

Appendix 4.4

Quantified Cost Risk Assessment Report

QCRA

Staffordshire County Council
Stafford Western Access Route

20th June 2014

QCRA
20th June 2014

Document status					
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1.0 EXECUTIVE SUMMARY

Faithful+Gould have been commissioned by Staffordshire County Council to undertake a structured Risk Update workshop and updated Quantitative Cost Risk Analysis (QCRA) on the Stafford Western Access Improvement Scheme. The output of this will help to inform the Business Case submission.

The objectives of the risk update workshop were to:

- Review the existing risks for validity
- For those that are still valid, review and update the probability and impact assessment, post mitigation only
- Update mitigation actions and owners
- Identify new risks, assess probability and impact, post mitigation only and provide mitigation actions

The workshop reviewed 93 risks which were those identified during the previous workshop held in 2010. Some of these had already been closed, and after this workshop, 14 risks remain open, two of which are only applicable to Section C and therefore outside the scope of the Business Case.

A further review of the risk register was held on 9th June and a subsequent update of the Cost Model was conducted. This Report now reflects the QCRA for the cost model and risk register, not just the risk register.

The resulting Risk Register (included in Appendix A) has been evaluated using a Triangular distribution in the Monte Carlo Risk Model. The results of the risk modelling are shown in the table below:

Confidence Level	Risk Only Exposure	Cost Model Only	Cost & Risk
10%	£17, 980	£31, 465, 145	£32, 004, 247
50%	£633, 328	£32, 378, 343	£33, 065, 195
80%	£1, 006, 709	£33, 003, 181	£33, 829, 569

Table 1: Summary of QCRA Results

2.0 BACKGROUND

In 2013, the Planning Inspector at the Examination into the Plan for Stafford Borough accepted that the full Stafford Western Access Route (as part of a wider package of transport measures) is critical infrastructure needed to deliver the full development requirements of Stafford Town up to 2031. This includes 5,500 new homes, 36ha of new employment provision and 17,400m² retail. Reduced journey times and congestion will allow expansion of economic activity in the town centre (employment, retail and education), enabling the town to thrive. The scheme will also make it possible to downgrade town centre roads and increase provision for sustainable modes. The proposed road is a 7.3 metre wide, two lane, single carriageway road, approximately 1.2km in length between the junction of Martin Drive/Rose Hill and the A34 Foregate Street.

In 2013, the Stafford Western Access Route went through a full prioritisation process of Major Transport Schemes completed by Atkins Consultants on behalf of the Stoke-on-Trent and Staffordshire Local Transport Body (LTB). On the basis of this process, the scheme was identified as a priority in the Strategic Economic Plan (SEP) produced by the Stoke-on-Trent and Staffordshire Local Enterprise Partnership (LEP) for the period 2015/16 to 2020/21.

3.0 PROJECT OBJECTIVES

The three key objectives are as follows:

- To provide high quality transport infrastructure required to deliver development in Stafford
- To reduce congestion on routes into and around the town centre which act as a constraint on regeneration proposals
- To facilitate improved access by sustainable modes between housing growth areas and the town centre. Delivery of the scheme whilst maintaining and/or enhancing environmental quality protection.

The scheme also relates to the following two objectives of Stoke-on-Trent and Staffordshire Strategic Economic Plan (SEP).

- Competitive Urban Centres: to support the sustained economic prosperity of other important urban centres across Staffordshire
- Connected County: to meet market demand for high quality employment and housing sites which are connected to the transport and communications network

4.0 KEY PROJECT DATES

During 2014 and 2015 Staffordshire County Council aims to secure planning permission for the scheme and Local Growth Funds (through the SEP) are expected to be available to acquire the necessary land in 2015/16. The key milestones for the project include:

Critical Path	Completion Date
Review Business Case	July 2014
Programme Entry	July 2014
Environmental Impact Assessment	March 2015
Planning Consent	Nov 2015
Land Acquisition	March 2016
Procurement	Jan 2016
Full Approval	Jan 2016
Scheme delivery – A34 to Doxey Road	Feb 2019
Scheme delivery – Doxey Road to Martin Drive	Feb 2019

Table 2: Key Project Dates

5.0 PROJECT CONSTRAINTS

The table below identifies the key project constraints that the scheme has to operate within:

Project Constraints		
Traffic	Network Rail bridge (there is only one)	Protected species
Corridor for green route	Flood plain	Housing developments
Doxey Bridge	Site of Special Scientific Interest	Statutory undertakers equipment
Land ownership	Highway boundary / tie in points	Budget / funding

Table 3: Project Constraints

6.0 INTERFACES

Project Interfaces	
Internal interfaces	Developers
EA / Natural England	Network Rail
Local Communities	Statutory Undertakers
Member of Parliament	Bus companies
Residents Association	Land owners
Chamber of Commerce	Tenants
LA	Pressure Groups
Staffordshire County Council	Staffordshire Wildlife Trust
Staffordshire Borough Council	

Table 4: Project Interfaces

7.0 PROJECT ASSUMPTIONS / EXCLUSIONS

Project Assumptions / Exclusions
The current Doxey Road rail bridge can be retained with strengthening works (if required)
The rail siding can be removed from operational use to allow the route to pass at grade
The land for Section C will be made available
There will be no requirement to divert some statutory undertakers equipment – Network Rail supply
There will be a requirement to increase clearance on overhead power line
There is limited ground contamination
Growth agenda will go ahead (including Castlefields development)
Planning permission is achieved
Funding is available – central government (LTB / LEP) and developer
Environmental impacts can be mitigated
7.3m carriageway with cycle and pedestrian facilities
Junction designs will be as drawn – traffic model (these have been designed / revisited)
Ground conditions are as assumed – (detailed ground investigation has just taken place)
Compulsory Purchase Order is required
IT improvements are excluded
Procurement may occur in stages

Table 5: Project Assumptions / Exclusions

8.0 METHODOLOGY

A risk workshop was held at Staffordshire County Council, Tipping Street, Stafford on Tuesday 6th May 2014, with the objective of reviewing the risk register and proposing a contingency figure for inclusion in the Business Case for the Stafford Western Access Route. Representatives of the Client and Atkins were present. All participated in the deliberations.

The objectives of the meeting were to:

- Review the existing risk register to validate which risks were still valid
- Identify any new risks
- Propose mitigation actions for all Open risks
- Assess probability and impact assessments for all Open risks, post mitigation only, with assessment justification

Evaluation was conducted using Latin Hypercube analysis, using Primavera Risk Analysis, 10,000 simulations were used. A tornado graph was created to identify the risks that have the most influence on the scheme.

A further update of the Risk Register was completed on 9th June and it is this version of the Register that has been used for Analysis with the revised Cost Model.

9.0 RESULTS

The summary of the outputs can be seen below:

Confidence Level	Risk Only Exposure	Cost Model Only	Cost & Risk
10%	£17, 980	£31, 465, 145	£32, 004, 247
50%	£633, 328	£32, 378, 343	£33, 065, 195
80%	£1, 006, 709	£33, 003, 181	£33, 829, 569

Table 6: Summary of QCRA Outputs

The outputs of the Quantitative Cost Risk Analysis for Risk Post Mitigation and Cost Model are as follows:

Confidence Level	Cost & Risk
10%	£32, 004, 247
50%	£33, 065, 195
80%	£33, 829, 569

Table 7: Summary of QCRA Results Risk and Cost Model

The graph below shows the range of simulated total exposure:

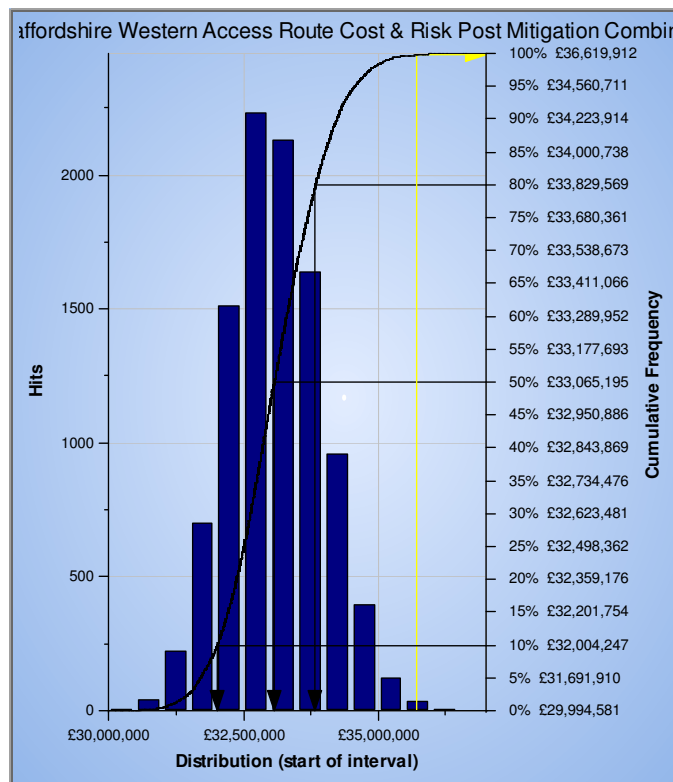


Figure 1 – S Curve, Post Mitigation Risk and Cost Model

The outputs of the Quantitative Cost Risk Analysis for the Risk Register Only Post Mitigation are as follows:

Confidence Level	Risk Exposure
10%	£17, 980
50%	£633, 328
80%	£1, 006, 709

Table 8: Summary of QCRA Results, Risk Only, Post Mitigation

The graph below shows the range of simulated total risk exposures:

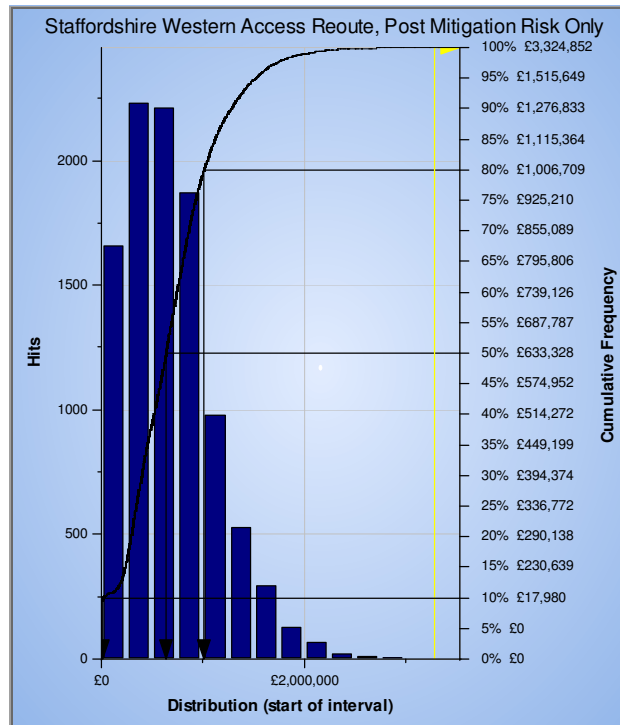


Figure 2 – S Curve, Post Mitigation Risk Only

The following Tornado Chart shows the top 5 risks which have the most significant cost impact to the Scheme:

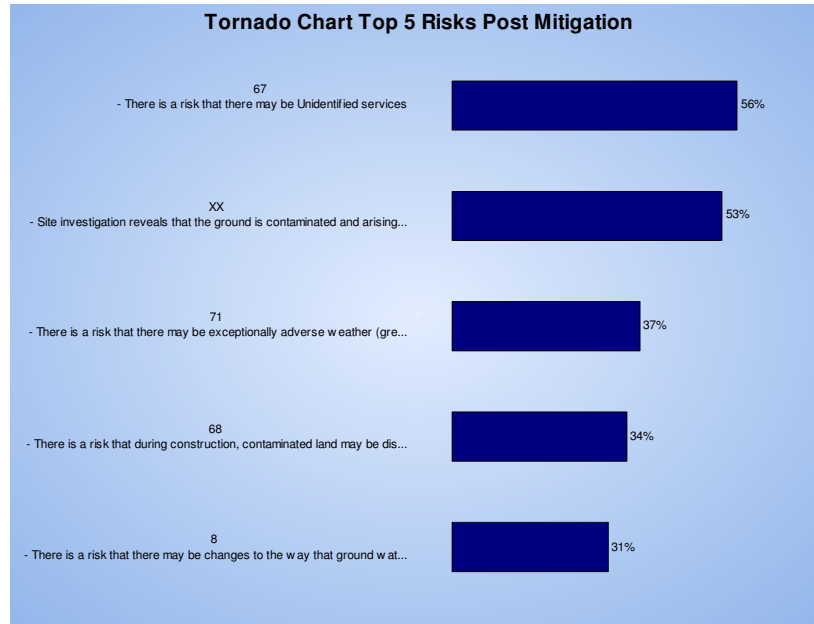


Figure 3 – Tornado Chart, Post Mitigation Risk Only

The outputs of the Quantitative Cost Risk Analysis for the Cost Model only are as follows:

Confidence Level	Risk Exposure
10%	£31,465,145
50%	£32,378,343
80%	£33,003,181

Table 9: Summary of QCRA Results Cost Model Only

The graph below shows the range of simulated total risk exposures:

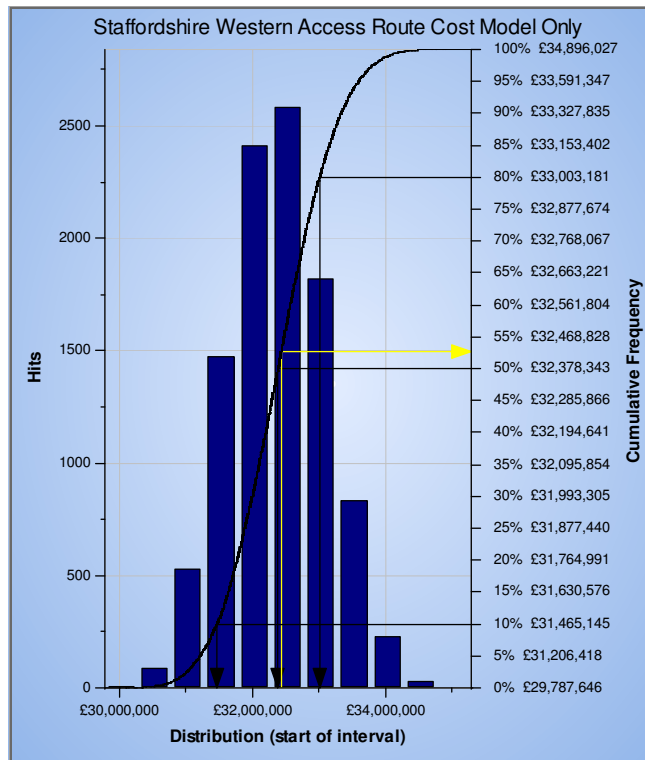


Figure 4 – S Curve, Post Mitigation Risk Only

The following Tornado Chart shows the top 5 cost items which have the most significant cost impact to the Scheme:

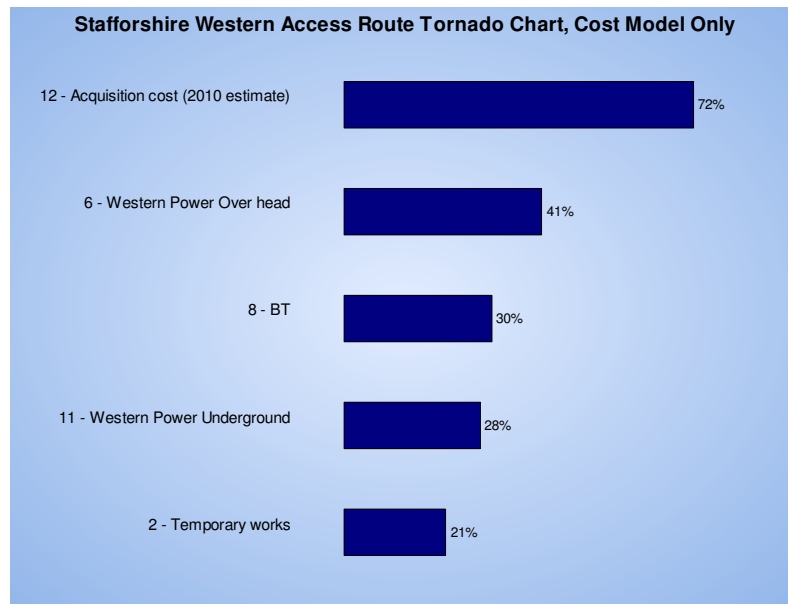


Figure 5 – Tornado Chart, Post Mitigation Cost Model Only

The outputs of the Quantitative Cost Risk Analysis for Risk Post Mitigation and Cost Model are as follows:

Confidence Level	Risk Exposure
10%	£32,004,247
50%	£33,065,195
80%	£33,829,569

Table 10: Summary of QCRA Results Risk and Cost Model

The graph below shows the range of simulated total exposure:

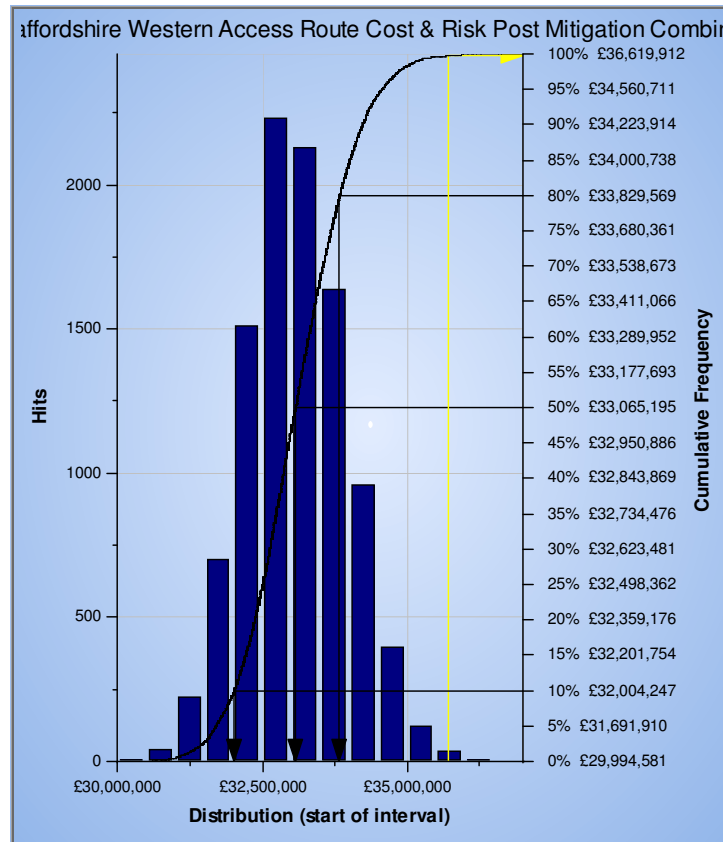


Figure 6 – S Curve, Post Mitigation Risk and Cost Model

10.0 APPENDICES

APPENDIX A - Risk Register as of 6th May 2014

Appendix A
Risk Register as of 6th May 2014

APPENDIX A:

Project Title: Stafford Western Access Route Client: Staffordshire County Council Risk Review Date: 6th May 2014														Major Transport Scheme Outline Business Case		FAITHFUL+GOLD				
Risk ID No	Risk Category	Risk Status	Date Reviewed	Risk Cause	Risk Description	Risk Consequence	Probability	Justification	Cost Impact	Schedule Impact	Action	Current Control Measures	Action Owner	Target Completion Date	Notes					
2	Business Case submission	Open	06/05/2014	Benefit cost ratio (BCR) needs to be 2. Scheme has changed significantly, inc scope and traffic assumptions. Therefore there is uncertainty until the modelling has been completed as to whether the BCR will achieve 2	There is a risk that the Business case may not be accepted for LTB and is postponed to LGF	Programme Entry delay / rework to demonstrate compliance. Money may go into growth fund, and ultimately allocated to another scheme	10%	1 Prob: Achieved 2.7 last time. Taken cost out of the scheme. Traffic growth assumptions are less than originally intended. Cost: If threshold not achieved, need to look at further ways to remove cost from scheme. No cost impact. Time only Time: Dependant on when Local Growth Fund is open. ML - 2 months as most of the work has already been done. 6 months Worst case	0	0	0	0	40	120	DS	1. Work through the process and ensure that everything is included 2. Run the model and assess the variables and how they affect the output	DS	June 2014	06/05/14: Risk valid. If this risk materialises, it will call into question whether the scheme is viable	
6	EIA for planning permission	Open	06/05/2014	In Section C the current developers have already had a license for bats and have already done work under licence - built a new road to replace one that was destroyed. The building that this has been located into needs to be demolished as part of the scheme	Section C - There is risk that Natural England may not issue a licence which will allow continuation of works	Delay whilst licence is discussed/negotiated.	2%	1 NO IMPACT ASSESSMENT PROVIDED AS THIS IS FOR SECTION C Probability: Low as there is plenty of time to negotiate with Natural England. Cost is the cost of consultant putting application together. Timescale is a minimum of 16 weeks, but if turned down	0	0	0	0	40	120	DS	1. Liaise with Natural England re their approach. Design high quality mitigation and enhancement into the scheme. 2. Discuss with Natural England before submission of licence. 3. Survey's need to be scheduled and timing adhered to due to seasonal nature of risk. Licenses to be submitted in line with this and liaise with Section C developers	AG	N/A		
7	EIA for planning permission	Open	06/05/2014	Phase 1 surveys have been undertaken. Low quality land and part of SSSI	There is a risk that there may be a significant population of protected species discovered in Sections A&B	Worse case: Natural England could request change to route, re-present case for mitigation	1%	1 Prob: Due to work already completed and what we know about habitats already there. Cost: Have to reveal other options that are available and what the objections were, how could they be resolved. No Cost impact, would be schedule delay	0	0	0	0	40	120	DS	1. Liaise with Natural England re their approach. Design high quality mitigation and enhancement into the scheme. 2. Discuss with Natural England before submission of licence. 3. Survey's need to be scheduled and timing adhered to due to seasonal nature of risk. Licenses to be submitted in line with this	DS	March 2015	06/05/14: New risk added	
8	EIA for planning permission	Open	06/05/2014	This is a wetlands habitat so height of water table may fluctuate during the year. Current proposed route could impact the SSSI	There is a risk that there may be changes to the way that ground water moves	Redesign of route, review of proposed design e.g. number of piles	2%	1 Prob: The footprint of piled foundation is relatively small in comparison to SSSI. The risk has been designed out as much as possible e.g. no. of piles. Max - 10% of £17m of construction costs. ML - 8%	0	850	1,700	0	0	0	0	DS	1. Hydrological assessment 2. Discuss with internal drainage board and Environmental Agency about water level management and any changes that need to be made 3. Impacts could be managed through water level management	DS	March 2015	06/05/14: Risk developed
35	Land acquisition	Open	06/05/2014		There is a risk that Compulsory Purchase Order (CPO) may not be confirmed for Section C	Land cannot be acquired - redesign.	0	NO IMPACT ASSESSMENT PROVIDED AS THIS IS FOR SECTION C	0	0	0	0	0	0	0	DS	Negotiate with landowner.	RK	N/A	06/05/14: CPO more applicable to Section C. Structure so narrower piece of land required. Section A CPO costs included in cost model
61	Construction	Open	06/05/2014	Previous experience at Reptil Employment Park Scheme	There is a risk that there may be unexploded ordnance	Stop work whilst Ordnance is cleared	1%	1 Prob: Very low. Not an area that was bombed heavily Time: ML - 5 days, Max - 2 weeks for someone to come out, and dispose of it	5	10	15	2	5	10	DS	1. Desktop survey to be conducted	DS	March 2015		

Project Title: Stafford Western Access Route Client: Staffordshire County Council Risk Review Date: 8th May 2014														Major Transport Scheme Outline Business Case														FAITHFUL+GOULD	
Risk ID No	Risk Category	Risk Status	Date Reviewed	Risk Cause	Risk Description	Risk Consequence	Likelihood	Justification	Cost Impact	Schedule Impact	Risk Owner Manager	Current Control Measures	Action Owner	Target Completion Date	Notes														
64	Construction	Open	06/05/2014	Settlement in Stafford which dates to pre Medieval times. There is a very good preserver of archaeological remains	There is a risk that there may be a significant archaeological discovery	Schedule delay whilst investigated.	5%	1 Prob: Historic env records suggest there is a low probability of archaeological remains Cost: Consultant if suite of archaeological sampling. String of sampling Time: Max 6 months, ML 8 weeks, Min 0	0	20	20	0	40	120	DS	Tolerate risk.	DS												
67	Construction	Open	06/05/2014	Utilities not mapped correctly, unclear land ownership	There is a risk that there may be Unidentified services	Extra costs if services need to be moved and associated time delay for diversion	60%	4 Prob: based on previous experience Cost: cost of diversion and cost of claim from contractor for their schedule delay. Max would represent approx. 12 weeks delay. ML - 8 weeks delay. Min - diversion cost Time:	100	500	800			DS	1. Undertake ground survey	DS	Feb 2019												
68	Construction	Open	06/05/2014	Bore holes are representative samples of contamination levels	There is a risk that during construction, contaminated land may be discovered that wasn't identified as part of Site Investigation	Construction will need to be stopped or modified whilst contamination is resolved.	5%	1 Prob: Low, detailed chemical analysis testing Time: 4 week delay @ £50k per week prelims Cost: max - allows for 1,000T to be disposed off site at an assumed rate of £100/Tonne ML - allows for 500T and same time delay	50	700	1,200			DS	1. Contaminated land survey undertaken during design 2. Remediation disposal strategy developed during design	DS	Feb 2019	06/05/14: Bore hole samples being taken which will identify if there will be any contamination. If there is, this will be managed as an issue. Remediation strategy will be developed if needed											
69	Construction	Open	06/05/2014	Representative samples have been taken and limited access to some areas. (relates to Geotechnical properties of material)	There is a risk that there may be unforeseen ground conditions - hydrology and geology (e.g. water table higher than assumed)	Redesign and change to construction approach	5%	1 Prob: Know that the ground is peat, quite high water table, slight variance on what we already know Cost: Estimated £12m for Method. Impact construction approach, may be in an area that is difficult to access. Contractor involvement would be required	250	250	1,000			DS	1. Surveys and detailed design 2. Early contractor involvement	DS	Feb 2019												
71	Construction	Open	06/05/2014	Work is being carried out on a flood plain	There is a risk that there may be exceptionally adverse weather (greater than 1:10 event)	Claim from Contractor for delay	60%	4 Prob: Based on previous contractor experience Cost: Assumes £50k / week. Working on a flood plain	100	300	500			DS	1. Scheme to commence in summer to make the most of summer months 2. Tolerate remaining risk as per clients / risks under NEC construction contract. Allowance to be included in management reserve.	DS													
73	Construction	Open	06/05/2014	Former gas works, apparatus associated with gas works, previous industrial use of ground	There is a risk that there may be buried obstructions/ structures	Change design and construction approach. Removal may be required depending on feasibility	5%	1 Prob: Unlikely Cost: 2 week claim for delay ML £50k / week. Max 4 week delay, plus £200k to deal with the obstruction	0	100	400			DS	1. Ensure GI is thorough and ongoing 2. Previous land use records 3. Radar surveys	DS	Feb 2019												
75	Design Work	Open	06/05/2014	Alignment of Network Rail possessions and Stafford Western Access route schedule	There is a risk that the Stafford Western Access route strengthening work for the bridge may need to be completed during a NR possession	Delays to programme, additional cost, potential redesign	5%	1 Prob: unlikely as works will be programmed with Network Rail to coincide with their closures required for Stafford re-signalling project (in advance of scheme if necessary) Cost: ML - estimated cost of possession on WCML Max - includes additional NR fees	0	50	75			DS	1. Meeting scheduled w/c 6th May with NR 2. Alignment of schedules and possessions. More clarity required for NR possessions Use of competent contractor, detailed programme of works	DS	Dec 2017	06/05/14: Utilise NR possessions											
XX	Design Work	Open	06/05/2014	Contaminated Land (chemical testing not yet complete)	Site investigation reveals that the ground is contaminated and arisings need to be disposed to hazardous landfill	Additional Cost, revised construction method	25%	Prob: low likelihood due to initial description of ground encountered (visual & smell) Cost: max - allows for 1,000T to be disposed off site at an assumed rate of £100/Tonne	0	500	1,000			DS	*****	DS	Dec 2014	06/06/14: New risk added											

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20th June 2014

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CONSTRUCTIVE EXPERTISE

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