



Welsh Government

---

# A494 DEESIDE - WELTAG STAGE 1 REPORT

Consideration of interventions on the Welsh  
Government Trunk Road and Motorway Network  
for Nitrogen Dioxide reduction



Yn gweithio ar ran  
**Llywodraeth Cymru**  
Working on behalf of the  
**Welsh Government**





Welsh Government

---

# **A494 DEESIDE - WELTAG STAGE 1 REPORT**

Consideration of interventions on the Welsh Government  
Trunk Road and Motorway Network for Nitrogen Dioxide  
reduction

**DRAFT (FINAL) PUBLIC**

**PROJECT NO. 70040135  
OUR REF. NO. 70040135**

**DATE: JANUARY / FEBRUARY 2018**

---

Welsh Government

---

## **A494 DEESIDE - WELTAG STAGE 1 REPORT**

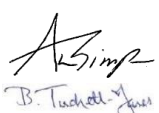
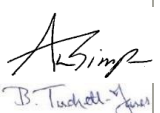

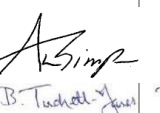
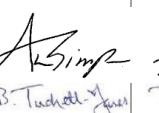
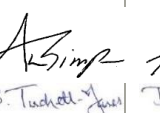
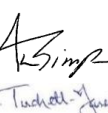
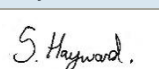
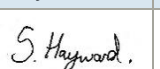
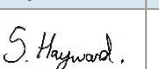
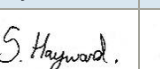
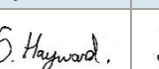
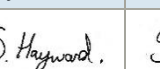
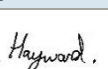
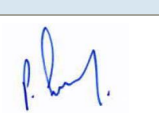
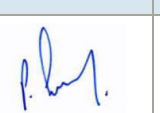
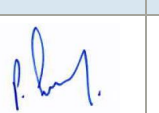

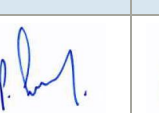


Consideration of interventions on the Welsh Government  
Trunk Road and Motorway Network for Nitrogen Dioxide  
reduction

WSP  
1 Capital Quarter  
Tyndall Street  
Cardiff  
CF10 4BZ  
Phone: +44 2920 769189

[WSP.com](http://WSP.com)

---

# QUALITY CONTROL

Issue/ revision	First issue	Revision 1	Revision 2	Revision 3	Revision 4	Revision 5	Revision 6
Remarks		Updated following client comments	Updated following client comments	Updated following client comments	Updated following client comments	Updated following client comments	Updated following client comments
Date	15/12/2017	21/12/2017	15/01/2018	22/01/2018	30/01/2018	31/01/2018	28/01/2018
Prepared by	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones	Alison Simpson / Bethan Tuckett-Jones
Signature	 B. Tuckett-Jones	 B. Tuckett-Jones	 B. Tuckett-Jones	 B. Tuckett-Jones	 B. Tuckett-Jones	 B. Tuckett-Jones	 B. Tuckett-Jones
Checked by	Stephen Hayward	Stephen Hayward	Stephen Hayward	Stephen Hayward	Stephen Hayward	Stephen Hayward	Stephen Hayward
Signature	 S. Hayward.	 S. Hayward.	 S. Hayward.	 S. Hayward.	 S. Hayward.	 S. Hayward.	 S. Hayward.
Authorised by	Peter Evans	Peter Evans	Peter Evans	Peter Evans	Peter Evans	Peter Evans	Peter Evans
Signature	 P. Evans.	 P. Evans.	 P. Evans.	 P. Evans.	 P. Evans.	 P. Evans.	 P. Evans.
Project number	70040135	70040135	70040135	70040135	70040135	70040135	70040135
Report number	70040135-03	70040135-03	70040135-03	70040135-03	70040135-03	70040135-03	70040135-03
File reference							



# CONTENTS

<b>1.</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1.	CONTEXT	1
1.2.	STUDY CORRIDOR	1
1.3.	APPROACH	3
1.4.	REPORT STRUCTURE	4
<b>2.</b>	<b>STRATEGIC CASE</b>	<b>5</b>
2.1.	CASE FOR CHANGE	5
2.2.	PROBLEM IDENTIFICATION	12
2.3.	OBJECTIVE OF THE STUDY	12
2.4.	THE PROCESS	13
2.5.	LONG LIST OF MEASURES	15
<b>3.</b>	<b>TRANSPORT CASE</b>	<b>23</b>
3.1.	METHODOLOGY	23
3.2.	STAGE 1 APPRAISAL	23
<b>4.</b>	<b>DELIVERY CASE</b>	<b>25</b>
4.1.	OVERVIEW	25
4.2.	PROJECT PLANNING – GOVERNANCE, ORGANISATIONAL STRUCTURE	25
4.3.	COMMUNICATIONS & STAKEHOLDER MANAGEMENT PLAN	25
<b>5.</b>	<b>FINANCIAL CASE</b>	<b>26</b>
5.1.	OVERVIEW	26
5.2.	ASSESSMENT	26
<b>6.</b>	<b>COMMERCIAL CASE</b>	<b>27</b>
6.1.	OVERVIEW	27

6.2.	ASSESSMENT	27
7.	SUMMARY AND NEXT STEPS	28
7.1.	OVERVIEW	28
7.2.	SHORT LIST OF MEASURES	28
7.3.	NEXT STEPS	29

---

## TABLES

Table 1: Baseline PCM Predicted NO <sub>2</sub> Concentrations at Deeside, without NO <sub>2</sub> reduction network measures (projections from 2017 Plan, July 2017)	7
Table 2: Monitored Annual Mean NO <sub>2</sub> concentrations alongside the A494	7

---

## FIGURES

Figure 1: The Study Corridor	2
Figure 2: Infrastructure and Local Facilities nearby the A494 Study Corridor	9
Figure 3: The Process	14



# 1. INTRODUCTION

---

## 1.1. CONTEXT

The European Union Ambient Air Quality Directive (2008/50/EC) sets legally binding limits for concentrations of certain air pollutants in outdoor air, termed 'limit values'. The Directive requires that Member States report annually on air quality within zones designated under the Directive and, where the concentration of pollutants in air exceeds limit values, to develop air quality plans that set out measures in order to attain the limit values. The only limit values that the UK currently fails to meet are those set in respect of nitrogen dioxide (NO<sub>2</sub>).

In July 2017, the UK Government published its Air Quality Plan (the 2017 Plan) for tackling roadside NO<sub>2</sub> concentrations<sup>1</sup>. The 2017 Plan set out details of the authorities responsible for delivering air quality improvements including devolved administrations and Local Authorities.

Wales is divided into 4 zones under the Directive:

- Two urban agglomeration zones (Cardiff and Swansea)
- Two non-agglomeration zones (North Wales and South Wales)

WSP have been commissioned by Welsh Government (WG) to undertake a WelTAG Stage 1 (Strategic Outline Case) and 2 (Outline Business Case) appraisals of potential Network Management measures for reducing NO<sub>2</sub> levels arising from traffic emissions at five separate locations on the Welsh Strategic Road Network. The five locations (and the respective zones) are:

- A494 Deeside (North Wales)
- A483 Wrexham (North Wales)
- A470 Upper Boat to Pontypridd (South Wales)
- M4 J41 – J42, Port Talbot (South Wales and Swansea)
- M4 J25 – J26, Newport (South Wales)

Given the differences between the five identified locations, five separate WelTAG Stage 1 reports have been produced. It is acknowledged that what might represent a practical measure in one location, might not be viable or deliverable in another. Therefore, the reports have been produced independently in parallel to ensure that the individual requirements of any one location do not dictate the measures considered at the others.

Where measures have been considered as not being deliverable by the Welsh Government using its powers as Highway or Traffic Authority for the strategic road network, these will be considered further in the overarching Welsh Government appraisal process of measures.

## 1.2. STUDY CORRIDOR

This report presents the Stage 1: Strategic Outline Case of the WelTAG process for reducing the levels of NO<sub>2</sub> on the A494 dual carriageway through network management measures. The other four locations are considered under separate cover.

The A494 study corridor is located in North Wales in Deeside. This is a predominantly industrial conurbation of towns and villages in Flintshire close to the Welsh/English borders, lying near the canalised stretch of the River Dee that flows from Chester to the east into the Dee Estuary.

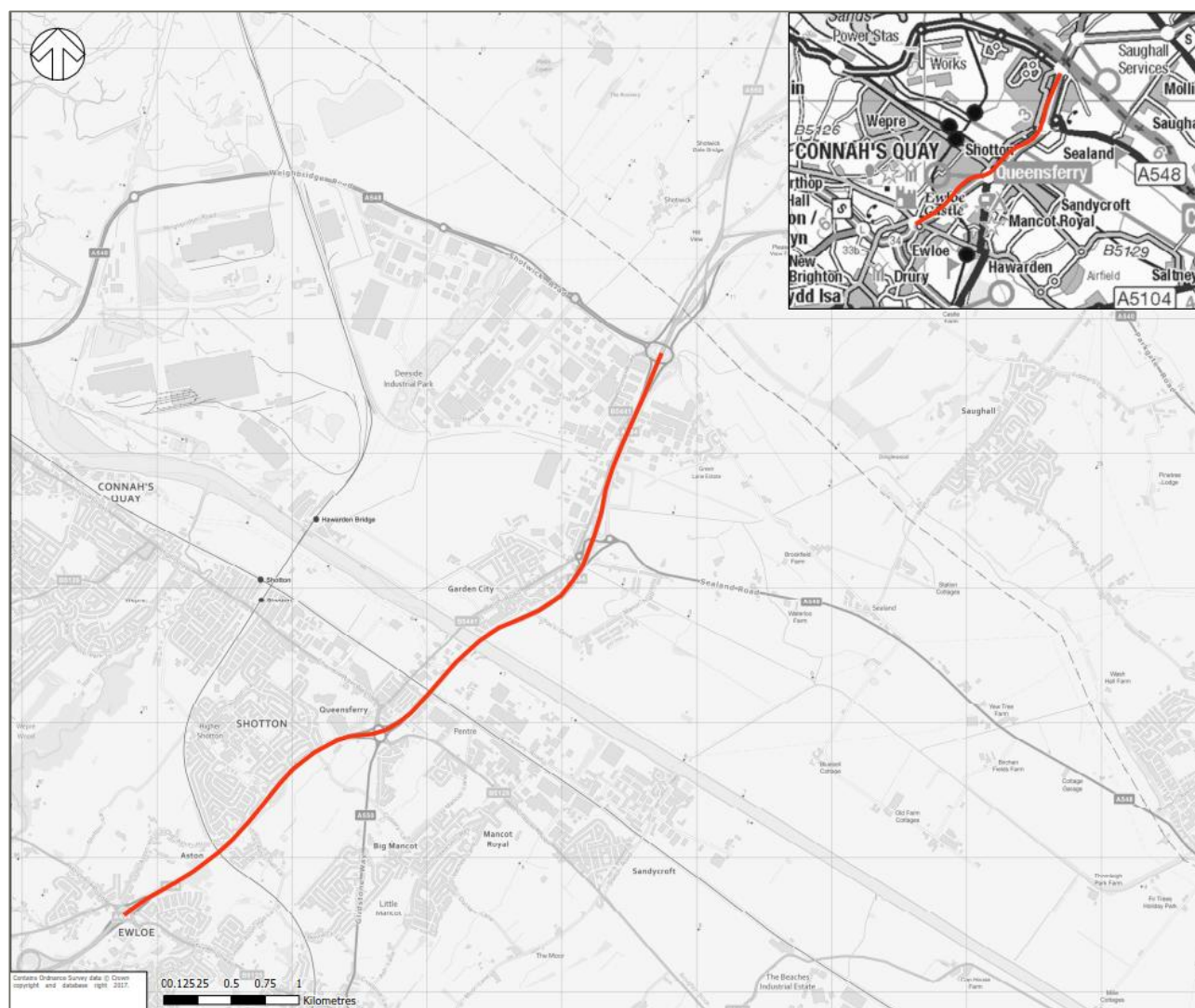
---

<sup>1</sup> UK plan for tackling roadside nitrogen dioxide concentrations; Available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/633269/air-quality-plan-overview.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633269/air-quality-plan-overview.pdf) - Accessed 10th November 2017

The study corridor considered in this report covers the principal corridor on the A494 between the B5125 St Davids Interchange (Holywell Road) to the A458 Deeside Park Interchange (Shotwick Road) at the Welsh/English borders. This is shown in Figure 1.

The A494 study corridor assumed for the purposes of this WelTAG study is independent of the PCM model. Whilst the study corridor encompasses the links in the PCM model that have shown an exceedance in limit values, it is not limited to these. This acknowledges that the measures and their subsequent impacts may be realised beyond the identified area with NO<sub>2</sub> exceedances.

**Figure 1: The Study Corridor**



The study corridor is approximately 5.9km in length and has a south west to north east alignment. The A494 between St Davids Interchange and the River Dee bridge crossing is a 2 lane all-purpose dual carriageway (D2AP). The stretch north of the River Dee to the Deeside Park Interchange is a 3 lane all-purpose dual carriageway (D3AP).

### 1.3. APPROACH

The Draft WelTAG 2017 Guidance<sup>2</sup>, which was out for consultation when this study commenced, is used as the basis for this appraisal. The guidance is significantly different to the 2008 version and provides a switch to the WG's Five Case Model for Public Sector Business Cases.

The Five Cases in the draft guidance are:

- **The strategic case:** the case for change, fit with other policies and objectives
- **The transport case:** the social and cultural, environmental, and economic impacts of the change including a value for money assessment
- **The delivery case:** can the scheme be delivered?
- **The financial case:** is the proposed spend affordable?
- **The commercial case:** how can the scheme be procured, is it attractive to the private sector, is it commercially viable?

The WelTAG guidance states that the purpose of the Stage 1: Strategic Outline Case is to:

*'understand the issue of concern, explore its context and to present a wide list of possible solutions, with sufficient clarity and depth for the review group to be able to decide whether there are any possible solutions (measures) that are worth pursuing and to select a short list of options (measures) for more detailed consideration'.*

As such, this Stage 1: Strategic Outline Case report:

- Identifies the issues that need addressing supported by evidence;
- Establishes the objective for the measure;
- Identifies a long list of possible measures;
- Assesses a long list of measures against the objective; and,
- Selects a short list of measures to take forward to the next stage.

Whilst WelTAG provides a fixed framework for appraisal, the guidance acknowledges that the level of detail provided in the WelTAG reports should be proportionate to the impacts under consideration. All major impacts and issues that could have a significant influence on delivery should be presented, but the level of detail in any analytical work should be proportionate to the scale and significance of the impact and sufficiently accurate for the decisions that need to be made.

**The objective of this study is to carry out an initial investigation and identify potential network management measures which will assist in bringing forward reductions in NO<sub>2</sub> in the shortest possible time to ensure compliance with the Air Quality Framework Directive requirements in five locations on the Welsh SRN listed above. Therefore, the transport case will focus on air quality and reflect the key considerations in relation to the EU Air Quality Directive and bringing forward compliance with limit values.**

---

<sup>2</sup> Available at: [https://consultations.gov.wales/sites/default/files/consultation\\_doc\\_files/161208-weltag-consultation-en.pdf](https://consultations.gov.wales/sites/default/files/consultation_doc_files/161208-weltag-consultation-en.pdf)  
Accessed 3rd November 2017

## 1.4. REPORT STRUCTURE

The structure of this Stage 1 report is as follows:

### **Chapter 2: Strategic case**

This chapter presents a baseline of the existing situation, including an overview of legislation and policies and a description of the current EU Limit Value compliance status. It outlines the objective and the EU Air Quality Directive and includes an evidence-based description of the current problem. A brief commentary is provided regarding the development of the long list of measures and how they plan to address the current problem. Information is provided on how the Goals, Objectives and Ways of Work have been considered.

### **Chapter 3: Transport case**

This chapter provides a summary of the appraisal against the objective through consideration of the key criteria.

### **Chapter 4: Delivery case**

This chapter identifies the WelTAG Review Group and the delivery arrangements of any potential measures.

### **Chapter 5: Financial case**

This chapter provides a high level analysis of potential funding mechanisms for delivery.

### **Chapter 6: Commercial case**

This chapter includes a description as to whether the measures are commercially viable, and provides an analysis as to whether measures could be packaged together for a phased delivery.

The conclusions of this Stage 1 report includes a short list of network management measures to be taken forward to Stage 2 (the Outline Business Case), based on their ability to solve the problem, their fit with the objective, and their impacts, deliverability and robustness under uncertainty.

## 2. STRATEGIC CASE

---

### 2.1. CASE FOR CHANGE

#### 2.1.1. LEGISLATIVE AND POLICY CONTEXT

This section provides a brief summary of relevant legislation, policies and plans that are pertinent to the A494 WelTAG Stage 1 appraisal. There are a number of overarching policies that set the context for the study, and those set out below have been used to assess against any potential network management measures for reducing NO<sub>2</sub> levels along the corridor.

UK and Welsh policies shape and guide respective regional and local plans and policies. Reference is made to them as appropriate.

##### **UK and Welsh legislation and policy Summary**

The requirements of the EU Ambient Air Quality Directive are transcribed into Welsh legislation via the Air Quality Standards (Wales) Regulations 2010 (Welsh Statutory Instrument No 1433 (W.126)). The regulations designate Welsh Ministers as the competent authority for the purposes of the Directive and place duties on Welsh Ministers to draw up and implement air quality plans in relation to achieving the Directive limit values where they are currently exceeded. The latest overarching UK Air Quality Plan was published in July 2017<sup>3</sup>, including zone plans for all four Welsh zones<sup>4</sup>.

National policies highlight commitment within the UK to reduce the amount of airborne pollutants, with the 1995 Environment Act making air quality control a statutory requirement for all local authorities. Thereafter, air quality has been monitored annually with action plans and Air Quality Management Areas (AQMAs) being set up where standards fall below the limits set by the Environment Act and the Air Quality (Wales) Regulations. The Environment (Wales) Act 2016 imposes various duties relation to the sustainable management of natural resources, including the air.

In Wales, national planning policy is comprised of Planning Policy Wales (PPW), Technical Advice Notes (TANs), circulars and policy clarification letters. PPW states “Development plan policies and decisions on planning applications should take into account national air quality objectives, EU limit and target values”. The Local Air Quality Management (LAQM) Policy Guidance in Wales provides guidance for local authorities on how to meet the statutory objectives set within the UK legislation.

Air quality related commitments are included in a number of policy documents, such as The Wales Transport Strategy (which is currently under review and will be published in draft for consultation during 2018), and the National Transport Finance Plan which are designed to promote a shift to more sustainable methods of transport such as walking and cycling and integrated public transport; and supporting highway schemes that are designed to reduce traffic congestion.

---

<sup>3</sup> Available at <https://www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017>

<sup>4</sup> Available at <https://uk-air.defra.gov.uk/library/no2ten/2017-zone-plan-documents>



The Well-being of Future Generations (Wales) Act strives to improve the social, economic, environmental and cultural well-being of Wales. Its goals, as summarised in The Essentials of the Act<sup>5</sup>, are as follows:

Goal	Description of the goal
<b>A prosperous Wales</b>	An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work.
<b>A resilient Wales</b>	A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).
<b>A healthier Wales</b>	A society in which people's physical and mental well-being is maximised and in which choices and behaviours that benefit future health are understood.
<b>A more equal Wales</b>	A society that enables people to fulfil their potential no matter what their background or circumstances (including their socio economic background and circumstances).
<b>A Wales of cohesive communities</b>	Attractive, viable, safe and well-connected communities.
<b>A Wales of vibrant culture and thriving Welsh language</b>	A society that promotes and protects culture, heritage and the Welsh language, and which encourages people to participate in the arts, and sports and recreation.
<b>A globally responsible Wales</b>	A nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being.

### Regional Summary

The Moving North Wales Forward Plan (MNWF) looks to create a sustainable, reliable, efficient and quality integrated transport network across the region. Their vision is to connect people, communities and businesses to jobs, facilities and services, and maximise economic opportunities. One of the outcomes hoped for is to deliver reduced emissions and improved air quality.

The MNWF looks to provide a modern, high quality transport system, which is considered to be fundamental to achieving economic growth. In addition, the plan shares the same ambitions as Planning Policy Wales in wanting the region to be a competitive and connected component of the Northern Powerhouse.

### Local Summary

The Flintshire County Council LAQM Progress Report in 2013 reported that monitoring carried out in 2012 indicated 5 potential new air quality hotspots in the County. The study found that the site Rose Cottage on the A1159 in Mold continued to exceed the objectives for NO<sub>2</sub> annual mean in 2012.

---

<sup>5</sup> Available at: <https://futuregenerations.wales/wp-content/uploads/2017/01/150623-guide-to-the-fg-act-en.pdf> - Accessed 8th January 2018

## 2.1.2. AIR QUALITY

The section of the A494 under consideration in this study sits within Flintshire County Council. Flintshire County Council has an action within the North Wales zone plan to reduce nitrogen dioxide concentrations within an Air Quality Management Area (AQMA). Whilst no details are currently available to confirm the extent of this AQMA, it is likely to lie several kilometres from the A494 section. There are no AQMAs located within 1km of the A494, either within Flintshire or within neighbouring local authorities.

Air quality baseline data for the A494 Deeside has been derived from both local authority (as uploaded on the Air Quality in Wales website<sup>6</sup>) and UK air quality reports.

Specifically, baseline and future baseline air quality NO<sub>2</sub> concentrations has considered outputs from the Pollution Climate Mapping (PCM) model developed by Ricardo AEA on behalf of Defra/DfT.

The PCM model projections presented in support of the 2017 Plan indicate that annual mean NO<sub>2</sub> concentrations will reach compliance with air quality limit values by 2021 (i.e. projected concentrations at or below 40µg/m<sup>3</sup>) on the A494 in Deeside.

The dates in Table 1 set the timescales within which the measures must be deliverable to bring forward compliance.

**Table 1: Baseline PCM Predicted NO<sub>2</sub> Concentrations at Deeside, without NO<sub>2</sub> reduction network measures (projections from 2017 Plan, July 2017)**

Site Location	NO <sub>2</sub> Predicted Baseline Concentration (µg/m <sup>3</sup> )					
	2017	2018	2019	2020	2021	2022
A494 Deeside (Aston Hill)	50	48	46	43	40	38
A494 Deeside (Jct with A550 to Jct with A548)	48	46	44	42	39	37
A494 Deeside (Jct with A548 to Jct with Shotwick Rd)	42	40	38	36	34	32

The PCM modelled concentrations in Table 1 are consistent with the concentrations monitored by Flintshire County Council (Aston Hill Roadside).

**Table 2: Monitored Annual Mean NO<sub>2</sub> concentrations alongside the A494 (µg/m<sup>3</sup>)**

ID	Location	Distance to A494	Bias-adjusted Annual Mean			Adjusted to 4m from A494		
			2015	2016	2017	2015 (4m)	2016 (4m)	2017 (4m)
2	St. Davids Close, Ewloe	50m	17.4	21.0	-	20.6	34.6	-
4	Moorfield Court, Aston	-	16.6	16.3	9.4	-	-	-
3	Aston Hill Roadside	10m	29.4	42.6	35.1	33.8	51.9	-
16	Belvedere Close, Queensferry	-	27.4	34.2	28.4	-	-	-
27	Riverside Park	15m	23.0	18.1	-	27.6	20.2	-
36	Station Road, Queensferry	-	22.0	19.4	-	-	-	-

<sup>6</sup> Available at: <http://www.welshairquality.co.uk/>

### 2.1.3. INFRASTRUCTURE AND LOCAL FACILITIES

The A494 between St Davids Interchange and the River Dee bridge crossing is a 2 lane all-purpose dual carriageway (D2AP), subject to a 50mph speed limit. The stretch north of the River Dee to the Deeside Park Interchange is a 3 lane all-purpose dual carriageway (D3AP) that is National Speed Limit. The study corridor operates with No Stopping (Clearway) Order. Chevrons occur on the northbound carriageway north of St Davids Interchange until north of the River Dee.

Beyond the corridor to the south, the A494 links with the A55 North Wales Expressway. This provides the A494 with a connection to the North Wales coast and Chester. The north of the corridor links to the M56 motorway, connecting road users to Liverpool and Manchester.

The infrastructure, including structures and junctions, on the A494 study corridor from west to east is summarised as follows:

- Grade separated roundabout at St Davids Interchange with the A494 on structures above the circulatory;
- Concrete gantry on the southbound carriageway to the north of St Davids Interchange;
- Rail underbridge (Borderlands Line);
- At grade priority junction on northbound carriageway with Old Aston Hill;
- Overbridge with an unclassified road between Lower Aston Hall Lane and Aston Park Road / Courtland Drive roundabout;
- At grade junctions at the Plough Inn on Aston Road (northbound) and Lower Aston Hall Lane (southbound);
- Footbridge south of Asda Queensferry;
- Grade separated roundabout connecting to the B5129 with the A494 on structures above the circulatory;
- Rail overbridge to the west of River Dee (North Wales Coast line);
- At grade priority junction on southbound carriageway south of River Dee;
- Bridge over the River Dee;
- Steel truss gantry to the east of River Dee;
- Steel truss gantry on the northbound carriageway to the south of Drome Corner;
- Drome Corner overbridge;
- Steel truss gantry on the northbound carriageway to the north of Drome Corner;
- Footbridge south of Deeside Industrial Estate (Chester Millennium Greenway);
- Steel truss gantry on the northbound carriageway to the south of Deeside Park Interchange; and
- Grade separated roundabout at Deeside Park Interchange, connecting the A494 with the A548. The circulatory forms two consecutive overbridges to the north east of Deeside Industrial Estate.

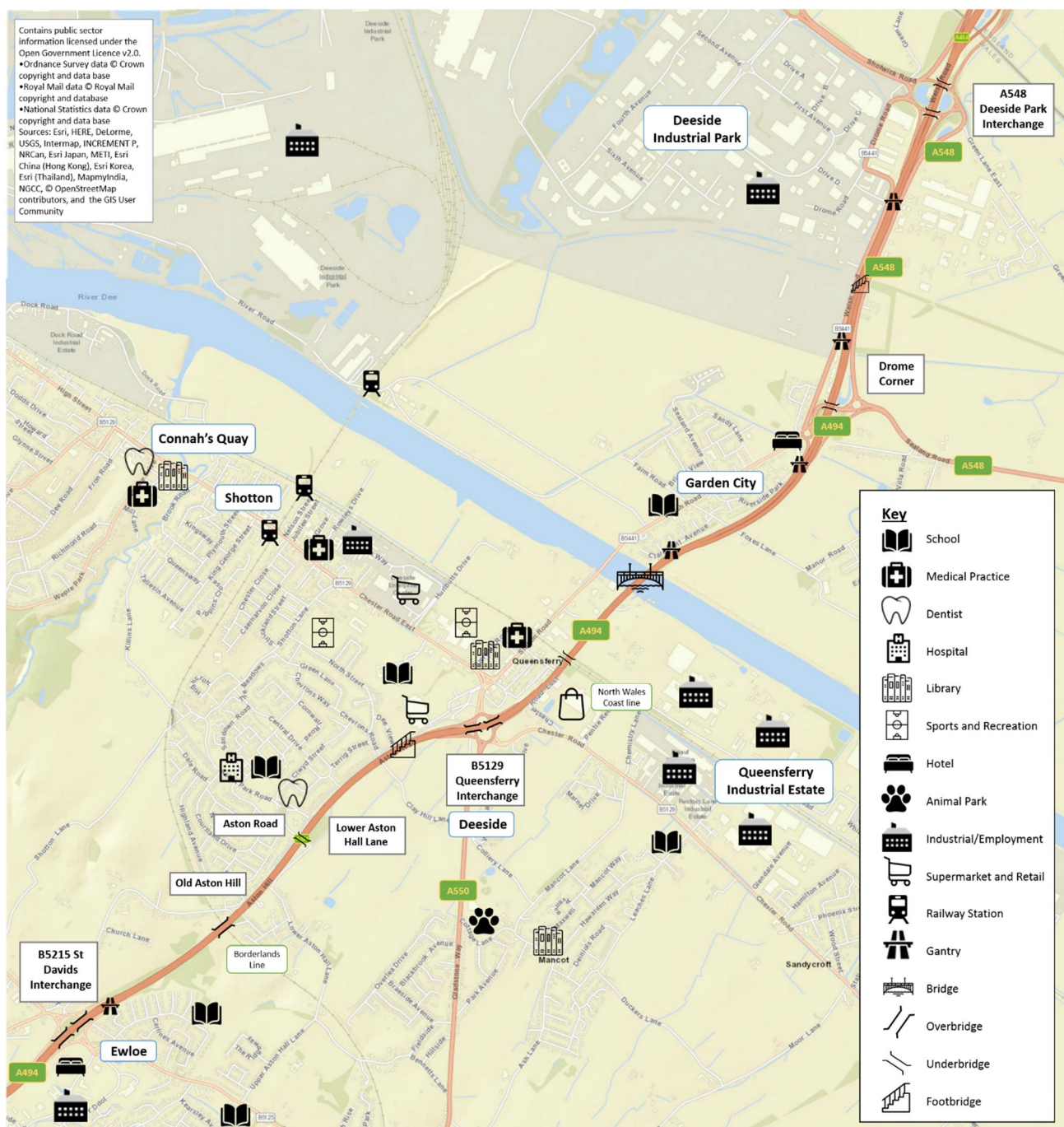
The A494 study corridor is in a reasonably built-up area, transecting through residential areas such as Ewloe, Deeside, Garden City, and Higher Shotton. The northern section of the corridor passes through Deeside Industrial Park and Queensferry Industrial area.

Around the study corridor, there are various community facilities, for instance schools (including a Welsh Medium primary school in Shotton), medical practices, libraries, leisure centres, employment areas, and retail parks. Flintshire's Welsh Medium Secondary School is located in Mold.

The infrastructure and local facilities in the vicinity of the A494 are illustrated in Figure 2.



**Figure 2: Infrastructure and Local Facilities nearby the A494 Study Corridor**



## 2.1.4. MAJOR SCHEMES

WG are looking to improve the A55 / A494 / A548: Deeside Corridor between the River Dee and Northop Interchange, recognising that the study corridor experiences congestion frequently. WG appointed consultants to study the possible routes, who have identified a preferred route that links the A55-A5119 Northop Junction with the A494 and A550 north of Deeside Park Interchange, via Kelsterton Interchange and the Flintshire Bridge. This route would bypass our study corridor.

The scheme is listed under measures provided by WG to deliver air quality improvements within the North Wales zone plan of the UK Air Quality Plan<sup>3,4</sup>. The plan lists the expected end date as 2022, which is later than the current projected compliance date for the North Wales zone. Therefore, the scheme has not been taken into account in this WelTAG appraisal.

### 2.1.5. TRAFFIC FLOWS

Annual Average Daily Flows (AADF) have been extracted from the Department for Transport (DfT). Traffic flows to the north of the A494 study corridor at the Drome Corner junction are approximately 47,500 vehicles. South of this, to the north of the River Dee crossing, the flows are approximately 63,000 vehicles. At the south of the A494 study corridor, the traffic flows are approximately 70,000 vehicles to the north of the St Davids Interchange. Along the study corridor, the percentage of Heavy Goods Vehicles (HGVs) varies from 7% to the north and 5% to the south.

Trafficmaster has been used to analyse the difference in annual average weekday vehicle speeds between cars / Light Good Vehicles (LGVs), and HGVs for both directions on the A494 study corridor. The data has been separated into four periods, as follows; AM Peak (07:00-10:00), Inter Peak (10:00-16:00), PM Peak (16:00-19:00), and Off Peak (19:00-07:00). The data used for this study is from the period between 1st June 2015 and 30th July 2016. Vehicle speeds below are all presented in kilometres per hour (kph).

Speeds of cars and LGVs are slightly faster than HGV speeds along the A494. Car and LGV speeds are at their highest during the Off Peak (92kph), and lowest during the PM Peak (71kph). The AM Peak and Inter Peak periods experience similar speeds, 84kph and 86kph respectively. In comparison, HGV speeds do not alter significantly between each period. The highest HGV speeds were recorded in the Inter and Off Peak periods (both 79kph), and the lowest are recorded in the PM Peak (71kph). The AM Peak has an average speed for HGVs along the study corridor of 77kph.

### 2.1.6. PUBLIC TRANSPORT

Analysis<sup>7</sup> shows that there was an annual increase of 3.5% in the number of station entries/exits across Wales in 2015-16 compared to the year before.

The study corridor along the A494 is adjacent to part of the Borderlands line, which stops at 15 stations between Wrexham and Bidson on the Wirral. These include Wrexham General and Shotton, which offer interchanges with services to Chester, Shrewsbury, and London. The passenger train services are operated by Arriva Trains Wales (ATW), with trains running every hour Monday to Saturday daytime, and every two hours after 18:45 and on Sundays. Parking provision is limited at Shotton, with 20 free spaces, none of which are accessible.

The study corridor also passes under the North Wales Coast railway line, which runs between Crewe and Holyhead.

Bus services in Flintshire are operated by a range of private companies, predominately Stagecoach, Arriva, and P&O Lloyd, with many services originating in Mold or Chester. No services operate on the A494; however, routes SP1 and SP2 from Mold to Ellesmere Port, and 8 from Sealand Manor to Mold, may offer an alternative to some car journeys.

### 2.1.7. ECONOMY

The Labour Market Profile of Flintshire<sup>8</sup> has identified that 75.1% are economically active (for those aged 16-64), which is similar to the average in Wales of 75.2%. There are 7,400 workless households in Flintshire, which equates to 15.5% of households, which is 2.3% lower than across Wales. Flintshire also has lower than average out-of-work benefits claimants and full time workers earn more than the national average.

### 2.1.8. DEMOGRAPHICS

The Local Area Report for Flintshire<sup>9</sup> covers the characteristics of people and households with information sourced from the 2011 Census key statistics. Of the 152,506 usual residents, 49.3% were males and 50.7% were females. 99.5% of the usual residents lived in households and 0.5% lived in communal establishments.

<sup>7</sup> Source Location: <http://gov.wales/docs/statistics/2017/170510-rail-station-usage-2015-16-en.pdf> - Accessed 13th November 2017

<sup>8</sup> Nomisweb.co.uk – Accessed on 9th November 2017

<sup>9</sup> Nomisweb.co.uk – Accessed on 8th January 2018

Furthermore, the average (mean) age of residents was 40.6 years, which is same as the national average across Wales.

Of all usual residents aged 3 and over in Flintshire, 79.4% have no Welsh language skills, which is 6.1% higher than across Wales. 13.2% of residents in Flintshire can speak Welsh, and 9.3% can speak, read, and write Welsh. This compares to the national average of 19.0% and 14.6% respectively.

## 2.1.9. OTHER SENSITIVE ENVIRONMENTAL AREAS

This section of the report identifies and determines the potential environmental constraints and opportunities within the vicinity of the A494 between Ewloe and Dunkirk. The report has been compiled using aerial imagery and ordnance survey maps.

### Statutory Designations

European Designated Sites (also known as Natura 2000 Sites) include any Special Protection Area (SPA), Special Area of Conservation (SAC), and RAMSAR sites. There are two SACS located within 1km of the A494 (measured from closest point) comprising the Deeside and Buckley Newt Sites, which is located approximately 1km north west from the A494, and River Dee and Bala Lake SAC which flows beneath the A494.

There are two Sites of Special Scientific Interest (SSSI) within proximity to the A494 comprising Connah's Quay Ponds SSSI located 1km north west, and River Dee SSSI, which flows beneath the A494.

There are no Areas of Outstanding Natural Beauty (AONB) located within 1km proximity to the proximity to the A494, nor are there any other Statutory Designations (National Parks and Country Parks) located within 1km to the A494.

### Non Statutory Designations

There are no non statutory designations within 1km of the A494, and no Special Landscape Areas within the vicinity of the highway on the A494.

### Areas of Population, Community Resources and Infrastructure

There are more than 20 sensitive human receptors (i.e. residential properties, hotels etc.) and community resources (i.e. footpaths, cycleways etc.) located within 1km of the A494. For instance, there are several instances of residential dwellings that are within 20m of the A494 at the closest point, as well as footpaths, restaurants, and industrial parks within 50m of the carriageway.

### Sensitive Noise Receptors

There are Noise Sensitive Areas, including five Noise Action Planning Priority Areas (NAPPA), located within 1km of the A494. These are:

- West side of J33B (within 40m of A55)
- Near Ashton Hill
- Near Queensferry
- Adjacent the industrial park on eastside of A494
- From the roundabouts on either side of the A494 up to where the bridge and footpath crosses the A494

### Water Environment

There are three water courses and permanent water bodies located within 1km of the A494, including a series of unnamed drainage ditches near Queensferry, the River Dee, and drainage ditches and watercourses that flow adjacent, underneath and within proximity to the A494, some of which are tributaries of the larger main watercourses.

### Cultural Heritage, Historic and Landscape designations

There are two Listed Buildings within 1km of the A494. These are the Ferry Bank Farm Approximately 50m south east of A494 on Fox's Drive, and Bascule Bridge over the River Dee on the A494 (approximately 200m north west).

There is one Scheduled Monument comprising Trueman's Hill Motte located 1km south east of the A494 near Hawarden.



There are no conservation areas within 1km of A494, and there are also no Historic Parks and Gardens within 1km of the A494.

## 2.2. PROBLEM IDENTIFICATION

The A494 lies within the North Wales zone for the purpose of the assessment of compliance with the EU Air Quality Directive.

The national assessment<sup>1</sup> of roadside NO<sub>2</sub> undertaken for the North Wales zone indicates that the annual limit value was exceeded in 2015 but it is likely to be achieved by 2021. WG are investigating additional network management measures for the strategic trunk road and motorway network that could bring forward the projected compliance date.

The compliance date of the North Wales zone is, in current projections, determined by the compliance of the A494 between the B5152 (Holywell Road) and the A458 (Shotwick Road). Elevated concentrations of NO<sub>2</sub> on this study corridor are due to a combination of high traffic volumes and periods of congestion<sup>10</sup>.

## 2.3. OBJECTIVE OF THE STUDY

Whilst WelTAG provides a fixed framework for appraisal, the guidance acknowledges that the level of detail provided in the WelTAG report should be proportionate to the impacts under consideration.

**The objective of this study is to carry out an initial investigation and identify potential network management measures which will assist in bringing forward reductions in NO<sub>2</sub> in the shortest possible time to ensure compliance with the Air Quality Framework Directive requirements in five locations on the Welsh SRN listed above. Therefore, the transport case will focus on air quality and reflect the key considerations in relation to the EU Air Quality Directive and bringing forward compliance with limit values.**

The following **key criteria** were described in the Project Brief for the high level appraisal of the potential measures:

- **Effectiveness**
- **Timescales**
- **Feasibility**

This has been interpreted for the purposes of this appraisal as meaning:

- **Effectiveness** – Is the measure likely to deliver reductions in roadside concentrations proportionate to the scale of the exceedance above the 40µg/m<sup>3</sup> legal limit
- **Timescales** – Can the measure be implemented within timescales that are meaningful (short enough) to have an impact on bringing forward the projected compliance date
- **Feasibility/Deliverability** – Can the measure be delivered in the location involved with the powers available to the Highway Authority

For the purpose of this appraisal, the phrase deliverability has been used, instead of feasibility to match more clearly the requirements of WelTAG for delivery.

The Stage 1 appraisal has focused on these three key criteria.

---

<sup>10</sup> A55 / A494 / A548: Deeside Corridor Project Summary. Available at: <https://beta.gov.wales/a55-a494-a548-deeside-corridor> - Accessed 20th December

In addition to the Air Quality Directive, the study contributes to the strategic priorities of the Welsh Government, including that of the Well-being of Future Generations (Wales) Act 2015. As such, based on the Future Generations Act and the recommendations within The National Institute for Health and Care Excellence (NICE) air quality guidelines<sup>11</sup> so that health impacts can be more fully considered, the following are considered as **secondary criteria** in the appraisal process:

- Will the measure deliver an overall reduction in NO<sub>2</sub> emissions to air
- Will the measure result in unintended consequences or other environmental impacts
- Will the measure contribute to well-being
  - Will the measure impact equally across multiple vehicle classes and journey types
  - Will the measure have a positive impact on wider public health and inequalities

It is possible that measures could be used in combination. Each individual measure need not bring forward compliance in itself but the improvement in NO<sub>2</sub> brought about by the measure should be proportionate to the scale of the exceedance of the limit value.

The secondary criteria will be considered in further detail during the Stage 2 appraisal, and will likely be significant where two measures are mutually incompatible. In such cases, delivery against the secondary criteria could weigh in favour of a particular measure.

At this stage the examination of the implications of the Well-Being of Future Generations requirements is limited due to the level of detail available of measures. A more detailed examination will be carried out in later WelTAG stages including consideration of impacts on well-being objectives of other public bodies.

## 2.4. THE PROCESS

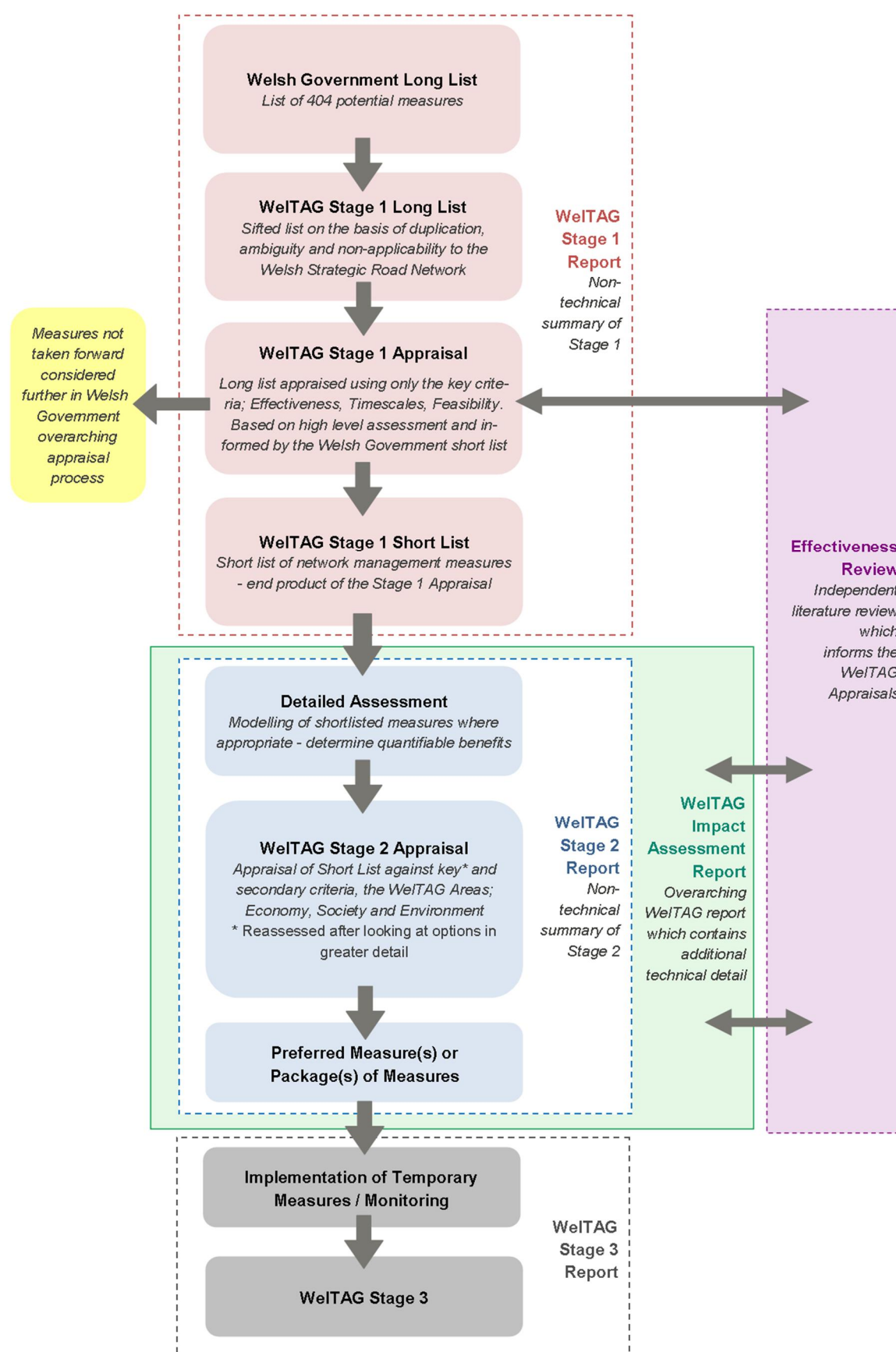
This study has been undertaken following the WelTAG framework and with consideration of the goals of the Future Generations Act. Preliminary work was undertaken by the WG, who produced a long list and short list of measures. These are not the WelTAG long list and short list, although they have been used to inform this study. This is discussed in more detail in Section 2.5.

This study is currently at Stage 1 (Strategic Outline Case), which identifies the issue and objective, develops a long list of possible measures, and following appraisal concludes with a short list of measures to take forward to Stage 2 (Outline Business Case). The WelTAG documents are supported by an Effectiveness Review, which considers documented evidence of the effectiveness of measures. This process is summarised in Figure 3.

---

<sup>11</sup> Air pollution: outdoor air quality and health, NICE guideline [NG70] Published date: June 2017

**Figure 3: The Process**



## 2.5. LONG LIST OF MEASURES

### Welsh Government Measures

WG has already undertaken a significant amount of work producing a list of 404 potential measures, which include ideas, strategies, and policies to reduce levels of NO<sub>2</sub> at the roadside. These high level preliminary ideas were compiled at a series of workshops (including brainstorming events) with a number of internal stakeholders within WG between September 2016 and September 2017; and from a review of publications and lessons learnt from other organisations such as the Scottish Government, DEFRA, and Highways England.

Prior to undertaking the Stage 1 WelTAG appraisal, WSP undertook a review of WG's list and considered that it is neither practical nor necessary to take all 404 potential measures through the formal WelTAG process. This review has taken account of information generated by the effectiveness review and the professional experience of the WSP team.

In WSP's review, each idea was considered and all potential measures that could be immediately sifted out of consideration where there is an unambiguous and, insofar as is practical, uncontestable failure against the objective were removed (e.g. not related to roadside emissions, or carried a significant safety risk if applied to the WG network). The sifting was undertaken generically and did not take account of location-specific constraints for measures, unless the idea was related to a specific location not associated with the WG network. The ideas were also sifted on the basis of ambiguity, for instance if the idea was more of an approach than a tangible measure. Measures that were duplications or were similar enough to be considered as one package of measures were combined and taken forward together.

A copy of the workshop notes following WG's workshops and review is included in Appendix A. This also includes the outcome of WSP's review and sifting process.

This review process identified measures that could be taken forward and developed further in the WelTAG Long List that were appraised in Stage 1, detailed in the following section. WSP did not identify any additional measures that were not included in the WG's list.

### WelTAG Stage 1 Long List of Measures

The measure development process considered all measures that had the potential to meet the key criteria for delivering the objective. This process did not consider location specific factors and as such, the numbering of the measures used within this report is non sequential as measures that are not relevant to the A494 Deeside have been removed. Following the review of WG's list of 404 potential measures, strategies and policies, 56 measures for reducing NO<sub>2</sub> on the A494 were identified. As there is a degree of overlap between many of the measures, they have been grouped into the following key themes:

- Air Quality Technology and Abatement
- Network Capacity and Demand
- Diversion Routes
- Policy and Funding
- Sustainable Travel
- Traffic Management
- Network Asset Management
- Communication

The long list of measures are detailed in the following section by the themes identified above.

## 2.5.1. AIR QUALITY TECHNOLOGY AND ABATEMENT

### S1: NOx Absorbing Materials

NOx absorbing paint / coatings and fencing / panels. This could either be added to existing fencing, structures, and walls; painted over hard surfaces; or as new installations. 'Air purifying concrete', which contains Titanium Dioxide, and can also be used combined with Asphalt.

### S2: NOx Abatement Technology

Review / investigate NOx abatement technologies - e.g. NOx removing "scrubbers". Mechanism for cleaning air in locations – "catalytic convertors".

### S3: Air Quality Monitoring Network

Invest in and improve the air quality monitoring network, by use of smart technology, e.g. a separate modelling & monitoring approach for Wales.

### S4: Air Quality Screening / Fencing / Canopy / Environmental Barriers

Install screens / barriers / fencing without special surfaces at sensitive locations – physical barrier to air movement between source & receptor. Air quality canopies with over-arching the carriageway design. There is some evidence for effectiveness of 4-6m height environmental barriers in Dutch & American studies.

### S5: Tunnels

Install tunnels at sensitive locations.

### S6: Vegetation

Planting vegetation for pollution abatement, with green infrastructure.

## 2.5.2. NETWORK DEMAND AND CAPACITY

### S7: Enforce/Reduce Speed Limit

Ensure that the strategic routes are run efficiently, for instance by introducing average speed limits in the areas most impacted by poor air quality. Could reduce speed limit and enforce current (or revised) speed limit using either spot cameras or average speed cameras. Predictable speed control on sections of trunk road network - can be refined to deliver specific levels of improvement.

### S8: HGV Overtaking Bans

Prohibit HGVs from overtaking other vehicles (either full time or part time, such as peak hours) with enforcement - particularly for high speed carriageways.

### S10: Flow Management (Upstream)

Flow management away from area of exceedance, either by delaying flows or balancing them across alternative routes.

- Control flows from upstream by inducing delay elsewhere on the network outside areas of exceedance on wider approach routes (away from receptors) by speed limits, lights, and lane closures.
- Redistribute traffic to alleviate flow/congestion at Air Quality hotspots. For instance by using signage, traffic info, Sat Nav instructions, to inform route choices during periods of peak congestion (causing diversion of some traffic to alternative routes).

### S11: Improve Flows (Locally)

Increase capacity of roads within area of exceedance to help flows. Improve flows at junctions - by changing lights, adding longer slip roads, or junction reconfiguration. Limit street works and cleaning to off peak hours.



#### **S12: Block off Roads**

Restrict access to some areas to cars of certain engine size and block off roads in times of predicted poor air quality. Will need to give notice ahead of the time that roads will be blocked.

#### **S14: Ramp Metering**

Use ramp metering to control traffic entering the road in question from side junctions / sliproads by traffic lights.

#### **S15: Parking Reduction**

Assess & reduce parking provision in certain areas, for instance by removing residents parking in day time in some areas to relieve demand in other areas and / or remove loading bays. Work with police, community safety to enforce parking and vehicle standards.

#### **S16: Junction Closures**

Close individual junction or junctions – either full time or part time, temporarily or permanently.

#### **S17: Variable Message Signs (VMS)**

Use VMS/gantry information boards for information/awareness within area of exceedance, and to display real time air quality & travel information e.g. to highlight air quality issues associate with vehicle travel. Drivers would be informed of information that could help to address air quality issues on network – either standalone or as part of other traffic information – e.g. promotion of Park & Ride, 'drive smoothly for air quality' etc. This may involve improving the VMS spec, such as upgrading the designs to that which allow more text/images to be used to display messages.

#### **S18: Expressway**

Implement an Expressway using variable speed limits without hard-shoulder running. These scheme use active traffic management techniques to increase capacity by use of variable speed limits at busy times. Benefits include smoother traffic flow, more reliable journey times, fewer road traffic collisions, and reduced noise and harmful vehicle emissions.

### **2.5.3. DIVERSION ROUTES**

#### **S19: Variable Diversions**

Variable diversions within set NO<sub>2</sub> limits (using continuous monitoring equipment).

### **2.5.4. SUSTAINABLE TRAVEL**

#### **S26: Reallocation of Road Space**

A reallocation of road space to include one or more of the following:

- Bus Lane to encourage modal shift.
- Low Emission Vehicle Lane to encourage shift to ULEVs.
- High Occupancy Vehicle Lane to encourage car sharing and reduce traffic.
- Specific lane for a range of specific vehicle/mode types to encourage modal shift etc.

#### **S27: Parking Improvement**

Introduction / Improvement / Promotion of additional parking at railway stations, along the strategic road network corridor, and on outskirts of towns, to encourage onward journeys using all modes of public transport (bus and rail), sustainable travel (walking, cycling, scooting), or by car sharing.

Observations of people parking cars at various locations to lift-share. Could identify areas adjacent to junctions along the strategic road network with air quality issues to facilitate this officially and reduce single occupancy car trips.

### **S28: Behaviour Change**

Package of several measures aimed at changing travel behaviour, resulting in a mode shift away from private car use. For instance, introducing Active Travel campaigns through school & business Travel Plans and using Personalised Travel Planning. Promote Active Travel with facilities, measures, incentives, and technology. Air quality awards for those organisations/companies that have changed behaviour. Measures could also include workplace charging levies and staggered timings for school buses. Potential to promote a 'No Car Day' event, which would encourage / incentivise the use of public transport. Whilst the benefit on the day may be minimal, it could provide long term benefits with a change in modal split.

### **S29: Car Sharing**

Promotion of and incentives for car sharing, such as free or reserved parking, supported by technology such as apps, and information/tools on websites. Furthermore, provision of parking, for instance at key locations along the strategic road network, to allow people to car share.

### **S30: Public Vehicle Fleet**

Consider Government procurement and buying standards for public sector vehicles, e.g. buses - Ultra Low-Emission Vehicles (ULEVs) encouraged. Local authorities could be given financial support/grants to invest in new cleaner vehicles in the affected areas.

Case study in Scotland - Support for green buses including scope for supporting retrofitting existing vehicles, taking account of technological and market developments and the need to tackle air quality as well as climate change.

### **S31: Electric Vehicle Charging Points**

Development of electric vehicle charging infrastructure, e.g. introduce charging points in towns across Wales (esp. in locations near the affected areas). The Plugged-in Places programme offers match-funding to consortia of businesses and public sector partners to install electric vehicle charging points.

### **S32: Integrated Transport Interchanges**

Improving and promoting an integrated multi-modal transport system (including ticketing) at existing public transport interchanges in Wales. This should increase attractiveness to users and make public transport a practical first option to encourage a modal shift away from private vehicles.

### **S33: Improved Rail Provision**

Improve rail infrastructure and services to encourage mode shift and / or reduce emissions - e.g. restore old lines, improve stations, rail electrification/bi-mode trains, Cardiff Metro (incl. valley line modernisation) (e.g.: The Bwcabus Project).

### **S34: Improved Bus Provision**

Improve and promote bus services to encourage mode shift, for instance by using corridor enhancements and bus priority measures, introducing new bus lanes, and removing pinch points on the road network that cause reliability issues for buses in Wales. There should also be support for local services, including subsidising travel, esp. for younger people in Wales. This could also include using the Bus Services Support Grant to support non-commercial services to support modal shift from cars. The Bwcabus Project, which is an innovative demand responsive transport scheme in rural Carmarthenshire that has seen an increase in passengers and helped people travel more sustainably, may be rolled out more widely.

### **S35: Reducing Need for Journeys**

Promote and encourage the use of technology to reduce the need to travel, e.g. working from home, video-conferencing, tele-working, online GP consultations.

### **S36: Pedestrian Walkways**

Pedestrian walkways over trunk roads, and the creation of a pedestrian-friendly environment to encourage mode-shift.

### **S37: Freight Operations**

Consider freight operations and promote modal shift.

Reduce empty HGV/LGV returns by use for a lorry share scheme, and/or encourage deliveries to be scheduled outside of peak periods, for instance during the night. By using 'last mile' consolidation points, shipments are consolidated to maximise vehicle utilisation on the "last mile" and make a reduced number of deliveries at agreed times.

Research into Freight Consolidation Centres (FCCs), which are distribution centres at which part-loads are consolidated into a lower number of loads delivered into target area. There could also be a trial of longer semi-trailers.

In Scotland, they have encouraged each local authority with an AQMA to create a Freight Quality Partnership (or utilise an existing RTP Freight Quality Partnership) and consider appropriate measures for local air quality improvement. Encourage Freight Quality Partnerships to extend their activities to include consideration of the environmental impact of freight transport.

Promote freight modal shift, e.g. providing initiatives & support to encourage the use of rail & water. Welsh Freight Mode Shift Revenue Support - grant to offset the greater operating costs of transport by rail or inland waterways vs road. Welsh Freight Facilities Grant - grant for capital costs of freight handling facilities associated with shift from road to rail / waterways.

### **S38: Eco-driving**

Provide eco-driver training, promote eco-driving (freight-bus-car), and educate HGV operators.

### **S39: Improve Planning Decisions**

Improve planning decisions to promote and plan for sustainable travel as part of new developments (residential or commercial), for instance by reducing the parking allocation. Planning could also be used to strengthen air quality planning regulations, and secure air quality improvements, or change how air quality is measured, e.g. by not placing receptors next to major roads.

## **2.5.5. POLICY AND FUNDING**

### **S40: Planning Policy**

Review planning policy and guidance and revisit existing policy initiatives to see if any could be more focussed towards specific locations. Updates to Planning Policy Wales and National Transport Finance Plan - to include green infrastructure, ecological impacts, school monitoring & impacts, transport/pollution/planning links, traffic calming, indoor air quality. Air quality to be considered in strategies & development plans. Amend Active Travel Act to take into account air quality exposure on proposed routes, along with monitoring & mitigation.

### **S41: Promotion of Ultra Low Emission Vehicles**

Initiatives, promotion, and support to encourage the purchase and manufacturing of electric/hydrogen/ Ultra Low-Emission Vehicles (ULEVs), e.g. with priority/cheaper parking, and lower tax rates. Consider the potential role of LPG to replace diesel for improved emissions, and subsidies for companies who reduce emissions, e.g. haulage and bus companies located in certain corridors. Grants to encourage conversion to cleaner vehicles and for purchase of ultra-low emission cars (LPG, natural gas, hybrid & electric vehicles), e.g. Plug-in Car Grant.

### **S42: Funding**

Ring-fenced funding for Public Service Boards to tackle air quality within wider context of environment / health / sustainability, to include the WG LA Single Revenue Grant.

#### **S44: Vehicle Emission Testing**

Using The Road Traffic (Vehicle Emissions) (Fixed Penalty) (Wales) Regulations 2003 - Issue road-side penalties for vehicles exceeding emissions, and tackle unnecessary idling.

#### **S45: National Road Pricing**

National road pricing.

#### **S46: Clean Air Zones / Low Emission Zones**

Promotion of Clean Air Zones and/or Low Emission Zones - implement with use of ANPR cameras/GPS/Bluetooth. Negotiate new vehicle emissions standards, establish a bus operator NOx emissions cap, and determine specific targets in terms of vehicle type and journeys taken to inform measures focussed on specific effects on traffic in locations of interest. Including requirement to display stickers on vehicles showing emissions category - higher emission vehicles banned during periods of high pollution levels (as in France). Could involve limiting HGV weight or emission, and zone charging.

#### **S47: Influencing Contractors**

Set minimum air quality standards for vehicles used in contracts. CEEQUAL (Civil Engineering Environmental Quality Awards) Scheme for major works projects. Revised standards for Non Road Mobile Machinery - requires engines for such vehicles to be compliant with emissions standards (incl. NO<sub>2</sub>). Mandatory considerate contractor scheme/s.

#### **S48: Air Quality Objectives**

Revised legislation to tighten air quality objectives.

#### **S50: LAQM Reporting**

Stronger enforcement of Local Air Quality Management (LAQM) reporting, with an increased focus on NO<sub>2</sub> & PM.

### **2.5.6. TRAFFIC MANAGEMENT**

#### **S51: Intelligent Traffic Management**

Intelligent Traffic Management, linking real-time emissions/air quality data with TM - &/or remote monitoring through use of Intelligent Transport System (ITS) & other innovative technological systems. Linked to Air Quality and/or traffic flows. Use systems to smooth out traffic flows when air quality issues and/or traffic congestion occurs, and/or link to travel info to influence route / mode / time of travel choices.

#### **S52: Traffic Lights**

Change traffic light phasing to ease traffic flow.

#### **S53: Enhanced Traffic Officer Service**

An enhanced Traffic Officer Service in Wales to clear motorway and trunk road incidents quickly thereby reducing emissions from idling vehicles caught up in congestion. Could involve upgrading their operation, providing additional teams, or expanding the service to routes that are not currently being covered.

#### **S54: Traffic Management Act**

Gives more powers to local authorities to control traffic & parking.

#### **S55: Restricted Access Zones**

Restricted access and/or lorry ban in urban centres.

#### **S56: Lane 1 Closure**

Lane 1 closure (overnight) to increase distance between traffic source and receptors.

#### **S57: Geofencing**

Geofencing is a GPS-based technology that sets an interactive digital boundary around a real geographic location. The geofencing system helps fleet managers track where their vehicles are located, how much fuel they're burning and how long a driver has left a vehicle idling. The location-based technology could make hybrid vehicles switch from their internal combustion engines into electric mode as they enter the area, reducing pollution.

#### **S58: Site Specific Assessment**

Do some site specific assessment to identify local causes of poor air quality.

### **2.5.7. NETWORK AND ASSET MANAGEMENT**

#### **S59: Cycle Lanes / Highways**

Segregated cycle lanes / highways

#### **S61: Realignment**

Realignment - move scheme / junction alignment away from receptors

#### **S62: Signage**

Signage within area of exceedance to encourage improved driving behaviour, reminding drivers to turn off engines when static (e.g. anti-idling), and emphasise awareness of other measures and/or awareness of entering area of any special measures etc.

#### **S63: Distance Chevrons**

Painted signs on road surface and supporting signs to increase buffer distances between vehicles, encouraging slower & smoother driving behaviour (& safer).

#### **S64: Concrete Safety Barriers**

Concrete safety barriers in the central reserve (to allow carriageway to be shifted towards central reservation).

### **2.5.8. COMMUNICATION**

#### **S65: Air Quality Areas**

Publicity campaigns to raise awareness using branding/presentation of areas where multiple activities are applied for air quality – e.g.: information, speed control, to raise awareness and encourage compliance.

#### **S66: Air Quality Communications**

A package of measures that provides information regarding air quality that raise awareness. For instance, adding air quality locations to Traffic Wales Website and including air quality in outward facing communications plans / announcements to inform drivers alongside information on speeds/road works. Daily information should be added to the UK air website, and information provided for local residents. Real-time information should be provided, with online tools/phone apps that provide route choices and times as well as air quality implications across all modes. Investing in smart technology will make it easier to 'see' air pollution and see effects of actions to tackle it. May also include the use of a pollution car labelling scheme and signage to influence route choice. A national communications strategy should be used to communicate risks and advice on measures.

### **S67: Work with Sat Nav Providers**

Work with Sat Nav providers to provide individual traveller information. Use info to divert traffic away from 'air quality hot spots'.

## 3. TRANSPORT CASE

---

### 3.1. METHODOLOGY

The WelTAG guidance states that the purpose of the Stage 1: Strategic Outline Case is to:

*“...understand the issue of concern, explore its context and to present a wide list of possible solutions, with sufficient clarity and depth for the review group to be able to decide whether there are any possible solutions (measures) within the transport sector that are worth pursuing and to select a short list of options (measures) for more detailed consideration”.*

Whilst WelTAG provides a fixed framework for appraisal, the guidance acknowledges that the level of detail provided in the WelTAG report should be proportionate to the impacts under consideration.

**The objective of this study is to carry out an initial investigation and identify potential network management measures which will assist in bringing forward reductions in NO<sub>2</sub> in the shortest possible time to ensure compliance with the Air Quality Framework Directive requirements in five locations on the Welsh SRN. Therefore, the transport case will focus on air quality and reflect the key considerations in relation to the EU Air Quality Directive and bringing forward compliance with limit values.**

The approach of the Stage 1 level of appraisal is intended to screen and test the measures against the objective of this study to ensure that measures address the problem identified. The key criteria for the high level appraisal have been identified as follows:

- **Effectiveness** – Is the measure likely to deliver reductions in roadside concentrations proportionate to the scale of the exceedance above the 40µg/m<sup>3</sup> legal limit
- **Timescales** – Can the measure be implemented within timescales that are meaningful (short enough) to have an impact on bringing forward the projected compliance date
- **Deliverability** – Can the measure be delivered in the location involved with the powers available to the Welsh Government as Highway or Traffic Authority

This Stage 1 appraisal will consider each of the measures on the long list of measures against these identified key criteria for the objective using a simple two point scoring system (pass or fail). Only those measures that pass all three criteria will be taken forward to Stage 2.

### 3.2. STAGE 1 APPRAISAL

The Stage 1 process has extended the initial review undertaken by WSP of the WG measures by including consideration of the specific conditions (baseline, geography, likely cause of poor air quality, compliance dates, level of non-compliance etc.) at each of the five locations.

A summary of the A494 Stage 1 appraisal of network measures has been included overleaf.



A494 Stage 1 Appraisal Summary			Key Criteria (Pass/Fail)			
Measure ID	Theme	Measure	Effectiveness	Timescales	Deliverability	Take Forward to Shortlist (Stage 2)?
			Is the measure likely to deliver reductions in roadside concentrations proportionate to the scale of the exceedance above the 40µg/m3 legal limit	Can the measure be implemented within timescales that are meaningful (short enough) to have an impact on bringing forward the projected compliance date	Can the measure be delivered in the location involved with the powers available to the Welsh Government as Highway or Traffic Authority	
S1	Air Quality Technology	NOx Absorbing Materials	Pass	Pass	Pass	Yes
S2	Air Quality Technology	NOx Abatement Technology	Fail	Pass	Fail	No
S3	Air Quality Technology	Air Quality Monitoring Network	Fail	Pass	Pass	No
S4	Air Quality Technology	Air Quality Screening/Fencing/Canopy/Environmental Barriers	Pass	Pass	Pass	Yes
S5	Air Quality Technology	Tunnels	Pass	Fail	Pass	No
S6	Air Quality Technology	Vegetation	Pass	Fail	Pass	No
S7	Network Demand and Capacity	Enforce/Reduce Speed Limit	Pass	Pass	Pass	Yes
S8	Network Demand and Capacity	HGV Overtaking Bans	Fail	Pass	Pass	No
S10	Network Demand and Capacity	Flow Management (Upstream)	Pass	Pass	Pass	Yes
S11	Network Demand and Capacity	Improve Flows (Locally)	Fail	Fail	Pass	No
S12	Network Demand and Capacity	Block Off Roads	Pass	Fail	Pass	No
S14	Network Demand and Capacity	Ramp Metering	Pass	Pass	Pass	Yes
S15	Network Demand and Capacity	Parking Reduction	Pass	Pass	Fail	No
S16	Network Demand and Capacity	Junction Closures	Pass	Pass	Fail	No
S17	Network Demand and Capacity	Variable Message Signs (VMS)	Pass	Pass	Pass	Yes
S18	Network Demand and Capacity	Expressway	Pass	Pass	Pass	Yes
S19	Diversion Routes	Variable Diversions	Pass	Pass	Pass	Yes
S26	Sustainable Travel	Reallocation of Road Space	Pass	Pass	Pass	Yes
S27	Sustainable Travel	Parking Improvement	Fail	Pass	Pass	No
S28	Sustainable Travel	Behaviour Change	Pass	Pass	Pass	Yes
S29	Sustainable Travel	Car Sharing	Fail	Pass	Pass	No
S30	Sustainable Travel	Public Vehicle Fleet	Fail	Pass	Pass	No
S31	Sustainable Travel	Electric Vehicle Charging Points	Fail	Pass	Pass	No
S32	Sustainable Travel	Integrated Transport Interchanges	Pass	Pass	Fail	No
S33	Sustainable Travel	Improved Rail Provision	Pass	Pass	Fail	No
S34	Sustainable Travel	Improved Bus Provision	Pass	Pass	Fail	No
S35	Sustainable Travel	Reducing Need for Journeys	Fail	Fail	Fail	No
S36	Sustainable Travel	Pedestrian Walkways	Fail	Pass	Pass	No
S37	Sustainable Travel	Freight Operations	Pass	Fail	Fail	No
S38	Sustainable Travel	Eco-driving	Fail	Pass	Pass	No
S39	Sustainable Travel	Improve Planning Decisions	Pass	Pass	Fail	No
S40	Policy and Funding	Planning Policy	Fail	Pass	Fail	No
S41	Policy and Funding	Promotion of Ultra Low Emission Vehicles	Pass	Fail	Fail	No
S42	Policy and Funding	Funding	Fail	Pass	Pass	No
S44	Policy and Funding	Vehicle Emission Testing	Pass	Pass	Pass	Yes
S45	Policy and Funding	National Road Pricing	Pass	Pass	Fail	No
S46	Policy and Funding	Clean Air Zones / Low Emission Zones	Pass	Pass	Pass	Yes
S47	Policy and Funding	Influencing Contractors	Fail	Pass	Pass	No
S48	Policy and Funding	Air Quality Objectives	Pass	Fail	Fail	No
S50	Policy and Funding	LAQM Reporting	Fail	Pass	Fail	No
S51	Traffic Management	Intelligent Traffic Management	Pass	Pass	Pass	Yes
S52	Traffic Management	Traffic Lights	Fail	Pass	Pass	No
S53	Traffic Management	Enhanced Traffic Officer Service	Pass	Pass	Pass	Yes
S54	Traffic Management	Traffic Management Act	Fail	Pass	Fail	No
S55	Traffic Management	Restricted Access Zones	Fail	Pass	Fail	No
S56	Traffic Management	Lane 1 Closure	Fail	Pass	Pass	No
S57	Traffic Management	Geofencing	Pass	Fail	Fail	No
S58	Traffic Management	Site Specific Assessment	Fail	Pass	Pass	No
S59	Network and Asset Management	Cycle Lanes / Highways	Fail	Pass	Pass	No
S61	Network and Asset Management	Realignment	Pass	Fail	Pass	No
S62	Network and Asset Management	Signage	Pass	Pass	Pass	Yes
S63	Network and Asset Management	Distance Chevrons	Pass	Pass	Pass	Yes
S64	Network and Asset Management	Concrete Safety Barriers	Fail	Pass	Pass	No
S65	Communication	Air Quality Areas	Pass	Pass	Pass	Yes
S66	Communication	Air Quality Communications	Pass	Pass	Pass	Yes
S67	Communication	Work with Sat Nav Providers	Pass	Pass	Fail	No

**NB** Measures which are not to be taken forward to the short list (Stage 2) as part of this study are considered further in the Welsh Government overarching appraisal process



## 4. DELIVERY CASE

---

### 4.1. OVERVIEW

The Delivery Case 'covers the delivery arrangements for the project and proposed management during its life time'. The WelTAG guidance states that in the Stage 1 report the Delivery Case needs to 'set out which organisation and groups within that organisation will sit on the Review Group that meets at the end of each WelTAG stage'.

### 4.2. PROJECT PLANNING – GOVERNANCE, ORGANISATIONAL STRUCTURE

#### 4.2.1. KEY PROJECT PARTIES & ROLES

##### **Welsh Government (WG)**

Ultimate client commissioning the study and part of the Project Board overseeing delivery.

##### **WSP**

Project Consultant, delivering the study.

#### 4.2.2. REVIEW GROUP

A Project Board has been set up to guide the WelTAG process and have met regularly to discuss the project. This group will take on the role of the Review Group and its members are as follows:

- Welsh Government
- North and Mid Wales Trunk Road Agent (NMWTRA)
- Third party consultants (WSP at Stage 1 and 2)

### 4.3. COMMUNICATIONS & STAKEHOLDER MANAGEMENT PLAN

Key stakeholders for the current stage of the study are:

##### **Welsh Government and NMWTRA/SWTRA**

The study team will consult with Welsh Government and NMWTRA/SWTRA staff who currently manage and operate the network to capture views on current processes, issues and potential measures. Consultation will be carried out informally throughout the study. These also form the Review Group and their comments have been incorporated into the Report.

##### **Other Third Party Stakeholders**

Third party stakeholders were not consulted to support the development of the study. Third party consultation will be carried out in a later stage of the WelTAG process.

##### **The Public**

Public consultation will not be carried out during this stage of the study, however it will form part of a later stage.

## **5. FINANCIAL CASE**

---

### **5.1. OVERVIEW**

The financial case 'presents information on whether an option (measure) is affordable in the first place and long term financial viability. It covers both capital and annual revenue requirements over the life cycle of the project and the implications of these for the balance sheet, income and expenditure accounts of public sector organisations.'

### **5.2. ASSESSMENT**

The WelTAG report represents a Stage 1: Strategic Outline Case and the details to inform the financial case are of a preliminary nature at this stage. No lifetime costs have been calculated at this stage. The Stage 1 appraisal has only been undertaken on the key criteria identified herein. Lifetime costs and the anticipated scheme life of measures will be identified at Stage 2 for the short list of measures.

## **6. COMMERCIAL CASE**

---

### **6.1. OVERVIEW**

The commercial case covers 'whether it is going to prove possible to procure the scheme and then to continue with it in the future'.

### **6.2. ASSESSMENT**

It is not considered possible at this stage to determine the commercial case of each measure, given the preliminary information available.

## 7. SUMMARY AND NEXT STEPS

---

### 7.1. OVERVIEW

The European Union Ambient Air Quality Directive (2008/50/EC) sets legally binding limits for concentrations of certain air pollutants in outdoor air, termed 'limit values'. The Directive requires that Member States report annually on air quality within zones designated under the Directive and, where the concentration of pollutants in air exceeds limit values, to develop air quality plans that set out measures in order to attain the limit values.

The national assessment<sup>1</sup> of roadside NO<sub>2</sub> undertaken for the North Wales zone indicates that the annual limit value was exceeded in 2015 but it likely to be achieved by 2021 through the introduction of committed measures. WG are investigating additional network management measures for the strategic trunk road and motorway network that could bring forward the projected compliance date.

The compliance date of the North Wales zone is, in current projections, determined by the compliance of the A494 between the B5125 St Davids Interchange to the A458 Deeside Park Interchange. This report has presented the Stage 1: Strategic Outline Case of the WelTAG process for reducing the levels of NO<sub>2</sub> on the A494 dual carriageway network in North East Wales. Elevated concentrations of NO<sub>2</sub> on this study corridor are due to a combination of high traffic volumes and periods of congestion.

The appraisal of measures has been undertaken in accordance with the Welsh Government's consultation draft version of WelTAG [2017]. A long list of measures has been appraised against the following key criteria:

- **Effectiveness** – Is the measure likely to deliver reductions in roadside concentrations proportionate to the scale of the exceedance above the 40µg/m<sup>3</sup> legal limit
- **Timescales** – Can the measure be implemented within timescales that are meaningful (short enough) to have an impact on bringing forward the projected compliance date
- **Deliverability** – Can the measure be delivered in the location involved with the powers available to the Welsh Government as Highway or Traffic Authority

In total, 56 measures have been appraised for the A494 study corridor, of which 18 measures have been shortlisted and will be taken forward to Stage 2.

### 7.2. SHORT LIST OF MEASURES

**The short list of measures to be taken forward to Stage 2 (the Outline Business Case), based on their ability to bring forward the date of compliance with EU Limit Values on the A494 against the key criteria (Effectiveness, Timescales, and Deliverability), are as follows:**

- S1: NOx Absorbing Materials
- S4: Air Quality Screening/ Fencing/ Canopy/ Environmental Barriers
- S7: Enforce/Reduce Speed Limit
- S10: Flow Management (Upstream)
- S14: Ramp Metering
- S17: Variable Message Signs (VMS)
- S18: Expressway
- S19: Variable Diversions
- S26: Reallocation of Road Space
- S28: Behaviour Change
- S44: Vehicle Emission Testing
- S46: Clean Air Zones / Low Emission Zones



- S51: Intelligent Traffic Management
- S53: Enhanced Traffic Officer Service
- S62: Signage
- S63: Distance Chevrons
- S65: Air Quality Areas
- S66: Air Quality Communications

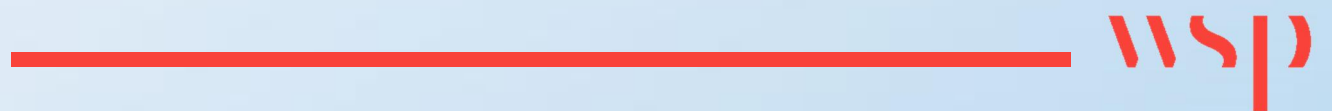
### **7.3. NEXT STEPS**

This study has taken development of measures and appraisal through WelTAG Stage 1. This has identified measures that are likely to bring forward the date of compliance with EU Limit Values. Stage 2 will consider these measures in greater detail, as well as appraise the measures further against the three key criteria, the relevant WelTAG impact areas, and the secondary criteria of the study objective.



# Appendix A

WELSH GOVERNMENT MEASURES  
REVIEW



## Appendix A: Welsh Government List of Measures - Review

Prior to this commission in October 2017, WG undertook a significant amount of work producing a list of 404 potential measures for reducing Nitrogen Dioxide levels arising from trunk roads and motorway traffic. A series of workshops (including brainstorming events) with a number of internal stakeholders within WG between September 2016 and September 2017; and from a review of publications and lessons learnt from other organisations such as the Scottish Government, DEFRA, and Highways England, generated a list of high level preliminary ideas, measures, strategies, and policies.

Prior to undertaking the Stage 1 WelTAG appraisal, WSP undertook a review of WG's list and considered that it is neither practical nor necessary to take all 404 potential measures through the formal WelTAG process. This review took account of information generated by the effectiveness review and the professional experience of the WSP team.

In WSP's review, each idea was considered and all potential measures that could be immediately sifted out of consideration where there is an unambiguous and, insofar as is practical, uncontested failure against the objective were removed (e.g. not related to roadside emissions, or carried a significant safety risk if applied to the WG network). The sifting was undertaken generically and did not take account of location-specific constraints for measures, unless the idea was related to a specific location not associated with the Welsh Government network. The ideas were also sifted on the basis of ambiguity, for instance if the idea was more of an approach than a tangible measure. Measures that were duplications or were similar enough to be considered as one package of measures were combined and taken forward together. The outcome of this review process identified measures that could be taken forward and developed further in the Long List in WelTAG Stage 1. WSP did not identify any additional measures that were not included in the WG's list.

A copy of the workshop notes following WG's workshops and WSP's review is included below. Some of the ideas generated at the workshops were recorded verbatim not discussed at length, and, although they have been listed, they did not have detailed descriptions or preliminary considerations recorded. The results of this process are carried forward into the Stage 1 report at Chapter 3.

Measure		WG Workshop and Review Notes	Screening Outcome	Reason for Screening
1	Origin & destination surveys - Find out more about the journeys people are making, to inform further ideas on how to reduce overall AADF - i.e. not "What and Where" but "Who and Why"	Could inform how best to target changing travel behaviour.	Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'. This measure does not warrant consideration in isolation as it is not likely to deliver reductions on concentrations on its own but could inform other actions.
2	Planting / vegetation for pollution abatement	Evidence suggests benefits only for PM pollution rather than NO <sub>2</sub> ?	Taken forward to Long List	Taken forward as 'Vegetation'.
3	General consideration of whether many little measures (not significant on their own) could be significant in combination	Could we better define what our targets are for reducing AADF etc, in order to see if we can 'scrape together' enough measures to bring about just enough change overall?	Removed from Long List	Not specific enough to form a measure - more of an approach.
4	Reduce speed limits and/or install Traffic Control systems <u>outside</u> areas of exceedance - on wider approach routes	Could this moderate the flow of traffic entering the exceedance area and reduce overall AADF? (bit like principle of ramp metering but on a big scale) - e.g change 50 and 40 limits down to 40 & 30 respectively? Or Intelligent traffic controls north of city?	Taken forward to Long List	Combined with other measures under 'Flow Management (Upstream)'.
5	Give an annual 'public transport allowance' to all citizens (in general or targetted to certain routes?) or a limited time free use of public transport	Could a) directly remove a number of road journeys and b) help to promote the idea of public transport travel / 'break the ice' in terms of behavioural change - more likely to choose public transport for future trips.	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
6	Provide some public transport services free of charge to all users - say, certain routes in problem locations.		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
7	Subsidise particular public transport routes	Reduce cost of public transport on relevant route to incentivise modal shift away from car journeys. Could WG find a way to subsidise PT travel to the extent that it is cheaper than car travel on key routes?	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
8	Look at other initiatives /case studies for additional ideas - e.g 'Clair City', 'Fleximobility'		Removed from Long List	Not specific enough to form a measure.



9	Attendance / engagement with AQMA's	Identify which AQMA's are most relevant and engage in discussions with AQMA leaders / stakeholders?	Taken forward to Long List	Combined with other measures under 'AQMA's'.
10	Targetted approach to location-based employers to take up home-working, employee active travel schemes etc.	Would need to be based on understanding of relevance and significance of journeys travelled	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
11	Revisit existing policy initiatives to see if any could be more focussed towards specific locations		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
12	Scrappage scheme	Area-based, company based or general?	Removed from Long List	Not specific enough to form a measure.
13	Park and Ride - introduction, or improvement of existing (all PT modes)	What do we already know about existing schemes, feedback on usage etc?	Taken forward to Long List	Combined with other measures under 'Parking Improvement' and 'Improved Bus Provision'.
14	Revisit concept of taking a 'corridor approach'	A470 north approach to Cardiff had been discussed previously in terms of taking a joined-up approach to planning, public transport, highways, various modal-shift / changing behaviours initiatives etc - run as a pilot with Transport contributing to wider collaboration? Corridor studies now currently in progress with regard to A470 & M4.	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover mode shift.
15	Provide ample free parking at rail stations and on outskirts of towns to encourage onward journeys via Public Transport or active modes.		Taken forward to Long List	Combined with other measures under 'Parking Improvement'.
16	Allow free or cheaper parking for cleaner cars		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
17	Provision of parking to allow people to car share along M4 corridor and major adjoining routes	Observations of people parking cars at various locations to lift-share. Could identify areas adjacent to junctions along the M4 and other major routes with AQ issues to facilitate this officially and reduce single occupancy car trips.	Taken forward to Long List	Combined with other measures under 'Parking Improvement' and 'Car Sharing'.
18	Introduce average speed limits in the areas most impacted by poor air quality, with enforcement particularly for high speed carriageways.	Average speed limit and enforced with average speed cameras.	Taken forward to Long List	Combined with other measures under 'Enforce/Reduce Speed Limit'.
19	Approach fleet managers to request that only vehicles with the highest EURO standards or best abatement technologies use those routes identified as having the worst AQ.	Bus operators, supermarkets, hauliers etc etc could be made aware of the issue and introduce these considerations and actions within their own env management plans.	Removed from Long List	Other measures are likely to cover promotion of ULEVs.
20	Use gantry information boards to highlight AQ issues associate with vehicle travel. Enable people to use different forms of transport or change their driving behaviour next time they travel.	Rather than the gantry information boards showing nothing use them to educate drivers particularly if they exist in AQ blackspots	Taken forward to Long List	Combined with other measures under 'Variable Message Signs (VMS)'.
21	Introduce screening between sources and receptors	May also have some noise reduction and environmental benefits.	Taken forward to Long List	Combined with other measures under 'AQ Screening/ Fencing/ Canopy/ Environmental Barriers'.

22	Do some site specific assessment to identify local causes of poor AQ?		Taken forward to Long List	Taken forward as 'Site Specific Assessment'
23	Healthy environment zones in cities - like CAZs or LEZs but not just for air quality - could encompass green infrastructure (including green walls, tree/wildflower planting), air quality, noise / positive sounds, active travel routes, crime prevention, zero tolerance to littering, etc. - policy integration in line with WFG Act - make really attractive xones good for health, recreation and business		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
24	Park and Bike	As Park and Ride - but using bikes instead of buses. Portland USA	Taken forward to Long List	Combined with other measures under 'Parking Improvement'.
25	Park and scoot	as Park and Ride - but using foot scooters - instead of buses	Taken forward to Long List	Combined with other measures under 'Parking Improvement'.
26	Zip Wires	Where height differentials are adequate - provide a zip wire to get people into and out of centre of town.Bristol	Removed from Long List	Not practical.
27	Provide information on distances, times and calories burned if people walk between locations	On maps or apps - provide information to encourage people to work - TfL	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
28	Buses run above lanes in the road	See experiment in China	Removed from Long List	Other measures are likely to cover improvements to bus provision.
29	Free parking for cars with more than two people in	Would need to check for improper use	Taken forward to Long List	Combined with other measures under 'Parking Improvement'.
30	Block off roads in times of predicted poor air quality	Give xx hours notice that roads will be blocked	Taken forward to Long List	Combined with other measures under 'Block Off Roads'.
31	Provide no car days in certain areas	close roads to traffic on xxxx days	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
32	Subside haulage and bus companies located on certain corridors to reduce emissions.	retro fit or new vehicles	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
33	All government vehicles to be ULEV		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
34	Charging points in all towns across Wales	Need to standardise charging plugs with industry	Taken forward to Long List	Combined with other measures under 'Electric Vehicle Charging Points'.

35	50 mph speed limit on all roads currently above that speed.		Taken forward to Long List	Combined with other measures under 'Enforce/Reduce Speed Limit'.
36	Autonomous vehicles		Removed from Long List	Not specific enough to form a measure.
37	Restrict access to some areas to cars of certain engine size		Taken forward to Long List	Combined with other measures under 'Block Off Roads'.
38	Restore railway lines which may take vehicles off roads		Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
39	Increase capacity of roads to help flows		Taken forward to Long List	Combined with other measures under 'Improve Flows (Locally)'
40	Improve flows at junctions - by changing lights or adding longer slip roads		Taken forward to Long List	Combined with other measures under 'Improve Flows (Locally)'
41	Remove all street markings and traffic controls		Removed from Long List	Not appropriate for the strategic road network. This is removed from the list on safety grounds.
42	Do not repair road surfaces in high pollution areas so that traffic will not use the road		Removed from Long List	Not appropriate for the strategic road network. This is removed from the list on safety grounds.
43	Make sure that a journey by public transport is cheaper than (or at least comparable to) the same journey by car.		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
44	Think about publicity campaigns - timing and focus of these to complement other initiatives		Taken forward to Long List	Combined with other measures under 'Air Quality Areas'.
45	Messages "Most people do....."	People tend to be more influenced by what they think most other people do.	Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'.
46	Points / Rewards Scheme for active travel and/or PT - e.g. actual savings, or similar to blood donating approach, or discounts from big retailers etc (like a Nectar Points scheme).		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
47	Introduce a 'steps a day' or 'walks a day' scheme similar to '5 a day' - combine with info / signing / other provisions, or '1 a week' sustainable journeys		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
48	Introduce speed limiters more widely across public vehicle fleet.		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.

49	Enhanced enforcement of lower speed limits		Taken forward to Long List	Combined with other measures under 'Enforce/Reduce Speed Limit'.
50	Subsidise or reduce the cost of tolls for HGV's (which may currently encourage travel by non-preferred routes)		Removed from Long List	Areas with tolls are either too distant from study areas or already committed under legislation.
51	Install sensors in cities (or widely?) to allow people to 'clock' their active travel.	Could tie into a points/rewards scheme. Could give feedback on health aspects - miles/calories etc.	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
52	Promote eBikes	All/any measures to promote & provide opportunities to use these - as for most people this is likely to represent an easier and quicker option for journeys than normal bikes.	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
53	Provide proper bike racks /space on buses & trains		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
54	Provide more bus lanes	Could make traffic congestion immediately worse for car users, but in so doing could also provide added advantage / appeal to bus travel option - especially if this point was emphasised via slogans on side/back of buses.	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision' and 'Reallocation of Road Space'.
55	Positive images of electric and ULE vehicles	Need to portray positive benefits to people in terms of benefits to them	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
56	Nudge on importance of air quality in choices of which mode to use	Need to describe benefits of mode to individual people	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
57	School travel plans	Enable individual schools to coordinate modes by air quality criteria	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
58	Ensure development of metro covers benefits to air quality and other env topics	Through assessments and publicity	Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
59	Improve planning decisions - either by policy change or change in interpretation of assessments	Ensure that decisions do not create receptors next to major roads, increasing the likelihood of issues	Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions' and 'Planning Policy'.
60	Messages - "Do I need to travel"?	Benefits of alternatives to travel	Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'.
61	Design a message on choice and convenience benefits of different mode	Message needs to be tailored to locations and specific groups and sourced from them	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
62	Change traffic light phasing	Can a change ease the flow?	Taken forward to Long List	Taken forward as 'Traffic Lights'

63	Allow more driver to driver eye contact	Reduce the amount of signs/instructions so that people have more opportunity to consider their relationship to other drivers	Removed from Long List	This is removed from the list on safety grounds.
64	Travel planning app which tells you choices	App which gives all modes - not just public transport	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
65	Non-charging clean air zone		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
66	Charging clean air zone		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
67	Realtime air quality information		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'AQ Communications'.
68	Clean air days		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'Clean Air Zones / Low Emission Zones'.
69	Open data		Removed from Long List	Not specific enough to form a measure. Communications relating to AQ information considered under 'AQ Communications'.
70	Real time travel info - across all modes	Joined up travel choices - if roads are bad - should I cycle - see app above	Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'AQ Communications'.
71	Set minimum air quality standards for vehicles used in contracts		Taken forward to Long List	Combined with other measures under 'Influencing Contractors'.
72	Air quality awards for those organisations/companies that have changed behaviour	CEEQUAL - ECOstars - Green Apple - or equivalent	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
73	Reduce empty HGV/LGV returns - lorry share?		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
74	LEV/ULEVs to use bus lanes /specific lane, etc		Taken forward to Long List	Combined with other measures under 'Reallocation of Road Space'.
75	Charging points in destination locations	Shops, tourist locations etc	Taken forward to Long List	Combined with other measures under 'Electric Vehicle Charging Points'.
76	Geofencing polluting vehicles - or vehicles not in ULEV mode	GPS warns drivers - and tells enforcement	Taken forward to Long List	Taken forward as 'Geofencing'.

77	Tackle engine idling		Taken forward to Long List	Combined with other measures under 'Vehicle Emission Testing'.
78	Set emissions limits for taxis		Taken forward to Long List	Combined with other measures under 'Vehicle Emission Testing'.
79	Provide various grant schemes to offset greater transport costs by rail/water		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
80	Grants to encourage conversion to cleaner vehicles		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
81	Evaluating benefits of rescheduling deliveries outside peak periods		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
82	Guidance on use of quiet deliveries outside peak periods		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
83	Research into Freight Consolidation Centre	FCC's are distribution centres at which part-loads are consolidated into a lower number of loads delivered into target area.	Taken forward to Long List	Combined with other measures under 'Freight Operations'.
84	Lower rates of tax for cleaner vehicles	Aligned with Euro standards	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
85	Trial of longer semi-trailers	10 yr study, report published July 2015	Taken forward to Long List	Combined with other measures under 'Freight Operations'.
86	Rail Electrification	Faster, more reliable journeys incentivise use, and no direct emissions.	Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
87	Introduction of bi-mode trains	Lower emissions than conventional diesels	Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
88	Grants/Sponsorship of innovation projects		Removed from Long List	Not specific enough to form a measure, and are considered under other measures.
89	Free travel for older & disabled people	Encourages bus use by those groups	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
90	Financial support for operators to invest in cleaner buses		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.

91	Cycle training for children	Aimed at encouraging ongoing cycle use, and reducing car and bus travel to school.	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
92	'Cycle City or Towns'	Match funding provided to Local Authorities for innovative ways to increase cycling in a number of cities/towns	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
93	Improved access and facilities for cyclists at stations & cycle hubs	Funding support provided for such improvements	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
94	Finding out how to encourage staff to cycle to work, or to convert leisure cyclists to every day cyclists	Focussed on large employers, Local Authorities & tourist destinations	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
95	Local Sustainable Transport Fund - available for investment in measures increasing use of buses, cycling, walking etc		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
96	Incentivising cycling and walking		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
97	Cycling & Walking Investment Strategy		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
98	Local Air Quality Management (LAQM) framework		Removed from Long List	Not specific enough to form a measure. Duties under LAQM are considered under 'AQMAS' and 'LAQM Reporting'.
99	Clean Air Act 1993	Allows designation of Smoke Control Areas - currently under review?	Removed from Long List	Not specific enough to form a measure.
100	Plug-in Car Grant	To assist purchasers of electric, plug-in, hybrid, hydrogen fuel-cell vehicles.	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
101	'Plugged in Places'	Funding development of recharging infrastructure	Taken forward to Long List	Combined with other measures under 'Electric Vehicle Charging Points'.
102	Grants for purchase of LPG, natural gas, hybrid & electric vehicles, or conversion costs.		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
103	Incentivising ULEV development, manufacture & uptake		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
104	Traffic Officer Service	Clearing motorway incidents quickly thereby reducing emissions from idling vehicles caught up in congestion	Taken forward to Long List	Combined with other measures under 'Enhanced Traffic Officer Service'.

105	The Road Traffic (Vehicle Emission) (Fixed Penalty) (England) Regs 2002	Powers to LA's to issue road-side fixed penalties for vehicles exceeding emissions limits or idling unnecessarily	Taken forward to Long List	Taken forward under 'Vehicle Emission Testing', although as The Road Traffic (Vehicle Emissions) (Fixed Penalty) (Wales) Regulations 2003.
106	CEEQUAL (Civil Engineering Environmental Quality Awards) Scheme for major works projects	Includes consideration of emissions within road construction & operation phases	Taken forward to Long List	Combined with other measures under 'Influencing Contractors'.
107	Carbon Reduction Commitment (CRC) energy efficiency scheme	Reputational, behavioural and financial encouragement to organisations to improve their energy management - cross benefits for NO2?.	Removed from Long List	Not relevant to tackling roadside NO2 concentrations.
108	Government procurement - buying standards for public sector vehicles - ULEV's encouraged		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
109	European Eco-design Regs		Removed from Long List	Not specific enough to form a measure.
110	Schools energy efficiency project		Removed from Long List	Not specific enough to form a measure.
111	Industrial Pollution & Control Implementation Guidelines	Incorporation of Best Available Technology into operating permits	Removed from Long List	This is fully implemented in Wales and hence emissions from industry are already minimised within the pollution control framework and are continuously reviewed by NRW through the permitting process.
112	UK plan lists 'Fuel duty incentives for ultra-low sulphur diesel' as a measure		Removed from Long List	Ultra-low sulphur diesel has little impact on NO2 and consideration given to low emission vehicles elsewhere.
113	Uk Plan lists 'Low carbon truck trial' as a measure	Directed at operators to help establish fleets with alternative fuels - gas, dual fuels & cooking oil - cross benefits for NO2?	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
114	Hydrogen for Transport Advancement	Match funding for 12 x hydrogen refuelling stations	Removed from Long List	Other measures are likely to cover promotion of ULEVs.
115	Develop HGV emissions testing	Current research projects in UK.	Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
116	Revised standards for Non Road Mobile Machinery	Requires engines for such vehicles to be compliant with emissions standards (incl. NO2)	Taken forward to Long List	Combined with other measures under 'Influencing Contractors'.
117	Medium Combustion Plant Directive	Framework for regulating combustion plants (incl NO2 emissions)	Removed from Long List	The medium combustion plant directive emission limits will be applied to all new medium combustion plant. As such, emissions from energy generation are minimised. Furthermore, their impact on roadside pollutant concentrations is imperceptible.
118	Daily information to public on AQ Index (incl NO2)	Via UK air website	Taken forward to Long List	Combined with other measures under 'Variable Message Signs' and 'AQ Communications'. Note Welsh Air Quality Forum also provides information.



119	National Planning Policy Framework 2012 (incl compliance with NO2 limits)		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
120	National Networks National Policy Statement 2014	Advises on how road and infrastructure decisions should take account of air quality, and mitigation	Taken forward to Long List	Combined with other measures under 'Planning Policy'.
121	AQ grant scheme	Available to LA's with exceedances	Removed from Long List	Not specific enough to form a measure and funding considered elsewhere.
122	Grants for replacing with lower emission vehicles (Green Bus Fund & Clean Bus Technology Fund)		Removed from Long List	Not specific enough to form a measure and funding is considered elsewhere.
123	Infrastructure Act	Applies in England - Requires Cycling & Walking Investment Strategy	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
124	Walking Cities programme	Dept of Health - Encourages active travel	Removed from Long List	Not specific enough to form a measure and influencing travel behaviour is considered under 'Behaviour Change'.
125	Cycle Cities Ambition programme	Investment in various projects to increase cycling	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover behaviour change.
126	NHS Sustainable Resilient, Healthy People & Place strategy	Pronotion of healthy behaviours incl walking & cycling	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover behaviour change.
127	Road Investment Strategy	In England - Incl 10 studies to better understand causes and management of air pollution	Removed from Long List	Not specific enough to form a measure.
128	Planning Policy Wales	AQ to be considered in strategies & development plans	Taken forward to Long List	Combined with other measures under 'Planning Policy'.
129	National Transport Finance Plan - Wales	Includes investment in schemes to reduce congestion and support active travel	Taken forward to Long List	Combined with other measures under 'Planning Policy'.
130	WG LA Single Revenue Grant	Funding for environmental and sustainability work, incl AQ	Taken forward to Long List	Combined with other measures under 'Funding'.
131	Intelligent Transport System (ITS) & other innovative technological systems on trunk road network	Reducing congestion	Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
132	M4 VSL - J24 to J29	Reducing congestion	Removed from Long List	Variable speed limits are already in operation on M4 study corridor.

133	Improvement to Steelworks access road off M4 at Llanwern	Reducing traffic on M4	Removed from Long List	Improvements already undertaken.
134	Traffic Officer Service in Wales	Reducing congestion	Taken forward to Long List	Combined with other measures under 'Enhanced Traffic Officer Service'.
135	M4 J28 improvement Tredegar Park Area	Improving Traffic Flow	Removed from Long List	Improvements to J28 are underway, due for completion September 2018.
136	M4 Corridor Around Newport - motorway & related improvements	Reducing congestion & propoting sustainable modes of transport	Taken forward to Long List	Taken forward as 'M4 Corridor Around Newport'.
137	Llandeilo Bypass	Easing congestion / reducing traffic	Removed from Long List	Not relevant to the study areas.
138	A55 / A494 Deeside improvement	Easing congestion	Removed from Long List	The scheme is listed under measures provided by WG to deliver air quality improvements within the North Wales zone plan of the UK Air Quality Plan, with expected end date later than the current projected compliance date for the North Wales Zone.
139	A483/A489 Newtown Bypass	Diversion of traffic / reduced congestion	Removed from Long List	Not relevant to the study areas.
140	A470 Upper Boat Gyratory	Complete - Improved traffic flow / reduced congestion	Removed from Long List	Improvements already undertaken.
141	Welsh Targetted promotion of sustainable ways to travel	Part of Welsh Sustainable Travel Centres Initiative	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
142	Improved integration at transport interchanges in Wales	Encourages modal shift away from private vehicles	Taken forward to Long List	Combined with other measures under 'Integrated Transport Interchanges' and 'Behaviour Change'.
143	Welsh Personalised Workplace & School Travel Planning Programme		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
144	Welsh travel planning & provision of personalised travel info		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
145	Welsh Walking & Cycling Action Plan	Supporting active travel modes	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
146	Traffic Management Act	Gives more powers to LA's to control traffic & parking	Taken forward to Long List	Taken forward as 'Traffic Management Act'.

147	Welsh Regional Transport Plans	Encouraging modal shift	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
148	Welsh Local Transport Plans	Encouraging modal shift	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
149	Implementation of Active Travel (Wales) Act 2013	encouraging modal shift	Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
150	Support for Local Bus Services in Wales	Grants to support services & encourage bus fleet conversion to cleaner fuels	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision' and 'Promotion of Ultra Low Emission Vehicles'.
151	Bwbca Bus Project - innovative demand responsive transport scheme in rural Carmarthenshire - may be rolled out more widely	Encouraging bus use	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
152	Bus Services Support Grant	Supports non-commercial services to support modal shift from cars.	Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
153	Discounted bus travel for younger people in Wales - increasing use of public transport		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
154	Removing pinch points on road network causing reliability issues for buses in Wales		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
155	Welsh Freight Mode Shift Revenue Support - grant to offset the greater operating costs of transport by rail or inland waterways vs road		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
156	Welsh freight facilities grant - grant for capital costs of freight handling facilities associated with shift from road to rail / waterways		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
157	Cardiff City Region Metro Project (incl. valley line modernisation)	Encourage modal shift from road to rail / public transport	Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
158	Pan-Wales rail infrastructure enhancement schemes & schemes for improving rail passenger services		Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
159	Electrification & gauge enhancement of S. Wales main railway line	Reducing direct emissions & encourage rail use	Taken forward to Long List	Combined with other measures under 'Improved Rail Provision'.
160	Cleaner Air for Scotland	Approach in Scotland - Strategy to coordinate policies on AQ improvement	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy.

161	Switched on Scotland: A Roadmap to Widespread Adoption of Plug-in Vehicles	Decarbonisation of Scottish vehicle fleet	Removed from Long List	Not specific enough to form a measure and other measures are likely to cover electric vehicles charging points and promotion of ULEVs.
162	National Walking Strategy - Scotland	Modal shift from cars to walking	Removed from Long List	Not specific enough to form a measure and influencing travel behaviour is considered under 'Behaviour Change'.
163	Air Quality Grant - Scotland	To support LA measures to improve AQ	Removed from Long List	Not specific enough to form a measure.
164	Buicycle Strategy - NI (now replaced by 'Northern Ireland Changing Gear - a Bicycle Strategy for Northern Ireland')		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
165	Active School Travel Programme - NI - activities in schools to encourage long-term behavioural change (e.g. cycle training)		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
166	Travelwise NI	Encourages use of sustainable travel options	Removed from Long List	Not specific enough to form a measure and other measures are likely to behaviour change.
167	E-car charging infrastructure - NI - to encourage uptake of electric vehicles		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover electric vehicles charging points.
168	Task Public Service Boards with regional AQ strategies (rather than individual LA's)	Adopt broad perspective with contributions from all public bodies, and ensure accountability of each partner etc.	Removed from Long List	Not specific enough to form a measure - more of an approach.
169	Invest in AQ monitoring network		Taken forward to Long List	Combined with other measures under 'AQ Monitoring Network'.
170	Tighten AQ objectives		Taken forward to Long List	Combined with other measures under 'AQ Objectives'.
171	Evidence review to appraise & communicate effectiveness of all air pollution management interventions, incl. systematic review of available literature.		Removed from Long List	Not specific enough to form a measure - more of an approach.
172	Ring-fenced funding for Public Service Boards to tackle AQ within wider context of environment / health / sustainability		Taken forward to Long List	Combined with other measures under 'Funding'.
173	Annual progress reports from LA's	As proposed in the recent public consultation	Removed from Long List	Not specific enough to form a measure - more of an approach.
174	Revised legislation to tighten AQ objectives		Taken forward to Long List	Combined with other measures under 'AQ Objectives'.

175	Guidance for Public Service Boards on Environmental Sustainability		Removed from Long List	Not specific enough to form a measure - more of an approach.
176	Clarify statutory responsibilities of NHS agencies in LAQM		Removed from Long List	Not specific enough to form a measure - more of an approach.
177	Invest in smart technology to make it easier to 'see' air pollution and see effects of actions to tackle it		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
178	National communications strategy to communicate risks and advice on measures		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
179	Use contributions of Directors of Public Health beyond the NHS.		Removed from Long List	Not specific enough to form a measure - more of an approach.
180	Stronger enforcement of LAQM reporting (proposed in consultation)		Taken forward to Long List	Combined with other measures under 'LAQM Reporting'.
181	Improved content / focus of AQM Plans on public health benefit & alignment with PSB Local Wellbeing Plans	As proposed in consultation - with less specific emphasis on meeting AQ legal limits.	Taken forward to Long List	Combined with other measures under 'AQ Communications'.
182	Increased focus on NO2 & PM in LAQM	As proposed in consultation - subject to some concerns & comments	Taken forward to Long List	Combined with other measures under 'LAQM Reporting'.
183	Increased partnership working between organisations		Removed from Long List	Not specific enough to form a measure - more of an approach.
184	Updated policy guidance - to include green infrastructure, ecological impacts, school monitoring & impacts, transport/pollution/planning links, traffic calming, indoor AQ.		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
185	AQ reports to be taken into account within Local Wellbeing Assessments		Removed from Long List	Not specific enough to form a measure - more of an approach.
186	Review of Planning policy & guidance	As proposed in consultation	Taken forward to Long List	Combined with other measures under 'Planning Policy'.
187	Amend Active Travel Act to take into account AQ exposure on proposed routes, along with monitoring & mitigation		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
188	Consider the potential role of LPG to replace diesel for improved emissions	Lower NOx & PM.	Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.

189	Improved monitoring, and improved guidance on this		Taken forward to Long List	Combined with other measures under 'AQ Monitoring Network'.
190	Make public transport a practical first option by improving and promoting integrated transport system		Taken forward to Long List	Combined with other measures under 'Integrated Transport Interchanges'.
191	Make better use of technology to reduce need for journeys - e.g. online GP consultations.		Taken forward to Long List	Combined with other measures under 'Reducing Need for Journeys'.
192	Intelligent Traffic Management, linking real-time emissions/AQ data with TM - &/or remote monitoring		Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
193	Green Infrastructure	NO2 impacts uncertain but could make active travel options more appealing?	Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'Vegetation'.
194	Introduce concept of 'Ecological AQMA's' where air pollution having impact on ecosystems, not just on human health		Removed from Long List	Not specific enough to form a measure - more of an approach.
195	Review / investigate NOx abatement technologies - eg scrubbers, roadside Nox catalytic reduction, surface dressings etc.	Could these be considered in high risk / exposure areas where few other options? A quick look on the web suggests there are many products and approaches being trialled out there.	Taken forward to Long List	Combined with other measures under 'NOx Abatement Technologies'.
196	Signage on key routes reminding drivers to turn off engines when static.	Careful consideration of wording required to have desired effect. May also require adjustments to traffic signal timings etc to allow for thjis? Could even use remote sensing linked to signage to pick up cars with idling engines?	Taken forward to Long List	Combined with other measures under 'Signage'.
197	Determine specific targets in terms of vehicle type and journeys taken to inform measures focussed on specific effects on traffic in locations of interest.	This could avoid the need for lengthy interim remodelling, as progress could be monitored via traffic data / Automatic No Plate Rec?	Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
198	Set up a separate modelling & monitoring approach for Wales.	Scope to find an approach which is more directly informative of potential impacts of local and national measures, and with faster turnaround / real-time?	Taken forward to Long List	Combined with other measures under 'AQ Monitoring Network'.
199	Develop an emissions strategy for Wales	Link into Welsh approach to decarbonisation, planning, WFG, Health, etc.	Removed from Long List	Not specific enough to form a measure.
200	LEZ including requirement to display stickers on vehicles showing emissions category - higher emission vehicles banned during periods of high pollution levels	As introduced now in French major cities.	Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
201	Information campaigns to encourage sustainable travel		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
202	Vehicle Retrofit		Removed from Long List	Not specific enough to form a measure.

203	Incentivising low emission fuel / vehicles		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
204	Eco Driver training		Taken forward to Long List	Combined with other measures under 'Eco-driving'.
205	Promote freight modal shift		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
206	Lorry road user charging		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
207	Provision of school buses		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
208	Devising new & priority bus measures		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
209	Promote walking & cycling		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
210	Workplace charging levies		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
211	High occupancy vehicle lanes		Taken forward to Long List	Combined with other measures under 'Reallocation of Road Space'.
212	National road pricing		Taken forward to Long List	Taken forward as 'National Road Pricing'.
213	Local congestion charging		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
214	Promote tele-working / video-conferencing		Taken forward to Long List	Combined with other measures under 'Reducing Need for Journeys'.
215	Increase fuel duty / target at diesels		Removed from Long List	Not specific enough to form a measure.
216	New tram schemes		Removed from Long List	Not specific enough to form a measure.



217	Allow more night time freight delivery		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
218	Lorry overtaking bans		Taken forward to Long List	Taken forward as 'HGV Overtaking Bans'.
219	Promote DeNOx retrofit		Removed from Long List	Not specific enough to form a measure.
220	Promote Eco-driving (freight, buses, cars etc)		Taken forward to Long List	Combined with other measures under 'Eco-driving'.
221	Annual vehicle emissions tests		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
222	Roadside vehicle emissions tests		Taken forward to Long List	Combined with other measures under 'Vehicle Emission Testing'.
223	Pedestrian walkways over trunk roads		Taken forward to Long List	Taken forward as 'Pedestrian Walkways'.
224	Designating new & priority bus measures		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
225	Managed motorways		Taken forward to Long List	Taken forward as 'Managed Motorway'.
226	Intelligent speed adaptation		Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
227	Ramp metering		Taken forward to Long List	Taken forward as 'Ramp Metering'.
228	Improved junction layout		Taken forward to Long List	Combined with other measures under 'Improve Flows (Locally)'
229	Better traffic management		Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
230	Strengthen air quality planning regulations		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.

231	Improved anti-idling enforcement		Taken forward to Long List	Combined with other measures under 'Vehicle Emission Testing'.
232	HGV scrappage		Taken forward to Long List	Combine with other measures under Promotion of Ultra Low emission Vehicles.
233	Fleet recognition schemes		Removed from Long List	Not specific enough to form a measure.
234	Negotiate new vehicle emissions standards		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
235	Reduced VED for early purchase of new vehicles		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
236	Promotion of LEZ's		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
237	Bus scrappage		Taken forward to Long List	Combine with other measures under Promotion of Ultra Low Emission Vehicles
238	Grants to buy new low emission buses		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
239	Bus operator NOx emissions cap		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
240	Priority parking for LEV's		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
241	Pollution car labelling scheme		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
242	Grants for purchase of ultra-low emission cars		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
243	Fiscal incentives for low emission vehicles		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
244	Development of EV charging infrastructure		Taken forward to Long List	Combined with other measures under 'Electric Vehicle Charging Points'.

245	Reduced shipping emission		Removed from Long List	Not relevant for the strategic road network.
246	Public information campaign to promote cleaner vehicles		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
247	Lorry ban in urban centres		Taken forward to Long List	Combined with other measures under 'Restricted Access Zones'.
248	Restricted access zones		Taken forward to Long List	Combined with other measures under 'Restricted Access Zones'.
249	Newer buses used for most polluted routes		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
250	Queue relocation		Taken forward to Long List	Combined with other measures under 'Flow Management (Upstream)'.
251	New roads		Removed from Long List	Not specific enough to form a measure.
252	NOx absorbing coatings		Taken forward to Long List	Combined with other measures under 'NOx Absorbing Materials'.
253	NOx absorbing fencing / panels etc		Taken forward to Long List	Combined with other measures under 'NOx Absorbing Materials'.
254	NOx absorbing road surface		Taken forward to Long List	Combined with other measures under 'NOx Absorbing Materials'.
255	Redevelopment of locations with high NOx		Removed from Long List	Not specific enough to form a measure.
256	Area based scrappage scheme - focus on vehicles passing through most polluted routes?		Removed from Long List	Not specific enough to form a measure.
257	Credit / payment incentives		Removed from Long List	Not specific enough to form a measure.
258	Conversion to bus-only routes		Removed from Long List	Measure is not practical on the Strategic Road Network.

259	Use of ANPR cameras/GPS/bluetooth transponders etc for LEZ-type schemes		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
260	Planning - Limit vehicle types or parking spaces on new developments (residential or commercial)		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
261	Planning - Specify vehicle access routing		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
262	Incentivised / reserved parking at destination for car-sharing		Taken forward to Long List	Combined with other measures under 'Car Sharing'.
263	Car-sharing website / portal / app		Taken forward to Long List	Combined with other measures under 'Car Sharing'.
264	Public information re car-sharing etc		Taken forward to Long List	Combined with other measures under 'Car Sharing'.
265	Multi-modal transport interchange		Taken forward to Long List	Combined with other measures under 'Integrated Transport Interchanges'.
266	Incentivised public transport along polluted routes		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
267	Company bus collection schemes		Removed from Long List	Not specific enough to form a measure.
268	Segregated cycle lanes / highways		Taken forward to Long List	Combined with other measures under 'Cycle Lanes / Highways'
269	Online tools provide route options and times - integrate cost options?		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'AQ Communications'.
270	Freight 'last mile' consolidation points		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
271	HGV zone charging		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
272	Predictable speed control on sections of trunk rd network - can be refined to deliver specific levels of improvement.		Taken forward to Long List	Combined with other measures under 'Enforce/Reduce Speed Limit'.

273	Junction management - local intervention that could include redesign, closure or building a new junction		Taken forward to Long List	Taken forward as 'Junction Closures'.
274	Identify a group of junctions to manage to redistribute traffic or vehicle types		Taken forward to Long List	Combined with other measures under 'Flow Management (Upstream)'.
275	Induce delay elsewhere on the network (away from receptors) to alleviate flow/congestion at AQ hotspots		Taken forward to Long List	Combined with other measures under 'Flow Management (Upstream)'.
276	Identify strategic routes & influence route choice to minimise AQ impacts		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
277	Signage to influence rt choice		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
278	Satnav-based route selection		Taken forward to Long List	Combined with other measures under 'Work with Sat Nav Providers'.
279	Barriers - install at sensitive locations		Taken forward to Long List	Combined with other measures under 'AQ Screening/ Fencing/ Canopy/ Environmental Barriers'.
280	Realignment - move scheme / junction alignment away from receptors		Taken forward to Long List	Taken forward as 'Realignment'.
281	Bypasses - planning / prioritisation of schemes which alleviate poor AQ hotspots		Taken forward to Long List	Taken forward as 'Realignment'.
282	Install tunnels at sensitive locations		Taken forward to Long List	Taken forward as 'Tunnels'.
283	Install canopies at sensitive locations		Taken forward to Long List	Combined with other measures under 'AQ Screening/ Fencing/ Canopy/ Environmental Barriers'.
284	Reduce background emissions from other sources (local road, domestic heating, industry, ports)		Removed from Long List	Background emissions contribute a relatively small proportion of road side pollution levels. The measure covers too many sectors to be a viable option.
285	Identify locations with large industrial point source contributions that impact trunk rd network and assist abatement upgrades		Removed from Long List	IPC is fully implemented in Wales and hence emissions from industry are already minimised within the pollution control framework and are continuously reviewed by NRW through the permitting process.
286	Lane 1 closure overnight		Taken forward to Long List	Taken forward as 'Lane 1 Closure'.

287	Concrete Safety Barriers in the Central Reserve (to allow carriageway to be shifted towards central reservation)	Slight reduction in NO2 for receptors >20m from Carriageway	Taken forward to Long List	Taken forward as 'Concrete Safety Barriers'.
288	4-6m height environmental barriers	Some evidence for effectiveness in Dutch & American studies.	Taken forward to Long List	Combined with other measures under 'AQ Screening/ Fencing/ Canopy/ Environmental Barriers'.
289	Congestion Assessment Methods / Congestion Modelling Test		Removed from Long List	Not specific enough to form a measure.
290	Phased Delivery of measures		Removed from Long List	Not specific enough to form a measure.
291	Implement Controlled Motorway before MM-ALR		Taken forward to Long List	Taken forward as 'Expressway'.
292	Scotland - Develop a National Air Quality Indicator		Removed from Long List	Already in place in Well-being of Future Generations Act National Indicators.
293	Scotland - Greener Scotland communication campaign	Encourage less car use for health & environment	Taken forward to Long List	Combined with other measures under 'AQ Communications'.
294	Scotland - National Air Quality awareness campaign		Taken forward to Long List	Combined with other measures under 'Air Quality Areas'.
295	Scotland - Refocussed LAQM system		Removed from Long List	Not specific enough to form a measure. Duties under LAQM are considered under 'AQMAS' and 'LAQM Reporting'.
296	Scotland - Monitoring network		Removed from Long List	Not specific enough to form a measure.
297	Scotland - Revised & updated AQ Plans		Removed from Long List	Not specific enough to form a measure.
298	Scotland - Design, develop and implement a two-level modelling system for regional & local scales to provide evidence for appraising & identifying potential transport & planning solutions to local air quality issues		Taken forward to Long List	Combined with other measures under Air Quality Monitoring
299	Scotland - Develop guidance and promote a support network for all practitioners involved in reviewing and assessing local impacts on air quality resulting from regional decision making.		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
300	Scotland - Undertake detailed modelling of major cities and associated adjoining spaces, covering areas associated with highest levels of poor air quality..		Taken forward to Long List	Combined with other measures under Air Quality Monitoring

301	Scotland - Implement national databases for trafficdata collection and local modelling outputs..		Taken forward to Long List	Combined with other measures under Air Quality Monitoring
302	Scotland - Develop National Low Emission Framework criteria, tests, and processes		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
303	Scotland - Design & implement a standard appraisal process for assessing local air quality measures.		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
304	Scotland - Develop software tools and associated guidance for National Low Emissions Framework, including funding, options and technical reports, that will underpin the evidence on effectiveness of options.		Taken forward to Long List	Combine with other measures under Clean Air Zones/Low Emission Zones.
305	Scotland - NHS boards and their local authority partners to include reference to air quality and health in next revision of their Joint Health Protection Plans, which should identify and address specific local priority issues.		Removed from Long List	Not specific enough to form a measure.
306	Scotland - All local authorities should ensure that they have a corporate travel plan which is consistent with any local air quality action plan.		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
307	Scotland - National Walking Strategy Delivery Plan		Removed from Long List	Not specific enough to form a measure and influencing travel behaviour is considered under 'Behaviour Change'.
308	Scotland - Cycling Action Plan (aiming for 10% of everyday journeys made by bike.by 2020)		Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'.
309	Scotland - Support for green buses including scope for supporting retrofitting existing vehicles, taking account of technological and market developments and the need to tackle air quality as well as climate change.		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
310	Scotland - Evaluate Bus Investment Fund to learn from supported projects and inform decisions on options for future support for local projects to improve public transport.		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet'.
311	Scotland - Review Bus Operators Grant including options to incentivise the use of low emission buses.		Taken forward to Long List	Combined with other measures under 'Public Vehicle Fleet' and 'Promotion of Ultra Low Emission Vehicles'.
312	Scotland - Review guidance and legislation on the powers of local transport authorities regarding bus service to see if they could be made more effective and to ensure enough priority is given to air quality alongside other considerations.		Removed from Long List	Not specific enough to form a measure.
313	Scotland - Actions under Switched On Scotland: A Roadmap to Widespread Adoption of Plug-In Vehicles.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover electric vehicles charging points.



314	Scotland - Work with key partners to investigate the use of hydrogen as a transport fuel, as well as exploring wider environmental and economic opportunities of using hydrogen for energy applications – especially in promoting renewables, energy balancing and storage.		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
315	Scotland - Continue to engage with partners on the role less carbon intensive fuels such as liquid petroleum gas, compressed natural gas and biofuels can play in the transition to a near zero emission road transport sector by 2050.		Taken forward to Long List	Combined with other measures under 'Promotion of Ultra Low Emission Vehicles'.
316	Scotland - Encourage each local authority with an AQMA to create a Freight Quality Partnership (or utilise an existing RTP Freight Quality Partnership) and consider appropriate measures for local air quality improvement.		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
317	Scotland - Encourage Freight Quality Partnerships to extend their activities to include consideration of the environmental impact of freight transport.		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
318	Scotland - Review existing Ministerial guidance on Regional and Local Transport Strategies in the light of the refreshed National Transport Strategy. In doing so, consider how: • air quality management should be addressed and how • RTPs and local authorities should use their transport strategies to support modal shift towards sustainable and active travel, including through Smarter Choices initiatives, and promote the take up of greener vehicles.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
319	Scotland - Review trunk road impacts on AQMAs and implement mitigation where trunk roads are the primary contributor to air pollutants.		Taken forward to Long List	In part already under way through this work and combine with other measures under Air Quality Areas.
320	Scotland - Ensure that future updates and revisions to Scottish Planning Policy and the National Planning Framework will take account of CAFS.		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
321	Scotland - Expect planning authorities to review the Local Development Plan and revise at the next scheduled update to ensure policies are consistent with CAFS objectives and any local authority air quality action plans.		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
322	Scotland - Work with Environmental Protection Scotland to produce updated guidance on air quality and planning.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy.
323	Work with SEPA to introduce air quality training for local authority spatial and transport planners.		Removed from Long List	Not specific enough to form a measure.
324	Scotland - Support SEPA in revising its guidance on Strategic Environmental Assessment to bring it into line with CAFS.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy.

325	Scotland - Ensure that future updates to the 'Low CarbonScotland: Meeting Our Emissions ReductionTargets' publication on meeting our climatechange targets take into account air qualityimpacts.		Removed from Long List	Not specific enough to form a measure.
326	Scottish Local Authorities - expected to develop a Sustainable Energy Action Plan to ensure that air quality considerations are covered.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy.
327	Forestry Commission Scotland - will publish updated guidance on the impact of biomass on air quality to help local authorities fulfil their statutory responsibilities.		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy.
328	Pedestrian crossings			Combined with other measures under 'Behaviour Change'.
329	Rights of Way improvements			Combined with other measures under 'Behaviour Change'.
330	Strategic recreational routes		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
331	Cycling strategy		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
332	Pont y Werin		Removed from Long List	Not specific enough to form a measure.
333	Bike It		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
334	City Centre Transport Exchange		Taken forward to Long List	Combined with other measures under 'Integrated Transport Interchanges'.
335	Bus Infrastructure Improvements		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
336	Safe Routes to Schools		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
337	Safer routes in communities		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
338	Travel awareness campaigns		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'AQ Communications'.

339	Creation of pedestrian-friendly environment on certain streets		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'Pedestrian Walkways'.
340	Improved bus provision		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
341	Bus corridor enhancements		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
342	Enhancement of bus & rail stations		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision' and 'Improved Rail Provision'.
343	Vehicle emission testing		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
344	Traffic management systems with AQ monitoring feedback		Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
345	Evaluation of specific highway improvement schemes		Removed from Long List	Not specific enough to form a measure.
346	Encourage travel plans for businesses & schools		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
347	Use the planning system to secure AQ improvements		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
348	Work with police, community safety to enforce parking and vehicle standards		Taken forward to Long List	Combined with other measures under 'Parking Reduction'.
349	Increase and publicise the availability of cycling facilities		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
350	Introduce cycling proficiency / National Standards in schools		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
351	Promote school walking buses		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
352	Improve walking routes into town centres		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.

353	Limit street works and cleaning to off peak hours		Taken forward to Long List	Combined with other measures under 'Improve Flows (Locally)'
354	Junction improvements to the A467 / A472 at Hafod-yr-ynys to add additional junction capacity which in turn prevents queuing and congestion within the AQMA		Removed from Long List	Not relevant to the individual study areas.
355	Assess & reduce parking provision in certain areas		Taken forward to Long List	Combined with other measures under 'Parking Reduction'.
356	Remove residents parking in day time in some areas to relieve demand in other areas		Taken forward to Long List	Combined with other measures under 'Parking Reduction'.
357	Promote more cycling and walking to school. Provide incentives such as free cycle helmets if children cycle to school more than 75 times in a year		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
358	Publicise alternative routes (incl possibly through haulage associations)		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
359	Staggered timings for School buses		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
360	Close certain streets to traffic		Taken forward to Long List	Combined with other measures under 'Block Off Roads'
361	Remove parking & loading bays		Taken forward to Long List	Combined with other measures under 'Parking Reduction'.
362	Variable diversions within set NO2 limits (using continuous monitoring equipment)		Taken forward to Long List	Taken forward as 'Variable Diversions'.
363	Regional AQ Policy & Guidance		Taken forward to Long List	Combined with other measures under 'Planning Policy'.
364	Sustainable Procurement incl Air Quality		Removed from Long List	Not specific enough to form a measure.
365	Realignment & traffic calming		Taken forward to Long List	Taken forward as 'Realignment'.
366	Traffic diversion		Taken forward to Long List	Combined with other measures under 'Flow Management (Upstream)'.

367	Limit HGV weight or emission		Taken forward to Long List	Combined with other measures under 'Clean Air Zones / Low Emission Zones'.
368	Encourage and provide tools to assist car sharing		Taken forward to Long List	Combined with other measures under 'Car Sharing'.
369	Improve integration within Planning system		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
370	Education of HGV operators		Taken forward to Long List	Combined with other measures under 'Freight Operations' and 'Eco-driving'.
371	Improve cross-boundary working		Removed from Long List	Not specific enough to form a measure.
372	Target schools traffic		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
373	Promote Sustainable transport as part of new developments		Taken forward to Long List	Combined with other measures under 'Improve Planning Decisions'.
374	Promote town centre developments		Removed from Long List	Not specific enough to form a measure.
375	Provide information for residents		Taken forward to Long List	Combined with other measures under 'AQ Communications'.
376	Target HGVs using unsuitable satnav routes		Removed from Long List	Not relevant to the study areas.
377	Improve rail services to key destinations / town centres		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision' and 'Improved Rail Provision'.
378	Improve cycling facilities		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
379	Distribution hub		Taken forward to Long List	Combined with other measures under 'Freight Operations'.
380	Lobby for change in toll system at Severn Bridge		Removed from Long List	Changes already underway.

381	Travel information improvement		Taken forward to Long List	Combined with other measures under 'Behaviour Change' and 'AQ Communications'.
382	Increased integration (including ticketing) of existing public transport to increase attractiveness to users		Taken forward to Long List	Combined with other measures under 'Integrated Transport Interchanges' and 'Behaviour Change'.
383	Encouragement of uptake of “Travel Planning” for existing workplaces and schools and mandatory “Travel Planning” for future large scale developments		Taken forward to Long List	Combined with other measures under 'Behaviour Change'.
384	Mandatory considerate contractor scheme/s		Taken forward to Long List	Combined with other measures under 'Influencing Contractors'.
385	Regional improvement to strategic bus corridor infrastructure across areas		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision'.
386	Infrastructure upgrade / improvement to rail stations to increase capacity		Taken forward to Long List	Combined with other measures under 'Improved Bus Provision' and 'Improved Rail Provision'.
387	National Cycle routes		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover behaviour change.
388	Community transport partnership		Removed from Long List	Not specific enough to form a measure and improved public transport provision included elsewhere.
389	Office cycle showers		Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'. This measure does not warrant consideration in isolation as it is not likely to deliver reductions on concentrations.
390	Office cycle lockers		Removed from Long List	Influencing travel behaviour is considered under 'Behaviour Change'. This measure does not warrant consideration in isolation as it is not likely to deliver reductions on concentrations.
391	Bus timetables		Removed from Long List	Not specific enough to form a measure and improved public transport provision and behaviour change is included elsewhere.
392	Regional/Local Transport Plans		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
393	Local Development Plans		Removed from Long List	Not specific enough to form a measure and other measures are likely to cover planning policy and behaviour change.
394	AQ canopy		Taken forward to Long List	Combined with other measures under 'AQ Screening/ Fencing/ Canopy/ Environmental Barriers'.

395	Specific lane for a range of specific vehicle / mode types	Create or transfer lane for certain types of vehicle / modes – to encourage modal shift etc.	Taken forward to Long List	Combined with other measures under 'Reallocation of Road Space'.
396	Improve VMS Spec/ability to display messages	Upgrade to designs which allow more text/ images to be used	Taken forward to Long List	Combined with other measures under 'Variable Message Signs (VMS)'.
397	Intelligent Traffic Management, linked to traffic flows		Taken forward to Long List	Combined with other measures under 'Intelligent Traffic Management'.
398	Low emission vehicle lane		Taken forward to Long List	Combined with other measures under 'Reallocation of Road Space'.
399	Distance chevrons		Taken forward to Long List	Taken forward as 'Distance Chevrons'.
400	Install new NOx absorbing fencing / panels		Taken forward to Long List	Combined with other measures under 'NOx Absorbing Materials'.
401	Add air quality locations to Traffic Wales Website	Add air quality data to inform drivers alongside information on speeds/ road works	Taken forward to Long List	Combined with other measures under 'AQ Communications'.
402	Hard signage	Signs installed to encourage improved driving behaviour and emphasise awareness of other measures and/or awareness of entering area of any special measures etc.	Taken forward to Long List	Combined with other measures under 'Signage'.
403	Air Quality Areas where multiple activities apply	Branding/presentation of Areas where multiple activities are applied for air quality – e.g.: information, speed control, to raise awareness and encourage compliance.	Taken forward to Long List	Combined with other measures under 'Air Quality Areas'.
404	Work with Sat Nav Providers to provide individual traveller information	Use info to divert traffic away from 'air quality hot spots'	Taken forward to Long List	Combined with other measures under 'Work with Sat Nav Providers'.





1 Capital Quarter  
Tyndall Street  
Cardiff  
CF10 4BZ

**wsp.com**