NORWICH
City Council

Norwich City Council
Air Quality Action Plan

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

June 2021

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Executive Summary

This Air Quality Action Plan (AQAP) has been produced as part of our statutory duties required by the Local Air Quality Management framework. It outlines the action we intend to take to improve air quality in Norwich City Council between 2020 and 2025.

This action plan replaces the previous action plan, which ran from 2015-2020. Projects proposed through this action plan are detailed in table 5.1.

Air pollution is associated with a number of adverse health impacts and is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society, for example children and older people, and those with heart and lung conditions. There is also often a strong correlation with equality 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]. Norwich City Council is committed to reducing the exposure of people in Norwich to poor air quality in order to improve their health.

We have developed actions that can be considered under ten broad topics: -

- Introduction of Low Emission Zone
- Reducing vehicle idling through engine switch-off legislation.
- Promoting low emission transport
- Promoting travel alternatives
- Alternatives to private vehicle use
- Transport planning and infrastructure
- Freight and delivery management
- Traffic management
- Policy guidance and development control
- Public information
- Vehicle fleet efficiency
- Environmental permits

[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

Our main priorities are to reduce emissions from public transport (Buses, Private Hire Vehicles and Taxis) and promote alternative modes of travel. To achieve this, Norwich City Council in conjunction with Norfolk County Council are proposing the following measures to be carried out over the next 5 years:

- Expansion of the Low Emission Zone (LEZ),
- Restricting traffic in the LEZ to a much tougher Euro emission standard by end of 2023 following discussions with transport operators,
- Extending engine switch off powers to accommodate extended LEZ,
- Promote low emission public transport through the use of external grant schemes and private investment,
- Reviewing traffic light junctions to reduce congestion and improve traffic flow – this could include updating traffic lights to smarter technology,
- Make road junctions safer and easier for cycles & pedestrians,
- Expand the cycle networks (Pedalways) and create safe more connected corridors for pedestrians and cyclists,
- Build upon School Travel Plans and introduce School Streets. Encourage schools to participate in air quality initiatives such as Clean Air Day,
- Introduce Mobility Hubs at key transport interchanges,
- Engage the public through a behaviour change programme, including the use of social media, to be more aware of taking personal responsibility for reducing air pollution, such as engine switch off, walking/cycling/car share/car club, using an open fire responsibly.

With the implementation of the above measures, it is felt Norwich City Council could conceivably meet its key objective to reduce NO_2 levels to below the National Air Quality Objective level or, at minimum, shrink the current Air Quality Management Area. These measures should also have some impact on particulates and hence it is anticipated $PM_{2.5}$ will continue to meet the World Health Organisation's guideline level.

This AQAP outlines how we plan to effectively tackle air quality issues within our control. We recognise that there are a large number of air quality policy areas that are

outside of Norwich City Council's influence (such as vehicle emissions standards agreed in Europe, transboundary pollutants etc), but for which we may have useful evidence, and so we will continue to work with regional and central government on policies and issues beyond Norwich City Council's direct influence.

Responsibilities and Commitment

In 2019 officers from Broadland DC, Norfolk County Council, Norwich City Council and South Norfolk DC agreed a Greater Norwich Growth Area Air Quality Pledge[4] to assist them in their operational delivery of air quality improvements across the county.

This pledge, although not a statutory document, will see the officers from the organisations collaboratively working to deal with transport derived air pollution.

The officer group will also work in conjunction with academic institutions (UEA), Highways England, bus, coach and rail companies, taxi firms, freight and distribution companies, car clubs and schools to achieve the improvements.

This AQAP was prepared by the Public Protection Department of Norwich City Council.

Progress each year will be reported in the Annual Status Reports (ASRs) produced by Norwich City Council, as part of our statutory Local Air Quality Management duties.

If you have any comments on this AQAP please send them to:

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[4] https://www.norwich.gov.uk/downloads/file/7125/greater_norwich_growth_area_air_quality_pledge

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1 Introduction

This report outlines actions that Norwich City Council will endeavour to deliver between 2020-2025 in order to reduce concentrations of air pollutants and exposure to air pollution; thereby positively impacting on the health and quality of life of residents and visitors to the City of Norwich.

It has been developed in recognition of the legal requirement on the local authority to work towards Air Quality Strategy (AQS) objectives under Part IV of the Environment Act 1995 and relevant regulations made under that part and to meet the requirements of the Local Air Quality Management (LAQM) statutory process.

This Plan will be reviewed every five years at the latest and progress on measures set out within this Plan will be reported annually within Norwich City Council's air quality Annual Status Report (ASR).

2 Summary of Current Air Quality in Norwich

The major pollutant source in the city is road traffic. Source apportionment exercises identify oxides of nitrogen from road traffic to be the most significant source of nitrogen dioxide (NO_2). Oxides of nitrogen are a by-product of incomplete combustion. Buses with the older technology engines have been identified to be the main contributor. Taxis and private hire vehicles are, on the whole, less polluting as their vehicle fleets have been systematically updated. This is due to Norwich City Council's work with taxi operators to mandate a longevity of the vehicle and by a desire by the operators to offer a more environmentally friendly mode of transport.

An Air Quality Management Area (AQMA) covering an area around central Norwich was declared in 2012 for exceedances of the annual mean NO_2 objective. All other pollutants have been screened out as they have met national objective levels.

Overall, NO_2 concentrations within the central AQMA are falling. In 2012, 10 of the diffusion tube monitoring locations exceeded the annual mean objective of 40µg/m^3. In 2019, the usual hot spots exceeded, Castle Meadow, Riverside Road, St Augustine's Street, St Stephens Street and Chapel Field North. The highest exceedance was Castle Meadow Mid at 47µg/m^3. However, once distance corrected and removing those not of relevant exposure, only 4 locations exceeded, 2 of which being at the objective level of 40µg/m^3. This shows levels continue to look promising and are on a downward trend despite re-locating diffusion tubes each year to try and find localised pollution hotspots as road changes are implemented.

In Norwich particulate matter, primarily $PM_{2.5}$, is known to be mostly a transboundary rather than city derived pollutant and hence strongly affected by meteorology. Both Castle Meadow & Norwich Lakenfields automatic stations show that the annual mean objective level of 25µg/m^3 (not set in Regulations) was easily met and in 2018 and 2019, both stations also met the World Health Organisation recommended guideline level of 10µg/m^3. The levels of PM_{10} recorded did not exceed the annual, or 24 hour, mean objective as set down in the Air Quality Strategy. For full details please refer to the 2020 Annual Status Report from Norwich City Council.

3 Norwich City Council's Air Quality Priorities

3.1 Public Health Context

Environmental legislation introduced over the past fifty years has provided a strong impetus to reduce the levels of harmful pollutants in the UK; as a result, current concentrations of many recognised pollutants are now at the lowest they have been since measurements began. However, although the lethal city smogs of the 1950s, caused by domestic and industrial coal burning, have now gone for good, air pollution remains a problem in the UK. Medical evidence shows that many thousands of people still die prematurely every year because of the effects of air pollution. The proportion of air pollutants that comes from traffic, has been increasing whilst the traditional heavy industrial pollution sources are in decline. Road traffic is the primary source of NO_2 air pollution in Norwich as there is very little industrial pollution.

In recent years, the issues surrounding indoor air quality have come to the fore, with understanding that the levels of indoor air pollution can, in some circumstances, have a more adverse effect on human health than outdoor air pollution. As a result, the council is working, mostly via social media and their website, to advertise this fact and to promote healthier indoor space. One of the main sources of indoor air pollution is from open fires and the council's website contains advice and links to assist residents in the choice of the most appropriate fires and fuel. This should translate into improved outdoor air quality as pollution from open fires will become better recognised and people will shift their own behaviour to favour healthier air.

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, which together are referred to as NOx. All combustion processes produce some NOx but only NO_2 is associated with adverse effects on human health. Nitrogen dioxide is predominantly a secondary pollutant formed by the oxidation of nitric oxide in the atmosphere.

Tyre wear and brake dust are now also known to generate particulate pollution especially in urban environments. Measures to reduce road traffic pollution will therefore play a major role in meeting the air quality objective for NO_2 and to some extent also reduce PM_{10} & $PM_{2.5}$.

As NO_2 has both short term and long-term health effects, two objectives have been set for NO_2 concentrations. The first is an hourly objective currently set at 200 micrograms per cubic metre (µg/m^3) not to be exceeded more than 18 times a year. The second is an annual objective of 40 µg/m^3. Real time monitoring carried out in the city has shown that, for the most part, the hourly objective for NO_2 is now being met.

Since monitoring began in 1998, Norwich has experienced no exceedance of the PM_{10} objective levels and has fallen well within the EU limit value to be met by 2020 for $PM_{2.5}$. Furthermore, over the last 2 years both automatic monitoring sites in Norwich have met the stringent WHO guideline level for $PM_{2.5}$.

3.2 Planning and Policy Context

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality. This culminated in The Environment Act 1995. The Air Quality Strategy provides a framework for air quality control through air quality management and set standards. There are other air quality standards[5] and their objectives[6] have been enacted through the National Air Quality Standards (NAQS) in 1997, 2000 & 2010.

The Environment Act 1995 requires local authorities to undertake the review and assessment of local air quality. In areas where it is anticipated that an air quality objective will not be met, local authorities are required to declare an Air Quality Management Area. Once an Air Quality Management Area is declared, the local authority must develop an Action Plan, which sets out how it will use the powers at its disposal in pursuit of the National Air Quality Objectives. However, local authorities are not obliged to achieve the objectives, as they do not have sufficient control over all the sources which could potentially give rise to the breach, but are obliged to work towards meeting the objectives. For example, in England major roads and motorways are usually under the control of the Highways Agency, and large industrial processes are regulated by the Environment Agency. The vast majority of Air Quality Management Areas have been declared because of emissions from road transport.

[5] Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.
[6] Refers to objectives in the Strategy for each of the eight pollutants. The objectives provide policy targets by outlining what should be achieved in the light of the air quality standards and other relevant factors and are expressed as a given ambient concentration to be achieved within a given timescale.

Norwich City Council and Norfolk County Council recognise their role in pursuit of the achievement of the national objectives set out in the NAQS and have been working closely to try to achieve these targets where the Air Quality Management Area has been declared.

In order to aid this, Norwich City Council have made air quality a material planning consideration for all significant developments with the AQMA and as such have made it compulsory for the applicant to submit an Environmental Impact Assessment for Air Quality with the planning application.

3.3 Source Apportionment

The AQAP measures presented in this report are intended to be targeted towards the predominant sources of emissions within Norwich City Council's area.

A source apportionment exercise carried out by AEA Technology which identified emissions of oxides of nitrogen (NOx) from traffic on roads close to the AQMAs as the most significant source contribution of NO_2. Emissions of NOx from local traffic accounted for approximately 68 -79% of the total modelled NOx concentrations at the most affected properties within the AQMAs. Since this work was carried out, there have been no significant changes in Norwich in terms of industrial development etc., so it is considered that this model is still applicable.

In 2015, a source apportionment study identified the primary contributor of $PM_{2.5}$ in Norwich was residual particulates (34%) and salt (35%). Norwich has a rural hinterland with a large agricultural industry, and it is activities associated with this that is expected to be the significant contributor along with salt due to Norwich's proximity to the coast. The composition of $PM_{2.5}$ is not expected to have significantly changed.

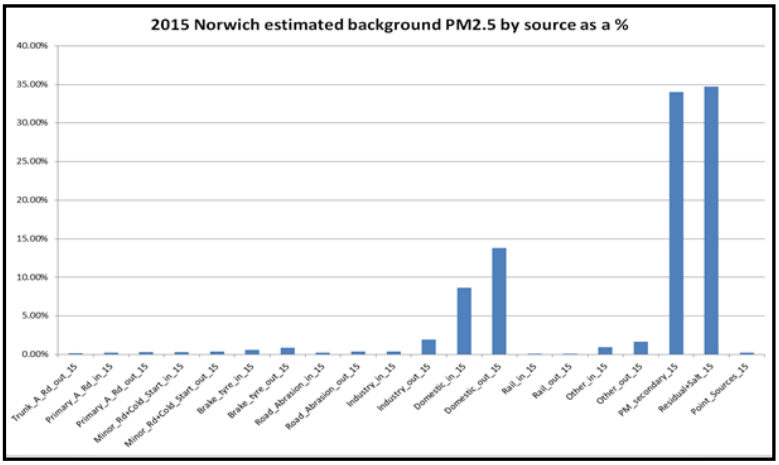


Figure 1. Source apportionment

3.4 Required Reduction in Emissions

3.4.1 NO_2

Overall, NO2 concentrations within the central AQMA are falling. In 2012, 10 of the diffusion tube monitoring locations exceeded the annual mean objective of 40µg/m3. In 2019, the usual hot spots exceeded, Castle Meadow, Riverside Rd, St Augustine's Street, St Stephens Street and Chapel Field North. However once distance corrected and removing those not of relevant exposure, only 4 locations exceeded, 2 of which sitting at the objective level of 40µg/m3. This shows levels continue to look promising and are on a downward trend despite relocating diffusion tubes to try and identify new hotspots. Figure 4 represents the last 5 years of monitoring for both the automatic stations and ratified diffusion tube data. It illustrates the slow but steady downward trend in NO_2 levels.

If the known problem areas are discounted, no new hotspots have been identified. This is reassuring. Unfortunately, the known hotspots occur principally on narrow medieval streets which form part of the major radial road network into and out of the city. These streets are also typically fronted by tall buildings, thus creating street canyons, or are constricted by waterways.

In order to calculate the percentage reduction in Road NOx that will be required to meet the national air quality objective level, guidance given in LAQM TG16 Box 7.5 & 7.6 and the LAQM NOx-NO_2 calculator has been used. The 2020 ASR concludes that the NO2 levels at CM1 were however uncharacteristically low in 2019 and that this

may not be entirely realistic but, at least in part, brought about by roadworks significantly reducing the flow of traffic onto the Castle Meadow / Agricultural Plain junction. As a result, an annual mean NO2 level averaged over the last 5 years has been used in this calculation as opposed to utilising the 2019 level. It is therefore calculated there will need to be a 44% reduction in Road NOx at the Castle Meadow monitoring station location (CM1) in order to meet the objective level. At 52 St Augustine's Street, the highest measured level within the AQMA at relevant receptor location, there would need to be a 22% reduction in Road NOx in order to meet the objective level. See Figures 2 & 3 below.

Receptor ID	CM1	DT11 52 St Aug. St
Measured NO2 level µg/m3	51.4 (average level over last 5 years)	46 (2019 level)
Background level 2019 µg/m3	13.1	13.1
Traffic Mix	Buses outside London	All UK urban traffic outside London
Fraction emitted as NO_2	0.105863	0.227128
Road Increment NOx µg/m3	139.86	77.03
Road NO_2 µg/m3	38	32.97
NO_2 Objective Level µg/m3	40	40
Required Road NOx µg/m3 to meet Obj. Level	78.85	60.42
Difference Road NOx Required vs Measured µg/m3	61.01	16.61
% Reduction in Road NOx required to meet objective level	43.6%	21.6%

Figure 2. Relevant Statistics from the NOx-NO_2 Calculator

Local Authority:	Norwich					Year:	2019		
						Traffic Mix:	Buses outside London		
Receptor ID	Easting,m	Northing, m	Road increment NO_x µg m^{-3}	Background µg m^{-3}		Fraction emitted as NO_2	Total NO_2 µg m^{-3}	Road NO_2 µg m^{-3}	Notes
				NO_x	NO_2				
CM1	623202	308615	139.86		13.1	0.105863	51.1	38	Buses outside London
52 St Aug. St	622826	309573	77.03		13.1	0.227128	46	32.9	All UK urban traffic outside London

Figure 3. Extract from the NOx-NO_2 Calculator

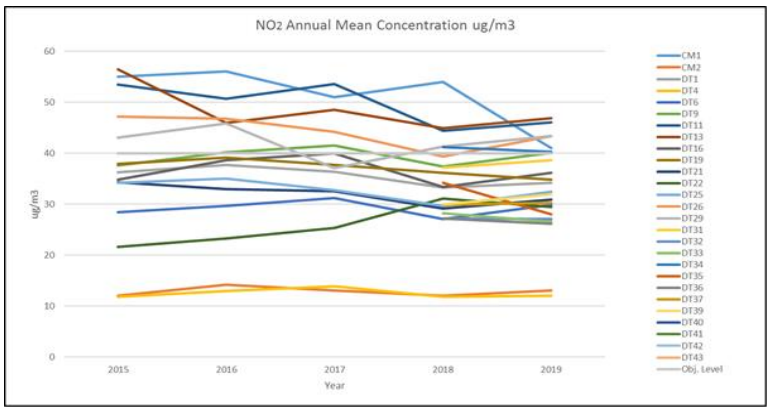


Figure 4. NO_2 Annual Mean for Last 5 Years

3.4.2 PM_{10}

The Air Quality objective for PM_{10} (particle matter of 10microns or greater) is 40µg/m^3. In 2019 the annual mean concentration of PM_{10} at the Castle Meadow automatic monitoring site was 19µg/m^3 and hence lies well below the annual mean objective. There were 5 exceedances of the 24-hour mean of 50µg/m^3 (35 allowed).

There were 8 exceedances of the 24-hour mean of 50µg/m^3 (35 allowed), and the maximum daily mean recorded was 70µg/m^3 (95% data capture).

Figure 5 below shows the results of the last 5 years of monitoring and, as the air quality objective has not been exceeded, no further assessment of PM_{10} will be undertaken as there is no reason to believe this level should increase. In fact, should the proposed measures in the AQAP be applied, these levels would be expected to decrease further.

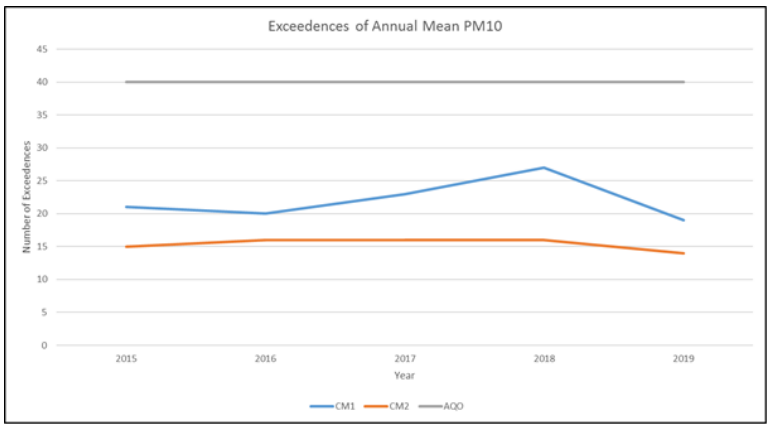


Figure 5. Exceedances of Annual Mean PM_{10}

3.4.3 $PM_{2.5}$

No regulatory value exists for $PM_{2.5}$ but local authorities are recommended to move towards the annual average EU limit value of 25µg/m^3, as stated in the Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe[7]. The World Health Organisation document "WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide", recommends a guideline value for $PM_{2.5}$ of 10µ/m^3. Norwich City Council's Annual Status Reports (ASR) show that in 2018 and 2019 the stringent WHO guideline level for $PM_{2.5}$ was met, as shown in figure 6 below. The ASRs go on to state that the main source of the $PM_{2.5}$ pollution is transboundary, being generated by agricultural fields, marine spray, salt particles and wind-blown continental pollution.

As both the annual average EU limit value and the WHO guideline levels are being met, no further assessment of $PM_{2.5}$ will be undertaken.

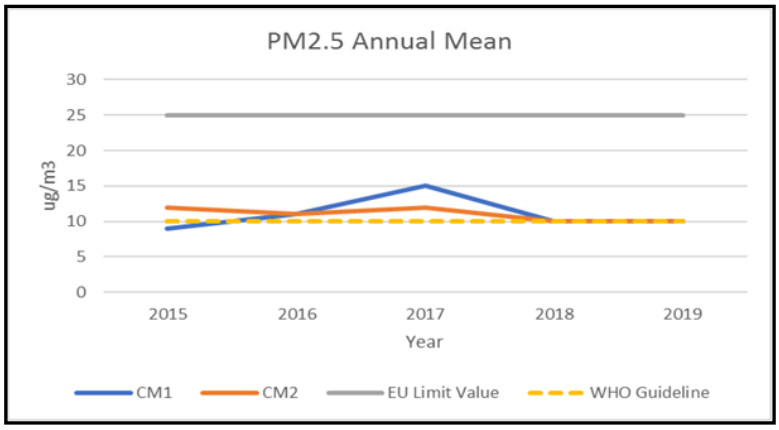


Figure 5. PM2.5 Annual Mean

3.5 Key Priorities

In this section, Norwich City Council sets out its air quality priorities and drivers for action to improve air quality. These are stipulated in the local public health and planning policy context in the Greater Norwich Area. This includes the technical supporting evidence with source apportionment of the main sources of air pollution, as well as the necessary reductions required to meet the air quality objectives.

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050

Norwich City Council

In 2020, all Highways functions within Norwich City Council were moved to Norfolk County Council. From an air quality perspective this means that it is even more crucial for the two councils to work closely with stronger collaboration.

The air quality action plan measures (Table 5.1) identifies which organisation is responsible for the delivery of the measure. Norfolk county council lead on the majority of the measures with city council collaborative working on measures 1, 5, 9, 18, 19, & 23. Norwich city council leads on measure 4.

In addition, the city council is the lead in relation air quality monitoring and annual reporting to Defra.

Norfolk county council through the Transforming Cities Fund have secured funding to support the delivery of the measures.

The priorities for Norwich City Council are:

- Expand the Low Emission Zone (LEZ) to encompass all bus and taxi only streets in the AQMA
- Restrict traffic in the LEZ to a much tougher Euro emission standard by end of 2023, engage with bus operators to aid this transition
- Extend engine switch off powers to accommodate the expanded LEZ, engage with bus operators and NCC Civil Enforcement Officers to facilitate its uptake and success
- Encourage the review of traffic light times, synchronicity, and their update to smarter technology
- Facilitate the reconfiguring of road junction changes to allow safer and more fluid transit for cycles & pedestrians
- Encourage the updating of School Travel Plans, aid the introduction of School Streets (including instigating air quality monitoring to show before and after scenarios), encourage the education of students on the importance of air quality
- Facilitate the expansion of the cycle networks (Pedalways) and create safe corridors for pedestrians and cyclists
- Aid the introduction of Mobility Hubs at key transport interchanges

- Engage the public, including through social media, to be more aware of taking personal responsibility for reducing air pollution, such as engine switch off, walking/cycling/car share/car club, using an open fire responsibly

With the implementation of the above measures, it is felt Norwich City Council could conceivably meet its key objective to reduce NO_2 levels to below the National Air Quality Objective level or, at minimum, shrink the current Air Quality Management Area. These measures should also have some impact on particulates and hence it is anticipated $PM_{2.5}$ will continue to meet the World Health Organisation's guideline level.

4 Development and Implementation of Norwich City Council AQAP

4.1 Consultation and Stakeholder Engagement

In developing/updating this AQAP, we have worked with other local authorities, agencies, businesses, and the local community to improve local air quality. Schedule 11 of the Environment Act 1995 requires local authorities to consult the bodies listed in Table 4.1.

Table 4.1 – Consultation Undertaken

Yes/No	Consultee
No	the Secretary of State
No	the Environment Agency
Yes	the highways authority
Yes	Norfolk County Council
Yes	all neighbouring local authorities
Yes	other public authorities as appropriate, such as Public Health officials
No	bodies representing local business interests and other organisations as appropriate

Note;

Environment Agency has not been consulted as no Part A1 processes considered to be contributing to NO_2 exceedences and are outside AQMA. Action Plan does not have any effect on water courses.

Bodies representing local businesses and organisations, such as bus companies, have not been contacted directly by City Council but bus companies have been contacted by the County Council, the leading Authority for such companies.

5 AQAP Measures

Table 5.1 shows the Norwich City Council AQAP measures. It contains:

- a list of the actions that form part of the plan
- expected benefit in terms of pollutant emission and/or concentration reduction
- the timescale for implementation
- how progress will be monitored

NB: Please see future ASRs for regular annual updates on implementation of these measures

Table 5.1 – Air Quality Action Plan Measures

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Castle Meadow Low Emission Zone	Promoting Low Emission Transport	Low Emission Zone (LEZ)	Norfolk County Council (NorCC) & Norwich City Council (NCC)	2004/5	2006/09	Reduction in NO^2 levels in Castle Meadow	Circa 10-15 $\mu g/m^3$ NO2	Erratic decline in NO^2 but probably would have been worse without LEZ.	Ongoing	Ongoing review of LEZ and the requirement to further reduce vehicle emissions. We are committed to agreeing with bus operators firm agreed dates for tougher Euro standards and ultimately zero emission compliance. (to be incorporated in revision of Bus Charter). Engine switch off enforcement commenced in autumn 2018 on Castle Meadow & St Stephens St where there is bus & taxi only traffic. Plans being considered to extend the geographical scope of the LEZ.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
2	Review of traffic light times & synchronisation to optimise traffic flow for all new road layout schemes	Traffic Management	UTC, Congestion management, traffic reduction	NorCC)	2014/15	2016 +	Reduced city centre congestion as well as wider network	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds. (NO^2 levels at CM1 reduced by >10 $\mu g/m^3$ in 2019. Reason unknown but smart traffic lights installed at end on Castle Meadow close to CM1. To date this is considered to be one explanation)	Ongoing	2021/22	Congestion should be minimised, but this needs to be monitored and where applicable diffusion tube sites reviewed. In addition, the work on ring road junction improvements will aid this. Latest generation traffic signal control software is now in use. In 2019 this was implemented on Agricultural Plain (at end of Castle Meadow) to improve traffic flow on this complicated 5-way junction.
3	Ring road junction improvements	Traffic Management	UTC, Congestion management, traffic reduction	NorCC	2016	2020/23	Reduced city centre congestion as well as wider network / increased numbers of people walking and cycling	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Designs well advanced for Grapes Hill roundabout. A new Dutch-style roundabout is being designed for Heartsease Fiveways junction	2021/22	The current design of the Heartsease roundabout is a significant barrier to walking and cycling along this corridor, which leads to a dominance of car traffic into the city. This is also a key bus corridor, which sees considerable delays.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
4	Engine switch-off enforcement	Public Information	Other	NCC	2016	2018	Reduction in NO^2 levels in city centre and surrounds	Complimentary to other measures; in particular Castle Meadow LEZ. (NO2 levels at CM1 reduced by >10 µg/m^3 in 2019. Reason unknown but smart traffic lights installed at end on Castle Meadow close to CM1. To date this is considered to be one explanation)	Engine switch off enforcement in place with issue of Fixed penalty Notices for drivers who fail to comply when requested. To date no non-compliance.	Commenced August 2018	Use of powers to enforce engine switch-off via issue of fixed penalty notices. Enforcement commenced specifically on Castle Meadow & St Stephens where bus & taxi only traffic. Any extension of the LEZ would mean extension of engine switch off enforcement area.
5	Signage informing engine switch-off enforcement. Electronic displays at traffic lights giving waiting times.	Public Information	Other	NorCC	2014/15	2017 – trial on Riverside Rd	Reduction in NO^2 levels in AQMA	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Ongoing	Ongoing but October 2018 for switch off enforcement on Castle Meadow	New signage associated with enforcement of engine switch off educates road users and reinforces AQMA. The option to display waiting time at traffic lights is being considered.
6	Low NOx Buses	Promoting Low Emission Transport	Public Vehicle Procurement -Prioritising uptake of low emission vehicles	NorCC	N/A	N/A	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	24 buses retrofitted by June 2018. First Bus has committed to £18m investment in new and refurbished vehicles to make their entire fleet Euro 5/6	Ongoing	Aim is to work in partnership with bus operators on funding opportunities relating to low NOx emission vehicles. An unsuccessful application to the All-Electric Bus Town Fund was made in 2020.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
7	Assess opportunity for a zero-emission bus fleet to operate the Norwich Park & Ride service when the contract is renewed in 2023	Promoting Low Emission Transport	Other	NorCC			Reduction in NO^2 levels in city centre and on busy feeder roads	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds		2022/23	Park & Ride Bus contract due for renewal giving opportunity for a zero-emission fleet. A successful grant application may be required. Policy decision would be needed as to whether the County Council continues to aim to operate the Park & Ride service as a zero-subsidy contract.
8	School Travel Plans	Promoting Travel Alternatives	School Travel Plans	NorCC	–	Implemented but requires updating	Reduction in NO^2 levels in city centre and surrounds. Passive NO^2 monitoring to be installed outside key schools.	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Ongoing	Ongoing	County to request updated travel plans - prioritising schools inside AQMA. Travel Plan to focus on using buses, cycling and walking to school to ensure travel by private car is minimised. County Council already promotes Modeshift Stars software with schools so they can generate and manage their own travel plans. Consideration will be given to whether school bus contracts can be amended on their renewal to utilise low emission vehicles. School travel plans to be highlighted as part of Clean Air Day campaign – led by County & Public Health Norfolk.
9	CCAG programmes	Promoting Travel Alternatives	Promotion of cycling	NCC, NorCC	2013	2014-2019	Reduction in vehicle use in city centre. Increased no. people cycling	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Complete	2019/20	Cycle routes have been extended and more joined up. All 2 orbital and 5 radial pedal ways now substantially complete.
10	West to East traffic restriction in Norwich City Centre	Traffic Management	UTC, Congestion management, traffic reduction	NorCC		2020/23	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2022/23	Provides substantially improved conditions for pedestrians and reduces congestion with buses
11	Revised layout in St Stephens Street / Red Lion Street	Traffic Management	UTC, Congestion management, traffic reduction	NorCC		2020/23	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2022/23	Provides substantially improved conditions for pedestrians and reduces congestion with buses

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
12	Thorpe Road bus/cycle contraflow	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	NorCC		2020/21	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2020/21	Provides a substantially improved and more direct route for buses and cyclists travelling into the city centre along a key radial route.
13	Mobility hubs at key transport interchanges	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	NorCC		2020/23	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2022/23	Key hubs being developed are at Norwich Rail Station, Norwich Bus Station, Norfolk & Norwich University Hospital and Bowthorpe
14	Bus rapid transit	Transport Planning and Infrastructure	Bus route improvements	NorCC	Ongoing	Ongoing	Reduced city centre congestion as well as wider network	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Ongoing	Ongoing	Transforming Cities will see substantial provision of priority for buses along key transport corridors including Dereham Road, Wroxham Road and Cromer Road.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
15	Rationalising and simplifying of traffic on Prince of Wales Road	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	NorCC	2016/17	Long term	Reduced city centre congestion	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Approval to construct given at June 2018 Highways Committee	2019	Works underway to reduce congestion and encourage greater levels of sustainable modes on this important link between the rail station and city centre.
16	Extension to Thickthorn Park and Ride site	Promoting Travel Alternatives	Other	NorCC		2020/23	Reduced city centre congestion as well as wider network	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2022/23	This will provide a sustainable travel option into the city centre as well as the University of East Anglia
17	Extension of Postwick Park and Ride site	Promoting Travel Alternatives	Other	NorCC		TBC	Reduced city centre congestion as well as wider network	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Project suspended	TBC	While spare capacity remains at the existing site, expansion of the site will remain on hold.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
18	Installation of Beryl Bikes, E-Bikes and E-scooters across the greater Norwich area	Promoting Travel Alternatives	Other	NCC + NorCC		2020	As of October 2020, 51,200 journeys have been taken and 223,000km have been covered by users of the service.	Studies are showing that 15% of all journeys taken by bike or scooter would otherwise have been taken by car.	Public bike share launched in March with E-scooters added in September as part of DfT trials	Scheme largely installed by end of 2020. Contract with Beryl runs until 2025 with option to extend.	Finding suitable space for bays to achieve optimal bay network density to drive up ridership.
19	Introduction of School Streets	Transport Planning and Infrastructure	Congestion management, traffic reduction	NCC & NorCC		2021/22	Reduction in traffic levels, improved air quality and greater numbers of pupils walking and cycling to school	Specific value not known but will encourage green corridors to be utilised by students/pupils	Introduction of School Streets	2021/22	The County Council will work with Sustrans and a wide range of stakeholders to implement.
20	Wayfinding. Investment in new and transformative infrastructure to encourage more sustainable modes of transport for commuting and leisure journeys	Transport Planning and Infrastructure	Other	NorCC		2020/23	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre	Outline design underway	2022/23	Provides substantially improved conditions for pedestrians and cyclists
21	Construction of final link of Northern Distributor Road (NDR) over River Wensum joining up with A47 West	Transport Planning and Infrastructure	Other	NorCC	2005	2023-2025	Reduced city centre congestion as well as wider network	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	?	2025	Post construction monitoring will be undertaken.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
22	Removal of private vehicle traffic from Tombland	Traffic Management	Strategic highway improvements, Re-prioritising road space away from cars, including Access management, Selective vehicle priority, bus priority, high vehicle occupancy lane	NorCC		Long term	Reduced city centre congestion	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Not started	TBC	Long term goal. Will be considered in light of emerging Transport for Norwich Strategy Review
23	Education & information campaigns to encourage more responsible driving and the use of alternative modes	Promoting Travel Alternatives	Other	NCC + NorCC	Ongoing	Ongoing	Reduction in NO^2 levels in city centre and surrounds	Specific value not known but will contribute to overall reduction in NO^2 levels in city centre and surrounds	Ongoing	Ongoing	Continuation of work to promote Transport for Norwich objectives utilising funding from DfT through Access fund.

6 Conclusions

In November 2012, Norwich City Council declared the whole of the city centre bounded approximately by the inner ring road as a single Air Quality Management Area. As a result, under the Environment Act 1995, it is a requirement of the Council to produce an Air Quality Action Plan in order to set down proposed measures to reduce air pollution and meet objective levels.

Implementation of measures identified from the previous Action Plan 2015, in addition to further road infrastructure changes and improvements to the emissions from public transport, is considered to have the greatest impact on tackling air pollution issues.

Improvements in air quality in Castle Meadow are anticipated as a result of building on the air quality measures already in place, principally by revising the Bus Charter and implementing tougher Euro emission standards for vehicles within the LEZ, plus the introduction of smart traffic lights.

The 2020 Action Plan therefore concentrates significantly on road and traffic changes. The overall aim of the road infrastructure changes are to divert as much non-essential traffic out of the city centre by way of restricted road access measures and re-routing of main traffic flows, while reducing emissions from traffic permitted within the LEZ.

Restricting access into the expanded LEZ for buses/taxis with tougher engine standards of Euro emissions will have ramifications for the bus and taxi companies. The proposed three-year time period for the execution of this measure should provide adequate time for businesses to adjust to this requirement which is long overdue and brings Norwich in line with other cities of its size and reach.

The 2020 Action Plan includes measures to increase bus lanes and cycle routes plus improvements to road junctions to facilitate safer cycle routes and greater connectivity.

Park & Ride facilities are continuously reviewed for ongoing improvement/expansion to enhance passenger utilisation.

In conjunction with road infrastructure changes, the plan is to also include new signage to encourage eco driving and traffic optimisation measures, such as traffic light synchronisation and traffic light control, possibly using indicative air pollution monitors, to optimise traffic flow, ease congestion and reduce queueing.

Many of the measures implemented in the 2015 Action Plan are still ongoing and supported. These include school and workplace travel plans, promoting alternative fuel use, land use planning, leading by example, continued support of Norfolk's car sharing and Car Club schemes, Travelwise initiative and promoting freight distribution centres.

All major developments in the city centre will have significant regard to air quality with a strong emphasis on sustainable travel methods. The Broadland Northway is expected to further divert traffic away from Norwich as a whole, and especially when the final link-up with the A47 is completed.

It is expected that the road infrastructure changes, in addition to all of the other proposed and ongoing measures, will achieve measurable improvements in air quality, particularly in the central AQMA.

Norwich City Council and Norfolk County Council are committed to improving air quality in the AQMA to bring it in line with the National Air Quality Standard for nitrogen dioxide. This Air Quality Action Plan will help guide the overall strategy to meet the government’s air quality objectives.

Appendix A: Response to Consultation

Table A.1 – Summary of Responses to Consultation and Stakeholder Engagement on the AQAP

Consultee	Category	Response
• Broadland DC	Local Authority	None received to date
• Norfolk County Council		Comments received from Highways 2020 and assimilated into report accordingly.
• Norwich City Council	Local Authority	Action Plan approved at Cabinet Meeting on 9th June 2021.
• Public Health Norfolk		Comments received, assessed and noted. E-mailed response.
• South Norfolk DC	Local Authority	None received to date.

Appendix B: Reasons for Not Pursuing Action Plan Measures

Table B.1 – Action Plan Measures Not Pursued and the Reasons for that Decision

Action category	Action description	Reason action is not being pursued (including Stakeholder views)

All actions from the previous Air Quality Action Plan have either been completed or are still ongoing.

Appendix C: Drawings

Figure 6. Norwich City AQMA

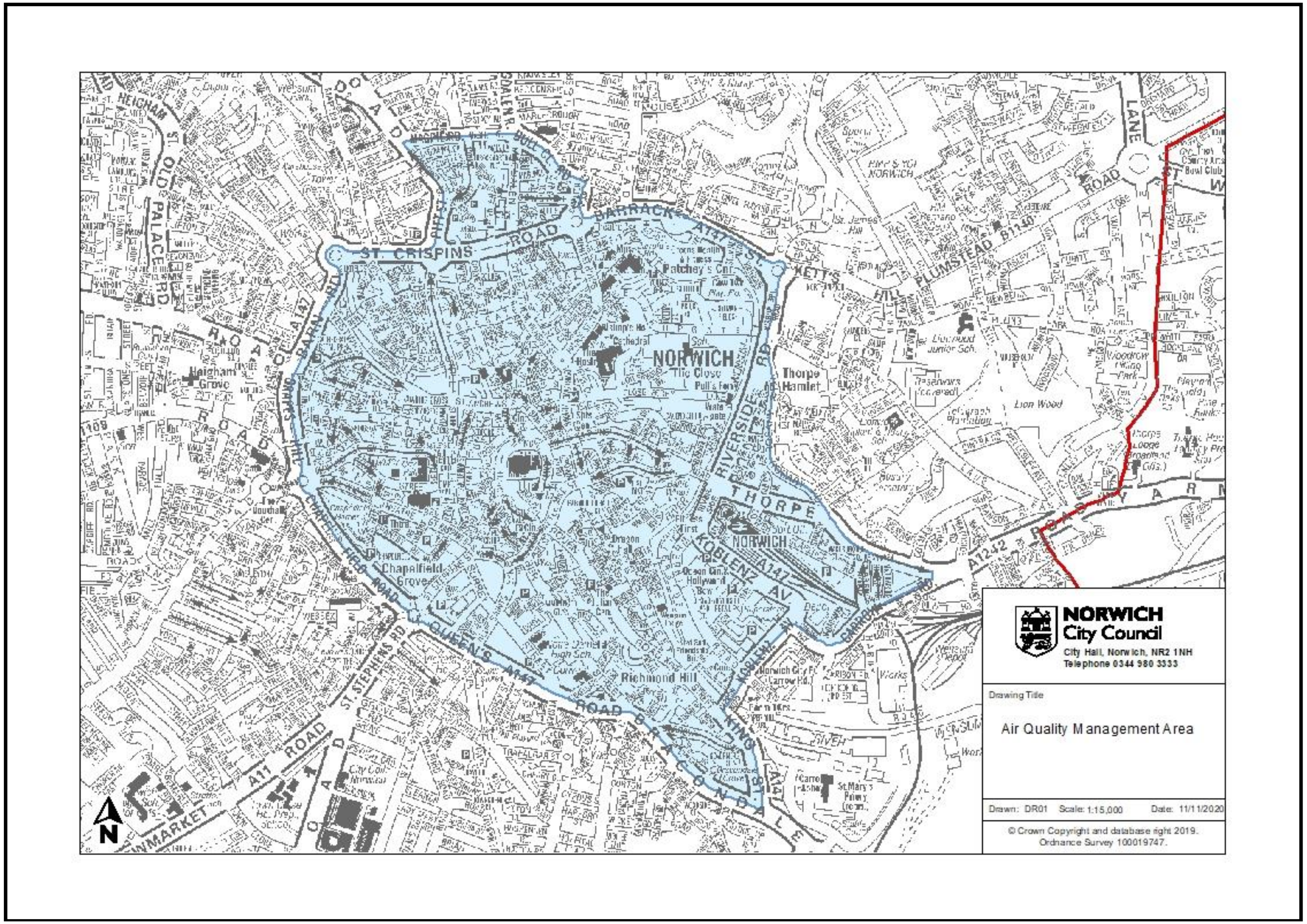


Figure 7. Norwich City Low Emission Zone - Current

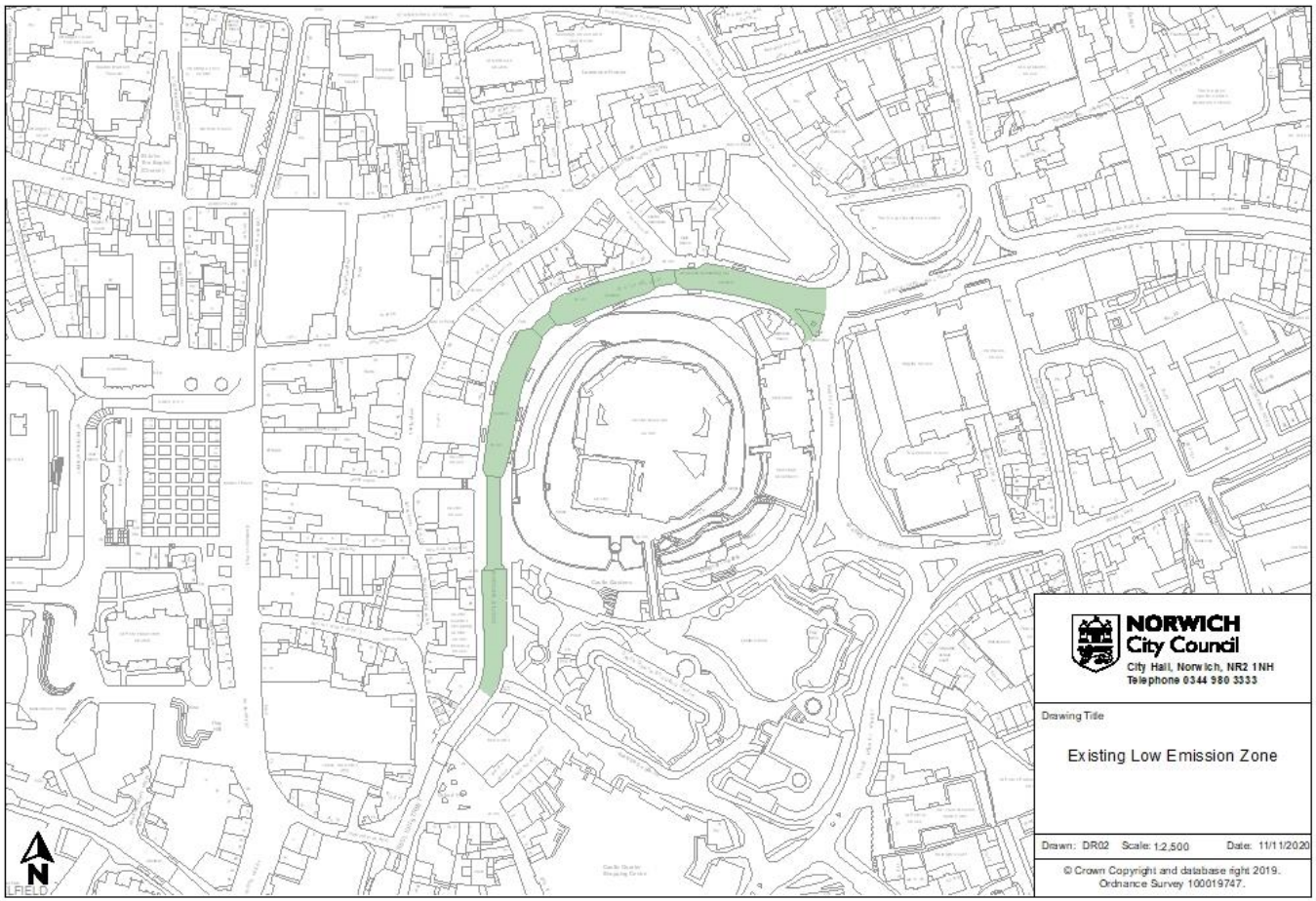
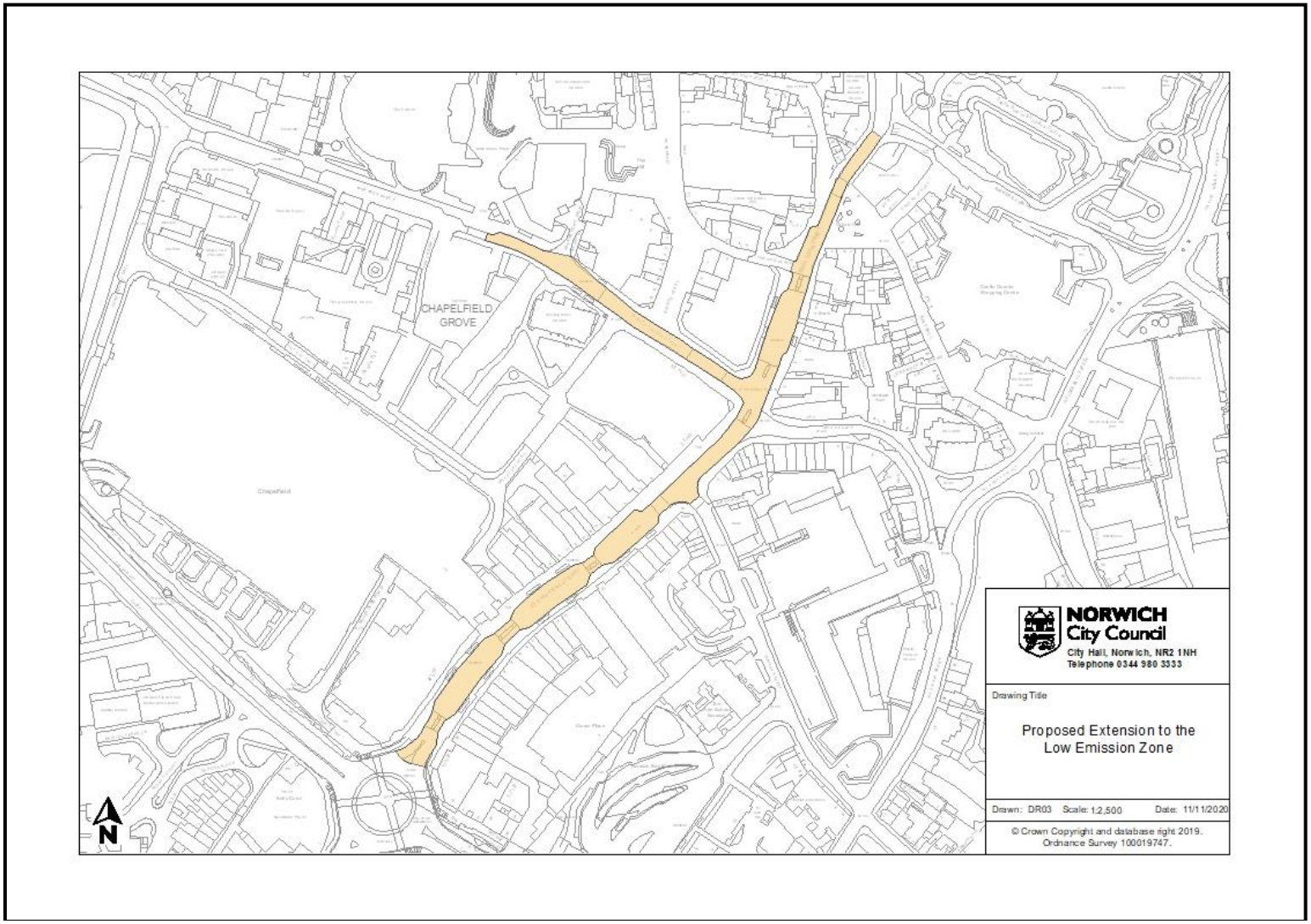


Figure 8. Proposed Extension to the Low Emission Zone.



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
AQS	Air Quality Strategy
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
EU	European Union
LAQM	Local Air Quality Management
NATS IP	Norwich Area Transport Scheme Implementation Plan
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NRP	Norwich Research Park
PHV	Private Hire Vehicle
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
TCF	Transforming Cities Fund

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Norwich City Council Annual Status Report 2020

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DEFRA (TG16) Local Air Quality Management Technical Guidance, Part IV of the Environment Act 1995, Feb 2018

DEFRA (PG16) Local Air Quality Management Policy Guidance, Part IV of the Environment Act 1995, April 2016

Air Quality Action Plan 2015, Norwich City Council

Annual Status Report 2016, Norwich City Council

Annual Status Report 2017, Norwich City Council

Annual Status Report 2018, Norwich City Council

Annual Status Report 2019, Norwich City Council

Norfolk County Council website – major projects and improvement plans - Norwich https://www.norfolk.gov.uk/roads-and-transport/major-projects-and-improvement-plans/norwich

DEFRA LAQM website – Air Quality Information Resource; http://uk-air.defra.gov.uk

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32008L0050