

Appendix F - Dudley Road Quantitative Cost Risk Analysis

[illegible]

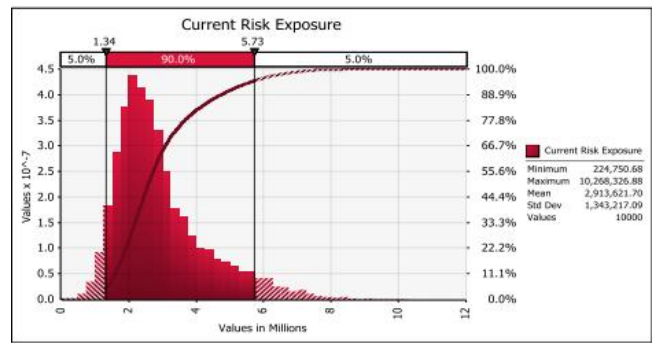
QCRA Results for: Dudley Road: Mainline section

Notes:

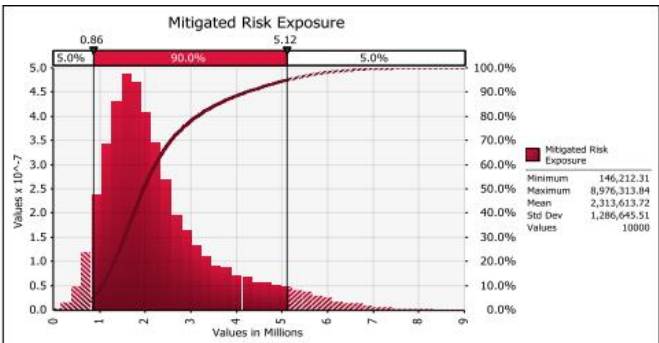
- This analysis has been prepared by Corderoy following a risk workshop held on Wednesday 09 June 2021 attended by Robert Warner (Project Manager - Birmingham City Council), Rachel Rock (Assistant Project Manager - Birmingham City Council), John Swift (NEC Project Manager), Paul Taylor (Commercial Manager - Birmingham City Council), Prime Kular (Consultant to Birmingham City Council) and Peter Cane (Corderoy Risk Manager)
- Risks from the Dudley Road risk register were modelled and analysed with @Risk for Excel, using Monte-Carlo modelling technique, to forecast a range of potential outcomes. The results were based on 10,000 iterations
- The Cost-Confidence curves below indicates the Current Risk Exposure and Mitigated Risk Exposure levels of risk depending of the different levels of probability/confidence.
- The key statistical results are provided in the table, showing the confidence (%) in left column) that our risk exposure will be equal or less than the value to the right (£m). These can be used to inform the Contingency required. For example:
- P50 (Median): There is a 50% probability/confidence that our Current Risk Exposure risk exposure will be equal or less than (will not exceed) £2,573,649.42 (Comparative EMV Value 2,912,398) and £1,958,530.78 (Comparative EMV Value £2,310,301) Mitigated Risk Exposure.
- The Birmingham City Council team have provided data regarding the assessment (Prob & Impact) of risks in the Risk Register based on a series of assumptions at the time of the risk workshop. These assumptions, may change as a result of review and other developments.
- Due to the potential magnitude of risk DR-007a Lee Railway Bridge widening the project has assumed that should full replacement of the bridge be required (whether caused by the project or not) will be funded from elsewhere and full replacement value of the bridge is excluded from the risk register and the analysis below.
- Both threats and opportunities have been included within the risk simulation exercise
- Known issues have been excluded from the analysis
- It is recommended that regular reviews of the Risk Register are undertaken and QCRA is run periodically to ensure the project risks are being managed and updated as the project develops and as more detailed information is made available

Monte-Carlo modelled Graphs

Current Risk Exposure



Mitigated Risk Exposure



Monte-Carlo modelled confidence outputs

Exposure Pre Mitigation		
5%	£	1,338,214.13
10%	£	1,561,351.77
15%	£	1,722,165.37
20%	£	1,863,716.00
25%	£	1,991,626.76
30%	£	2,110,329.84
35%	£	2,217,559.02
40%	£	2,341,278.56
45%	£	2,458,757.67
50%	£	2,573,649.42
55%	£	2,712,691.69
60%	£	2,850,134.13
65%	£	3,021,073.85
70%	£	3,219,566.30
75%	£	3,494,464.79
80%	£	3,821,477.91
85%	£	4,285,432.93
90%	£	4,878,107.39
95%	£	5,727,247.94

Exposure Post Mitigation		
5%	£	862,595.55
10%	£	1,055,603.20
15%	£	1,195,911.88
20%	£	1,324,445.17
25%	£	1,437,711.93
30%	£	1,544,409.22
35%	£	1,645,377.56
40%	£	1,747,527.83
45%	£	1,854,634.52
50%	£	1,958,530.78
55%	£	2,082,438.35
60%	£	2,221,991.77
65%	£	2,376,478.22
70%	£	2,565,387.37
75%	£	2,812,795.26
80%	£	3,139,586.83
85%	£	3,585,339.76
90%	£	4,212,745.38
95%	£	5,119,247.81

Top 5 risks by cost exposure

Current Risk Exposure

ID	Risk Title	EMV Pre mitigation
DR-007b	Lee Canal Bridge widening	473,333
DR-053	Additional costs for stats not accounted for	187,500
DR-033b	Project Interfaces	161,667
DR-005	Objection to Orders	133,333
DR-057	Additional requirements in order to hand back asset	128,000

Mitigated Risk Exposure

ID	Risk Title	EMV Post mitigation
DR-007b	Lee Canal Bridge widening	473,333
DR-053	Additional costs for stats not accounted for	125,000
DR-033b	Project Interfaces	129,333
DR-005	Objection to Orders	80,000
DR-057	Additional requirements in order to hand back asset	80,000

"DISCLAIMER: Contract (Rights of Third Parties) Act 1999
This document is confidential to Corderoy and its client Pell Frischmann. It was prepared for the benefit of Pell Frischmann and Birmingham City Council only, and any disclosure to any third party should not be taken as advice from Corderoy or Pell Frischmann or Birmingham City Council to that third party, and it is provided expressly without Corderoy or Pell Frischmann's undertaking any responsibility in contract, tort or otherwise at law or in equity for its contents or any reliance any third party chooses to place on it. Neither is this document intended to, or amount to, or constitute legal or commercial advice to any third party. Neither Corderoy or Pell Frischmann or Birmingham City Council bind themselves together nor individually to act or refrain from acting in any particular way in accordance with any views expressed in the document."

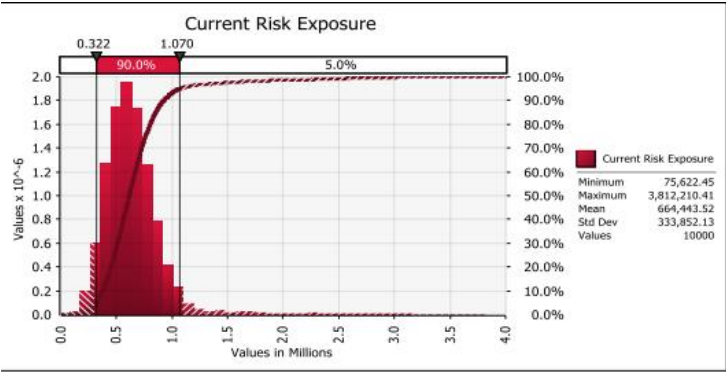
QCRA Results for: Dudley Road: Western Road section

Notes:

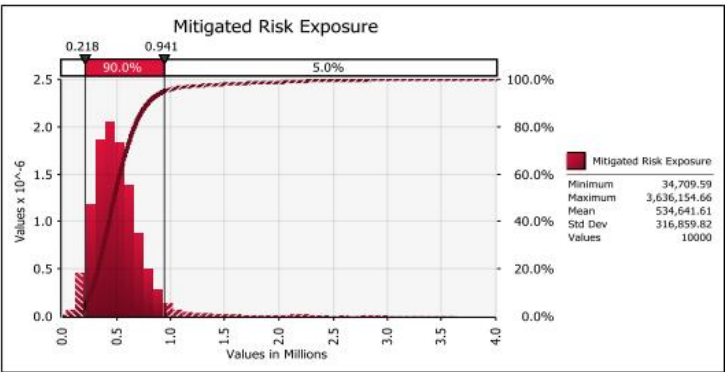
- This analysis has been prepared by Corderoy following a risk workshop held on Wednesday 09 June 2021 attended by Robert Warner (Project Manager - Birmingham City Council), Rachel Rock (Assistant Project Manager - Birmingham City Council), John Swift (NEC Project Manager), Paul Taylor (Commercial Manager - Birmingham City Council), Prime Kular (Consultant to Birmingham City Council) and Peter Cane (Corderoy Risk Manager)
- Risks from the Dudley Road risk register were modelled and analysed with @Risk for Excel, using Monte-Carlo modelling technique, to forecast a range of potential outcomes. The results were based on 10,000 iterations
- The Cost-Confidence curves below indicates the Current Risk Exposure and Mitigated Risk Exposure levels of risk depending of the different levels of probability/confidence.
- The key statistical results are provided in the table, showing the confidence (%) in left column) that our risk exposure will be equal or less than the value to the right (£m). These can be used to inform the Contingency required. For example:
- P50 (Median): There is a 50% probability/confidence that our Current Risk Exposure risk exposure will be equal or less than (will not exceed) £615,290.41 (Comparative EMV Value £665,697) and £480,471.92 (Comparative EMV Value £534,034) Mitigated Risk Exposure.
- The Birmingham City Council team have provided data regarding the assessment (Prob & Impact) of risks in the Risk Register based on a series of assumptions at the time of the risk workshop. These assumptions, may change as a result of review and other developments.
- Both threats and opportunities have been included within the risk simulation exercise
- Known issues have been excluded from the analysis
- It is recommended that regular reviews of the Risk Register are undertaken and QCRA is run periodically to ensure the project risks are being managed and updated as the project develops and as more detailed information is made available

Monte-Carlo modelled Graphs

Current Risk Exposure



Mitigated Risk Exposure



Monte-Carlo modelled confidence outputs

Current Risk Exposure		
5%	£	322,412.28
10%	£	378,380.93
15%	£	419,899.16
20%	£	451,710.40
25%	£	481,450.02
30%	£	510,249.82
35%	£	537,442.54
40%	£	562,497.25
45%	£	591,078.04
50%	£	615,290.41
55%	£	640,153.37
60%	£	668,941.40
65%	£	696,693.20
70%	£	726,732.72
75%	£	761,646.16
80%	£	802,377.69
85%	£	853,683.18
90%	£	923,592.24
95%	£	1,070,459.35

Mitigated Risk Exposure		
5%	£	217,598.83
10%	£	264,736.22
15%	£	301,171.72
20%	£	330,854.83
25%	£	357,511.67
30%	£	382,231.82
35%	£	408,024.90
40%	£	432,768.45
45%	£	456,345.72
50%	£	480,471.92
55%	£	506,610.81
60%	£	533,176.48
65%	£	560,265.64
70%	£	592,067.73
75%	£	628,184.57
80%	£	666,818.03
85%	£	716,462.69
90%	£	792,415.34
95%	£	941,296.43

Top 5 risks by cost exposure

Current Risk Exposure

ID	Risk Title	EMV Pre mitigation
DR-009	C4 to C8 cost estimate and programme	125,000
DR-033a	Project Interfaces to western road	53,334
DR-056	BIM deliverables	43,750
DR-057	Additional requirements in order to hand back asset	42,667
DR-050	Network Rail cables serving west coast main line	42,000

Mitigated Risk Exposure

ID	Risk Title	EMV Post mitigation
DR-009	C4 to C8 cost estimate and programme	83,334
DR-033a	Project Interfaces to western road	32,000
DR-056	BIM deliverables	43,750
DR-057	Additional requirements in order to hand back asset	26,667
DR-050	Network Rail cables serving west coast main line	40,000

"DISCLAIMER: Contract (Rights of Third Parties) Act 1999
This document is confidential to Corderoy and its client Pell Frischmann. It was prepared for the benefit of Pell Frischmann and Birmingham City Council only, and any disclosure to any third party should not be taken as advice from Corderoy or Pell Frischmann or Birmingham City Council to that third party, and it is provided expressly without Corderoy or Pell Frischmann's undertaking any responsibility in contract, tort or otherwise at law or in equity for its contents or any reliance any third party chooses to place on it. Neither is this document intended to, or amount to, or constitute legal or commercial advice to any third party. Neither Corderoy or Pell Frischmann or Birmingham City Council bind themselves together nor individually to act or refrain from acting in any particular way in accordance with any views expressed in the document."