Technical Note

Project:	Coventry Clean Air Zone OBC (addendum 2 – update Sep 2019)
Subject:	Economic Appraisal Summary of Options DS14 and DS13l

[redacted]

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Client signoff

Client	Coventry City Council
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Please note the caveat that the results presented in this note are provisional, subject to review, updating and potential refinement

1. Economic Appraisal Results Summary

1.1. Revised Options

This Technical Note provides a summary of the economic appraisal results for the revised options DS14 and DS13l. It summarises the economic impacts of the two option packages in terms of benefits and costs and presents the net present value (NPV) of each option. This is the second addendum to the Coventry Air Quality Plan OBC and E1 the Economic Appraisal Methodology Report which was produced for the earlier options at OBC stage.

- The benchmark CAZ D option (Option DS14) plus additional measures scheme implements charges on all non-compliant vehicles (cars, light good vehicles, heavy goods vehicles, taxis, coaches and buses that do not meet the defined emission standards). This scheme is likely to deliver compliance with the EU limit values for air quality by 2021. Based on these forecast compliance timescales, it is assumed there will be no CAZ toll charges incurred by road users post 2024.

- The preferred option (Option DS13l) has been developed since the OBC to tackle air quality exceedance hotspots directly and to meet compliance in the shortest possible time. The option includes inbound and outbound traffic restrictions along Holyhead Road and traffic management measures on Foleshill Lane to reduce emissions on the key areas identified as having significant air quality issues. Together with the additional measures in DS14, extensive travel planning interventions, and measures designed to support the upgrade of taxis and buses to electric or low emissions vehicles, this option is also forecast to deliver compliance with the EU limit values for air quality by 2021.

The revised option packages comprise:

- The CAZ D (DS14) plus additional measures scheme implements charges on all non-compliant vehicles (cars, light good vehicles, heavy goods vehicles, taxis, coaches and buses that do not meet the defined emission standards). The additional measures include the following:

    - Capacity improvements on the B4106 at junction with Hearsall Lane;
    - Opening of Upper Hill Street, giving left in / left out access to the Ring Road;
    - Upgrade of ring road J7 to further support additional traffic rerouting on the B4106 through J7 rather than J8 (Holyhead Road), and to enhance the walking and cycling routes from Spon End into the city centre, providing the capability to encourage more local journeys to be made on foot or by bike;
    - Removal of the traffic signalled junction of Holyhead Road and Barras Lane;
    - Peak time restrictions for Holyhead Road at J8 (Inbound in AM peak, Outbound in PM peak); and
    - Construction of a high-quality segregated cycle route along Coundon Road to encourage cycling in the city, remove local car journeys off the network, and ease pressure on air quality hotspots such as Holyhead Road.

- Option DS13l does not include a CAZ charge. The additional measures in DS14 are supplemented with additional schemes along Foleshill Lane, as well as a range of travel planning and measures designed to support the upgrade of taxis. These are summarised as follows:

    - Interpeak restrictions on Holyhead Road (3 hours inbound and 3 hours outbound);
    - Closure of Barras Lane between Coundon Road and Holyhead Road;
    - HGV ban along part of Foleshill Road
    - Restricting the right-hand turn movement from Cash's Lane to Foleshill Road southbound; and;
    - Focussed travel planning;

Impacts included, but funded outside of AQ:

- Queen Victoria Road Public Realm Scheme;
- Replacement of two thirds of the bus movements on Foleshill Road with electric buses;

Clean Air Fund:

- Support for taxi drivers to upgrade vehicles;
- Implementation of electric charging points for taxis;
- Provision of SWIFT cards to impacted residents around Holyhead Road/ Foleshill Lane.

CAZ Area and Charges

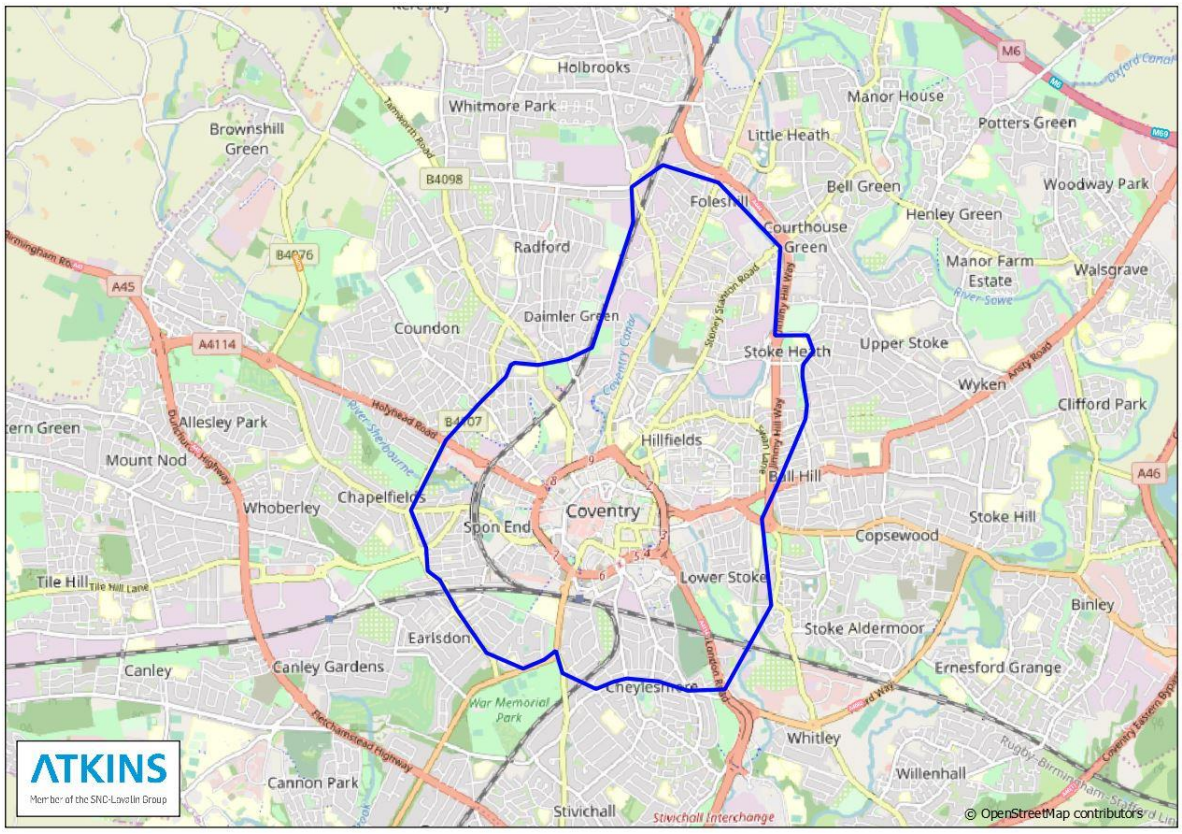
Since OBC stage the assumed charges for non-compliant vehicles have been revised. The current fee assumptions for the charging of non-compliant vehicles are summarised in Table 1-1.

Table 1-1 - Option DS14: CAZ Charge and Penalty Charge by Vehicle Type

Vehicle	Car	LGV	HGV	Bus	Taxi
CAZ Charge	£8	£8	£50	£50	£8
Penalty Charge (if paid within 14 days)	£60	£60	£120	£120	£60
Penalty Charge (if paid after 14 days)	£120	£120	£120	£120	£120

Option DS14 consists of a Clean Air Zone (CAZ D) with the boundary shown in Figure 1-1. The CAZ area is consistent with that presented in the OBC. Since OBC stage, the behaviour response rates have been updated to be in line with the West Midlands response rates. The number of non-compliant vehicles and response rates in terms of those choosing to upgrade, cancel, pay charge and avoid are set out in Table 1-2.[1]

Figure 1-1 - CAZ D Boundary DS14



[1] Table 1-2 is taken from the Traffic Modelling team

Table 1-2 - Option DS14: Behaviour Response Rates

	Trips to City Centre Zones in CAZ D boundary (from 2021 DM scenario)		Upgrade	Cancel	Pay Charge	Avoid
Car	**Total**	13,319	N/A			
	Compliant	10,122 (76%)	N/A			
	Non Compliant	3,196 (24%) Split between Compliant and Non Compliant vehicles for 2021 provided by Atkins	1,023 (32%)	458 (14%)	1,085 (34%) (CASM Demand Model Reaction)	630 (20%) (CASM Demand Model Reaction)
	JAQU Guidance		64.3%	7.1%	7.1%	21.4%
	Birmingham CC		32%	14%	12%	42%
LGV	**Total**	1,250	N/A			
	Compliant	775 (62%)	N/A			
	Non Compliant	475 (38%) Split between Compliant and Non Compliant vehicles for 2021 provided by Atkins	119 (25%)	0 (0%)	228 (48%)	128 (27%) Removed trips
	JAQU Guidance		63.8%	6.0%	20.3%	10%
	Birmingham CC		25%	0%	48%	27%
HGV	**Total**	464	N/A			
	Compliant	334 (72%)	N/A			
	Non Compliant	130 (28%) Split between Compliant and Non Compliant vehicles for 2021 provided by Atkins	81 (62%)	0 (0%)	14 (11%)	35(27%) Removed trips
	JAQU Guidance		82.6%	4.3%	8.7%	4.3%
	Birmingham CC		62%	0%	11%	27%

- The CAZ D (DS14) plus additional measures scheme implements charges on all non-compliant vehicles (cars, light good vehicles, heavy goods vehicles, taxis, coaches and buses that do not meet the defined emission standards). The additional measures include the following:

  - Capacity improvements on the B4106 at junction with Hearsall Lane;
  - Opening of Upper Hill Street, giving left in / left out access to the Ring Road;
  - Upgrade of ring road J7 to further support additional traffic rerouting on the B4106 through J7 rather than J8 (Holyhead Road), and to enhance the walking and cycling routes from Spon End into the city centre, providing the capability to encourage more local journeys to be made on foot or by bike;
  - Removal of the traffic signalled junction of Holyhead Road and Barras Lane;
  - Peak time restrictions for Holyhead Road at J8 (Inbound in AM peak, Outbound in PM peak); and
  - Construction of a high-quality segregated cycle route along Coundon Road to encourage cycling in the city, remove local car journeys off the network, and ease pressure on air quality hotspots such as Holyhead Road.

1.2. Summary of Results

The results of the economic analysis are presented in Option DS14 Results:

Table 1-3 and Figure 1-2 for Option DS14; and Option DS13l Results:
Table 1-4 and Figure 1-3 for Option DS13l.

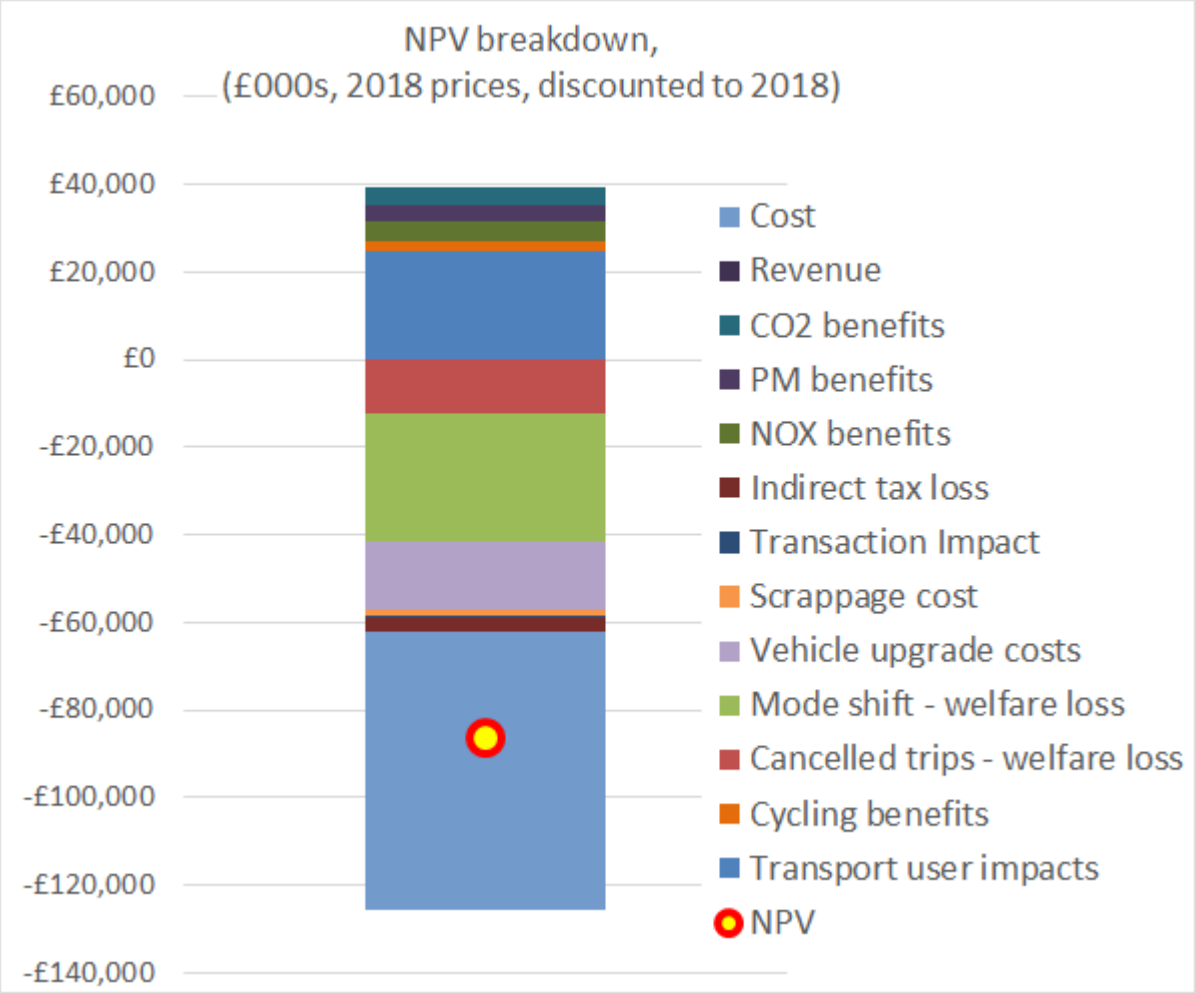
Option DS14 Results:

Table 1-3 - Option DS14: Summary of costs and benefits

Category	DS14 (£000s)	Description
Transport user impacts (TUBA)	£24,552	Travel time savings + vehicle operating cost savings + [excludes CAZ user charge (toll) impacts]
Cycling: Journey Quality	£200	Health and absenteeism benefits due to increased cycling as a result of new cycle provision (decongestion benefits captured in Transport user impacts entry)
Cycling: Physical Activity	£1,554	
Cycling: Absenteeism	£621	
Cycling: Accidents	£13	
Welfare loss - cancelled trips	-£12,487	Disbenefit experienced by those cancelling their trip to avoid paying the CAZ charge
Welfare loss - CAZ-induced mode shift	-£29,292	'Rule of half' disbenefit experienced by those shifting to other modes to avoid paying the CAZ charge
Upgrade welfare	-£15,300	Costs to drivers of upgrading their vehicle sooner than planned to achieve compliance
Scrappage cost	-£1,572	Costs of scrapping vehicles earlier than planned as part of the change in fleet turnover to achieve compliance
Transaction impact	-£144	Time spent by drivers in upgrading vehicles sooner than intended for compliance (i.e. search & purchase time)
Indirect tax loss	-£3,361	Primarily loss in fuel duty to government due to fuel savings associated with vehicles being upgraded to more efficient models for compliance and changes in traffic conditions
NOX benefits	£4,420	Value of reduction in NOx emissions as a result of the option
PM benefits	£3,724	Value of reduction in PM emissions as a result of the option
CO2 benefits	£4,060	Value of reduction in CO2 emissions as a result of the option
Cost (PVC)	-£63,435	Implementing and operating costs of the CAZ
NPV	-£86,447	

+ve values denote benefit / -ve values denote dis-benefits; all impacts are in 2018 prices; discounted to 2018

Figure 1-2 - Option DS14: Net Present Value by component



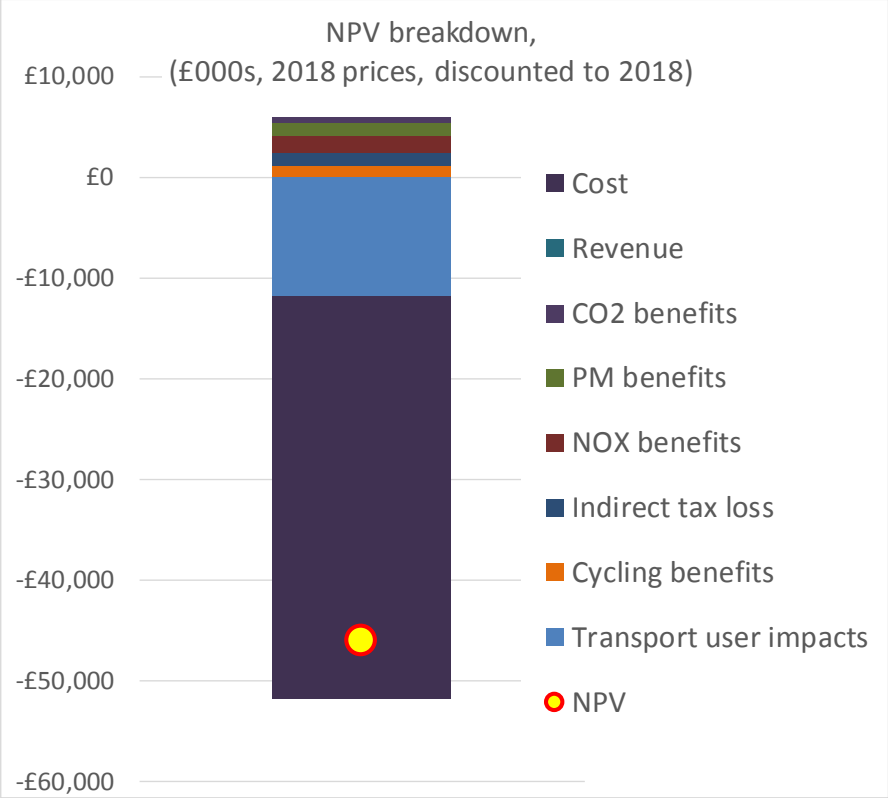
Option DS13l Results:

Table 1-4 - Option DS13l: Summary of costs and benefits

Category	DS13l (£000s)	Description
Transport user impacts (TUBA)	-£11,890	Time saving and vehicle operating cost savings as a result of the scheme as represented in TUBA, accounting for highway interventions and traffic reduction due to travel planning and cycling schemes
Indirect tax revenue losses	£1,363	Loss in indirect tax revenue received by government mainly due to reduced fuel use and payment of fuel duty
Cycling: Journey Quality	£200	Health and absenteeism benefits due to increased cycling as a result of new cycle provision (decongestion benefits captured in Transport user impacts entry)
Cycling: Physical Activity	£667	
Cycling: Absenteeism	£169	
Cycling: Accidents	£4	
NO_X benefits	£1,685	Value of reduction in NOx emissions as a result of the option
PM benefits	£1,318	Value of reduction in PM emissions as a result of the option
CO_2 benefits	£498	Value of reduction in CO2 emissions as a result of the option
Cost (PVC)	-£40,047	Implementation and operating costs
NPV	-£46,033	

+ve values denote benefit / -ve values denote dis-benefits; all impacts are in 2018 prices; discounted to 2018

Figure 1-3 - Option DS13l: Net Present Value by component



1.3. Comparing the Options

By combining the costs and economic impacts it is possible to compare the overall net present value (NPV) of the two options. This indicates the overall value for money of each option and allows a comparison of the two options from an economic perspective. On economic grounds (in NPV terms) Option DS13l performs better than Option DS14. The NPV for option DS13l is -£46.0million, and for Option DS14 it is -£86.4million (

Table 1-5).

Note that the present value of costs (PVC) estimation for Option DS13l includes funding from two different streams that have been added together – the Implementation Fund and the Clean Air Fund (CAF). Whereas for Option DS14, the Clean Air Fund costs have not been quantified and therefore are not included in the PVC estimate. The proposed provisions in Option DS13l funded through the CAF affect traffic movements and therefore the economic impacts, hence they have been included in the cost-benefit assessment for this option. Not including the CAF element would lower the PVC for Option DS13l and would positively impact the NPV.

For both options the costs outweigh the benefits. This is not surprising given that the focus of the scheme is to improve air quality. The cost for implementing and maintaining the charging infrastructure is the main cost component for the CAZ D option, DS14. Consequently, the costs associated with this option (£63.5m) are higher than for DS13l (£40m), which does not require CAZ charging infrastructure. Costs for the additional measures are similar between the two options. Improvements to the road layout, traffic management, specific interventions designed to target high exceedance areas, and the cycling infrastructure is a sizeable component of the costs for each option. These costs are greater for DS13l as there are additional traffic management measures and interventions on Foleshill Lane and Holyhead Rd.

Benefits associated with air quality improvements are somewhat higher for Option DS14 than for Option DS13l. This is mainly due to the larger impact on non-compliant vehicle kms resulting from the 'upgrade' and 'avoid' behaviour responses affected by the CAZ D. The cycling benefits are higher for DS14 for similar reasons: there is a higher behaviour change response. Though journey quality impacts are the same due to the implementation of a new cycle route the other cycling impacts are a little higher for Option DS14 due to the bigger impact on mode shift from cars to cycling. However, these cycling benefits are fairly modest in relation to the overall level of benefits.

A significant portion of road user benefits are realised by improved journey times. These are higher for DS14 (£20.3m) than for DS13l (-£8.2m) due to the decongestion impacts of the CAZ D resulting from the 'avoid' and 'cancel' journey behaviour responses. The additional traffic reduction measures on Holyhead Rd and Foleshill Lane cause traffic to re-route to other parts of the network and lead to longer journey times.

An important difference in terms of user impacts is the dis-benefit resulting from the costs associated with upgrading non-compliant vehicles. The high welfare loss due to the impact of vehicle upgrade and scrappage combine to give an overall economic dis-benefit of -£23m for Option DS14. Combining scheme costs and overall user dis-benefits gives a larger negative NPV for Option DS14 relative to Option DS13l. Where, in contrast, DS13l does not impose a heavy welfare loss on users. Overall, implementation costs are lower, the level of dis-benefits are lower, and the NPV is higher for Option DS13l (

Table 1-5).

Table 1-5 - Comparison of Net Present Value, Costs and Benefits (£000s)

Cost component	Option DS14 CAZ D	Option DS13l
Benefits* (PVB)	-£23,013	-£5,986
Costs (PVC)	-£63,435	-£40,047
NPV	**-£86,447**	**-£46,033**

* +ve values denote benefits / -ve values denote dis-benefits. All impacts are in £000s, 2018 prices, discounted to 2018

Appendix – Detailed Breakdown of Benefits and Costs

Category	DS14 (£000s)	DS13l (£000s)
Transport user impacts: Time	£20,334	-£8,179
Transport user impacts: Tolls	£0	£0
Transport user impacts: Fuel VOC	£756	-£2,226
Transport user impacts: Non-fuel VOC	£3,462	-£1,486
Welfare loss - cancelled trips	-£12,487	£0
Welfare loss - CAZ-induced mode shift	-£29,292	£0
Vehicle upgrade costs	-£15,300	£0
Scrappage cost	-£1,572	£0
Transaction impact	-£144	£0
Indirect tax loss	-£3,361	£1,363
Cycling: Journey Quality	£200	£200
Cycling: Physical Activity	£1,554	£667
Cycling: Absenteeism	£621	£169
Cycling: Accidents	£13	£4
NOX benefits	£4,420	£1,685
PM benefits	£3,724	£1,318
CO2 benefits	£4,060	£498
Benefits (PVB)	**-£23,013**	**-£5,986**
Cost (PVC)	-£63,435	-£40,047
NPV	-£86,447	-£46,033