Cheshire West and Chester Council
Frodsham Air Quality Action Plan

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

May 2017

Cheshire West and Chester

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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 (LAQM) framework. It outlines the action we will take to improve air quality in the Frodsham Air Quality Management Area (AQMA) between 2017 and 2020.

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 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]. Cheshire West and Chester Council is committed to reducing the exposure of people in the Frodsham AQMA to poor air quality in order to improve health.

We have developed actions within the Frodsham AQMA that can be considered under five broad topics:

- Traffic management
- Freight and delivery management
- Public information;
- Promoting Low Emission Transport
- Promoting Travel Alternatives

Our main priority is reducing congestion and emissions.

Our secondary priority is to raise awareness of the issue and through this assist with the third priority of promoting the uptake of low emission vehicles. In this AQAP we outline how we plan to effectively tackle air quality issues within our control. However, we recognise that there are a large number of air quality policy areas that are outside of our influence (such as vehicle emissions standards agreed in Europe), 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 Cheshire West and Chester Council's direct influence.

[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

Responsibilities and commitment

This AQAP was prepared by Atkins Ltd on behalf of Cheshire West and Chester Council with the support and agreement of the following officers and departments:

Regulatory Services
Area Highways Team

This AQAP has been approved by:

Maria Byrne

Director of Place Operations

This AQAP will be subject to an annual review, appraisal of progress and reporting to the Council's air quality steering group. Progress each year will be reported in the annual status reports (ASRs) produced by Cheshire West and Chester Council, as part of our statutory LAQM duties. Any formal decisions will be subject to the appropriate approval route.

If you have any comments on this AQAP please send them to Environmental Protection at: Regulatory Services, Wyvern House, The Drumber, Winsford, Cheshire. CW7 1AH.

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Table of Contents

List of Tables

List of Figures

1 Introduction

This report outlines the actions that Cheshire West and Chester Council will deliver between 2017 and 2020 in order to reduce concentrations of air pollutants and exposure to air pollution within the Frodsham AQMA; thereby positively impacting on the health and quality of life of residents and visitors to the Frodsham area.

It has been developed in recognition of the legal requirement on the local authority to work towards national 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.

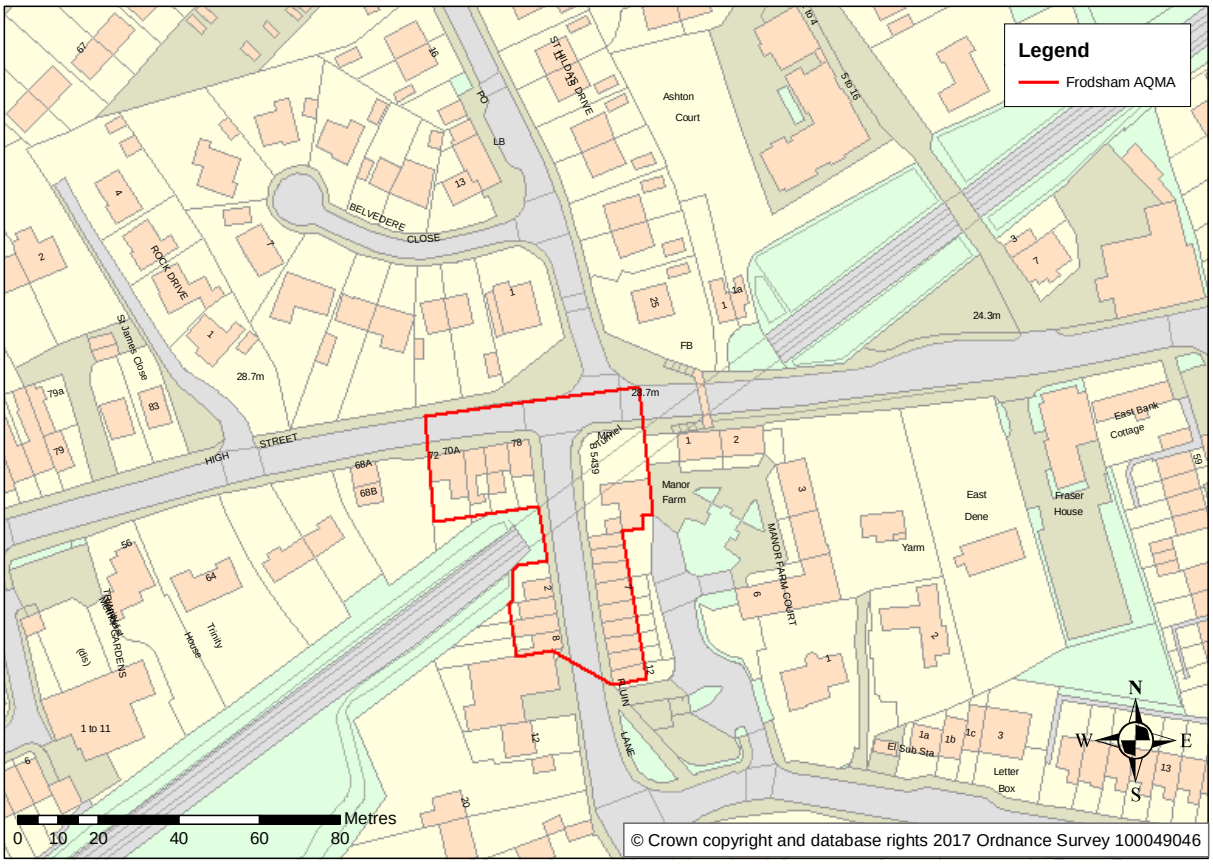
This plan will be reviewed every five years at the latest and progress on measures set out within this plan will be reported annually through Cheshire West and Chester Council's annual status report.

2 Summary of current air quality in Cheshire West and Chester

2.1 Local air quality management

The Frodsham AQMA, which is located at the junction of the B5439 Fluin Lane and the A56 (see Figure 2.1), was declared on 27 November 2015 due to monitored and modelled exceedances of the annual mean nitrogen dioxide (NO_2) objective of 40 micrograms per cubic metre ($\mu g/m^3$).

Figure 2.1 – Location and extent of Frodsham AQMA



A total of 18 residential properties[4] are located within the AQMA boundary including:

- No. 2, 4, 6 and 8 Fluin Lane;
- No. 70, 70a, 72, 72a, 74, 76 and 78 High Street;
- Manor Farm, Bridge Lane; and

[4] Cheshire West and Chester Council, 2015. Air Quality Management Area Order 2015 (No1). Available at: www.cheshirewestandchester.gov.uk/aqmanagement

- No. 7, 8, 9 10, 11 and 12 Manor Farm Court.

The AQMA was declared based on the results of a detailed assessment[5], which was undertaken due to monitored exceedances of the annual mean NO_2 objective at a number of diffusion tube sites in the vicinity of the Fluin Lane / A56 junction (see Section 0). Dispersion modelling undertaken in order to inform the detailed assessment confirmed that exceedances of the annual mean NO_2 objective were confined to the area in the vicinity of the junction and along Fluin Lane. The key contributors to exceedances of the objective at this location were identified within the detailed assessment as being queuing traffic during peak hours at approaches to the Fluin Lane / A56 junction, coupled with the assumed presence of a street canyon[6] along Fluin Lane resulting in the reduced dispersion of emissions.

2.2 Local air quality monitoring

Measurements of pollutant concentrations can be made by deploying analytical instruments that measure continuously and record average concentrations over specified time intervals, or by using simpler sampling devices such as diffusion tubes, which absorb pollutants over a longer time period and are subsequently analysed at a laboratory to give an average concentration for the sampling period.

Cheshire West and Chester Council operates a number of continuous air quality monitoring stations, the closest of which to the Frodsham AQMA is an urban background site located on Langdale Way, Frodsham (approximately 0.4 km east of the AQMA), the location of which is shown in Figure 2.2. Monitoring results obtained at this site in recent years are summarised in Table 2.1, however it should be noted that monitoring only commenced at this site in April 2014.

[5] Cheshire West and Chester Council, 2014. Air quality detailed assessment for Cheshire West & Chester Council: Frodsham – Fluin Lane / A56, March 2014.

[6] LAQM Technical guidance TG(16) indicates that the presence of obstacles (buildings, trees, walls, etc.) can 'modify the wind flow locally and alter dispersion. This is especially the case in so called street canyons, where buildings on both sides of the road can lead to the formation of vortices and recirculation of air flow that can trap pollutants and restrict dispersion (often termed as the canyon effect). Although street canyons can generally be defined as narrow streets where the height of buildings on both sides of the road is greater than the road width, there are numerous example whereby broader streets may also be considered as street canyons where buildings result in reduced dispersion and elevated concentrations (which may be demonstrated by monitoring data).'

Table 2.1 – NO_2 Monitoring results at Frodsham continuous monitoring station

Site ID	Site name	Site type	Air quality criteria	2014	2015
Frodsham	Langdale Way, Frodsham	Urban background	Annual mean (µg/m^3)	17.6 [a]	14.4
			Number of exceedances of hourly mean standard (200 µg/m^3)	0	0
[a] Data capture less than 75%, therefore result should be treated with caution. Source: ratified monitoring data provided by Cheshire West and Chester Council.					

Cheshire West and Chester Council also measures NO_2 using diffusion tubes at locations in and surrounding the Frodsham AQMA. A summary of the data obtained between 2011 and 2015 at the diffusion tube sites closest to the Frodsham AQMA are presented in Table 2.2, the locations of which are illustrated in Figure 2.2.

The monitoring results in Table 2.1 and Table 2.2 indicate that between 2011 and 2016:

- the annual mean NO_2 AQS objective was exceeded at three of the four diffusion tube sites in the Frodsham AQMA, namely:
    - site FH, High Street (72), in all years between 2012 – 2014 and 2016
    - site FJ, Fluin Junction, in all years between 2012 – 2016
    - site FM, Fluin Lane (rear of 10 Manor Farm Ct), in 2012
- the annual mean NO_2 AQS objective was achieved at site FT, Fluin Lane (terrace), within the Frodsham AQMA, in all years during which monitoring was undertaken at this site (2014 - 2016).
- urban background NO_2 concentrations in the study area were well below the annual mean objective (40 µg/m^3) in all years;
- roadside NO_2 concentrations at locations in the study area, outside of the Frodsham AQMA, were below the annual mean AQS objective (40 µg/m^3) in all years;

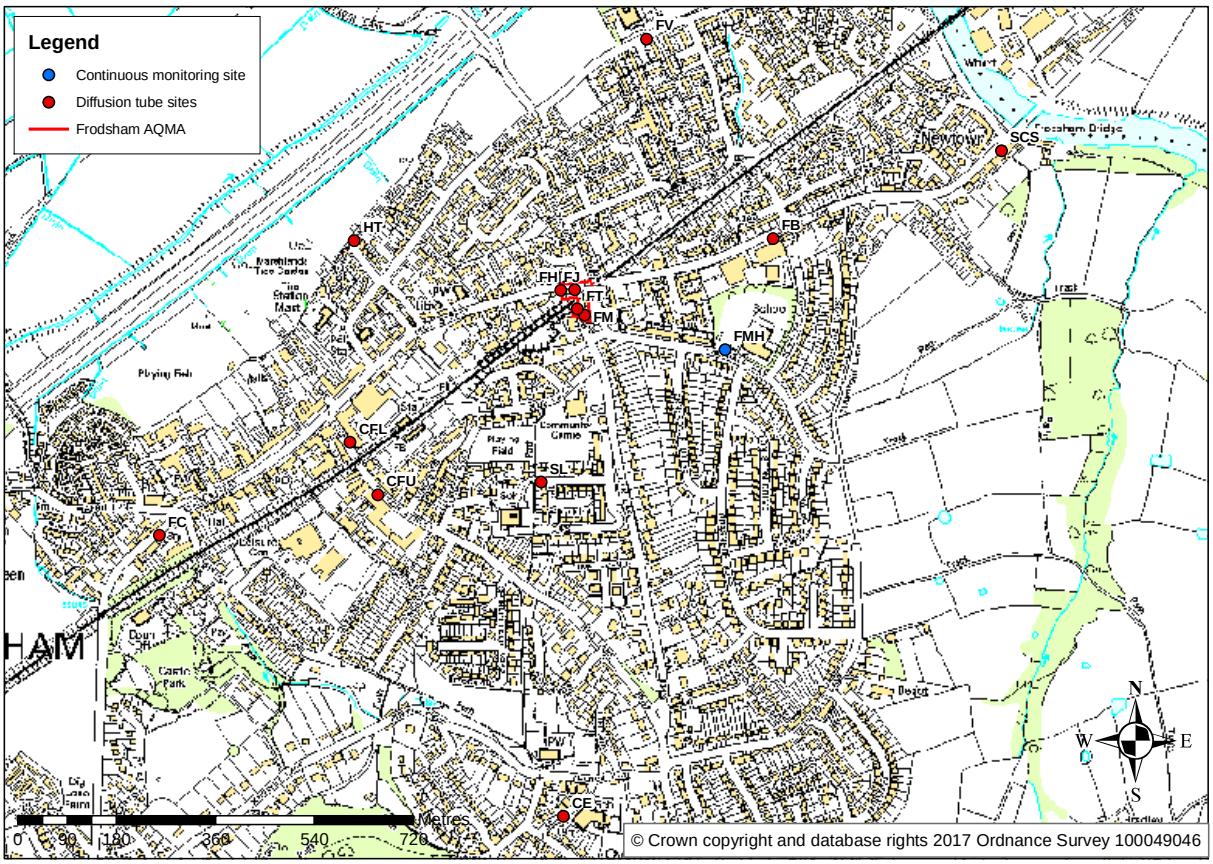
Table 2.2 – NO_2 diffusion tube results in Frodsham AQMA, 2011 - 2016 (µg/m^3)

Site ID	Site name	easting	northing	Distance from AQMA (direction)	Site type	2011	2012	2013	2014	2015	2016
CE	Frodsham CE Primary School	352150	377182	0.9 km (S)	Roadside	-	-	15.5	14.5	-	-
CFL	Church Street (lower)	351762	377862	0.5 km (SW)	Roadside	-	-	33.1	31.9	29.4	31.7
CFU	Church Street (upper)	351813	377767	0.5 km (SW)	Roadside	-	-	27.4	-	-	-
FB	Bridge Lane	352532	378233	0.3 km (E)	Roadside	31.4	34.6	32.3	-	-	-
FC	Chester Rd (26)	351415	377693	0.8 km (SW)	Roadside	32.0	34.5	33.3	-	-	-
FH	High Street (72)	352146	378139	Within Frodsham AQMA	Roadside	-	**45.5**	**40.3**	**41.7**	39.7	**46.2**
FJ	Fluin junction	352171	378140		Roadside	**43.1**	**47.6**	**44.7**	**42.6**	**41.3**	**42.2**
FM	Fluin Lane (rear 10 Manor Farm Court)	352189	378094		Roadside	37.3	**40.9**	36.8	36.6	32.9	37.3
FT	Fluin Lane (terrace)	352176	378105		Roadside	-	-	-	36.3	33.9	36.3
FV	Frodsham Weaver Vale School	352302	378596	0.5 km (NE)	Roadside	-	-	21.7	21.4	21.3	-
FW	Woolley Close	352637	378702	0.7 km (NE)	Urban background	-	-	21.9	19.1	-	-
HT	Hawthorne Road (b)	351770	378229	0.4 km (NW)	Roadside	-	-	24.7	22.9	-	-
SCS	Sutton causeway south	352947	378393	0.8 km (E)	Roadside	-	-	34.6	34.5	30.8	-
SL	St Luke's Sch.	352110	377790	0.3 km (S)	Urban background	-	-	17.9	17.6	-	

Values in **bold** exceed the AQS objective of 40µg/m^3

Data have been corrected for bias against national factors.

Figure 2.2 – Location of monitoring sites in vicinity of Frodsham AQMA

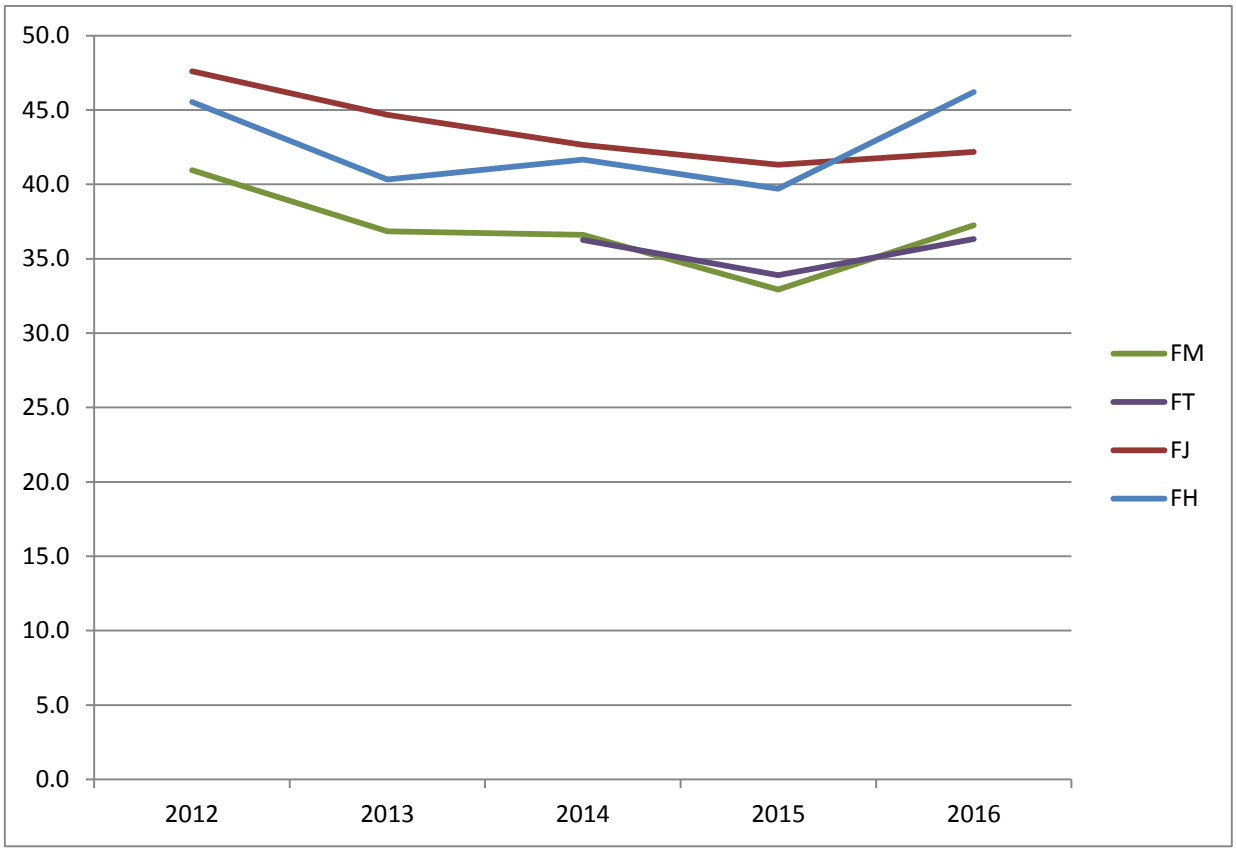


2.2.1 Monitored trends

Monitored annual mean NO_2 concentrations at the diffusion tube sites located within the Frodsham AQMA are shown in Figure 2.3. Monitoring data were available between 2011 and 2016 with the exception of site FT. These monitored trends in annual mean NO_2 concentrations indicate that:

- Annual mean NO_2 concentrations at each monitoring site in the Frodsham AQMA are generally reducing over time with the exception of FH located on High Street; and as a result
- Compliance with the annual mean NO_2 AQS objective (40µg/m^3) is unlikely to be achieved at all locations by 2020 without intervention. (Prior to 2016 data being available, compliance at all monitoring locations by 2018 was predicted).

Figure 2.3 – Trends in annual mean NO_2 concentrations within Frodsham AQMA



3 Cheshire West and Chester's air quality priorities

3.1 Planning and policy context

The Cheshire West and Chester Local Plan Strategic Policies document provides the overall vision, strategic objectives, spatial strategy and strategic planning policies for the borough to 2030.

STRAT 1 Sustainable development states that proposals should:

- Provide for mixed-use developments which seek to provide access to homes, employment, retail, leisure, sport and other facilities, promoting healthy and inclusive communities whilst reducing the need to travel;
- Locate new housing, with good accessibility to existing or proposed local shops, community facilities and primary schools and with good connections to public transport; and
- Support regeneration in the most deprived areas of the borough and ensure those reliant on non-car modes of transport can access jobs and services.

STRAT 10 Transport and accessibility states that:

- In order to minimise the need for travel, proposals for new development should be located so as they are accessible to local services and facilities by a range of transport modes;
- New development will be required to demonstrate that appropriate provision is made for access to public transport and other alternative means of transport to the car;
- Proposals should seek to maximise use of sustainable (low carbon) modes of transport, by incorporating high quality facilities for pedestrians, cyclists and public transport and where appropriate charging points for electric vehicles; and
- Proposals for new industrial and warehousing development should maximise opportunities to transport products by non-road modes of transport. Sites alongside the Manchester Ship Canal, Weaver Navigation and rail network may be particularly suitable for freight use and these opportunities should be integrated into development proposals where feasible. Existing or potential

freight movement opportunities will be safeguarded from development which could preclude continued or future freight use.

SOC 5 Health and well-being states that proposals will be supported that:

- promote safe and accessible environments and developments with good access by walking, cycling and public transport; and
- Development that gives rise to significant adverse impacts on health and quality of life (e.g. soil, noise, water, air or light pollution, and land instability, etc) including residential amenity, will not be allowed.

The Local Plan (part two) will set out the non-strategic allocations and detailed policies, following on from the strategic framework set out in the Local Plan (part one). When adopted both documents will constitute the statutory development plan for Cheshire West and Chester and will replace all former Local Plans. It is proposed that Local Plan (part two) is submitted to Secretary of State for examination in 2017 Local Plan (part two) offers an opportunity to include policies specifically related to air quality in planning considerations.

Cheshire West and Chester Local Transport Plan (2011-2026)

Cheshire West and Chester Council's Local Transport Plan[7] sets plans and priorities for transport from 2011 to 2026. The aim is to deliver and manage a well maintained, safe, integrated and sustainable transport network through effective travel planning. The plan includes the following key themes:

- Reducing carbon emissions – Travel plans aim to reduce single occupancy car use and promote multi occupancy travel.
- Right services, right place, right time – Walking or cycling as all or part of journeys improves health and wellbeing.

[7] Cheshire West and Chester Council (2011) Local Transport Plan Integrated Transport Strategy 2011-2026

- A world class place to live and invest – A less congested network improves settlement attractiveness and improves business journey reliability, supporting economic investment.
- Supporting regeneration – Travel Plans ensure that new developments have adequate facilities to support sustainable journeys and aim to minimise traffic impact.
- Cycling and walking – The promotion of the benefits of walking and cycling and associated measures are achieved through travel plans.

These plans are supported by local planning Supplementary Planning Documents (SPD) such as travel planning guidance and the others currently being developed for example the car parking standards SPD and parking strategy.

Taxi / private hire vehicle licensing

The CWAC Statement of licensing policy for Hackney carriages, private hire vehicles, drivers, and private hire vehicle operators[8] details the vehicle requirements, the age policy. Under the mandatory age limits, Hackney carriages must be under 5 years old, or new at first registration in the Chester zone. No Hackney carriages older than 15 years are permitted. Private hire vehicles must be under 5 years old and will not be permitted when they are over 10 years old. Hackney carriage, private hire vehicle licences will usually be granted for 12 months. This means that newly licensed vehicles will be euro 5 emission standard (made after September 2009), and euro 6 standard in the Chester zone (made after September 2014). These policies provide control over the emission standards of these vehicles operating in the borough.

Low emission strategy

In addition to the above the council is also working on a low emission strategy that will be completed in summer 2017. The strategy takes a long-term integrated approach to air quality allowing us to identify priority areas in order to reduce

[8] CWAC (2016) Statement of licensing policy For Hackney carriages, private hire vehicles, drivers, and private hire vehicle operators – 17 August 2016 (Version 8)

emissions throughout the borough including the town of Frodsham. The strategy will identify key actions which can be developed in more detail and be incorporated into this AQAP.

3.2 Source apportionment

The AQAP measures presented in this report are intended to be targeted towards the predominant sources of emissions within the Frodsham AQMA.

A source apportionment exercise was carried out by Atkins Ltd on behalf of Cheshire West and Chester Council in 2016 (see Appendix C). This estimated that within the AQMA the percentage source contributions were as follows:

- Local road traffic makes the most significant contribution to annual mean NO_2 concentrations at receptors where exceedances of the annual mean NO_2 AQS objective occur (between 56 and 68%);
- Cars are estimated to make the most significant contribution to annual mean NO_2 concentrations at all modelled receptors (between 37 and 46%);
- Light goods vehicles (LGV) are estimated to make the second largest contribution to annual mean NO_2 concentrations at all receptors (between 8 and 11%);
- Buses are expected to make a relatively important contribution to annual mean NO_2 concentrations at modelled receptors adjacent to the A56 (between 6 and 9%), but a less significant contribution at modelled receptors adjacent to Fluin Lane (between 4 and 5%);
- Rigid heavy goods vehicles (HGV) are estimated to make a relatively important contribution to annual mean NO_2 concentrations at receptors adjacent to Fluin Lane (between 4 and 5%), but a less significant contrition at modelled receptors adjacent to the A56 (between 2 and 3%); and
- At a number of receptors where exceedances of the annual mean NO_2 AQS objective are modelled to occur, emissions from queuing traffic make an important contribution (up to 9%).

3.3 Required reduction in emissions

Reductions in local road traffic NOx emissions of up to 21% are required in order to achieve the annual mean NO_2 AQS objective (see appendix C).

3.4 Key priorities

In order to most effectively reduce annual mean NO_2 concentrations within the Frodsham AQMA the following key priorities were identified:

- Reduce emissions from cars and LGVs in the study area, for example by working with local schools and business to reduce traffic volumes; and / or
- Reduce congestion at the A56 / Fluin Lane junction which should consequently reduce emissions.

Whilst buses were modelled to make a relatively important contribution to annual mean NO_2 concentrations at receptors along the A56 within the Frodsham AQMA, it should be noted that the Arriva 21 / X30 service, which accounts for a significant proportion of the buses which travel along the A56 through the Frodsham AQMA, comprises of a fleet of compressed natural gas (CNG) buses. These buses are estimated to result in 36 to 56% lower NOx emissions than conventional euro IV buses[9], therefore additional measures aimed at reducing emissions from buses within the Frodsham AQMA are not considered appropriate at this stage.

Long term and in line with the emerging low emission strategy, the renewal of the national fleet will see older vehicles replaced with newer vehicles meeting euro 6 standard as a minimum and a reduction in emissions as a consequence. The renewal of the national fleet will also see a higher proportion of low emission vehicles and in particular, electric vehicles with zero emissions. Presently the government target is that all cars and vans sold in the UK should be zero emission by 2050. To deliver this locally it is necessary to ensure information is available to residents to ensure that

- They are able to make informed decisions about vehicle purchases.

[9] http://naei.defra.gov.uk/resources/NAEI_Emisison_factors_for_alternative_vehicle_technologies_Final_Feb_13.pdf

- That they are aware of incentives and promotion schemes to buy electric vehicles.

Additionally there is a need to help facilitate the creation of electric vehicle charging point and associated infrastructure to support this.

4 Development and implementation of Cheshire West and Chester's AQAP

4.1 Consultation and stakeholder engagement

In developing/updating this AQAP, we intend to work 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. In addition, we intend to undertake the following stakeholder engagement:

- Local community – residents and commerce through a range of media including
    - Council website
    - email
    - local newspaper
    - direct mail to residents within the AQMA
    - local Councillors
    - Town Council
- Other measures to be determined

To-date, no formal consultation has been undertaken as the proposal to be taken forward is currently being finalised. When complete consultation on the draft will be undertaken and, the response to our consultation stakeholder engagement will be provided in appendix A.

Table 4.1 – Consultation to be undertaken

Yes/No	Consultee
Yes	the Secretary of State
Yes	the Environment Agency
Yes	the Highways Agency
No	all neighbouring local authorities – not applicable
Yes	other public authorities as appropriate, such as public health officials
Yes	bodies representing local business interests and other organisations as appropriate

4.2 Steering group

The Council formed a cross-service officer air quality steering group in September 2016 which includes officers from Environmental Protection, Public Health, Planning, Local Plans, Highways, Legal Services, Climate Change and Strategic Transport. The Steering Group is chaired by the Director of Place Operations. This steering group will discuss and agree the need to form a specific Frodsham air quality steering group and identify any external partners businesses and local community groups that should be engaged in the process.

5 AQAP Measures

As part of this study a number of possible air quality action plan measures were developed and qualitatively assessed, in conjunction with representatives of Cheshire West and Cheshire Council, in terms of their likely impact on local air quality and feasibility. The results of this assessment are summarised in appendix B.

Based on the results of this assessment, two potential action plan measures were taken forward for more detailed assessment, namely:

- Option TI02 - Improve existing priority junction with additional capacity (i.e. right turn facilities on A56). See sketch 5150929-ATK-HW01-GA-DR-D-OPT2-P1 in appendix D.
- Option TI03 - Signalise Fluin Lane and increase the number of approach lanes on A56 High Street (incorporating right turn lanes). See sketch 5150929-ATK-HW01-GA-DR-D-OPT3-P1 in appendix D.

The results of this detailed assessment are described in more detail in appendix C, however in summary:

- Option TI02 is modelled to help alleviate queuing on Fluin Lane and reduce annual mean NO_2 concentrations at receptors where exceedances of the annual mean NO_2 AQS objective are modelled to occur by up to 0.5 µg/m^3.
- Option TI03 is modelled to help alleviate queuing on Fluin Lane, although additional queues are generated along the A56 as a result. These changes are modelled to result in reductions in annual mean NO_2 concentrations at

receptors along Fluin Lane (of up to 0.7 µg/m^3) but an increase in annual mean NO_2 concentrations at receptors adjacent to the A56 (or up to 3.1 µg/m^3). Consequently option TI03 has been ruled out for further consideration.

- Option TI02 is therefore considered to be the better option in terms of air quality impacts as there are expected to be reductions in annual mean NO_2 concentrations without any increase in pollutant concentrations elsewhere.

Further to appendix B and in recognition that more needs to be done beyond the further consideration of option TI02, consideration is also being given to the following measure, however potential safety issues are currently being investigated:

- Option TI12 - Build-out (chicane) on Fluin Lane northbound to reduce capacity and relocate queueing traffic outside of AQMA. See sketch 5150929-ATK-HW01-GA-DR-D-OPT4-P1 in appendix D. This will be explored further in 2017.

Table 5.1 shows the proposed Frodsham 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

The following information will be added to Table 5.1 as work progresses

- The estimated cost of implementing each action is identified in appendix B but refined estimates will be added as part of the process of establishing the feasibility of each measure.
- The responsible service/organisation that will deliver this action.

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

Table 5.1 – Air quality action plan measures

Measure number	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	Alteration to layout of Fluin Lane / A56 junction	Traffic management	Urban traffic control (UTC), congestion management, traffic reduction	Cheshire West and Chester Council	Apr 17 – Dec 17	To be confirmed	Measured annual mean NO_2 concentrations in AQMA	-1 µg/m^3	Options TI02 and TI03 have been developed and assessed, with TI03 excluded for further consideration	2018	A further option is currently being considered in terms of likely feasibility before a final decision is made on which option to progress.
2	Alteration of junction - option TI02	Traffic Management	UTC, congestion management, traffic reduction	CWAC	Apr 17 – Dec 17	To be confirmed	Measured annual mean NO_2 concentrations in AQMA	-1 µg/m^3	Initial modelling work completed	To be determined	Option TI02 as detailed above has been assessed and will deliver improvements to both Fluin Lane and the A56.
3	Build out / chicane – option TI12	Traffic Management	UTC, congestion management, traffic reduction	CWAC	Apr 17 – Dec 17	To be confirmed	Measured annual mean NO_2 concentrations in AQMA	To be determined	Initial safety audit completed.	To be determined	Variation on measure TI12 in appendix B, To be fully explored.

Measure number	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	Low emission strategy	Policy guidance and development control	Low emissions strategy	CWAC	2015-2017	2017-	Adoption of strategy	Yes, borough wide	Draft report under development	2017	Will deliver improvements in PM10 as well.
5	Electric vehicle charging points through planning conditions	Policy guidance and development control	AQ planning and policy guidance	CWAC	2015	2017	Adoption of policy	Yes, borough-wide	Inclusion in local Parking Standards guidance	2017	Policy in Local Plan part one and draft part two
6	Publicity/ education – option BC03	Public information	Via the internet / other	CWAC	2017	2017	To be determined	Low	Work not commenced	Ongoing	
7	Explore traffic regulation order options – option NM01/NM02/NM05	Traffic management	UTC, congestion management, traffic reduction	CWAC	2017	To be determined	To be determined	-1 µg/m^3	Work not commenced	To be determined	This measure is to further explore the possibility of restricting HGVs on Fluin Lane or prohibiting a right hand turn on to the A56

Measure number	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
8	Bear's Paw junction feasibility - Option TI10	Traffic management	UTC, congestion management, traffic reduction	CWAC	2017	2017	To be determined	-1 µg/m^3	Qualitative assessment confirmed potential for further exploration.	To be determined	This is subject to measure 7 above and assessing the potential to increase green time at Church Street/A56
9	Freight and delivery management via TROs – option NM03	Freight and delivery Management	Route management plans/ strategic routing strategy for HGVs	CWAC	Complete	Subject to Defra grant approval	Implementation of Eco-Stars scheme	Yes, borough wide	Grant application submitted to Defra 2016.	To be determined	This measure is subject to funding approval from Defra – scheme presently placed on the grant reserve list
10	Dev / Maintenance of school travel plans – option BC01	Promoting travel alternatives	School travel plans	CWAC	2017	To be determined	Successful implementation of travel plan	Low	To be determined	To be determined	This will require schools to actively participate as the Council no longer has the capacity to lead on travel plans for anything but new developments

Measure number	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
11	Explore extension of 20mph zone programme to Fluin La junction	Traffic management	Reduction of speed limits, 20mph zones	CWAC	2017	To be determined	Implementation of 20mph zone	Low	Work not yet commenced	To be determined	This measure is considered undesirable as reduction of speed limits on A-roads is not generally considered appropriate but nonetheless should be explored further

Appendix A: Response to consultation

Table A.1 – Summary of responses to consultation and stakeholder engagement on the AQAP

Consultee	Category	Response
To be completed	To be completed	To be completed

Appendix B: Assessment of possible action plan measures

Table B.1 – Action plan measures considered (ranked in order or potential air quality impact and likely feasibility)

Reference	Intervention type	Intervention	Potential beneficial effects	Potential impact on air quality in local area (0 = Negligible 1 = Small 3 = Medium 5 = Large)	Likely feasibility / acceptability (0 = not feasible 1 = unlikely / low 2 = likely / medium 3 = very likely / high	Cost (- 3 = very high (£250k+) -2 = high (£100k - £250k) -1 = medium (£20k - £100k) 0 = low (£0 - £20k)	Details regarding feasibility / acceptability and likely consequential effects
TI02	Transport infrastructure	Improve existing priority junction with additional capacity (i.e. right turn facilities on A56). See sketch 5150929-ATK-HW01-GA-DR-D-OPT2-P1.	Would potentially assist traffic in flowing more freely on all arms of the junction. Provision of right turn facilities on the A56 in both directions would reduce the need for through traffic to slow/stop to allow right turn manoeuvres to take place thereby reducing congestion	3	2	-2	Dependent up traffic modelling to prove deliverability and benefits. Considered unlikely to have any significant adverse effects on traffic conditions
NM04	Network management	Banning certain turning movements	Would reduce traffic using Fluin lane.	3	1	-1	The right turn out and left turn into Fluin Lane would need to be banned and this would be difficult to implement with physical measures. Also would need to be considered with improvements at the Bear's Paw Junction.
TI12	Transport infrastructure	Build-out (chicane) on Fluin Lane northbound to reduce capacity and relocate queueing traffic outside of AQMA.	Would potentially reduce congestion / queuing within the AQMA	3	1	-2	Will require complimentary measures to reduce northbound traffic on Fluin Lane and also capacity improvements on the A56. Potentially Bear's Paw signals may need improvements to accommodate additional traffic which will re-route from Fluin Lane. Will remove on-street parking on Fluin Lane and may also need improvements to Langdale Way junction. Would need to be subject to Road Safety Audit which may prove problematic due to proximity to junction.
TI03	Transport infrastructure	Signalise Fluin Lane and increase the number of approach lanes on A56 High Street (incorporating right turn lanes). See sketch 5150929-ATK-HW01-GA-DR-D-OPT3-P1.	Potential opportunity to manage and reduce queue lengths on all arms of the junction	1	2	-2	Subject to traffic modelling proving compliance and ability to be incorporated into tactical diversion routes.
TI07	Transport infrastructure	Signalise Fluin Lane and keep the number of lanes as existing	Opportunity to manage queue lengths on all arms of the junction and incorporate pedestrian crossings.	1	2	-2	Subject to traffic modelling proving compliance, although unlikely to provide favourable results the scheme would be cheaper to implement than other signalisation intervention (TI03).
TI10	Transport infrastructure	Improvements to A56/ Church Street (Bear's Paw junction)	Improvements to capacity here would offer the opportunity to "downgrade" the Fluin Lane junction and reduce traffic.	1	2	-2	Would need careful consideration and probably would need to be implemented in conjunction with other measures to divert traffic from Fluin Lane.

Reference	Intervention type	Intervention	Potential beneficial effects	Potential impact on air quality in local area (0 = Negligible 1 = Small 3 = Medium 5 = Large)	Likely feasibility / acceptability (0 = not feasible 1 = unlikely / low 2 = likely / medium 3 = very likely / high	Cost (- 3 = very high (£250k+) -2 = high (£100k - £250k) -1 = medium (£20k - £100k) 0 = low (£0 - £20k)	Details regarding feasibility / acceptability and likely consequential effects
EI01	Environmental interventions	Reduce emissions from buses by working in partnership with bus operators to improve bus fleet (e.g. bus quality partnership)	Would potentially reduce emissions from buses	1	2	-3	Would take time and money to implement. CWAC to explore additional sources of funding.
PI01	Physical interventions	Purchase and remove the first property on corner of Fluin Lane/Main Street (on the right hand side, direction Kingsley) in order to create space and improve visibility.	Would remove residential property from AQMA and potentially improve visibility for traffic on Fluin Lane	1	2	-3	Purchasing and demolishing property likely to be prohibitively expensive. Potential effect on congestion and emissions difficult to quantify.
NM01	Network management	Vehicle weight restrictions on Fluin Lane	Would significantly reduce the number of HGVs using Fluin Lane.	1	1	0	Lack of suitable alternative routes for the largest of vehicles would receive objections and make implementation and enforcement problematic.
BC01	Behavioural change	Develop travel plans for local schools / businesses likely to use junction during peak hours	Could assist to reduce volume of traffic at Fluin Lane junction during peak hours and associated congestion. The travel plan would suggest measures through which reductions could be achieved and mechanisms for implementing the measures	1	1	-1	Relatively low cost and easy to implement. Will require ongoing commitment from Council officers to work with schools and businesses however internal resources are limited
NM05	Network management	Traffic calming along A56 and Fluin Lane	Potential to dissuade some vehicles from using this route and also smooth traffic flow on A56 creating more opportunities for vehicles to exit Fluin Lane	1	1	-2	Could result in increased congestion and emissions in other areas
TI01	Transport infrastructure	Provide a mini-roundabout at Fluin Lane junction (see sketch 5150929-ATK-HW01-GA-DR-D-OPT1A-P1)	Would potentially reduce extent of queuing traffic on Fluin Lane by improving access onto A56 for vehicles turning right	1	1	-2	Unlikely to provide capacity improvements within modelling or to adhere to design standards. To accommodate within the existing highway boundary it results in a very awkward alignment. Road safety would also be a consideration on a primary route with this form of junction. Would potentially result in increased congestion along A56
TI11	Transport infrastructure	Remove St Hilda's Drive arm from junction by providing a new access route to this estate or improving the junction of A56/ Ship Street	This would offer more scope for improving capacity at the Fluin Lane junction and thereby reducing queueing traffic on Fluin Lane and the A56.	1	1	-3	This would attract large costs associated with acquiring the necessary land and constructing and new linkages.
TI05	Transport infrastructure	Provide a "double mini-roundabout"	Would potentially allow traffic to keep flowing on all arms of the junction	1	0	-3	Insufficient distance between minor arms to accommodate the arrangement without third-party land-take.
TI04	Transport infrastructure	Provide a conventional roundabout (see sketch 5150929-ATK-HW01-GA-DR-D-OPT1B-P1)	Would potentially allow traffic to keep flowing on all arms of the junction	1	0	-3	Would require significant amount of third-party land to be able to accommodate (see sketch 5150929-ATK-HW01-GA-DR-D-OPT1B-P1 for minimum size). Considered to be undeliverable.
TI16	Transport infrastructure	Build a relief road for the whole of the Ship Street area (this would reduce traffic exiting opposite Fluin Lane and further down opposite Morrison's). The Ship Street area has seen significant development in recent years with no corresponding improvements	Would potentially reduce traffic flows in AQMA	1	0	-3	Likely to be prohibitively expensive

Reference	Intervention type	Intervention	Potential beneficial effects	Potential impact on air quality in local area (0 = Negligible 1 = Small 3 = Medium 5 = Large)	Likely feasibility / acceptability (0 = not feasible 1 = unlikely / low 2 = likely / medium 3 = very likely / high	Cost (- 3 = very high (£250k+) -2 = high (£100k - £250k) -1 = medium (£20k - £100k) 0 = low (£0 - £20k)	Details regarding feasibility / acceptability and likely consequential effects
		to road infrastructure, access routes etc.					
TI17	Transport infrastructure	Convert the Ashton Drive underbridge to a one-way exit road for the Ship Street area traffic	Would potentially reduce traffic flows in AQMA	1	0	-3	Likely to be prohibitively expensive
BC03	Behavioural change	Advertising campaigns to raise awareness of sustainable travel and AQMA	Could assist to reduce volume of traffic at junction and queueing during peak hours by making road user's aware of air quality problems and alternative routes	0	2	0	Could assist other measures in reducing some car based trips to work, shops, school etc. but would need investment over a long period of time to offer tangible benefits.
TI06	Transport infrastructure	Improve existing priority junction by improving visibility from Fluin Lane	Potentially cheaper than incorporating right turn facilities on the A56 and could offer capacity improvements to Fluin Lane traffic	0	2	-1	Effect on congestion and emissions uncertain, no capacity improvements afforded to the A56 traffic
NM02	Network management	Signage strategy	Offers some potential to reduce non-local trips from further afield	0	1	-1	Would need to be implemented in conjunction with in-car navigation systems to achieve real benefits.
NM03	Network management	Review or implement strategic freight strategy	Potential to reduce HGV trips through the junction	0	1	-1	Would only offer long-term benefits once the strategy is implemented. Also requires "buy-in" from operators.
BC02	Behavioural change	Personalised travel planning	Could assist to reduce volume of traffic at junction and queueing during peak hours by making road user's aware of alternative routes	0	1	-1	Potential for short term improvements but would need to be spread over a wide area to have even a small impact.
EI03	Environmental interventions	Make use of HGV vehicle routing agreements through the planning process	Could offer the opportunity to limit future HGV movements through the junction.	0	1	-1	Would not offer any reductions in existing traffic
TI19	Transport infrastructure	Box junction at the Main Street/Fluin Lane junction to remove queuing traffic at that point and reduce the impact of emissions	Would prevent vehicles from queuing across the Fluin Lane arm of the junction whilst the pedestrian crossing is in operation thereby allowing some vehicles to exit Fluin Lane.	0	1	-1	Unlikely to allow many vehicles to leave Fluin Lane as the queues on the A56 are short-lived whilst the pedestrian is crossing.
EI04	Environmental interventions	Anti-idling measures (e.g. signage, campaigns)	Would reduce emissions from idling vehicles within AQMA	0	1	-1	Benefits only likely to arise when vehicles are stationary for longer than a minute
TI08	Transport infrastructure	Remove/ relocate controlled pedestrian crossing	Reduces the opportunity for queues to build-up on the A56	0	1	-1	Uncertain effect on congestion and emissions. Would reduce pedestrian accessibility in local area.
EI02	Environmental interventions	Work with local haulage companies to renew fleet of HGVs	Would potentially reduce emissions from HGVs	0	1	-1	Would improve the situation but would be difficult to get buy in from enough operators to achieve results.
TI15	Transport infrastructure	Reconsider the location of both pedestrianised crossings (on Main Street near Fluin Lane and by Gates' garage)	Considered unlikely to result in a reduction in congestion or emissions (see TI08)	0	1	-1	Uncertain effect on congestion and emissions. Would reduce pedestrian accessibility in local area.
TI09	Transport infrastructure	Shared space/ public realm scheme	Would offer potential opportunity to create a gateway into Frodsham from the east and	0	1	-3	Potential to include ancillary environmental enhancements such as tree planting.

Reference	Intervention type	Intervention	Potential beneficial effects	Potential impact on air quality in local area (0 = Negligible 1 = Small 3 = Medium 5 = Large)	Likely feasibility / acceptability (0 = not feasible 1 = unlikely / low 2 = likely / medium 3 = very likely / high	Cost (- 3 = very high (£250k+) -2 = high (£100k - £250k) -1 = medium (£20k - £100k) 0 = low (£0 - £20k)	Details regarding feasibility / acceptability and likely consequential effects
			could incorporate measures to improve air quality through slowing vehicle speeds thereby smoothing the flow of traffic.				
TI13	Transport infrastructure	Remove all traffic lights (including those at the Bears Paw junction) and replace with a series of mini-roundabouts (to reduce back-up as far as the garden centre)	Considered unlikely to result in a reduction in congestion or emissions	0	1	-3	Potential safety and accessibility issues
TI14	Transport infrastructure	In combination with above, relocate crossing points away from the Main Street/Church Street junction	Considered unlikely to result in a reduction in congestion or emissions	0	1	-3	Potential safety and accessibility issues
TI18	Transport infrastructure	Develop motorway side cycle routes from Frodsham to Helsby high school	Considered unlikely to result in a reduction in congestion or emissions	0	0	-3	Effect likely to be minimal

Appendix C: Frodsham AQMA air quality study

Source apportionment exercise

For each modelled receptor, source apportionment has been undertaken in accordance with the methodology described within Box 7.5 of technical guidance LAQM.TG16 in order to determine the relative contribution of the following emission sources to modelled annual mean NO_2 concentrations:

- Regional background, local background and local road traffic (Table C-1);
- Vehicle type i.e. cars, LGVs, rigid HGVs, artic HGVs and buses (Table C-2); and
- Queuing and free flowing traffic (Table C-3).

Table C-1 Relative contribution of background and traffic sources at receptors

Receptor	Annual mean NO_2 concentration ($\mu g/m^3$)	Relative contribution (%)		
		Regional background	Local background	Local road traffic
1 Manor Farm Court	**45.1**	9%	23%	68%
2 Manor Farm Court	**43.9**	10%	23%	67%
25 St Hilda's Drive	36.8	12%	28%	61%
7 Manor Farm Court	**43.8**	10%	23%	67%
2 Fluin La	35.9	12%	28%	60%
8 Fluin La	34.0	13%	30%	58%
74 High St	**45.8**	9%	22%	68%
68 High St	**43.3**	10%	23%	67%
56 High St	34.7	12%	29%	58%
83 High St	32.5	13%	31%	56%
79 High St	36.0	12%	28%	60%
73 High St	37.8	11%	27%	62%
Fraser House	**40.6**	11%	25%	64%
1 Belvedere	34.6	12%	29%	58%
Manor Farm	**45.7**	9%	22%	68%
12Manor Farm Court	40.0	11%	25%	64%
1BridgeLa	36.0	12%	28%	60%

Notes:
Exceedances of annual mean NO_2 AQS objective (40 $\mu g/m^3$) shown in **bold**
Maximum relative contribution shown in red

The results in Table C-1 indicate that regional background sources (which CWAC has no influence over) are estimated to contribute between 9 and 13% of annual mean NO_2 concentrations at modelled receptors, local background sources[10] (over which CWAC may have some influence) between 22 and 31% and local road traffic sources between 56 and 68%. Local road traffic is therefore estimated to make the most significant contribution to annual mean NO_2 concentrations at modelled

[10] Local background sources include emissions from major and minor roads, domestic and industrial combustion, aircraft and rail across the wider study area.

receptors, in particular at those receptors where exceedances of the annual mean NO_2 AQS objective are modelled to occur (where the estimated contribution of local road traffic to annual mean NO_2 concentrations is between 64 and 68%). Emissions from local road traffic should therefore be the principal source for CWAC to target within the AQAP.

Table C-2 Relative contribution by vehicle type at receptors

Receptor	Annual mean NO_2 concentration ($\mu g/m^3$)	Relative contribution (%)				
		Cars	LGVs	Rigid HGVs	Artic HGVs	Buses
1 Manor Farm Court	**45.1**	46%	11%	3%	2%	7%
2 Manor Farm Court	**43.9**	45%	11%	3%	2%	6%
25 St Hilda's Drive	36.8	41%	10%	3%	1%	6%
7 Manor Farm Court	**43.8**	46%	10%	5%	3%	4%
2 Fluin La	35.9	39%	9%	4%	2%	5%
8 Fluin La	34.0	38%	9%	4%	2%	4%
74 High St	**45.8**	45%	10%	3%	2%	9%
68 High St	**43.3**	44%	10%	2%	1%	9%
56 High St	34.7	39%	8%	2%	1%	8%
83 High St	32.5	37%	8%	2%	1%	8%
79 High St	36.0	40%	9%	2%	1%	8%
73 High St	37.8	41%	9%	2%	1%	9%
Fraser House	**40.6**	43%	11%	3%	2%	6%
1 Belvedere	34.6	39%	9%	3%	1%	7%
Manor Farm	**45.7**	46%	10%	5%	2%	5%
12Manor Farm Court	40.0	44%	9%	4%	2%	4%
1 Bridge La	36.0	40%	10%	3%	1%	6%

Notes:
Exceedances of annual mean NO_2 AQS objective (40 $\mu g/m^3$) shown in **bold**
Maximum relative contribution shown in red

The results in Table C-2 indicate that:

- Cars are estimated to make the most significant contribution to annual mean NO_2 concentrations at all modelled receptors (between 37 and 46%);
- LGVs are estimated to make the second largest contribution to annual mean NO_2 concentrations at all modelled receptors (between 8 and 11%);
- Buses are expected to make a relatively important contribution to annual mean NO_2 concentrations at modelled receptors adjacent to the A56 (between 6 and 9%), but a less significant contribution at modelled receptors adjacent to Fluin Lane (4-5%); and
- Rigid HGVs are estimated to make a relatively important contribution to annual mean NO_2 concentrations at receptors adjacent to Fluin Lane (between 4 and 5%), but a less significant contrition at modelled receptors adjacent to the A56 (2-3%).

Table C-3 Relative contribution of free-flowing and queuing traffic at receptors

Receptor	Annual Mean NO_2 Concentration (µg/m^3)	Relative Contribution (%)	
		Free-Flowing Traffic	Queuing Traffic
1 Manor Farm Court	**45.1**	66%	2%
2 Manor Farm Court	**43.9**	66%	1%
25 St Hilda's Drive	36.8	59%	2%
7Manor Farm Court	**43.8**	60%	7%
2 Fluin Lane	35.9	51%	9%
8 Fluin Lane	34.0	50%	8%
74 High Street	**45.8**	60%	9%
68 High St	**43.3**	66%	1%
56 High St	34.7	58%	0%
83 High St	32.5	55%	0%
79 High St	36.0	60%	0%
73 High St	37.8	62%	0%
Fraser House	**40.6**	64%	0%
1 Belvedere	34.6	52%	7%
Manor Farm	**45.7**	61%	7%
12 Manor Farm Court	40.0	58%	6%
1 Bridge Lane	36.0	59%	1%
Notes: Exceedances of annual mean NO_2 AQS objective (40 µg/m^3) shown in **bold**			

The results in Table C-3 indicate that free flowing traffic is estimated to make the most significant contribution to annual mean NO_2 concentrations at all modelled receptors (between 50 and 66%). At some receptors however, emissions from queuing traffic are estimated to make a relatively important contribution (up to 9%), in particular at a number of receptors where exceedances of the annual mean AQS objective are modelled to occur. Given that these queues are only modelled to occur during relatively short periods (i.e. between the hours of 08:00 – 10:00 and 15:00 – 19:00 Monday to Friday) reducing congestion within the AQMA and therefore the extent and / or duration of these queues could result in a reduction in annual mean NO_2 concentrations at these receptors.

Level of improvement required

In order to determine the level of improvement required to meet the annual mean NO_2 AQS objective, the percentage reduction in local road traffic NO_x emissions required to meet the AQS objective has been estimated at each modelled receptor where an exceedance is modelled to occur. This analysis has been undertaken in accordance with the methodology described in Box 7.6 of LAQM.TG16, the results of which are shown in Table C-4.

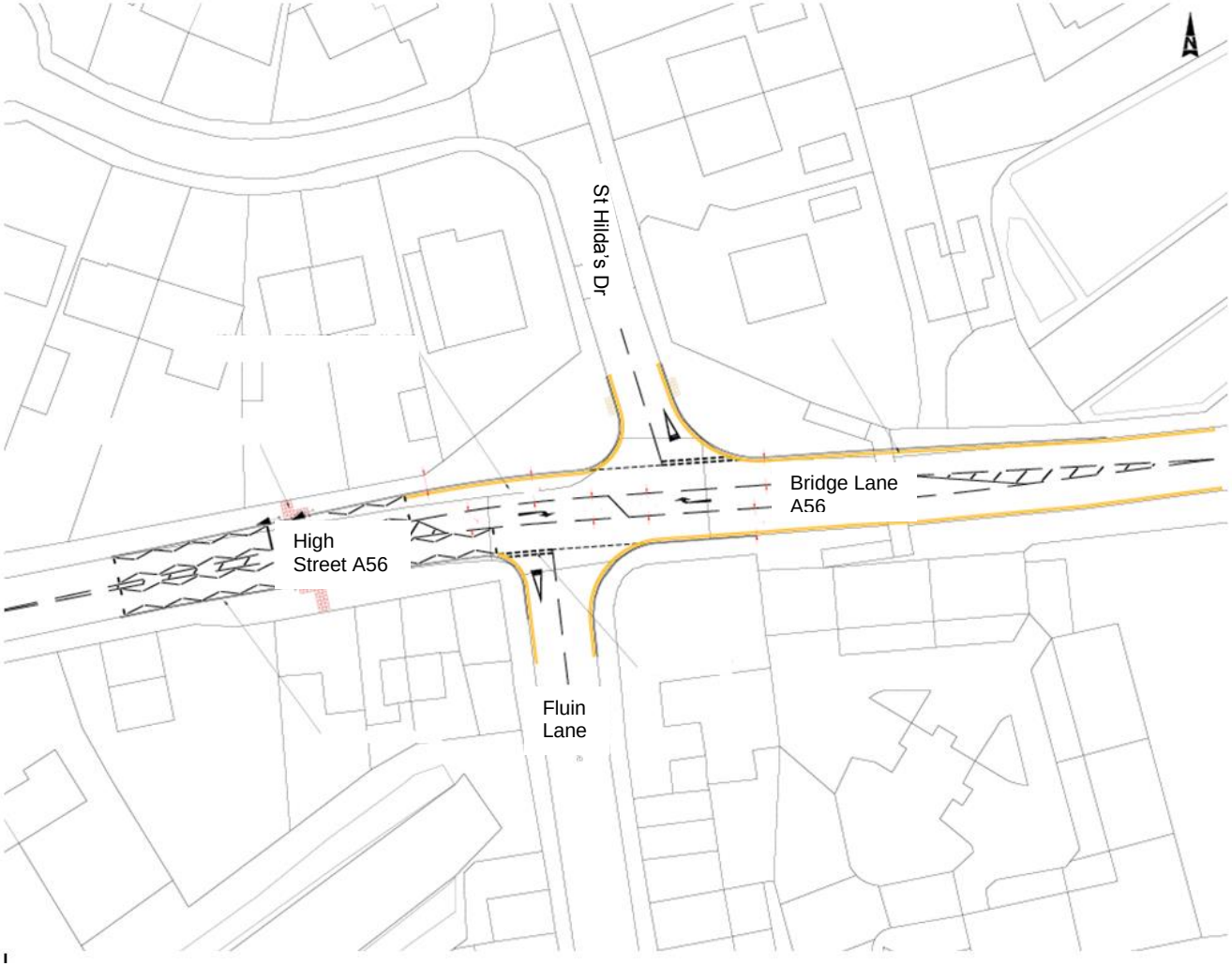
Table C-4 Reduction in NO_x emissions required to meet AQS objective

Receptor	Annual mean NO_2 concentration ($\mu g/m^3$)	Reduction in local road traffic NO_x emissions required to meet AQS objective
1 Manor Farm Court	45.1	19%
2 Manor Farm Court	43.9	15%
7 Manor Farm Court	43.8	15%
74 High St	45.8	21%
68 High St	43.3	13%
Fraser House	40.6	3%
Manor Farm	45.7	21%

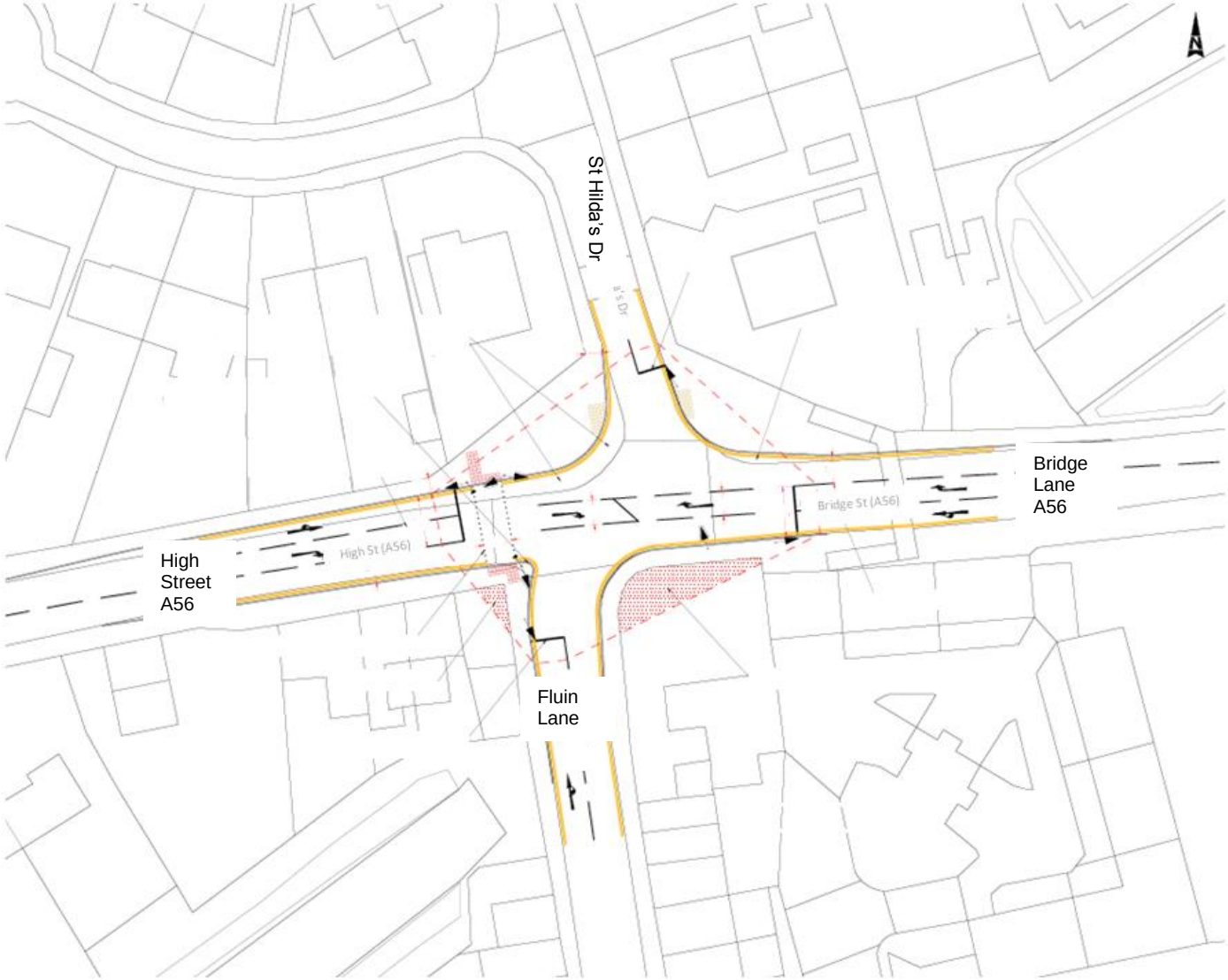
The results shown in Table C-4 indicate that reductions in local road traffic NO_x emissions of up to 21% are required in order to achieve the annual mean NO_2 AQS objective at modelled receptors. Whilst reductions in local road traffic emissions are expected to occur over time due to improvements in the local vehicle fleet, as older, more-polluting vehicles are gradually replaced with newer vehicles which meet more stringent vehicle emissions, the results in Table C-4 indicate that additional action is likely to be required in order to meet the annual mean NO_2 AQS objective within the Frodsham AQMA over the shorter term.

Appendix D: Sketches of possible measures

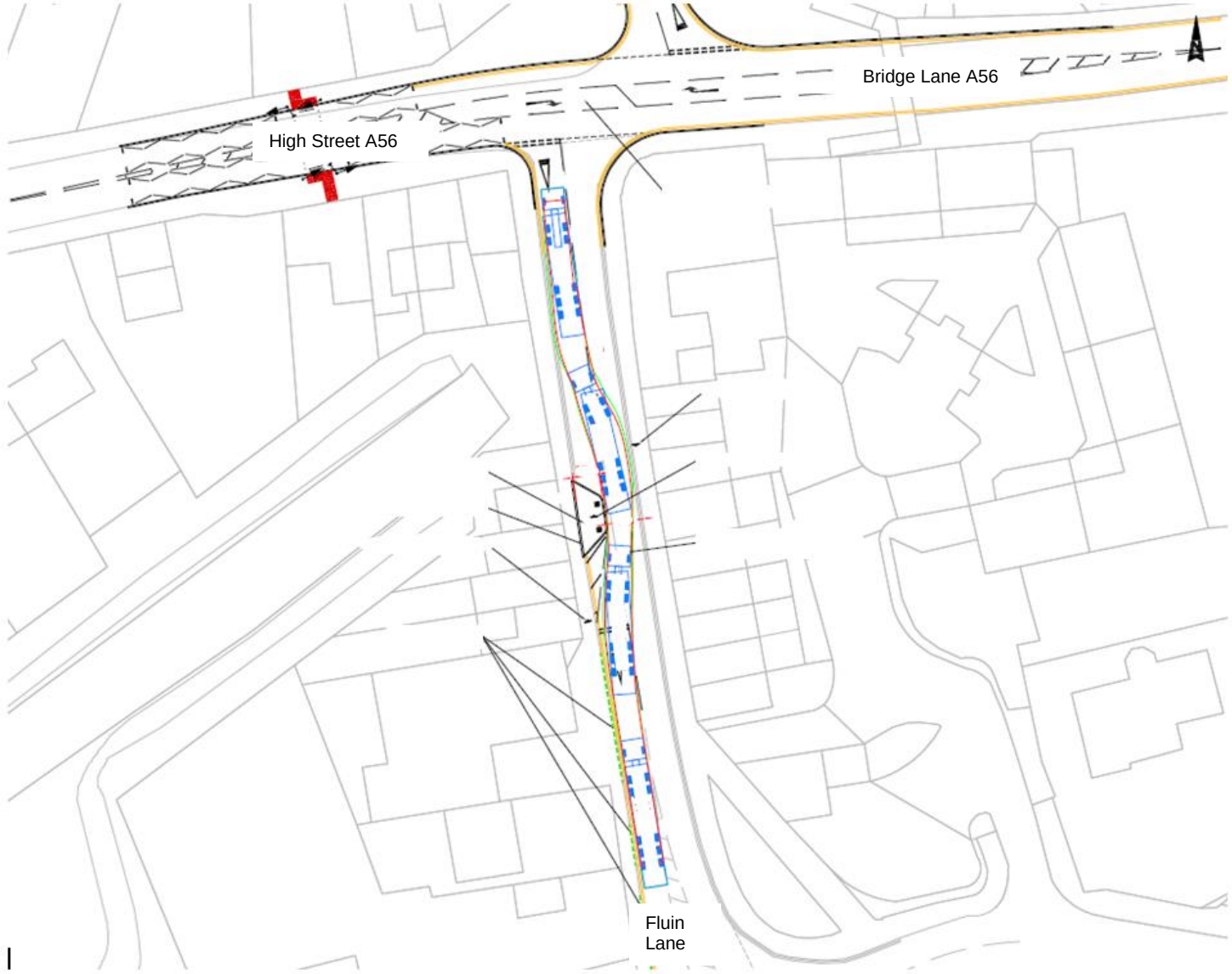
Measure 2 (TI02) – Drawing of the Fluin Lane / A56 junction showing an amended road layout introducing a right-turn facilities on the A56.



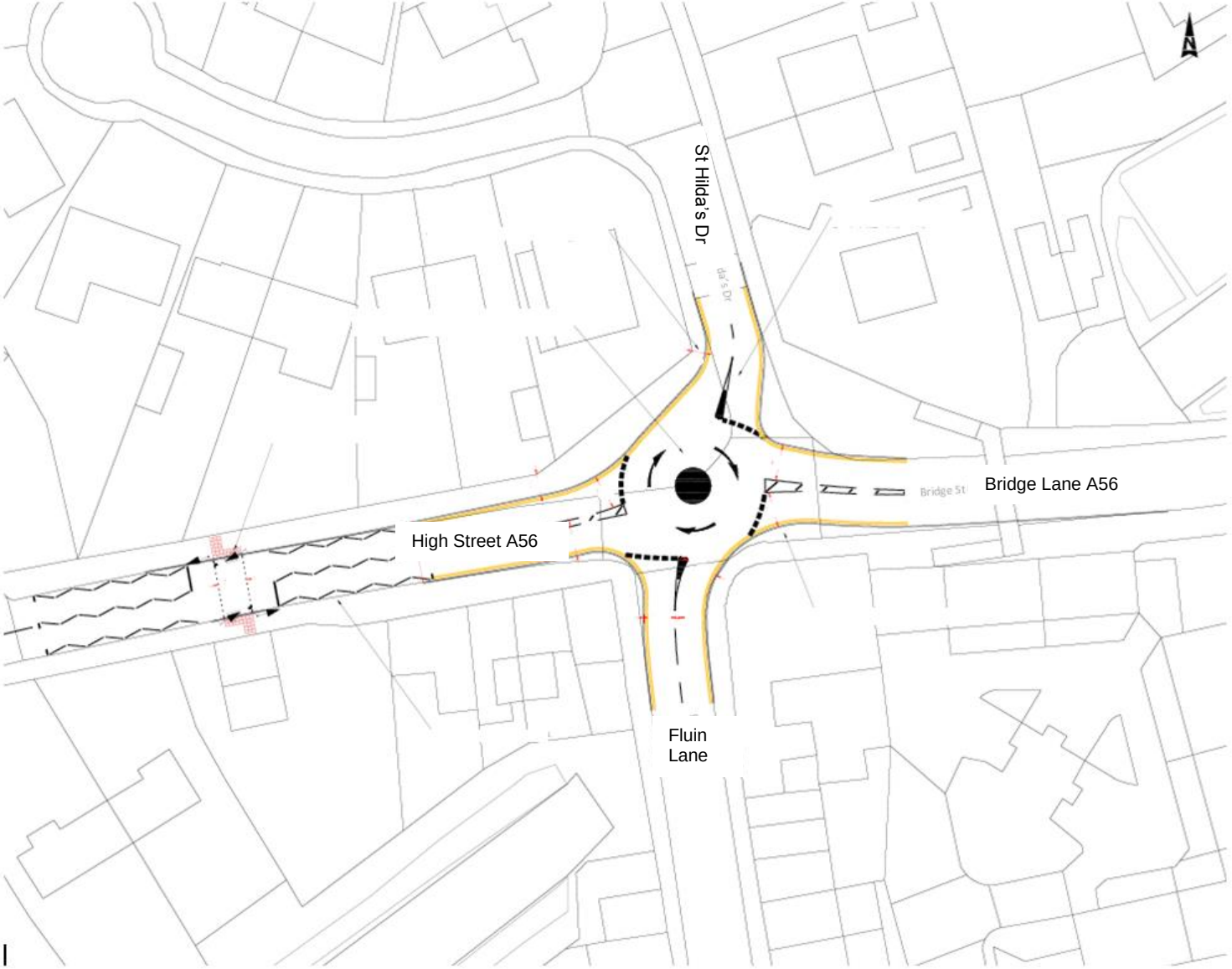
Measure 1 (TI03) – Drawing of the Fluin Lane / A56 junction showing the signalisation of the junction.



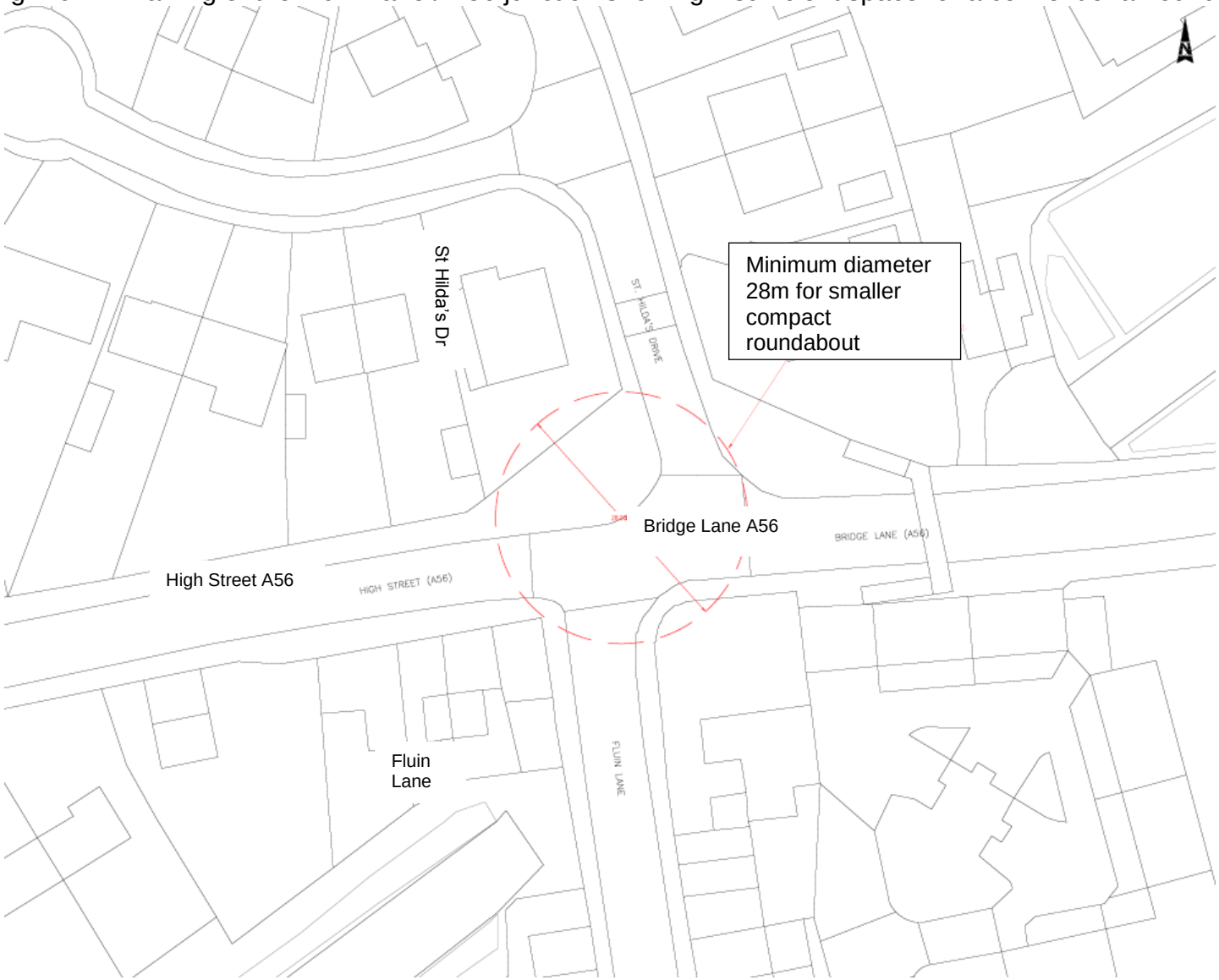
Measure 3 (TI12) – Drawing of the Fluin Lane / A56 junction showing the option for a chicane on Fluin Lane



Drawing TI01 – Drawing of the Fluin Lane / A56 junction showing a mini roundabout



Drawing TI04 – Drawing of the Fluin Lane / A56 junction showing insufficient space for a conventional roundabout.



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
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