APPENDIX L - Option Cost Estimates

1) Preferred Option Technical Note (Option P2)
2) All Primary Options
3) Estimated OB Factor

© WSP 2017

1) Preferred Option Technical Note (Option P2)

© WSP 2017

Project name		Comrie Flood Alleviation Scheme	
Element of overall project		Costing Technical Note (Preferred Option)	
Mouchel project reference number		1069622	
Technical Note Reference		WP05_TN_001	
Revision and status		Draft v1	
Originator(s)	A Williamson	**Date**	24.05.16
Checker(s)	P Swift / M Whittaker	**Date**	24.05.16
Reviewer(s)	P Swift / M Whittaker	**Date**	24.05.16
Issued	31.05.16	**Distribution**	PD, CMQ, PS, AW

Table 1: Walls and Embankments

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
1	Wall	3102	1.23	1906	£5,913,411
2	Embankments	657	0.95	694	£456,271
				Total Cost (£)	**£6,369,681**

Item 1 Assumptions:

a) Height is an average height of all of the walls included in the scheme. This includes for 900 metres of flood walls along the Upper Earn at an assumed height of 1.5 metres high at this stage in the absence of any better information at this stage (this area has not been scoped out at this stage). Further scoping of the Upper Earn however could reduce this figure.

b) Piles below to average 4.5m deep sheet steel (based on an initial seepage test for two locations by geotechnical team)

c) Gritstone facing and coping finishes or similar/allowances for fence/boundary wall reinstatement / accommodation works & disruption to private services to private properties.

(Rate has been built up based on these items and assumptions)

Item 2 Assumptions:

a) Height is an average height of all of the embankments included in the scheme.

b) Embankments include a clay core cut off.

c) Scour protection measures to riverside slopes/allowances for fence/boundary wall reinstatement / accommodation works & disruption to private services to private properties.

(Rate has been built up based on these items and assumptions)

Table 2: Environmental mitigation, landscaping, accommodation works, private services & existing features

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
3	Uplift % (5%)	NA	NA	£6,369,681	£318,484
				Total Cost (£)	**£318,484**

Item 3 Assumptions:

a) This is based on a 5% uplift on the total for items 1 and 2 (i.e. 5% x £6,369,681 = £318,484). This is for items that are not included for elsewhere concerning, environmental/wildlife matters and reinstatement of private and public areas following the works. The 5% is a cumulative figure often used for these matters in estimating at this stage of design development. It has also been judged to give us an appropriate sum of money in the estimate to cover these matters currently and to avoid them being overlooked.

Table 3: Contaminated Land

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
4	Contaminated Land	NA	NA	NA	£50,000
				Total Cost (£)	**£50,000**

Item 4 Assumptions:

a) This has been based on discussions with the contaminated land team as their current best estimate of the cost to undertake any work relating to contaminated land.

Table 4: Drainage

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
5	225mm Pipe (2m depth)	1500	NA	75	£112,500
6	MHs / outfalls / flap valves	NA	NA	NA	£56,250
7	Pumping Stations	4 no.	NA	75,000	£300,000
8	Electrical / mechanical costs	4 no.	NA	25,000	£100,000
				Total Cost (£)	**£568,750**

Item 5 Assumptions:

a) This has been based on discussions with a principal drainage engineer on what will be needed for the scheme. Drainage pipes have been assumed to 225 diameter pipes at an average depth of 2 metres for a total length of approximately 1500 metres. The rate has been based on this size and depth of pipe.

Item 6 Assumptions:

a) A 50% increase uplift has been allowed for MHs / outfalls / flap valves, based on the QS's experience of costing for these drainage items that are going to be required but are not currently identified / designed in detail currently.

Item 7 & 8 Assumptions:

a) It is initially estimated that a total of 4 pumping stations at this stage will be required based on the scheme layout and likely surface water build up locations behind defences.

b) Additional costs of each of the pumping stations for electrical and mechanical works have also been included

c) Almondbank pumping station is estimated at £122k. There is no detail currently for these pumping stations which can vary vastly in price dependent upon their size and specifications. This is an appropriate allowance at this stage from the QS's experience to cover an average price for these currently undefined items and include for them in the estimating

Table 5: River Works

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
9	River Erosion	1200	NA	845	1,014,450
10	River Stabilisation	500	NA	664	332,062
				Total Cost (£)	**£1,346,513**

Item 9 & 10 Assumptions:

a) Based on an initial scoping of the lengths of river erosion and stabilisation works which would be needed as part of the scheme.

b) Rates are based on an estimation of the clearance for the length and distance of bank slopes and an allowance for rock protection / excavation and fill based on other schemes.

Table 6: Flood Gates:

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
11	Pedestrian Flood Gates	33 no.	NA	3000	99,000
12	Vehicle Flood Gates	3 no.	NA	6500	19,500
				Total Cost (£)	**£118,500**

Item 11 & 12 Assumptions:

a) A total of 3 vehicle access gates are proposed through the town and 7 pedestrian access gates are proposed through the town.

b) Another 26 pedestrian access flood gates are assumed at this stage along the upper earn (one for each property) in the absence of better information (this area has not been scoped out at this stage). Rates are based on typical costs based on manufacturers' websites.

Table 7: Invermilton Defences

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
13	Invermilton protection	300	1 (assumed)	1300	390,000
				Total Cost (£)	**£390,000**

Item 13 Assumptions:
;

a) A 1 metre high defence wall / embankment is assumed to be required around the Invermilton depo at this stage. An average rate for the wall and embankment (used in item 1 and 2) has been used.

Table 8: Sub- total for Items 1 -13

No. Item	Item	Cost (£)
1	Walls	£5,913,411
2	Embankments	£456,271
3	Environmental mitigation accommodation works / Private services / existing features	£318,484
4	Contaminated Land	£50,000
5	225mm Pipe (2m depth)	£112,500
6	MHs / outfalls / flap valves	£56,250
7	Pumping Stations	£300,000
8	Electrical / mechanical costs	£100,000
9	River Erosion	£1,014,450
10	River Stabilisation	£332,062
11	Pedestrian Flood Gates	£99,000
12	Vehicle Flood Gates	£19,500
13	Invermilton protection	£390,000
	Total Cost (£) - Sub Total 1	**£9,161,928**

Table 9: Works by and for Statutory and Other Authorities

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
14	Uplift % (15%) x Sub Total 1	NA	NA	£9,161,928	£1,374,289
			Sub Total 2	Total Cost (£)	**£1,374,289**

Item 14 Assumptions:

a) An allowance has been made at this stage based on the QS experience on other projects. This figure varies dependent upon the work content to give an appropriate amount to cover for Statutory undertakers and other bodies equipment that may have to be protected or diverted including for consultation, attendance, any estimating/design they may have to do and to cover , main contractor work (trial pitting) and attendances for them.

b) It also includes for local authority resources input, fees, licences and costs, police liaison etc. For reference Almondbank includes for £810k approx. 12% on works costs.

Table 10: Sub- total for Items 15 & 16

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
15	Preliminaries 1	NA	NA	**27.5% x Sub Total 1**	**£2,519,530**
	Overhead & Profit	NA	NA	20%	
	Working in rivers, temp works	NA	NA	2.5%	
	Access, time constraints	NA	NA	2.5%	
	Traffic Management, Access	NA	NA	2.5%	
16	Preliminaries 2	NA	NA	**12.5% x Sub Total 2**	**£171,786**
			Sub Total 3:	Total Cost (£)	**£2,691,316**

Item 15 & 16 Assumptions:

a) An allowance has been made at this stage based on the QS experience on other projects.

b) Base level of prelims as a starting point and then an allowance has been included for scheme specifics as stated. Basic breakdown is as follows, 1.5% insurance, 6% overhead admin/contribution, 3% profit, 8.5% site overhead and 1% financing.

c) 12.5 % in item 16 is an allowance for management time only by the contractor on certain specialist aspects of the contract, undertaken by the statutory authority or specialist sub-contractors and therefore reducing the contractors preliminaries in some aspects e.g. management of service providers and diversions of utilities.

Table 11: Subtotal for Items 1 – 16

No. Item	Item	Cost (£)
Sub Total 1	Measured Works	£9,161,928
Sub Total 2	Works by and for Statutory and Other Authorities	£1,374,289
Sub Total 3	Preliminaries 1 & 2	£2,691,316
	Total Cost (£) – Sub Total 4 - Total to construct	**£13,227,534**

Table 12: Scheme Design and Supervision

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
17	Uplift % (16%) x Sub Total 4	NA	NA	£2,116,405	£2,116,405
				Total Cost (£)	**£2,116,405**

Item 17 Assumptions:

a) This item includes for surveys, site and other investigations including data collection, design development, procurement, scheme supervision, management and administration (to include Geotechnical, environmental and ecological considerations).

b) Based on the QS experience this amount ranges between 12.5 to 17.5% dependent upon scheme size and complexity but with reference to Almondbank, a figure towards the higher value has been used. More detailed costing may require this value to be increased but 16% has been used at this stage.

c) The environmental item is for consultants or specialists to survey for and identify species habitats etc. and design mitigation measures. Item 3 is for incorporating and constructing environmental mitigating measures.

Table 13: Land Requirements and Compensation

No. Item	Item	Total Length (m)	Average Height (m)	Rate (£) / Unit metre	Total Cost (£)
18	Land requirements & comp.	NA	NA	NA	£458,461
				Total Cost (£)	**£458,461**

Item 18 Assumptions:

a) This is based on an urban land area of 2.187 hectares / 5.27 acres (the footprint area of the scheme) with a typical rate of £75,000 of compensation required per acre in an urban environment. A further 16% has been added to cover PKC's and Mouchel's liaison fee. An assumption has been made that some land will have to be purchased from lots of the land owners.

b) As a comparison £250k was used for the Almondbank scheme but this was a smaller scheme.

Table 14: Scheme Total Construction Cost Summary

No. Item / Sub Total	Item	Cost (£)
Sub Total 1	Measured Works	**£9,161,928**
Sub Total 2	Works by and for Statutory and Other Authorities	**£1,374,289**
Sub Total 3	Preliminaries 1 & 2	**£2,691,316**
Sub Total 4	**Total Cost (£) – Total to construct**	**£13,227,534**

Table 15: Scheme Construction, Design and Supervise Total Cost Summary

No. Item / Sub Total	Item	Cost (£)
Sub Total 4	**Total Cost (£) – Total to construct**	**£13,227,534**
Item 17	Design and supervise	**£2,116,405**
Item 18	Allowance for land and compensation	**£458,461**
Sub Total 5	**Total Cost (£) – total to construct, design and supervise with land**	**£15,802,400**

Table 16: Scheme Construction Summary Including Risk and Lower Optimism Bias

No. Item / Sub Total	Item	Cost (£)
Sub Total 5	**Total Cost (£) – Total to construct**	**£15,802,400**
Item 20	Risk Allowance (0 %)	**£ 0**
Sub Total 6	**Total Cost (£) – Total to construct with risk allowance**	**£15,802,400**
Item 21	Sub Total 6 x Lower Optimism Bias (40.8%)	**£6,447,379**
Sub Total 7	**Total Cost (£) – Total to construct with risk allowance and optimism bias**	**£22,249,780**
Item 22	Inflation for 2020 Q3 Uplift	**£2,224,978**
Grand Total		**£24,474,758**

Item 20 Assumptions:

a) 0% risk has been included. No further risk allowance (in addition to the optimism bias) has been used in this calculation as selected by PKC.

Item 21 Assumptions:

a) Optimism bias has been based on the Scottish Government guidance calculation for flood schemes and has been issued to the client. A value of 40.8% has been used in this calculation as selected by PKC.

Item 22 Assumptions:

a) This assumes a 2% uplift for 5 years from Q3 2015 to Q3 of 2020 when the project is likely to begin construction.

2) All Primary Options

© WSP 2017

Project Name: **Comrie & Dalginross Flood Defence Scheme**

Simple Descriptive Summary of Costs for Primary Options showing key quantities

Option No	Description	Cost (£)	Cost (£)	Cost (£)	Cost (£)	Cost (£)	Cost (£)	Comments
		Option P2	Option P4	Option P5	Option P6	Option P1	Option P3	
	Flood defence wall (both banks to rivers)	Walls & Embankments	Walls & Embankments with storage Ruchill	Walls & Embankments with storage R Earn	Walls & Embankments with storage R Lednock	Dredging	Storage only R Earn & Ruchill	
Option P2	Average1.23m high above existing levels reinforced Concrete Wall for a total length of 3102m	£5,913,411						walls include:- Piles below to ave 4.5m deep sheet steel/ Gritstone facing and coping finishes or similar/allowances for fence/boundary wall reinstatement/ accomodation works & disruption to private services to private properties.
	Average 0.95m high above existing levels earth embankments for a total length of 657m	£456,271						
Option P4	Average 0.71m high above existing levels reinforced Concrete Wall for a total length of 3026m		£5,291,446					
	Average 0.46m high above existing levels earth embankments for a total length of 657m		£317,820					
Option P5	Average 1.18m high above existing levels reinforced Concrete Wall for a total length of 2774m			£5,478,139				
	Average 0.49m high above existing levels earth embankments for a total length of 985m			£513,823				embankments include:- Scour protection measures to riverside slopes/allowances for fence/boundary wall reinstatement/ accomodation works & disruption to private services to private properties.
Option P6	Average 1.18m high above existing levels reinforced Concrete Wall for a total length of 2774m				£5,463,734			
	Average 0.58m high above existing levels earth embankments for a total length of 985m				£564,636			
	Sub-total 1: Walls	**£5,913,411**	**£5,291,446**	**£5,478,139**	**£5,463,734**	**£0**	**£0**	
	Sub-total 2: Embankments	**£456,271**	**£317,820**	**£513,823**	**£564,636**	**£0**	**£0**	
	Upstream Storage(by concrete core and rock dam walls or alternative methods) incl associated necessary installations and equipment		storage	storage	storage		storage	
Option P2	None							
	Associated necessary equipment/installations							
Option P3	2 KM reservoir of Water of Ruchill 4.1M cu m storage						£15,386,164	
	2 KM reservoir of Water on Upper River Earn 2.9M cu m storage						£8,281,407	
	Associated necessary equipment/installations						£2,378,524	
Option P4	2 KM reservoir of Water of Ruchill 4.1M cu m storage		£15,386,164					
	Associated necessary equipment/installations		£1,384,755					
Option P5	2 KM reservoir of Water on Upper River Earn 2.9M cu m storage			£8,281,407				
	Associated necessary equipment/installations			£993,769				
Option P6	1.4 KM reservoir of Water on River Lednock 1.2M cu m sorage				£2,983,592			
	Associated necessary equipment/installations				£462,457			
	Sub-total 3: Storage	**£0**	**£16,770,918**	**£9,275,176**	**£3,446,049**	**£0**	**£26,046,094**	
	Dredging (incl stockpile , deposition and disposal)							
Option P1	As longsection details average 5m depth dredged					£15,865,371		
	Sub-total 4: Dredging	**£0**	**£0**	**£0**	**£0**	**£15,865,371**	**£0**	
	Total for Each Option Measured Works(shown above)	**£6,369,681**	**£22,380,183**	**£15,267,138**	**£9,474,419**	**£15,865,371**	**£26,046,094**	
	Other Likely Major Items of Cost (incl prelims)							
	Allowance for dealing with Ecological & Environmental mitigation/Landscaping/Accomodation works/Private services/existing features.	£318,484.07	£1,119,009.17	£763,356.90	£473,720.95	£793,268.54	£1,302,304.71	
	Contaminated land current assessment	£50,000	£50,000	£50,000	£50,000			
	Drainage 1500lm total	£112,500	£112,500	£112,500	£112,500			
	associated collection/outlets flapvalves/outfalls	£56,250	£56,250	£56,250	£56,250			
	pumping stations	£300,000	£300,000	£300,000	£300,000			
	associated electrical/mechanical and civils associated	£100,000	£100,000	£100,000	£100,000			
	River bank erosion protection 1200lm	£1,014,450	£1,014,450	£1,014,450	£1,014,450	£1,014,450		
	River bank stabilisation 500lm	£332,063	£332,063	£332,063	£332,063	£332,063		
	flood gates vehicular 3no	£19,500	£19,500	£19,500	£19,500			
	flood gates pedestrian 33no	£99,000	£99,000	£99,000	£99,000			
	Property protect(House and depot downstream likely affected invermilton) Walls/embankments 300m	£390,000	£390,000	£390,000	£390,000			
	Total for Each Option Measured Works(Other Major items)	**£2,792,247**	**£3,592,772**	**£3,237,119**	**£2,947,483**	**£2,139,781**	**£1,302,305**	
	Works by and for Statutory and Other Authorities	£1,374,289	£1,883,381.45	£1,812,219.54	£1,789,868.79	£270,077.28	£947,022.59	
	Preliminaries(incl OH&P 20%, Temp works/working in adj water courses 2.5% restricted access/working time contraints 2.5% & TM/Ped access 2.5%)	£2,691,316	£6,539,439	£4,851,439	£3,467,454	£2,605,371	£6,336,883	
	Total for Each Option Measured Works and associated costs	**£13,227,534**	**£34,395,776**	**£25,167,916**	**£17,679,225**	**£20,880,600**	**£34,632,304**	
	Surveys, Investigations ,Design development, Procurement, Supervision & management (incl Geotechnical, environmental and ecological considerations)	**£2,116,405**	**£3,668,882.78**	**£2,684,577.74**	**£1,885,784.05**	**£1,670,447.99**	**£3,694,112.46**	
	Land Requirements and compensation Allowances only at this stage	**£458,461**	**£3,557,272.82**	**£3,620,779.77**	**£3,163,103.57**	**£0.00**	**£6,429,880.00**	
	GROSS SCHEME BASE ESTIMATE incl DESIGN/MANAGE & Lands allowance (Excl. VAT).	**£15,802,400**	**£41,621,932**	**£31,473,274**	**£22,728,113**	**£22,551,048**	**£44,756,297**	
	No separate consideration is given to each option currently							
	Client instructed OB Allowance(Lower Bound incl risk at this stage 40.8%)	£6,447,379	£16,981,748	£12,841,096	£9,273,070	£9,200,828	£18,260,569	
	overall effective risk/OB %	*40.8%*	*40.8%*	*40.8%*	*40.8%*	*40.8%*	*40.8%*	
	Whole Scheme Esimate incl. OB & Risk allowances (Excl VAT) for works likely as identified in Preliminary Assessment Current Q3 2015.	**£22,249,780**	**£58,603,680**	**£44,314,370**	**£32,001,183**	**£31,751,875**	**£63,016,866**	
	Forecast Future inflation to anticipated start construction period Year 2020	£2,224,978	£5,860,368	£4,431,437	£3,200,118	£3,175,188	£6,301,687	
	Whole Scheme Esimate incl. Land allowance, OB, Risk and future inflation allowances (Excl VAT) for works likely as identified in Preliminary Assessment forecast to 2020.	**£24,474,758**	**£64,464,048**	**£48,745,807**	**£35,201,302**	**£34,927,063**	**£69,318,552**	
		Option P2	**Option P4**	**Option P5**	**Option P6**	**Option P1**	**Option P3**	
		Walls & Embankments	Walls & Embankments with storage Ruchill	Walls & Embankments with storage R Earn	Walls & Embankments with storage R Lednock	Dredging	Storage only R Earn & Ruchill	
	Option 4							
	GROSS SCHEME BASE ESTIMATE incl DESIGN/MANAGE and a lands allowance (Excl. VAT).EXCL OB/RISK allowance	15,802,400	OB/Risk	£6,447,379				
	Forecast Future inflation to anticipated start construction period Year 2020	1,580,240		644,738				
	current construction cost estimate	17,382,640	currently firm but future adjustable	7,092,117	to be managed, firmed up, mitigated, value engineered as further defined			

Review by Martyn G Whittaker for Mouchel w/e 20/11/15 & 27/11/15 | *Revision B Martyn G Whittaker w/e04/12/15 revC and D w/e 11/03/16* | *revised verE w/e 20/05/16 used as base*

Risk/OB factors reviewed in version F Aug16 version F further reviewed/reduced as client instructed version G

Project Name: **Comrie & Dalginross Flood Defence Scheme**

Simple Summary of Costs for Primary Options

Option No	Description	Cost (£)	Cost (£)	Cost (£)	Cost (£)				Cost (£)		Cost (£)		Grand TOTAL for Budgetary purposes.		Grand TOTAL for Budgetary purposes.		
	Flood defence wall (both banks to rivers)	basic constructtion costs for current design details	preliminaries	other likely major work items	allowance for statutory and other parties	**Total to construct**	Design and supervise	**Total to Design build and supervise**	allowance for lands and compensation	**Total incl Land but Excl OB/Risk**	Current Best Estimate OB/Risk allowance	**Total incl OB/Risk**	**TOTAL Q3 2015 prices**	Future inflation	**TOTAL Q3 2020 prices**	approx maintenance cost for 50 years at 2020 prices	**Total 50 year life cost**
Option P2	Walls & Embankments	£6,369,681	£2,691,316	£2,792,247	£1,374,289	**£13,227,534**	£2,116,405	**£15,343,939**	£458,461	**£15,802,400**	£6,447,379	**£22,249,780**	**£22,249,780**	£2,224,978	**£24,474,758**	£2,313,300	**£26,788,058**
Option P4	Walls & Embankments with storage Ruchill	£22,380,183	£6,539,439	£3,592,772	£1,883,381	**£34,395,776**	£3,668,883	**£38,064,659**	£3,557,273	**£41,621,932**	£16,981,748	**£58,603,680**	**£58,603,680**	£5,860,368	**£64,464,048**	£6,925,303	**£71,389,350**
Option P5	Walls & Embankments with storage R Earn	£15,267,138	£4,851,439	£3,237,119	£1,812,220	**£25,167,916**	£2,684,578	**£27,852,494**	£3,620,780	**£31,473,274**	£12,841,096	**£44,314,370**	**£44,314,370**	£4,431,437	**£48,745,807**	£4,863,973	**£53,609,780**
Option P6	Walls & Embankments with storage R Lednock	£9,474,419	£3,467,454	£2,947,483	£1,789,869	**£17,679,225**	£1,885,784	**£19,565,010**	£3,163,104	**£22,728,113**	£9,273,070	**£32,001,183**	**£32,001,183**	£3,200,118	**£35,201,302**	£3,260,963	**£38,462,265**
Option P1	Dredging	£15,865,371	£2,605,371	£2,139,781	£270,077	**£20,880,600**	£1,670,448	**£22,551,048**	£0	**£22,551,048**	£9,200,828	**£31,751,875**	**£31,751,875**	£3,175,188	**£34,927,063**	£9,381,323	**£44,308,386**
Option P3	Storage only R Earn & Ruchill	£26,046,094	£6,336,883	£1,302,305	£947,023	**£34,632,304**	£3,694,112	**£38,326,417**	£6,429,880	**£44,756,297**	£18,260,569	**£63,016,866**	**£63,016,866**	£6,301,687	**£69,318,552**	£9,475,976	**£78,794,528**
work content on descriptive summary											40.8% lower bound						
Revision B Martyn G Whittaker w/e04/12/15 revC and D w/e 11/03/16		*revised verE w/e 20/05/16 used as base*															

Risk/OB factors reviewed in version F Aug16 version F further reviewed/reduced as client instructed version G

3) Estimated OB factor

© WSP 2017

Comrie Flood Mitigation Scheme - Optimism Bias Calculation

Risk components contributing to above factors (%, summing to 100 – see next page for definitions)		Average % for Flood Defence Projects	Comrie Project Risk %	Comments
Procurement	Late contractor involvement in design	1	1	No procurement of a contractor has been undertaken at this stage and there has been no ECI as yet to review scheme constructability or coststt. Therefore, for these reasons this risk value has not been reduced from 1.
	Dispute and claims occurred	11	11	No contractor has been appointed as yet and no consideration of how the contract documents will negate dispute or claims has been discussed. A risk register has been produced identying key risks some of which if not carefully designed and mitigated, have the potential to result in disputes and or claims. There has been limited consultation and agreements in place with other third parties e.g. Scottish Water, SEPA, SNH, Statutory Bodies, Land Owners too. Therefore, for these reasons, this risk value has not been reduced from 11.
	Other	1	1	For the reasons outlined above, the project the risk value has not been reduced from 1.
Project specific	Design complexity	4	2	Constraints on the site are likely to cause some complexity for the implementation of the project e.g. working along river corridor, working on others land, environmental sensitvities such contaminated land, restrictions of working area, access, possible compulsory purchase for example. Some of these working areas may include working from the river and include areas where access and working area is limited.
	Degree of innovation	4	1	The techniques undertaken are proven flood mitigation techniques used however, there may be some bespoke elements such as flood gates.
	Environmental impact	13	11	The proposed works will have adverse environmental impact on watercourses and river corridor. No habitat survey has yet been completed so the extent of the potential impacts are unknown. Significant tree loss may result though. So on this basis, iit is considered appropriate to reduce the score from 13 to 11.
	Other	9	4.5	There is still uncertainty in the design at this stage especially in some locations such as Invermilton and the upper Earn.
Client specific	Inadequacy of the Business Case	23	11.5	The scheme is within the Scottish Flood scheme Programme and is identified as a priority site. The current benefit cost ratio is aboce 1 (1.25) based on the current costing of the scheme. The current calculated costs for the scheme have increased and caused a reduction in the B:C ratio which is considered a risk. The economic appraisal is close to completion at this point. The project has a risk contingency.
	Funding availability	2	1	The funding process from the Scottish Government is unclear regarding how Scottish Government decide upon allocation of funding to schemes. Therefore the funding for the scheme is not guaranteed. There is also uncertainty as to if the Council can afford their part of the funding required at this stage (the funding is generally 80% Scottish Government and 20% Local Authority (Client).
	Project management team	1	1	There has been continuity of staff on the project to date. But over the subsequet years of the project, this may alter. The current teams have experience of delivering similar projects and can draw upon their experience to help deliver this project. For these reasons, this risk value has not been reduced from 1.
	Poor project intelligence	8	6	We have developed what is workable scheme but a lot of issues still need to be further developed. A risk register has been developed and identifies the key risks and areas to develop mitigation strategies.
Environment	Public relations	5	5	Engagement is planned with the local community and the majority of land owners directly affected by the scheme have been identified. However as the preferred scheme has not yet been presented to the community, there is still some uncertainty over the communities full acceptance of the preferred scheme. It is possible that some people within the community will object to the scheme. This is based on past experience of some of the local land owners. For these reasons, this risk value has not been reduced from 5.
	Site characteristics	4	4	An environmental baseline report has been undertaken but no habitat survey has yet been undertaken and so this issue has not been fully investigated at this stage in the project. Based on the findings of the habitat survey and further environmental work, it could cause delays and increases in cost to the project. It is also very probable that a full EIA will be required for this scheme. For these reasons, this risk value has not been reduced from 4.
External influences	Economic	5	3	Governments are currrently seeking to fund flood schemes but the budget has been reducing over the years. A lot of other authorities are vying for the same funding too. Currently there is still uncertainty in the economy in the short to medium term and this could be affected by potential political changes (e.g. EU Referendum Result). Overheated market could be an issue when this goes to site, also the availability of resources such as contractors availability to undertake the work.
	Legislation/regulations	4	2	Scotland National Flood Risk management Strategy has been published with committment for funding over the next 6 years. New floods bring a change of legislation and empahsis. A lot of uncertainty in this area due to possible political changes in the short to medium term (e.g. elections, EU Referendum). Election / referendum results are likely to have some impact on legislation and regulations currently in place.
	Technology	4	2	Once outline design has been completed, we will have a better understanding regarding how advances in construction methods and flood alleviation products could affect the construction of the scheme (construction is likely to start in 2018 onwards). There may unlikely be limited technicloglical improvements in this sector though albeit improvements in flood warning times may influence the preferred option.
	Other	1	1	Because we are in such an early stage of the scheme, there are still many unknowns at this time and this factor has therefore not been reduced. For these reasons, this risk value has not been reduced from 1.
	TOTAL	100	68	

Optimism Bias: 40.8 %

Link below:

http://www.gov.scot/Publications/2012/02/9806/13