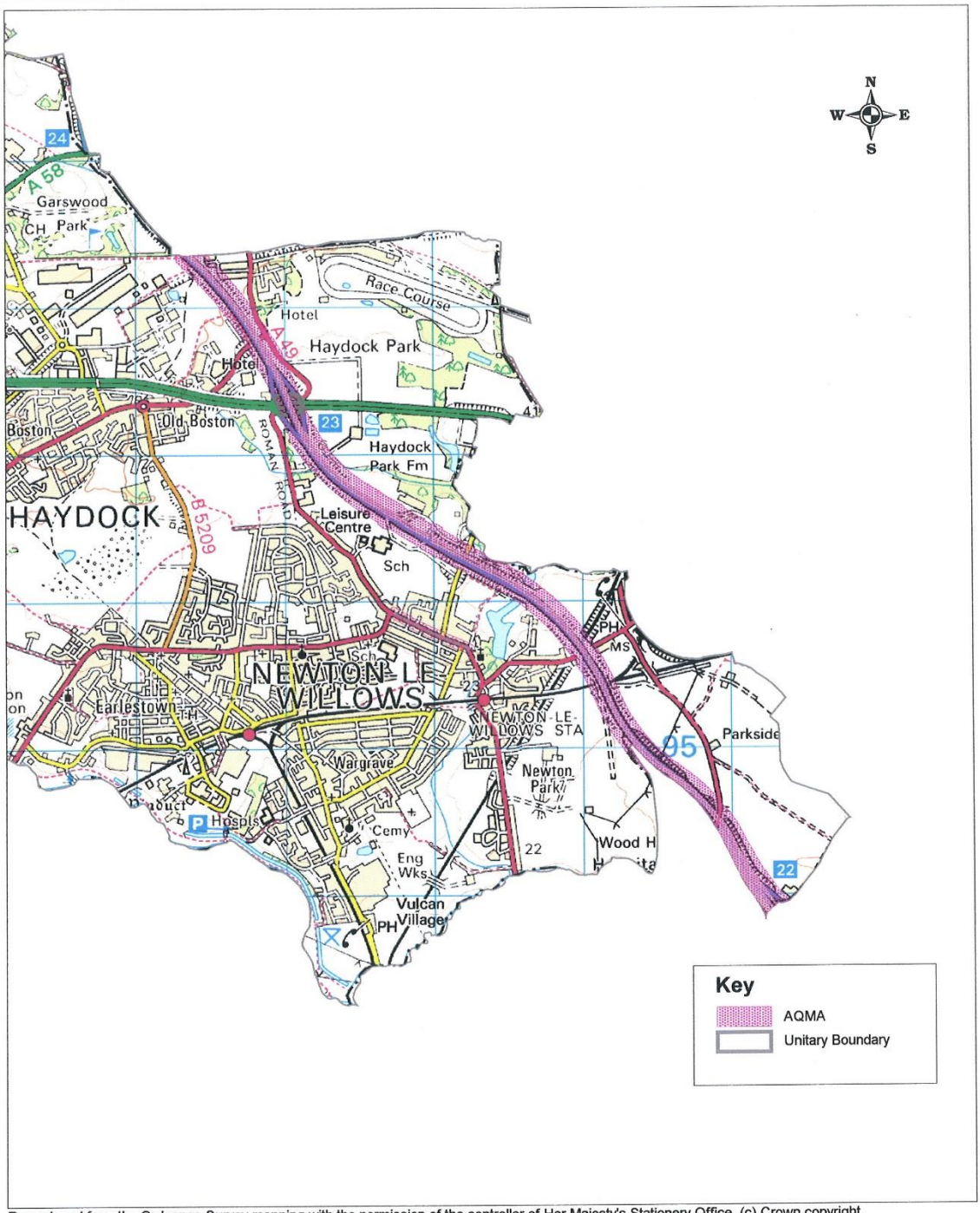
T27 – 51 Carr Mill Road



St Helens Council
Environmental Health
3rd Floor Wesley House
Corporation Street
St Helens
WA10 1HE

Air Quality Management Area

M6 Motorway and Newton-le-Willows High Street



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Environmental Health
3rd Floor Wesley House
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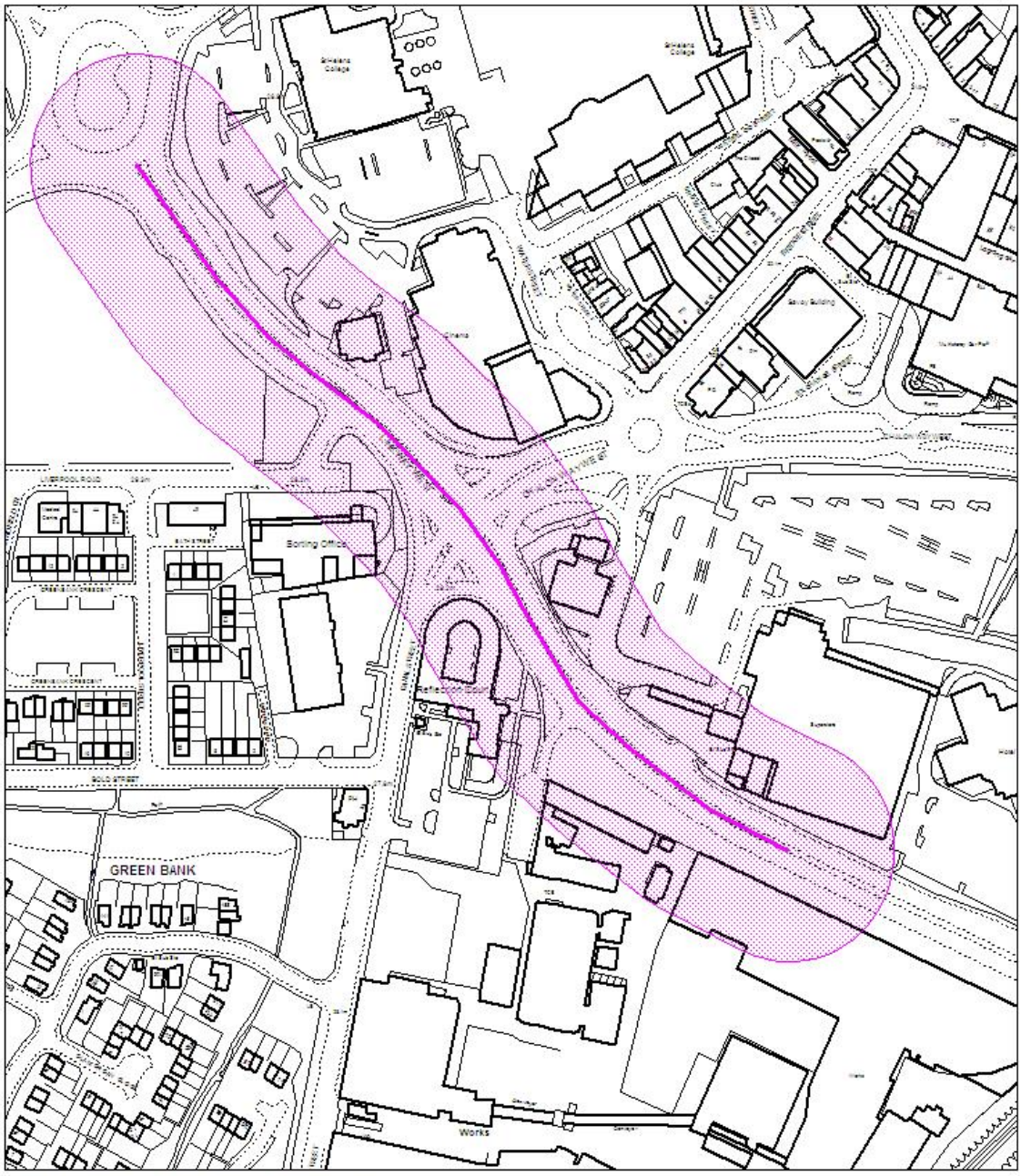
St Helens
WA10 1HE

Air Quality Management Area

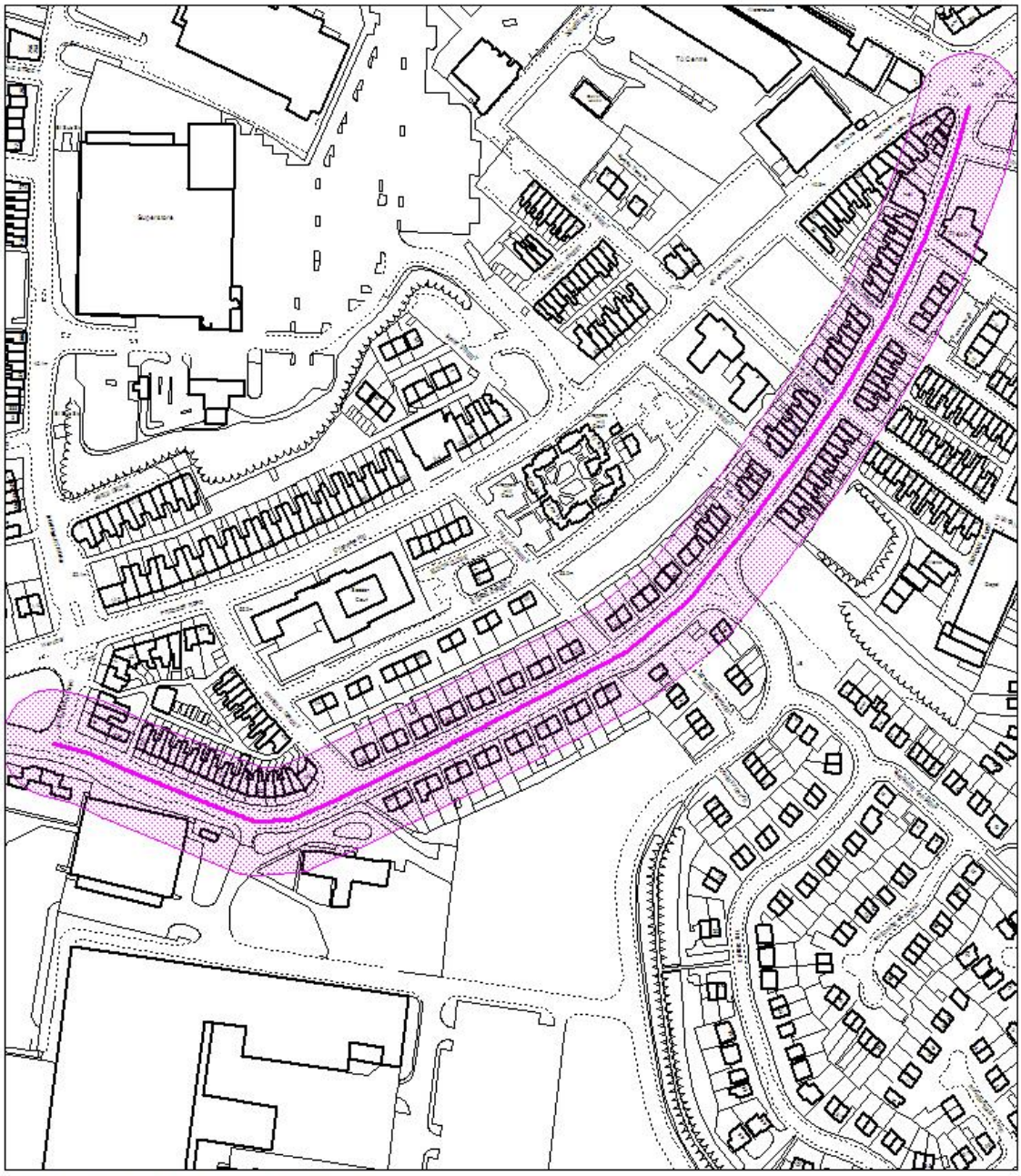
Newton-le-Willows High Street

St Helens Council
AQMA 4 Reflection Court Linkway West



St Helens Council
AQMA 3 Borough Road

St.Helens Council



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 micrograms of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
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
LCR	Liverpool City Region
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

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5. Vehicle Certification Agency http://www.dft.gov.uk/vca/fcb/index.asp
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