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## *APPENDIX W – Commercial Risk Register*

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## 1) Risk Matrix

## The Risk Matrix

						PROBABILITY →				
						Negligible	Unlikely	Possible	Probable	Almost Certain
						Very Low	Low	Medium	High	Very High
						<5%	6-20%	21-50%	51-80%	>80%
						①	②	③	④	⑤
						IMPACT ↑	> 5%	> 20%	Major	Very High / Showstopper
3 to 5%	10 to 20%	Large	High	④	4		8	12	16	20
1 to 3%	5 to 10%	Moderate	Medium	③	3		6	9	12	15
0.5 to 1%	1 to 5%	Minor	Low	②	2		4	6	8	10
< 0.5%	< 1%	Minimal	Very Low	①	1		2	3	4	5
Cost as % of Project cost (not just fees)	Time	Quality	Overall IMPACT	Score	Cost / time and quality may be affected differently by a single risk. If overall risk is required, use the most severe affected component or give consideration to managing each separately.					

### Quality Definitions for Risk Register

- 1 Minimal - meets or exceeds mandatory requirements
- 2 Minor - a few minor shortfalls, some small changes required to rectify
- 3 Moderate – some shortfalls requiring moderate changes to rectify but not impacting on delivery of an objective
- 4 Large - a large shortfall with an objective not being met, significant change required to rectify
- 5 Major - a major shortfall with more than one objective not being met and requiring significant changes to rectify

### Other Impacts.

Also consider other aspects which might affect the project. e.g. reputation, safety (e.g. loss of life)

The measure of these risks can be subjective but will frequently have an associated cost which makes their quantification simpler.

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## 2) Scheme Risk Register

# Project Risk, Issue and Opportunity Register

F103e



<b>Project Number</b>	1069622	<b>Date register last updated</b>	.
<b>Project Title</b>	Comrie	<b>Version Number</b>	.
<b>Client</b>	Perth and Kinross Council	<b>Current Risk Status of Project (gross risk)</b>	
<b>Project</b>	Paul Swift	<b>Risk Status of Project if all mitigation successful (net risk)</b>	
			<b>Gross weighted risk value</b>
			<b>Net weighted risk value</b>

IDENTIFICATION					CURRENT RISK ASSESSMENT		RISK MANAGEMENT					
Risk No (Identifier)	Risk, Issue or Opportunity	Description	Impact Description	Risk Type	Risk Source / Reference	Prob	Impact	Risk Ranking	Risk Assessment Notes	Risk Owner	Proposed Mitigation	Cost of Mitigation £
1	Risk	Modelling - the hydrology is more complex than we have assessed	Flows for various returns periods are incorrect and the flood scheme does not satisfy the	Commercial		1	4	4		Mouchel	Thorough review of model. SEPA review and approval too.	
2	Risk	Modelling - the interaction of the rivers with each has been inaccurately modeled	Flows for various returns periods are incorrect and the flood scheme does not satisfy the	Commercial		1	4	4		Mouchel	Thorough review of model. SEPA review and approval too.	
3	Risk	Environmental - there are environmental constraints / risks that will significantly increase costs and constructability	Delays to the scheme development and increase in costs	Commercial		3	3	9		Client	Underake environmental assessment to understand constraints and mitigation	
4	Risk	Geotechnical - GI is not as comprehensive as required for this stage or we have areas where GI is sparse	Underestimation of foundation / seepage requiriements resulting in delays and cost	Commercial		5	5	25		Client	Review GI with scheme extents. Advise client of risks associated with current GI. Include in report. Do more GI.	
5	Risk	Geotechnical - Seepage analysis undertaken is not representative for all areas	Increase in costs for seepage cut off and delays. Design does not meet seepage criteria.	Commercial		5	5	25		Client	Review GI with scheme extents and undertake necessary seepage analysis at this stage. If we do not do all the seepage analysis we	
6	Risk	Urban Drainage - Extents of secondary flooding extensive	More design needed to assess the urban drainage flooding resulting in increased costs	Commercial		3	4	12		Client	Model sewer newtork to establish flood extent. Identify mitigation measures and cost them.	
7	Risk	Constructability - Some areas pose construction difficulties increasing cost and construction difficulty	Increased impact on landowners / enabling works required resulting in increased cost /	Commercial		5	4	20		Client	Review of scheme extents and scope on site bearing in mind construction. Obtain Contractor advice.	
8	Risk	Utilities - Unknown utilities and clashes increase construction cost and difficulty	Increased costs and delays to do design amendments	Commercial		3	4	12		Client	Obtain latest services and check on site. Undertake exploratory digs if considered necessary. Undertake C3 estimates and	
9	Risk	Risks - project risks not identified / adequately quantified and included in risk register	Unknown risks arise increasing costs and introducing delays	Commercial		3	4	12		Client / Consultant	Undertake a risk register workshop with the client. Review risks at regular intervals with client.	
10	Risk	Construction costs - underestimate the construction costs	Scheme	Commercial		3	4	12		Consultant	Establish all aspects with a construction and allow reasonable allowances for risks or unknowns based on experience.	
11	Risk	Economic appraisal - scheme costs increase / damages decrease resulting in scheme being economically unviable	Scheme does not proceed to flood order status	Commercial		2	5	10		Client	Ensure damages are robustly checked and appropriate. Review costs against damages. If costs exceed damages, undertake a	
12	Risk	Public objection to the scheme	Delays in scheme promotion. Difficulty obtaining approvals.	Commercial		3	5	15		Client	Undertake public consultation on scheme to gauge / get public support. Collate concerns and address them if possible.	
13	Risk	Landownership - significant land take for scheme	Increase in compensation costs. Scheme objections. Delays.	Commercial		3	3	9		Client	Review scheme and land take impacts. Enter in early dialogue with landowners to agree strategy.	
14	Risk	Contam land - more contam land than originally identified	Increase in costs. Scheme re-design. Delays.	Commercial		3	5	15		Client	Review contam land on site via GI. Undertake further testing if necessary. Develop mitigation strategy to treat contam land.	
15	Risk	Invasive species - invasive species along river corridor that require treatment	Increase in costs to address the invasives. Delays to scheme promotion while invasives	Commercial		5	5	25		Client	Undertake a invasive species survey. Agree a strategy for dealing with them. Include costs in estimate	
16	Risk	Structurally sensive structures	Impact on nearby structures resulting in onerous construction restrictions and works,	Commercial		5	4	20		Client	Review nearby structures and their susceptiability to nearby construction vibration and works. Determine mitigation	
17	Risk	Compulsory Purchase - properties require compulsory purchase for works to proceed	Objections from community resulting in delays in scheme development. Scheme may not get	Commercial		4	4	16		Client	Review how scheme will be constructed and determine if compulsory purchase is requiried.	
18	Risk	Dalginross Bridge - Impact on bridge greater than anticipated resulting in increase in design, costs and delays	Delays and construction costs increase.	Commercial		3	5	15		Client	Review impact of scheme on bridge to accommodate flood gates and increased hydraulic load. Allow for works to bridge if	
19	Opportunity	We can store flood water upstream in Lednock / Earn Lochs	Reduces construction in town	Commercial		1	5	-5		Client	Discuss with SSE possibility for use of upstream dams. Arrange meeting with client and SSE at some point to further discuss.	
20	Risk	Upper Earn defences impratical and not cost effective	Scheme does not progress. Public objection to no defences in this area or the scale of them.	Commercial		4	4	16		Client	Review defences in this area and identify preferred alignment. Review other alternatives such as diversion.	
21	Risk	Programme too ambitious	Risk of slippage or some a missed component of the scheme	Operational		4	4	16		Consultant	Technical reviews and checks by project team. Programme to be agreed that allows the project team to cover all aspects.	
22	Risk	River bank needs extensive river erosion	Increased costs and delays	Commercial		3	4	12		Client	Review river bank and proposed defences. Design to ensure flood defences are protected.	
23	Risk	Archaeological interests locally	Increased costs and delays.	Commercial		2	4	8		Client	Undertake desk based search to review potential interests and impacts. Investigate further if necessary. Add costs to deal with	
24	Risk	Sheet pile driveability	Sheet piles refuse to drive to required depth	Commercial		5	5	25		Client	Thorough GI and review. Piling contractor advice. Design based on likely driveability. Alternative design considered if need be.	
25	Risk	River bank stability	River bank is unstable and does not provide support to flood defences. Design change.	Commercial		3	4	12		Client	Geo-morphological assessment of river banks. Design to ensure stability of defences.	
26	Risk	Insufficient topographic levels used	Incorrect defence heights calculated. Wrong costs estimated. Costs should be higher.	Commercial		4	5	20		Client	Undertake new topo survey for defence line to accurately determine defence heights.	
27	Risk	Increased flood risk to other properties	Scheme promotion hindered	Commercial		5	5	25		Client	Identify properties at increased flood risk and develop mitigation measures.	

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28	Risk	Inadequate scoping of compensation budget	Increase in scheme costs and delays	Commercial		4	3	12		Client	Engage with public and landowners to identify compensation budgets. Seek agreement with landowners prior to flood order.	
29	Risk	Increase in hydraulic load to bridges	Bridges cannot withstand increase in hydraulic load from raised water levels. Additional works	Commercial		3	5	15		Client	Review additional hydraulic load on bridges and effect on bridge. Develop mitigation measures if need be.	
30	Risk	Landownership changes during scheme development	Agreements with landowners alter as scheme progresses and agreements reached with	Commercial		3	4	12		Client	Review landownership at various stages of scheme. Engage with new landowners if required.	
31	Risk	Artillery finds on site	Excavation uncovers artillery shells. Delays to construction and increase in scheme costs.	Commercial		3	4	12		Client	Review likelihood of artillery shells being present via review of historic maps. Possible trial digs if considered necessary. Include	
32	Risk	Utilities cost estimates are low	Utilities cost estimates C3 are low compared with C4 estimates	Commercial		4	5	20		Client	Provide comprehensive information to utilities for review and estimation. Review of utilities estimates and increase allowance	
33	Risk	Dalginross Bridge - a flood gate at the bridge is unfeasible	Other options need to be considered such as raising bridge deck. Increase in costs	Commercial		4	5	20		Client	Review feasibility of installing a flood gate at the bridge by review of available products and liaison with suppliers.	
34	Risk	Changes in river bed levels over project duration	Flood levels alter and affect defence levels. Increase in cost.	Commercial		4	3	12		Client	Undertake river topographic survey at key stages to confirm flood levels. Amend design if need be.	
35	Risk	Shared land ownership where flood defences are required.	More extensive consultation is required to obtain agreement with landowners. Delays,	Commercial		3	5	15		Client	Ensure landowner information is obtained and reviewed. Extensive consultation with shared owners to reach agreement.	
36	Opportunity	Re-use of existing flood defences	Existing flood defences can be used in flood scheme. Reduce scheme costs	Commercial		3	4	-12		Client	Assess existing defences suitability for re-use in scheme	
37	Opportunity	Re-use of excavated material	Excavated material can be re-used in flood scheme. Reduce scheme costs	Commercial		3	3	-9		Client	Review suitability of material for re-use in the scheme	
38	Risk	Trunk road needs to be closed for part of the works	Significant road closures and diversions required and weekend / night working.	Commercial		4	4	16		Client	Review constructability at these locations and identify alternative options to mitigate need for diversions.	
39	Opportunity	Environmental opportunities to enhance local environment	Enhance local environment. Public satisfaction	Commercial		3	3	-9		Client	Review all environmental enhancement opportunities and discuss with client for incorporation into scheme	
40	Risk	Do not receive all pertinent information from various stakeholders	Information is not provided and therefore scheme not fully designed. Costs increase and	Commercial		4	5	20		Client	Continious liaison with PKC / stakeholders and assurances that they have provided all information at key stages.	
41	Issue	The inclusion of flood gates means there is additional operational responsibility on the Council	Additional operational resources required. Risk gates are not shut prior to a flood event.	Operational		4	5	0		Client	Review need for flood gates and design out if possible. Review operational requirements prior to acceptance these need to form	
42	Risk	Freeboard - PKC request lower freeboards levels are used instead of Mouchel recommended freeboard levels.	Flood defences are lower and costs reduce. Scheme more economically viable	Commercial		3	5	15		Client	Standard of protection reduces and risk of over design events increases. Clear communication to document client instruction to	
43	Risk	Environmental surveys - windows for surveys are missed	Delays to scheme promotion	Commercial		3	4	12		Client	Advise client of environmental survey windows and recommend surveys are planned for in advance	
44	Risk	Flow surveys - miss optimum window for obtaining flow survey data	Delays to scheme promotion. Insufficient data is collected for calbrating the drainage system	Commercial		3	4	12		Client	Drainage system is not fully calibrated. Risk the drainage system is not fully representative of what actually happens and hence	
45	Risk	Flood gates on bridge - during a flood event, emergency services cannot cross the bridge to attend incidents on the other side of	Damages, injury, death during a flood event	Commercial		5	5	25		Client	Review scheme design and impact on emergency planning. Ensure suitable measures can be implemented prior to	
x		If you need to add more risks, insert rows above this line and copy down formulae										