

Brighton 3Ts Main Scheme QRA Outputs

A quantitative risk analysis (QRA) was carried out for the Brighton 3Ts Main Scheme project in October 2014. The joint risk register “LOR-CO-SW-SH-0033 Joint Main Scheme 02 Oct 14 R6” was used as the basis of the analysis.

Risks were jointly reviewed through a series of workshops and quantitative risk reviews with cost managers. The QRA used the @Risk software package to model the data through 5000 iterations in order to produce key output statistics for Trust owned and LOR owned risks.

The following table summarises the key QRA outputs with risk exposures at the 50% (P50) and 80% (P80) confidence levels. The summation of these outputs indicated the overall risk contingency figures shown below.

Risks included in analysis	P50	P80
Trust All	£ 8,105,975	£ 10,474,020
LOR All	£ 11,717,090	£ 15,112,965
Total	£ 19,823,065	£ 25,586,985

Note the QRA outputs on the following pages contain:

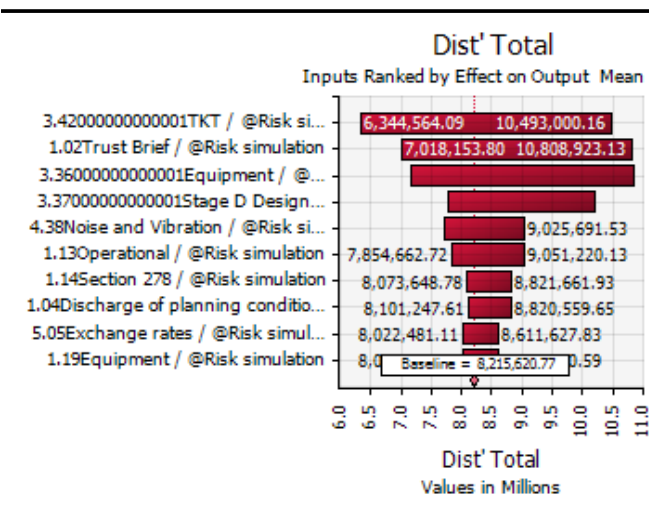
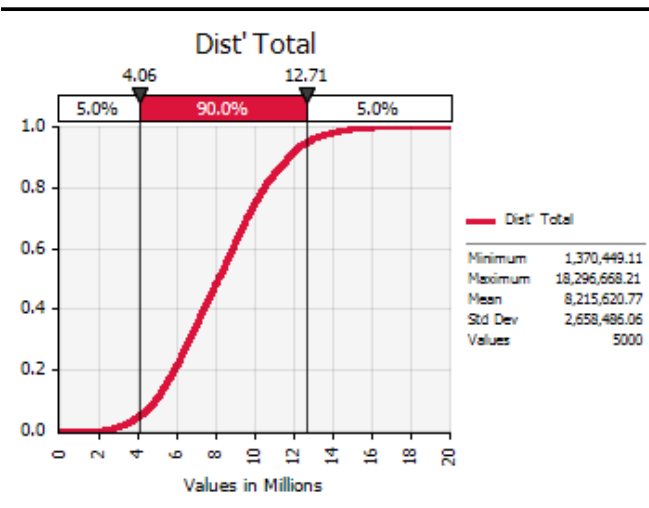
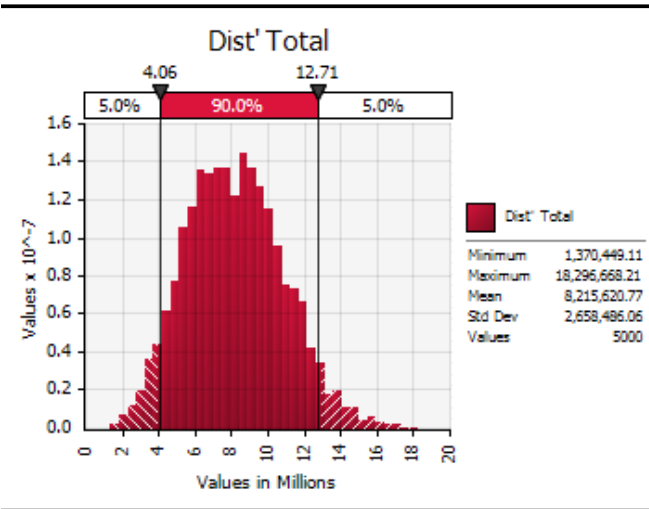
- Risk exposures at all confidence levels between 0% and 100% at 5% increments
- Top risks in order of sensitivity ie. The extent to which they influence the risk exposure
- S-curve – graph plotting risk exposure against cumulative probability
- Tornado graph – graphical representation of the top risks by sensitivity

Notes about data modelled:

- There is no contribution from cost estimating uncertainty
- All risks were modelled using a triangular distribution for cost impact
- Strategic / Revenue risks were outside the remit of the quantitative analysis

@RISK Output Report for Dist' Total

Performed By: Louise Greenhalgh
 Date: 16 September 2014 09:48:16



Simulation Summary Information	
Workbook Name	3Ts QRA Model Trust R1 D
Number of Simulations	1
Number of Iterations	5000
Number of Inputs	406
Number of Outputs	3
Sampling Type	Latin Hypercube
Simulation Start Time	16/09/2014 09:47
Simulation Duration	00:00:04
Random # Generator	Mersenne Twister
Random Seed	1607583354

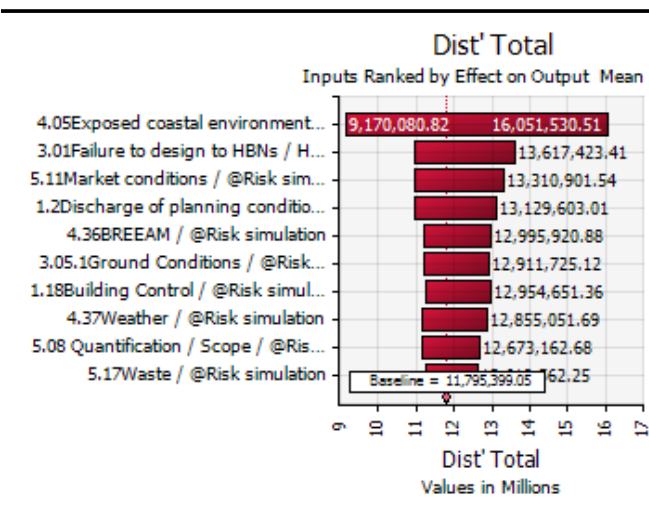
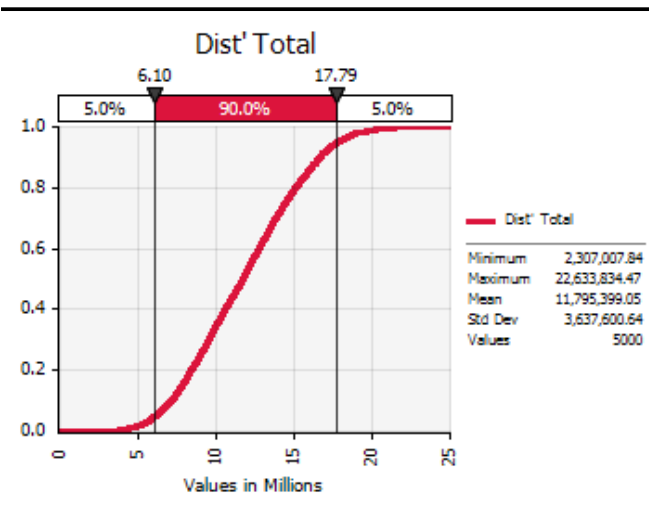
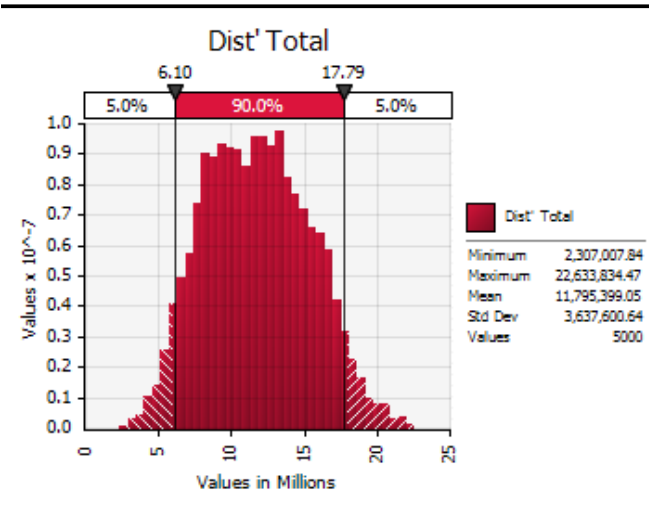
Summary Statistics for Dist' Total		
Statistics	Percentile	
Minimum	5%	4,064,463
Maximum	10%	4,881,556
Mean	15%	5,399,378
Std Dev	20%	5,859,035
Variance	25%	6,255,347
Skewness	30%	6,620,625
Kurtosis	35%	6,995,650
Median	40%	7,371,771
Mode	45%	7,744,730
Left X	50%	8,105,975
Left P	55%	8,504,107
Right X	60%	8,844,299
Right P	65%	9,219,270
Diff X	70%	9,576,750
Diff P	75%	10,002,098
#Errors	80%	10,474,020
Filter Min	85%	11,064,236
Filter Max	90%	11,744,232
#Filtered	95%	12,709,696

Change in Output Statistic for Dist' Total			
Rank	Name	Lower	Upper
1	3.4200000000000001	6,344,564	10,493,000
2	1.02Trust Brief / @Risk simulation	7,018,154	10,808,923
3	3.3600000000000001	7,161,159	10,831,542
4	3.3700000000000001	7,787,301	10,205,750
5	4.38Noise and Vi	7,710,266	9,025,692
6	1.13Operational	7,854,663	9,051,220
7	1.14Section 278	8,073,649	8,821,662
8	1.04Discharge of	8,101,248	8,820,560
9	5.05Exchange rat	8,022,481	8,611,628
10	1.19Equipment /	8,018,451	8,596,461

@RISK Output Report for Dist' Total

Performed By: Louise Greenhalgh

Date: 20 October 2014 09:27:01



Simulation Summary Information	
Workbook Name	3Ts QRA Model LOR R1 Dra
Number of Simulations	1
Number of Iterations	5000
Number of Inputs	406
Number of Outputs	3
Sampling Type	Latin Hypercube
Simulation Start Time	20/10/2014 09:26
Simulation Duration	00:00:06
Random # Generator	Mersenne Twister
Random Seed	120038524

Summary Statistics for Dist' Total		
Statistics	Percentile	
Minimum	5%	6,101,968
Maximum	10%	7,123,090
Mean	15%	7,835,047
Std Dev	20%	8,405,792
Variance	25%	8,993,487
Skewness	30%	9,524,582
Kurtosis	35%	10,031,144
Median	40%	10,592,778
Mode	45%	11,157,101
Left X	50%	11,717,090
Left P	55%	12,219,590
Right X	60%	12,784,228
Right P	65%	13,289,892
Diff X	70%	13,837,559
Diff P	75%	14,434,846
#Errors	80%	15,112,965
Filter Min	85%	15,876,557
Filter Max	90%	16,641,378
#Filtered	95%	17,791,871

Change in Output Statistic for Dist' Total			
Rank	Name	Lower	Upper
1	4.05 Exposed coa	9,170,081	16,051,531
2	3.01 Failure to de	10,973,322	13,617,423
3	5.11 Market cond	10,982,997	13,310,902
4	1.2 Discharge of p	10,966,292	13,129,603
5	4.36 BREEAM / @F	11,212,600	12,995,921
6	3.05.1 Ground Co	11,203,972	12,911,725
7	1.18 Building Con	11,255,071	12,954,651
8	4.37 Weather / @	11,167,736	12,855,052
9	5.08 Quantificati	11,173,513	12,673,163
10	5.17 Waste / @Ri	11,250,656	12,619,562