

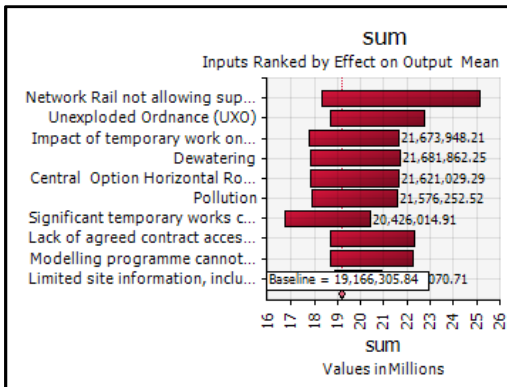
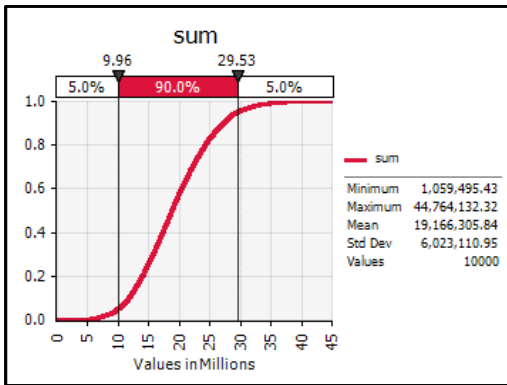
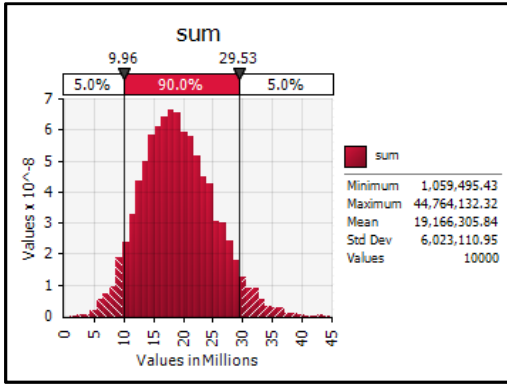
## *Appendix O – Risk Register*

Risk Register Ref	Hazard/Risk Name	Effect/Consequence	Initial Risk Exposure									Spreadsheet Construction Risk		
			Probability			Cost Impact (£k)			Risk Rank (P x CI)	£12,044,054	£19,259,645	£26,475,236		
			Rank		%	Cat		Min		Most Likely	Max	Min	Most Likely	Max
1	Modelling programme cannot be delivered in accordance with DfT technical requirements and timescales. DfT require Outline Business Case to be completed before Christmas 2015 in order to review, brief ministers, and ministerial decision in January for Chancellors Budget statement (end March 2015 / April 2015).	Will prevent funding or decision for funding in this financial year; delay to scheme programme.	2	L	13%	4	H	2,430,623	3,645,934	4,861,245	8	315,981	473,971	631,962
2	Following completion of the modelling and economic appraisal for the scheme, the scheme does not show "value for money" according to DfT guidance and assessment criteria (i.e. the Benefit Cost Ratio is below 2). ie the scheme benefits are not significant greater than scheme costs.	This could result in the scheme being "dropped", or reduced in scale, or an alternative 'better value' solution requested.	3	M	36%	3	M	959,456	1,695,039	2,430,623	9	340,607	601,739	862,871
4	If the NSIP is not secured, and DCO route not followed (discussed in risk ID82), the following risk could occur: Land cannot be acquired in time for intended construction programme. Possibility that this may require CPO. This risk can be closed is NSIP secured	Delay to project programme, and increase in costs associated with delay if contract has commenced; If CPO route occurs, possible increase in projected land costs	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
5	DfT are not satisfied with the methodology proposed or the outcomes of the model	Abortive business case work, slippage of key deadlines in relation to approvals, lapse of LEP funds, project delay	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
6	Limited site information, including topographical survey, statutory undertaker information leading to inaccuracies in design.	Additional costs and delay to programme; abortive work; redesign of scheme	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
7	Objection to the scheme on environmental grounds (though this would be considered as part of the DCO process - risk ID82)	Delay and additional costs to manage protests	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
8	Objection to the scheme on highway and traffic grounds (though this would be considered as part of the DCO process - risk ID82)	Delay and additional costs to manage objections	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
9	Objection to the scheme on planning grounds (though this would be considered as part of the DCO process - risk ID82)	Delay and additional costs to manage objections	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
10	Difficulty of accurately pricing contract. Market forces affecting tender prices.	Tender price exceeds cost budget	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
11	Unforeseen/uncertain ground conditions - works relating to the new crossing.	Unforeseen/uncertain ground conditions may lead to scheme re-design. Additional costs and delays	3	M	36%	3	M	959,456	1,695,039	2,430,623	9	340,607	601,739	862,871
12	Estimated costs based on 2015 prices + adjustments for inflation.	Inaccurate estimate - increase in cost of construction materials above inflation allowance. Additional costs	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
13	Changes to design after Target Cost agreed.	Additional cost and delays to project programme	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
14	Public opposition to the preferred option (though this would be considered as part of the DCO process - risk ID82)	Changes to design - additional cost, timing and programme delays	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
15	Politics / Elections.	Lack of local political support for the scheme (option designs, location of crossing, type of crossing)	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
16	Council cannot find a suitable local funding contribution for the scheme (in the region of 10-20% of scheme costs) of c.£100m scheme. DfT / Government unwilling to pay for full scheme (budget constraints)	Scheme would compare unfavourably to others in a competition (if local funding contribution could not be found), or DfT may not provide the remainder funding c.£90m (scheme not classed as 'value for money'). Full scheme could not proceed.	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729

17	Accessibility / Special Interest group opposition (though this would be considered as part of the DCO process - risk ID82)	Opposition to walk-cycle proposals result in redesign, delay	2	L	13%	1	VL	255,855	319,819	383,783	2	33,261	41,576	49,892
19	Third Crossing- Accuracy of estimate for the scheme are based on the preliminary design and are calculated using rates from previous similar type of schemes.	Inaccurate cost estimates, additional costs, possible reduction in the B/C ratio	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
20	Recent environmental impact assessment not undertaken to consider issues including the presence of watercourses, bat/nesting surveys, endangered species, rare aquatic species etc.	Cost of engineering and environmental design changes, impact on scheme programme	3	M	36%	2	L	383,783	671,619	959,456	6	136,243	238,425	340,607
21	Third Crossing - presence and disposal of contaminated materials in areas of excavation as well as the possibility of tar in carriageway layers which will require disposal at specific controlled tips.	Inaccurate cost estimates, additional costs, possible reduction in the B/C ratio	2	L	13%	1	VL	255,855	319,819	383,783	2	33,261	41,576	49,892
22	Tree removal mitigation works are likely to be required at other locations off site if replacement trees cannot be provided at the specific sites.	Increased costs and potential project delays	2	L	13%	1	VL	255,855	319,819	383,783	2	33,261	41,576	49,892
23	Time for procurement (under EU legislation) extends beyond set limits (ie scheme deliver by 2020)	Delays to the work programme and potential cost implications	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
24	Environmental consents not in place by start of construction.	Delays to project	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
26	TTRO not in place in advance of the works.	Delays to project	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
27	Lack of resources to deliver engineering design and analysis feeding into the OBC leading to programme slippage and missing tender date for main works.	Delays to project	1	VL	3%	3	M	959,456	1,695,039	2,430,623	3	23,986	42,376	60,766
28	Risk of public and work force health and safety during site clearance and scheme construction.	Injuries/ fatalities to workforce or members of the public could lead to injury compensation costs & poor local and national PR	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
29	Severe weather or flooding event causes delay to construction.	Project delays	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
30	Design brief not fully defined before commencement of project due to short time scales for DfT submission.	Changes resulting in abortive design/lack of continuity of design - Project delays	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
31	Lack of agreed contract access routes and site compound for storage / assembly / site office.	Extra costs and project delays	2	L	13%	4	H	2,430,623	3,645,934	4,861,245	8	315,981	473,971	631,962
32	Impact of temporary work on the local highway network.	Poor PR for Suffolk County Council and additional costs to provide extra temporary traffic management systems	3	M	36%	4	H	2,430,623	3,645,934	4,861,245	12	862,871	1,294,306	1,725,742
33	Out of hours/night working required due to programme delay caused by consultant or client or other.	Additional cost	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
35	Loss of key personnel.	Additional delay in order to locate new personnel to cover loss of expertise	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
36	Quality of schemes below anticipated.	The scheme does not deliver on its aims and problems identified in the business case persist	1	VL	3%	1	VL	255,855	319,819	383,783	1	6,396	7,995	9,595
37	Third Crossing- Planned STATS maintenance work conflicting with the proposed scheme construction.	Project delays	2	L	13%	1	VL	255,855	319,819	383,783	2	33,261	41,576	49,892
38	Lack of stakeholder support (such as Association of British Ports (ABP), Highways England, Network Rail, local businesses)	Changes to design - additional cost, timing and programme delays	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
39	Council Decision / Approvals.	Councillors not agreeing to the proposals	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
40	Presence of critical utility infrastructure impacts upon highway design option.	Additional survey works needed prior to scheme implementation, with concurrent time and cost impacts	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
41	Third Crossing- Delays and disruption arising when new design layouts are constructed and fully operational.	Bad PR publicity for Suffolk County Council	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
42	The Council is unable to attract competent, experienced contractors to bid for the work.	Limited contractor appointed to carry out the works, leading to a lower quality design and build and potential delay implications	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
43	Existing River Wall construction details, specifically river wall anchoring details, adversely impact design.	Use of specialist foundation solutions to accommodate existing river wall construction	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986

44	Existing services along / close / crossing to preferred crossing alignment.	Significant work in terms of temporary and permanent service diversions.	3	M	36%	3	M	959,456	1,695,039	2,430,623	9	340,607	601,739	862,871
45	Foundation Construction within river channel.	Construction of foundation works disrupts river traffic / port operations, objections from Port Authority.	3	M	36%	2	L	383,783	671,619	959,456	6	136,243	238,425	340,607
46	Unexploded Ordnance (UXO)	Impact to construction operations in particular excavations and foundation construction.	2	L	13%	4	H	2,430,623	3,645,934	4,861,245	8	315,981	473,971	631,962
47	Presence of soft ground (alluvial soils) along preferred alignment.	Settlement issues affecting adjacent structures/ river walls / existing services.  Requirement for extensive ground improvement works onshore and heavy foundation solutions.  Ground instability issues affecting existing structures / assets during large structural excavation works.	3	M	36%	3	M	959,456	1,695,039	2,430,623	9	340,607	601,739	862,871
48	Significant temporary works constructions for earthworks and piled foundations in an urban environment.	Clashes / Issues with planning of works with local community and existing infrastructure.	4	H	66%	4	H	2,430,623	3,645,934	4,861,245	16	1,592,058	2,388,087	3,184,115
49	Flooding	Flood risk during construction	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
50	Pollution	Pollution of river and groundwater during piling works.	3	M	36%	4	H	2,430,623	3,645,934	4,861,245	12	862,871	1,294,306	1,725,742
51	Construction of earthworks on shore.	Crossing will require construction of associated earthworks . These will result in settlement affecting adjacent structures (e.g. anchored river walls)	3	M	36%	2	L	383,783	671,619	959,456	6	136,243	238,425	340,607
52	Dewatering	There will be arrequirement for dewatering of large excavation during construction works. This will affect existing structures (particularly anchored river walls) / assets due to potential settlement effects.	3	M	36%	4	H	2,430,623	3,645,934	4,861,245	12	862,871	1,294,306	1,725,742
56	Central Option Horizontal Road Alignment - clash with existing buildings/commercial properties	Proposed alignments clash with operational function of Port Authority on north bank and other commercial properties on south bank	3	M	36%	4	H	2,430,623	3,645,934	4,861,245	12	862,871	1,294,306	1,725,742
63	Ground Investigation finds contaminated land	Delay to project programme, and increase in costs associated with delay if contract has commenced	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
64	Discovery of protected species not originally recorded	Delay to project programme if additional surveys and / or consents are required to be obtained	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
65	Uncharted archaeology found	Significant archaeological finds discovered leading to an overall programme delay	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
66	Potential to miss environmental survey seasons	Depending upon the presence of protected species, some species specific surveys may be required which are seasonal - e.g. wintering birds, and bats	2	L	13%	1	VL	255,855	319,819	383,783	2	33,261	41,576	49,892
67	Challenge to Environmental Statement due to insufficient assessment	Delay to overall scheme delivery if objections to planning on environmental grounds	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
68	Changes to Legislation, Policy, Designations and guidance.	Changes to policy / legislation / designations resulting in an insufficient environmental assessment and a subsequent challenge to the scheme on environmental grounds	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
70	Flood Zones - potential for 1 in 100 year flooding from existing environmental flood zone areas	Central and western options are all impacted by the environmental flood zone areas from Lake Lothing	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
71	Central Option - visibility to side road on business park	Access to Lings car showroom may potentially be a hazard for vehicle turning movements due to visibility entering/exiting the showroom	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
72	Pedestrian/cyclist safety over bridges	Potential safety hazard for pedestrians and cyclists when travelling on bridge over the channel	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
73	Central Option - rat-running in residential roads (particularly if option C6 or similar pursued - ie route uses no strtegic highway)	Central Option - potential for increased traffic in residential roads leading to bridge crossing	1	VL	3%	2	L	383,783	671,619	959,456	2	9,595	16,790	23,986
75	Central Option - reduced car park space	New access road into business park will reduce existing car park spaces to local businesses	4	H	66%	1	VL	255,855	319,819	383,783	4	167,585	209,481	251,378
76	Network Rail Asset Protection Agreement required for bridge over railway on North side.	Dealy in obtaning agreement affects design and construction programme	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
77	Proposed new bridge over railway causes signal sighting issues for trains	Bridge span may require amendment to suit required signal sighting distances	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
78	Working on or near the railway and possession requirements	Permissions and possession availability cause affect to construction programme	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981

79	Network Rail required clearances exceed those currently proposed	Highway approach gradients require revision which may exceed maximum permitted (highway and/or pedestrians) gradients, tie-in arrangements also affected	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
80	The potential of non agreement of structure / bridge proposals on ABP land / dockside area.	Structure / bridge proposals may require amendments that could affect viability of solution.	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
81	ABP required clearances over Lake Lothing exceed those currently provided.	Bascule bridge operations affect traffic flow or highway approach gradients require revision which may exceed maximum permitted (highway and/or pedestrians) gradients, tie in arrangements also affected	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
82	Secretary of state doesn't grant scheme status as Nationally Significant Infrastructure Project, and subsequently not DCO granted	Significant delay to programme, as traditional planning application, likely Public Inquiry which will not be time limited will result	2	L	13%	3	M	959,456	1,695,039	2,430,623	6	124,729	220,355	315,981
83	Network Rail not allowing supports within the NR fence line	Significant increase to required construction depth (circa 2000mm) would make the central option a problem.	2	L	13%	5	VH	4,861,245	6,908,085	8,954,925	10	631,962	898,051	1,164,140
84	Cost increases to raw materials such as steel increasing the scheme cost	Significant increase to required construction depth (circa 2000mm) would make the central option a problem.	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729
84	Additional structures needed to overcome scheme issues such as flooding / land take/ access requirements.	extra cost to scheme	2	L	13%	2	L	383,783	671,619	959,456	4	49,892	87,311	124,729



Simulation Summary Information	
Workbook Name	Lowestoft Third Crossing Risk Reg
Number of Simulations	1
Number of Iterations	10000
Number of Inputs	140
Number of Outputs	71
Sampling Type	Monte Carlo
Simulation Start Time	10/12/2015 11:46
Simulation Duration	00:00:10
Random # Generator	Mersenne Twister
Random Seed	873283475

Summary Statistics for sum		
Statistics		Percentile
Minimum	1,059,495	5%
Maximum	44,764,132	10%
Mean	<b>19,166,306</b>	15%
Std Dev	6,023,111	20%
Variance	3.62779E+13	25%
Skewness	0.338123365	30%
Kurtosis	3.039541778	35%
Median	18,767,236	40%
Mode	18,263,573	45%
Left X	9,959,464	<b>50% 18,767,236</b>
Left P	5%	55%
Right X	29,533,847	60%
Right P	95%	65%
Diff X	19,574,383	70%
Diff P	90%	75%
#Errors	0	80%
Filter Min	Off	<b>85% 25,545,702</b>
Filter Max	Off	90%
#Filtered	0	95%

Change in Output Statistic for sum			
Rank	Name	Lower	Upper
1	Network Rail not allow	18,310,213	25,128,604
2	Unexploded Ordnance	18,671,203	22,730,992
3	Impact of temporary w	17,767,550	21,673,948
4	Dewatering	17,852,234	21,681,862
5	Central Option Horizo	17,829,312	21,621,029
6	Pollution	17,890,399	21,576,253
7	Significant temporary	16,754,377	20,426,015
8	Lack of agreed contrac	18,710,285	22,332,176
9	Modelling programme	18,702,131	22,232,072
10	Limited site informatio	18,908,546	20,879,071