



2019 Air Quality Annual Status Report (ASR)

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

Date May 2019

Broadland District Council and South Norfolk District Council

Broadland District Council

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Executive Summary: Air Quality in the Broadland and South Norfolk Council Areas

Air Quality in Broadland and South Norfolk Districts

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

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

This is a combined Broadland District Council and South Norfolk District Council Air Quality Annual Status Report. The two councils are combining officers and resources and forming one team. As a result of this increased collaboration DEFRA has agreed to a single ASR to cover both authority areas.

Air quality in both Broadland and South Norfolk is generally good, mainly because both areas are not intensively built up or industrialised but are districts that include large rural areas. Air pollution in both areas is mainly associated with road traffic and in particular with queuing traffic on busy roads primarily in the suburbs of Norwich and the market towns. There are no Air Quality Management Areas (AQMA's) in Broadland or South Norfolk District Council. The monitoring undertaken has been for NO₂ and the annual average concentrations recorded at each monitoring is below the air quality standard in the Regulations.

Construction of the Norwich Northern Distributor Road (NDR) also known as the Broadland Northway together with the associated cycle paths is now complete and the road is being used by many drivers as an alternative to the Norwich Outer Ring Road. Plans are being developed to extend the Broadland Northway from its current western limit to join with the A47 to the west of Norwich. If the extension is constructed it will offer a range of new routes to and from the Broadland area, north

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

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Norwich and North Norfolk and reduce the traffic demand on the outer Ring Road. The extension is at the preliminary stage. Study of traffic flow around the northern Norwich area has seen an overall reduction in traffic in the Norwich suburbs in favour of using the Broadland Northway.

As highlighted in previous ASR's produced by South Norfolk, a by-pass is proposed for Long Stratton and an application is being processed by the planning department. Both councils continue to monitor air quality in their market towns especially those where significant development is underway or is proposed. The location of air quality monitoring points is continually reviewed and tubes will be relocated if it is considered to be appropriate and further monitoring points will be added if required.

Actions to Improve Air Quality

Broadland and South Norfolk Council staff work closely with colleagues in Public Health, Transport for Norwich (within the department of planning and transportation at Norfolk County Council) and the Norfolk Environmental Protection Group Air Quality sub group. The councils consider the impact of existing local industrial processes through the LAPPC and LAIPPC regimes and also consider new developments to ensure that local air quality is considered in the planning process.

Conclusions and Priorities

The monitoring undertaken by both authorities during 2018 has in general shown an improvement compared to the previous year's data. Broadland and South Norfolk Councils are working together and with partner authorities on alternative methods of monitoring and potential schemes to reduce emissions from vehicles.

The council's will also work with developers to consider air pollution as early as possible in the planning and development process.

Local Engagement and how to get Involved

For further information on air quality please contact us at:

Environ.protection@broadland.gov.uk or envserv@s-norfolk.gov.uk

If people would like to find out more about air quality in general there are a number of resources available on like. These include:

<https://uk-air.defra.gov.uk/> (the UK government air website)

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<https://air-uk.defra.gov.uk/data/> (the UK Government air quality archive)

www.airqualityengland.co.uk (air quality England. A quick reference to A.Q. information for a variety of local authority areas across England)

www.metoffice.gov.uk/guide/weather/air-quality (Met Office air pollution web page)

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1 Local Air Quality Management

This report provides an overview of air quality in the Broadland and South Norfolk districts 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 Broadland and South Norfolk District Councils 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 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.

Neither Broadland District Council or South Norfolk District Council currently have any AQMAs. For reference, a map of the Broadland and South Norfolk Council monitoring locations is available in Appendix D.

2.2 Progress and Impact of Measures to address Air Quality in Broadland and South Norfolk District Council's

Defra's appraisal of last year's ASR concluded Broadland District Council needed to keep the location of monitoring points under review and ensure the map showing the locations of the monitoring points is clearer. DEFRA advised South Norfolk District Council to continue to implement its air quality strategy and continue with its monitoring.

Broadland District Council and South Norfolk District Council have taken forward a number of direct measures during the current reporting year in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.1.

Key completed measures are:

- Work with Norfolk County Council to review traffic data for the Broadland Northway and the primary routes through Broadland towards Norwich to assess changes in traffic flow and movement following the opening of the Northern Distributor Road from A47 Postwick to A1067 Fakenham Road in Attlebridge.
- Review of current NOX tube locations and relocate as appropriate.

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- Introduction of new NOX tube locations at key traffic queueing junctions (based on Norfolk County Council traffic flow data) and where concern about air quality has been raised by residents.
- Assessment of the need to monitor PM_{2.5}'s and if required
- Based on the above Identify locations where monitoring could be undertaken
- Source suitable portable continuous monitors for short term monitoring to better ascertain air quality peaks at key locations within both districts.
- Continue to review air quality monitoring locations and relocate or add further tubes as appropriate.

The 2 council's priorities for the coming year are:

- Promoting sustainable travel alternatives to the car. Broadland and South Norfolk Council is working in conjunction with the other authorities within the Greater Norwich Project area to develop walking and cycling routes for journeys to work and supporting the use of public transport.
- Working with developers to ensure sustainable
- Continue the development of the Greater Norwich Air Quality Working Group to feed into the Greater Norwich Development Plans and to support action to reduce emissions from vehicles with the Greater Norwich area.
- Develop closer working ties between Broadland and South Norfolk District Councils.

The principal challenges and barriers to implementation that Broadland and South Norfolk Council's anticipate facing are:

Procuring a good quality portable monitor that produces monitoring data that reflects the pollutant concentrations at the monitoring point.

The cost of procuring suitable monitors, once a suitable monitor has been identified.

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Table 2.1 – 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	Energy Efficiency of New Build Properties	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Property Developers	Completed	Completed	Reduction of energy bills and energy use	N/A	Implemented	On going	Reduction of energy bills and energy use
2	Promoting cycling as an alternative to the car	Promoting Low Emission Transport	Other	Norfolk County Council	Completed	On going	Reducing congestion and vehicle emissions	N/A	On going	On going	Improvements to cycle routes, establishing new routes, highlighting benefits of cycling to work
3	School Travel Plans	Promoting Travel Alternatives	School Travel Plans	Norfolk County Council, MAT's and individual schools	On going	On going	Reducing emissions and congestion	N/A	On going	On going	Reducing emissions and congestion
4	Alternative transport methods	Alternatives to private vehicle use	Other	Norfolk County Council, Local Authorities, Transport Providers	Completed	On going	Reducing congestion and vehicle emissions	N/A	On going	On going	Reducing emissions and congestion
5	Educating drivers on responsible driving techniques	Other	Other	Norfolk County Council	Completed	On going	Reducing Vehicle emissions and energy use and promoting safe driving techniques	N/A	On going	On going	Reducing emission and energy use and promoting safe driving techniques
6	Energy efficiency information for residents	Public Information	Via leaflets	Broadland and South Norfolk DC's	Completed	Completed	Reducing emissions and energy use	N/A	Providing information when requested	On going	Reducing emissions and energy use

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7	Link authority for the E.C.O (Energy Company Obligation) scheme	Public Information	Other	Broadland and South Norfolk DC's and All L.A's	Completed	Completed	Reducing emissions and energy use	N/A	Providing information when requested	On going	Reducing emissions and energy use
8	Health Improvement Grants	Other	Other	Broadland and South Norfolk DC's	Completed	Completed	Reducing emissions and energy use and improving residents health and well being	N/A	On going	On going	Reducing emissions and energy use and improving residents health and well being
9	Warm Homes Fund	Other	Other	Broadland District Council and some housing associations	On going	Planning	Reducing emissions and energy use and improving residents health and well being	N/A	Planning	On going	Reducing emissions and energy use and improving residents health and well being
10	Greater Norwich Air Quality Working Group	Other	Other	Broadland District Council, South Norfolk Council, Norwich City Council, Norfolk County Council	On going	Planning	Collaborative working to improve air quality within the Greater Norwich Area through various projects and initiatives	T.B.C	Planning	On going	Collaborative working to improve air quality within the Greater Norwich Area through various projects and initiatives
11	Construction of the remaining section of the Norwich Northern Distributor Road from A1067 to A47 west of Norwich	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	Norfolk County Council	Planning Phase	Planning	Individual uptake	N/A	Planning	On going	Re-routing traffic from Norwich Outer ring-road and join Norwich Southern by-pass to key routes north of Norwich

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12	National Cycle Scheme	Alternatives to private vehicle use	Other	Broadland and South Norfolk DC's	On going	On going	Individual up take	N/A	On going	On going	Reducing emissions and congestion
13	Community Rail Partnerships	Promoting Travel Alternatives	Promote use of rail and inland waterways	Norfolk Community Rail Partnership	On going	On going	Individual up take	N/A	On going	On going	Reducing emissions and congestion
14	Bike Walk Scoot	Promoting Alternatives to private vehicle use	School Travel Plans	Broadland District Council	On going	On going	Individual up take	N/A	On going	On going	Reducing emissions and congestion, promoting healthier living
15	Norfolk Bus Charter	Promoting Alternatives to private vehicle use	Low Emissions Strategy	Norfolk County Council	On going	On going	Collaborative working to improve air quality within the Greater Norwich Area through various projects and initiatives	N/A	On going	On going	Reducing emissions and congestion, promoting healthier living

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.

Broadland and South Norfolk District Councils are taking the following measures to address PM_{2.5}:

- The Councils are working to ensure regular two-way engagement with representatives of Public Health England, and the Director of Public Health at Norfolk County Council;
- The Councils are looking to work directly with Public Health England including working to encourage active travel resulting in improvements to air quality;
- We have also been working with local industrial processes to ensure local air quality is safeguarded
- We review planning applications for new developments to ensure local air quality is safeguarded via the planning regime.

Although there is no legal requirement for Local Authorities to monitor for PM_{2.5} Broadland District Council and South Norfolk District Council have both referred to the DEFRA background concentration data to consider PM_{2.5} levels across the districts and identify areas of elevated concentrations. The 2010, 2011, 2013, 2015 and 2017 data have been used to assess if the background concentrations are above the EU threshold. The next step will be to determine whether there is a need to carry out monitoring for PM_{2.5} and if so where.

There is currently no threshold value for PM_{2.5} in England. The EU directive from which the English Air Quality Regulations are derived gives a threshold of 25ug/m³ Annual mean. The background review has not identified any locations where the background concentrations exceed the EU threshold. The result for 2017 shows improvements in PM_{2.5} across both districts when compared to the results for the previous years. The variation in the background concentrations suggests that there

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may be areas where the background level of PM_{2.5} combined with other anthropogenic sources may cause an increase the concentration. Therefore further investigation of this parameter will be required to determine if monitoring is required and, if monitoring is required, the locations where it would be required.

Opening the Broadland Northway has seen changes in traffic flows in the North Norwich and the urban fringe areas which form part of the Broadland District Council area. Further assessment and traffic studies will be undertaken by Norfolk County Council which Broadland District Council will review. There have been some fluctuations in traffic flow along the main routes from the Broadland Northway towards Norwich city as drivers find the best route for their journeys.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Non-Automatic Monitoring Sites

Broadland and South Norfolk Councils undertook non- automatic (passive) monitoring of NO₂ at 48 sites (20 sites in Broadland and 28 sites in South Norfolk) sites during 2018. [Appendix A](#) shows the details of the sites.

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

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO₂ annual mean concentrations for the past 5 years with the air quality objective of 40µg/m³.

For diffusion tubes, the full 2018 dataset of monthly mean values is provided in Appendix B. In addition graphs have been included in Figure A.1 comparing the all of the annual results for the locations monitored. In some locations this data goes back to 2010.

All of the monitoring data has been correctly ratified and adjusted for distance from the source to the receptor where required.

The results of the passive diffusion tube monitoring have not identified any exceedances of the annual threshold of 40ug/m³. Reviewing the data for 2018 against previous years has shown that in most cases there is a general trend showing an overall decline in NO₂ concentrations at the monitoring points. The only exception to this is found at BN11 (Reepham Road) and BN18 (Middletons Lane). However, in the case of BN11 There was a notable reduction in the concentration

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recorded from 2017 to 2018 which may be an indication of traffic flow changes following the opening of Broadland Northway. With regards to BN18 this is only 2 years worth of data and therefore is not sufficient data to start ascertaining trends. Further monitoring at this location is required and monitoring will continue in this location.

Year on year changes have seen an increase recorded at BN1 (A47 North Burlingham), BN4 (Hillside Avenue) and BN15 (Wroxham Bridge Wroxham). The increase at BN1 may be a result of the relocation of the tube following the removal of the tube and its base from the previous location during ground works. The tube is again located on a junction but the new location is bidirectional where as the last location was one way for traffic coming off the A47 only. There is therefore the potential for traffic to wait for a space to enter the flow of traffic on the A47. Another factor may have been the long warm period in 2017 which saw an increase in the frequency of travelling to the coast. The increase in concentration recorded at BN15 may also be due in to the increase in tourist and day trip traffic as a result of the warm summer last year.

The data for NO₂ in the South Norfolk District area also shows a year on year improvement of NO₂ Emissions compared to 2017 data. The graphs for each location show data from 2010 (or later where 2010 is not available) to 2018 and include a linear trend line. All locations except DT6 (Church Plain Loddon), DT15 (Harleston) and DT16 (Diss Road Scole) show an overall trend of improving air quality. The trend data for DT6, DT15 and DT16 all show an deteriorating air quality, although the actual data shows a years on year improvement from 2017 to 2018. The trend data is indicative and in the case of the above three locations the trend has been squewed by past increases in NO₂ concentration and therefore do not truly reflect the current conditons. We will monitoring these trends.

3.2.2 Particulate Matter (PM₁₀)

PM₁₀ monitoring is not undertaken by either Broadland or South Norfolk District Councils. A review of potential pollutants by both authorities in the past did not highlight PM₁₀ as potentially significant and therefore monitoring was not required. This was been agreed with DEFRA at the time of the review.

3.2.3 Particulate Matter (PM_{2.5})

Broadland and South Norfolk District Council's do not currently undertake monitoring for PM_{2.5} but have undertaken an initial review of the DEFRA background concentration data. The review has looked at the background concentration data from the DEFRA website for 2010, 2011, 2013, 2015 and 2017. There is currently no UK air quality threshold for PM_{2.5} so this review has used the EU threshold of 25ug/m³. The initial assessment against the EU threshold has not identified any locations within the authority areas where the background concentrations exceed the threshold. However, there may be locations where the introduction of anthropogenic sources of PM_{2.5} to the background concentrations could require further assessment. Broadland and South Norfolk District Councils will therefore review this parameter further in order to determine whether there are locations that may benefit from monitoring.

Appendix A: Monitoring Results

Table A.1 – 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?	Inlet Height (m)
Broadland District Council										
BN1	A47 Nth Burlingham	Roadside	635997	310021	NO2	NO	8	2	NO	1.8
BN2	Norwich Road Acle	Kerbside	639713	310237	NO2	NO	25	2	NO	2.5
BN3	Cox's Hill Beighton	Rural	638094	308891	NO2	NO	2	2	NO	2
BN4	Hillside Avenue Thorpe St Andrew	Suburban	626911	308738	NO2	NO	10	1	NO	3
BN5	Dussingdale Drive Thorpe St Andrew	Suburban	627755	309440	NO2	NO	19	2	NO	2.5
BN6	Breck Road Sprowston	Suburban	626313	311010	NO2	NO	13	2	NO	2.5
BN7	17 Heath Crescent Hellesdon	Suburban	621539	312522	NO2	NO	0	7	NO	1.5
BN8	Hansell Road Thorpe St Andrew	Suburban	627003	309849	NO2	NO	9	1	NO	2
BN9	Chartwell Road Old Catton	Suburban	622938	311399	NO2	NO	10	9	NO	2

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BN10	Yarmouth Road Thope St Andrew	Suburban	625264	308411	NO2	NO	2	10	NO	3
BN11	21 Reepham Road Hellesdon	Suburban	621642	311622	NO2	NO	0	8	NO	2
BN12	10A Boundary Rd Hellesdon	Suburban	621698	311565	NO2	NO	0	8	NO	2
BN13	213 Milecross Ln Hellesdon	Suburban	621811	311636	NO2	NO	0	10	NO	2
BN14	Berrington Road Hellesdon	Suburban	620690	311758	NO2	NO	9	1	NO	2
BN15	Wroxham Library Wroxham	Roadside	630182	318042	NO2	NO	9	1	NO	2
BN16	The Avenue Wroxham	Roadside	329887	317575	NO2	NO	13	2	NO	2
BN17	School Rd Drayton	Roadside	617794	314204	NO2	NO	10	2	NO	3
BN18	Middletons Lane Hellesdon	Suburban	620175	311832	NO2	NO	6	1	NO	3
BN19	189 Yarmouth Rd Thorpe St Andrew	Suburban	627494	308773	NO2	NO	0	9	NO	2
BN20	The Street Acle	Kerbside	640161	310350	NO2	NO	0	1	NO	3
BN21	Thorpe End	Roadside	627741	310902	NO2	NO	9	2	NO	2
BN22	Wroxham Rd/Ring Road Sprowston	Roadside	624060	311166	NO2	NO	5	1	NO	3

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BN23	Dussingdale Drive Thorpe St Andrew	Roadside	627563	309236	NO2	NO	6	3	NO	3
BN24	Fifers Lane Hellesdon	Suburban	621466	312662	NO2	NO	0	16	NO	1.5
BN25	Red Lion Street Aylsham	Roadside	619333	326894	NO2	NO	0	1	NO	1.5
South Norfolk District Council										
DT1	46a Newmarket Rd Cringleford	Suburban	619208	304645	NO2	NO	0	15	NO	1.5
DT2	131 Longwater Ln Costessey	Suburban	616797	310477	NO2	NO	0	15	NO	1.5
DT3	90 The Street Poringland	Suburban	626803	302092	NO2	NO	0	5	NO	1.5
DT4	87 Denmark St Diss	Suburban	611223	279637	NO2	NO	0	3	NO	1.5
DT5	131 Victoria Rd Diss	Suburban	611945	279572	NO2	NO	0	3	NO	1.8
DT6	21 Church Plain	Suburban	636192	298751	NO2	NO	0	3	NO	1.5
DT7	A140 Long Stratton	Roadside	619722	292745	NO2	NO	3	1	NO	2.1
DT8	Fairland Street Wymondham	Kerbside	611129	301425	NO2	NO	0	3	NO	2.1
DT9	Kirby Bedon Rd Bixley	Kerbside	625439	305944	NO2	NO	20	2	NO	2.1

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DT10	209 Norwich Road Wymondham	Suburban	612515	302652	NO2	NO	0	15	NO	1.5
DT11	2 Thickethorne Cottages	Rural	618137	305678	NO2	NO	0	10	NO	1.5
DT12	Rightup Lane Wymondham	Suburban	611528	300987	NO2	NO	20	3	NO	2.1
DT13	233 Norwich Rd Wymondham	Suburban	612663	302751	NO2	NO	0	12	NO	1.5
DT14	28 Norwich Road Wymondham	Suburban	611380	302751	NO2	NO	0	8	NO	1.5
DT15	Harleston Hotel	Roadside	624484	283276	NO2	NO	5	2	NO	2.1
DT16	Diss Road Scole	Roadside	614895	283276	NO2	NO	8	1	NO	1.8
DT17	84 West End Costessey	Roadside	616652	311650	NO2	NO	4	1	NO	2.1
DT18	Long Stratton Chinese	Roadside	619710	292730	NO2	NO	1	1	NO	2.1
DT19	Long Stratton Traffic Lights East	Roadside	619732	292740	NO2	NO	7	1	NO	2.1
DT20	Long Stratton Funeral Directors	Suburban	619642	292346	NO2	NO	0	5	NO	1.5
DT21	Long Stratton South Bound (60M)	Suburban	619694	292653	NO2	NO	0	2	NO	2.1
DT22	Long Stratton Co-	Roadside	619710	292722	NO2	NO	5	2	NO	2.1

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	op Chemist Swan Lane									
DT23	3 Norwich road Costessey	Suburban	618991	309796	NO2	NO	0	15	NO	1.5
DT24	14 Station Road Wymondham	Suburban	618823	293032	NO2	NO	0	5	NO	1.5
DT25	Long Stratton Bus Stop	Roadside	619823	293032	NO2	NO	5	4	NO	2.1
DT26	Newmarket Road Cringleford	Roadside	619801	305869	NO2	NO	20	2	NO	2.1
DT27	Lord Nelson Drive Costessey	Roadside	616348	310585	NO2	NO	100	1	NO	2.1
DT28	Riverside Court Costessey	Suburban	6167997	310585	NO2	NO	100	1	NO	2.1
DT29	25 Broad St Harleston	Suburban	619131	305633	NO2	NO	8	0	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).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO₂ 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/m ³) ⁽³⁾				
					2014	2015	2016	2017	2018
Broadland District Council									
BN1	Roadside	Diffusion Tube	100	100	30.8	28.4	30.6	24	26.3
BN2	Kerbside	Diffusion Tube	80	0	21.6	18.3	19.3	16.6	-
BN3	Roadside	Diffusion Tube	80	0	16.5	13.3	14.4	14.4	-
BN4	Suburban	Diffusion Tube	100	100	14.6	12.7	14.9	13.6	14.3
BN5	Suburban	Diffusion Tube	80	0	22	20.2	20.5	16.7	-
BN6	Suburban	Diffusion Tube	100	100	13.8	12.7	12.5	13.5	13.6
BN7	Suburban	Diffusion Tube	100	100	15.5	13.6	14	15.5	14.2
BN8	Kerbside	Diffusion Tube	100	100	15.4	11.8	12.8	14.4	13.4
BN9	Roadside	Diffusion Tube	100	100	23.4	28.3	29.4	31	26.9
BN10	Roadside	Diffusion Tube	100	100	22.7	20.6	20	19.8	18.7
BN11	Suburban	Diffusion Tube	100	100	34.3	30.1	32	34	29.6
BN12	Suburban	Diffusion Tube	100	100	33.5	29.2	30.5	30	29.4
BN13	Suburban	Diffusion Tube	100	100	25.8	24.4	24.8	23.4	22.8

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BN14	Suburban	Diffusion Tube	80	0	17.6	16	16.2	15	-
BN15	Roadside	Diffusion Tube	100	100	21.7	16.6	17.4	15.6	22
BN16	Roadside	Diffusion Tube	100	100	20.5	19.2	17	18.4	18.2
BN17	Suburban	Diffusion Tube	35	100		-	-	19.5	14
BN18	Roadside	Diffusion Tube	35	100		-	-	18.1	26
BN19	Suburban	Diffusion Tube	30	100		-	-	31.8	27.2
BN20	Kerbside	Diffusion Tube	20	100		-	-	-	22.52
BN21	Roadside	Diffusion Tube	20	100		-	-	-	18.73
BN22	Suburban	Diffusion Tube	20	100		-	-	-	31.71
BN23	Suburban	Diffusion Tube	20	100		-	-	-	17.72
BN24	Suburban	Diffusion Tube	20	100		-	-	-	18.13
BN25	Kerbside	Diffusion Tube	17	83		-	-	-	21.73
South Norfolk District Council									
DT1	Suburban	Diffusion Tube	100	100	21.5	17.1	20.2	21.2	19.7
DT2	Suburban	Diffusion Tube	100	100	20.3	18.1	21.2	21.6	20.1
DT3	Suburban	Diffusion Tube	100	100	18	15.4	19.3	20	18.6
DT4	Suburban	Diffusion Tube	100	100	24.1	21	29.2	26.7	24.8
DT5	Suburban	Diffusion	100	100	33	26	30	28.2	26.2

Broadland District Council and South Norfolk District Council

		Tube							
DT6	Suburban	Diffusion Tube	98	100	12	10.4	13.5	20.2	18.8
DT7	Suburban	Diffusion Tube	100	100	27.8	32	33.5	37.2	34.6
DT8	Suburban	Diffusion Tube	100	100	23.4	18.4	23.3	22	20.5
DT9	Suburban	Diffusion Tube	100	100	26.7	21.4	25.4	24.9	23.2
DT10	Suburban	Diffusion Tube	100	100	16.7	12	18	16.5	15.3
DT11	Rural	Diffusion Tube	100	100	15.9	12.8	15.8	14.9	13.9
DT12	Suburban	Diffusion Tube	98	100	21.4	16.3	21.9	21.2	19.7
DT13	Suburban	Diffusion Tube	100	100	14.2	11.9	15.9	16.1	15.0
DT14	Suburban	Diffusion Tube	100	100	18.1	13.3	17	16.2	15.1
DT15	Roadside	Diffusion Tube	100	100	28.1	25.1	27.6	26.2	24.4
DT16	Roadside	Diffusion Tube	100	100	20.5	18.1	21.4	26.2	24.4
DT17	Roadside	Diffusion Tube	100	100	13.1	10.8	19.4	20.5	19.1
DT18	Roadside	Diffusion Tube	100	100	27.4	25.9	29.8	26.6	24.7
DT19	Roadside	Diffusion Tube	98	100	36.3	30.6	36.9	34.3	31.9
DT20	Suburban	Diffusion Tube	98	100	35.9	33.6	32.9	31	28.8
DT21	Suburban	Diffusion Tube	100	100	35.1	26.9	31.1	28.5	26.5
DT22	Roadside	Diffusion Tube	100	100	26.4	23.2	25.2	20.5	19.1

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DT23	Suburban	Diffusion Tube	100	100	16.2	13	16.7	15.6	14.5
DT24	Suburban	Diffusion Tube	100	100	17.1	13.9	17.4	16.1	15.0
DT25	Roadside	Diffusion Tube	100	100	31.7	29.3	30.1	29	27.0
DT26	Roadside	Diffusion Tube	100	100	24.4	21.4	25.5	24.1	22.4
DT27	Roadside	Diffusion Tube	100	100	28.3	23.1	28.4	25.4	23.6
DT28	Suburban	Diffusion Tube	100	100		16.3	14.1	13.9	12.9
DT29	Suburban	Diffusion Tube	90	100	28.2	31.5	27.8	24.2	22.5

CLICK HERE THEN PASTE COMPLETED DATA ROWS FROM EXCEL TEMPLATE

- Diffusion tube data has been bias corrected (**confirm by selecting in box**)
- Annualisation has been conducted where data capture is <75% (**confirm by selecting in box**)

Notes:

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

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

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

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

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Boxes 7.9 and 7.10 in LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Appendix B: Full Monthly Diffusion Tube Results for 2018

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2018

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted (factor) and Annualised ⁽¹⁾	Distance Corrected to Nearest Exposure ⁽²⁾
Broadland District Council															
BN1	36.0	27.0	33.0	29.0	18.0	-	29.0	28.0	30.0	26.0	31.0	25.0	28.4	26.4	
BN4	20	25	16	11	7	8	12	11	13	24	20	19	15.5	14.4	
BN6	24	16	16	11	7	7	12	11	15	16	20	19	14.5	13.5	
BN7	19	19	16	11	8	8	21	11	14	17	19	19	15.2	14.1	
BN8	20	18	16	13	8	8	12	11	14	15	21	19	14.6	13.6	
BN9	36	29	34	26	16	22	31	27	32	30	27	36	28.8	26.8	
BN10	30	24	24	20	14	12	18	18	11	19	26	27	20.3	18.8	
BN11	27	38	43	28	23	16	37	29	30	38	38	33	31.7	29.5	
BN12	31	40	41	27	26	20	33	25	30	36	37	34	31.7	29.5	
BN13	28	29	29	25	12	14	26	24	27	25	30	26	24.6	22.9	
BN15	24	26	30	21	24	15	27	19	23	23	31	21	23.7	22.0	
BN16	26	20	22	19	12	12	19	18	21	19	23	23	19.5	18.1	
BN17	18	20	17	11	8	7	13	11	14	17	29	16	15.1	14.0	

Broadland District Council and South Norfolk District Council

BN18	33	31	24	25	19	18	24	25	28	28	29	40	27.0	25.1	
BN19	29	27	33	28	38	23	32	26	28	30	31	27	29.3	27.3	
BN20	29	25	27	23	18	14	25	25	26	24	28	25	24.1	22.4	
BN21	23	29	31	18	11	12	19	15	19	18	28	18	20.1	18.7	
BN22	43	38	50	12	13	21	39	35	37	41	40	40	34.1	31.7	
BN23	24	22	22	17	11	12	18	16	21	20	24	22	19.1	17.7	
BN24	25	23	22	16	13	13	18	16	21	21	23	23	19.5	18.1	
BN25			27	22	21	18	25	12	26	28	30	26	23.5	21.9	
South Norfolk District Council															
DT1	26	18	27	24	16	15	16	21	21	21	27	25	21.4	19.9	
DT2	26	21	22	21	15	15	14	22	23	23	21	25	20.7	19.2	
DT3	24	20	26	19	16	13	15	18	18	23	21	20	19.4	18.1	
DT4	31	31	43	41	27	28	24	22	23	26	30	30	29.7	27.6	
DT5	33	26	38	35	27	22	30	28	27	33	35	31	30.4	28.3	
DT6	36	25	29	22	19	16	17	17	16	23	26	27	22.8	21.2	
DT7	38	33	47	40	35	35	38	41	40	47	39	41	39.5	36.7	
DT8	27	26	31	25	22	21	19	17	20	25	28	26	23.9	22.2	
DT9	31	28	30	25	20	17	24	25	11	27	30	30	24.8	23.1	
DT10	22	19	30	21	15	11	17	13	11	14	26	20	18.3	17.0	
DT11	20	18	23	21	13	10	15	15	12	16	25	27	17.9	16.7	
DT12	25	23	26	23	21	20	22	22	28	24	27	26	23.9	22.2	
DT13	20	19	19	18	11	8	14	14	15	17	24	21	16.7	15.5	
DT14	22	22	21	20	16	14	14	15	16	19	21	20	18.3	17.1	
DT15	30	26	34	27	32	25	25	26	29	31	30	34	29.1	27.0	
DT16	27	23	27	21	18	16	19	20	21	23	24	24	21.9	20.4	

Broadland District Council and South Norfolk District Council

DT17	26	21	25	23	19	16	18	19	20	23	25	23	21.5	20.0	
DT18	30	29	38	32	31	30	31	25	24	31	32	29	30.2	28.1	
DT19	40	34	47	42	32	37	40	38	38	38	38	36	38.3	35.7	
DT20	37	24	39	30	27	24	31	30	29	31	37	34	31.1	28.9	
DT21	32	29	33	26	29	29	26	30	33	34	30	33	30.3	28.2	
DT22	26	24	26	23	21	21	22	21	21	25	28	22	23.3	21.7	
DT23	22	19	24	18	11	9	13	14	14	15	21	20	16.7	15.5	
DT24	23	23	25	21	18	16	17	15	14	17	23	21	19.4	18.1	
DT25	36	31	35	31	28	24	29	31	33	35	29	31	31.1	28.9	
DT26	32	27	25	26	21	18	20	23	22	23	25	25	23.9	22.2	
DT27	28	30	24	17	21	21	19	15	15	21	22	18	20.9	19.5	
DT28	19	16	17	14	9	7	8	12	14	15	17	18	13.8	12.9	
DT29	44	36	45	38	25	34	41	40	41	42	40	39	38.8	36.0	

- Local bias adjustment factor used (confirm by selecting in box)
- National bias adjustment factor used (confirm by selecting in box)
- Annualisation has been conducted where data capture is <75% (confirm by selecting in box)
- Where applicable, data has been distance corrected for relevant exposure (confirm by selecting in box)

Notes:

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

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

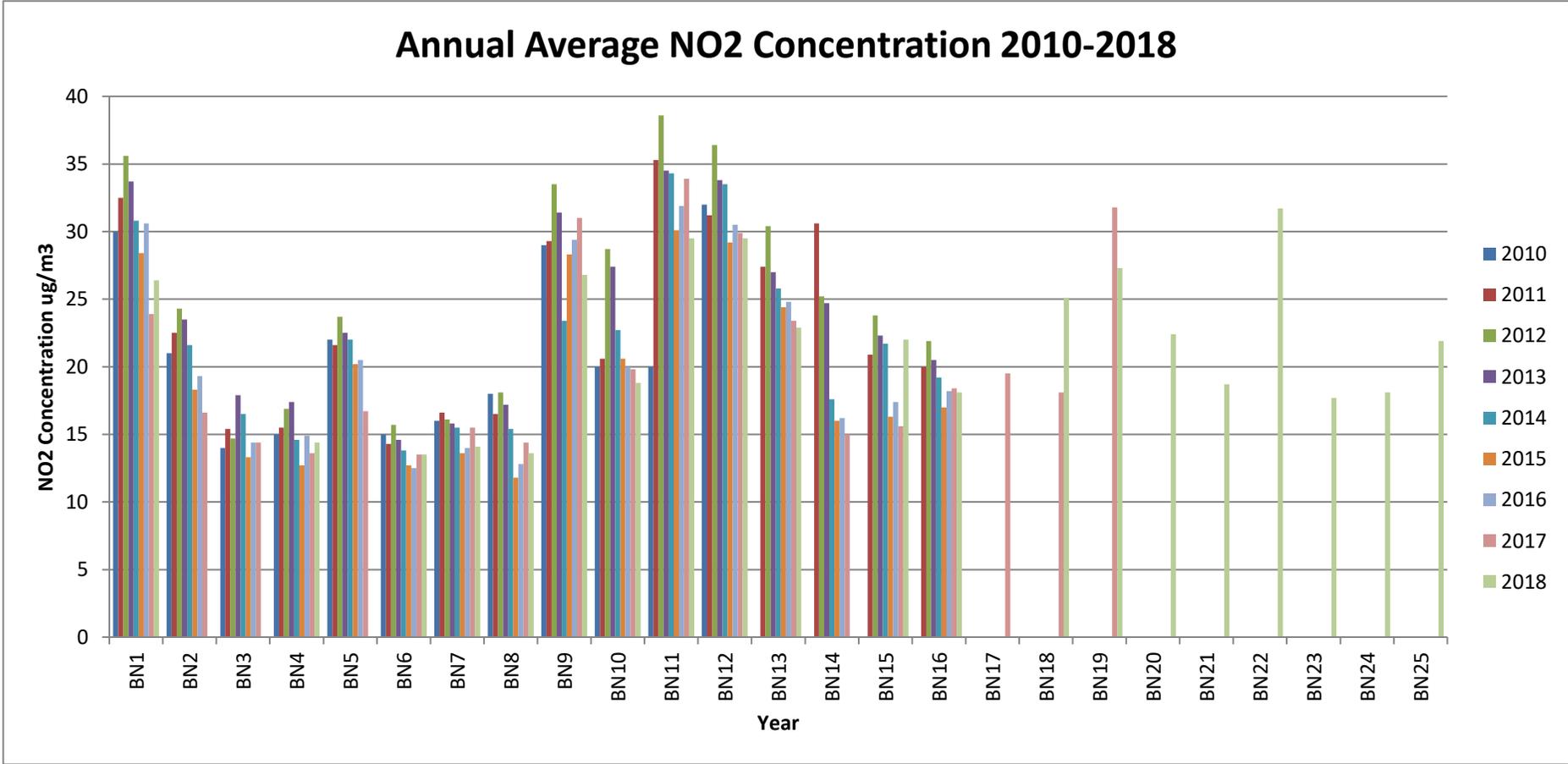
(1) See Appendix C for details on bias adjustment and annualisation.

(2) Distance corrected to nearest relevant public exposure.

4 Figures

Figure A.1 – Trends in Annual Mean NO₂ Concentrations

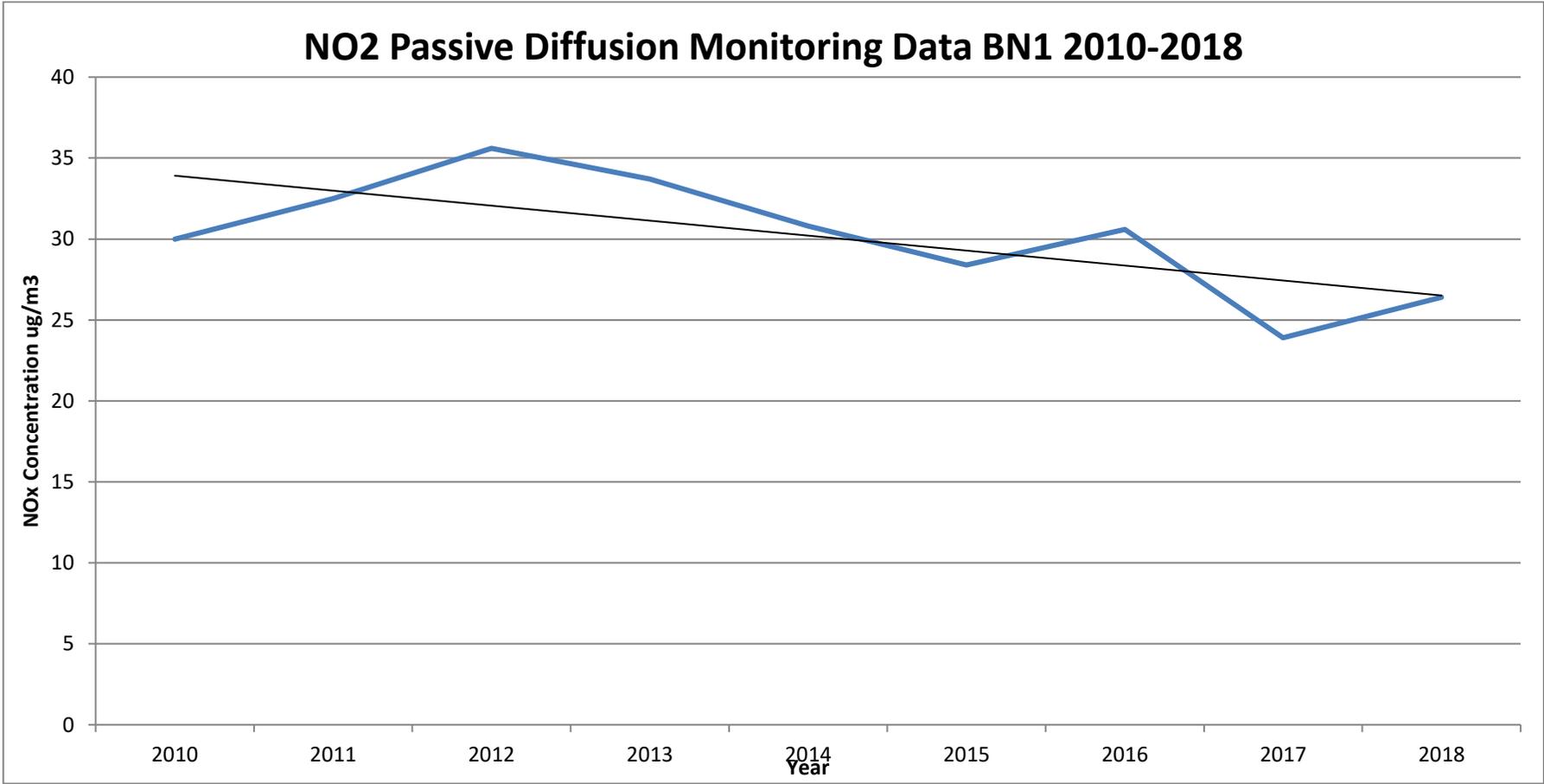
Broadland District Council data



Trend Graphs for locations where monitoring was undertaken in 2018

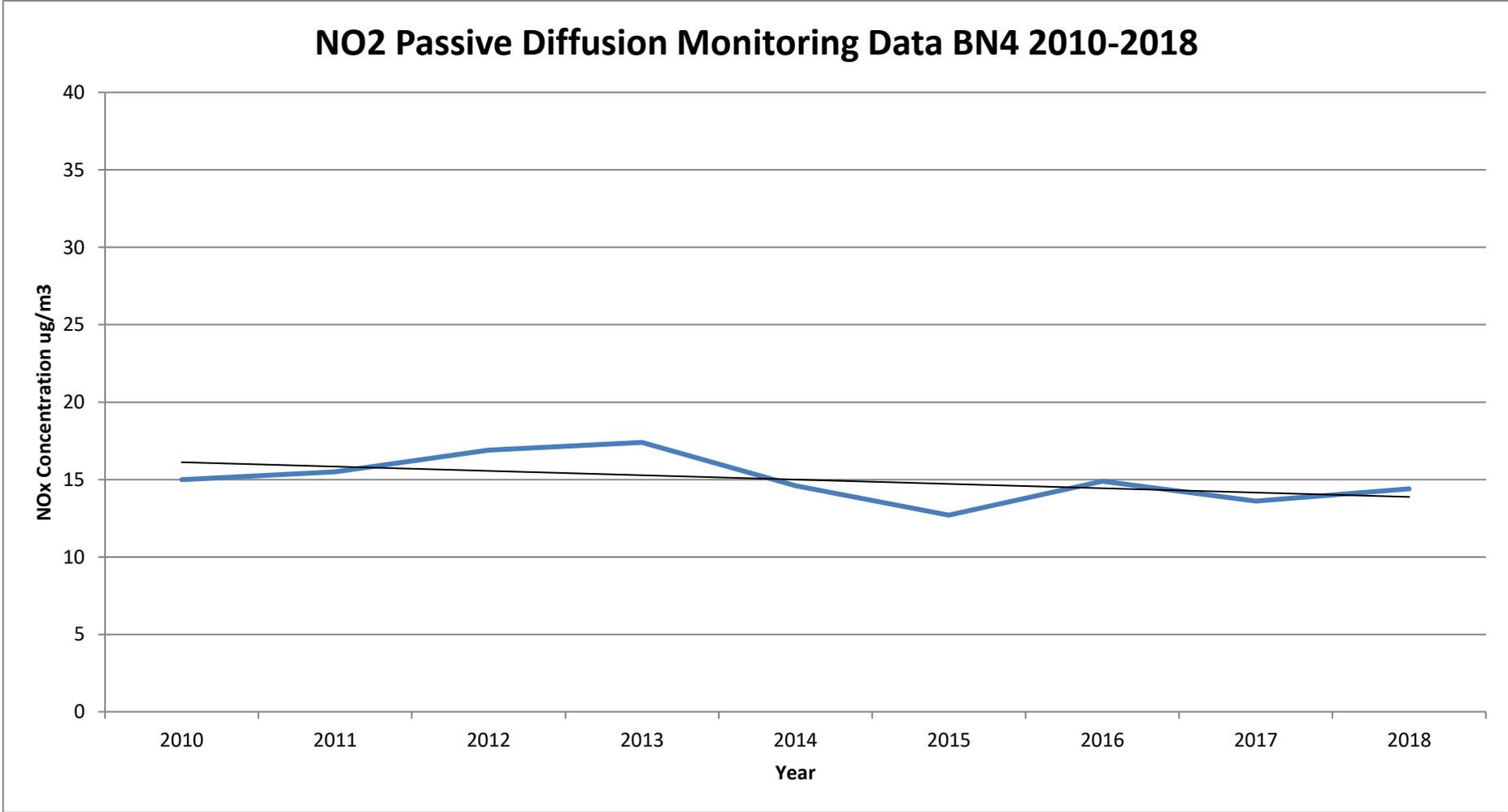
Note: Concentration shown in Blue Trend shown in Black.

BN1



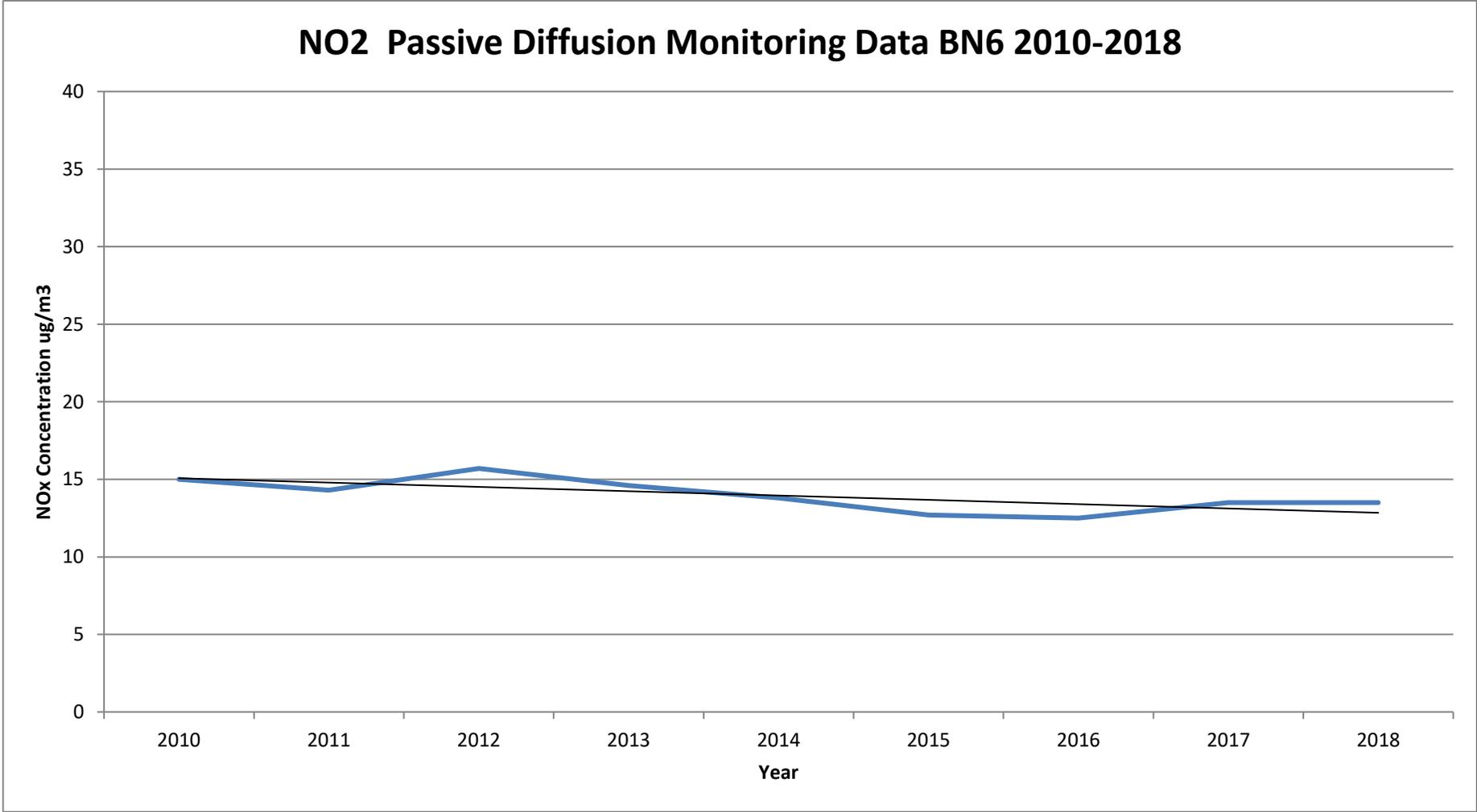
Note: Concentration shown in Blue Trend shown in Black.

BN4



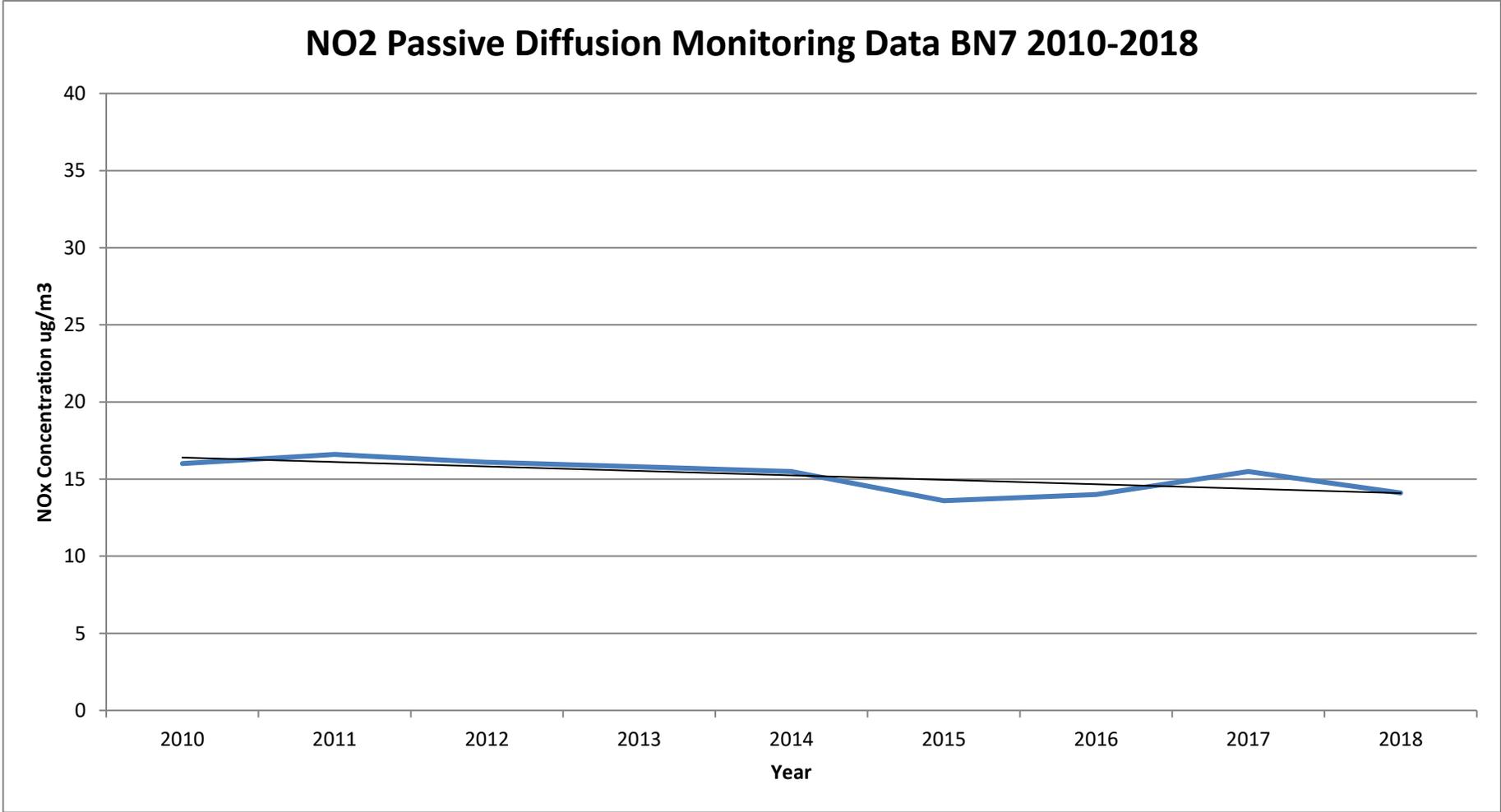
Note: Concentration shown in Blue Trend shown in Black.

BN6



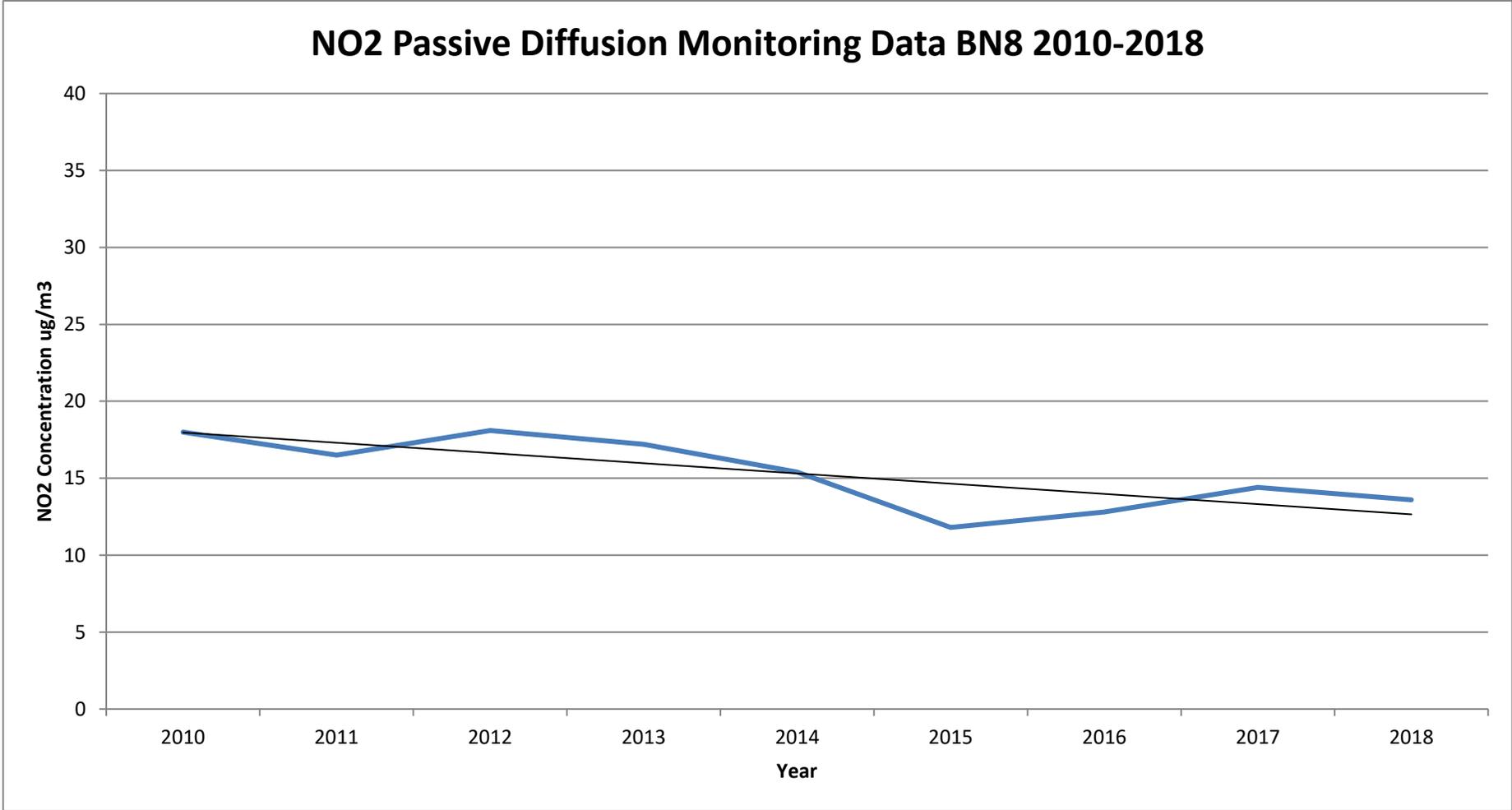
Note: Concentration shown in Blue Trend shown in Black.

BN7



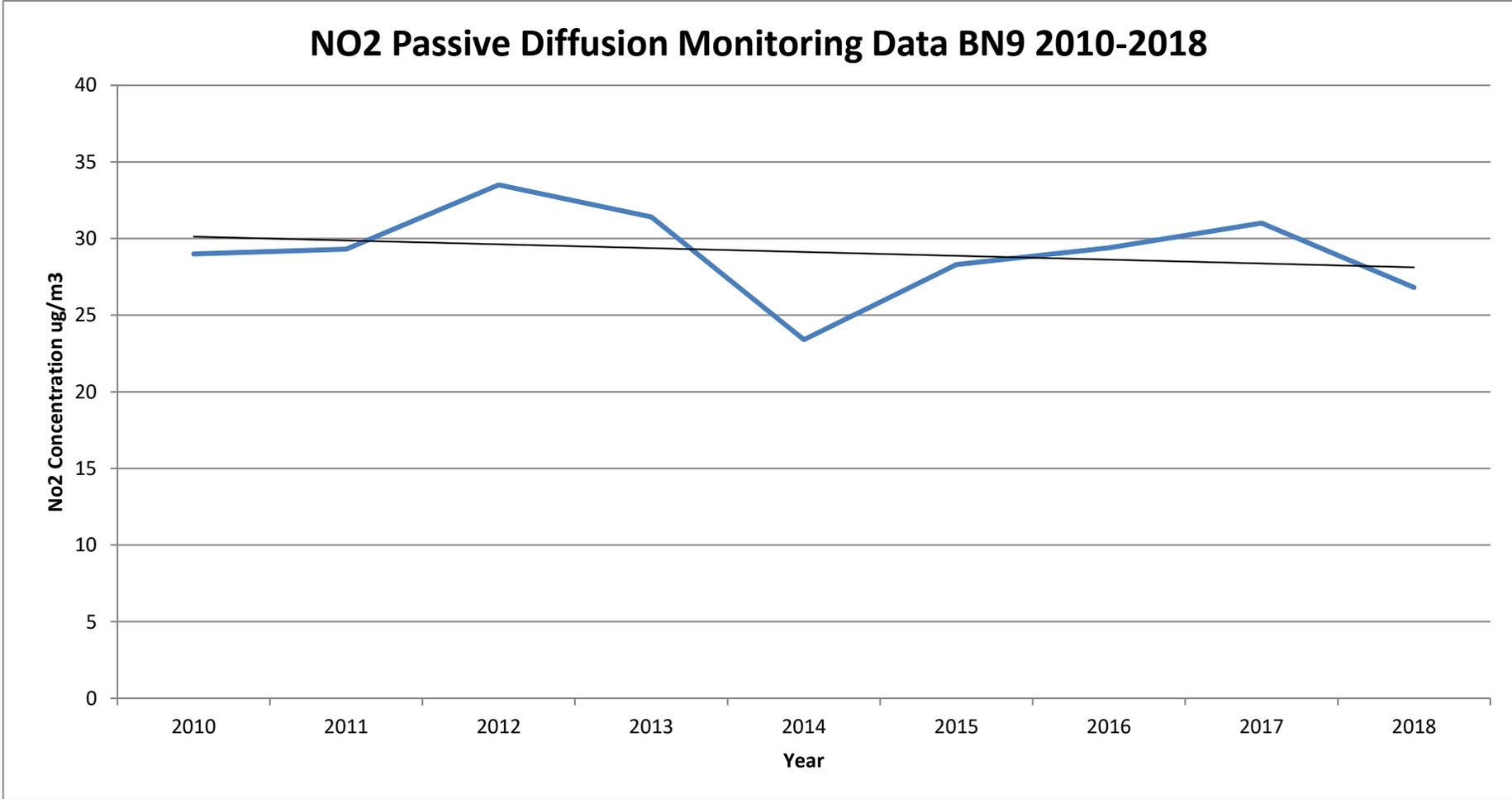
Note: Concentration shown in Blue Trend shown in Black.

BN8



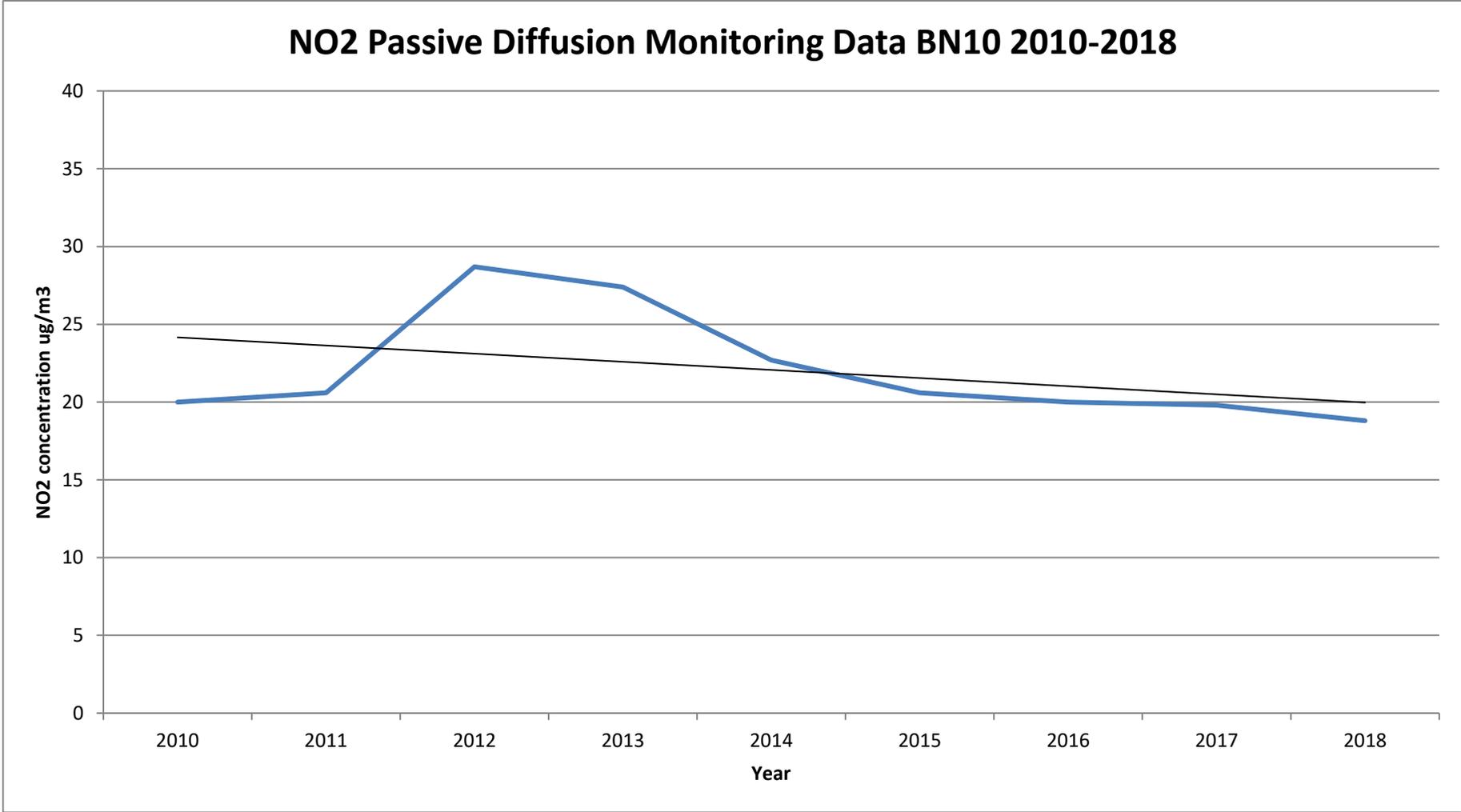
Note: Concentration shown in Blue Trend shown in Black.

BN9



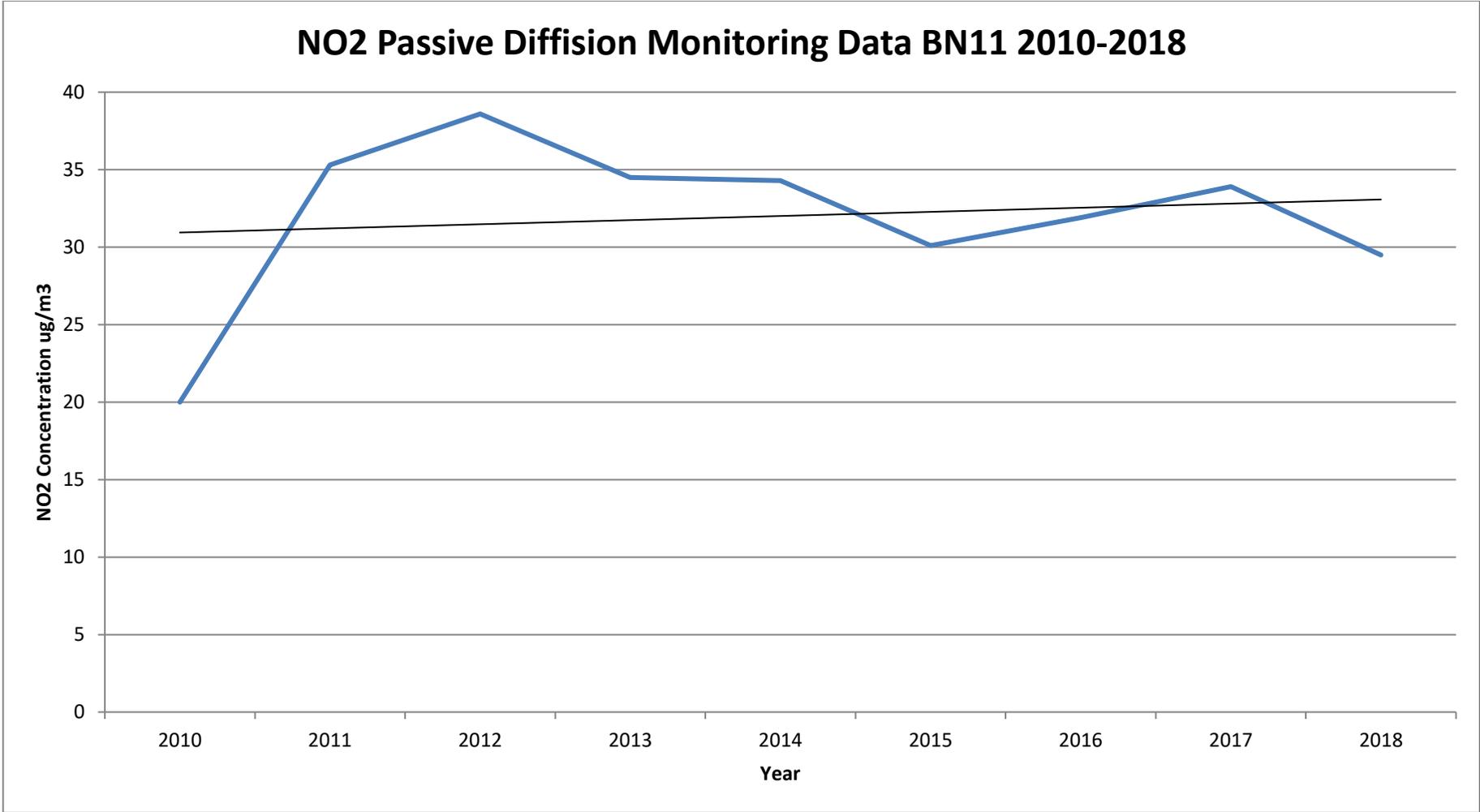
Note: Concentration shown in Blue Trend shown in Black.

BN10



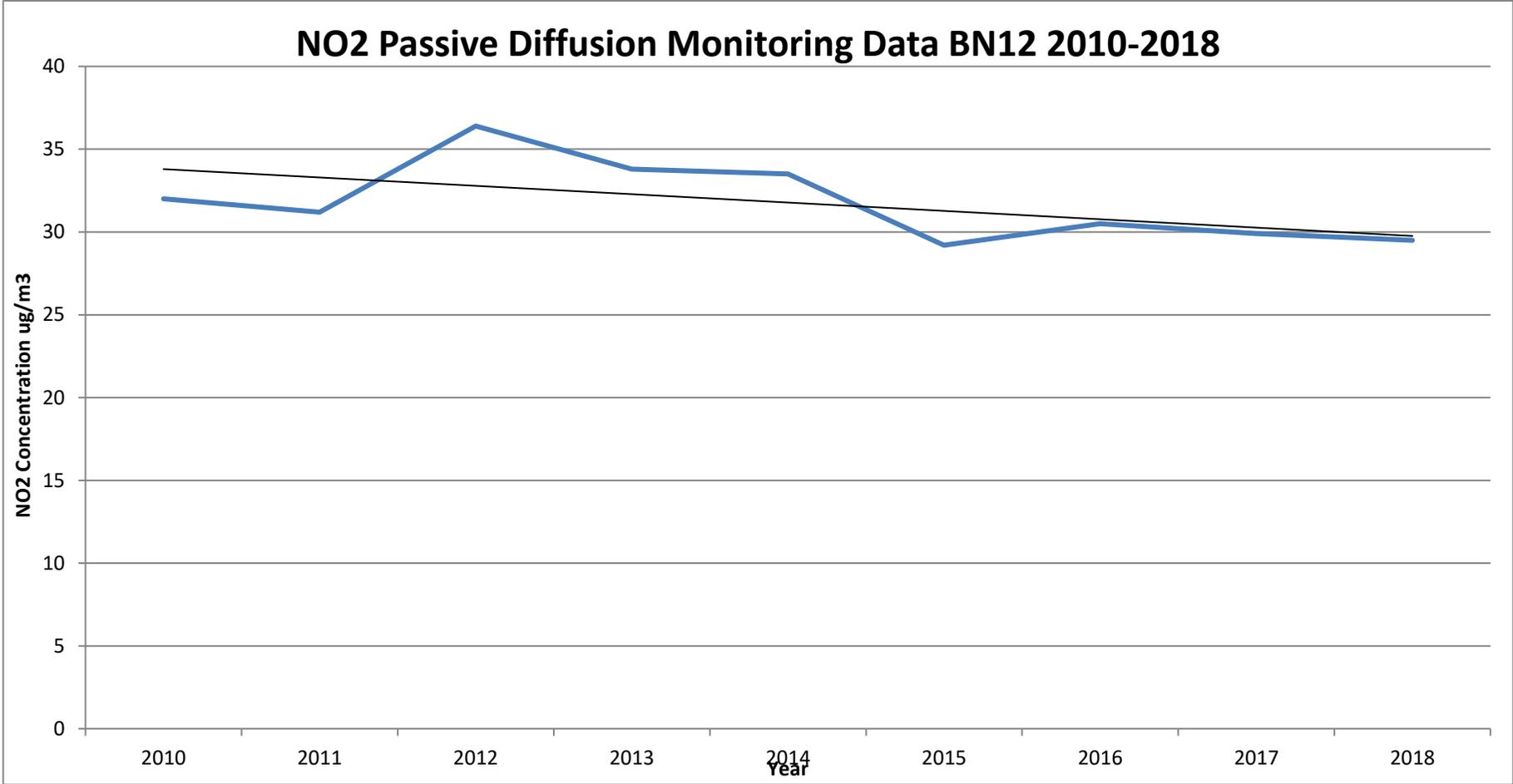
Note: Concentration shown in Blue Trend shown in Black.

BN11



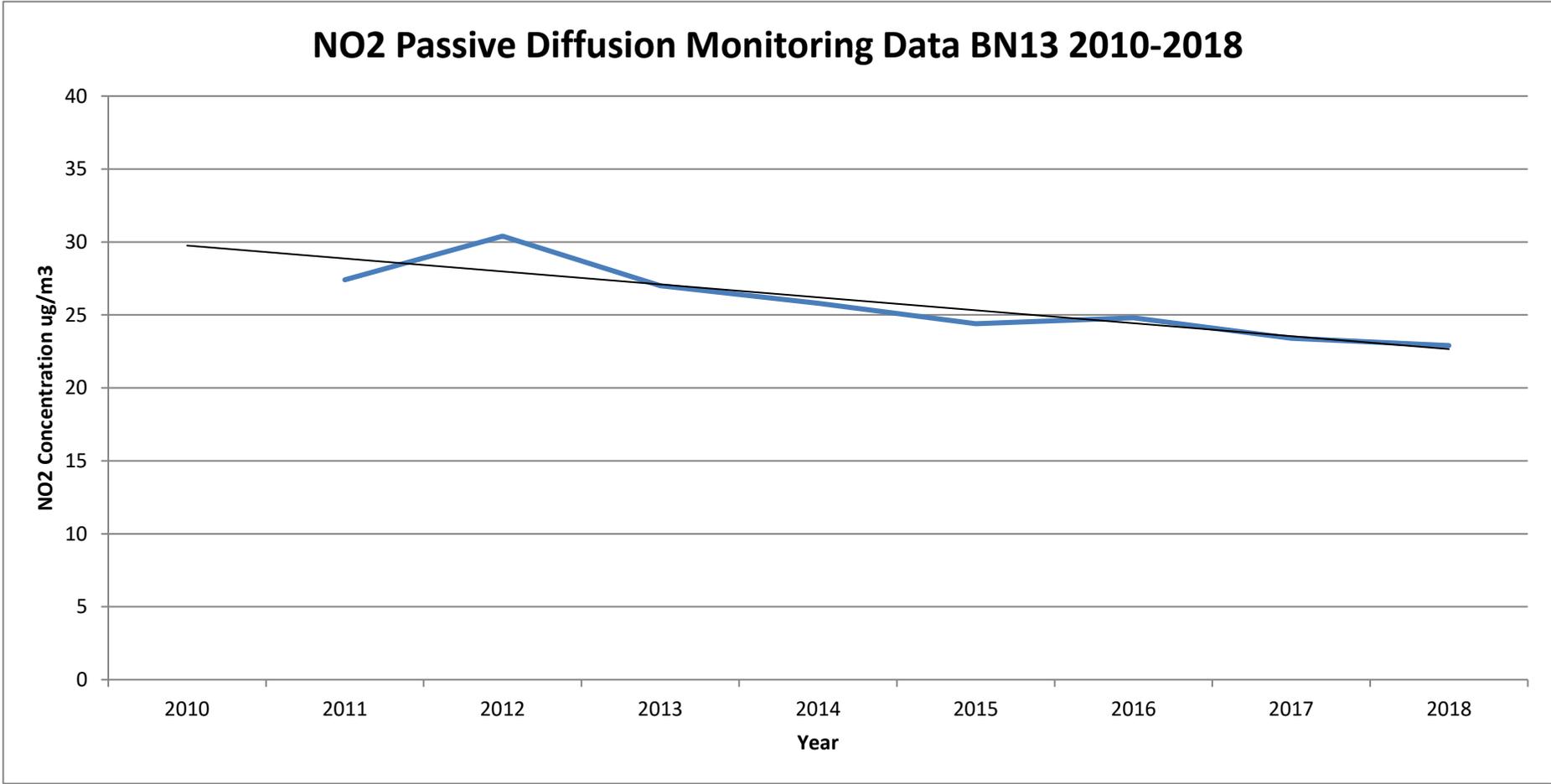
Note: Concentration shown in Blue Trend shown in Black.

BN12



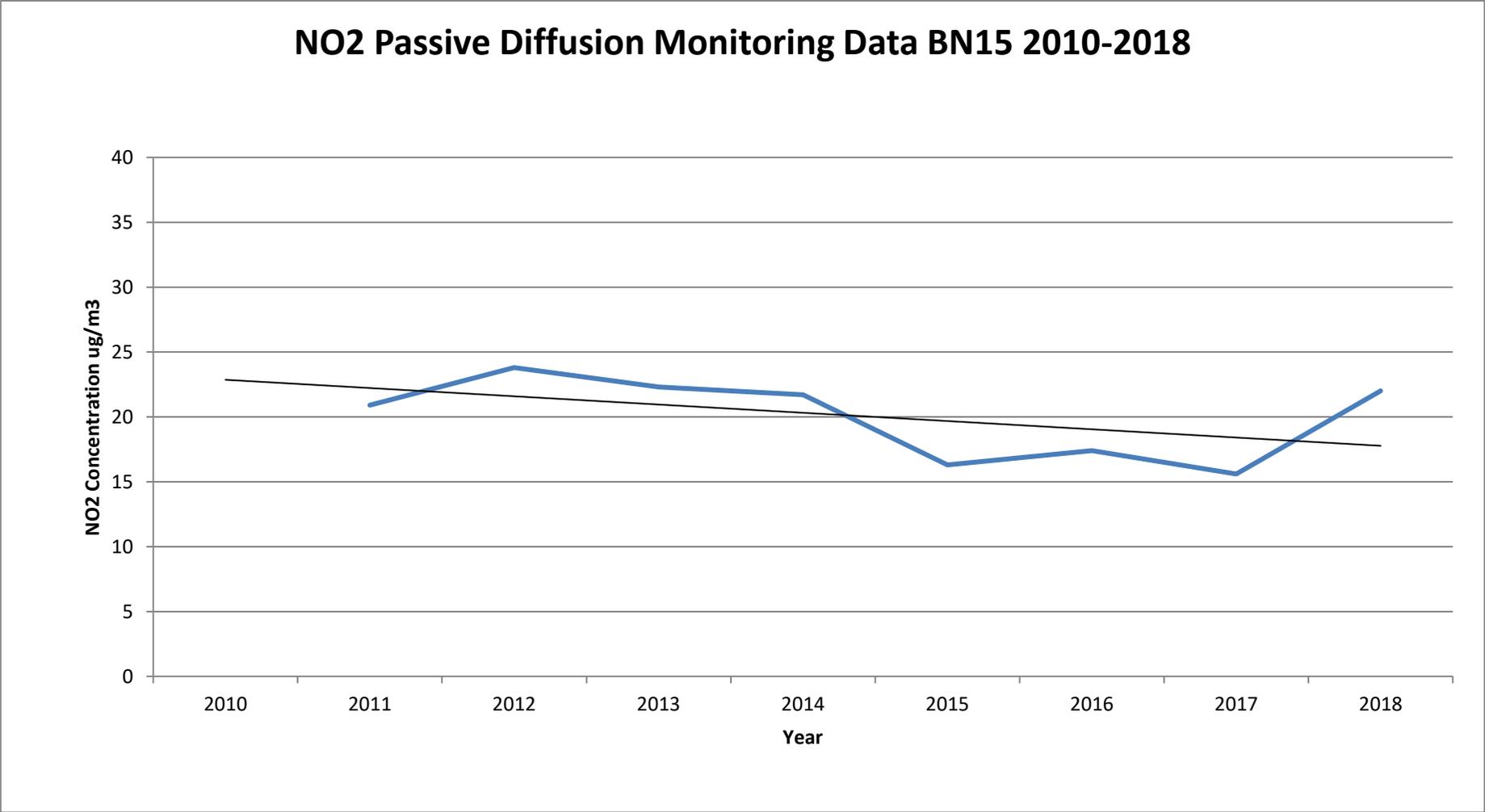
Note: Concentration shown in Blue Trend shown in Black.

BN13



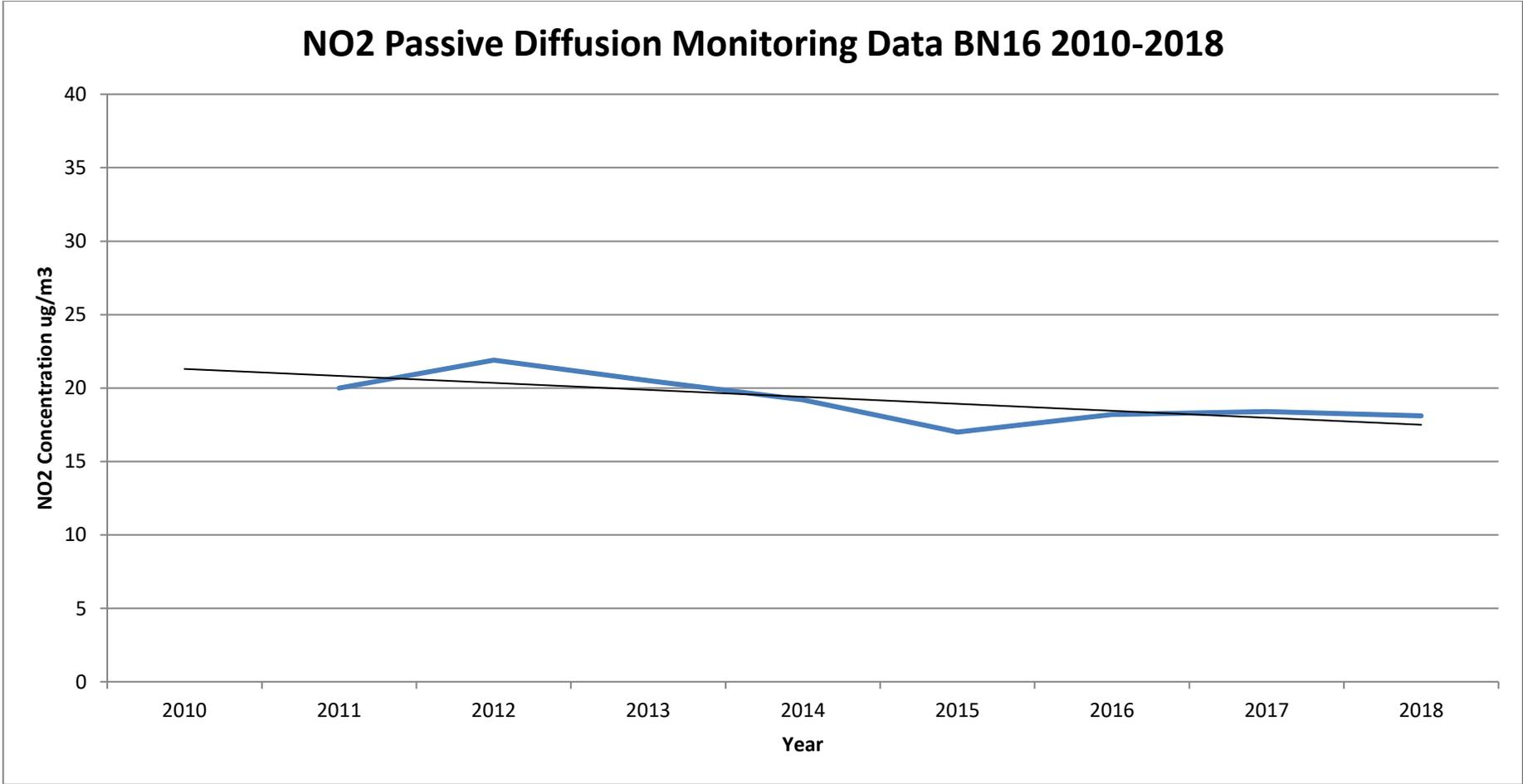
Note: Concentration shown in Blue Trend shown in Black.

BN15



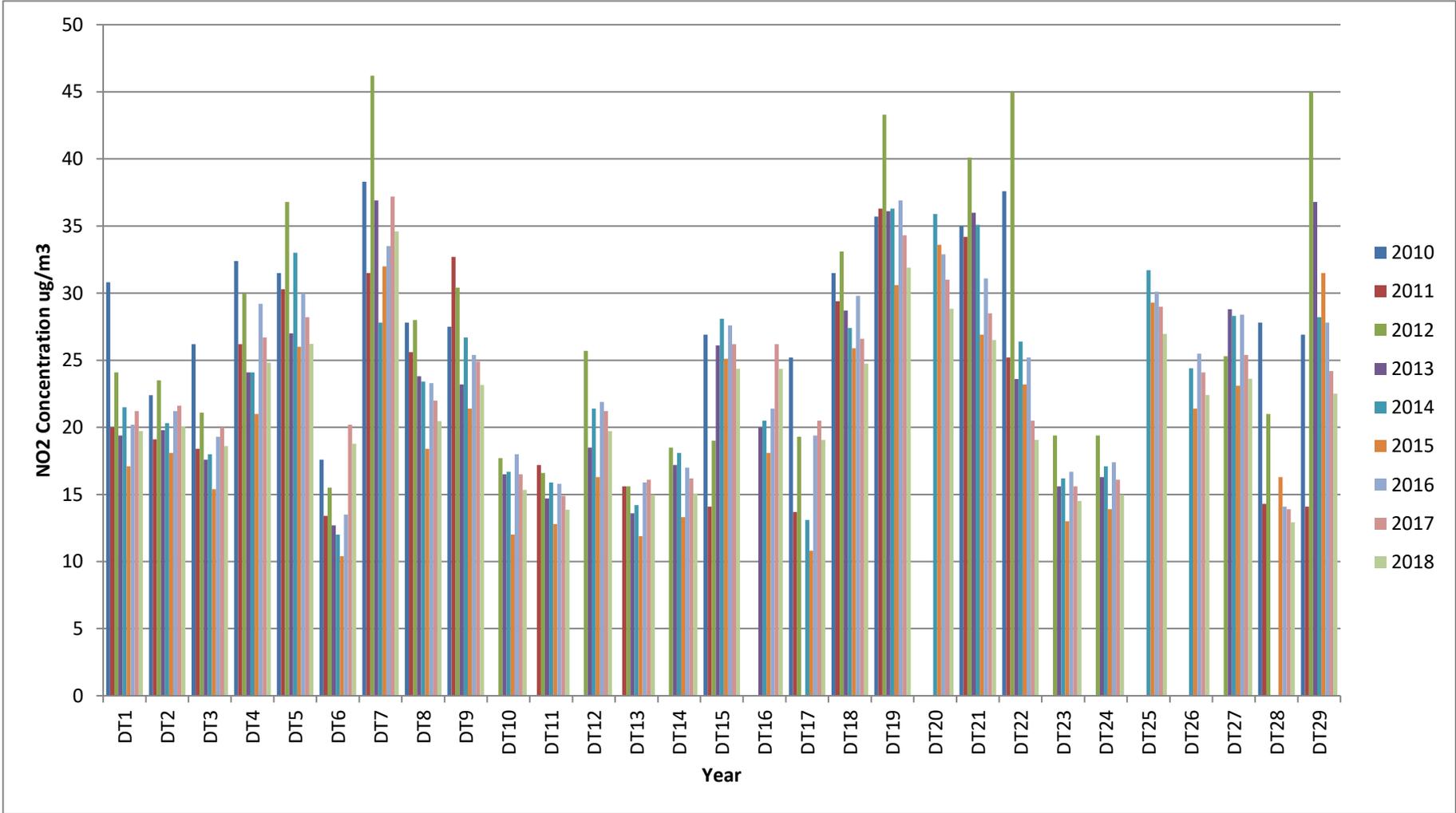
Note: Concentration shown in Blue Trend shown in Black.

BN16

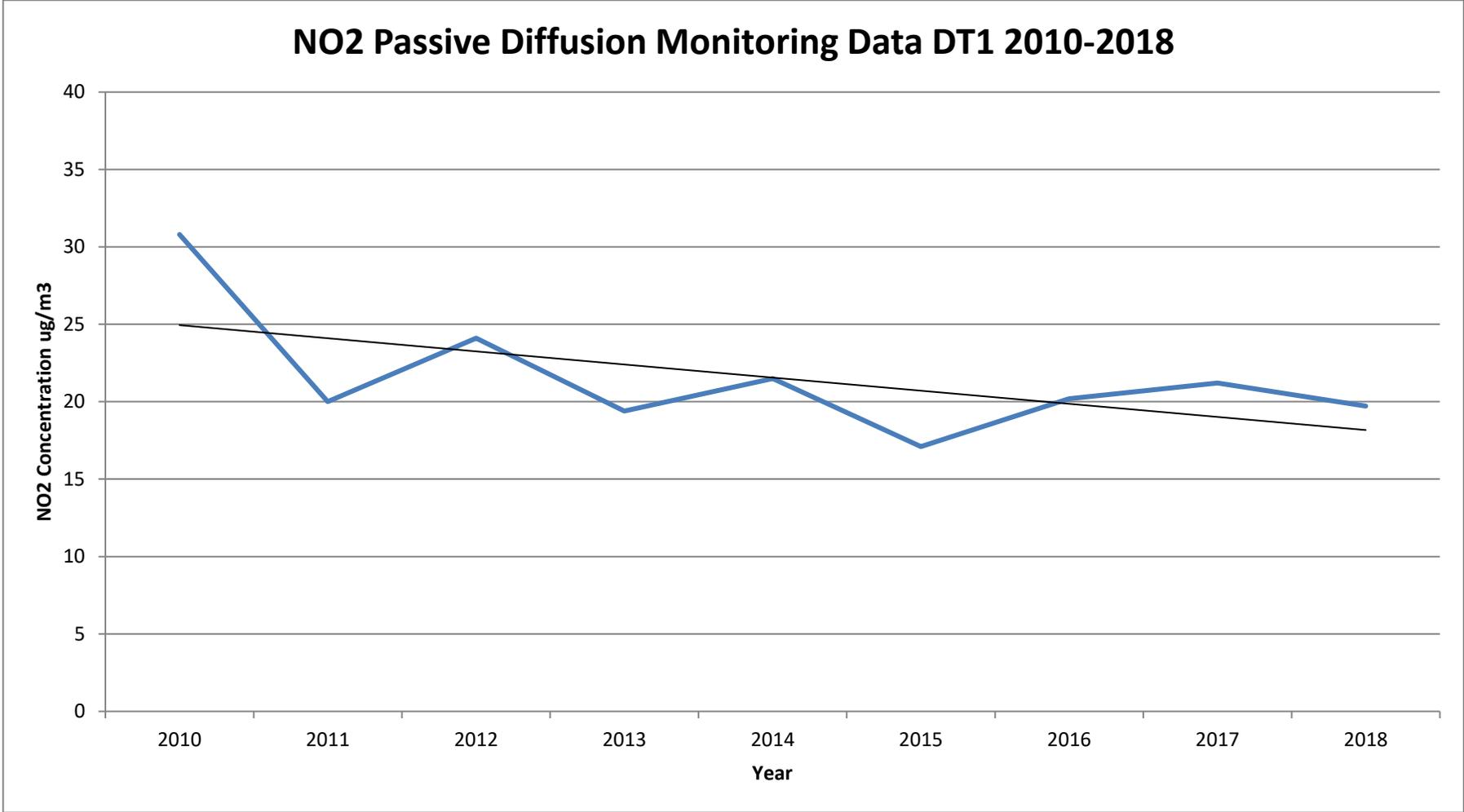


No graphs have been produced for BN17-BN25 as there is insufficient data to draw any meaningful trend.

South Norfolk District Council data

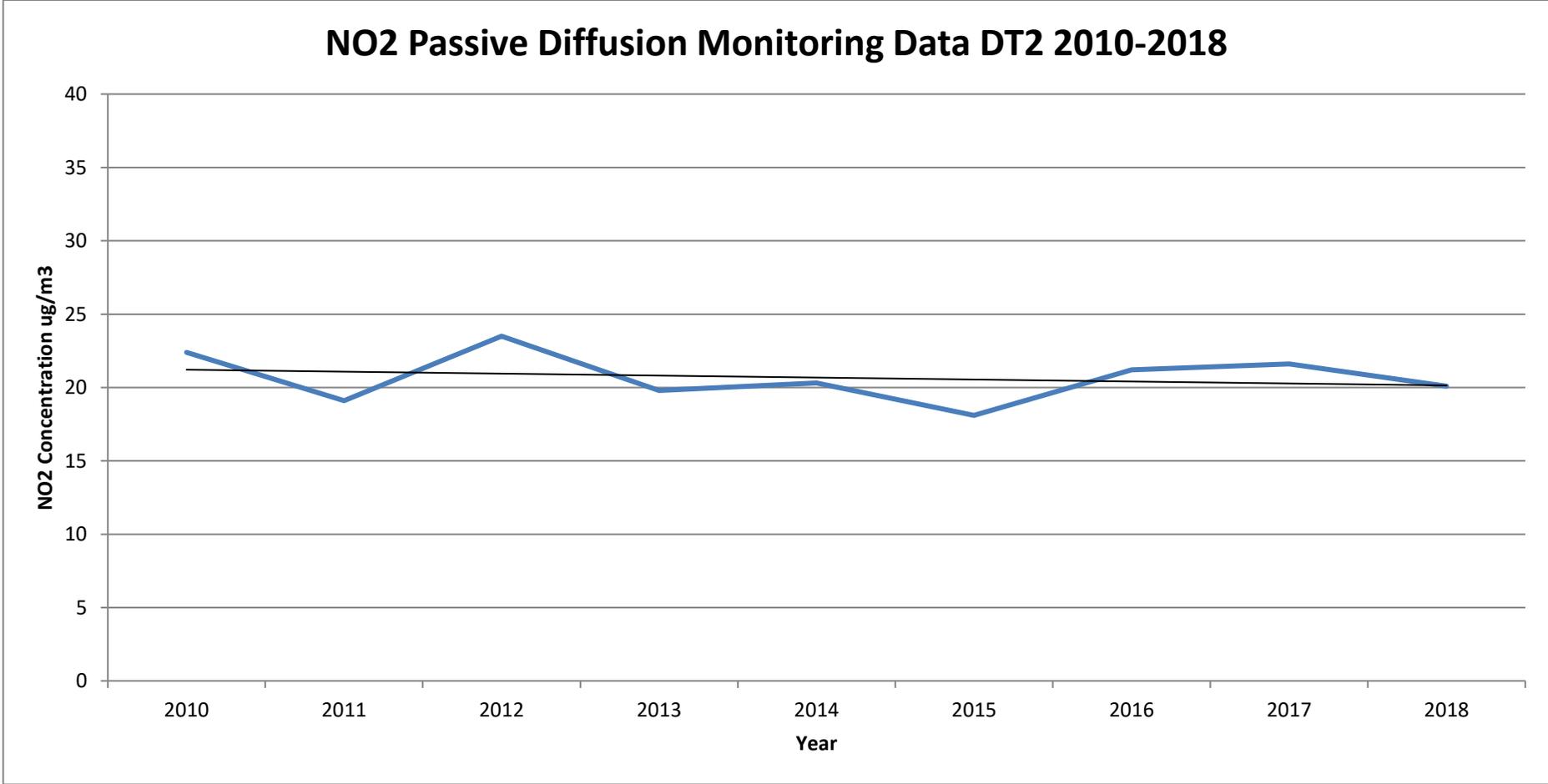


DT1



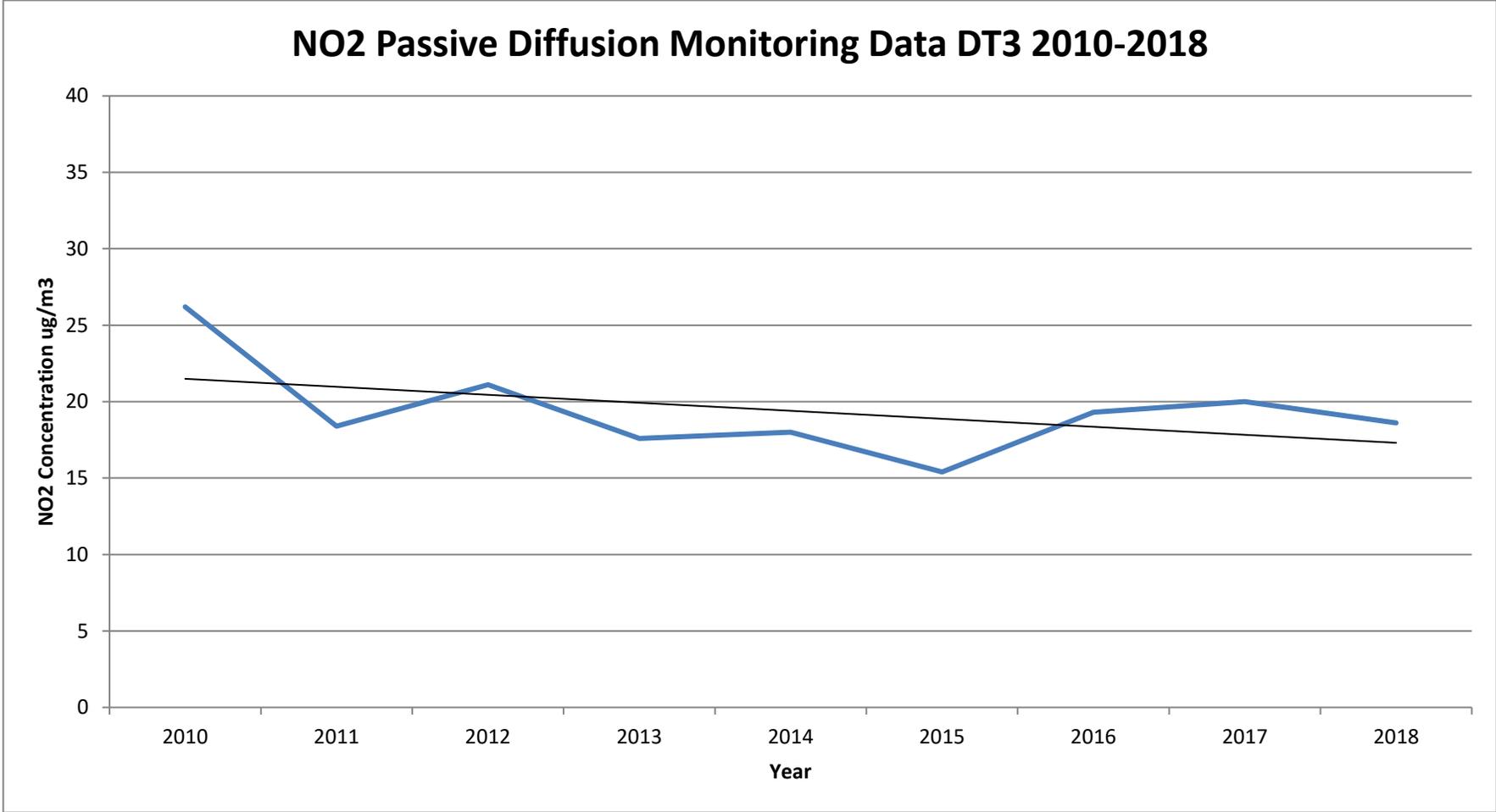
Note: Concentration shown in Blue Trend shown in Black.

DT2



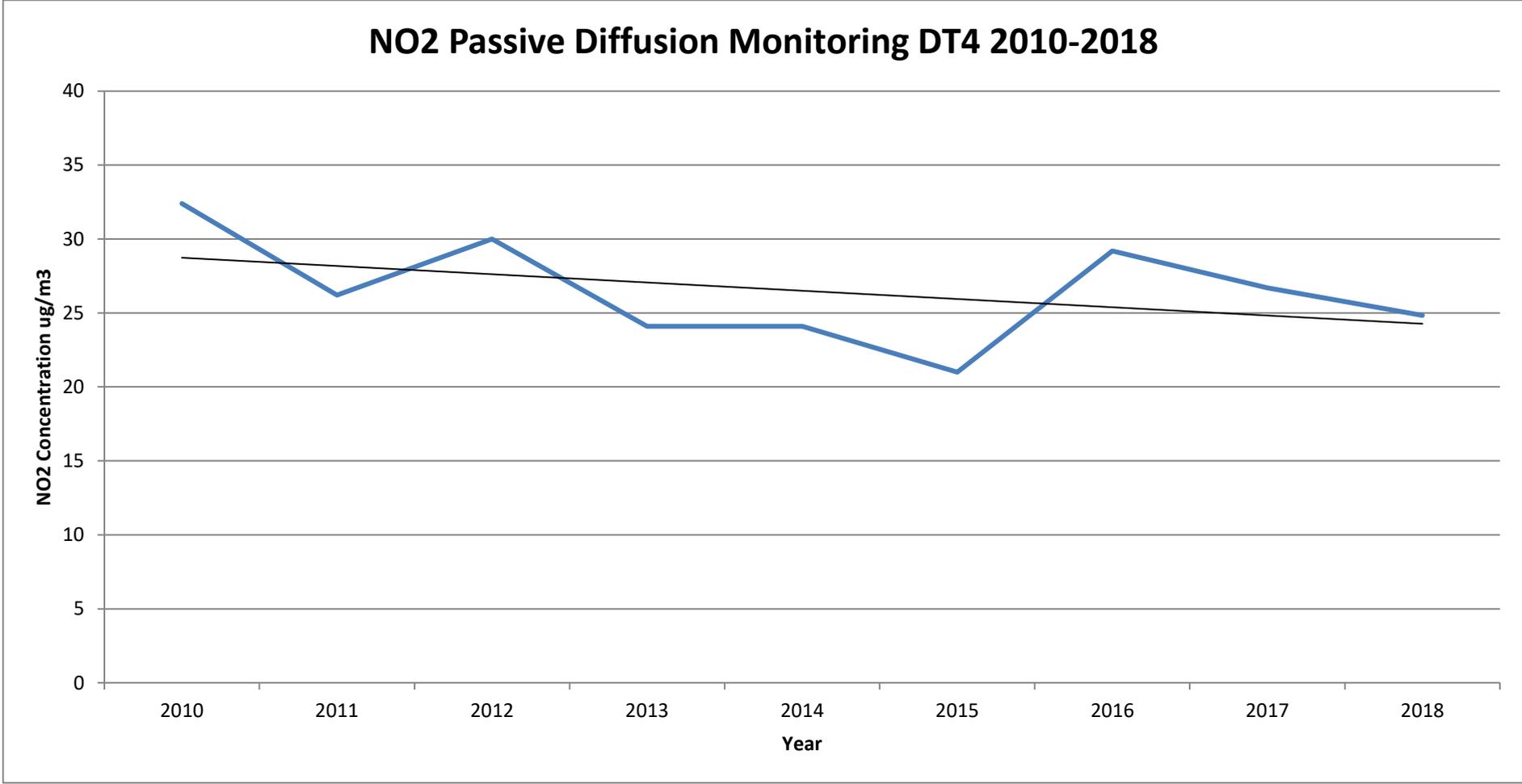
Note: Concentration shown in Blue Trend shown in Black.

DT3



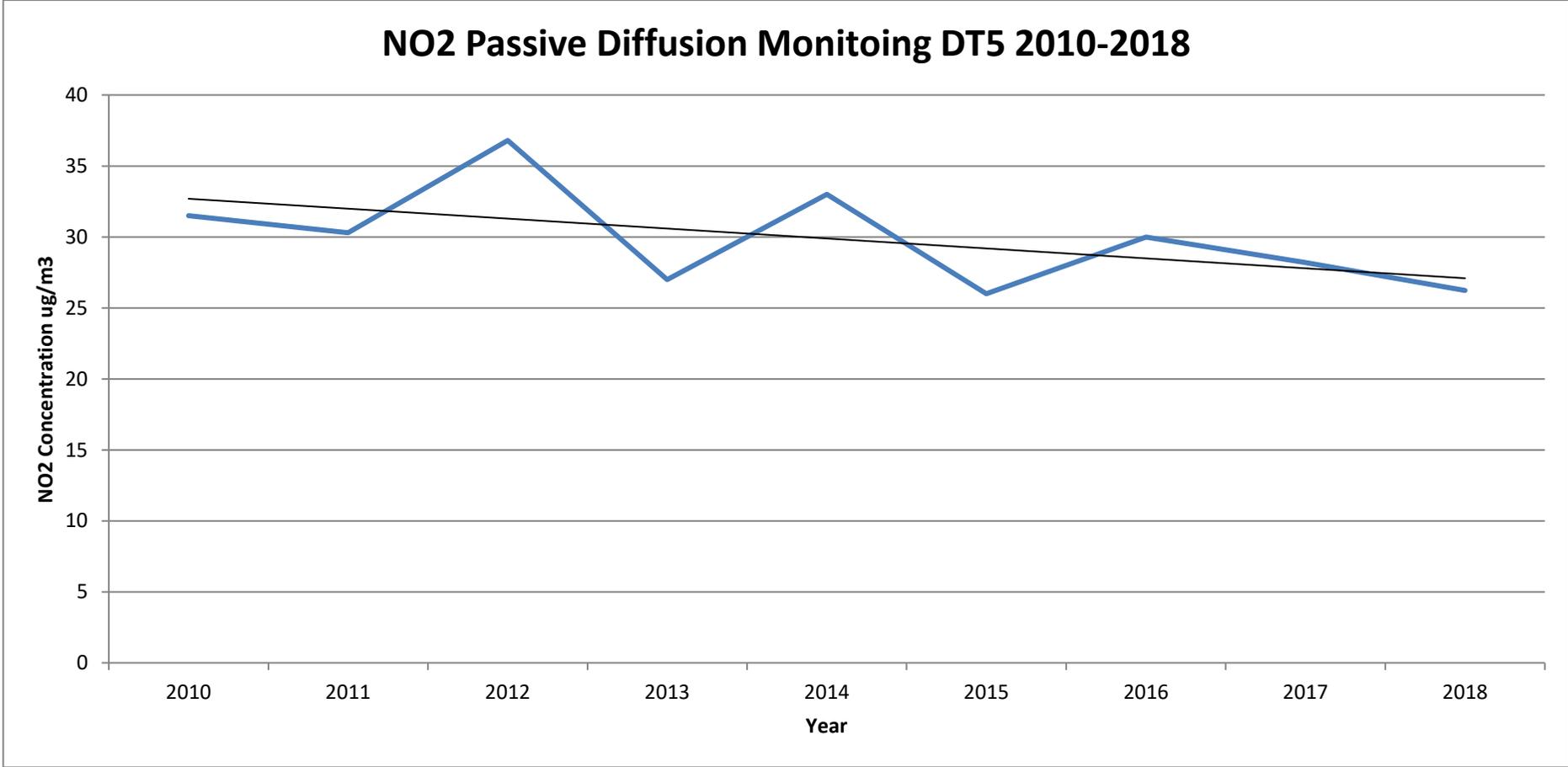
Note: Concentration shown in Blue Trend shown in Black.

DT4



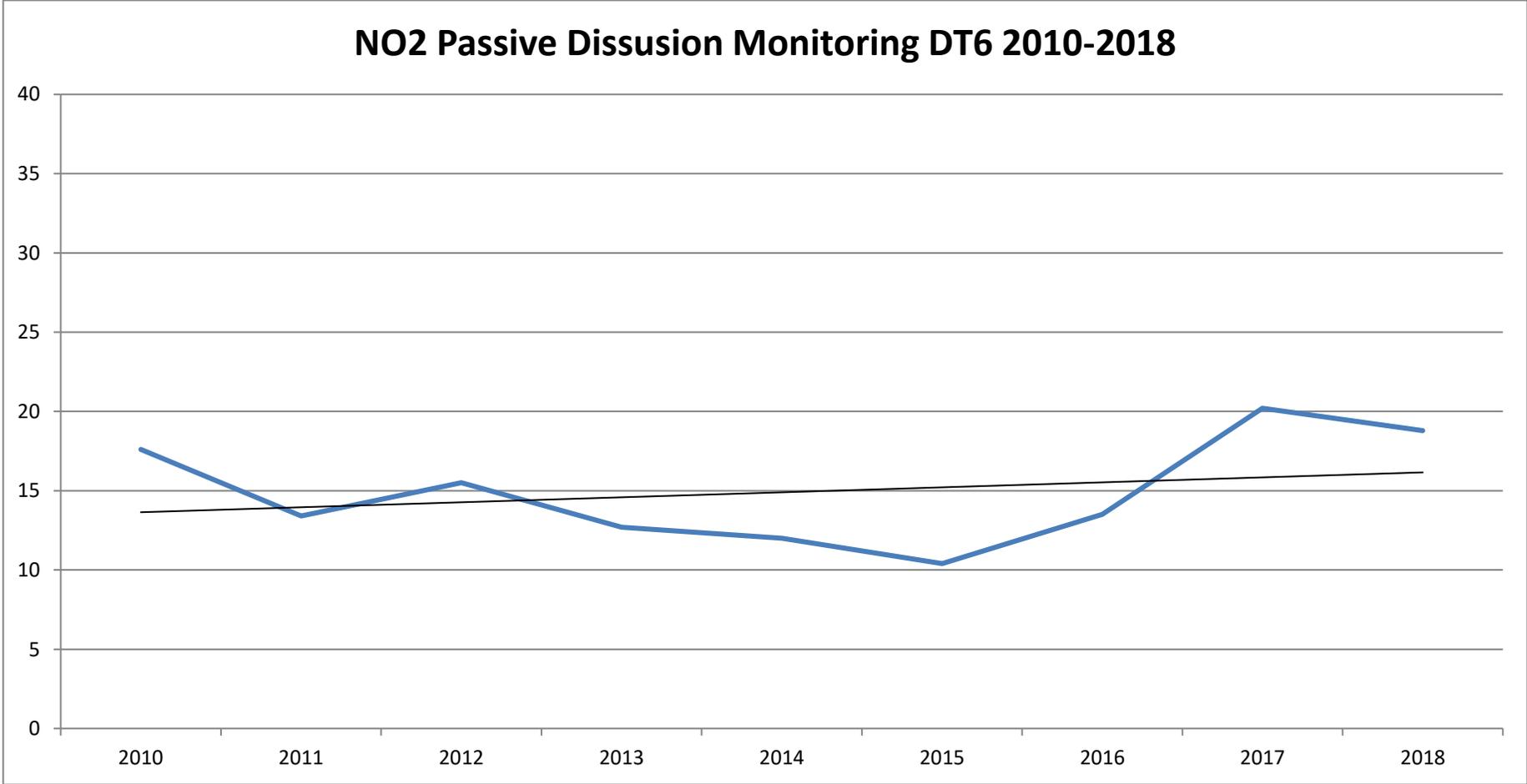
Note: Concentration shown in Blue Trend shown in Black.

DT5



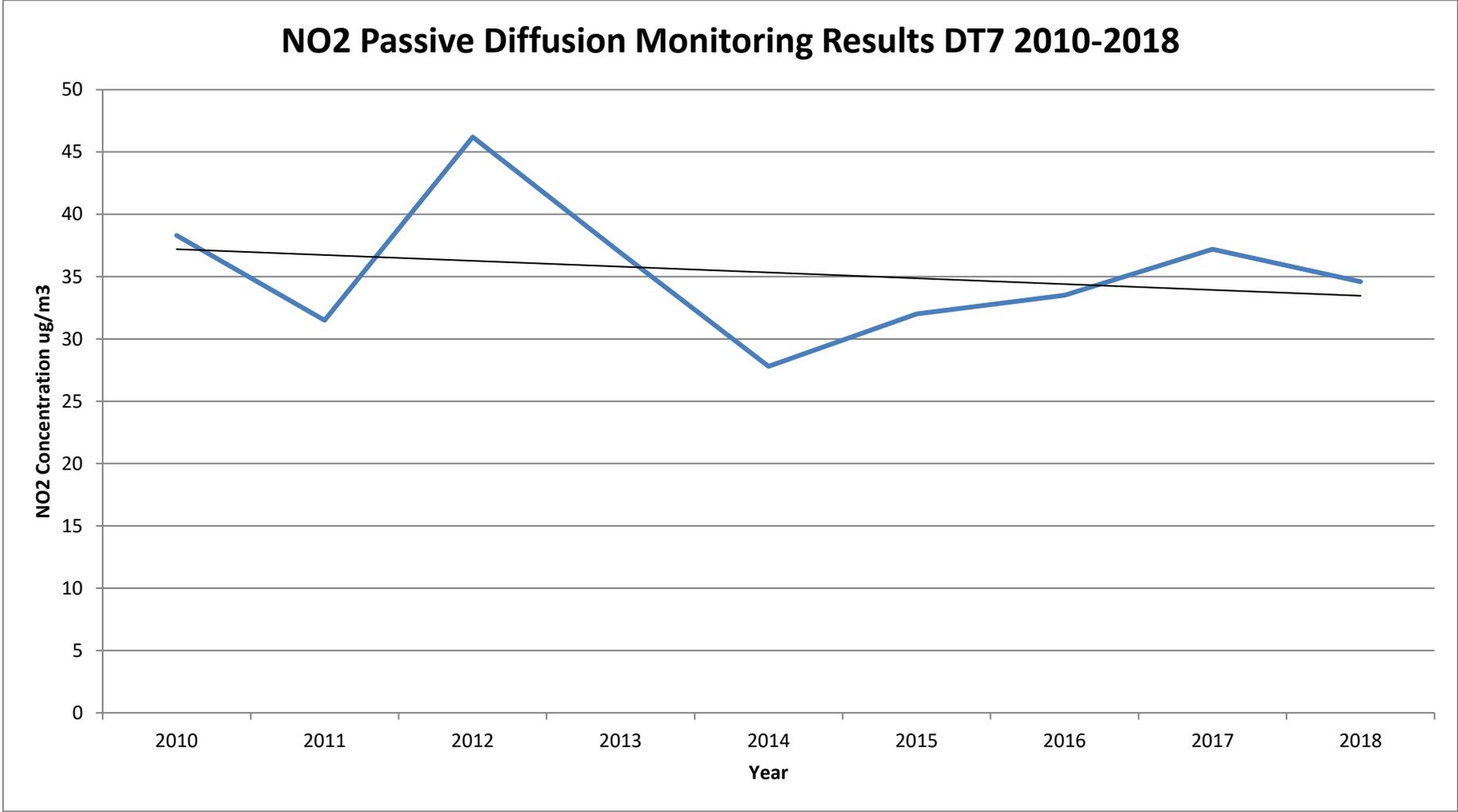
Note: Concentration shown in Blue Trend shown in Black.

DT6



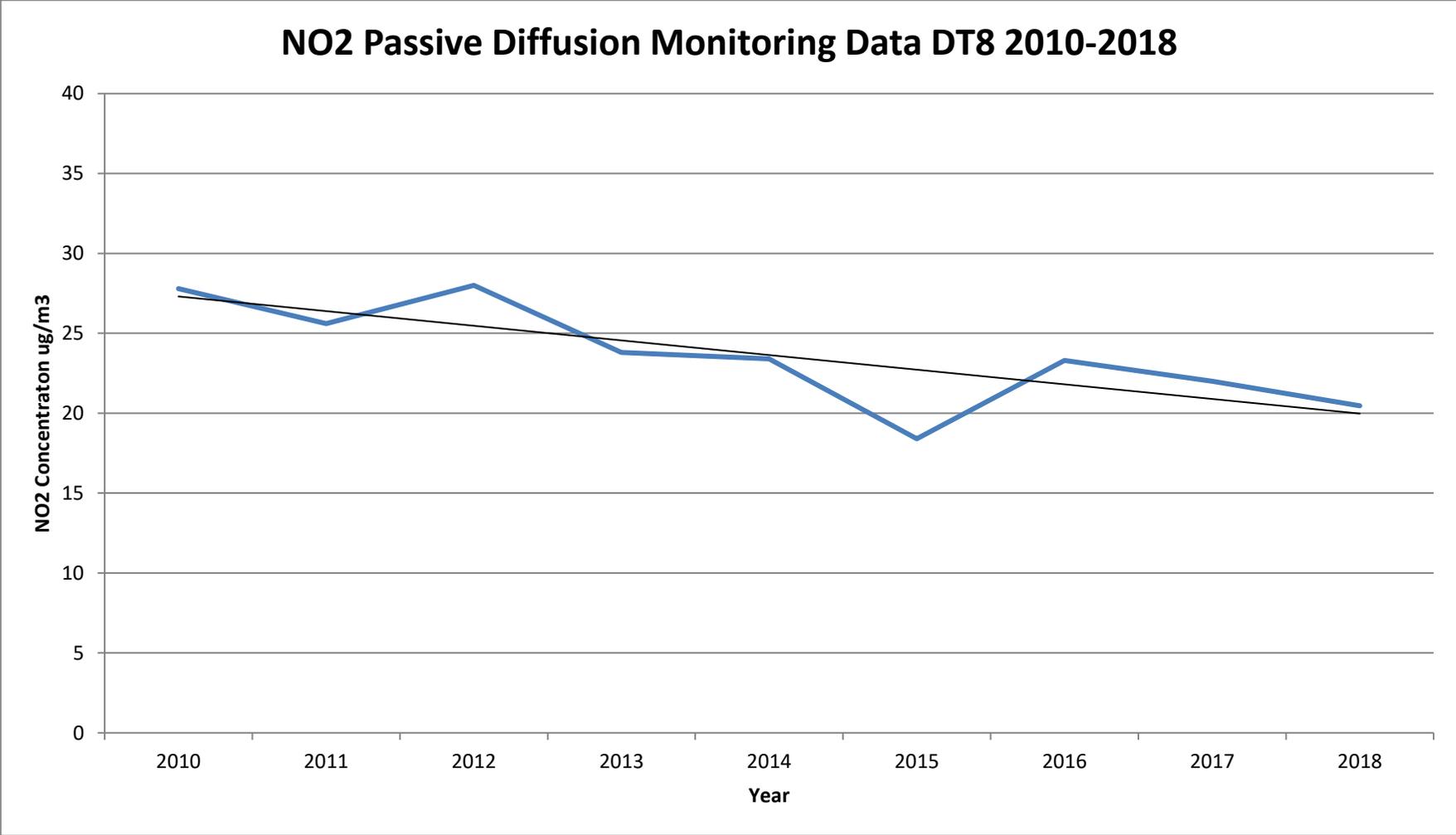
Note: Concentration shown in Blue Trend shown in Black.

DT7



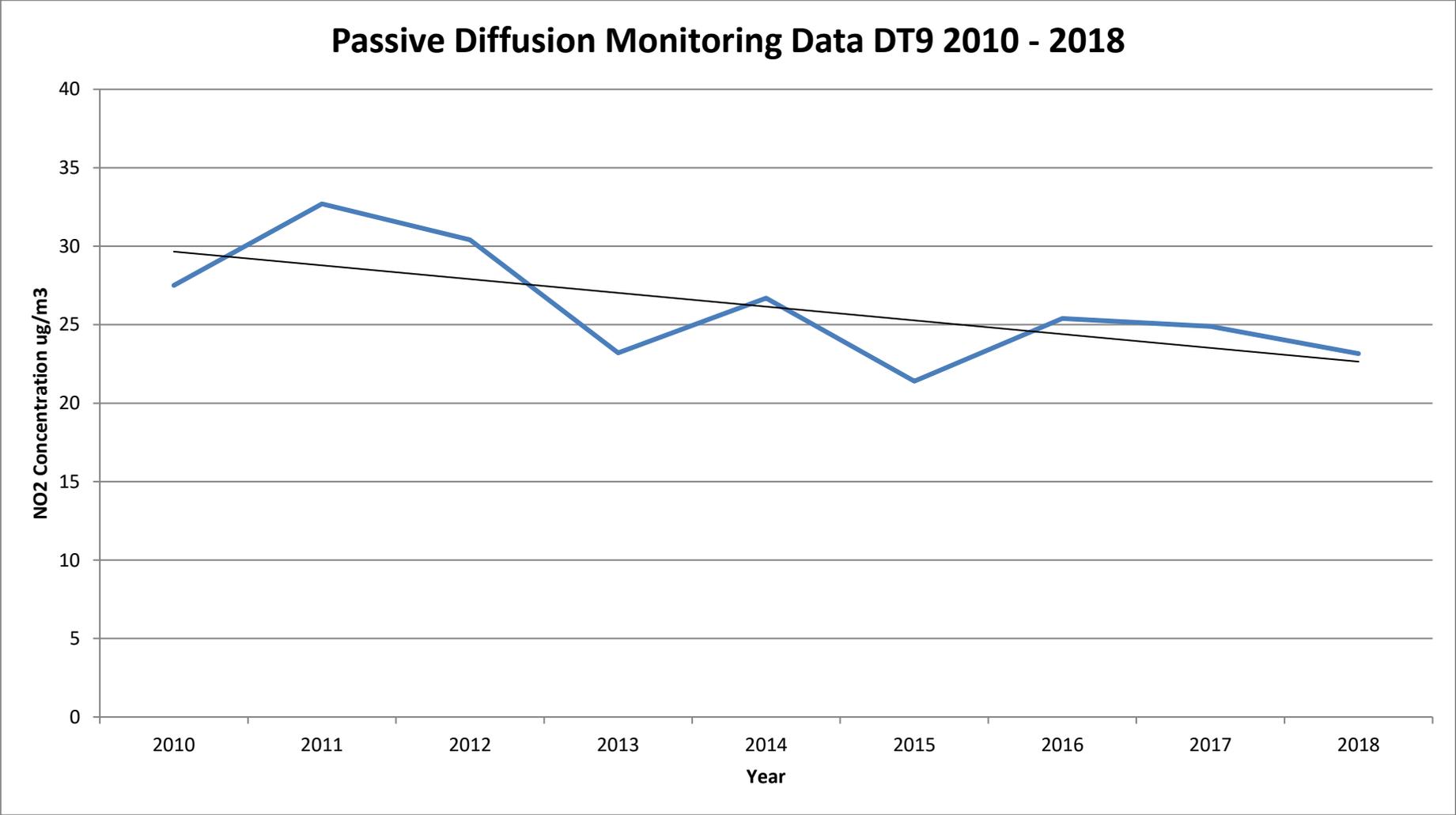
Note: Concentration shown in Blue Trend shown in Black.

DT8



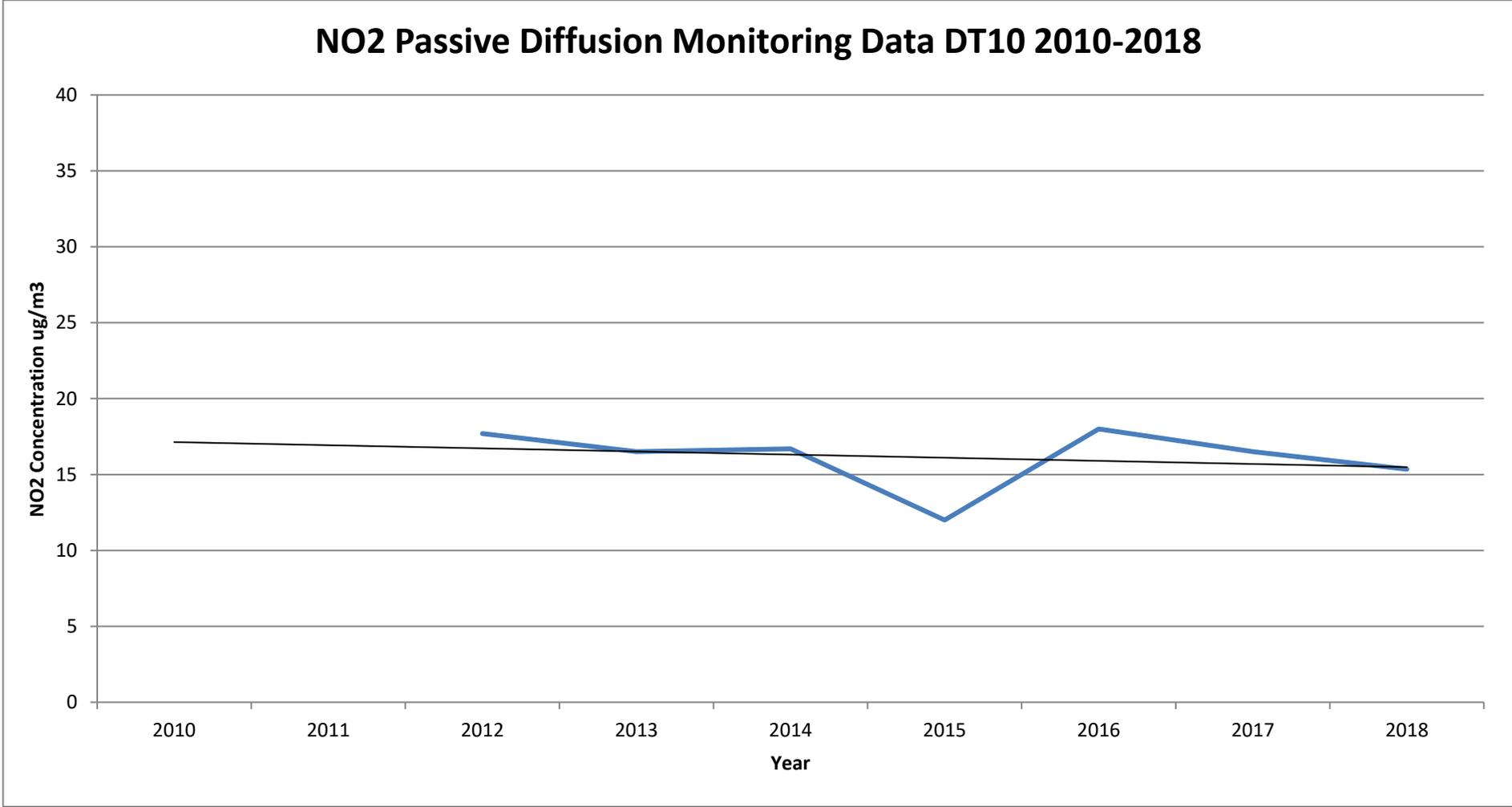
Note: Concentration shown in Blue Trend shown in Black.

DT9



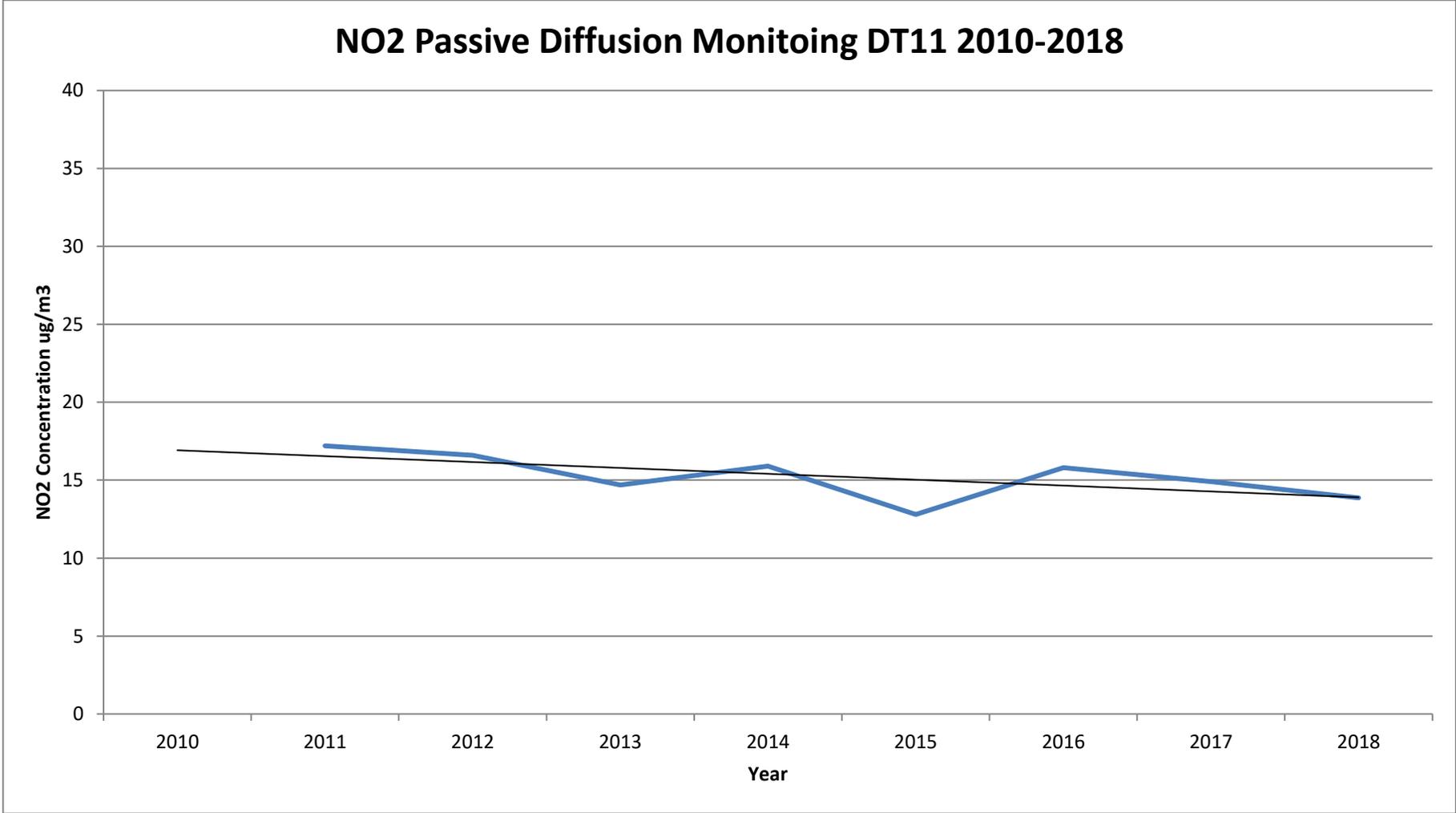
Note: Concentration shown in Blue Trend shown in Black.

DT10



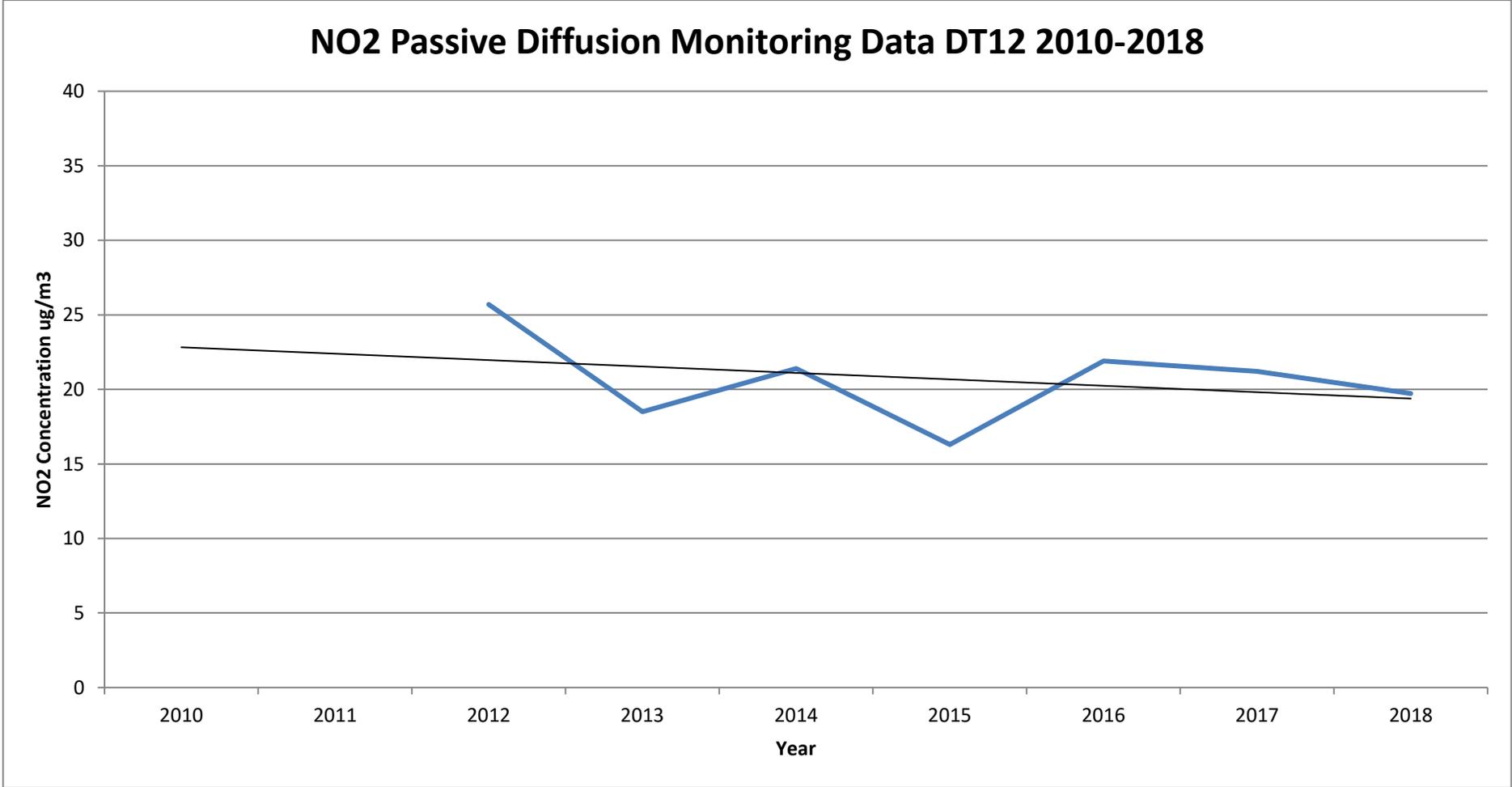
Note: Concentration shown in Blue Trend shown in Black.

DT11



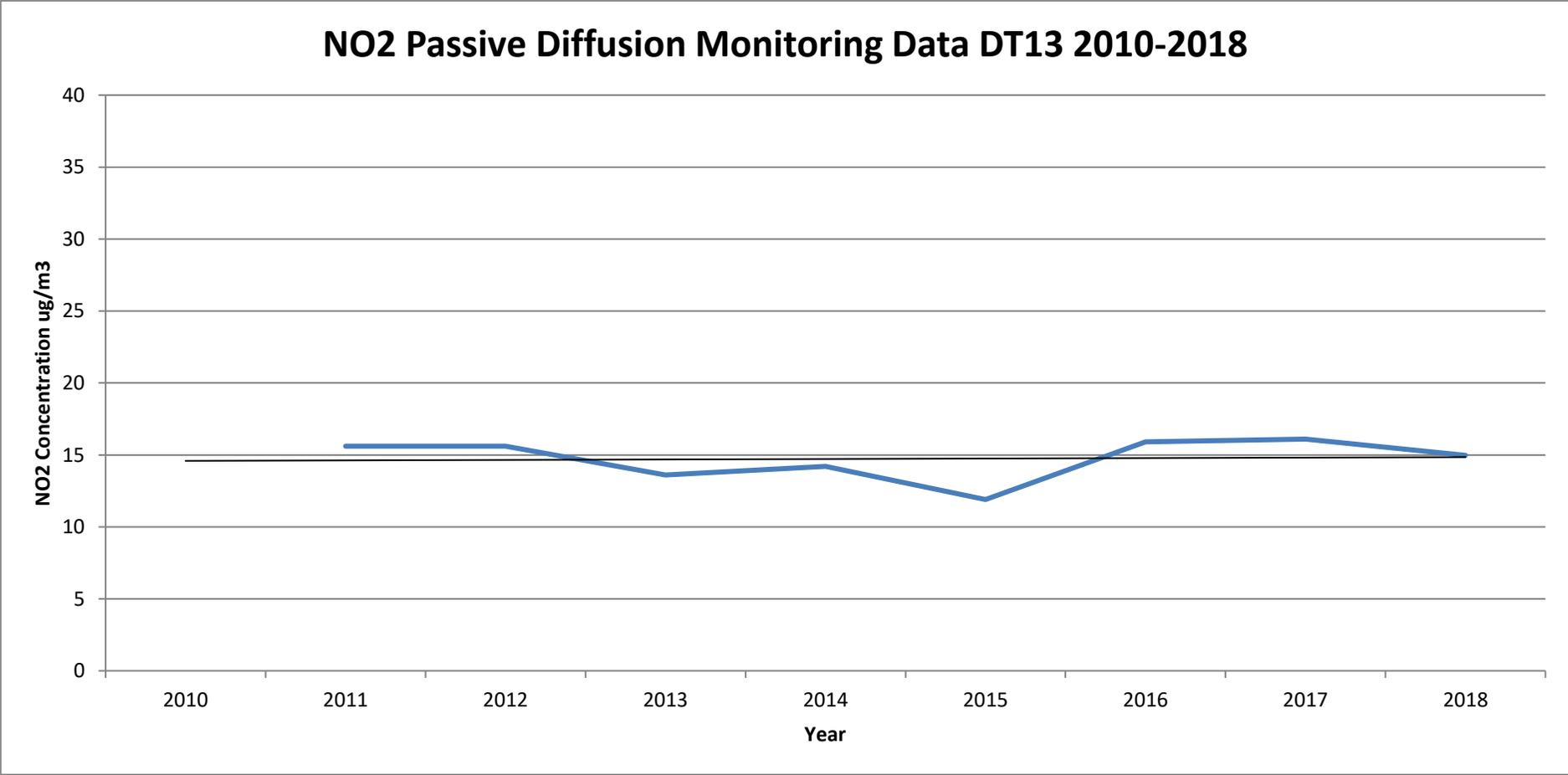
Note: Concentration shown in Blue Trend shown in Black.

DT12



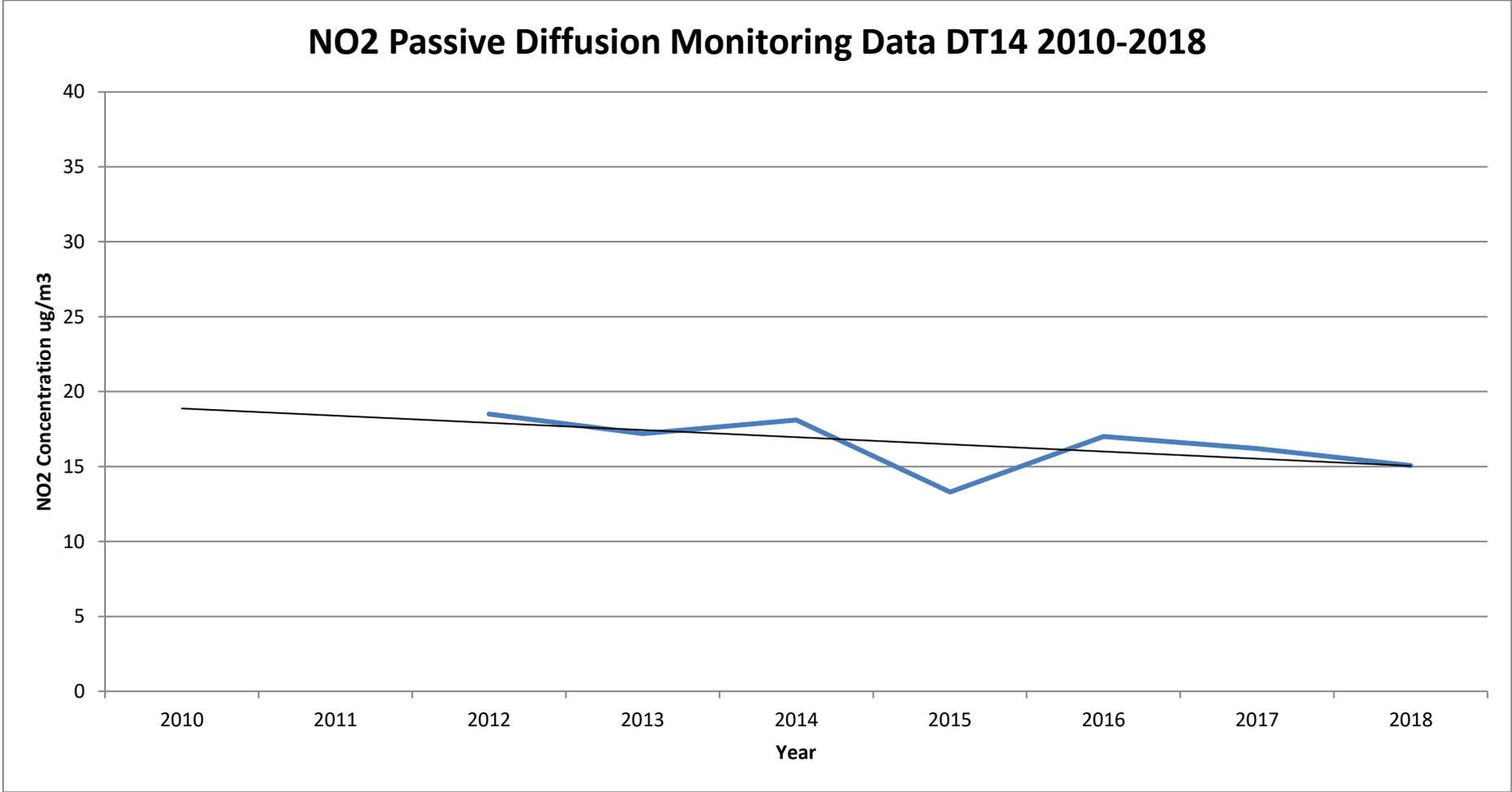
Note: Concentration shown in Blue Trend shown in Black.

DT13



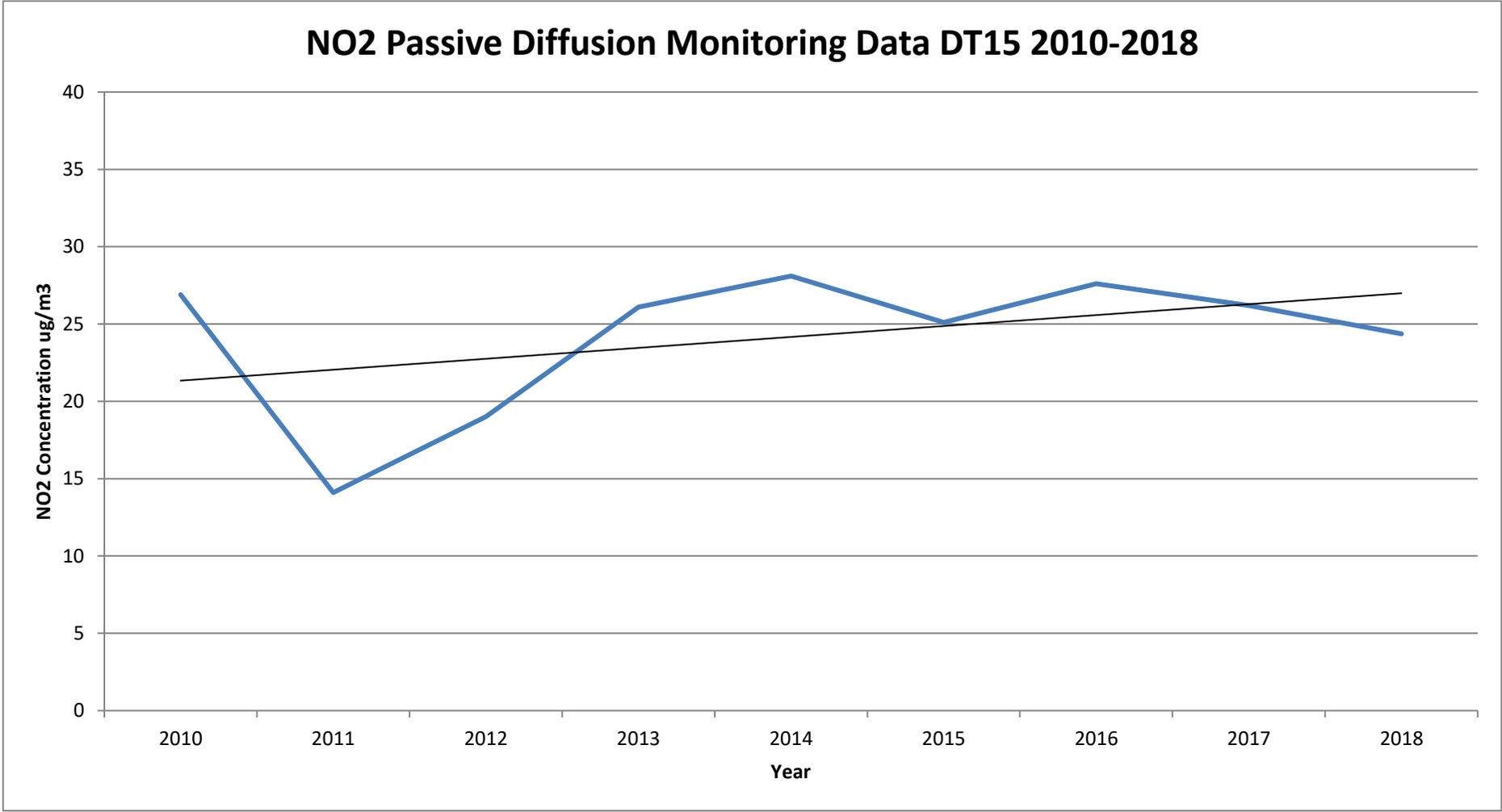
Note: Concentration shown in Blue Trend shown in Black.

DT14



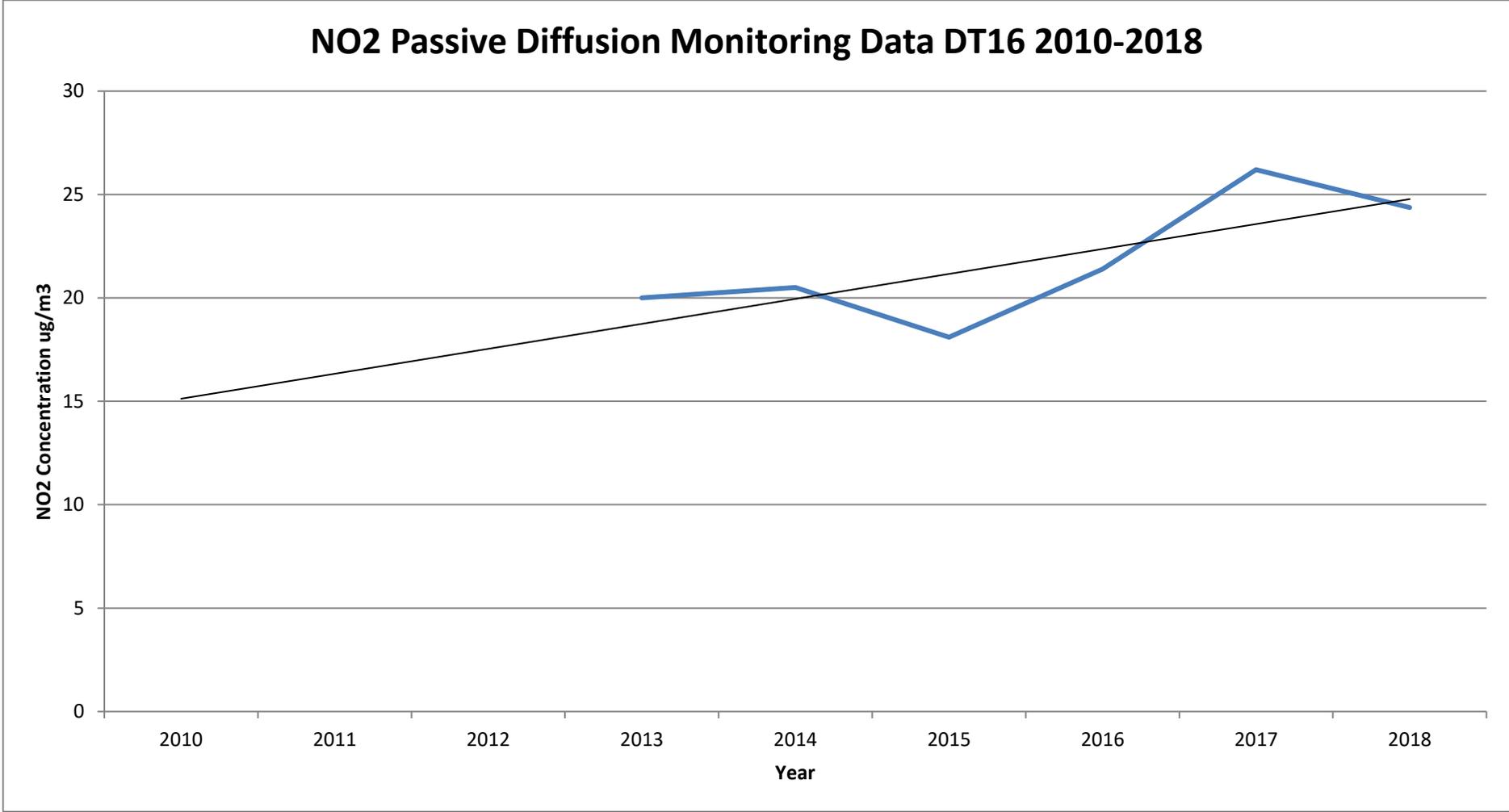
Note: Concentration shown in Blue Trend shown in Black.

DT15



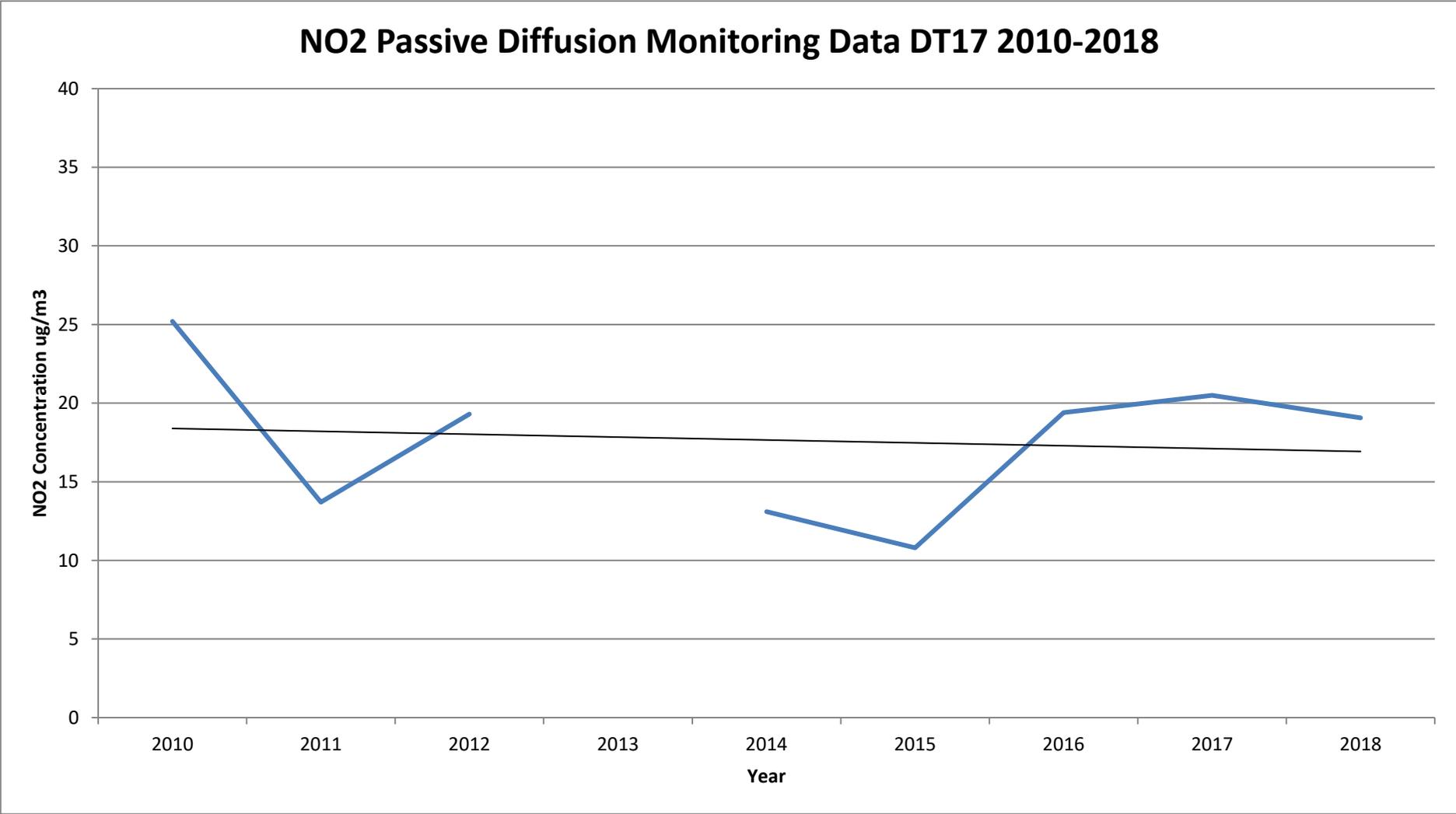
Note: Concentration shown in Blue Trend shown in Black.

DT16



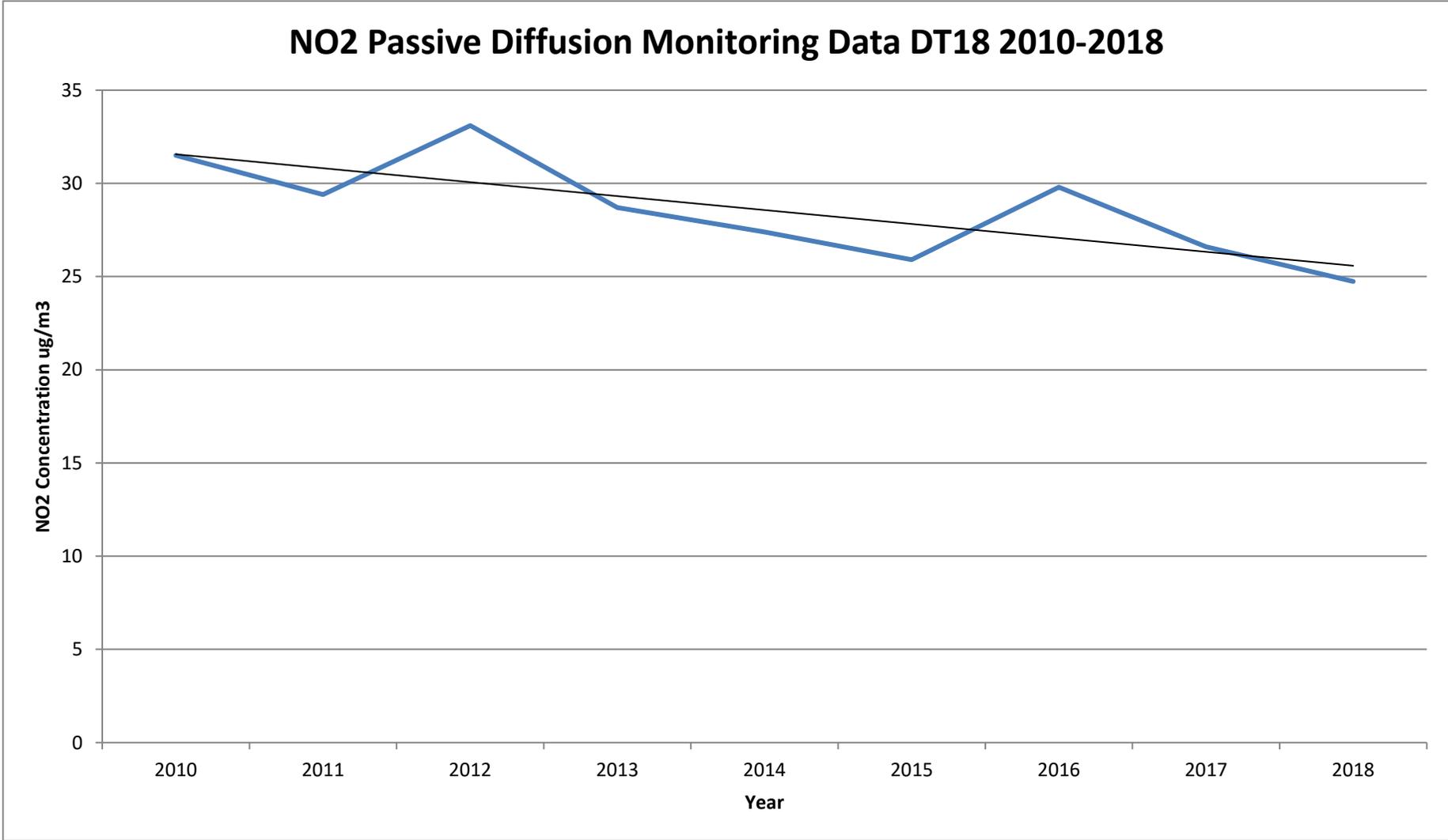
Note: Concentration shown in Blue Trend shown in Black.

DT17



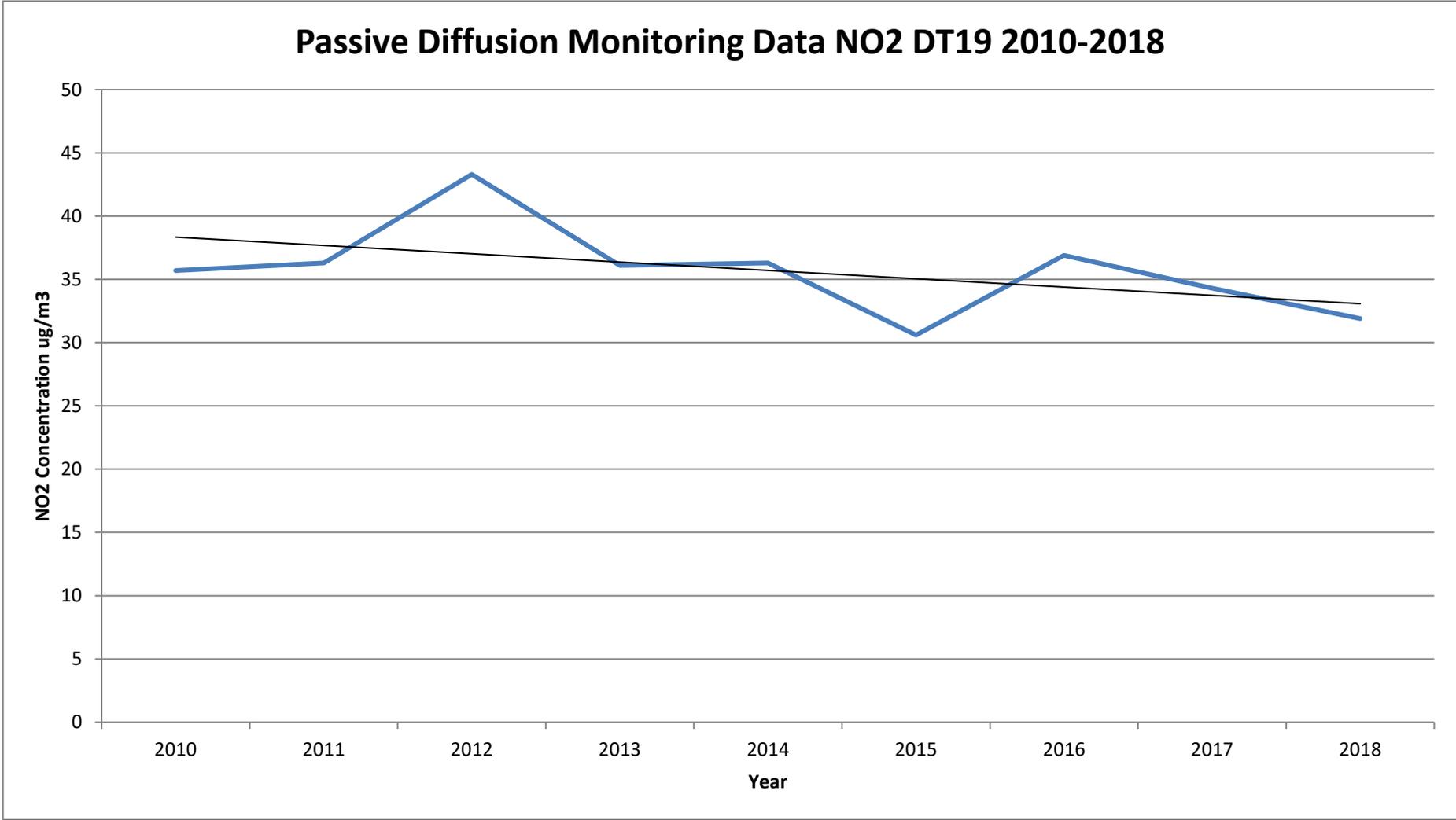
Note: Concentration shown in Blue Trend shown in Black.

DT18



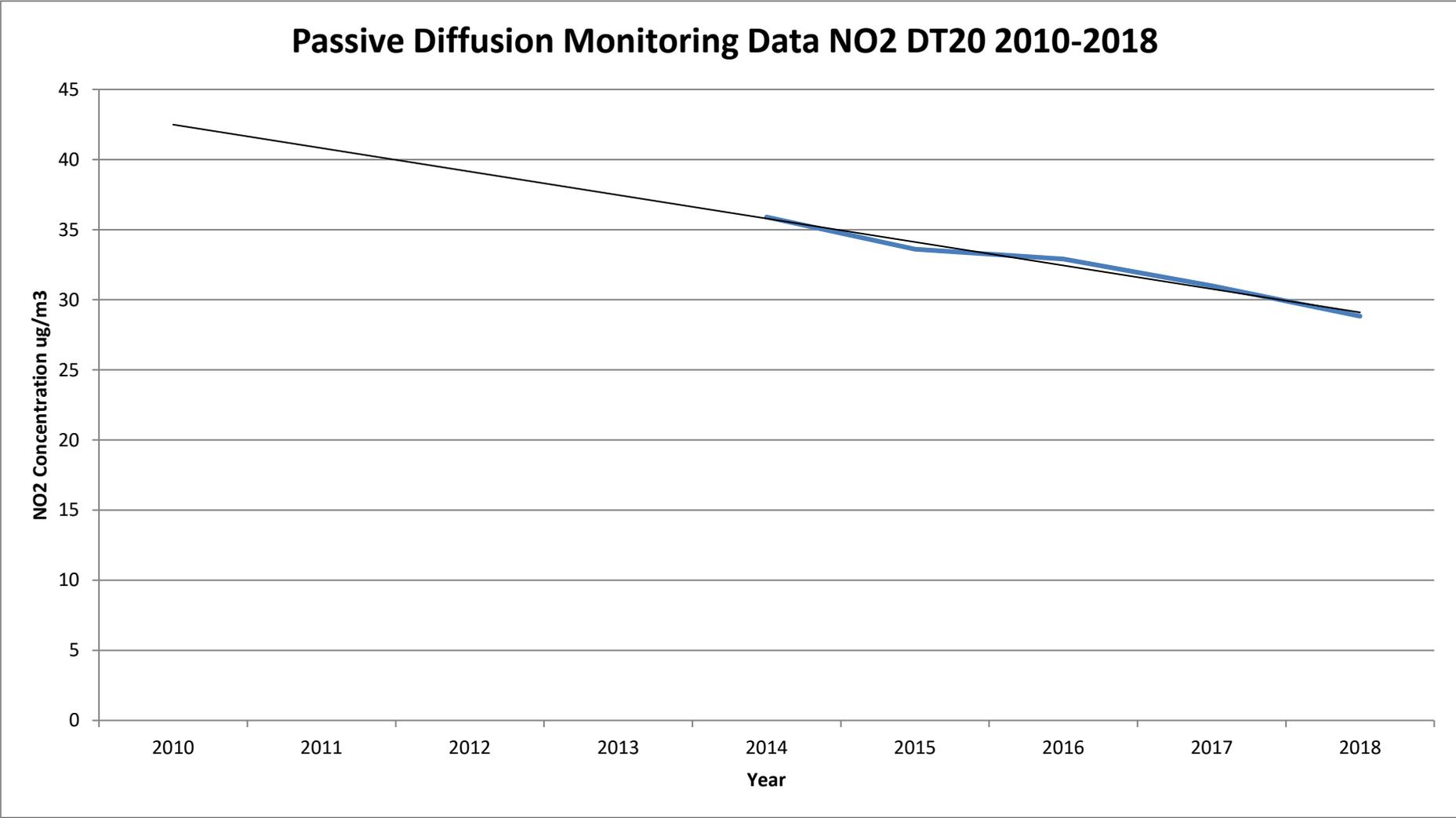
Note: Concentration shown in Blue Trend shown in Black.

DT19



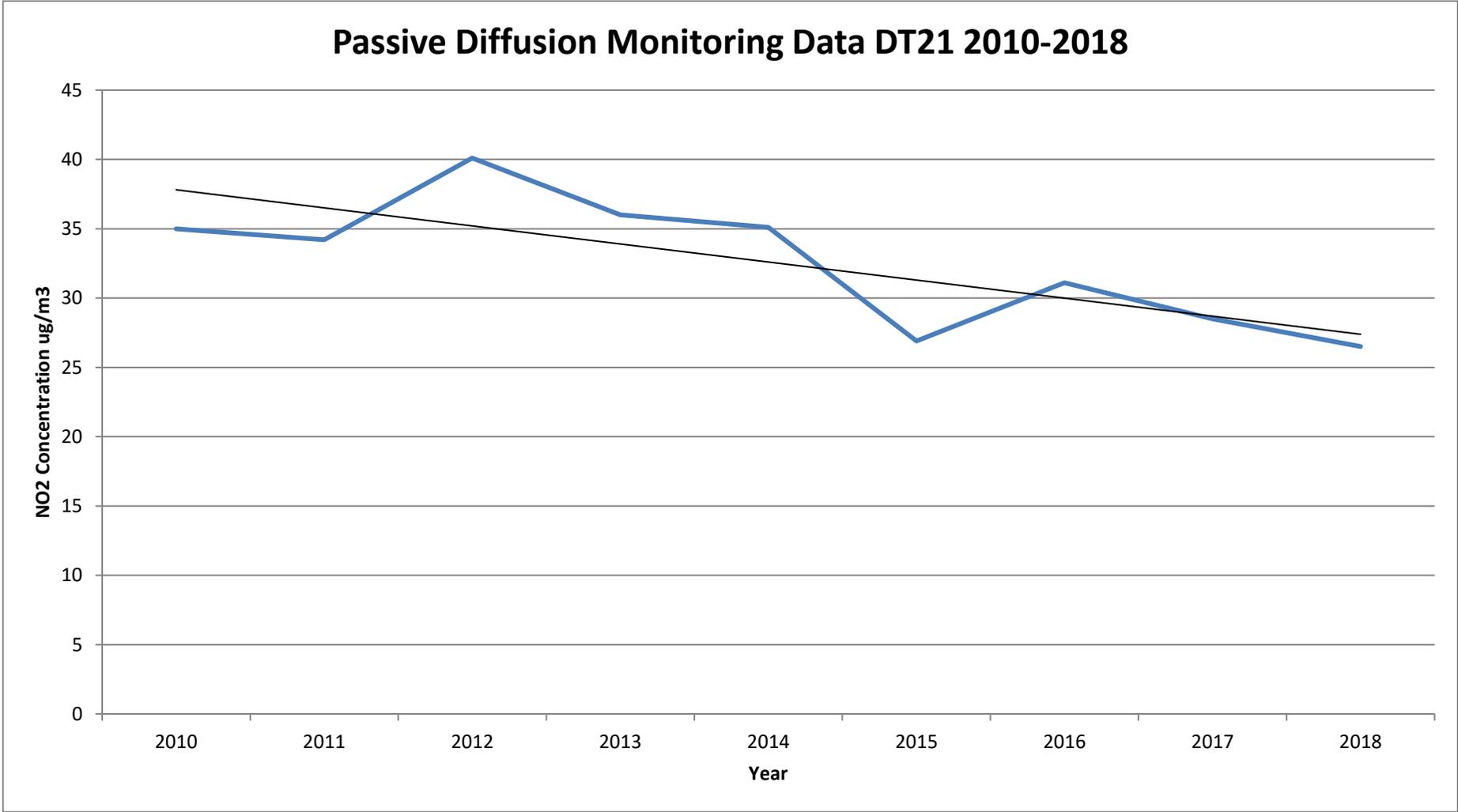
Note: Concentration shown in Blue Trend shown in Black.

DT20



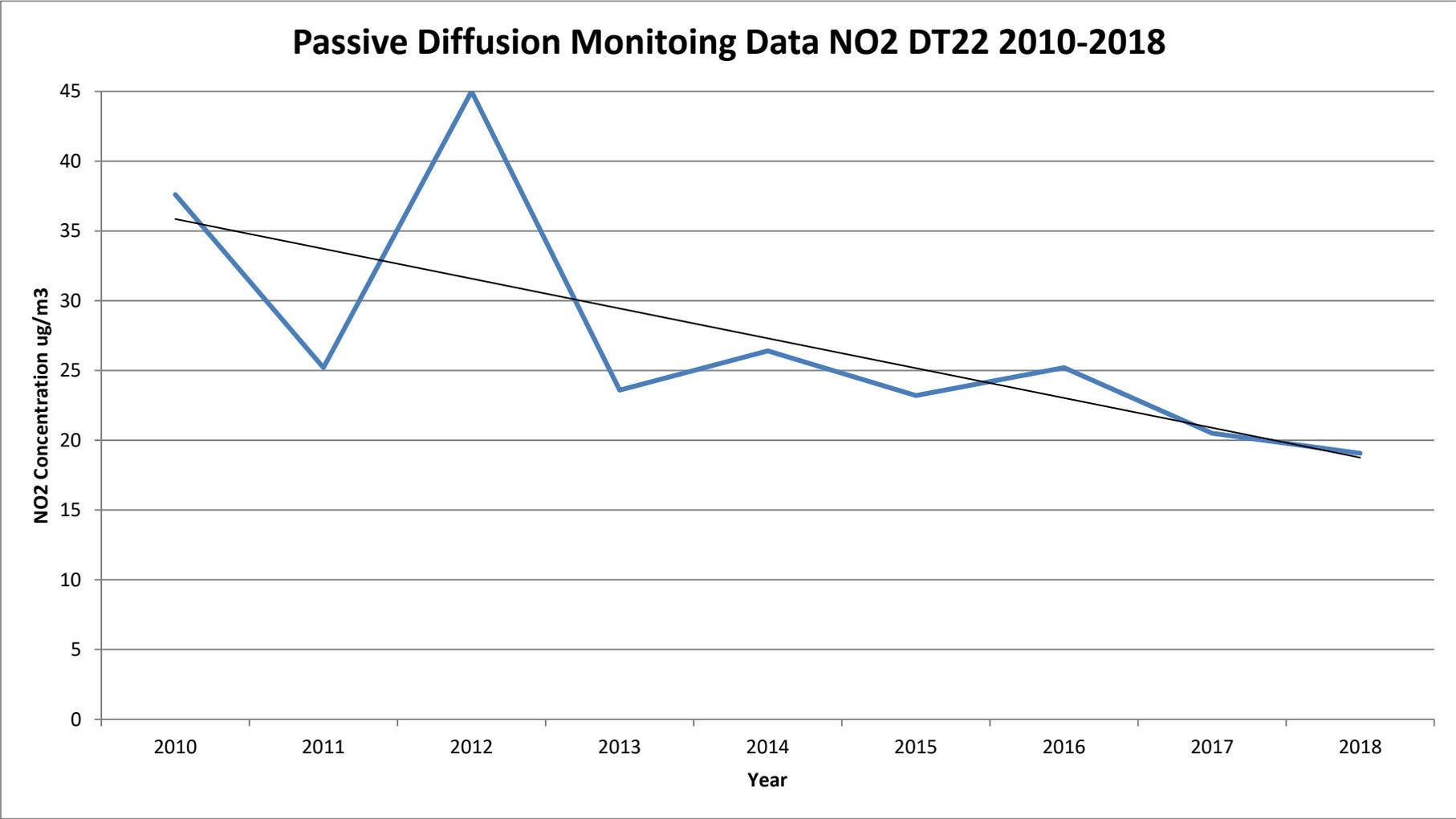
Note: Concentration shown in Blue Trend shown in Black.

DT21



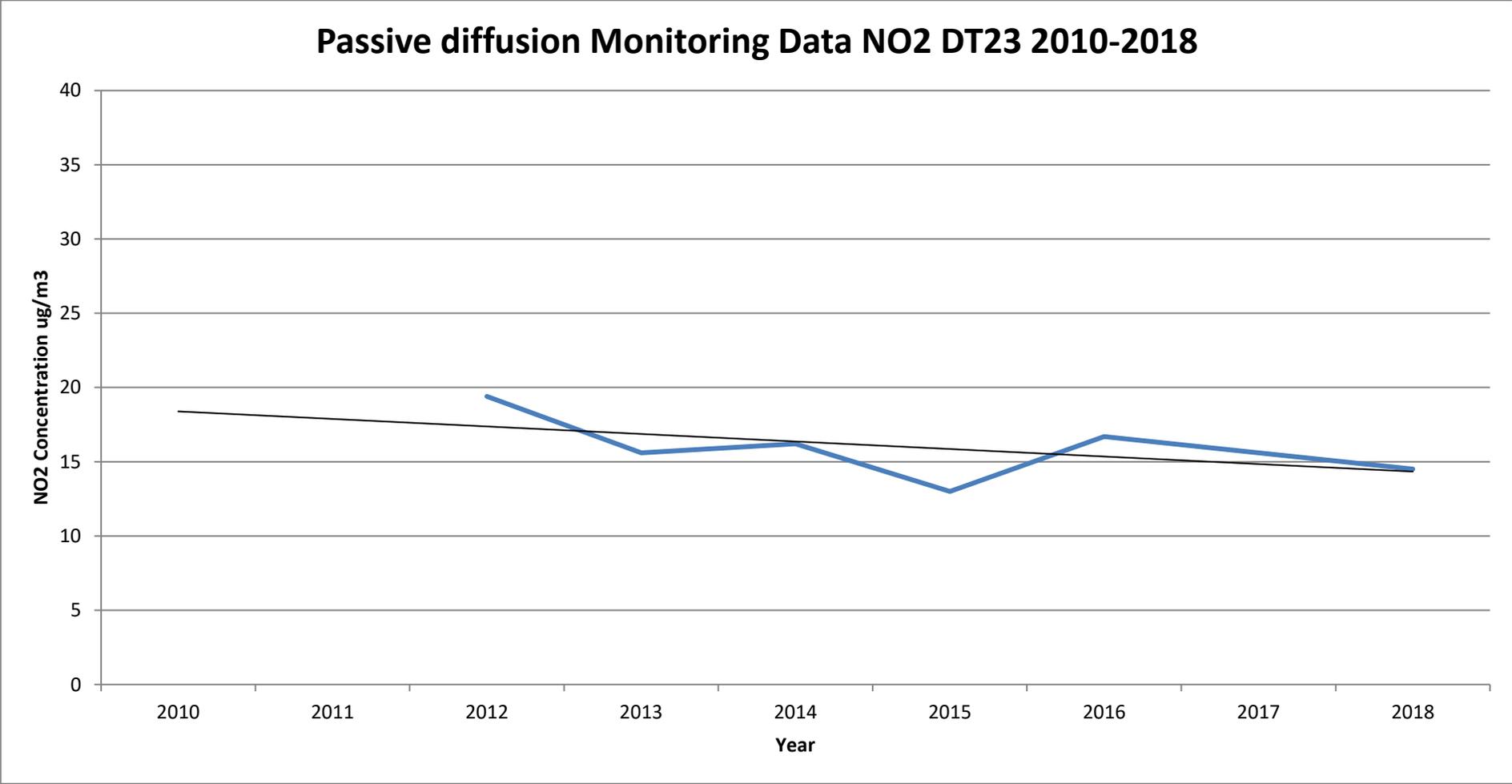
Note: Concentration shown in Blue Trend shown in Black.

DT22



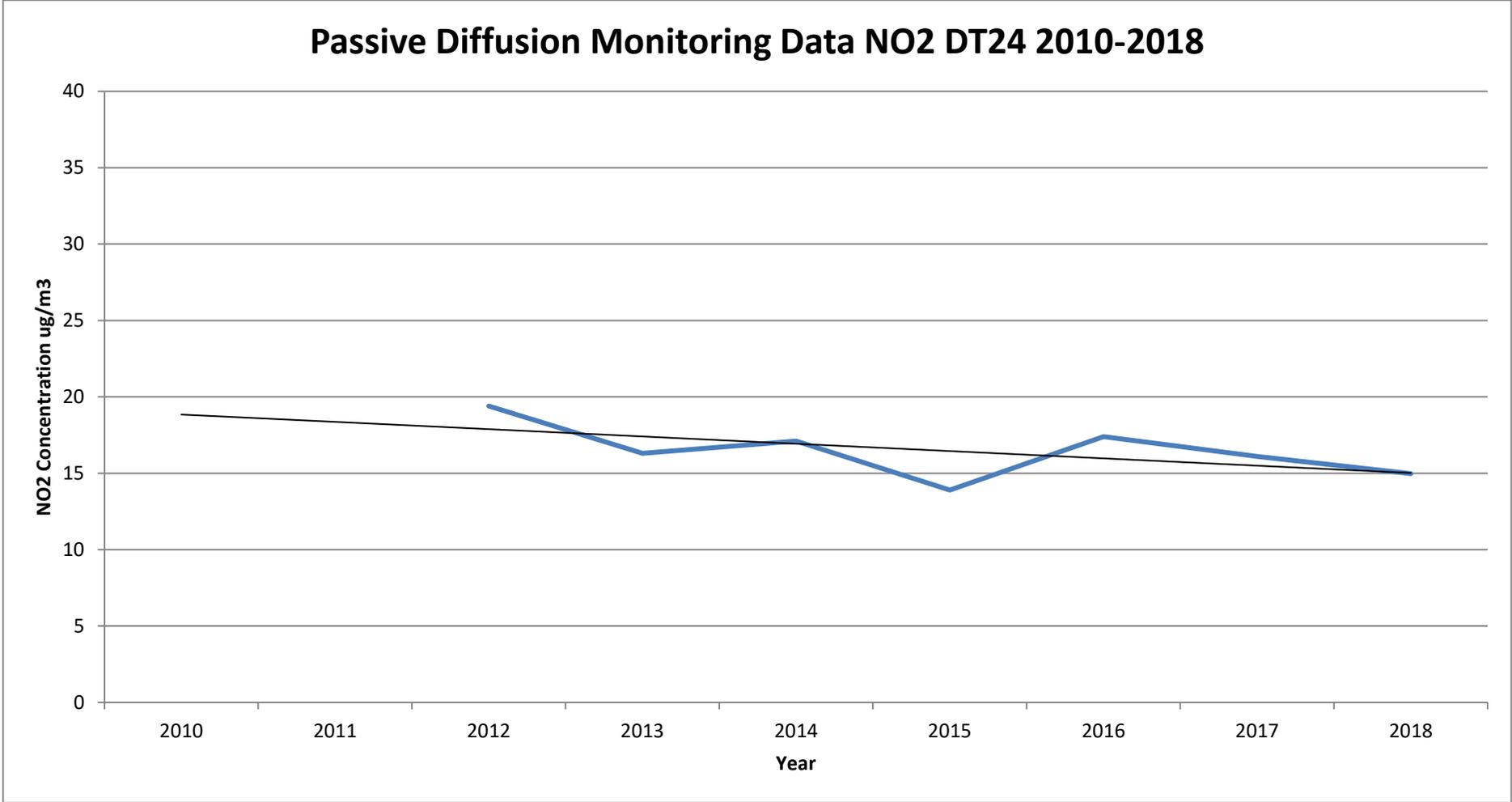
Note: Concentration shown in Blue Trend shown in Black.

DT23



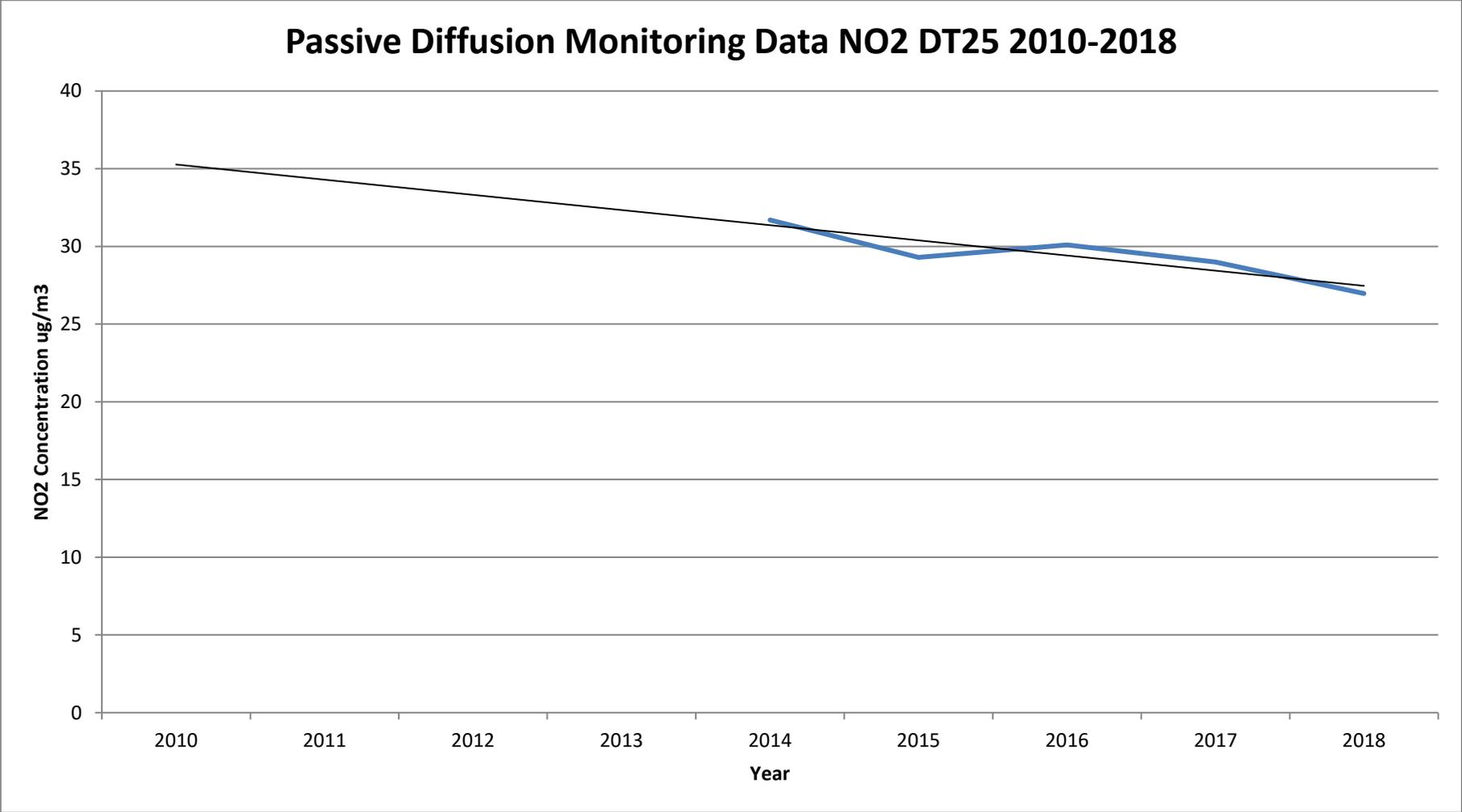
Note: Concentration shown in Blue Trend shown in Black.

DT24



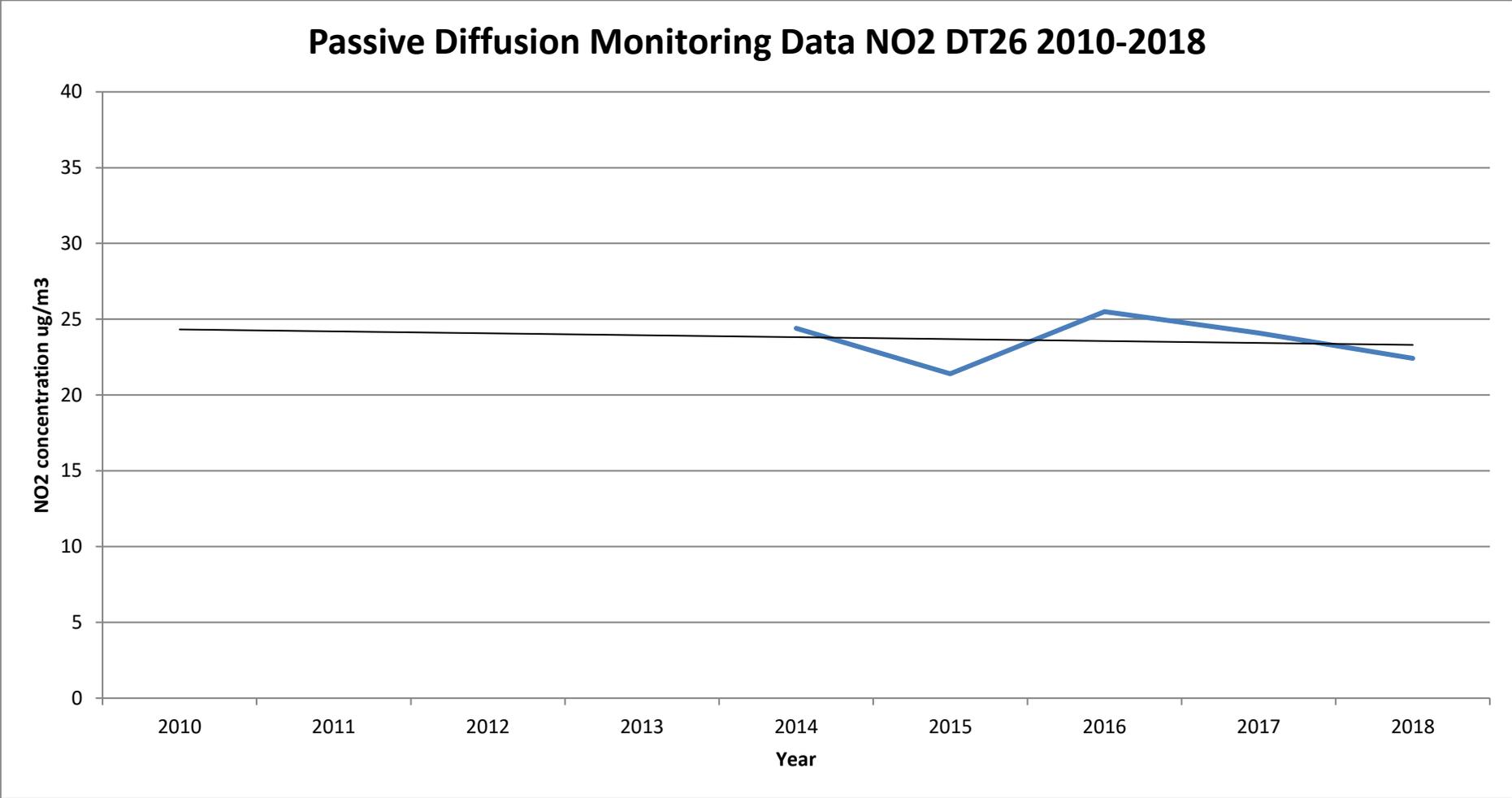
Note: Concentration shown in Blue Trend shown in Black.

DT25



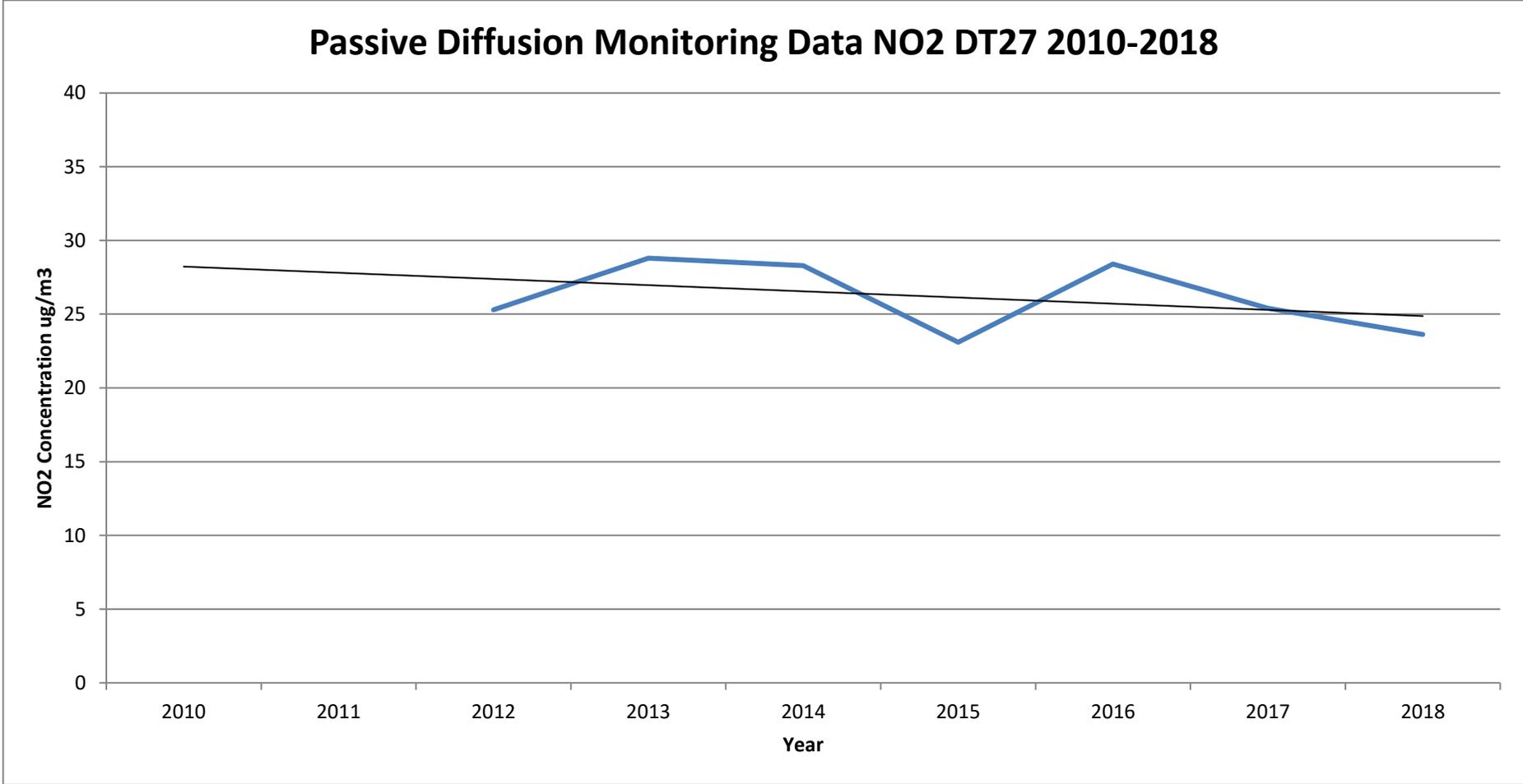
Note: Concentration shown in Blue Trend shown in Black.

DT26



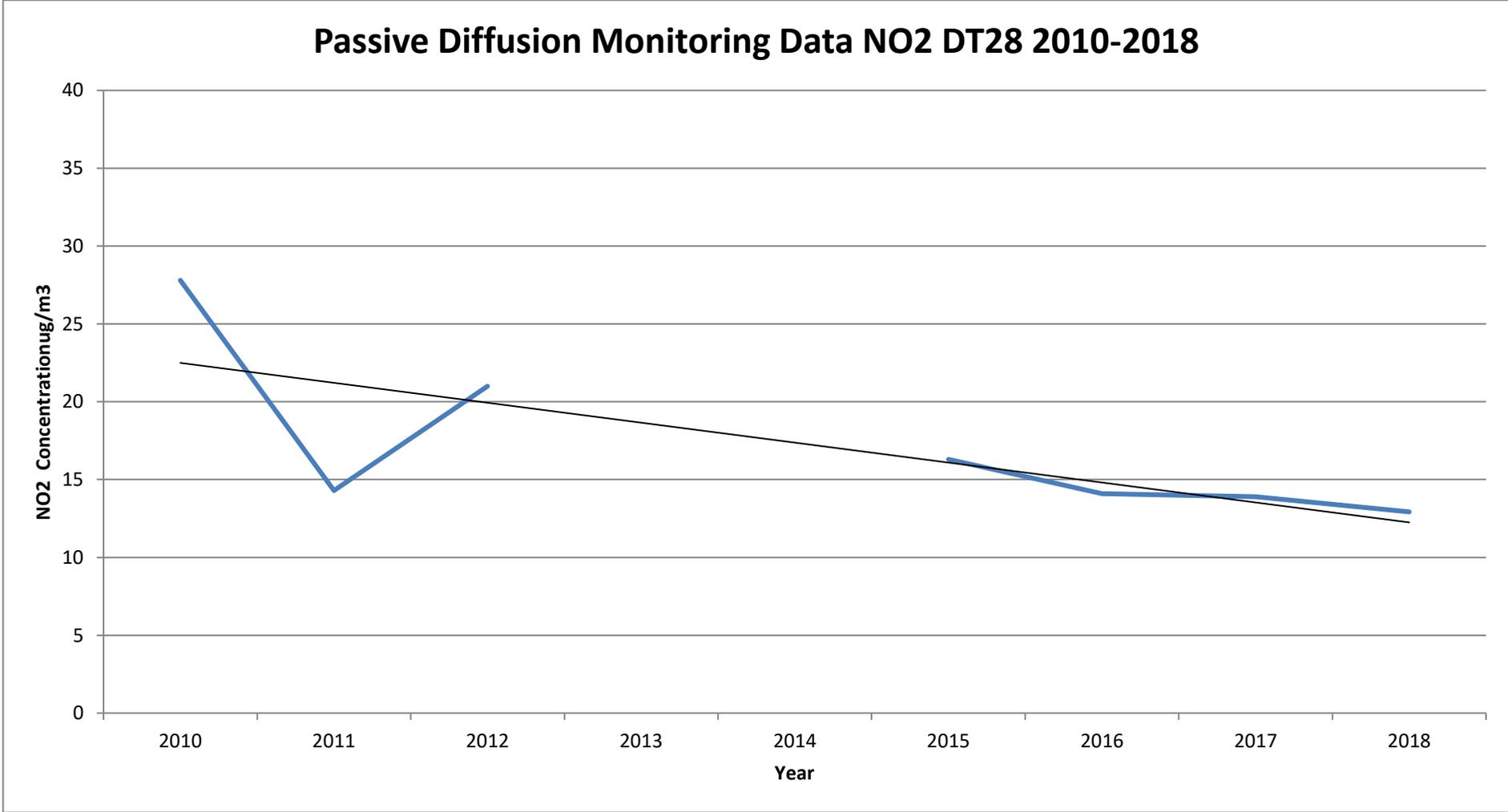
Note: Concentration shown in Blue Trend shown in Black.

DT27



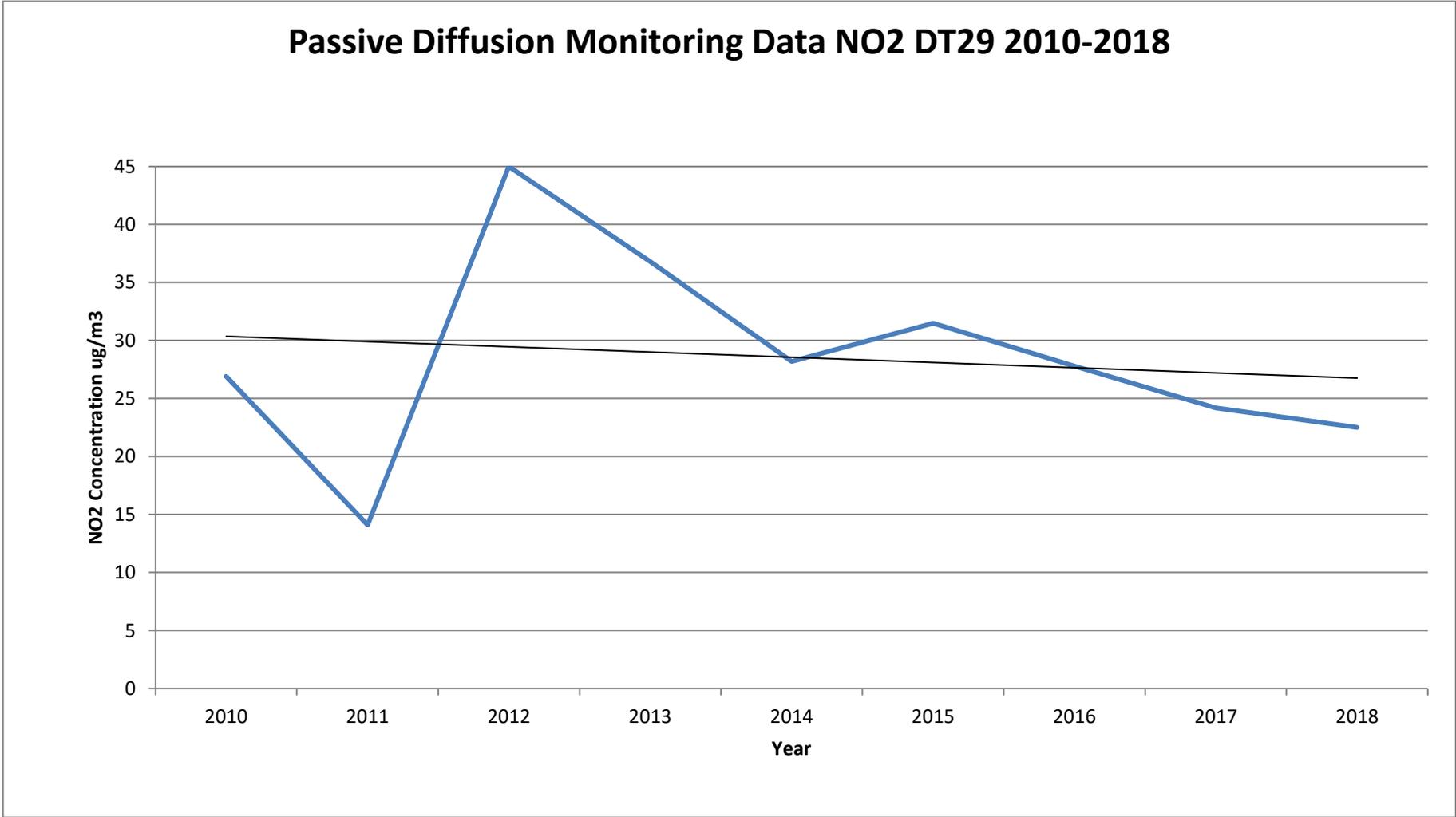
Note: Concentration shown in Blue Trend shown in Black.

DT28



Note: Concentration shown in Blue Trend shown in Black.

DT29



Note: Concentration shown in Blue Trend shown in Black.

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

Diffusion Tubes Bias Adjustment Factors

Broadland and South Norfolk District Council's diffusion tubes are prepared and analysed by Gradko International using 20% TEA in water. No automatic monitoring was undertaken in either council area. The Bias adjustment factor used in this document was derived from the latest version of the national database –co-location studies available on the LAQM website at:

https://laqm.defra.gov.uk/assets/Database_Diffusion_Tube_Bias_Factors_v03_18%20FINAL.xls

The results from the above spreadsheet gave an adjustment factor of 0.93 for 2018.

No locations produced results than 75% of the results in this monitoring period.

Therefore no data adjustment was required for any location. If adjustment was required it would be carried out as specified in LAQM TG16 paragraph 7.78.

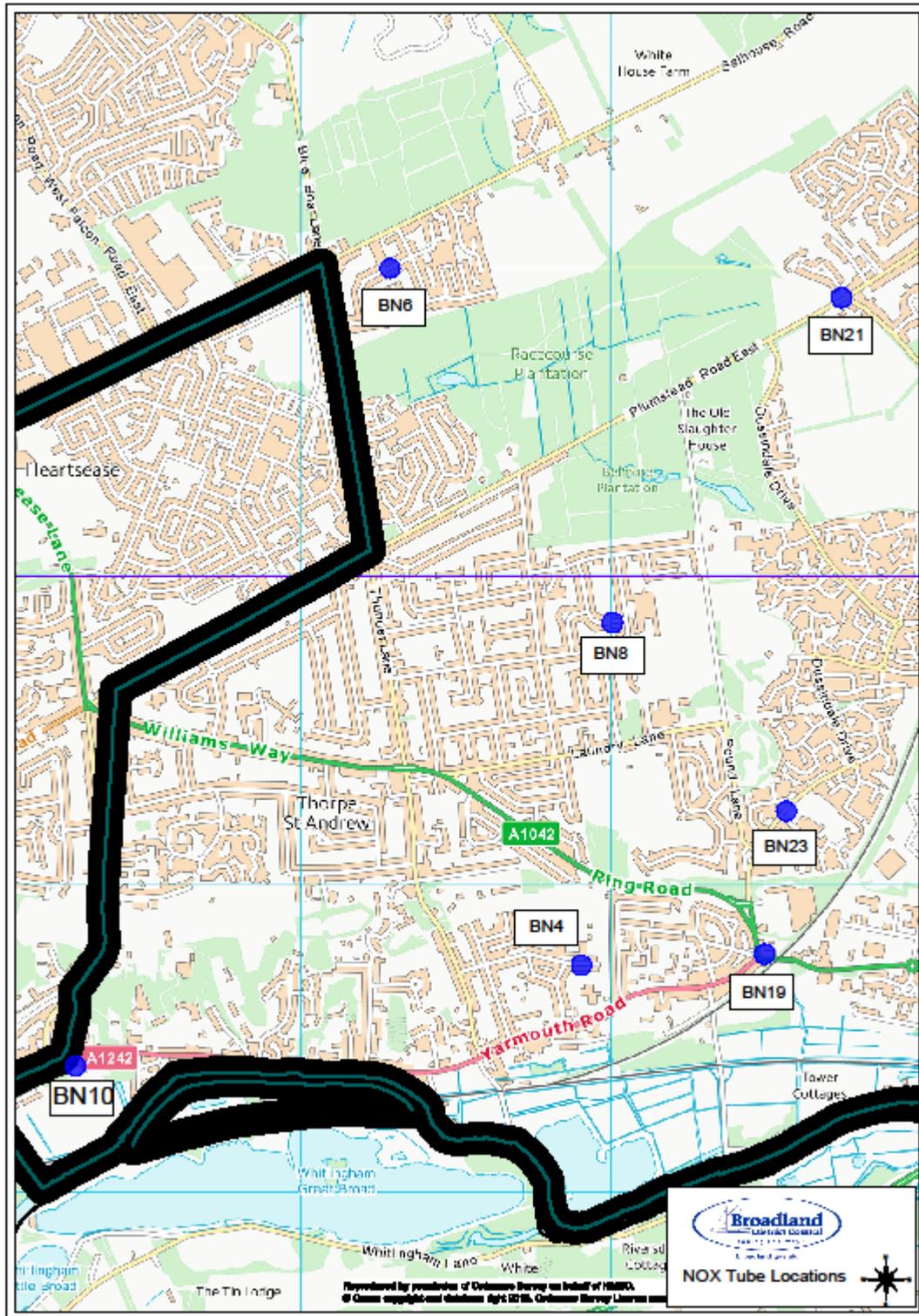
Distance correction has not been undertaken for any location as none of the annual average results were above or sufficiently close to the threshold standard to warrant this being undertaken. Should distance correction be required it would be carried out in line with paragraph's 7.77-7.79 of LAQM TG16.

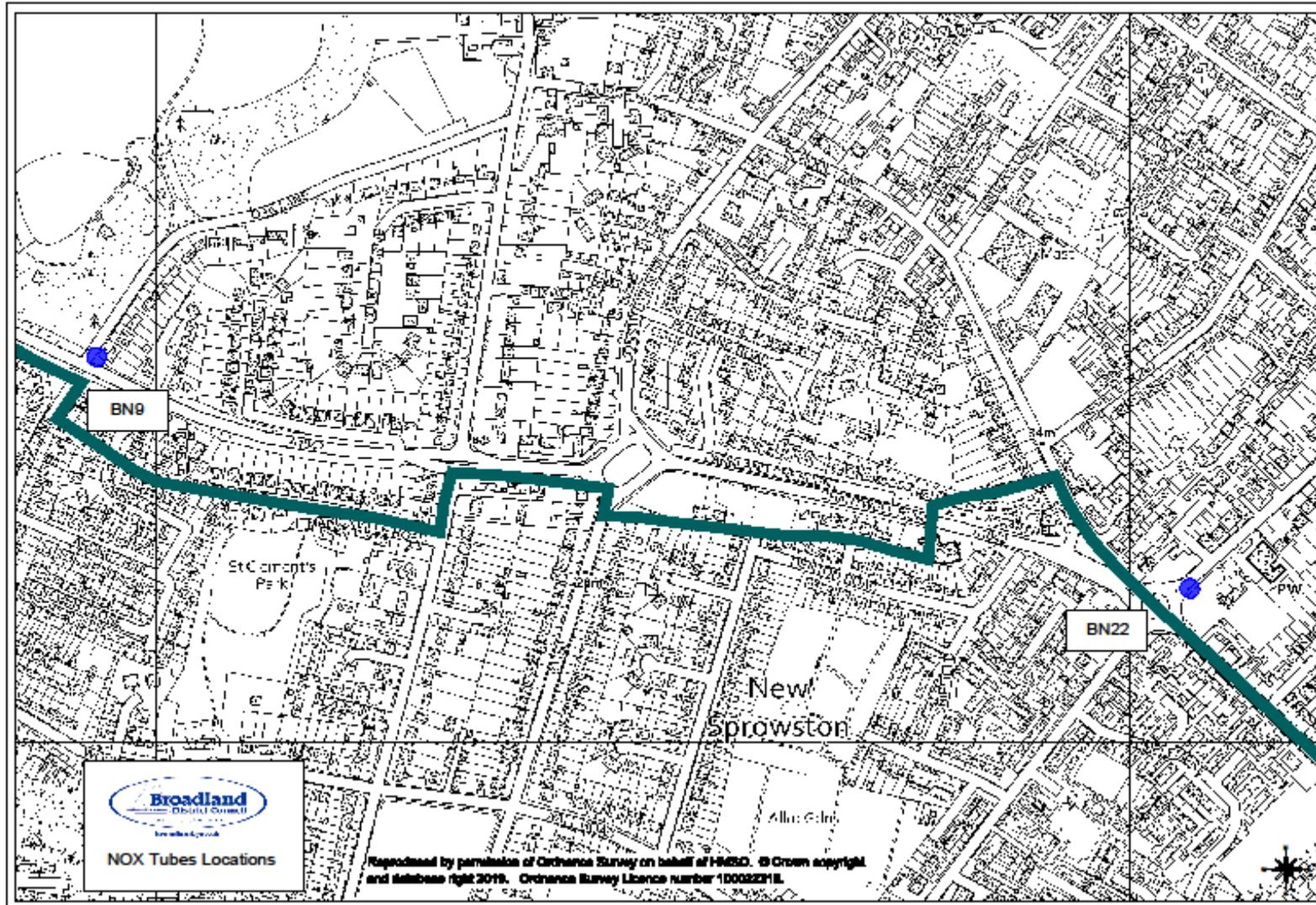
QA/QC of Diffusion Tubes Monitoring

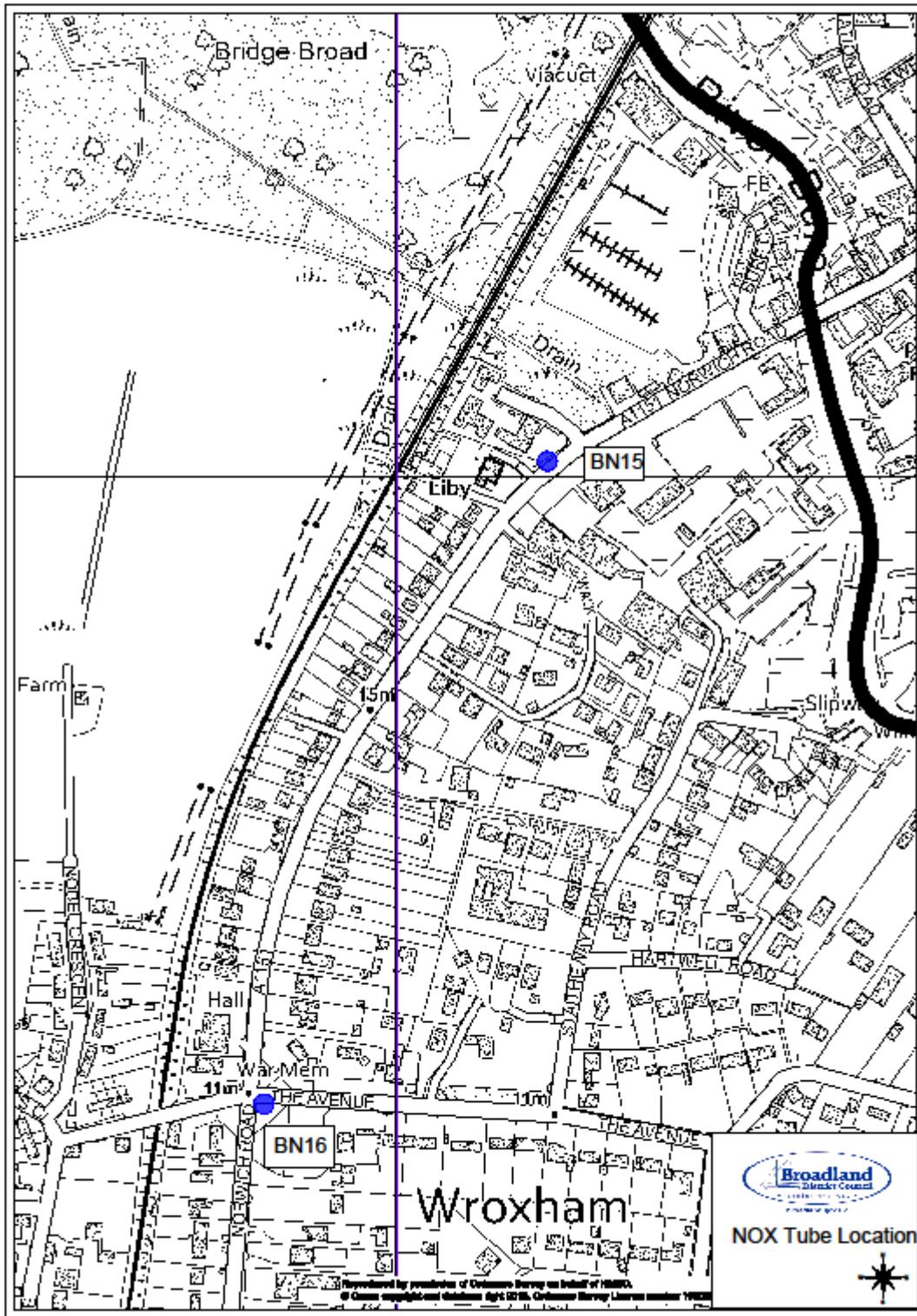
The diffusion tubes used by Broadland and South Norfolk District Councils are prepared and analysed by Gradko International using the 20%TEA in water method. The laboratory has demonstrated good data precision during 2018 and their analysis performance has been deemed 100% by the AIR-PT assessment scheme (formerly the WASP assessment scheme).

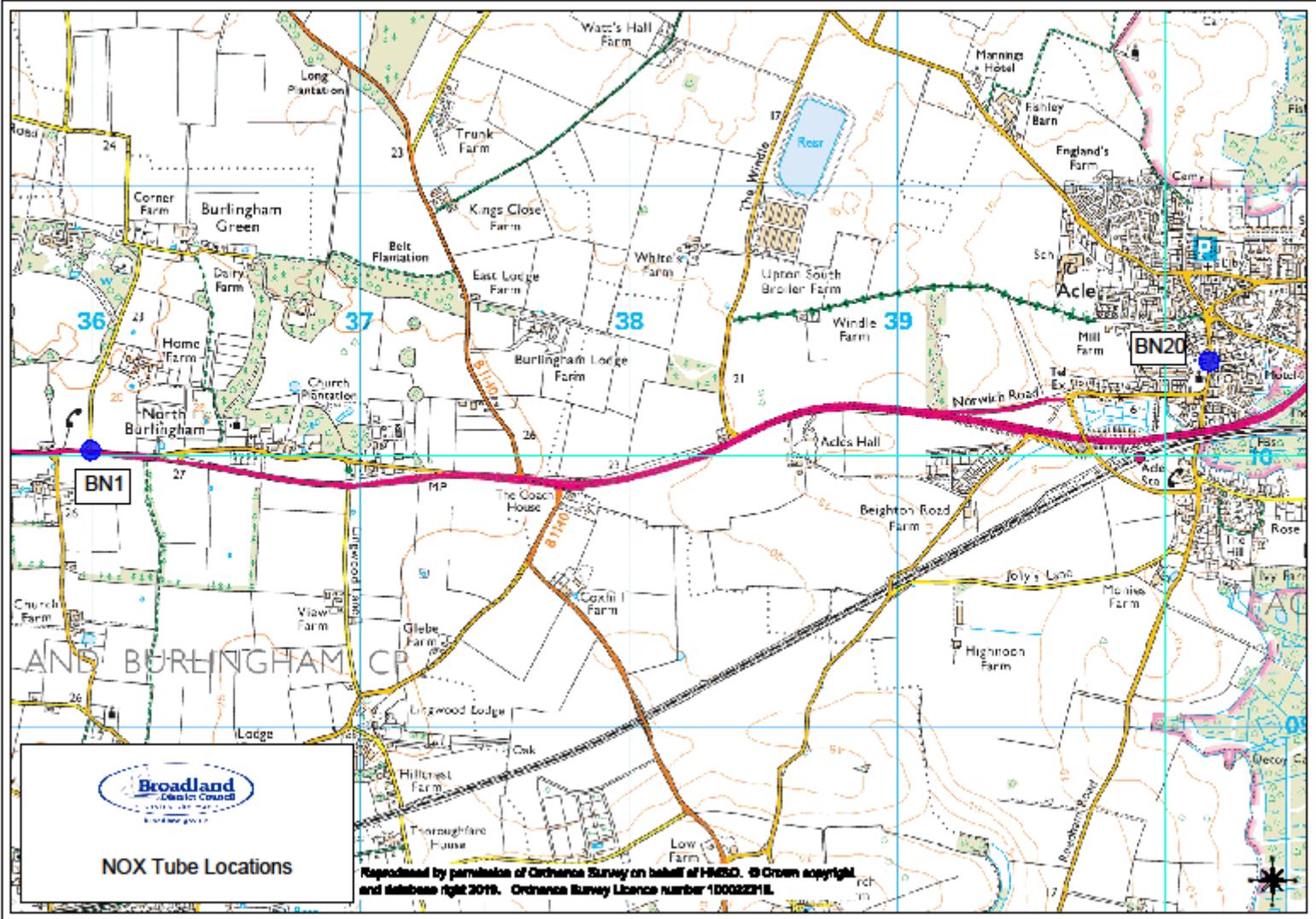
Appendix D: Maps of Monitoring Locations and AQMAs

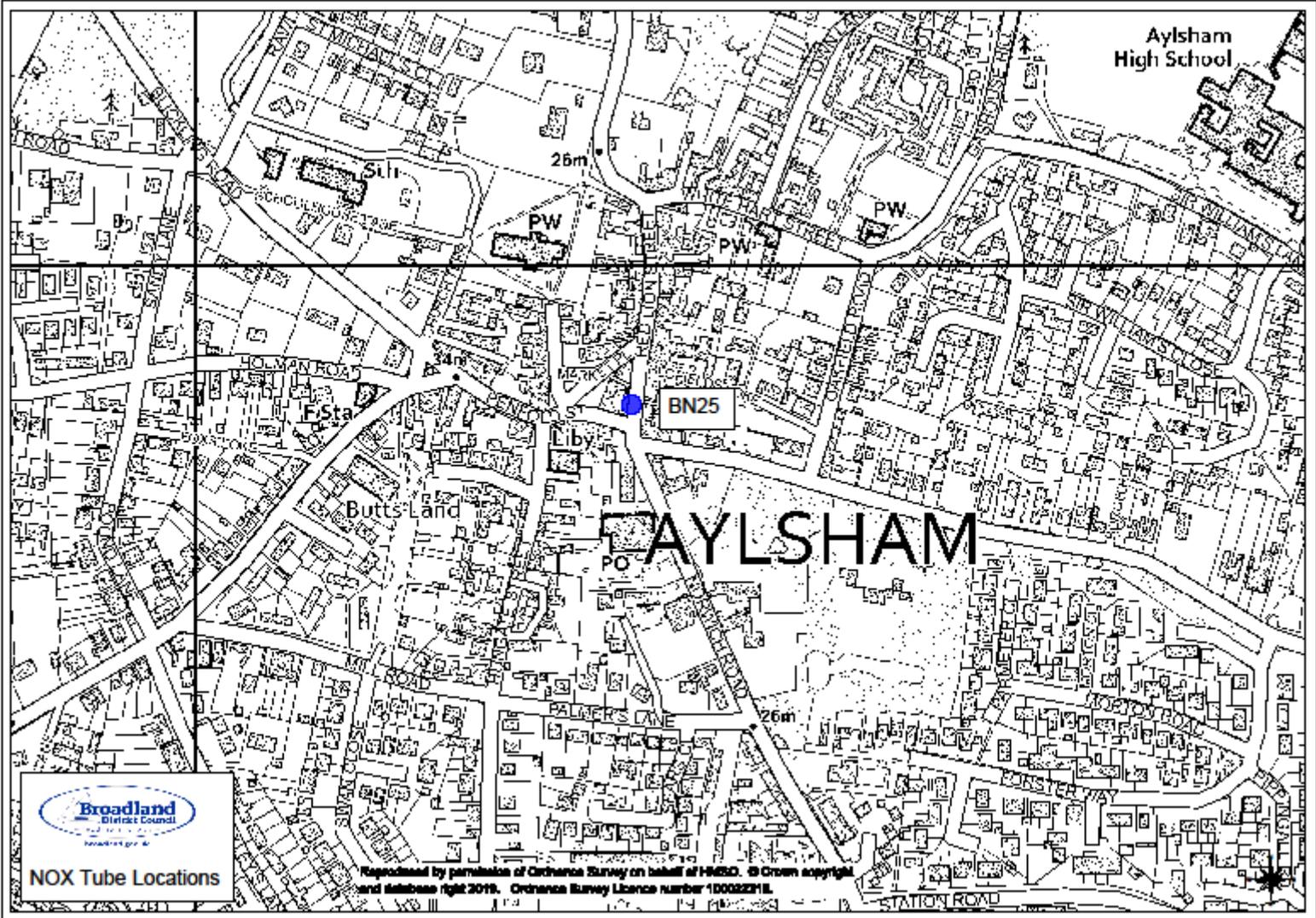
Broadland District Council area

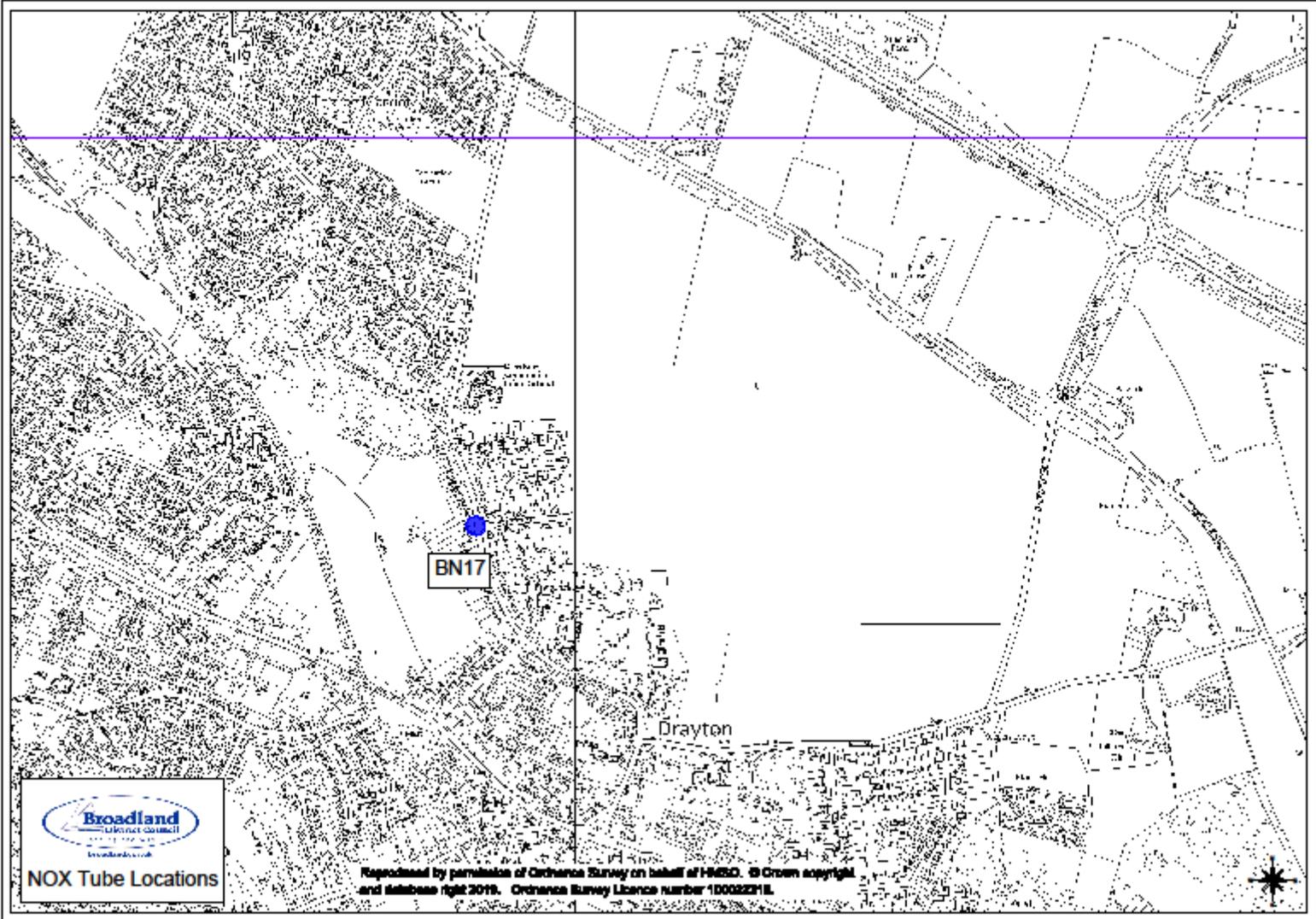


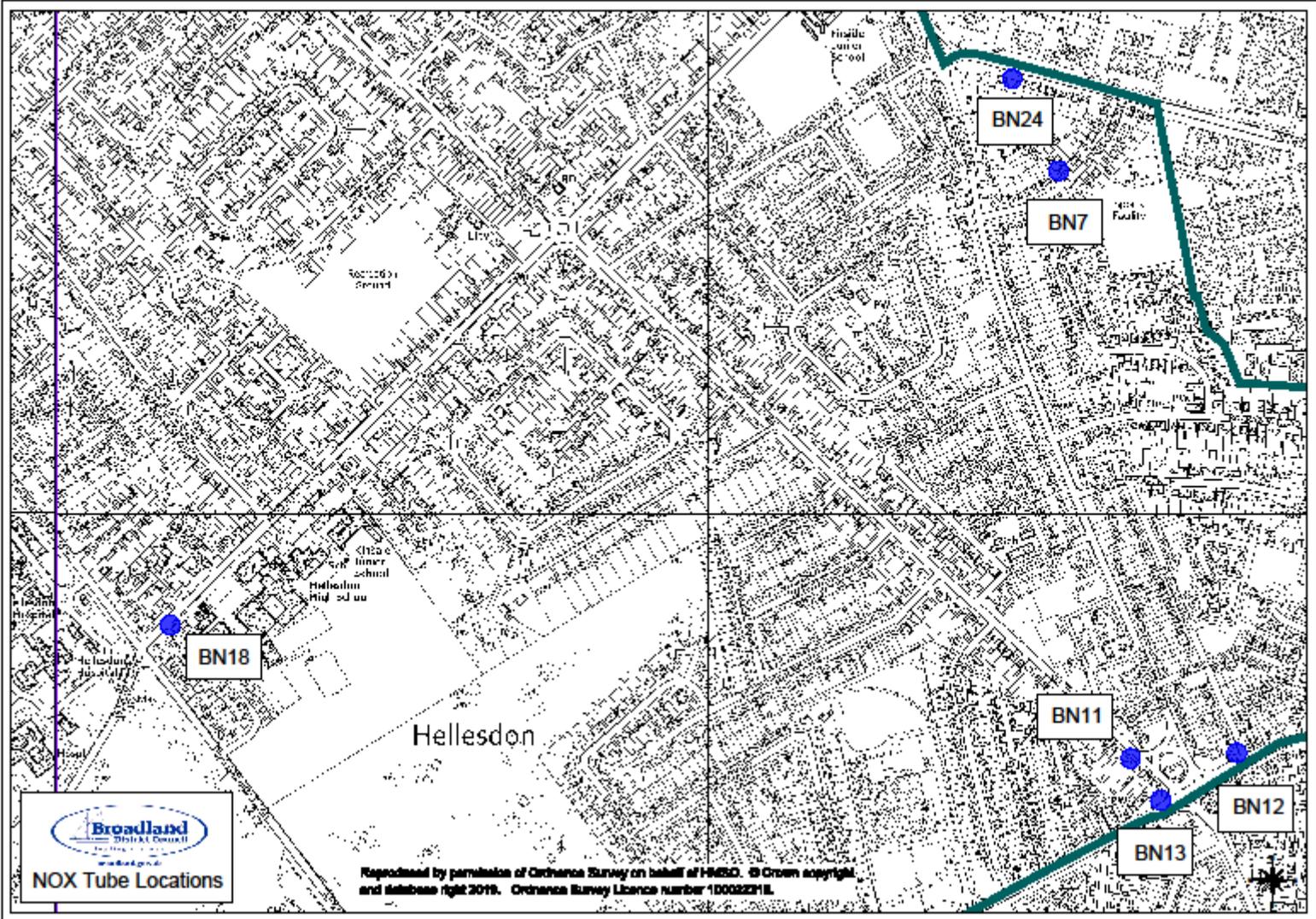




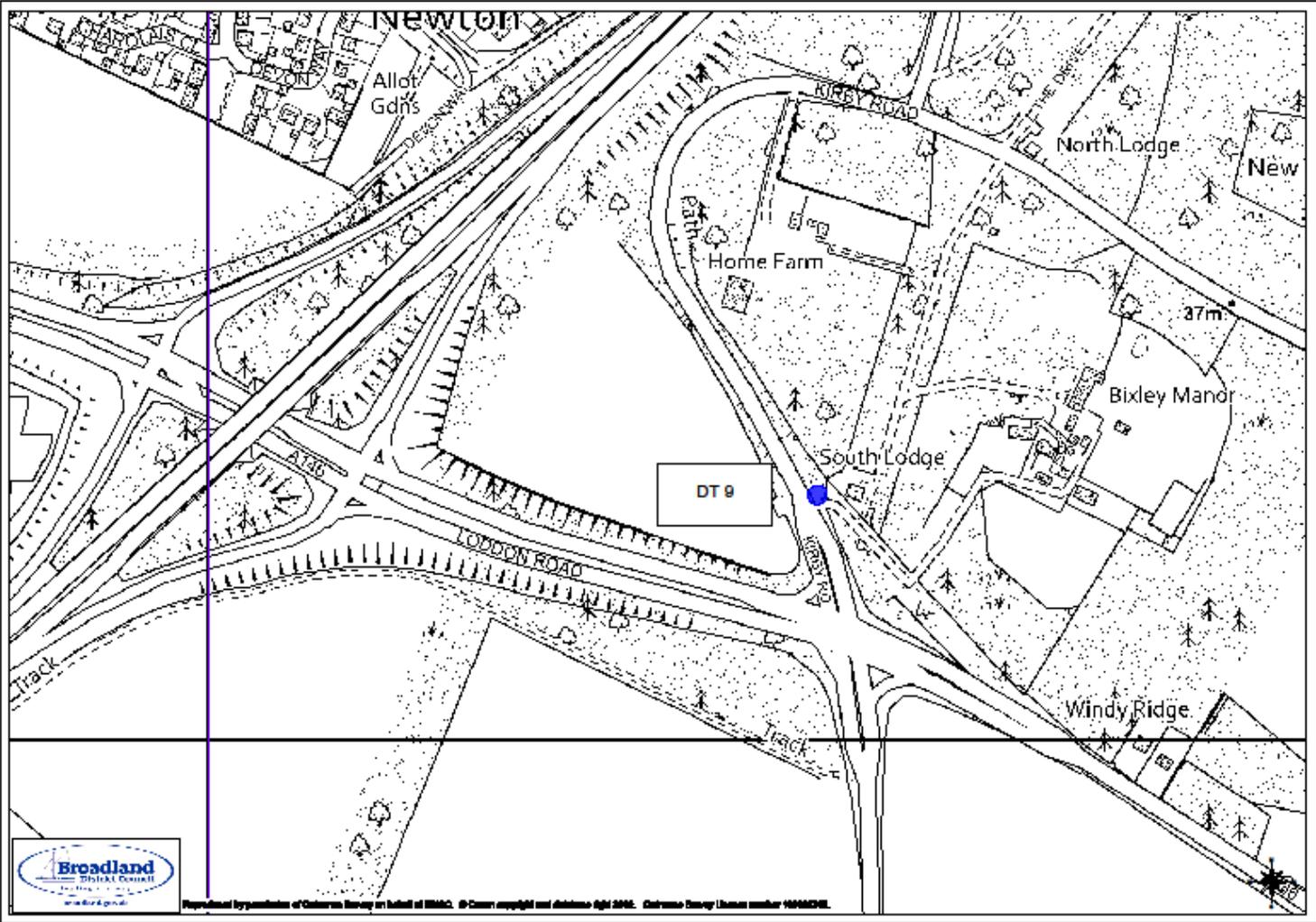


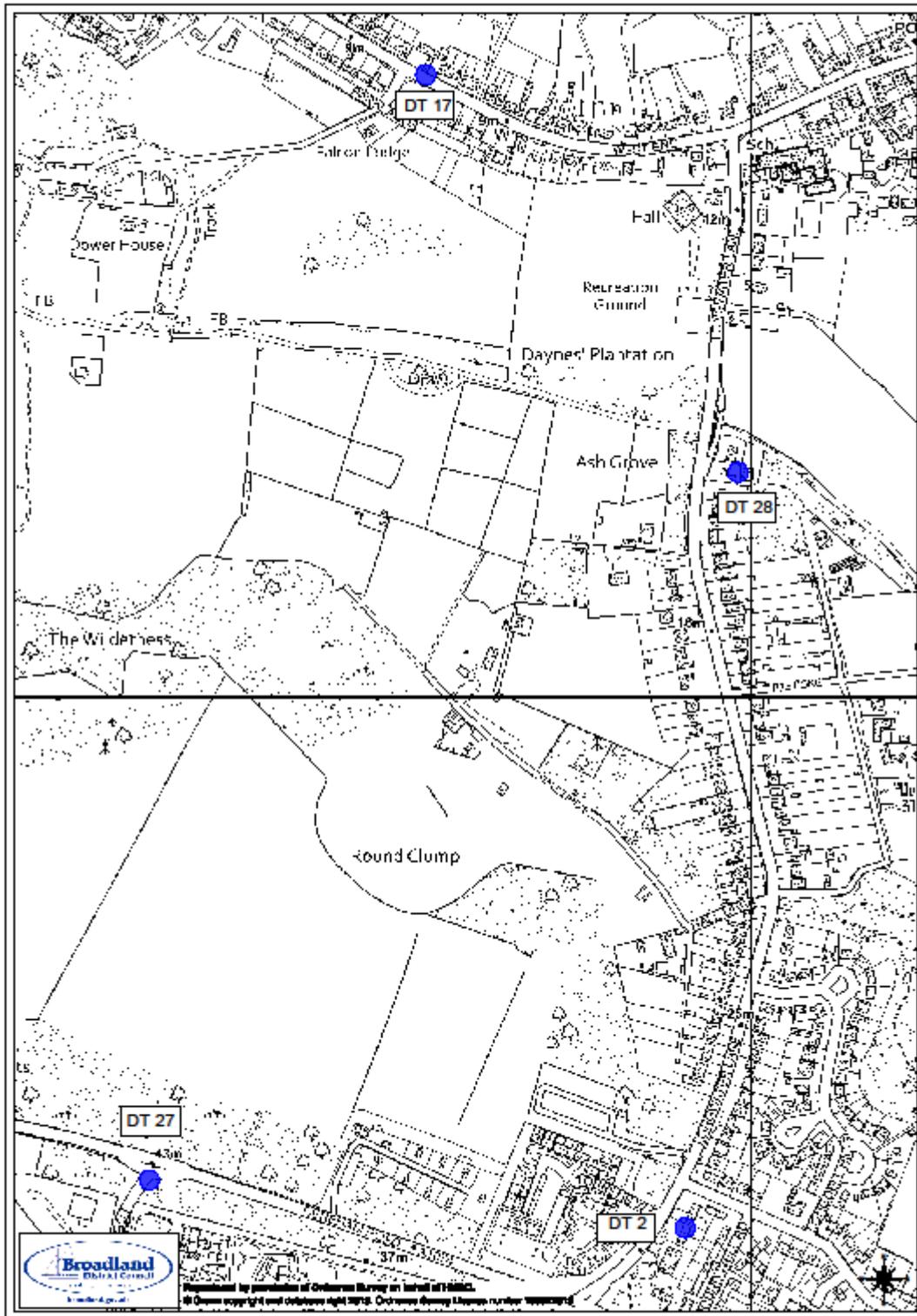


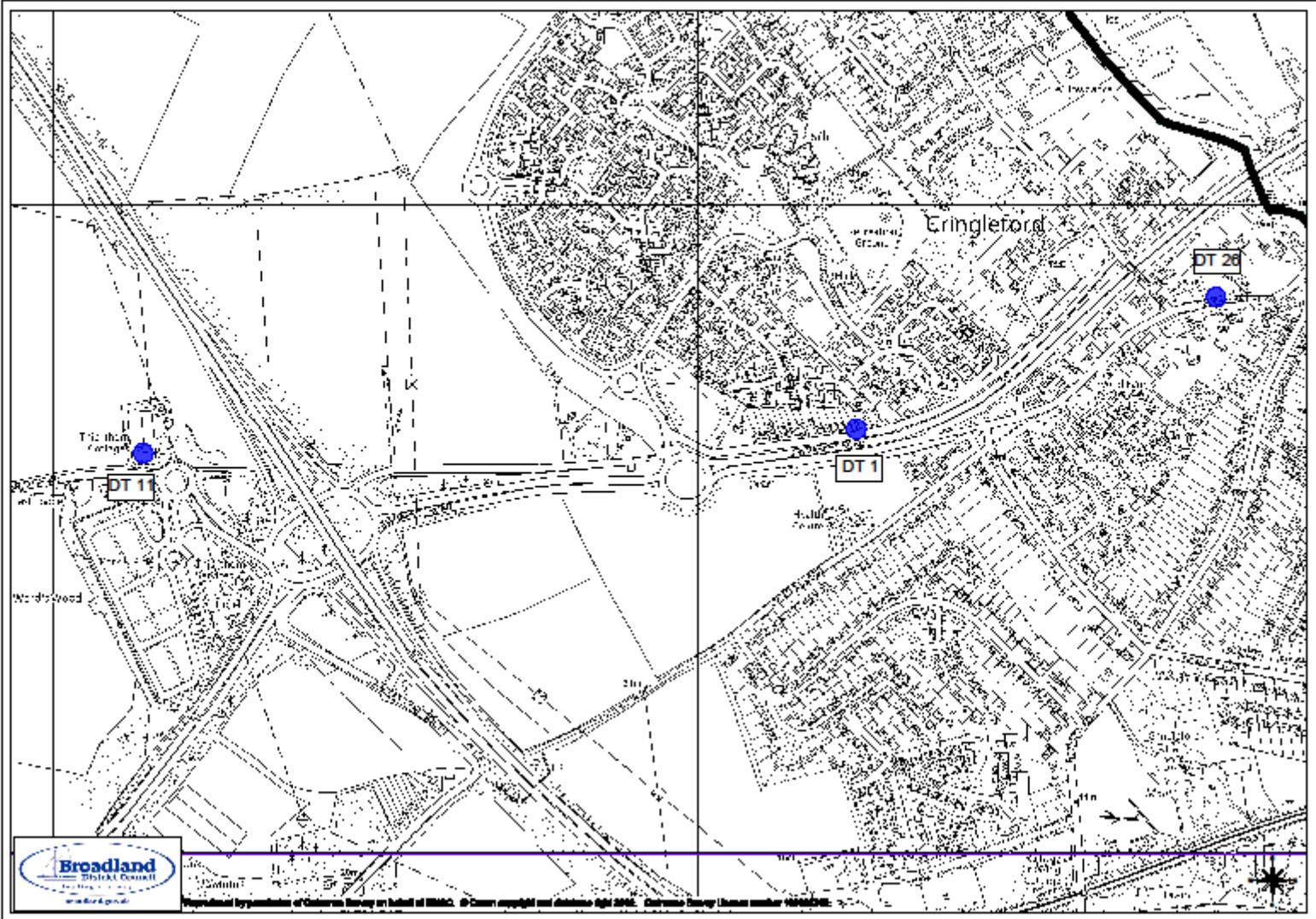


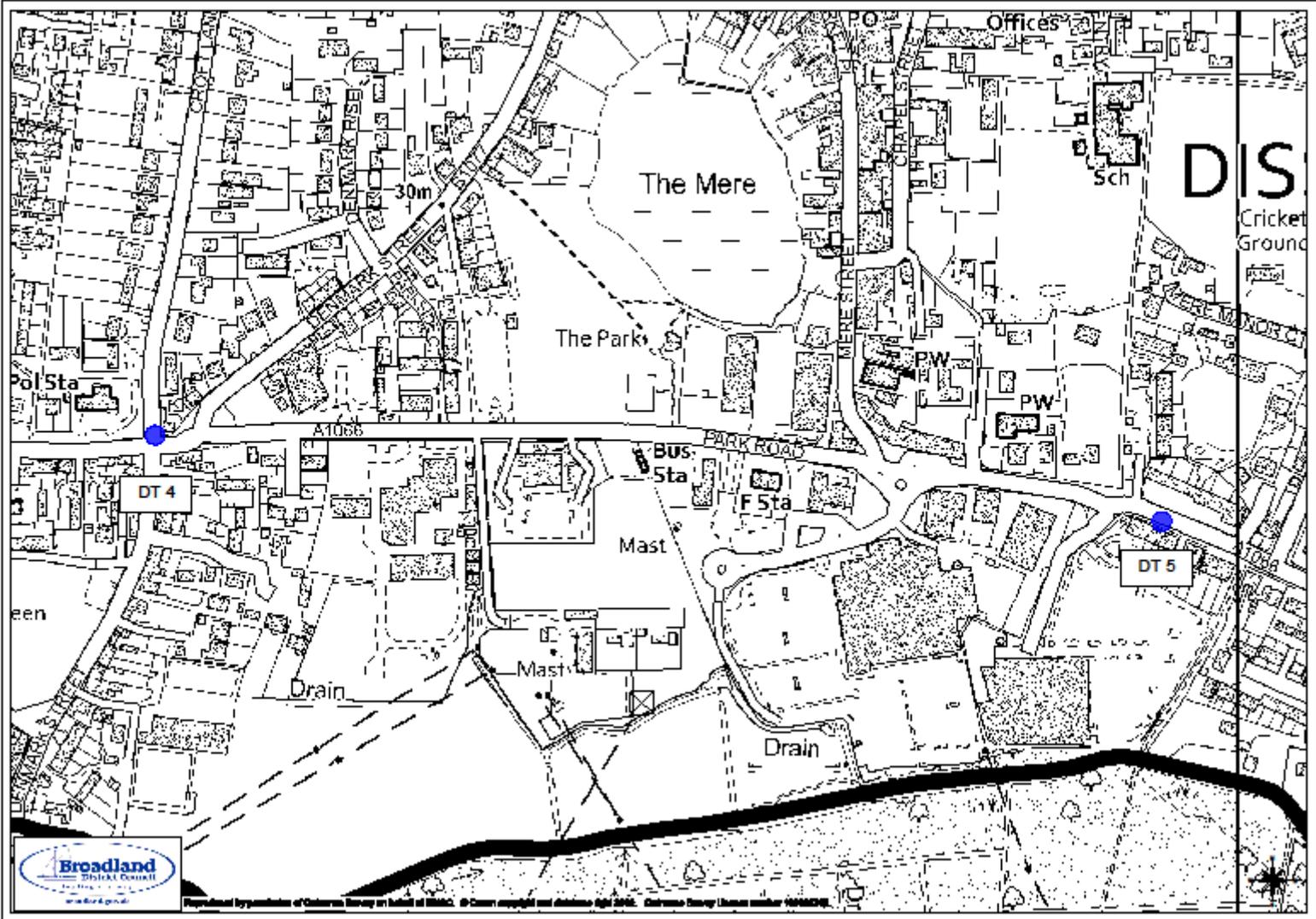


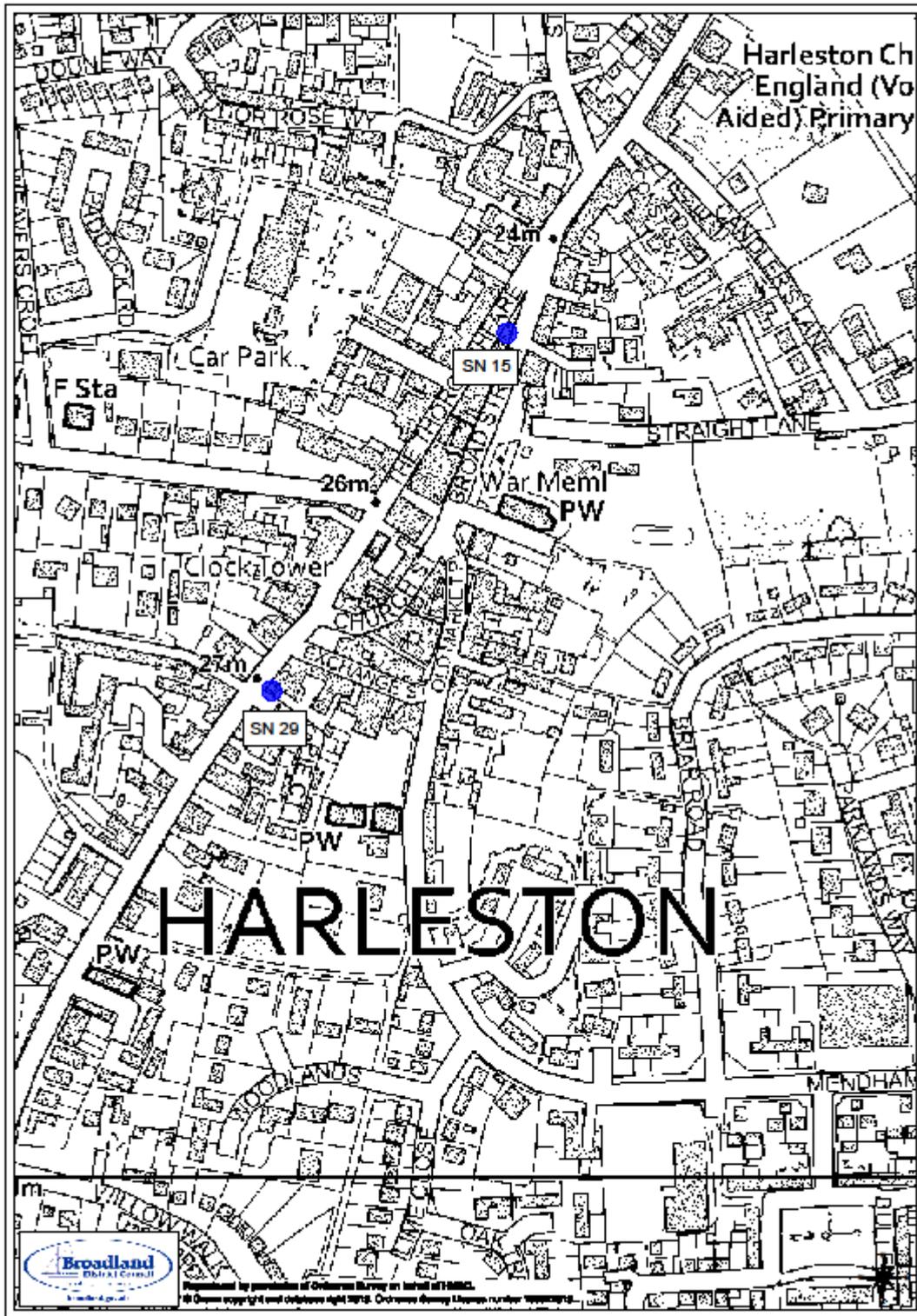
South Norfolk District Council

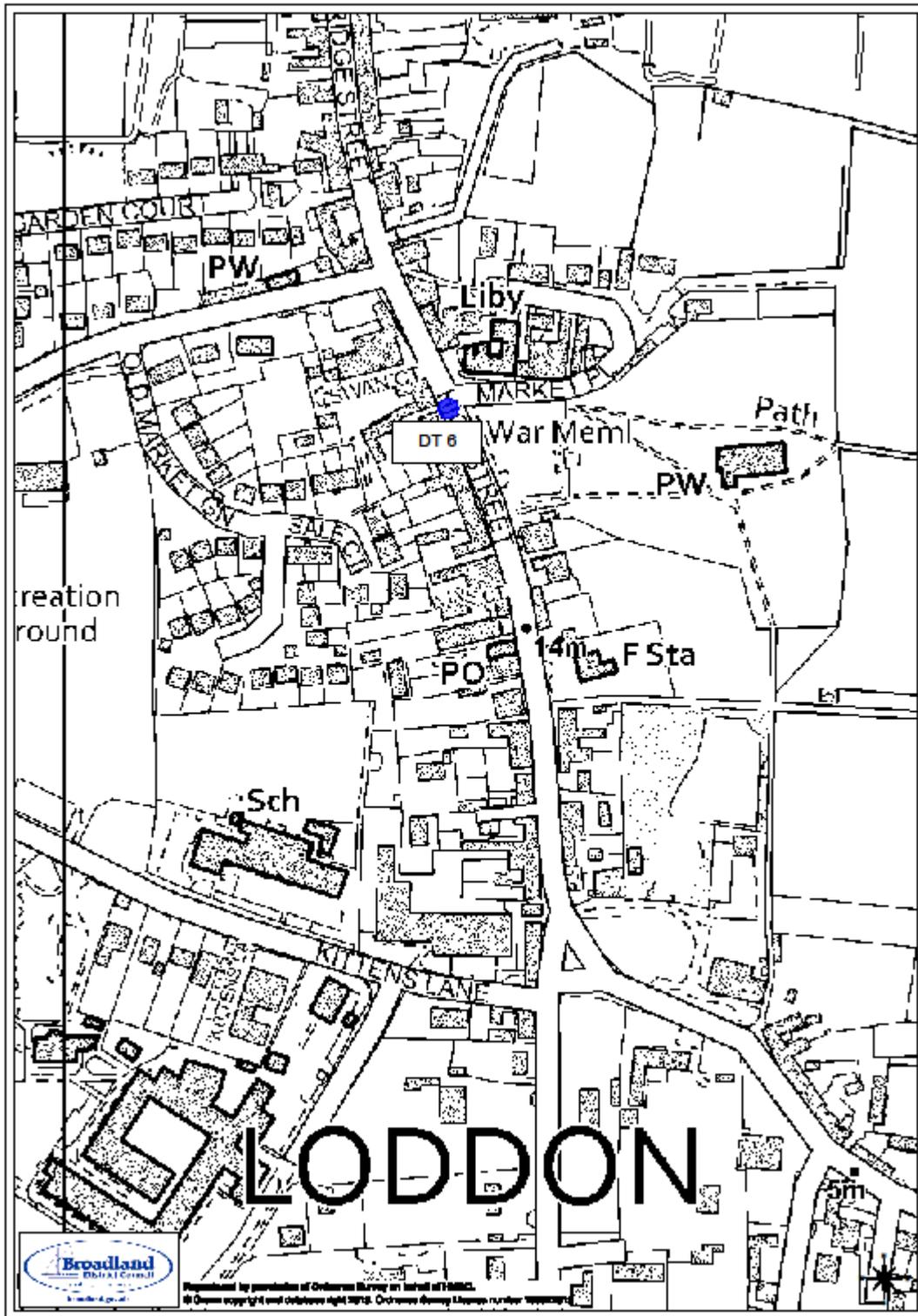


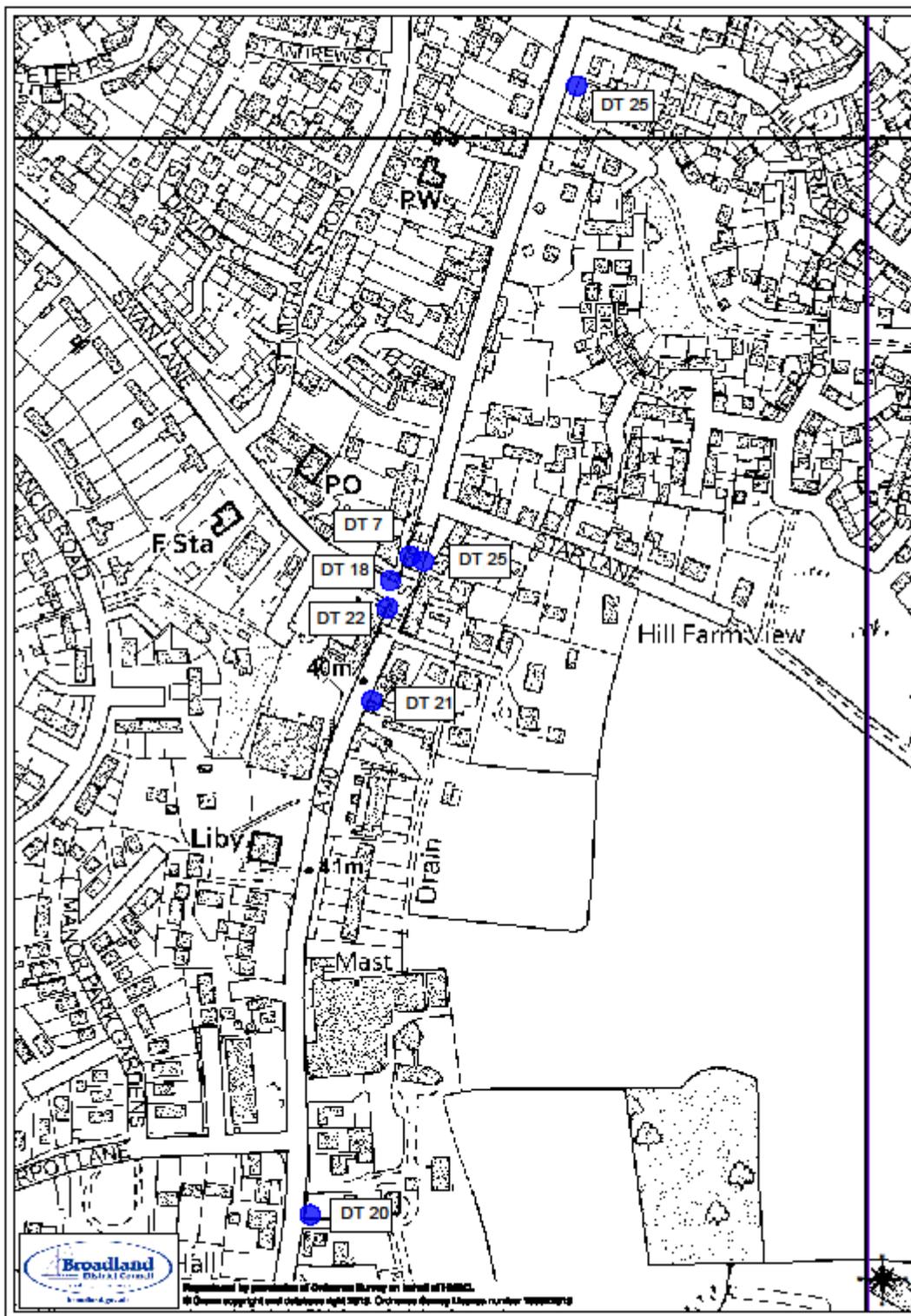


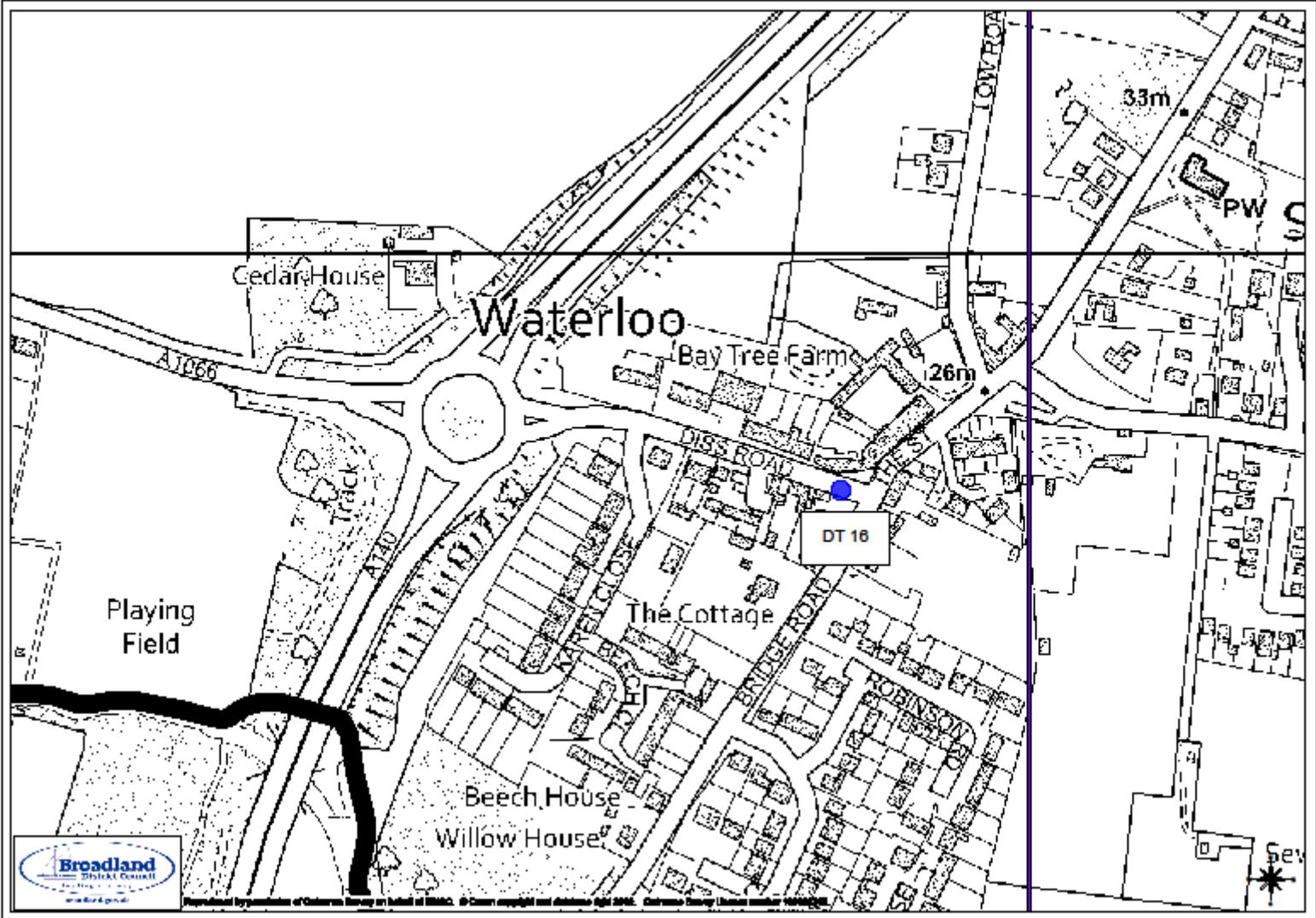


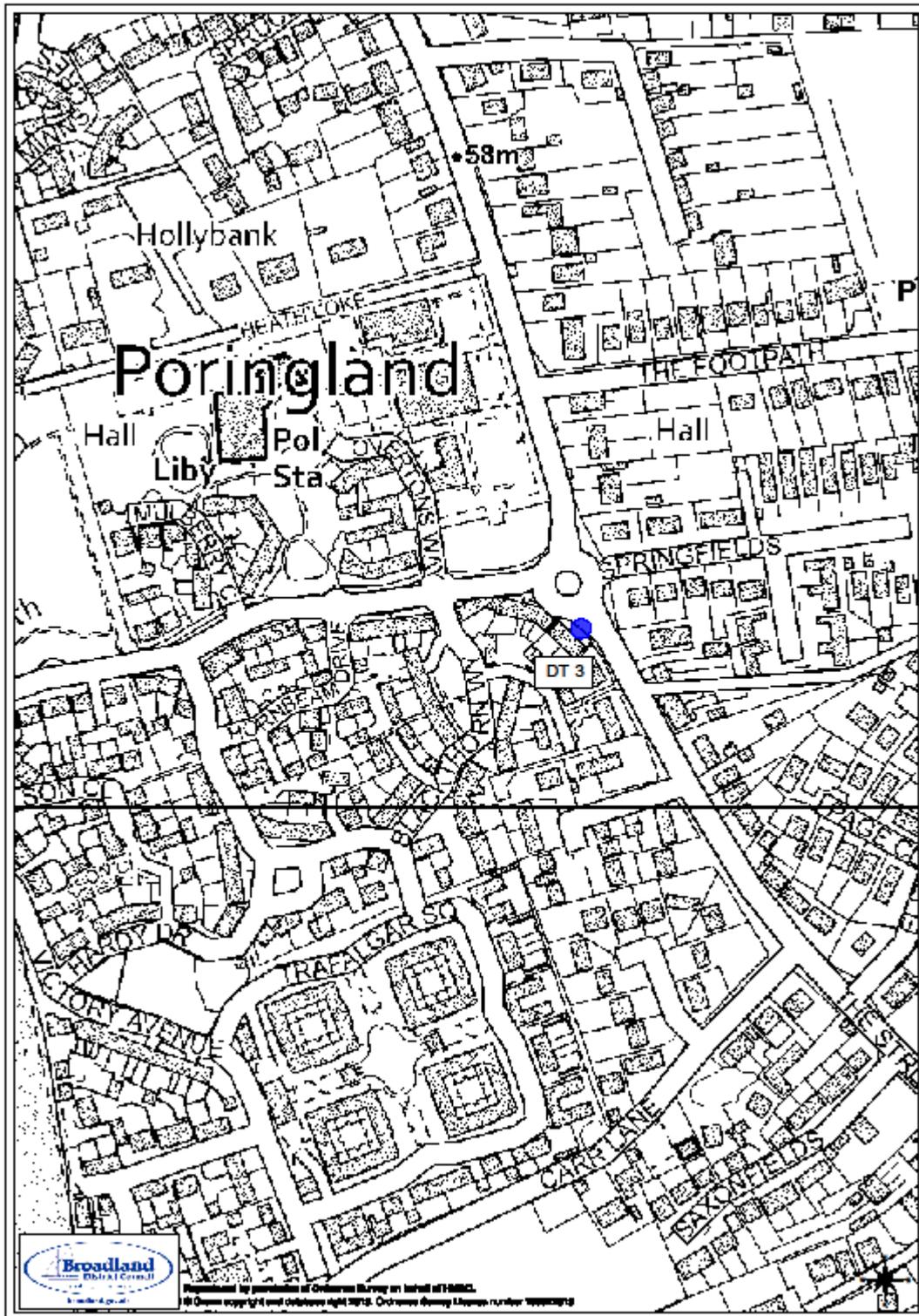












Appendix E: Summary of Air Quality Objectives in England

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 microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO ₂	Sulphur Dioxide
...	...

References

Local Air Quality Management Policy Guidance (PG16)

Local Air Quality Management Technical Guidance (TG16)

Air Pollution Background Concentration Maps (2010, 2011, 2013, 2015)

Greater Norwich Growth Area Air Quality Pledge (2017)

Draft Norfolk Bus Charter (2019)