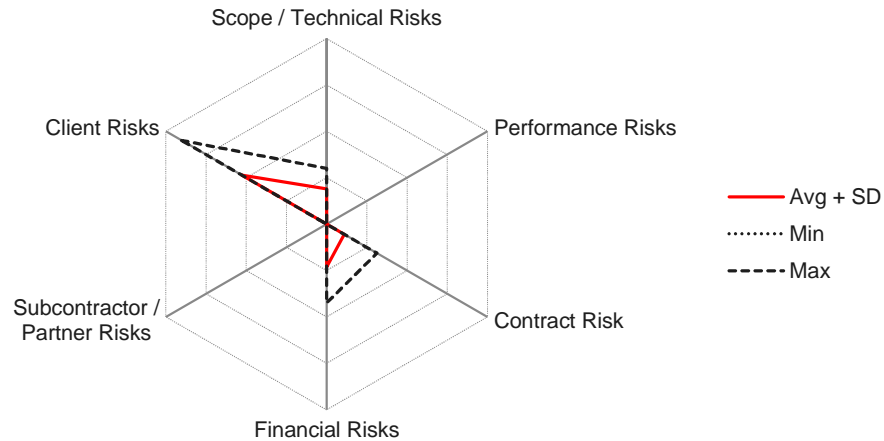


Project name	A4 Portway OBC
Discipline	Transport
Design Stage	Concept Design
Client PM	Toby Clayton
Discipline Lead	Martin Trevor
RR Description	QCRA
Date / Version	29/11/2023

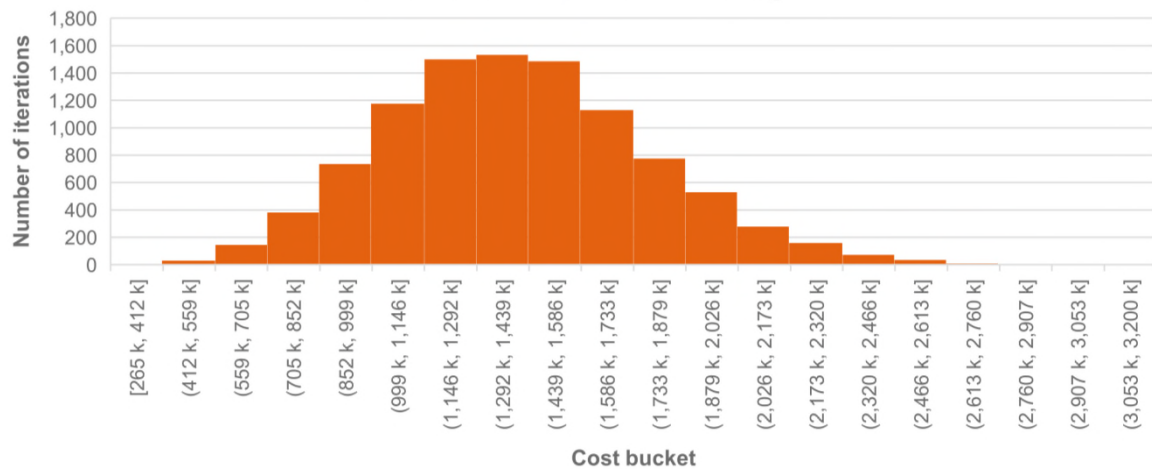


Complex Risk & Opportunity Register

Key Project Risk Areas



Monte Carlo Simulation - Histogram



Monte Carlo Simulation - p Values

	P50	P60	P70	P80	P90	P100
Scope / Technical Risks	268,712	296,687	326,617	361,645	410,222	600,000
Performance Risks	-	-	-	-	-	-
Contract Risk	83,380	118,099	155,245	198,718	259,007	625,000
Financial Risks	262,052	312,306	366,073	428,998	516,263	850,000
Subcontractor / Partner Risk	-	-	-	-	-	-
Client Risks	795,421	861,011	931,184	1,013,310	1,127,204	1,805,000
Opportunities	-	-	-	-	-	-
Aggregate of MC Result	1,409,565	1,503,415	1,603,824	1,721,335	1,884,303	3,200,000

Complex Risk & Opportunity Register

The purpose of this document is to provide a template for a more robust evaluation of project risks.

Project name	A4 Portway OBC
Discipline	Transport
Design Stage	Concept Design
Client PM	Toby Clayton
Discipline Lead	Martin Trevor
Risk Register Description	QCRA
Date / Version	29/11/2023

Run Monte Carlo / Update Sheet

Restore Probability Formulas

Data Quality Check

No errors found, all set.

View Monte Carlo Results

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Issue #	Category *	Risk	Detailed description	Start date	Resolution date	Risk Owner	Mitigating actions	Likelihood	Outcome 1 - Reasonable Worst Case			Outcome 2 - Most Likely Case			Outcome 3 - Best Case			Status (Open/Closed)
									[1] Prob (%)	[1] Cost (\$)	[1] Assumptions	[2] Prob (%)	[2] Cost (\$)	[2] Assumptions	[3] Prob (%)	[3] Cost (\$)	[3] Assumptions	
1	Client Risks	Construction	Insufficient funding for whole project as the cost of construction increases due to scope creep				More accurate cost forecasts to be completed in the FBC to refine the scheme cost. BCC to explore additional funding avenues from other sources and also identify any potential underspend on other programme activities	Medium	7.5%	- Risk duplicated below	32.5%	- Risk duplicated below	20.0%	- Risk duplicated below				Open
2	Client Risks	Programme	Delays in the construction period result in the project completion date extending beyond the CRSTS funding window				Strong schedule adherence techniques to be used throughout the project lifecycle to ensure that milestone dates are met in advance of the construction period. BCC to seek advice from BCC Engineering Design team on the construction schedule to refine during the business case process. Early engagement with civils contractor when tender awarded to build construction programme. Early warning system to be implemented with the civils contractor	Medium	7.5%	- No additional cost to the project	32.5%	- No additional cost to the project	20.0%	- No additional cost to the project				Open
3	Contract Risk	Construction	Insufficient capacity in the civil contractors supply chain to complete the project				All potential civil contractors will be subjected to a rigorous tender evaluation process whereby they must demonstrate that they can fulfil the materials, supplies and resource requirements of the project. Project team to explore options to include contract bonds to add resilience to the contract	Unlikely	2.5%	100,000 Potential inflationary increases	10.0%	60,000 Potential inflationary increases	5.0%	- No inflationary increases				Open
4	Financial Risks	Design	Project cannot secure assigned funding through the WECA Grant Assurance & Business Case process. This could be for reasons including lack of suitability with the DIT's TAG / WECA's Grant Assurance guidance on appraisal, or the project is not transformational enough to realise clear benefits at BCR ratio of 2:1. This risk could incur programme delays to key milestones as further time is required to understand project benefits, additional cost could also be incurred as a result of this programme extension				The DIT's TAG and WECA's guidance on appraisal is not within the controls of the project. Ongoing engagement between WECA and the project team about the business case and to ensure early identification of any issues with the BCR. Arcadis to develop strong strategic narrative within the business case and emphasis to be placed on the alignment with the policy and strategy. Risk built into the programme to cover delays to the WECA Grant Assurance process	Medium	7.5%	200,000	32.5%	100,000	20.0%	50,000				Open
5	Contract Risk	Programme	Political approval process might take longer than allowed for in the programme, which could incur programme delays				Project to start briefings to politicians early and maintain a high frequency. Regular updates will be scheduled with the Cabinet Member for Transport and Mayor's Office at key points through-out the project. Potentially controversial, or sensitive elements of scheme will be highlighted from outset. Risk has been built into the programme as a contingency to a longer political approval process.	Unlikely	2.5%	40,000	10.0%	20,000	5.0%	10,000				Open
6	Client Risks	Design	Lack of stakeholder support for proposals (taxi forum, The Disability & Equality Forum etc.) - could impact on the programme of the project through design amendments.				Stakeholder Engagement Plan to be drafted by BCC Engagement Team. Residents and key stakeholders to be engaged early to account for their views within the design process. Residents and Key Stakeholders will then be presented with concept designs at public consultation, where they can register their level of support for the concept designs. Feedback at consultation has been relatively positive, amendments appear minor which can be considered by the design team within the programme	Unlikely	2.5%	75,000 Allowance for design changes	10.0%	50,000 Allowance for design changes	5.0%	30,000 Allowance for design changes				Open
7	Client Risks	Programme	Optioneering process leads to the progression of potentially controversial measures that generate large public opposition. Risk of BCC officer time being consumed by consultation and public responses that results in delay.				Work closely with Bristol City Council Engagement team through-out early engagement, public consultation, and statutory consultation, and with the BCC Comms team, to ensure stakeholders and residents fully understand the aims, objectives, and reasons for the project. Accommodate any reasonable requests emerging from consultation where these do not impact on the aims of the project. Communicate with BCC Engagement Team to understand the resource demands of engagement and consultation to effectively direct resources. Following consultation it appears that the outbound bus lane is not favoured, the project team will consider narrative within the business case to demonstrate why the bus lane is required	Low	5.0%	50,000	15.0%	25,000	10.0%	15,000				Open
8	Client Risks	Programme	Internal priority conflicts over transport projects emerges then the A4 Portway may become delayed whilst other projects are prioritised. This could cause delay to the programme				Work closely with other BCC PM's to ensure a wider understanding of priorities in service area. Utilise internal processes to plan priorities and escalate issues as appropriate. Regularly update the project programme to ensure accurate reporting and flagging of any issues in the Monthly Highlight Report. BCC PM's bi-weekly meeting and the bi-weekly meeting with the WECA programme manager to be used to identify any conflicts and / or issues	Low	5.0%		15.0%		10.0%					Open

Complex Risk & Opportunity Register

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Design Stage	Concept Design
Client PM	Toby Clayton
Discipline Lead	Martin Trevor
Risk Register Description	QCRA
Date / Version	29/11/2023

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9	Contract Risk	Construction	Inadequate Traffic Management during the construction process could lead to reduced road safety, increased highway user complaints, need to implement additional Temporary Traffic Management measures. Risk of officer time being taken up by complaints, and increased cost of TTM				BCC PM to hold conversations with internal BCC network management officers to agree acceptable TTM prior to tender process going live. BCC PM to liaise with BCC Eng Design (or design team if other) to ensure adequate TTM plans have been included as part of the tender, and that TTM plans adhere to relevant legislation. Signalled crossings will be maintained to uphold road user safety.	Unlikely	2.5%	80,000	Cost of additional TM measures	10.0%	75,000	Cost of additional TM measures	5.0%	25,000	Cost of additional TM measures	Open
10	Financial Risks	Construction	Uncertain future economic conditions may result in an increase to the cost of, labour, raw materials, and supplies. Uncertain market conditions may dictate the demand for materials, labour, and supplies which could result in long lead-in times, programme delays, and rising project costs				Through the tender process, ensure that all parties that have submitted a bid are able to resource and supply the work in the given timescales. RPI increase to be accounted for within the economic and financial cases of the business case, contingency derived from a QRA to be placed on construction costs. Inflation to be included within the business case.	High	10.0%	-	Captured in inflation %	50.0%	-	Captured in inflation %	30.0%	-	Captured in inflation %	Open
11	Client Risks	Design	If the WERTM model experiences delay with the validation testing of the future scenarios, the programme for the business case may also suffer slippage as alternative modelling approach will have to be adopted				BCC PM to maintain engagement with WECA to monitor the likelihood of the WERTM suffering further delays. BCC PM to arrange a 'Plan B' approach to business case appraisal and modelling, that is supported by WECA Grant Assurance. BCC PM to approach PMs of other corridor schemes that have been through the Outline Business Case process to understand their approach to appraisal, and use these examples to formulate an alternative approach to the appraisal of the A4 Portway, that could be included in the ASR. WERTM no longer being used to produce the outputs for appraisal on the OBC. Early engagement with the WERTM team to line up resource for the FBC modelling	Medium	7.5%	50,000		32.5%	30,000		20.0%	20,000		Open
12	Client Risks	Programme	High volume of decisions being taken through the BCC Decision Pathway could result in delays when seeking approvals at various gateways in the project (e.g. OAR, ASR). Project delay will also incur a cost based on increased resource time.				BCC PM to update the Cabinet Member for Transport and Mayor's Office monthly via email, emails to include communication regarding programme update and when decisions will need to be made. BCC PM to back on to the BCC Decision Pathway well in advance of meetings to ensure the agenda spots are not filled up by other projects. BCC PM to obtain decisions via email where possible to decouple the A4 Portway project from the Key Decision meeting cycles. Average daily cost of resource time calculated for the project which will be made apparent to key decision makers if holding up the project for significant amount of time.	Medium	7.5%	75,000		32.5%	50,000		20.0%	30,000		Open
13	Client Risks	Construction	The OBC being ready for the CA Joint Committee is close to a committee cycle meeting at the end of January 2024. Failure to meet the January 30th 2024 deadline could result in the OBC approvals falling back to the next committee date in March 2024 - incurring a delay on the subsequent FBC tasks				Risk has been built into the programme to allow 3 month contingency for missing the CA deadline / failure to obtain political approvals. Strong programme adherence techniques to be used to ensure sub-deadlines are met in the build up to the submission of the OBC. Key stakeholders to be engaged with updates and at decision making points to ensure the timely progression of tasks	Medium	7.5%	50,000		32.5%	30,000		20.0%	15,000		Open
14	Client Risks	Programme	The OBC ready for BCC cabinet approvals is close to the PRDA period. Any delay to the OBC tasks causing the OBC issue to be delayed could result in a 6-8 week delay on the programme				Risk has been built into the programme to allow for 3 months contingency for missing the OBC cabinet approvals, as the Cabinet approvals process and WECA CA process are set to be run simultaneously. Key decision makers / stakeholders on the decision pathway are to be kept up to date will all major project updates and where key decisions are required. Decision pathway activities to start whilst finalising the OBC to reduce the risk of missing the cabinet date	Medium	7.5%	100,000		32.5%	50,000		20.0%			Open
15	Client Risks	Programme	Lack of political and administration support on the preferred design options could cause delays which could incur additional costs, and also may warrant re-designs that would incur additional cost				Early and ongoing engagement has been held with the BCC Cabinet member for transport and the administration on the design optioneering process. Each decision making body has been in support of the preferred design options. In advance of seeking approval on the final preliminary designs the specialist BCC teams on the CA consultee list will be consulted for their input on the designs to enhance the quality of the designs and BCC PM to arrange coring samples to get a better understanding of the carriageway make up. Actions can then be taken with regards to the design and construction methodology to mitigate against contaminated highway. Cost to be included in cost	Medium	7.5%	50,000		32.5%	30,000		20.0%	15,000		Open
16	Scope / Technical Risks	Construction	Make up of the carriageway is poor and contains contaminated material which could alter the scope of the scheme and could incur large costs of handling contaminated material during construction. Risk of changes to scope and time /				Early and ongoing engagement has been held with the BCC Cabinet member for transport and the administration on the design optioneering process. Each decision making body has been in support of the preferred design options. In advance of seeking approval on the final preliminary designs the specialist BCC teams on the CA consultee list will be consulted for their input on the designs to enhance the quality of the designs and BCC PM to arrange coring samples to get a better understanding of the carriageway make up. Actions can then be taken with regards to the design and construction methodology to mitigate against contaminated highway. Cost to be included in cost	Medium	7.5%	200,000	Allowance includes coal tar disposal on binder layer and associated programme delay	32.5%	100,000	Allowance includes coal tar disposal on binder layer and associated programme delay	20.0%	50,000	Allowance includes coal tar disposal on binder layer and associated programme delay	Open

Complex Risk & Opportunity Register

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Design Stage	Concept Design
Client PM	Toby Clayton
Discipline Lead	Martin Trevor
Risk Register Description	QCRA
Date / Version	29/11/2023

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17	Client Risks	Construction	Construction not achievable in 18 months with just one site at a time which could cause programme delays that extend beyond the March 2027 funding deadline				Work with Arcadis design team, and seek views from internal design consultants on how best to phase the construction. Phasing of the construction can be done as the project transitions to detailed design and the full business case stage. Multiple sites will need to be constructed simultaneously, tender process to ensure that chosen delivery partner able to resource the work / Early engagement with BCC procurement team to ensure resource is lined up to support the preparation of tender documents and the procurement process. Early engagement with the partner selected to complete the tender process (BCC EngDes or other) to ensure resource available to complete the tender documents and smooth communication with procurement resource. Detailed designs to be developed and the phasing of the works to be complete and packaged up to ensure all information is available to feed into the tender process	Medium	7.5%	100,000		32.5%	75,000		20.0%	50,000		Open
18	Client Risks	Programme	Completion of the tender preparation activity within 3 months could be challenging due to the size of the project - risk of programme delays				Time for risk has been built into the programme on decision pathway activities. Specific activity to seek approval on procuring contractor prior to contractor mobilisation to be built into cabinet report. BCC PM to work with procurement, legal, and other partners to understand what can be granted through the cabinet report approvals and what 'asks' need their own approvals.	Medium	7.5%	50,000		32.5%	30,000		20.0%	15,000		Open
19	Scope / Technical Risks	Construction	failure or delays to secure approvals on spending the funding could cause delay to the contractor mobilisation				BCC PM to have a discussion with the designers preparing the preliminary designs about the time required to prepare the detailed designs. BCC PM to refine the programme for detailed designs and the Full Business Case closer to the commencement of the activity when more information is known from the completion of the OBC and the preliminary designs (utilities etc.). Some detailed design funding has been re-profiled to 23/24 FY so that detailed design tasks can commence at risk	Unlikely	2.5%	50,000		10.0%	30,000		5.0%	20,000		Open
20	Client Risks	Design	Time required for detailed design is above that anticipated in the current programme - extension of the detailed design task could have consequent impact on the programme				It is accepted that there will be requirements for some utility works given the size of the project. Uncertainties around the utilities and the risks are to be reduced through C2,C3,C4 and C5 searches to provide certainty to designs and cost.	Medium	7.5%	75,000		32.5%	50,000		20.0%	30,000		Open
21	Client Risks	Design	The completion of the detailed design task is dependent on the utility searches and the NRSWA 1991 returns gathered as part of the design process. Extensive utility infrastructure could result in large amounts of detailed design work to be completed to run diversions resulting in programme delays and cost increases				BCC PM to build task into the program for obtaining the streetspace. Permits to be obtained at least 3 months in advance of the works starting, longer for larger projects. PAA's to be registered when there is confidence around the construction dates to give the network and highways team a heads up. Permits may have to be completed by the client PM	Medium	7.5%	750,000		32.5%	350,000		20.0%	200,000		Open
22	Client Risks	Programme	Failure to obtain permits to work on the highway could result in the road space being booked up by other agencies wishing to work on the highway (e.g. utilities). The impact would be a delay to the programme				BCC PM to liaise with BCC procurement, senior officers, and decision makers on the programme to provide them with an early warning that the construction period starting. As soon as chosen contractor selected BCC PM to raise the PO and engage with finance, procurement, senior officers to ensure smooth passage through the PO approvals process.	Unlikely	2.5%	75,000		10.0%	50,000		5.0%	30,000		Open
23	Client Risks	Programme	Failure to raise the contractor PO in a timely manner could delay the start of the contractor mobilisation period and consequently impact the milestones thereafter				it is accepted that there will be delay and a reduced resilience of the network / route during the construction period. Early engagement with network management team will take place to ensure that all TM and phasing is appropriate and allow traffic to continue to flow, phasing designs to be produced alongside the detail designs before going out to procurement. Working hours can be accounted for to minimise the impact on the network.	Unlikely	2.5%	100,000		10.0%	75,000		5.0%	50,000		Open
24	Client Risks	Programme	Multiple sites and extensive traffic management on the corridor during the construction phase could cause delay to traffic and temporarily reduce the resilience of the network. Resulting in poor provision for all users of the corridor. Unplanned amending and moving TM mid-construction could cause delay to the overall construction completion				Early engagement with the BCC TRO team to provide them with requirements of the scheme and the programme. TROs shared with key stakeholders prior to statutory consultation to understand any big red flags or non negotiables.	High	10.0%	150,000	Increased TM requirements	50.0%	75,000	Increased TM requirements	30.0%	50,000	Increased TM requirements	Open
25	Client Risks	Programme	Delay occurs in the TRO activities, which would impact on the subsequent tasks such as completion of detailed design, procurement, construction etc.				BCC to commission a drainage survey to inform the detailed design. Contingency value added for drainage works during the construction in the QRA whilst the potential impact of this risk is still relatively unknown]	Unlikely	2.5%	50,000		10.0%	30,000		5.0%	15,000		Open
26	Scope / Technical Risks	Design	Drainage surveys show that the drains along the Portway are in poor condition resulting in additional detailed design work, and an increase in scope of construction activities. This could have a large financial impact, and an impact on the scope.					High	10.0%	350,000		50.0%	250,000		30.0%	150,000		Open

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0.75

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27	Financial Risks	Construction	The cost of the drainage survey is more than budgeted for, which could result in the need to draw down more CRSTS funding to complete the survey, reducing the amount of funding available for construction				Early engagement with drainage survey suppliers to understand the cost of drainage survey for the corridor. Engagement with the Highway Maintenance team, flood team, and procurement team to understand and determine the appropriate procurement route	High	10.0%	50,000		50.0%	30,000		30.0%	15,000		Open
28	Financial Risks	Construction	Tender returns for civil contractor are priced higher than anticipated cost estimates which could take the project over the CRSTS amount allocated for the project				Detailed design to be costed up including the costs for the civils, street lighting, signal infrastructure, utilities, Bill of Materials to be used based on the BCC Highways framework prices, Contingency and risk allowance included in the funding request to cover increases in tender returns	Medium	7.5%	600,000		32.5%	350,000		20.0%	120,000		Open
29	Client Risks	Construction	Scope of work increases due to unforeseen issues with utilities and/or other services under the surface of the site.				Prior to the tender period the design will have been subjected to C4 utility searches to understand whether any diversionary works will be needed. These searches should improve our knowledge of the utilities that are affected by the works and reduce the risk finding 'unknown' utilities when the project moves to the construction phase	Medium	7.5%	200,000		32.5%	150,000		20.0%	100,000		Open
30	Contract Risk	Programme	A cable strike may occur during the construction phase. The impact of this risk would be on the programme as a delay to the works would be in place until Health and Safety had cleared the site. Depending on the severity of the cable strike there may also be an impact on cost to repair the cable				Prior to the construction the BCC PM will work with the Design Team to arrange the relevant utility searches up to C5's. Trial pits will be completed prior to the commencement of construction to improve knowledge of utility locations. BCC Highways Electrical Asset Team will produce an electrical design for the project, their involvement will be maintained through-out the design and construction phases of the project. Contractor to bear the cost of a cable strike	Unlikely	2.5%	- Contractors Risk	10.0%	- Contractors Risk	5.0%	- Contractors Risk				Open
31	Contract Risk	Programme	Issues could arise with the chosen contractor, such as they could go bust. This could impact the project programme in terms of finding an alternative contractor, and potentially budget if the alternative contractor is more expensive than the first choice				Work with Design team to prepare the contracts before they are released for tender. BCC PM and Design team to ensure sufficient details on the project are contained in the procurement package so that potential bidders understand the requirements of the project. Each bid submitted will be subjected to a rigorous assessment to ensure that the bid meets the requirements of the contract and that the contractor has the capacity, resources, supplies, and materials to fulfil the works. A contract bond has been included in the cost estimate at 10% of the contract value, that insures the project against any failure to deliver on the contract requirements from the contractor behalf.	Unlikely	2.5%	450,000 Risk of over-valuing works complete to date. Cost of procurement.	10.0%	350,000 Risk of over-valuing works complete to date. Cost of procurement.	5.0%	250,000 Risk of over-valuing works complete to date. Cost of procurement.				Open
32	Client Risks	Programme	Site constraints demand a complex build methodology, which may result in the requirement for additional Temporary Traffic Management measures to be installed. Additional TTM would incur additional cost, and may incur some delay on the construction programme to set up / take down additional TTM				Traffic Management plans will be produced as part of the detailed design leading into the construction package. Phasing diagrams may also be required to break the work down into packages. These will be developed with the design team. Early engagement with the BCC Network Management team over the TM plans to ensure that impact on the network is minimised	High	10.0%	75,000		50.0%	50,000		30.0%	30,000		Open
33	Client Risks	Construction	Geo-technical conditions show an underestimation of the additional earth works and conditions required. Additional cost, and potentially time to be incurred if further geotechnical work required.				Coring samples of the highway have been completed and show that there is tar build up in the bound layers of the highway - this to be considered in detailed design. Cost contingency set aside for any further geo-technical work required	Unlikely	2.5%	75,000		10.0%	50,000		5.0%	30,000		Open
34	Client Risks	Programme	The submission of a late business case could mean that the project misses the target date for BCC Cabinet, and WECA Committee. This risk would cause delay in the programme of the current stage, and also the construction stage. Delays in the programme also have the potential to incur cost implications.				Programme for the project, and the current stage, has been developed. PM to deploy strict programme adherence techniques. Regular review of the programme to identify programme risks and opportunities to accelerate tasks. The programme includes a time contingency to allow for delays in the political approval process.	Medium	7.5%	50,000		32.5%	30,000		20.0%	15,000		Open
35	Client Risks	Construction	The severity of Covid-19 (or other nationally significant event) could increase which may result in additional restrictions and/or reduced resources that may cause impact to the delivery of the project				Early contractor engagement to ensure early programming. Remote work practices have become more established and consequently more efficient. BCC contractor framework requires contractors to increase safety within their working environments - engagement with contractors has assured that covid safe working methods are now established. CDM regulations are to be adhered to through-out the project	Low	5.0%	50,000		15.0%	30,000		10.0%	15,000		Open
36	Client Risks	Construction	Street lighting and / or traffic signal costs escalate due to global material shortages creating instability in pricing. Pricing has been driven up. There is a risk to the cost of the works and potentially the programme if additional time is required during the tender processes to find cost effective alternative supplier				Detailed design will provide a cost, in order to mitigate an appropriate financial contingency will be added. Ongoing engagement with BCC lighting team and Traffic signals for early indication of cost and supply issues. These costs will then be refined as the detail of the design progresses. There is an element of acceptance that the cost of materials and supplies has increased by a large amount with CPI over the past few years	Medium	7.5%	75,000		32.5%	50,000		20.0%	30,000		Open

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37	Client Risks	Construction	Chemical works in Avonmouth (near) COMAH site - Major chemical leak / issue on one of these sites could result in the project having to down tools until the chemical leak has been resolved				Safe working practices and information about chemical spillages included in the construction pack for the chosen contractor. Direct mitigation of chemical spillage risk outside the control of the project team	Low	5.0%	75,000		15.0%	50,000		10.0%	30,000		Open
38	Client Risks	Construction	Other unforeseen contractor compensation events based on changing network requirements				Early conversations with BCC network management team to understand their requirements to maintain network capacity. Also to understand local build requirements, and wider requirements	Medium	7.5%	200,000		32.5%	150,000		20.0%	100,000		Open
39									#N/A			#N/A		#N/A				
40									#N/A			#N/A		#N/A				
41									#N/A			#N/A		#N/A				
42									#N/A			#N/A		#N/A				