B6344 Crag End land slip - Repairs
Risk Register

Pre Mitigation						Mitigation	Post Mitigation							
No	Risk	Probability Rating %	Cost/Risk Rational £	Maximum Likely Liability £	Minimum Liability £	Mitigation Measures	Probability Rating %	Cost/Risk Rational £	Maximum Likely Liability £	Minimum Liability £	Risk Owner	Milestones/Risk Status	Linked Risk	Comment
1	Safety													
1.1	Serious accident	2	Construction statistically dangerous industry - Estimated, one serious accident during construction. HSE delays.	500,000	500,000	Design out risk. H & S plan production, method statements, risk Assessment, full CDM compliance. Requirement for contractors insurance.	0	Add allowance for contractors insurance to estimate and remove from risk register at that point.	0	0	PM/DT/SS/CONT	Detailed design complete Oct/2013 with significant risks eliminated.		For HARM analysis - use pre mitigation values.
1.2	Vandalism, theft	25	From experience, the threat of vandalism/theft is likely on a scheme of this size. Estimated cost £25,000	25,000	25,000	Employ adequate site security, procure adequate security	0	From experience, the threat of vandalism/theft is likely on a scheme of this size.Cost allowed fvor in estimate	0	0				Security allowed for in estimate
2	Design / Supervision Risk/investigation													
2.1	Access road at east end - soft spots	25	Land is saturated and soft spots will have to be addressed	10,000	0	Allow for quantity of stone to infill soft spots	0	Critical access point to site	0	0	PM/DT/SS	Access track installed		For HARM analysis - use pre mitigation values.
2.2	Access road at west end - soft spots	25	The extent of spot spots around a stream is unknown but standing water is visible	20,000	0	Allow for quantity of stone to infill soft spots and provide a stream crossing	0	Critical access point to site		0	PM/DT/SS	Access track installed		For HARM analysis - use pre mitigation values.
3	Construction Risk													
3.2	Poor ground conditions due to ongoing land slip	100	Temporary ground water management will amke ground stable enough for work to take place	150,000	150,000	Provide deep well facility along length of slip	0	Ground water managed and site stabilised to permit work	0	0	SS/PM	Ground stabilised		
3.3	Deeper well points required for temporary water management	33	Ground water level may have to be reduced to a lower level to stabilise ground	50,000	0	Ground investigation to determine ground characteristics and ground water levels	20	Ground water managed and site stabilised to permit work	50,000	0	SS/PM	Reassess following receipt of ground investigation interpretive report expected July 2013		
3.4	Temporary ground water management system required for longer than anticipated	33	Works may be compromised if ground water not continually managed	38,610	0	Monitor ground water levels through out works period	20	Ground water managed and site stabilised to permit work	38,610	0	SS/CONT/DT	Continuous monitoring during construction.		
3.5	Width of land slip being wider than is visible at present	10	Length of stabilised road on completion of works has to be adequate to resist further slip	214,368	0	Ground investigation to determine ground characteristics and extent of slip planes	5	Allow for maximum increase in works length of 10%	214,368	0	SS/CONT/DT	Receipt and assessment of GI report		
3.6	Capping beam to be larger than envisaged at initial design stage	25	Design is influenced by design output from pile design. This in turn is dependent on ground strata characteristics	42,000	0	Ground characteristics required from GI.	10	capping beam to be designed to suit all ground characteristics	42,000	0	SS/CONT/DT			
3.7	Ground anchors not long enough because of inadequate rock	50	Anchors will have to be secured in competent rock at a greater depth	150,000	0	Ground characteristics required from GI.	10	Ground anchors successfully installed	150,000	0	SS/CONT/DT	Ground anchors successfully installed		
3.8	Facing construction may be larger than estimated	50	Finished ground levels may have to be lower to suit land owner requirements	40,000	0	Liaise with land owner	20	Agreement reached with land owner	40,000	0	SS/CONT/DT	Land reinstated		
3.9	Unknown quantity of ground water to be managed permanently	50	Ground water is fed by artesian water together with levels present in superficial soils	50,000	0	Ground characteristics required from GI.	20	Ground water levels managed to prescribed designed datum	50,000	0	SS/CONT/DT			
3.10	Access shafts for installation of permananent ground water management equipment may have to be deeper or wider than assumed	50	Specialist equipment for thrust boring may need a wider thrust pit than assumed. Shafts may have to be deeper than assumed.	195,000	0	Ground characteristics required from GI.	20	Permanent water management system installed	195,000	0	SS/CONT/DT	Permanent water management system installed		
3.11	Permanent water management - larger quantity of water than assumed	50	Ground water is fed by artesian water together with levels present in superficial soils	15,000	0	Ground characteristics required from GI.	20	Permanent water management system installed	15,000	0	SS/CONT/DT	Permanent water management system installed		
3.12	Greater area/depth of road reconstruction required	50	land slip is continuing to develop so area of reinstatement may grow	60,000	0	Stabilise ground with water management system	10	Road reinstated	60,000	0	SS/CONT/DT			
3.13	Obstruction or soft spots in road drainage	100	Site is strewn with large boulders at surface level	15,000	0	Ground characteristics required from GI.	20	Expect obstructions and soft spots	15,000	0	SS/CONT/DT	Drainage system insatlled		
4	Output / Programme													
4.1	Tie bar installation - extra time for gang in attendance due to bad weather	20	4weeks @ £5000 = £25000	25,000		Immitigable	20	4weeks @ £5000 = £25000	25,000	0	PM/SS			
4.2	Capping beam construction - extra time for gang in attendance due to bad weather	20	4weeks @ £6650 = £26600	26,600	0	Immitigable	20	4weeks @ £6650 = £26600	26,600	0	PM/SS	Continuous monitoring during construction.		
5	Acquisition Of Land													
5.1	Acquisition of access over private land	75	Lump sum £4000	4,000	4,000	Explore during negotiations with land owners	50	Lump sum £4000	4,000	4,000	PM/AM	Assess at works mobilisation		
5.2	Design changes require additional land	10	Estimated lump sum	100,000	10,000	Detail the design as far as possible at planning application stage	1	Estimated lump sum	100,000	10,000	PM/AM	Planning application 8/11		
5.3	Delay in obtaining land / Non performance - delays construction	40	Say 6 month delay 3% inflation on construction cost.	500,000	500,000	Early land purchase	5	Say 6 month delay 3% inflation on construction cost.	500,000	500,000	PM/AM	Completion of land purchase		
5.4	Unsatisfactory reinstatement of "licensed Land "	20	Estimated lump sum	80,000	50,000	Adequate site supervision	5	Estimated lump sum	50,000	50,000	PM/AM/SS	Completion of reinstatements		
5.5	Additional works - Licence areas	50	Licence costs plus commitment to manage for 5 years. New field drainage and seeding/fertilising/mowing.	100,000	80,000	Negotiation	5	Licence costs plus commitment to manage for 5 years. New field drainage and seeding/fertilising/mowing.	100,000	80,000	PM/AM	Most issues resolved by planning application. 08/11		
6	Quality Management													
6.1	Materials or workmanship not in accordance with works information	10	Estimated lump sum £50,000	50,000	50,000	Quality checking by NCC Labs/Supervisory staff/contractor QA	1	Estimated lump sum £50,000	50,000	50,000	PM/SS	Continuous monitoring during construction period		
6.2	Failure of critical suppliers/subcontractors	1	Estimated lump sum £500,000	500,000	500,000	Consider alternatives in advance, Design using standard components where possible. Scrutiny of subcontractor viability.	1	Estimated lump sum £50,000	50,000	50,000	PM/DT	Completion of detailed design 03/12		
7	Commercial Risk													
7.1	Bankruptcy main contractor	5	Estimated additional staff cost to reassess 'next best' tender. Delay. Costs if construction underway	100,000	100,000	Ensure viability at pre qualification	1	Estimated additional staff cost to reassess 'next best' tender. Delay. Costs if construction underway	100,000	100,000	PM	Continuous monitoring		
7.2	Errors in - budget, BoQ, measure, tender, contract documents or scope of works	90	Estimated cost	375,000	375,000	Comprehensive project management and QA procedures	5	5% of construction cost	375,000	0	SS/DT/PM			
7.3	Non collaborative approach by main contractor	25	Estimated lump sum £25,000	25,000	25,000	Selection of contractor with reference to quality criteria. Workshops. Develop dispute resolution procedure. Option C contract. Partnering agreement.	10	Estimated lump sum £25,000	25,000	25,000	PM/SRO	Continuous monitoring		
7.4	Failure to achieve timely and accurate Assessment of compensation events	10	Estimated lump sum £50000	50,000	0	Ensure adequate staffing levels. Robust project management	5	Estimated lump sum £100000	50,000	0	PM/SRO/SS	Continuous monitoring		

Risk owners: PM - Project Manager, DT - Design Team, SS - Site Supervisor, SRO - Senior Responsible Owner, AM - NCC asset management officer, CONT - Contractor.
Where more than one risk owner is shown, the first indicated is the lead for that risk.

Values used in HARM analysis