



Bristol City Council Clean Air Plan
Outline Business Case
Quantitative Risk Assessment

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Bristol City Council

DRAFT



Bristol City Council Clean Air Plan

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Document history and status

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Appendix A. @Risk Output

Appendix B. Risk Register

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Acronyms and Abbreviations

BCC	Bristol City Council
CAP	Clean Air Plan
CAZ	Clean Air Zone
Defra	Department for Environment, Food & Rural Affairs
DfT	Department for Transport
EU	European Union
FBC	Full Business Case
JAQU	Joint Air Quality Unit
LA	Local Authority
NO ₂	Nitrogen Dioxide
OBC	Outline Business Case
QRA	Quantitative Risk Assessment

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1. Introduction

Poor air quality is the largest known environmental risk to public health in the UK¹. Investing in cleaner air and doing more to tackle air pollution are priorities for the EU and UK governments, as well as for Bristol City Council (BCC). BCC has monitored and endeavoured to address air quality in Bristol for decade and declared their first Air Quality Management Area in 2001. Despite this, Bristol has ongoing exceedances of the legal limits for Nitrogen Dioxide (NO₂) and these are predicted to continue until around 2029 without intervention.

The UK has in place legislation transposing requirements in European Union law, to ensure that certain standards of air quality are met, by setting Limit Values on the concentrations of specific air pollutants. In common with many EU member states, the EU limit value for annual mean nitrogen dioxide (NO₂) is breached in the UK and there are on-going breaches of the NO₂ limit value in Bristol. The UK government is taking steps to remedy this breach in as short a time as possible, with the aim of reducing the harmful impacts on public health. Within this objective, the government has published a UK Air Quality Plan and a Clean Air Zone Framework, both published in 2017. The latter document provides the expected approach for local authorities when implementing and operating a Clean Air Zone (CAZ).

Due to forecast air quality exceedances, in 2017 Bristol City Council has been directed by the Minister Therese Coffey (Defra) and Minister Jesse Norman (DfT) to produce a Clean Air Plan to achieve air quality improvements in the shortest possible time. In line with Government guidance, as part of the Plan, Bristol City Council has considered a range of options for the implementation of a Clean Air Zone (CAZ), including both charging and non-charging measures, in order to achieve sufficient improvement in air quality and public health and in line with legal requirements as set out below. This process requires the production of a Strategic Outline Case, an Outline Business Case (this report and a Full business Case, that will be prepared following the Outline Business Case.

Jacobs has been commissioned to support BCC to produce an Outline Business Case (OBC) for the delivery of the CAP; a package of measures which will bring about compliance with the Limit Value for annual mean NO₂ in the shortest time possible in central Bristol. The OBC assesses the shortlist of options set out in the Strategic Outline Case², and proposes a preferred option including details of delivery. The OBC forms a bid to central government for funding to implement the CAP.

1.1 Purpose of this Report

A Quantitative Risk Assessment (QRA) was undertaken for the Bristol City Council Clean Air Plan. The project involves the implementation of the Hybrid option, which includes a CAZ C and a diesel car ban, in which highly polluting vehicles would be charged to drive. The project is currently at the Outline Business Stage (OBC) and this QRA has been developed to support the OBC Submission.

This is the first QRA undertaken on this scheme. This technical memorandum outlines the risk identification (risk register) and the QRA process and presents the QRA outputs.

The main purpose of the QRA is to support the scheme costing as presented within the financial case by predicting the level of risk contribution, having a defined level of confidence, to cover the various stages of the scheme. QRA allows for uncertainty in unplanned additional cost items, including cost due to delay, that cannot be included in the project costs. The assessed risk value is to be used in the financial case for this package and incorporated in the economic appraisal.

The QRA process involves four steps.

- Step 1 is identification of all risks affecting the project through risk workshops and risk reviews. This step results in a risk register.

¹ Public Health England (2014) Estimating local mortality burdens associated with particular air pollution.
<https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution>

² Bristol City Council Clean Air Plan: Strategic Outline Case, April 2018
https://www.cleanairforbristol.org/wp-content/uploads/2018/05/Strategic-Outline-Case_BCC_Final_05.04.18.pdf

- Step 2 is analysis of the various risks by defining their distributions in terms of probabilities, impacts and knock-on effects. This information is also gathered through risk workshops and other interactions including stakeholders.
- Step 3 is undertaking the risk modelling using Monte Carlo simulation (in this project @Risk® software was used).
- Step 4 is analysing the results against required contingency needs for the project.

The risk model has been constructed by Jacobs using Microsoft Excel® and @Risk® software packages. The model used the Monte-Carlo simulation theory by replicating a large number of iterations of possible project risk scenarios. Confidence levels relating to the cost of the scheme are obtained from the distribution of the averaged results produced by the simulations.

2. Risk Model Inputs

2.1 Cost of Implementation and Operation

Monthly costs have been established for risks which occur during various stages of the project. These are split between costs which occur during the OBC or Full Business Case (FBC), and those which occur during the implementation and delivery/operation of the scheme.

The following unit costs of delay (£ per month) have been considered for the various risks that could cause delay to the project:

- £2,500 to £20,000/month – for risks during the OBC/FBC stage that do not affect the critical path of project. This allows for project management costs and the potential for a limited amount of re-work.
- £75,000/month – for risks during the OBC/FBC stage that affect the critical path of project. This is based on the average spend per month of the project to date.
- £110,000/month – for risks during the OBC/FBC that affect the critical path of project and include legal staff costs. This is based on the average spend per month of the project to date plus an allowance for a limited amount of legal assistance within a month.
- £167,000/month – for risks that occur during delivery/operation of the scheme. This is based on the approximate monthly cost of staff required to enforce the scheme.

This QRA has been defined based on the Hybrid option level of operation and delivery delay cost.

2.2 Risk Identification, Categorisation, and Ranking

A risk register was developed through group consensus via a risk workshop. The risk workshop consisted of staff from BCC and Jacobs that are involved in the project.

A total of 112 risks were initially identified. Each risk was categorised based on project objectives, then scored, which produced an Overall Risk Ranking in terms of high, medium, or low for each risk. The current Risk Register is included in Appendix B of this document.

The risks that are used in the QRA are taken directly from the risk register. A number of risk mitigatory/management actions have been taken by the project team. Following the first QRA workshop, 106 risks were deemed potential risks that are pertinent to the scheme, which were quantified (financial risk and delay risk).

2.3 Risk Quantification

Individual risks were defined in terms of their distributions, likelihood/probabilities, impacts and knock on effects, etc., through the workshop. For each risk, the key inputs into the @RISK software to be assessed in the QRA model are; Financial/Delay Impact Estimate (best case, worst case, and most likely), and Probability / Likelihood.

The risk category and the Overall Risk Ranking (high, medium, low) were used as a guidance in quantifying risks. These values were then used in the model to determine a Mean Outcome and a Risk Exposure for each risk and for each iteration. The Monte Carlo simulation used 10,000 iterations using the @Risk software to develop a single probability distribution for all possible risk outcomes for the scheme. The results were then used to determine various risk percentile values for the scheme.

3. Risk Model Outputs

3.1 Risk Value

The QRA figure being included financial case is the 80th Percentile - P(80). In addition, the 50th Percentile (P(50)) and the P(Mean), the mean percentile value also provide further levels of confidence. QRA results are shown below. The @Risk outputs for OBC stage are included in Appendix A of this document, which show the full range of percentile values calculated by @Risk.

Table 3-1: QRA 1 – OBC Stage

	P(50)	P(80)	P(Mean)
Grand Total Risk (Financial + Delay)	£5,276,000	£6,500,000	£5,317,000

The P(80) level of risk has been used to establish a quantified contingency budget, inline with discussion between BCC and JAQU.

3.2 Highest Ranked Risks

The top ten ranked risks in the OBC stage of the project are listed below.

Table 3-2: Top 10 risks QRA 1 – Outline BC / Full BC Stage

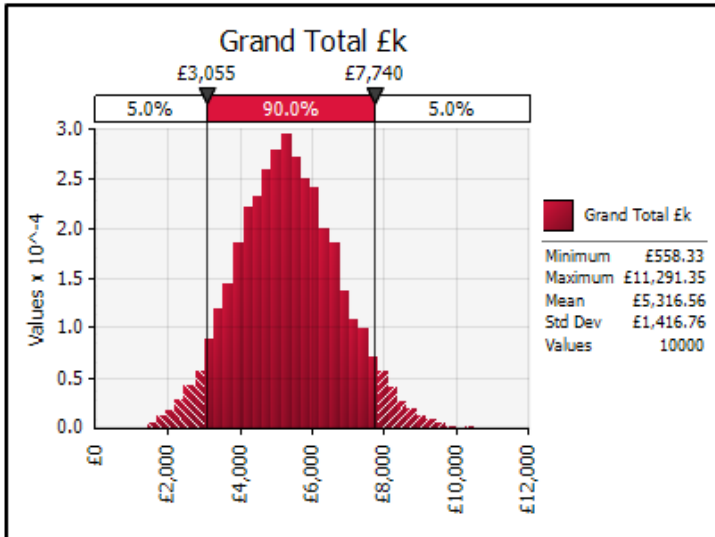
Rank	Risk Ref	Description
1	Risk 30	Inability to implement Hybrid option due to lack of appropriate legislation leading requirement to implement the benchmark option (Medium CAZ D+) by Government Ministers / JAQU
2	Risk 27	Successful challenges to the process for declaring the hybrid option at FBC
3	Risk 31	TRO objections result in public inquiry
4	Risk 28	Successful challenges to the process for making the Order (JR)
5	Risk 29	Successful challenges to the process for enforcing the Hybrid option leading to inability to enforce (e.g. location/quality of signage, ability to avoid zone, DVLA database inaccurate)
6	Risk 58	General election
7	Risk 61	Change in political leadership may mean a change in direction
8	Risk 64	Mechanism of objecting to TROs used to delay scheme/object to the scheme as a whole
9	Risk 24	Planned restrictions being unenforceable by BCC under the Traffic Management Act 2004
10	Risk 57	Hybrid scheme refinement required to ease implementation

With ongoing development of the project resulting in improved certainty around specific risks and costs, an increased level of confidence in the QRA results is expected in further iterations.

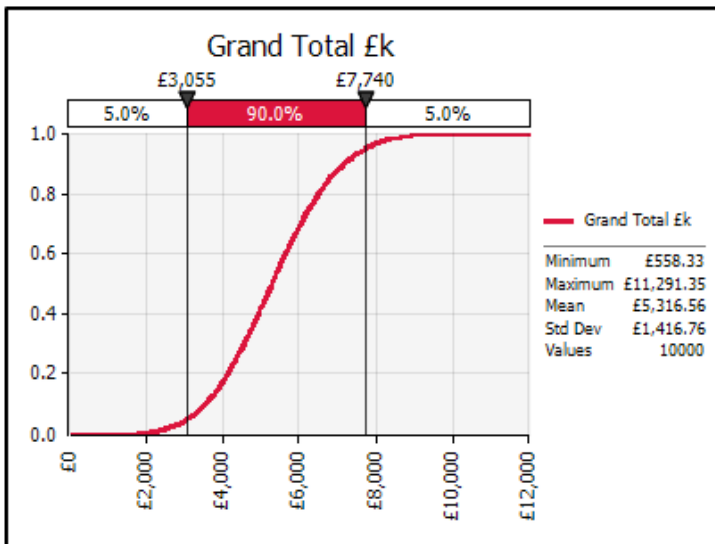
Appendix A. @Risk Output

QRA 1 – OBC Stage

@RISK Output Report for Grand Total £k X125
 Performed By: Premathilaka, Anuradha/UKS
 Date: 11 October 2019 09:47:55



Simulation Summary Information	
Workbook Name	BCC CAZ QRA NEW draft v
Number of Simulations	1
Number of Iterations	10000
Number of Inputs	384
Number of Outputs	4
Sampling Type	Monte Carlo
Simulation Start Time	11/10/2019 09:46
Simulation Duration	00:00:31
Random # Generator	Mersenne Twister
Random Seed	2020458990



Summary Statistics for Grand Total £k			
Statistics	Percentile		
Minimum	£ 558	5%	£ 3,055
Maximum	£ 11,291	10%	£ 3,515
Mean	£ 5,317	15%	£ 3,849
Std Dev	£ 1,417	20%	£ 4,112
Variance	2007208.622	25%	£ 4,330
Skewness	0.165580488	30%	£ 4,545
Kurtosis	2.952289651	35%	£ 4,740
Median	£ 5,276	40%	£ 4,922
Mode	£ 5,326	45%	£ 5,101
Left X	£ 3,055	50%	£ 5,276
Left P	5%	55%	£ 5,450
Right X	£ 7,740	60%	£ 5,629
Right P	95%	65%	£ 5,820
Diff X	£ 4,685	70%	£ 6,030
Diff P	90%	75%	£ 6,258
#Errors	0	80%	£ 6,500
Filter Min	Off	85%	£ 6,779
Filter Max	Off	90%	£ 7,185
#Filtered	0	95%	£ 7,740



Appendix B. Risk Register

See separate Excel Spreadsheets below:

- 1) QRA1 - OBC Stage

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BCC CAZ - Risk Register and QRA

Rev: v1.6 DRAFT - 11 October 2019

Scheme: Bristol Clean Air Zone

Milestone: Outline Business Case

Works Cost: TBC

Cost of delay (k): Varied by risk

Resources
Business case
On-street effects
Legal / process
Communications / stakeholder challenge
Procurement
Publicity
Financial
Technical / design
Construction
Operation

Likelihood		
Extreme Risk	1 - Almost Certain	95.0%
High Risk	2 - Likely	50.0%
Medium Risk	3 - Possible	25.0%
Low Risk	4 - Unlikely	12.5%
	5 - Rare	5.0%

ENTER QRA QUANTITIES IN THESE COLUMNS

No.	Risk Ref	Description	Category	Sup port	Stage at which Risk occurs	Mitigation owner	Initial Risk					Proximity (date)	Approach Avoid, Accept, Reduce, Transfer	Mitigation Measures	DATE OF UPDATE	Status	Residual Risk					Reason for closure & comments	Likelihood (%)	Financial			Delay			
							Cost	Time	Perf	Rating	RAG						Cost	Time	Perf	Rating	RAG			Min (€k)	Max (€k)	Likely (€k)	Min (mths)	Max (mths)	Likely (mths)	Delay Cost (€k)/Month
							Impact	Prob.	Impact	Prob.	Impact						Prob.	Impact	Prob.	Impact	Prob.									
1	Risk 1	Staff / skills shortage in BCC projects	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	5	3	10.0
2	Risk 2	Staff / skills shortage in BCC BAU / back office staff for processing PCNs	Resources		Operation	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	5	3	10.0
3	Risk 3	Staff / skills shortage in BCC TRO team	Resources		Implementation	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	5	3	10.0
4	Risk 4	Staff / skills shortage in BCC ICT team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	5	3	10.0
5	Risk 5	Staff / skills shortage in BCC Smart Cities / Control Centre team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%			0.5	3	1	10.0	
6	Risk 6	Staff / skills shortage in BCC street-lighting team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	4	3	10.0
7	Risk 7	Staff / skills shortage in BCC Procurement team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		12.5%			0.5	2	1	5.0	
8	Risk 8	Staff / skills shortage in BCC Legal team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		12.5%				1	4	3	5.0
9	Risk 9	Staff / skills shortage in BCC FOI team	Resources		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		12.5%				1	4	3	5.0
10	Risk 10	Staff / skills shortage in neighbouring authorities and HE (for signage etc).	Resources	UAs / HE	OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		12.5%			0.5	2	1	5.0	
11	Risk 11	Staff / skills shortage in Jacobs	Resources	Jacobs	OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		5.0%			0.5	2	1	2.5	
12	Risk 12	Staff / skills shortage in JAQU	Resources	JAQU	OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		5.0%			0.5	2	1	2.5	
13	Risk 13	Staff / skills shortage in Volker for power	Resources	Volker	OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		5.0%			0.5	2	1	2.5	
14	Risk 14	Staff / skills shortage in BCC fibre and comms contractor	Resources	Comms Contractor	OBC	BCC	M	M	M	M	4.00	2019	Reduce	Identify staff with appropriate experience/knowledge in advance of work being undertaken. Identify early whether this risk is likely to materialise in order to find alternative resources to support project. Consider recruiting if necessary.	20/09/2019	Open	M	M	M	L	2.00		12.5%			1	3	2	5.0	
15	Risk 15	Agreement on, and resources to take on the system operation, including hardware (BAU arrangements).	Resources	FBC	BCC	BCC	M	L	M	M	3.33	2019	Reduce	Have early discussions within BCC with BAU teams to agree scope, specification and gain understanding and approvals.	20/09/2019	Open	M	L	L	L	1.33		12.5%			1	1	1	5.0	
17	Risk 17	Complementary mitigation measures not sufficient	Business Case	OBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Realistic assessment and modelling of the effects of complementary measures	20/09/2019	Open	L	L	L	L	1.00		25.0%			0.5	3	1	10.0	
18	Risk 18	Implementation timescale of the hybrid option is too long so the benchmark option (Med CAZ D+) provides compliance in the shortest possible time	Business Case	FBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Develop Medium CAZ D proposals to the same level as the hybrid option	20/09/2019	Open	L	L	L	L	1.00		50.0%				3	8	6	75.0
20	Risk 20	The number of people driving uncompliant vehicles into the zones is higher than estimated	On-street effects	Operation	BCC	BCC	M	L	M	L	1.67	2019	Accept	n/a	20/09/2019	Open	M	L	M	L	1.67		50.0%	20	160	80				
21	Risk 21	Complementary mitigation measures not implemented in time	On-street effects	Implementation	BCC	BCC	M	L	M	M	3.33	2019	Reduce	Early identification of realistic and practical complementary measures. Progress work on these with equal priority as other CAZ elements (AEDs / back office / signage etc) and not as a secondary priority	20/09/2019	Open	L	L	L	L	1.00		25.0%				1	3	2	10.0
22	Risk 22	Impact on neighbouring authorities' road networks	On-street effects	Operation	BCC	BCC	L	L	M	L	1.33	2019	Transfer	Transfer risk to the neighbouring local authorities	20/09/2019	Open	L	L	M	L	1.33		25.0%				1	3	2	10.0
23	Risk 23	Unforeseen impacts on local junctions at key points outside CAZ zones, e.g. outside schools.	On-street effects	Operation	BCC	BCC	L	L	M	M	2.67	2019	Reduce	Ensure that modelling and assessment work takes into account likely impacts at these key locations outside the CAZ	20/09/2019	Open	L	L	M	L	1.33		5.0%			0.5	2	1	2.5	
24	Risk 24	Planned restrictions being unenforceable by BCC under the Traffic Management Act 2004	Legal / process	Implementation	BCC	BCC	H	M	H	H	8.00	2019	Reduce	Liaise closely with JAQU and DFT to enable legislation	07/10/2019	Open	H	M	M	H	7.00		50.0%				2	6	3	167.0
25	Risk 25	Successful challenge by way of JR to the process for selection of the hybrid option before decision at Cabinet to submit OBC	Legal / process	OBC	BCC	BCC	H	M	H	H	8.00	2019	Accept	Robust OBC, robust consultation, good liaison with JAQU, and a robust and timely public communications and stakeholder plan.	07/10/2019	Open	H	M	H	H	8.00		50.0%				3	8	6	75.0
26	Risk 26	Successful challenge by way of JR to Cabinet decision re hybrid option at OBC on the basis of process	Legal / process	FBC	BCC	BCC	H	M	H	H	8.00	2019	Reduce	Robust OBC, robust consultation, good liaison with JAQU, and a robust and timely public communications and stakeholder plan.	07/10/2019	Open	H	M	M	M	4.67		50.0%				3	8	6	75.0
27	Risk 27	Successful challenges to the process for declaring the hybrid option at FBC	Legal / process	Implementation	BCC	BCC	H	M	H	H	8.00	2019	Reduce	Robust OBC, robust consultation, good liaison with JAQU, and a robust and timely public communications and stakeholder plan.	07/10/2019	Open	H	M	M	M	4.67		50.0%				3	8	6	167.0
28	Risk 28	Successful challenges to the process for making the Order (JR)	Legal / process	Implementation	BCC	BCC	H	M	H	H	8.00	2019	Reduce	Robust OBC, robust consultation, good liaison with JAQU, and a robust and timely public communications and stakeholder plan.	07/10/2019	Open	H	M	M	M	4.67		50.0%				3	8	6	167.0
29	Risk 29	Successful challenges to the process for enforcing the hybrid option leading to inability to enforce (e.g. location/quality of signage, ability to avoid zone, DVLA database inaccurate)	Legal / process	FBC	BCC	BCC	M	M	H	H	7.00	2019	Reduce	Ensure legal support for proper implementation	07/10/2019	Open	M	M	M	M	4.00		25.0%				3	8	6	167.0
30	Risk 30	Inability to implement Hybrid option due to lack of appropriate legislation leading requirement to implement the benchmark option (Medium CAZ D+) by Government Ministers / JAQU	Legal / process	FBC	BCC	BCC	H	M	H	H	8.00	2019	Reduce	Robust OBC, robust consultation, good liaison with JAQU	07/10/2019	Open	M	M	M	M	4.00		50.0%				5	9	6	167.0
31	Risk 31	TRO objections result in public inquiry	Legal / process	Implementation	BCC	BCC	M	M	M	H	6.00	2019	Accept	Ensure proper engagement and explanation and robust consultation through TRO process	07/10/2019	Open	M	M	M	M	4.00		25.0%				3	8	6	167.0
32	Risk 32	Delays in approvals from JAQU	Legal / process	OBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Ongoing and regular engagement with JAQU. Identify key issues and address early	20/09/2019	Open	L	L	L	M	2.00		12.5%				1	3	2	5.0
33	Risk 33	HE or other LA approvals of signage on SRN take longer than anticipated	Legal / process	FBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Early discussions with HE and other LAs on signage. Understand approvals processes, staff required, liability for costs etc.	07/10/2019	Open	M	M	M	L	2.00		12.5%				1	3	2	5.0
34	Risk 34	DFT signage approval takes longer than anticipated	Legal / process	FBC	BCC	BCC	M	M	H	H	7.00	2019	Reduce	Early discussions with DFT and JAQU on signage. Understand approvals processes, staff required, liability for costs etc.	07/10/2019	Open	M	M	M	M	4.00		50.0%				1	3	2	110.0
35	Risk 35	The determination of WECA's Key Route Network requires additional approvals for scheme implementation resulting in delays	Legal / process	FBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Early discussions with WECA on KRN	07/10/2019	Open	M	M	M	L	2.00		12.5%				1	3	2	5.0
36	Risk 36	Data protection / GDPR issues	Legal / process	FBC	BCC	BCC	M	M	M	M	4.00	2019	Reduce	Seek legal opinion early Undertake a Privacy Impact Assessment ASAP	20/09/2019	Open	M	M	M	L	2.00		25.0%				1	3	2	10.0

No.	Risk Ref	Description	Category	Sup port	Stage at which Risk occurs	Mitigation owner	Cost	Time	Perf	Rating	RAG	Proximity (date)	Approach Avoid, Accept, Reduce, Transfer	Mitigation Measures	DATE OF UPDATE	Status	Cost	Time	Perf	Rating	RAG	Reason for closure & comments	Likelihood (%)	Min (Ek)	Max (Ek)	Likely (Ek)	Min (mths)	Max (mths)	Likely (mths)	Delay Cost (Ek)/Month	
37	Risk 37	Hybrid option does not deliver legal compliance if turned off for technical, legal or political reasons.	Legal / process		Operation	BCC	H	M	H	M	5.33	2019	Accept	n/a	07/10/2019	Open	H	M	H	M	5.33		25.0%				2	4	3	75.0	
38	Risk 38	New TROs cause a redesign of existing TROs (e.g. RPZs)	Legal / process		Implementation	BCC	M	M	M	M	4.00	2019	Accept	n/a	07/10/2019	Open	M	M	M	M	4.00		25.0%				2	6	3	110.0	
39	Risk 39	Can BCC legally access DVLA's database to identify diesel vehicles	Legal / process		OBC	BCC	H	M	H	M	5.33	2019	Reduce	Seek legal opinion ASAP. Work with JAQU and DVLA	07/10/2019	Open	H	M	H	M	5.33		25.0%				1	3	2	10.0	
40	Risk 40	Lack of understanding by the public on what the hybrid option restrictions mean	Communication s / stakeholder challenge		Operation	BCC	M	L	M	M	3.33	2019	Reduce	Try to make sure the restrictions, charges and exemptions are easy to understand to the 'person in the street'. Also a clear communications package workstream covering pre-publicity and sources of help.	20/09/2019	Open	M	L	M	L	1.67		25.0%				0.5	2	1	75.0	
41	Risk 41	Large number of FOI requests	Communication s / stakeholder challenge		OBC	BCC	M	M	L	M	3.33	2019	Reduce	Ensure the project and procedures are open and transparent. Put information into the public domain proactively to prevent the feeling that 'they have something to hide'. Seek legal / FOI input early.	20/09/2019	Open	L	L	L	L	1.00		12.5%				0.5	2	1	5.0	
42	Risk 42	Consultation on TRO delays / blocks expected TROs	Communication s / stakeholder challenge		Implementation	BCC	M	H	H	H	8.00	2019	Reduce	Seek to draft TROs with less chance of opposition. Consult early, setting out the reasons for the TRO and mitigating measures. Seek political support	20/09/2019	Open	L	M	M	M	3.33		25.0%				1	3	2	75.0	
43	Risk 43	A failure to adequately communicate and engage with stakeholders leading to challenge	Communication s / stakeholder challenge		OBC	BCC	M	M	M	H	6.00	2019	Reduce	Seek to design scheme with less chance of opposition. Consult early, setting out the reasons for the CAZ and mitigating measures. Seek political support, and have robust communications and stakeholder plan.	20/09/2019	Open	M	M	M	L	2.00		12.5%				1	3	2	5.0	
44	Risk 44	Reliance on industry's understanding/ability to deliver retrofit solutions for older taxis/LGVs/HGVs/buses/coaches	Communication s / stakeholder challenge		Operation	BCC	M	M	L	M	3.33	2019	Accept	Risk effects baseline rather than scheme impacts. Monitor success of other projects and update baseline assumptions if need be	20/09/2019	Open	M	M	L	M	3.33		25.0%				1	3	2	75.0	
45	Risk 45	Input from BCC-internal City Design teams on camera and/or signage design cause delay	Communication s / stakeholder challenge		FBC	BCC	M	M	M	M	4.00	2019	Reduce	Seek to design scheme with less chance of opposition. Consult early. Seek political support	20/09/2019	Open	L	L	L	L	1.00		12.5%				1	3	2	10.0	
46	Risk 46	Input from external civic society / conservation group / design groups on camera and/or signage design cause delay	Communication s / stakeholder challenge		FBC	BCC	M	M	M	M	4.00	2019	Reduce	Seek to design scheme with less chance of opposition. Consult early. Seek political support, and have robust communications and stakeholder plan.	20/09/2019	Open	L	L	L	L	1.00		25.0%				1	3	2	75.0	
47	Risk 47	Need to undertake additional consultation work to reflect scheme refinement	Communication s / stakeholder challenge		OBC	BCC	M	H	H	H	8.00	2019	Reduce	Programme additional consultation work	20/09/2019	Open	L	M	M	L	1.67		25.0%				3	6	4	75.0	
48	Risk 48	Lack of clarity in scope of what is to be procured (e.g. back office systems / signs)	Procurement		OBC	BCC	H	H	M	H	8.00	2019	Reduce	Be clear on the scheme, so the scope of the system can also be clear. Agree scope with all stakeholders, including Smart Cities and Highway Signage teams. Accept the CAZ can't upgrade all existing systems and signs	20/09/2019	Open	L	M	L	M	2.67		12.5%				1	3	2	5.0	
49	Risk 49	Delays in approvals from Procurement Boards for cameras, back office systems and/or signage, including soft market testing, benchmarking, equalities and sustainability elements	Procurement		FBC	BCC	M	H	M	H	7.00	2019	Reduce	Start discussions on procurement process early. Get early agreement to progress procurement, agree route and timescales.	20/09/2019	Open	L	M	L	M	2.67		25.0%				1	4	3	75.0	
50	Risk 50	Delays in procuring approved ICT hardware, e.g. secure managed network switches.	Procurement		FBC	BCC	L	M	M	M	3.33	2019	Reduce	Agree scope early with BCC ICT. Use existing approved hardware where possible. Try to avoid 'gold plating' the solution.	20/09/2019	Open	L	L	L	L	1.00		25.0%				1	4	3	75.0	
51	Risk 51	Unsuccessful contractors challenge procurement process	Procurement		FBC	BCC	M	M	M	M	4.00	2019	Reduce	Follow a robust procurement process and be clear on what is being asked and how it will be marked. Seek early input from Procurement teams.	20/09/2019	Open	L	L	L	L	1.00		25.0%				1	4	3	75.0	
52	Risk 52	No clear plan or budget for decommissioning on street equipment when not required anymore	Procurement		OBC	BCC	M	L	L	M	2.67	2019	Reduce	Plan for decommissioning, including a suitable budget with protections to ring-fence it.	20/09/2019	Open	L	L	L	L	1.00		5.0%				1	3	2	2.5	
53	Risk 53	Procurement of signs for neighbouring local authorities / HE – not covered by lot 7 of the BCC Framework. Will need a procurement route	Procurement		OBC	BCC	M	L	M	H	5.00	2019	Reduce	Engage with HE and neighbouring LAs to agree procurement routes	20/09/2019	Open	L	L	L	M	2.00		12.5%				1	3	2	10.0	
54	Risk 54	The impact of hybrid option is unacceptable requiring switch off	Political		Operation	BCC	H	H	H	M	6.00	2019	Reduce	Ensure modelling is robust. Seek political support. Comprehensive communications package to explain the scheme and mitigating measures.	20/09/2019	Open	L	L	L	L	1.00		50.0%				3	6	5	110.0	
55	Risk 55	Cabinet does not approve OBC, resulting in delay	Political		OBC	BCC	M	H	H	M	5.33	2019	Reduce	Seek early political support. Ensure the OBC is robust.	20/09/2019	Open	L	M	M	L	1.67		12.5%				3	6	3	110.0	
56	Risk 56	Financial Uncertainty associated with Brexit	Political		FBC	BCC	M	M	M	M	4.00	2019	Accept	n/a	20/09/2019	Open	M	M	M	M	4.00		25.0%				2	4	3	110.0	
57	Risk 57	Hybrid scheme refinement required to ease implementation	Political		FBC	BCC	H	H	H	H	9.00	2019	Reduce	Seek political support. Ensure a range of complementary measures to offer alternatives	20/09/2019	Open	M	M	M	M	4.00		25.0%				3	8	6	110.0	
58	Risk 58	General election	Political		OBC	BCC	M	M	M	M	4.00	2019	Accept	n/a	20/09/2019	Open	M	M	M	M	4.00		25.0%				3	8	6	110.0	
59	Risk 59	Conflicts with mayoral election pre-election period	Political		Implementation	BCC	M	M	M	M	4.00	2019	Reduce	Plan programme to take into account pre-election period. Seek early advice on what can and cannot happen in pre-election period.	20/09/2019	Open	L	L	L	M	2.00		25.0%				2	4	3	75.0	
60	Risk 60	Impact of local authority pre-election period on the consenting programme	Political		Implementation	BCC	M	M	M	M	4.00	2019	Reduce	Plan programme to take into account pre-election period. Seek early advice on what can and cannot happen in pre-election period.	20/09/2019	Open	L	L	L	M	2.00		25.0%				2	6	3	75.0	
61	Risk 61	Change in political leadership may mean a change in direction	Political		Implementation	BCC	M	M	M	M	4.00	2019	Accept	n/a	20/09/2019	Open	M	M	M	M	4.00		50.0%				3	8	6	110.0	
62	Risk 62	Proposed exemptions not politically acceptable	Political		OBC	BCC	M	H	H	M	5.33	2019	Reduce	Early consultation on exemptions.	20/09/2019	Open	L	M	M	M	3.33		25.0%				0.5	2	1	10.0	
63	Risk 63	Exemptions do not deliver overall legal compliance	Political		OBC	BCC	M	M	H	M	4.67	2019	Reduce	Take into account in the modelling different exceptions so there is an evidence base. Try to keep exemptions realistic.	20/09/2019	Open	L	L	M	L	1.33		12.5%				0.5	2	1	10.0	
64	Risk 64	Mechanism of objecting to TROs used to delay scheme/object to the scheme as a whole	Political		Implementation	BCC	M	M	M	H	6.00	2019	Reduce	Seek political support. Have an effectively publicity and communications package to promote the positive benefits of the CAZ and alternatives.	20/09/2019	Open	L	L	L	M	2.00		25.0%				3	8	6	110.0	
65	Risk 65	Differences in political opinions with neighbouring authorities affect joint working	Political		FBC	BCC	M	M	M	M	4.00	2019	Reduce	Early engagement with neighbouring authorities at both political and officer levels.	20/09/2019	Open	M	M	M	L	2.00		12.5%				0.5	2	1	10.0	
66	Risk 66	Impact on businesses used to delay scheme/object to the scheme as a whole	Political		OBC	BCC	H	H	H	H	9.00	2019	Reduce	Seek political and business community support. Have an effectively publicity and communications package to promote the positive benefits of the CAZ and complementary measures.	20/09/2019	Open	M	M	M	M	4.00		12.5%				0.5	2	1	10.0	
67	Risk 67	Pressure from various interest groups (e.g. conservation areas, civic design)	Political		OBC	BCC	M	M	M	H	6.00	2019	Reduce	Seek political and interest group support. Have an effectively publicity and communications package to promote the positive benefits of the CAZ and complementary measures. Design scheme and infrastructure to reduce anticipated impacts	20/09/2019	Open	L	L	L	M	2.00		30.0%	5	50	25					
68	Risk 68	Delays in funding / insufficient funding from JAQU	Financial		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Good liaison with JAQU	20/09/2019	Open	L	L	L	L	1.00		25.0%				2	4	3	75.0	
69	Risk 69	Delays in obtaining JAQU funding for Clean Air Fund	Financial		FBC	BCC	L	L	L	L	1.00	2019	Reduce	Good liaison with JAQU	20/09/2019	Open	L	L	L	L	1.00		10.0%				1	6	3	10.0	
70	Risk 70	Budget allocated for installation of signage in other LAs or on HE network is insufficient	Financial		FBC	BCC	M	M	H	M	4.67	2019	Reduce	Early design and costing work on signage. Need to agree signage on HE and other LA network, and also agree procurement route(s)	20/09/2019	Open	L	L	M	L	1.33		40.0%				0.5	2	1	10.0	
71	Risk 71	Handling of financial payments – payment processors etc – cause delay	Financial		FBC	BCC	M	M	H	H	7.00	2019	Reduce	Work with JAQU re central portal. Agree with BCC finance how this will work and what monies gets paid to whom, when and how.	20/09/2019	Open	L	L	M	M	2.67		10.0%				0.5	3	1	10.0	
72	Risk 72	Vandalism of on-street equipment hits revenue budgets and reduces income and effectiveness	Financial		Implementation	BCC	M	M	M	M	4.00	2019	Reduce	Design and specify on street equipment that is robust and out of reach of all expected vandalism	20/09/2019	Open	L	L	L	L	1.00		25.0%	75	150	120	0.25	1	0.5	10.0	
73	Risk 73	Payment for works required in neighbouring authorities / HE areas not made in timely manner	Financial		Implementation	BCC	M	L	L	M	2.67	2019	Reduce	Agree contractual terms with neighbouring authorities and HE early	20/09/2019	Open	M	L	L	L	1.33		10.0%				0.5	2	1	50.0	
75	Risk 75	Impact of utilities on cost of signs and poles / cost of new utility supplies and/or diversions.	Financial		FBC	BCC	H	H	H	H	9.00	2019	Reduce	Robust design work including searches. Plan and order new utility supplies early. Have a sufficient budget for utilities including diversions.	20/09/2019	Open	M	M	M	M	4.00		75.0%	5	50	15					
76	Risk 76	Risk of insolvency of suppliers	Financial		Implementation	BCC	H	H	H	M	6.00	2019	Reduce	Robust procurement process including supplier assessment including financials. Need to take into account suppliers over-stretching themselves on similar schemes elsewhere. Use of financial bonds where appropriate.	20/09/2019	Open	M	M	M	L	2.00		10.0%				1	6	3	10.0	
77	Risk 77	System(s) could fail and/or be unavailable (both locally and nationally) potentially causing delays and/or confusion, with an increase in enquiries to BCC and possibly an increase in complaints	Technical / Design		Operation	BCC	M	M	H	M	4.67	2019	Reduce	Robust assessment of potential suppliers during tender process including back office systems and support. Ensure that effective error-handling and fail-over processes are included as part of the detailed technical design for end-to-end processes across all systems. Load-testing of systems to ensure resilience. Build system availability SLAs into supplier contracts, with appropriate penalties for non-performance. Ensure robust contract management processes are in place.	07/10/2019	Open	L	L	M	L	1.33		5.0%				0.5	2	1	5.0	

No.	Risk Ref	Description	Category	Sup port	Stage at which Risk occurs	Mitigation owner	Cost	Time	Perf	Rating	RAG	Proximity (date)	Approach Avoid, Accept, Reduce, Transfer	Mitigation Measures	DATE OF UPDATE	Status	Cost	Time	Perf	Rating	RAG	Reason for closure & comments	Likelihood (%)	Min (Ek)	Max (Ek)	Likely (Ek)	Min (mths)	Max (mths)	Likely (mths)	Delay Cost (Ek)/Month	
78	Risk 78	Lack of knowledge in all organisations (BCC, Jacobs, JAQU, DIT etc), or inability to respond in timely manner.	Technical / Design		OBC	BCC	M	M	M	M	4.00	2019	Reduce	Engage with the right people / teams early, including enforcement, procurement, smart cities and ICT. Also with external organisations. Flag up early if there are concerns about lack of knowledge to address early.	20/09/2019	Open	L	L	L	L	1.00		10.0%				1	3	2	10.0	
80	Risk 80	DVLA database not available when required.	Technical / Design		OBC	BCC	M	H	H	H	8.00	2019	Reduce	Work with JAQU and DVLA to understand availability of test environments and their test plans, as well as their implementation and roll-out plans	07/10/2019	Open	M	M	M	L	2.00		10.0%				1	6	2	10.0	
83	Risk 83	JAQU doesn't provide the required Payment Portal in the required timescale	Technical / Design		Implementation	BCC	M	M	H	H	7.00	2019	Reduce	Continue working with JAQU	20/09/2019	Open	M	M	M	M	4.00		5.0%	1	50	20					
84	Risk 84	JAQU doesn't provide the required Taxi and Private Hire database in the required timescale	Technical / Design		Implementation	BCC	M	M	H	H	7.00	2019	Reduce	Continue working with JAQU	20/09/2019	Open	M	M	M	M	4.00		5.0%				1	6	3	10.0	
85	Risk 85	JAQU doesn't provide the required public vehicle checker website in the required timescale	Technical / Design		Implementation	BCC	M	M	H	H	7.00	2019	Reduce	Continue working with JAQU	20/09/2019	Open	M	M	M	M	4.00		5.0%				1	6	3	10.0	
86	Risk 86	The Approved Enforcement Device enforcement mechanism not in place when scheme opens	Technical / Design		Operation	BCC	M	M	H	H	7.00	2019	Reduce	Early work on specification and procurement, as well as technical elements such as on-street infrastructure and power supplies	20/09/2019	Open	M	M	H	L	2.33		10.0%				1	6	3	15.0	
87	Risk 87	The Approved Enforcement Device design takes longer, or costs more, than anticipated	Technical / Design		FBC	BCC	M	M	H	M	4.67	2019	Reduce	Early work on specification and procurement of AEDs. Need realistic cost estimates and contingency. Ensure no scope creep.	20/09/2019	Open	L	L	M	L	1.33		5.0%				0.5	6	1	10.0	
88	Risk 88	The signage design takes longer than anticipated	Technical / Design		FBC	BCC	M	M	H	M	4.67	2019	Reduce	Early work on specification and procurement of signage. Need realistic cost estimates and contingency. Ensure no scope creep.	20/09/2019	Open	L	L	M	L	1.33		5.0%				0.5	6	1	7.0	
89	Risk 89	The signage is hard to design accurately for every site in terms of preliminaries	Technical / Design		FBC	BCC	M	M	M	H	6.00	2019	Accept	Need a large allowance of time and budget for contingency for signage.	20/09/2019	Open	M	M	M	H	6.00		70.0%	1	75	10	1	6	2	2.0	
90	Risk 90	The on-street power supply design takes longer, or costs more, than anticipated	Technical / Design		FBC	BCC	H	H	H	H	9.00	2019	Reduce	Early work on specification and procurement of on-street power. Need realistic cost estimates and contingency. Agree early and be clear on requirements for cabinets, earthing, circuit breakers, testing	20/09/2019	Open	M	M	M	M	4.00		50.0%				1	3	2	12.0	
91	Risk 91	Structural strength of lamp-columns not able to be ascertained – resulting in more new free-standing poles being required	Technical / Design		FBC	BCC	M	H	H	H	8.00	2019	Reduce	Early engagement with street lighting teams on requirements to understand which can and cannot be used.	20/09/2019	Open	L	M	M	M	3.33		30.0%	1	12	6					
92	Risk 92	The ICT system design takes longer, or costs more, than anticipated	Technical / Design		FBC	BCC	M	H	H	H	8.00	2019	Reduce	Creation of Enabling Technology project with a BCC Solution Architect to be assigned to project team. Early engagement with ICT team and identification of suitable resource	07/10/2019	Open	L	M	M	M	3.33		50.0%				1	6	3	20.0	
93	Risk 93	The ICT system design requires more internal ICT approvals and/or requirements e.g. ICT security, than anticipated	Technical / Design		FBC	BCC	M	H	H	H	8.00	2019	Reduce	Creation of Enabling Technology project with a BCC Solution Architect to be assigned to project team. Early engagement with ICT team on requirements including comms, networks, security	07/10/2019	Open	L	M	M	L	1.67		10.0%				0.5	2	1	10.0	
95	Risk 95	Delays in the availability of the highway for CAZ street-works due to new network management arrangements and highway booking from April 2020. Other utilities may have made their reservations first.	Construction		Implementation	BCC	M	H	H	H	8.00	2020	Reduce	Need early programme of works and book in as soon as possible. Allow some time contingency in programme for delays	20/09/2019	Open	L	M	M	L	1.67		10.0%				1	3	2	10.0	
97	Risk 97	The Approved Enforcement Device supply and installation takes longer, or costs more, than anticipated due to competing priorities for contractors	Construction		Implementation	BCC	M	M	M	H	6.00	2020	Reduce	Early specification and procurement. Ensure project programme has sufficient time for the expected competing priorities. Seek procurement advice on use of non-performance rebates etc.	20/09/2019	Open	L	L	L	M	2.00		30.0%				1	6	3	10.0	
98	Risk 98	The communication system implementation takes longer, or costs more, than anticipated due to a new BCC contractor for fibre and cameras	Construction		Implementation	BCC	M	M	M	M	4.00	2020	Reduce	Early design and specification of fibre (if required) and cameras / camera mountings. Use mobile comms (4G etc) instead of fixed comms to reduce required infrastructure. Possibly use Dynnig if required.	20/09/2019	Open	L	L	L	L	1.00		15.0%				1	6	2	10.0	
99	Risk 99	The signage implementation takes longer than anticipated due to competing priorities for contractors	Construction		Implementation	BCC	M	M	M	H	6.00	2020	Reduce	Early specification and procurement. Ensure project programme has sufficient time for the expected competing priorities. Seek procurement advice on use of non-performance rebates etc (if possible in existing procurement contract for signage)	20/09/2019	Open	L	L	L	M	2.00		30.0%				1	6	3	10.0	
100	Risk 100	The on-street power supply implementation takes longer, or costs more, than anticipated due to competing priorities for contractors	Construction		Implementation	BCC	M	M	M	H	6.00	2020	Reduce	Early specification and procurement. Ensure project programme has sufficient time for the expected competing priorities. Seek procurement advice on use of non-performance rebates etc (but unlikely for on-street power)	20/09/2019	Open	L	L	L	M	2.00		30.0%				1	6	3	10.0	
101	Risk 101	The ICT system implementation takes longer, or costs more, than anticipated due to competing priorities for contractors	Construction		Implementation	BCC	M	M	M	H	6.00	2020	Reduce	Early specification and procurement. Ensure project programme has sufficient time for the expected competing priorities. Seek procurement advice on use of non-performance rebates etc (but unlikely for ICT system)	20/09/2019	Open	L	L	L	M	2.00		5.0%				1	6	2	20.0	
102	Risk 102	Construction risks associated with built environment, such as unknown geotechnical, environmental	Construction		Implementation	BCC	L	L	M	M	2.67	2020	Reduce	Possible staged implementation to reflect construction issues when identified	20/09/2019	Open	L	L	L	L	1.00		15.0%	5	30	10					
105	Risk 105	Multiple LA tenders mean small number of suppliers too busy to submit, or take a commercial decision not to tender as small potential return, or a lack of resources.	Procurement		Procurement	BCC	M	H	M	H	7.00	2019	Reduce	Ensure market know the scale and scope of BCC project. Ensure contracts have robust penalty clauses for late delivery	01/10/2019	Open	M	M	M	M	4.00		25.0%				1	4	3	75.0	
106	Risk 106	Current contract for the BCC back-office system is only in place until the end of 2020, with the option to extend for a further 2 years - if this contract is re-procured and a new solution is selected, within the life-time of CAZ operating, there are likely to be additional costs incurred.	Procurement		Procurement	BCC	M	M	M	M	4.00	2019	Reduce	Further discussions are needed to identify the appropriate mitigation measures, as several options are possible. Commitment to combine Bus Lane Enforcement and CAZ procurement.	10/10/2019	Open	L	L	L	L	1.00		10.0%				1	3	2	20.0	