



South Western CFRAM Study

Preliminary Options Report UoM 22

July 2016

The Office of Public Works



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The Office of Public Works

Jonathan Swift Street
Trim
Co. Meath

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Issue and Revision Record

Revision	Date	Originator	Checker	Approver	Description
A	December 2015	TD / RM / JD	B. O'Connor	F. McGivern	Draft Issue
B	March 2016	T. Donovan	B. O'Connor	F. McGivern	Draft Issue
C	May 2016	T. Donovan	B. O'Connor	F. McGivern	Draft Final
D	June 2016	T. Donovan	B. O'Connor	F. McGivern	Final
E	July 2016	J Desmond	T Donovan	F McGivern	Final

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Information class: Standard

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Appendix A. Estimate of Costs

Summary

UoM	22	Optimism Bias	42.47%
AFA	Castleisland	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood defences	Preliminaries	7%
Description	Flood defences	Design Fees	13%
		Compensation and Land	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 60,468.52

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 8,531,424.03	€ 10,514.00	€ 8,541,938.03
2	Embankments	€ 290,446.26	€ 95,045.18	€ 385,491.45
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising			€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 8,952,070.29	€ 314,531.66	€ 9,266,601.95
		Basic Construction Costs		€ 8,952,070.29
		Preliminaries		€ 626,644.92
		Optimism Bias		€ 4,068,136.70
		Construction Costs (Excl VAT)		€ 13,646,851.91
		Design Fees		€ 1,774,090.75
		Σ Construction Costs and Fees		€ 15,420,942.66

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 1,364,685.19
Allowance for Compensation and Land Acquisition	€ 1,364,685.19
Site Investigation	€ 50,000.00
Art Allowance	€ 60,468.52
PV O&M	€ 314,531.66
PV O&M Optimism Bias	€ 133,583.45
Σ Other Items	€ 3,287,954.00

Option Cost for Cost Benefit Analysis € 18,708,896.66

CFRAM Unit Cost Development Project				
Optimism Bias Calculator				
Prepared by:	MM	Date:	December 2015	
Site Reference:		Site Name:	Castleisland	1 - Flood defences

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:
				<div></div> Default weighting defined by OPW for all CFRAM projects <div></div> Default risk value defined for all CFRAM projects <div></div> Automated function cell (no input required) <div></div> User defined - risk value, comments, justification
Procurement	Weight	Select from Dropdown Risk score		Comment/justification
Complexity of Contract Structure	1	Medium	50%	Default risk value
Late Contractor Involvement in Design	2	Medium	50%	Default risk value
Poor Contractor Capabilities	1	Medium	50%	Default risk value
Government Guidelines	1	Medium	50%	Default risk value
Dispute & Claims Occurred	3	Medium	50%	Default risk value
Information Management	1	Medium	50%	Default risk value
Budgeting	2	Medium	50%	Default risk value
Other	1	Medium	50%	Default risk value
Project Specific				
Design Complexity	2	High	70%	Large scheme with walls, embankments and pump stations
Degree of Innovation	2	Low	30%	Standard and proven methods
Technology	2	Medium	50%	Pump stations and associated equipment required
Services	3	High	70%	Unknown - town centre with large amount of services expected
Ground conditions	3	Very High	90%	Unknown - expected karst area
Health and Safety	3	Medium	50%	Large scale scheme but no unusual risks associated with works
Other	1	High	70%	Surface water drainage, pump stations and karst area
Client Specification				
Inadequacy of the Business Case	3	Medium	50%	Default risk value
Large No. of Stakeholders	2	High	70%	High number of stakeholders
Funding Availability	2	Medium	50%	Default risk value
Project Management Team	1	Medium	50%	Unforeseeable
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs
Other	1	Very Low	10%	None
Environment				
Public Relations	2	High	70%	High number of stakeholders and interferences
Site Characteristics	2	Very High	90%	Japanese Knotweed and Giant Rhubarb identified along the river bank
Environmental Impact	3	Medium	50%	No significant environmental impacts
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals
Amenity and art	1	Medium	50%	Town centre - large number of stakeholders
Contaminated land	3	Medium	50%	Unknown
Archaeology	3	Medium	50%	Unknown
Other	1	Very Low	10%	None
External Influences				
Political	3	Medium	50%	Default risk value
Economic	2	Medium	50%	Default risk value
Legislation / Regulations	1	Medium	50%	Default risk value
Multiple river users / stakeholders	2	High	70%	Large number of stakeholders and interferences
Flood events during construction	3	Medium	50%	History of flooding
Other	1	Very Low	10%	None
	68		52%	
Weighting to apply: 0.541				Minimum Optimism Bias: 10% Maximum Optimism Bias: 70% Calculated Optimism bias: 42%

1. Walls

[illegible]

2. Embankments

2. Embankments		Imported Material	Length of Embankment	Height of Embankment		Rate	Capital Cost of Embankment	Maintenance Costs Estimate	PV Rate	PV Cost
		Select		Min 1.0m	Max 3.0m					
No.	Select Embankment from Dropdown	Yes/No	(m)	(m)		(€/m)	(€)	H/L	(€/m)	(€)
1	Rural clay embankment (€/m) < 100m	Yes	69.296	1.00		€ 138.67	€ 9,609.24	Average	€ 70.68	€ 4,898.00
2	Rural clay embankment (€/m) < 100m	Yes	48.502	1.00		€ 138.67	€ 6,725.75	Average	€ 70.68	€ 3,428.23
3	Rural clay embankment (€/m) < 100m	Yes	53.448	1.10		€ 154.91	€ 8,279.41	Average	€ 70.68	€ 3,777.83
4	Rural clay embankment (€/m) < 100m	Yes	77.34	1.00		€ 138.67	€ 10,724.70	Average	€ 70.68	€ 5,466.57
5	Rural clay embankment (€/m) < 100m	Yes	95.815	1.00		€ 138.67	€ 13,286.62	Average	€ 70.68	€ 6,772.42
6	Rural clay embankment (€/m) < 100m	Yes	115.84	1.30		€ 187.38	€ 21,705.92	Average	€ 70.68	€ 8,187.83
7	Rural clay embankment (€/m) < 100m	Yes	21.124	1.00		€ 138.67	€ 2,929.25	Average	€ 70.68	€ 1,493.09
8	Rural clay embankment (€/m) < 100m	Yes	115.049	1.40		€ 203.61	€ 23,425.68	Average	€ 70.68	€ 8,131.92
9	Rural clay embankment (€/m) < 100m	Yes	66.949	1.60		€ 236.09	€ 15,805.82	Average	€ 70.68	€ 4,732.11
10	Rural clay embankment (€/m) < 100m	Yes	17.658	2.70		€ 467.40	€ 8,253.42	Average	€ 70.68	€ 1,248.11
11	Rural clay embankment (€/m) < 100m	Yes	51.05	2.50		€ 419.87	€ 21,434.32	Average	€ 70.68	€ 3,608.33
12	Rural clay embankment (€/m) < 100m	Yes	63.858	1.90		€ 284.80	€ 18,186.53	Average	€ 70.68	€ 4,513.63
13	Rural clay embankment (€/m) < 100m	Yes	17.28	1.00		€ 138.67	€ 2,396.21	Average	€ 70.68	€ 1,221.39
14	Rural clay embankment (€/m) < 100m	Yes	83.595	1.20		€ 171.14	€ 14,306.63	Average	€ 70.68	€ 5,908.68
15	Rural clay embankment (€/m) < 100m	Yes	63.26	1.50		€ 219.85	€ 13,907.78	Average	€ 70.68	€ 4,471.36
16	Rural clay embankment (€/m) 100 - 1,000m	Yes	122.402	2.00		€ 284.53	€ 34,827.45	Average	€ 70.68	€ 8,651.65
17	Rural clay embankment (€/m) 100 - 1,000m	Yes	134.985	2.00		€ 284.53	€ 38,407.74	Average	€ 70.68	€ 9,541.05
18	Rural clay embankment (€/m) 100 - 1,000m	Yes	127.231	1.50		€ 206.19	€ 26,233.79	Average	€ 70.68	€ 8,992.98
								Average		
								Average		
Capital Cost							€ 290,446.26		Total PV Cost	€ 95,045.18
Total Cost										€ 385,491.45

3. Demountable Barrier

[illegible]

3a. Flood Gate

[illegible]

4. In-Channel Excavation

4. In-Channel Excavation		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
No. Select Excavation Type from Dropdown	Comments	Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
				Total Cost	€ 0.00

No. Dredging	Volume of Dredging	Rate	Cost of Dredging
	(m³)	Select a Rate from Dropdown (€/m³)	(€)
		Total Cost	€ 0.00

Total Excavation Costs € 0.00

5. Excavation on Land		Volume of Excavation	Rate	Cost of Excavation
No. Select Excavation Type from Dropdown	Comments	(m³)	(€/m³)	(€)
		Total Cost	€ 0.00	

6. Weir Construction		Width of Weir		Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
No. Select Weir Height from Dropdown	Comments	Min 10m	Max	(€/m)	(€)	Select	(€/weir)
		20m	(m)			H/L	
						Average	
				Capital Cost	€ 0.00	Total PV Cost	€ 0.00
						Total Cost	€ 0.00

7. Weir Removal		Length of Weir	Rate	Cost of Construction
No. Description of Weir	(m)	(€/m)	(€)	
		Total Cost	€ 0.00	

8. Bridges		Remove or Replace	Area of Bridge	Rate	Cost of Construction	PV Costs
No.	Description of Bridge	Select	(m ²)	(€/m ²)	(€)	(€/bridge)
		Yes/No				

9. Bridge Underpinning		Length of Bridge	Rate	Cost of Construction
No. Choose a suitable bridge from dropdown	Comments	(m)	(€/m)	(€)
		Total Cost	€ 0.00	

10a. Culverts (Rural)		Disposal of Spoil	Ground Type	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost	
No. Description of Culvert		Select	Select Soil/Rock	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)	
			Soil	2.5					High			
									Average			
									Low			
									Average			
									Average			
									Average			
									Average			
									Average			
									Average			
Capital Cost								€ 0.00		Total PV Cost		€ 0.00
										Total Cost		€ 0.00

10b. Culverts (Urban)		Culvert	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost
No. Description of Culvert	Select	Select	Select					H/L		
	New/Replacement	(m)	(m)	(m)	(€/m)	(€)		(€/m)	(€)	
								High		
								Average		
								Low		
								Average		
								Average		
								Average		
								Average		
								Average		
Capital Cost						€ 0.00		Total PV Cost		€ 0.00
								Total Cost		€ 0.00

10c. Culverts (Headwall)		Length of Culvert	Culvert Size	Rate	Cost of Construction
No. Description of Culvert	(m)	Select (m)	(€/m)	(€)	
		Capital Cost	€ 0.00		
		Overall Capital Cost	€ 0.00	Overall PV Cost	€ 0.00
					Overall Cost € 0.00

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L	Capital Cost	PV Cost	Total Cost
No. Select Gate Type	Comments					(€)	(€)	(€)
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

12. Road Raising		Length of Road	Cost of Construction	Cost of Construction
Note cost is to raise road by 600mm				
No. Road Details		(m)	(€)	(€)
		Total Cost	€ 0.00	€ 0.00

13. Individual Property Protection		Factor Select	Number of Units	Rate	Cost of Works	PV Rate	PV Cost
No. Property Type	Comments			(€)	(€)	(€)	(€)
1 Detached							
2 Semi-Detached							
3 Terraced							
4 Flat							
5 Residential average							
6 Shop							
7 Office							
					Capital Cost	€ 0.00	€ 0.00
					PV Cost		€ 0.00
					Total Cost		€ 0.00

14. Hydrometric Gauging Stations		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
No. Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
					Capital Cost	€ 0.00	€ 0.00
					PV Cost		€ 0.00
					Total Cost		€ 0.00

15. Flood Forecasting		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
No. Category	Comments				(€)	(€)	(€)	(€)
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
No. Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
1 0.02 m3/s							
2 0.05 m3/s							
3 0.1 m3/s		1	€ 130,200.00	€ 130,200.00	€ 80,429.30	€ 17,873.18	€ 98,302.48
4 0.5 m3/s							
5 1.0 m3/s							
6 2.0 m3/s							
7 3.0 m3/s							
				Capital Cost	€ 130,200.00		€ 208,972.48
				Total Cost			€ 339,172.48

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17. Channel Maintenance		Length of Channel	Rate	Maintenance Costs
No. Channel Type	Comments	(m)	(€)	(€)
			Total Cost	€ 0.00

18. Bank Protection		Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
No. Description of Bank Protection				(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High						
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

19. Manhole Sealing		No. of Manholes	Rate	Cost of Construction
No. Manhole Type	Comments		(€)	(€)
			Total Cost	€ 0.00

Summary

UoM	22	Optimism Bias	42.47%
AFA	Castleisland	Site Investigation Estimate	€ 50,000.00
Option	2 - Flow diversion & flood defences	Preliminaries	7%
Description	Flow diversion & flood defences	Design Fees	13%
		Compensation and Land	15%
		Archaeology and Environmental	10%
		Art Allowance	€ 51,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 7,593,477.22	€ 7,621.96	€ 7,601,099.18
2	Embankments	€ 175,121.31	€ 59,883.86	€ 235,005.17
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation	€ 0.00	€ 0.00	€ 184,948.66
5	Excavation on Land	€ 0.00	€ 0.00	€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal	€ 0.00	€ 0.00	€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning	€ 0.00	€ 0.00	€ 0.00
10	Culverts	€ 93,303.02	€ 189,739.75	€ 283,042.78
11	Sluice Gates	€ 17,038.00	€ 46,365.04	€ 63,403.04
12	Road Raising	€ 0.00	€ 0.00	€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance	€ 0.00	€ 0.00	€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing	€ 0.00	€ 0.00	€ 0.00
		€ 8,009,139.55	€ 512,583.08	€ 8,706,671.30
		Basic Construction Costs		€ 8,009,139.55
		Preliminaries		€ 560,639.77
		Optimism Bias		€ 3,639,635.69
		Construction Costs (Excl VAT)		€ 12,209,415.01
		Design Fees		€ 1,587,223.95
		Σ Construction Costs and Fees		€ 13,796,638.96

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 1,220,941.50
Allowance for Compensation and Land Acquisition	€ 1,831,412.25
Site Investigation	€ 50,000.00
Art Allowance	€ 51,000.00
PV O&M	€ 512,583.08
PV O&M Optimism Bias	€ 217,697.05
Σ Other Items	€ 3,883,633.89

Option Cost for Cost Benefit Analysis € 17,680,272.85

CFRAM Unit Cost Development Project					
Optimism Bias Calculator					
Prepared by:	MM	Date:	December 2015		
Site Reference:		Site Name:	Castleisland	2 - Flow diversion & flood defences	

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	Default weighting defined by OPW for all CFRAM projects
					Default risk value defined for all CFRAM projects
					Automated function cell (no input required)
					User defined - risk value, comments, justification
Procurement	Weight	Select from Dropdown Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	High	70%	Large scheme with walls, embankments, pump stations and flow diversion	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Medium	50%	Pump stations and associated equipment required	
Services	3	High	70%	Unknown - town centre with large amount of services expected	
Ground conditions	3	Very High	90%	Unknown - expected karst area	
Health and Safety	3	Medium	50%	Large scale scheme but no unusual risks associated with works	
Other	1	High	70%	Surface water drainage, pump stations, flow diversion and karst area	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	High	70%	High number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	High	70%	High number of stakeholders and interferences	
Site Characteristics	2	Very High	90%	Japanese Knotweed and Giant Rhubarb identified along the river bank	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals	
Amenity and art	1	Medium	50%	Town centre - large number of stakeholders	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Medium	50%	Unknown	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	High	70%	Large number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68		52%		
Weighting to apply: 0.541				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
				Calculated Optimism bias:	42%

1. Walls

[illegible]

2. Embankments

[illegible]

3. Demountable Barrier

3. Demountable Barrier						Length of Wall	With Ground Beam Installation	Height	Additional Costs	Wall Length for Maintenance	Rate	Cost of Wall	PV Maintenance Rate
No.	Select Demountable Barrier Span from Dropdown	Comments	(m)	Select Yes/No	Select (mm)	Select	Select	(€/m)	(€)	(€/m)			

3a. Flood Gate

<u>3a. Flood Gate</u>		No. of Flood Gates	Height Select	Width Select	Rate	Cost of Flood Gate	PV & Event Rate	PV Costs
No.	Select Flood Gate from Dropdown	Comments	(m)	(m)	(€/gate)	(€)	(€/gate)	(€)
Capital Cost						€ 0.00	Total PV Cost	€ 0.00
							Total Cost	€ 0.00
Overall Capital Cost						€ 0.00	Overall PV Cost	€ 0.00
							Overall Cost	€ 0.00

4. In-Channel Excavation

<u>4. In-Channel Excavation</u>		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³ (m³)		
No.	Select Excavation Type from Dropdown	Comments		(€/m³)	(€)
		Total required volume to be excavated is 4185m3 as channel is 697.515m long by 4m by 1.5m			
1	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
2	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
3	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
4	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
5	Excavation in soft soil and material taken to waste facility	Rural	185.09	€ 47.21	€ 8,738.49
				Total Cost	€ 184,948.66

Volume of Dredging		Rate	Cost of Dredging
		Select a Rate from Dropdown (€/m³)	(€)
No.	Dredging		
		Total Cost	€ 0.00

5. Excavation on Land

<u>5. Excavation on Land</u>						Volume of Excavation	Rate	Cost of Excavation
No.	Select Excavation Type from Dropdown	Comments	(m³)	(€/m³)	(€)			
							Total Cost	€ 0.00

6. Weir Construction

6. Weir Construction		Width of Weir		Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
		Min 10m	Max 20m			Select	
No. Select Weir Height from Dropdown	Comments	(m)	(€/m)	(€)	H/L	(€/weir)	
					Average		
				Capital Cost	€ 0.00	Total PV Cost	€ 0.00
						Total Cost	€ 0.00

7. Weir Removal

[illegible]

8. Bridges

8. Bridges		Remove or Replace	Area of Bridge	Rate	Cost of Construction	PV Costs
No.	Description of Bridge	Select Yes/No	(m ²)	(€/m ²)	(€)	(€/bridge)
				Capital Cost	€ 0.00	€ 0.00
					Total Cost	€ 0.00

9. Bridge Underpinning

9. Bridge Underpinning		Length of Bridge	Rate	Cost of Construction	
No.	Choose a suitable bridge from dropdown	Comments	(m)	(€/m)	(€)

10a. Culverts (Rural)

[illegible]

10b. Culverts (Urban)

[illegible]

10c. Culverts (Headwall)

10c. Culverts (Headwall)		Length of Culvert	Culvert Size	Rate	Cost of Construction
No.	Description of Culvert	(m)	(m) Select	(€/m)	(€)
1	Road Crossing	2	3.0 x 2.1m	€ 15,077.98	€ 30,155.95
				Capital Cost	€ 30,155.95
Overall Capital Cost			€ 93,303.02	Overall PV Cost	€ 189,739.75
			Overall Cost		€ 283,042.78

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L	Capital Cost	PV Cost	Total Cost
No. Select Gate Type	Comments					(€)	(€)	(€)
1	Sluice Gates	1500	Woodland/open public or open non public locations with lower debris loads	Electric Operation	Average	€ 17,038.00	€ 46,365.04	€ 63,403.04
Capital Cost						€ 17,038.00	PV Cost	€ 46,365.04
						Total Cost		€ 63,403.04

12. Road Raising		Length of Road	Cost of Construction	Cost of Construction
No. Road Details		(m)	(€)	(€)
Total Cost			€ 0.00	€ 0.00

13. Individual Property Protection		Factor Select	Number of Units	Rate	Cost of Works	PV Rate	PV Cost
No. Property Type	Comments			(€)	(€)	(€)	(€)
1	Detached						
2	Semi-Detached						
3	Terraced						
4	Flat						
5	Residential average						
6	Shop						
7	Office						
Capital Cost				€ 0.00		PV Cost	€ 0.00
						Total Cost	€ 0.00

14. Hydrometric Gauging Stations		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
No. Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
Capital Cost				€ 0.00		PV Cost	€ 0.00
						Total Cost	€ 0.00

15. Flood Forecasting		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
No. Category	Comments				(€)	(€)	(€)	(€)
Capital Cost					€ 0.00		PV Cost	€ 0.00
							Total Cost	€ 0.00

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
No. Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
1	0.02 m3/s						
2	0.05 m3/s						
3	0.1 m3/s	1	€ 130,200.00	€ 130,200.00	€ 80,429.30	€ 17,873.18	€ 98,302.48
4	0.5 m3/s						
5	1.0 m3/s						
6	2.0 m3/s						
7	3.0 m3/s						
Capital Cost				€ 130,200.00		PV Cost	€ 208,972.48
				Total Cost		Total Cost	€ 339,172.48

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17. Channel Maintenance		Length of Channel	Rate	Maintenance Costs
No. Channel Type	Comments	(m)	(€)	(€)
Total Cost			€ 0.00	

18. Bank Protection		Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
No. Description of Bank Protection				(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High						
Capital Cost						€ 0.00		PV Cost
								€ 0.00
						Total Cost		€ 0.00

19. Manhole Sealing		No. of Manholes	Rate	Cost of Construction
No. Manhole Type	Comments		(€)	(€)
Total Cost			€ 0.00	

Summary

UoM	22	Optimism Bias	39.82%
AFA	Castleisland	Site Investigation Estimate	€ 50,000.00
Option	3 - Flow diversion and western flood defences	Preliminaries	14%
Description	Flow diversion and western flood defences	Design Fees	13%
		Compensation and Land	15%
		Archaeology and Environmental	10%
		Art Allowance	€ 31,983.95

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 1,590,874.05	€ 1,601.20	€ 1,592,475.25
2	Embankments	€ 175,121.31	€ 59,883.86	€ 235,005.17
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation	€ 0.00	€ 0.00	€ 184,948.66
5	Excavation on Land	€ 0.00	€ 0.00	€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal	€ 0.00	€ 0.00	€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning	€ 0.00	€ 0.00	€ 0.00
10	Culverts	€ 93,303.02	€ 189,739.75	€ 283,042.78
11	Sluice Gates	€ 17,037.99	€ 46,365.04	€ 63,403.03
12	Road Raising	€ 0.00	€ 0.00	€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance	€ 0.00	€ 0.00	€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing	€ 0.00	€ 0.00	€ 0.00
		€ 2,006,536.37	€ 506,562.33	€ 2,698,047.36
		Basic Construction Costs		€ 2,006,536.37
		Preliminaries		€ 280,915.09
		Optimism Bias		€ 910,943.91
		Construction Costs (Excl VAT)		€ 3,198,395.37
		Design Fees		€ 415,791.40
		Σ Construction Costs and Fees		€ 3,614,186.77

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 319,839.54
Allowance for Compensation and Land Acquisition	€ 479,759.31
Site Investigation	€ 50,000.00
Art Allowance	€ 31,983.95
PV O&M	€ 506,562.33
PV O&M Optimism Bias	€ 201,731.00
Σ Other Items	€ 1,589,876.12

Option Cost for Cost Benefit Analysis € 5,204,062.90

CFRAM Unit Cost Development Project					
Optimism Bias Calculator					
Prepared by:	MM	Date:	December 2015		
Site Reference:		Site Name:	Castleisland	3 - Flow diversion and western flood defences	

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	Default weighting defined by OPW for all CFRAM projects
					Default risk value defined for all CFRAM projects
					Automated function cell (no input required)
					User defined - risk value, comments, justification
Procurement	Weight	Select from Dropdown Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Medium	50%	Reduced scheme with flow diversion, embankments and short sections of walls	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Medium	50%	Unknown - away from town centre	
Ground conditions	3	Very High	90%	Unknown - expected karst area	
Health and Safety	3	Medium	50%	No unusual risks associated with works	
Other	1	Medium	50%	Risks associated with flow diversion and karst area	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Number of stakeholders and interferences	
Site Characteristics	2	Very High	90%	Japanese Knotweed and Giant Rhubarb identified along the river bank	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals	
Amenity and art	1	Low	30%	Works outside town centre	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Medium	50%	Unknown	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Medium	50%	Number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68		47%		
Weighting to apply: 0.497				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
				Calculated Optimism bias:	40%

1. Walls

1. Walls			Length of Wall	Height of Wall	Rate	Capital Cost of Wall	Maintenance Costs Estimate	PV Rate	PV Cost
No.	Select Wall Type from Dropdown	Comments	(m)	Min 0.6m Max 3.0m (m)	(€/m)	(€)	Select H/L	(€/m)	PVC * Length (€)
1	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	removed	0	0.60	€ 1,257.14	€ 0.00	Average	€ 8.43	€ 0.00
2	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	removed	0	0.60	€ 1,257.14	€ 0.00	Average	€ 8.43	€ 0.00
3	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	removed	0	0.60	€ 1,257.14	€ 0.00	Average	€ 8.43	€ 0.00
4	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	removed	0	0.60	€ 1,257.14	€ 0.00	Average	€ 8.43	€ 0.00
5	Retaining Wall, Urban with sheet piling, >100m in length (€/m)	removed	0	0.60	€ 1,192.68	€ 0.00	Average	€ 8.43	€ 0.00
6	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	removed	0	0.60	€ 1,257.14	€ 0.00	Average	€ 8.43	€ 0.00
7	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Most northern wall	50.311	2.50	€ 5,835.99	€ 293,614.55	Average	€ 8.43	€ 424.12
8	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Barrack Lane - Nerbert Bridge - south-west section	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
9	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Barrack Lane - Nerbert Bridge - north-west section	0	3.70	€ 8,716.80	€ 0.00	Average	€ 8.43	€ 0.00
10	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Barrack Lane - Nerbert Bridge - north-middle section	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
11	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Barrack Lane - Nerbert Bridge - north-east section	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
12	Retaining Wall, Urban with sheet piling, >100m in length (€/m)	Church St - Barrack Lane - north	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
13	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Church St - Barrack Lane - north	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
14	Retaining Wall, Urban with sheet piling, >100m in length (€/m)	Fire Station South (excl. Bridge parapet)	132.43	4.20	€ 9,683.80	€ 1,282,425.63	Average	€ 8.43	€ 1,116.38
15	Retaining Wall, Urban with sheet piling, >100m in length (€/m)	Barrack Lane - Nerbert Bridge - south-east section	0	3.50	€ 8,330.00	€ 0.00	Average	€ 8.43	€ 0.00
16	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Barrack Lane Bridge - u/s parapet (Change - not 3.5m)	0	1.10	€ 3,688.40	€ 0.00	Average	€ 8.43	€ 0.00
17	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Church St - Barrack Lane - south	0	4.00	€ 9,297.00	€ 0.00	Average	€ 8.43	€ 0.00
18	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	Church lane - south - head wall (NEW)	7.2	1.10	€ 2,060.26	€ 14,833.86	Average	€ 8.43	€ 60.70
							Average		
							Average		
Capital Cost						€ 1,590,874.05		Total PV Cost	€ 1,601.20
Total Cost								Total PV Cost	€ 1,592,475.25

2. Embankments

[illegible]

3. Demountable Barrier

3. Demountable Barrier						Length of Wall	With Ground Beam Installation	Height	Additional Costs	Wall Length for Maintenance	Rate	Cost of Wall	PV Maintenance Rate
No.	Select Demountable Barrier Span from Dropdown	Comments	(m)	Select Yes/No	Select (mm)	Select	Select	(€/m)	(€)	(€/m)			

3a. Flood Gate

[illegible]

4. In-Channel Excavation

4. In-Channel Excavation		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
No. Select Excavation Type from Dropdown		Comments			
			Total required volume to be excavated is 4185m3 as channel is 697.515m long by 4m by 1.5m		
1	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
2	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
3	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
4	Excavation in soft soil and material taken to waste facility	Rural	1000	€ 44.05	€ 44,052.54
5	Excavation in soft soil and material taken to waste facility	Rural	185.09	€ 47.21	€ 8,738.49
				Total Cost	€ 184,948.66

No. Dredging	Volume of Dredging (m³)	Rate (€/m³)	Cost of Dredging (€)
		Select a Rate from Dropdown	
		Total Cost	€ 0.00

5. Excavation on Land		Volume of Excavation	Rate	Cost of Excavation
No. Select Excavation Type from Dropdown	Comments	(m³)	(€/m³)	(€)
		Total Cost		€ 0.00

6. Weir Construction		Width of Weir	Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
No. Select Weir Height from Dropdown	Comments	Min 10m Max 20m	(€/m)	(€)	Select H/L	(€/weir)
		(m)			Average	
		Capital Cost		€ 0.00	Total PV Cost	€ 0.00
				Total Cost	€ 0.00	

7. Weir Removal		Length of Weir	Rate	Cost of Construction
No. Description of Weir	(m)	(€/m)	(€)	
		Total Cost	€ 0.00	

8. Bridges		Remove or Replace	Area of Bridge	Rate	Cost of Construction	PV Costs
No. Description of Bridge		Select Yes/No	(m²)	(€/m²)	(€)	(€/bridge)
				Capital Cost	€ 0.00	€ 0.00
				Total Cost	€ 0.00	

9. Bridge Underpinning		Length of Bridge	Rate	Cost of Construction
No. Choose a suitable bridge from dropdown	Comments	(m)	(€/m)	(€)
		Total Cost	€ 0.00	

10a. Culverts (Rural)		Disposal of Spoil	Ground Type	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost
No. Description of Culvert		Select	Select Soil/Rock	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)
1	Road Crossing	Surplus excavated material carted to licenced tip	Rock	6	3.0 x 2.1m	20	€ 3,157.35	€ 63,147.07	High	€ 189,739.75	€ 189,739.75
									Average		
									Low		
									Average		
									Average		
									Average		
									Average		
									Average		
									Average		
							Capital Cost	€ 63,147.07		Total PV Cost	€ 189,739.75
								Total Cost	€ 252,886.82		

10b. Culverts (Urban)		Culvert	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost
No. Description of Culvert	Select	Select	Select					Select		
	New/Replacement	(m)	(m)	(m)	(€/m)	(€)	H/L	(€/m)	(€)	
							High			
							Average			
							Low			
							Average			
							Average			
							Average			
							Average			
							Average			
Capital Cost							€ 0.00	Total PV Cost		€ 0.00
Total Cost								Total Cost		€ 0.00

10c. Culverts (Headwall)		Length of Culvert	Culvert Size	Rate	Cost of Construction
No. Description of Culvert		(m)	Select (m)	(€/m)	(€)
1	Road Crossing	2	3.0 x 2.1m	€ 15,077.98	€ 30,155.95
				Capital Cost	€ 30,155.95
		Overall Capital Cost	€ 93,303.02	Overall PV Cost	€ 189,739.75
				Overall Cost	€ 283,042.78

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L	Capital Cost	PV Cost	Total Cost
No. Select Gate Type	Comments					(€)	(€)	(€)
1	Sluice Gates	1500	Woodland/open public or open non public locations with lower debris loads	Electric Operation	Average	€ 17,037.99	€ 46,365.04	€ 63,403.03
Capital Cost						€ 17,037.99	PV Cost	€ 46,365.04
						Total Cost		€ 63,403.03

12. Road Raising		Length of Road	Cost of Construction	Cost of Construction
No. Road Details		(m)	(€)	(€)
Total Cost			€ 0.00	€ 0.00

13. Individual Property Protection		Factor Select	Number of Units	Rate	Cost of Works	PV Rate	PV Cost
No. Property Type	Comments			(€)	(€)	(€)	(€)
1	Detached						
2	Semi-Detached						
3	Terraced						
4	Flat						
5	Residential average						
6	Shop						
7	Office						
Capital Cost				€ 0.00		PV Cost	€ 0.00
						Total Cost	€ 0.00

14. Hydrometric Gauging Stations		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
No. Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
Capital Cost				€ 0.00		PV Cost	€ 0.00
						Total Cost	€ 0.00

15. Flood Forecasting		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
No. Category	Comments				(€)	(€)	(€)	(€)
Capital Cost					€ 0.00		PV Cost	€ 0.00
							Total Cost	€ 0.00

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
No. Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
1	0.02 m3/s						
2	0.05 m3/s						
3	0.1 m3/s	1	€ 130,200.00	€ 130,200.00	€ 80,429.30	€ 17,873.18	€ 98,302.48
4	0.5 m3/s						
5	1.0 m3/s						
6	2.0 m3/s						
7	3.0 m3/s						
Capital Cost				€ 130,200.00		PV Cost	€ 208,972.48
				Total Cost		Total Cost	€ 339,172.48

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17. Channel Maintenance		Length of Channel	Rate	Maintenance Costs
No. Channel Type	Comments	(m)	(€)	(€)
Total Cost			€ 0.00	

18. Bank Protection		Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
No. Description of Bank Protection				(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High						
Capital Cost						€ 0.00		PV Cost
								€ 0.00
						Total Cost		€ 0.00

19. Manhole Sealing		No. of Manholes	Rate	Cost of Construction
No. Manhole Type	Comments		(€)	(€)
Total Cost			€ 0.00	

Summary

UoM	22	Optimism Bias	39.65%
AFA	Dingle	Site Investigation Estimate	€ 50,000.00
Option	1 - Storage & Flood Defences	Preliminaries	16%
Description	Flood defences and storage	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 27,635.94

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 790,473.56	€ 2,250.40	€ 792,723.96
2	Embankments	€ 737,572.94	€ 41,407.65	€ 778,980.59
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation	€ 0.00	€ 0.00	€ 0.00
5	Excavation on Land	€ 0.00	€ 0.00	€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal	€ 0.00	€ 0.00	€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning	€ 0.00	€ 0.00	€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 47,774.91	€ 76,466.64	€ 124,241.55
12	Road Raising	€ 0.00	€ 0.00	€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance	€ 0.00	€ 0.00	€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing	€ 0.00	€ 0.00	€ 0.00

€ 1,706,021.41	€ 329,097.17	€ 2,035,118.58
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Basic Construction Costs	€ 1,706,021.41
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Preliminaries	€ 272,963.43
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Optimism Bias	€ 784,609.28
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Construction Costs (Excl VAT)	€ 2,763,594.11
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Design Fees	€ 359,267.23
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Σ Construction Costs and Fees	€ 3,122,861.35
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 276,359.41
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Allowance for Compensation and Land Acquisition	€ 276,359.41
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Site Investigation	€ 50,000.00
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Art Allowance	€ 27,635.94
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PV O&M	€ 329,097.17
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PV O&M Optimism Bias	€ 130,477.35
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Σ Other Items	€ 1,089,929.28
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Option Cost for Cost Benefit Analysis	€ 4,212,790.63
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CFRAM Unit Cost Development Project						
Optimism Bias Calculator						
Prepared by:	MM	Date:	December 2015			
Site Reference:			Site Name:	Dingle 1 - Storage & Flood Defences		

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default weighting defined by OPW for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default risk value defined for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Automated function cell (no input required)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">User defined - risk value, comments, justification</div> </div>	
Procurement	Weight	Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Medium	50%	Small scheme, low complexity (single storage area with flow control structure) and minor flood defences	
Degree of Innovation	2	Medium	50%	Standard and proven methods	
Technology	2	High	70%	Storage area and flow controls, pump station and associated equipment required	
Services	3	Low	30%	Unknown - no significant services expected in works area	
Ground conditions	3	Very High	90%	Unknown - reports of old landfill at proposed storage area site	
Health and Safety	3	Low	30%	Small scale scheme with no unusual risks associated with works	
Other	1	Medium	50%	Risks associated with storage area	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Low number of stakeholders - but critical	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Low number of stakeholders and interferences - but critical to storage area	
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals	
Amenity and art	1	Low	30%	Small rural scheme with low number of stakeholders	
Contaminated land	3	Very High	90%	Unknown - critical to storage area	
Archaeology	3	Low	30%	Unknown - small scheme which can be adequately scoped	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Medium	50%	Low number of stakeholders and interferences - but critical to storage area	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68	47%			
Weighting to apply: 0.494				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 40%	

AFA: Dingle
Option: 1 - Storage & Flood

1. Walls

Select Wall Type from Dropdown	Comments	Length of Wall	Height of Wall	Rate	Capital Cost of Wall	Maintenance Costs Estimate	PV Rate	PV Cost
		(m)	Min 0.6m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		47.314	2.70	€ 6,446.82	€ 305,024.63	Average	€ 8.43	€ 398.86
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		62.477	1.10	€ 2,060.26	€ 128,718.80	Average	€ 8.43	€ 526.68
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		32.834	1.65	€ 3,395.41	€ 111,484.86	Average	€ 8.43	€ 276.79
Retaining Wall, Urban with sheet piling, >100m in length (€/m)		115.493	1.10	€ 1,965.89	€ 227,047.00	Average	€ 8.43	€ 973.61
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		8.833	1.10	€ 2,060.26	€ 18,198.27	Average	€ 8.43	€ 74.46
						Average		
						Average		
						Average		
Capital Cost					€ 790,473.56		Total PV Cost	€ 2,250.40
							Total Cost	€ 792,723.96

2. Embankments

Select Embankment from Dropdown	Comments	Imported Material	Length of Embankment	Height of Embankment	Rate	Capital Cost of Embankment	Maintenance Costs Estimate	PV Rate	PV Cost
		Select Yes/No	(m)	Min 1.0m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Rural clay embankment (€/m) < 100m		Yes	54.578	2.90	€ 514.94	€ 28,104.31	Average	€ 70.68	€ 3,857.70
Rural clay embankment (€/m) 100 - 1,000m		Yes	204.54	2.50	€ 400.21	€ 81,858.72	Average	€ 70.68	€ 14,457.35
Rural clay embankment (€/m) 100 - 1,000m	Rate applied, conservative estimate by combining rate for 2m and 3m high embankment	Yes	326.71	5.00	€ 1,921.00	€ 627,609.91	Average	€ 70.68	€ 23,092.61
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 737,572.94		Total PV Cost	€ 41,407.65
								Total Cost	€ 778,980.59

3. Demountable Barrier

Select Demountable Barrier Span from Dropdown	Comments	Length of Wall	With Ground Beam Installation	Height	Additional Costs	Rate	Cost of Wall	PV & Event Rate	PV Including Events Costs
		(m)	Select Yes/No	Select (mm)	Select	(€/m)	(€)	(€/m)	(€)
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
								Total Cost	€ 0.00

3a. Flood Gate

3a. Flood Gate		No. of Flood Gates	Height	Width	Rate	Cost of Flood Gate	PV & Event Rate	PV Costs
Select Flood Gate from Dropdown	Comments		Select (m)	Select (m)	(€/gate)	(€)	(€/gate)	(€)
Capital Cost						€ 0.00	Total PV Cost	€ 0.00
							Total Cost	€ 0.00
Overall Capital Cost						€ 0.00	Overall PV Cost	€ 0.00
							Overall Cost	€ 0.00

4. In-Channel Excavation

Select Excavation Type from Dropdown	Comments	Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
Total Cost					€ 0.00

Volume of Dredging		Rate	Cost of Dredging
		Select a Rate from Dropdown (€/m³)	(€)
Dredging	(m³)		
Total Cost			€ 0.00

Total Excavation Costs € 0.00

5. Excavation on Land

Select Excavation Type from Dropdown	Comments	Volume of Excavation	Rate	Cost of Excavation
		(m³)	(€/m³)	(€)
Total Cost				€ 0.00

6. Weir Construction

Select Weir Height from Dropdown	Comments	Width of Weir	Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
		Min 10m Max 20m (m)	(€/m)	(€)	Select H/L Average	(€/weir)
					Average	
Capital Cost				€ 0.00	Total PV Cost	€ 0.00
					Total Cost	€ 0.00

7. Weir Removal

Length of Weir Rate Cost of Construction

Description of Weir	(m)	(€/m)	(€)
Total Cost			€ 0.00

8. Bridges	Remove or Replace Select Yes/No	Area of Bridge (m²)	Rate (€/m²)	Cost of Construction (€)	PV Costs (€/bridge)
Description of Bridge					
Capital Cost				€ 0.00	€ 0.00
Total Cost				€ 0.00	

9. Bridge Underpinning		Length of Bridge (m)	Rate (€/m)	Cost of Construction (€)
Choose a suitable bridge from dropdown	Comments			
Total Cost			€ 0.00	

10a. Culverts (Rural)	Disposal of Spoil Select	Ground Type Select Soil/Rock	Invert Select (m)	Culvert Size Select (m)	Length of Culvert (m)	Rate (€/m)	Cost of Construction (€)	Maintenance Costs Estimate Select H/L Average	PV Cost (€/m)
Description of Culvert									
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
								Total Cost	€ 0.00

10b. Culverts (Urban)	Culvert Select New/Replacement	Invert Select (m)	Culvert Size Select (m)	Length of Culvert (m)	Rate (€/m)	Cost of Construction (€)	Maintenance Costs Estimate Select H/L High Average Low Average Average Average Average Average Average	PV Rate (€/m)	PV Cost (€)
Description of Culvert									
Capital Cost						€ 0.00		Total PV Cost	€ 0.00
								Total Cost	€ 0.00

10c. Culverts (Headwall)	Number of Headwalls	Culvert Size Select (m)	Rate (€/m)	Cost of Construction (€)
Description of Headwall / Culvert				
Capital Cost				€ 0.00
Overall Capital Cost		€ 0.00	Overall PV Cost	€ 0.00
			Overall Cost	€ 0.00

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L Average	Capital Cost (€)	PV Cost (€)	Total Cost (€)
Select Gate Type	Comments							
Sluice Gates	Sluice gate from embankment	1800	Urban/suburban locations with high debris loads	Electric Operation	Average	€ 47,774.91	€ 76,466.64	€ 124,241.55
Capital Cost						€ 47,774.91	PV Cost	€ 76,466.64
							Total Cost	€ 124,241.55

12. Road Raising	Length of Road (m)	Cost of Construction (€)	Cost of Construction (€)
Note cost is to raise road by 600mm			
Road Details			
Total Cost		€ 0.00	€ 0.00

13. Individual Property Protection		Factor Select	Number of Units	Rate (€)	Cost of Works (€)	PV Rate (€)	PV Cost (€)
Property Type	Comments						
Detached							
Semi-Detached							
Terraced							
Flat							
Residential average							

Shop							
Office							
Capital Cost				€ 0.00	PV Cost	€ 0.00	
					Total Cost	€ 0.00	

14. Hydrometric Gauging Stations

		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
Capital Cost				€ 0.00	PV Cost	€ 0.00	
					Total Cost	€ 0.00	

15. Flood Forecasting

		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
Category	Comments				(€)	(€)	(€)	(€)
Capital Cost					€ 0.00	PV Cost	€ 0.00	
						Total Cost	€ 0.00	

16. Pumping Stations

		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
0.02 m3/s							
0.05 m3/s							
0.1 m3/s		1	€ 130,200.00	€ 130,200.00	€ 80,429.30	€ 17,873.18	€ 98,302.48
0.5 m3/s							
1.0 m3/s							
2.0 m3/s							
3.0 m3/s							
Capital Cost				€ 130,200.00		PV Cost	€ 208,972.48
				Total Cost		Total Cost	€ 339,172.48

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17. Channel Maintenance

		Length of Channel	Rate	Maintenance Costs
Channel Type	Comments	(m)	(€)	(€)
Total Cost			€ 0.00	

18. Bank Protection

	Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
Description of Bank Protection			(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High					
Capital Cost				€ 0.00	PV Cost	€ 0.00	
					Total Cost	€ 0.00	

19. Manhole Sealing

		No. of Manholes	Rate	Cost of Construction
Manhole Type	Comments		(€)	(€)
Total Cost			€ 0.00	

Summary

UoM	22	Optimism Bias	37.88%
AFA	Dingle	Site Investigation Estimate	€ 50,000.00
Option	2 - Flood defences and diversion	Preliminaries	8%
Description	Flood defences and diversion	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 51,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 790,473.56	€ 2,250.40	€ 792,723.96
2	Embankments	€ 28,104.31	€ 3,857.70	€ 31,962.01
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 4,590,387.95	€ 200,179.98	€ 4,790,567.93
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising			€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 5,539,165.82	€ 415,260.55	€ 5,954,426.37
		Basic Construction Costs		€ 5,539,165.82
		Preliminaries		€ 443,133.27
		Optimism Bias		€ 2,266,235.65
		Construction Costs (Excl VAT)		€ 8,248,534.74
		Design Fees		€ 1,072,309.52
		Σ Construction Costs and Fees		€ 9,320,844.26

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 824,853.47
Allowance for Compensation and Land Acquisition	€ 824,853.47
Site Investigation	€ 50,000.00
Art Allowance	€ 51,000.00
	€ 415,260.55
PV O&M Optimism Bias	€ 157,310.47
Σ Other Items	€ 2,323,277.96

Option Cost for Cost Benefit Analysis € 11,644,122.22

CFRAM Unit Cost Development Project					
Optimism Bias Calculator					
Prepared by:	AEP	Date:	December 2013		
Site Reference:		Site Name:	Dingle 2 - Flood defences and diversion		

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:							
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> Default weighting defined by OPW for all CFRAM projects <div style="width: 15px; height: 10px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> Default risk value defined for all CFRAM projects <div style="width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> Automated function cell (no input required) <div style="width: 15px; height: 10px; background-color: #FFD700; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> User defined - risk value, comments, justification </div>							
Procurement	Weight	Risk score		Comment/justification							
Complexity of Contract Structure	1	Medium	50%	Default risk value							
Late Contractor Involvement in Design	2	Medium	50%	Default risk value							
Poor Contractor Capabilities	1	Medium	50%	Default risk value							
Government Guidelines	1	Medium	50%	Default risk value							
Dispute & Claims Occurred	3	Medium	50%	Default risk value							
Information Management	1	Medium	50%	Default risk value							
Budgeting	2	Medium	50%	Default risk value							
Other	1	Medium	50%	Default risk value							
Project Specific											
Design Complexity	2	Low	30%	Small scheme with low complexity, flow diversion and minor flood defences							
Degree of Innovation	2	Low	30%	Standard and proven methods							
Technology	2	Medium	50%	Pump station and associated equipment required							
Services	3	Medium	50%	Unknown - no significant services expected in works area							
Ground conditions	3	Medium	50%	Unknown - significant length of flow diversion crossing multiple properties							
Health and Safety	3	Medium	50%	Potential for deep excavations and road crossings with flow diversion							
Other	1	Medium	50%	Risks associated with flow diversion							
Client Specification											
Inadequacy of the Business Case	3	Medium	50%	Default risk value							
Large No. of Stakeholders	2	High	70%	Large number of interferences associate with flow diversion							
Funding Availability	2	Medium	50%	Default risk value							
Project Management Team	1	Medium	50%	Unforeseeable							
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs							
Other	1	Very Low	10%	None							
Environment											
Public Relations	2	Medium	50%	Large number of interferences associate with flow diversion							
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown							
Environmental Impact	3	Medium	50%	No significant environmental impacts							
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals							
Amenity and art	1	Low	30%	Small scheme with works away from public view							
Contaminated land	3	Medium	50%	Unknown							
Archaeology	3	Low	30%	Unknown - small scheme which can be adequately scoped							
Other	1	Very Low	10%	None							
External Influences											
Political	3	Medium	50%	Default risk value							
Economic	2	Medium	50%	Default risk value							
Legislation / Regulations	1	Medium	50%	Default risk value							
Multiple river users / stakeholders	2	Medium	50%	Low number of stakeholders and interferences - but critical to storage area							
Flood events during construction	3	Medium	50%	History of flooding							
Other	1	Very Low	10%	None							
	68		45%								
Weighting to apply:				0.465	<table border="1" style="width: 100%;"> <tr> <td>Minimum Optimism Bias:</td> <td>10%</td> </tr> <tr> <td>Maximum Optimism Bias:</td> <td>70%</td> </tr> <tr> <td>Calculated Optimism bias:</td> <td>38%</td> </tr> </table>	Minimum Optimism Bias:	10%	Maximum Optimism Bias:	70%	Calculated Optimism bias:	38%
Minimum Optimism Bias:	10%										
Maximum Optimism Bias:	70%										
Calculated Optimism bias:	38%										

AFA: Dingle
Option: 2 - Flood defences and

1. Walls

Select Wall Type from Dropdown	Comments	Length of Wall	Height of Wall	Rate	Capital Cost of Wall	Maintenance Costs Estimate	PV Rate	PV Cost
		(m)	Min 0.6m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		47.314	2.70	€ 6,446.82	€ 305,024.63	Average	€ 8.43	€ 398.86
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		62.477	1.10	€ 2,060.26	€ 128,718.80	Average	€ 8.43	€ 526.68
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		32.834	1.65	€ 3,395.41	€ 111,484.86	Average	€ 8.43	€ 276.79
Retaining Wall, Urban with sheet piling, >100m in length (€/m)		115.493	1.10	€ 1,965.89	€ 227,047.00	Average	€ 8.43	€ 973.61
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		8.833	1.10	€ 2,060.26	€ 18,198.27	Average	€ 8.43	€ 74.46
						Average		
						Average		
						Average		
Capital Cost					€ 790,473.56		Total PV Cost	€ 2,250.40
							Total Cost	€ 792,723.96

2. Embankments

Select Embankmentl from Dropdown	Comments	Imported Material	Length of Embankment	Height of Embankment	Rate	Capital Cost of Embankment	Maintenance Costs Estimate	PV Rate	PV Cost
		Select Yes/No	(m)	Min 1.0m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Rural clay embankment (€/m) < 100m		Yes	54.578	2.90	€ 514.94	€ 28,104.31	Average	€ 70.68	€ 3,857.70
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 28,104.31		Total PV Cost	€ 3,857.70
								Total Cost	€ 31,962.01

3. Demountable Barrier

Select Demountable Barrier Span from Dropdown	Comments	Length of Wall	With Ground Beam Installation	Height	Additional Costs	Rate	Cost of Wall	PV & Event Rate	PV Including Events Costs
		(m)	Select Yes/No	Select (mm)	Select	(€/m)	(€)	(€/m)	(€)
Capital Cost						€ 0.00		Total PV Cost	€ 0.00
								Total Cost	€ 0.00

3a. Flood Gate

3a. Flood Gate		No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
Select Flood Gate from Dropdown	Comments							
Capital Cost					€ 0.00	Total PV Cost	€ 0.00	
						Total Cost	€ 0.00	
Overall Capital Cost					€ 0.00	Overall PV Cost	€ 0.00	
						Overall Cost	€ 0.00	

4. In-Channel Excavation

Select Excavation Type from Dropdown	Comments	Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
Total Cost					€ 0.00

Volume of Dredging		Rate	Cost of Dredging
		Select a Rate from Dropdown (€/m³)	(€)
Dredging	(m³)		
Total Cost			€ 0.00

Total Excavation Costs € 0.00

5. Excavation on Land

Select Excavation Type from Dropdown	Comments	Volume of Excavation	Rate	Cost of Excavation
		(m³)	(€/m³)	(€)
Total Cost				€ 0.00

6. Weir Construction

6. Weir Construction		Width of Weir		Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
Select Weir Height from Dropdown	Comments	Min 10m	Max 20m	(€/m)	(€)	Select	(€/weir)
		(m)				H/L	
						Average	
				Capital Cost	€ 0.00	Total PV Cost	€ 0.00
						Total Cost	€ 0.00

7. Weir Removal

Description of Weir	Length of Weir	Rate	Cost of Construction
	(m)	(€/m)	(€)

				Total Cost		€ 0.00	
<u>14. Hydrometric Gauging Stations</u>		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
				Capital Cost	€ 0.00	PV Cost	€ 0.00
				Total Cost		€ 0.00	

<u>15. Flood Forecasting</u>		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
Category	Comments				(€)	(€)	(€)	(€)
				Capital Cost	€ 0.00	PV Cost	€ 0.00	€ 0.00
				Total Cost		€ 0.00		

<u>16. Pumping Stations</u>		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
0.02 m3/s							
0.05 m3/s							
0.1 m3/s		1	€ 130,200.00	€ 130,200.00	€ 80,429.30	€ 17,873.18	€ 98,302.48
0.5 m3/s							
1.0 m3/s							
2.0 m3/s							
3.0 m3/s							
				Capital Cost	€ 130,200.00	PV Cost	€ 208,972.48
				Total Cost		€ 339,172.48	

110670

<u>17. Channel Maintenance</u>		Length of Channel	Rate	Maintenance Costs
Channel Type	Comments	(m)	(€)	(€)
			Total Cost	€ 0.00

<u>18. Bank Protection</u>		Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
Description of Bank Protection				(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High						
				Capital Cost	€ 0.00	PV Cost	€ 0.00	€ 0.00
				Total Cost		€ 0.00		

<u>19. Manhole Sealing</u>		No. of Manholes	Rate	Cost of Construction
Manhole Type	Comments		(€)	(€)
			Total Cost	€ 0.00

Summary

UoM	22	Optimism Bias	40.00%
AFA	Dingle	Site Investigation Estimate	€ 50,000.00
Option	3 - Flood defences	Preliminaries	7%
Description	Flood defences	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 51,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 7,659,183.92	€ 15,589.06	€ 7,674,772.98
2	Embankments	€ 28,104.31	€ 3,857.70	€ 31,962.01
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising			€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 130,200.00	€ 208,972.48	€ 339,172.48
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 7,817,488.23	€ 228,419.23	€ 8,045,907.46
		Basic Construction Costs		€ 7,817,488.23
		Preliminaries		€ 547,224.18
		Optimism Bias		€ 3,345,884.96
		Construction Costs (Excl VAT)		€ 11,710,597.37
		Design Fees		€ 1,522,377.66
		Σ Construction Costs and Fees		€ 13,232,975.03

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 1,171,059.74
Allowance for Compensation and Land Acquisition	€ 1,171,059.74
Site Investigation	€ 50,000.00
Art Allowance	€ 51,000.00
PV O&M	€ 228,419.23
PV O&M Optimism Bias	€ 91,367.69
Σ Other Items	€ 2,762,906.40

Option Cost for Cost Benefit Analysis € 15,995,881.43

CFRAM Unit Cost Development Project						
Optimism Bias Calculator						
Prepared by:	AEP	Date:	December 2013			
Site Reference:			Site Name:	Dingle	3 - Flood defences	

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:							
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> Default weighting defined by OPW for all CFRAM projects <div style="width: 15px; height: 15px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> Default risk value defined for all CFRAM projects <div style="width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> Automated function cell (no input required) <div style="width: 15px; height: 15px; background-color: #FFD700; border: 1px solid black; margin-right: 5px; margin-top: 2px;"></div> User defined - risk value, comments, justification </div>							
Procurement	Weight	Risk score		Comment/justification							
Complexity of Contract Structure	1	Medium	50%	Default risk value							
Late Contractor Involvement in Design	2	Medium	50%	Default risk value							
Poor Contractor Capabilities	1	Medium	50%	Default risk value							
Government Guidelines	1	Medium	50%	Default risk value							
Dispute & Claims Occurred	3	Medium	50%	Default risk value							
Information Management	1	Medium	50%	Default risk value							
Budgeting	2	Medium	50%	Default risk value							
Other	1	Medium	50%	Default risk value							
Project Specific											
Design Complexity	2	Low	30%	Small scheme with low complexity - flood defence walls							
Degree of Innovation	2	Low	30%	Standard and proven methods							
Technology	2	Medium	50%	Pump station and associated equipment required							
Services	3	High	70%	Unknown - significant services expected in works area - town centre							
Ground conditions	3	Medium	50%	Unknown							
Health and Safety	3	Medium	50%	No unusual risks associated with works							
Other	1	Medium	50%	Risks associated with significantly high flood defence walls (i.e. 4m high)							
Client Specification											
Inadequacy of the Business Case	3	Medium	50%	Default risk value							
Large No. of Stakeholders	2	High	70%	Large number of interferences associated with flood walls							
Funding Availability	2	Medium	50%	Default risk value							
Project Management Team	1	Medium	50%	Unforeseeable							
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs							
Other	1	Very Low	10%	None							
Environment											
Public Relations	2	Very High	90%	Large number of interferences associate with flood defence walls - significantly high walls							
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown							
Environmental Impact	3	Medium	50%	No significant environmental impacts							
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals							
Amenity and art	1	Medium	50%	Significant works in public view							
Contaminated land	3	Medium	50%	Unknown							
Archaeology	3	Low	30%	Unknown - developed town centre							
Other	1	Very Low	10%	None							
External Influences											
Political	3	Medium	50%	Default risk value							
Economic	2	Medium	50%	Default risk value							
Legislation / Regulations	1	Medium	50%	Default risk value							
Multiple river users / stakeholders	2	Very High	90%	Large number of interferences associate with flood defence walls - significantly high walls							
Flood events during construction	3	Medium	50%	History of flooding							
Other	1	Very Low	10%	None							
	68	48%									
Weighting to apply:				0.500	<table border="1" style="width: 100%;"> <tr> <td>Minimum Optimism Bias:</td> <td>10%</td> </tr> <tr> <td>Maximum Optimism Bias:</td> <td>70%</td> </tr> <tr> <td>Calculated Optimism bias:</td> <td>40%</td> </tr> </table>	Minimum Optimism Bias:	10%	Maximum Optimism Bias:	70%	Calculated Optimism bias:	40%
Minimum Optimism Bias:	10%										
Maximum Optimism Bias:	70%										
Calculated Optimism bias:	40%										

AFA: Dingle
Option: 3 - Flood defences

1. Walls

1. Walls		Length of Wall	Height of Wall	Rate	Capital Cost of Wall	Maintenance Costs Estimate	PV Rate	PV Cost
			Min 0.6m Max 3.0m					
Select Wall Type from Dropdown	Comments	(m)	(m)	(€/m)	(€)	Select H/L	(€/m)	PVC * Length (€)
	All walls are <100m in length, however some walls have been summed together							
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		444.11	1.10	€ 2,060.26	€ 914,981.60	Average	€ 8.43	€ 3,743.85
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.093	1.30	€ 2,481.89	€ 5,194.59	Average	€ 8.43	€ 17.64
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		4.887	1.50	€ 3,003.90	€ 14,680.06	Average	€ 8.43	€ 41.20
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.404	1.30	€ 2,481.89	€ 5,966.46	Average	€ 8.43	€ 20.27
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		4.948	1.30	€ 2,481.89	€ 12,280.38	Average	€ 8.43	€ 41.71
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		4.087	2.50	€ 5,835.99	€ 23,851.70	Average	€ 8.43	€ 34.45
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		14.843	2.40	€ 5,530.58	€ 82,090.38	Average	€ 8.43	€ 125.13
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		4.631	2.50	€ 5,835.99	€ 27,026.47	Average	€ 8.43	€ 39.04
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		16.346	2.50	€ 5,835.99	€ 95,395.11	Average	€ 8.43	€ 137.80
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.344	2.20	€ 4,919.75	€ 16,451.66	Average	€ 8.43	€ 28.19
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.28	2.20	€ 4,919.75	€ 16,136.79	Average	€ 8.43	€ 27.65
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		36.865	2.20	€ 4,919.75	€ 181,366.74	Average	€ 8.43	€ 310.77
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		36.967	1.50	€ 3,003.90	€ 111,045.18	Average	€ 8.43	€ 311.63
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.16	1.80	€ 3,786.92	€ 11,966.66	Average	€ 8.43	€ 26.64
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.588	1.80	€ 3,786.92	€ 13,587.46	Average	€ 8.43	€ 30.25
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		28.721	1.40	€ 2,742.89	€ 78,778.67	Average	€ 8.43	€ 242.12
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		28.763	1.80	€ 3,786.92	€ 108,923.12	Average	€ 8.43	€ 242.47
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.159	1.80	€ 3,786.92	€ 11,962.87	Average	€ 8.43	€ 26.63
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.121	1.80	€ 3,786.92	€ 11,818.97	Average	€ 8.43	€ 26.31
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		15.227	1.30	€ 2,481.89	€ 37,791.72	Average	€ 8.43	€ 128.36
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		17.447	1.80	€ 3,786.92	€ 66,070.36	Average	€ 8.43	€ 147.08
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.317	1.90	€ 4,047.92	€ 13,426.96	Average	€ 8.43	€ 27.96
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.615	1.90	€ 4,047.92	€ 14,633.24	Average	€ 8.43	€ 30.47
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		66.262	1.30	€ 2,481.89	€ 164,454.90	Average	€ 8.43	€ 558.59
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		66.368	1.90	€ 4,047.92	€ 268,652.61	Average	€ 8.43	€ 559.48
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		38.332	1.10	€ 2,060.26	€ 78,973.85	Average	€ 8.43	€ 323.14
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.701	5.40	€ 12,004.60	€ 32,424.42	Average	€ 8.43	€ 22.77
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.8	5.40	€ 12,004.60	€ 33,612.88	Average	€ 8.43	€ 23.60
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		56.078	5.30	€ 11,811.20	€ 662,348.47	Average	€ 8.43	€ 472.74
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		55.209	5.40	€ 12,004.60	€ 662,761.96	Average	€ 8.43	€ 465.41
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.888	2.30	€ 5,225.17	€ 15,090.28	Average	€ 8.43	€ 24.35
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		23.466	2.30	€ 5,225.17	€ 122,613.76	Average	€ 8.43	€ 197.82
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		29.375	4.80	€ 10,844.20	€ 318,548.38	Average	€ 8.43	€ 247.63
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		62.553	3.70	€ 8,716.80	€ 545,261.99	Average	€ 8.43	€ 527.32
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		12.222	2.30	€ 5,225.17	€ 63,861.99	Average	€ 8.43	€ 103.03
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.881	2.30	€ 5,225.17	€ 15,053.70	Average	€ 8.43	€ 24.29
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		12.718	2.60	€ 6,141.40	€ 78,106.37	Average	€ 8.43	€ 107.21
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		63.156	3.70	€ 8,716.80	€ 550,518.22	Average	€ 8.43	€ 532.40
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		29.215	4.30	€ 9,877.20	€ 288,562.40	Average	€ 8.43	€ 246.28
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		22.692	3.90	€ 9,103.60	€ 206,578.89	Average	€ 8.43	€ 191.29
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		2.847	2.30	€ 5,225.17	€ 14,876.05	Average	€ 8.43	€ 24.00
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		110.627	1.10	€ 2,060.26	€ 227,920.27	Average	€ 8.43	€ 932.59
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		27.871	2.00	€ 4,308.93	€ 120,094.18	Average	€ 8.43	€ 234.95
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		25.521	2.30	€ 5,225.17	€ 133,351.48	Average	€ 8.43	€ 215.14
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		301.907	1.10	€ 2,060.26	€ 622,006.60	Average	€ 8.43	€ 2,545.07
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		32.834	1.80	€ 3,786.92	€ 124,339.67	Average	€ 8.43	€ 276.79
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		62.477	1.10	€ 2,060.26	€ 128,718.80	Average	€ 8.43	€ 526.68
Retaining Wall, Urban with sheet piling, <100m in length (€/m)		47.314	2.70	€ 6,446.82	€ 305,024.63	Average	€ 8.43	€ 398.86
				Capital Cost	€ 7,659,183.92	Total PV Cost		€ 15,589.06
			397.218			Total Cost		€ 7,674,772.98

2. Embankments

<u>2. Embankments</u>		Imported Material	Length of Embankment	Height of Embankment Min 1.0m Max 3.0m	Rate	Capital Cost of Embankment	Maintenance Costs Estimate	PV Rate	PV Cost
Select Embankment from Dropdown	Comments	Select Yes/No	(m)	(m)	(€/m)	(€)	Select H/L	(€/m)	PVC * Length
Rural clay embankment (€/m) < 100m		Yes	54.578	2.90	€ 514.94	€ 28,104.31	Average	€ 70.68	€ 3,857.70
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 28,104.31	Total PV Cost		€ 3,857.70
							Total Cost		€ 31,962.01

3. Demountable Barrier

<u>3. Demountable Barrier</u>		Length of Wall	With Ground Beam Installation	Height	Additional Costs	Rate	Cost of Wall	PV & Event Rate	PV Including Events Costs
Select Demountable Barrier Span from Dropdown	Comments	(m)	Select Yes/No	Select (mm)	Select	(€/m)	(€)	(€/m)	(€)
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
Total Cost								Total Cost	€ 0.00

3a. Flood Gate

3a. Flood Gate		No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
Select Flood Gate from Dropdown	Comments							
					Capital Cost	€ 0.00	Total PV Cost	€ 0.00
							Total Cost	€ 0.00
					Overall Capital Cost	€ 0.00	Overall PV Cost	€ 0.00
							Overall Cost	€ 0.00

4. In-Channel Excavation

4. In-Channel Excavation		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
Select Excavation Type from Dropdown	Comments	Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
				Total Cost	€ 0.00
Volume of Dredging		Rate	Cost of Dredging		
Dredging	(m³)	Select a Rate from Dropdown (€/m³)	(€)		
		Total Cost	€ 0.00		
Total Excavation Costs € 0.00					

5. Excavation on Land		Volume of Excavation	Rate	Cost of Excavation
Select Excavation Type from Dropdown	Comments	(m³)	(€/m³)	(€)
		Total Cost	€ 0.00	

6. Weir Construction		Width of Weir Min 10m Max 20m	Rate	Capital Cost of Weir	Maintenance Costs Estimate Select H/L	PV Cost/Weir
Select Weir Height from Dropdown	Comments	(m)	(€/m)	(€)		(€/weir)
					Average	
		Capital Cost	€ 0.00		Total PV Cost	€ 0.00
				Total Cost	€ 0.00	

7. Weir Removal		Length of Weir	Rate	Cost of Construction
Description of Weir	(m)	(€/m)	(€)	
		Total Cost	€ 0.00	

8. Bridges		Remove or Replace Select Yes/No	Area of Bridge	Rate	Cost of Construction	PV Costs
Description of Bridge			(m²)	(€/m²)	(€)	(€/bridge)
			Capital Cost	€ 0.00		€ 0.00
				Total Cost	€ 0.00	

9. Bridge Underpinning		Length of Bridge	Rate	Cost of Construction
Choose a suitable bridge from dropdown	Comments	(m)	(€/m)	(€)
		Total Cost	€ 0.00	

10a. Culverts (Rural)		Disposal of Spoil Select	Ground Type Select Soil/Rock	Invert Select (m)	Culvert Size Select (m)	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate Select H/L	PV Cost
Description of Culvert				(m)	(m)	(m)	(€/m)	(€)		(€/m)
									Average	
						Capital Cost	€ 0.00		Total PV Cost	€ 0.00
						Total Cost	€ 0.00			

10b. Culverts (Urban)		Culvert Select New/Replacement	Invert Select (m)	Culvert Size Select (m)	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate Select H/L	PV Rate	PV Cost
Description of Culvert			(m)	(m)	(m)	(€/m)	(€)		(€/m)	(€)
								High		
								Average		
								Low		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
						Capital Cost	€ 0.00		Total PV Cost	€ 0.00
						Total Cost	€ 0.00			

10c. Culverts (Headwall)		Number of Headwalls	Culvert Size Select (m)	Rate	Cost of Construction
Description of Headwall / Culvert				(€/m)	(€)
			2.4 x 2.1m		
				Capital Cost	€ 0.00
Overall Capital Cost		€ 0.00		Overall PV Cost	€ 0.00
				Overall Cost	€ 0.00

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L	Capital Cost	PV Cost	Total Cost
Select Gate Type	Comments					(€)	(€)	(€)

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Summary

UoM	22	Optimism Bias	35.76%
AFA	Glenflesk	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood defences and road raising	Preliminaries	32%
Description	Flood defences and road raising	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 25,500.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 0.00	€ 0.00	€ 0.00
2	Embankments	€ 29,192.18	€ 13,105.34	€ 42,297.52
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising	€ 37,277.06		€ 37,277.06
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 0.00	€ 0.00	€ 0.00
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 66,469.24	€ 13,105.34	€ 79,574.58
		Basic Construction Costs		€ 66,469.24
		Preliminaries		€ 21,270.16
		Optimism Bias		€ 31,379.74
		Construction Costs (Excl VAT)		€ 119,119.13
		Design Fees		€ 15,485.49
		Σ Construction Costs and Fees		€ 134,604.61

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 11,911.91
Allowance for Compensation and Land Acquisition	€ 11,911.91
Site Investigation	€ 50,000.00
Art Allowance	€ 25,500.00
PV O&M	€ 13,105.34
PV O&M Optimism Bias	€ 4,687.09
Σ Other Items	€ 117,116.25

Option Cost for Cost Benefit Analysis € 251,720.87

CFRAM Unit Cost Development Project						
Optimism Bias Calculator						
Prepared by:	AEP	Date:	December 2013			
Site Reference:		Site Name:	Glenflesk 1 - Flood defences and road raising			

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default weighting defined by OPW for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default risk value defined for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Automated function cell (no input required)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 10px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">User defined - risk value, comments, justification</div> </div>	
Procurement	Weight	Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Low	30%	Small scheme with low complexity - embankments and road raising	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Low	30%	Unknown - large amount of services not expected in rural area	
Ground conditions	3	Medium	50%	Unknown	
Health and Safety	3	Low	30%	Small scale scheme with no unusual risks associated with works	
Other	1	Very Low	10%	None	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Low number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Low number of stakeholders and interferences	
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	High	70%	Number of species of conservation importance present - Otters / Badgers / Bats	
Amenity and art	1	Low	30%	Small rural scheme with low number of stakeholders	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Low	30%	Unknown - small scheme which can be adequately scoped	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Low	30%	Low number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68	41%			
Weighting to apply: 0.429				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 36%	

1. Walls

[illegible]

2. Embankments

[illegible]

3. Demountable Barrier

3. Demountable Barrier						Length of Wall	With Ground Beam Installation	Height	Additional Costs	Wall Length for Maintenance	Rate	Cost of Wall	PV Maintenance Rate
No.	Select Demountable Barrier Span from Dropdown	Comments	(m)	Select Yes/No	Select (mm)	Select	Select	Select	Select	(€/m)	(€)	(€/m)	
Capital Cost											€ 0.00		

3a. Flood Gate

[illegible]

4. In-Channel Excavation

<u>4. In-Channel Excavation</u>					
		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
No.	Select Excavation Type from Dropdown	Comments	Select Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
				Total Cost	€ 0.00

No. Dredging	Volume of Dredging (m³)	Rate Select a Rate from Dropdown (€/m³)	Cost of Dredging (€)
Total Cost			€ 0.00

Total Excavation Costs € 0.00

5. Excavation on Land		Volume of Excavation	Rate	Cost of Excavation
No. Select Excavation Type from Dropdown	Comments	(m³)	(€/m³)	(€)
		Total Cost	€ 0.00	

6. Weir Construction		Width of Weir	Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
No. Select Weir Height from Dropdown	Comments	Min 10m Max 20m	(€/m)	(€)	Select H/L	(€/weir)
		(m)			Average	
		Capital Cost	€ 0.00		Total PV Cost	€ 0.00
				Total Cost	€ 0.00	

7. Weir Removal		Length of Weir	Rate	Cost of Construction
No. Description of Weir	(m)	(€/m)	(€)	
		Total Cost	€ 0.00	

8. Bridges		Remove or Replace	Area of Bridge	Rate	Cost of Construction	PV Costs
No. Description of Bridge		Select Yes/No	(m²)	(€/m²)	(€)	(€/bridge)
		Capital Cost	€ 0.00		€ 0.00	
				Total Cost	€ 0.00	

9. Bridge Underpinning		Length of Bridge	Rate	Cost of Construction
No. Choose a suitable bridge from dropdown	Comments	(m)	(€/m)	(€)
		Total Cost	€ 0.00	

10a. Culverts (Rural)		Disposal of Spoil	Ground Type	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost
No. Description of Culvert		Select	Select Soil/Rock Soil	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)
									High Average Low Average Average Average Average Average		
		Capital Cost	€ 0.00						Total PV Cost	€ 0.00	
										Total Cost	€ 0.00

10b. Culverts (Urban)		Culvert	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Rate	PV Cost
No. Description of Culvert	Select	Select	Select					Select		
	New/Replacement	(m)	(m)	(m)	(€/m)	(€)	H/L	(€/m)	(€)	
							High			
							Average			
							Low			
							Average			
							Average			
							Average			
							Average			
							Average			
Capital Cost						€ 0.00		Total PV Cost		€ 0.00
Total Cost								Total Cost		€ 0.00

10c. Culverts (Headwall)		Length of Culvert	Culvert Size	Rate	Cost of Construction
No. Description of Culvert	(m)	Select (m)	(€/m)	(€)	
		Capital Cost	€ 0.00		
		Overall Capital Cost	€ 0.00	Overall PV Cost	€ 0.00
				Overall Cost	€ 0.00

11. Sluice Gates		Size Select	Maintenance Select	Operation Select	Maintenance Costs Estimate Select H/L	Capital Cost	PV Cost	Total Cost
No. Select Gate Type	Comments					(€)	(€)	(€)
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

12. Road Raising		Length of Road	Cost of Construction	Cost of Construction
No. Road Details		(m)	(€)	(€)
1	South of town	47.89	€ 778.39	€ 37,277.06
Total Cost			€ 778.39	€ 37,277.06

13. Individual Property Protection		Factor Select	Number of Units	Rate	Cost of Works	PV Rate	PV Cost
No. Property Type	Comments			(€)	(€)	(€)	(€)
1	Detached						
2	Semi-Detached						
3	Terraced						
4	Flat						
5	Residential average						
6	Shop						
7	Office						
				Capital Cost	€ 0.00	PV Cost	€ 0.00
						Total Cost	€ 0.00

14. Hydrometric Gauging Stations		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
No. Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
				Capital Cost	€ 0.00	PV Cost	€ 0.00
						Total Cost	€ 0.00

15. Flood Forecasting		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
No. Category	Comments				(€)	(€)	(€)	(€)
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
No. Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
1	0.02 m3/s						
2	0.05 m3/s						
3	0.1 m3/s						
4	0.5 m3/s						
5	1.0 m3/s						
6	2.0 m3/s						
7	3.0 m3/s						
				Capital Cost	€ 0.00	PV Cost	€ 0.00
						Total Cost	€ 0.00

17. Channel Maintenance		Length of Channel	Rate	Maintenance Costs
No. Channel Type	Comments	(m)	(€)	(€)
		Total Cost	€ 0.00	

18. Bank Protection		Fluvial/Coastal Select	Maintenance Select	Length	Rate	Cost of Construction	PV Rate	PV Cost
No. Description of Bank Protection				(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High						
						Capital Cost	€ 0.00	€ 0.00
						PV Cost		€ 0.00
						Total Cost		€ 0.00

19. Manhole Sealing		No. of Manholes	Rate	Cost of Construction
No. Manhole Type	Comments		(€)	(€)
		Total Cost	€ 0.00	

Summary

UoM	22	Optimism Bias	37.71%
AFA	Killarney	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	17%
Description	Flood defences	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	10%
		Art Allowance	€ 25,500.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 121,122.64	€ 2,805.25	€ 123,927.89
2	Embankments	€ 384,639.92	€ 110,422.67	€ 495,062.60
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation	€ 0.00	€ 0.00	€ 0.00
5	Excavation on Land	€ 0.00	€ 0.00	€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal	€ 0.00	€ 0.00	€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning	€ 0.00	€ 0.00	€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising	€ 0.00	€ 0.00	€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 0.00	€ 0.00	€ 0.00
17	Channel Maintenance	€ 0.00	€ 0.00	€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing	€ 0.00	€ 0.00	€ 0.00

€ 505,762.56	€ 113,227.92	€ 618,990.49
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Basic Construction Costs	€ 505,762.56
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Preliminaries	€ 85,979.64
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Optimism Bias	€ 223,121.62
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Construction Costs (Excl VAT)	€ 814,863.81
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Design Fees	€ 105,932.30
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Σ Construction Costs and Fees	€ 920,796.11
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 81,486.38
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Allowance for Compensation and Land Acquisition	€ 81,486.38
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Site Investigation	€ 50,000.00
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Art Allowance	€ 25,500.00
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PV O&M	€ 113,227.92
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Optimism Bias	€ 42,693.59
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Σ Other Items	€ 394,394.28
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Option Cost for Cost Benefit Analysis	€ 1,315,190.38
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CFRAM Unit Cost Development Project					
Optimism Bias Calculator					
Prepared by:	MM	Date:	December 2015		
Site Reference:		Site Name:	Killarney 1 - Flood Defences		

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	Default weighting defined by OPW for all CFRAM projects
					Default risk value defined for all CFRAM projects
					Automated function cell (no input required)
					User defined - risk value, comments, justification
Procurement	Weight	Select from Dropdown Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Low	30%	Small scheme with low complexity - embankments, short section of walls and flood resilience	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Medium	50%	Unknown - large amount of services not expected in rural area	
Ground conditions	3	Medium	50%	Unknown	
Health and Safety	3	Medium	50%	Small scale scheme with no unusual risks associated with works	
Other	1	Very Low	10%	None	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Low number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Low number of stakeholders and interferences	
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	High	70%	Freshwater pearl mussel recorded in close proximity downstream of works	
Amenity and art	1	Low	30%	Low number of stakeholders - works out of public view	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Medium	50%	Unknown - small scheme which can be adequately scoped	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Medium	50%	Low number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68		44%		
Weighting to apply: 0.462				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
				Calculated Optimism bias:	38%

AFA: Killarney
Option: 1 - Flood Defences

1. Walls

Select Wall Type from Dropdown	Comments	Length of Wall	Height of Wall	Rate	Capital Cost of Wall	Maintenance Costs Estimate	PV Rate	PV Cost
		(m)	Min 0.6m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Retaining Wall, Rural (no stone cladding), >100m in length (€/m)		219.84	1.10	€ 362.79	€ 79,756.70	Average	€ 8.43	€ 1,853.25
Retaining Wall, Rural (no stone cladding), >100m in length (€/m)		105.07	1.10	€ 362.79	€ 38,118.80	Average	€ 8.43	€ 885.74
Retaining Wall, Rural (no stone cladding), <50m in length (€/m)		4.31	1.10	€ 413.12	€ 1,780.56	Average	€ 8.43	€ 36.33
Retaining Wall, Rural (no stone cladding), <50m in length (€/m)		3.55	1.10	€ 413.12	€ 1,466.58	Average	€ 8.43	€ 29.93
						Average		
						Average		
						Average		
						Average		
						Average		
Capital Cost					€ 121,122.64		Total PV Cost	€ 2,805.25
							Total Cost	€ 123,927.89

2. Embankments

Select Embankment from Dropdown	Comments	Imported Material	Length of Embankment	Height of Embankment	Rate	Capital Cost of Embankment	Maintenance Costs Estimate	PV Rate	PV Cost
		Select Yes/No	(m)	Min 1.0m Max 3.0m (m)	(€/m)	(€)	Select H/L Average	(€/m)	PVC * Length (€)
Rural clay embankment (€/m) > 100m	WWTP	Yes	203.33	1.00	€ 124.63	€ 25,341.68	Average	€ 70.68	€ 14,371.83
Rural clay embankment (€/m) 100 - 200m		yes	145.1	2.00	€ 284.53	€ 41,285.79	Average	€ 70.68	€ 10,256.00
Rural clay embankment (€/m) > 100m		Yes	546.59	2.00	€ 277.36	€ 151,601.28	Average	€ 70.68	€ 38,634.22
Rural clay embankment (€/m) < 100m		Yes	52.76	1.00	€ 138.67	€ 7,316.20	Average	€ 70.68	€ 3,729.20
Rural clay embankment (€/m) < 100m		Yes	47.61	1.00	€ 138.67	€ 6,602.06	Average	€ 70.68	€ 3,365.18
Rural clay embankment (€/m) < 100m		Yes	298.25	2.00	€ 301.03	€ 89,763.02	Average	€ 70.68	€ 21,080.99
Rural clay embankment (€/m) > 100m		Yes	183.6	2.00	€ 277.36	€ 50,922.99	Average	€ 70.68	€ 12,977.27
Rural clay embankment (€/m) < 100m	Killarney View Hotel	Yes	85	1.00	€ 138.67	€ 11,786.91	Average	€ 70.68	€ 6,007.99
Capital Cost						€ 384,639.92		Total PV Cost	€ 110,422.67
								Total Cost	€ 495,062.60

3. Demountable Barrier

Select Demountable Barrier Span from Dropdown	Comments	Length of Wall	With Ground Beam Installation	Height	Additional Costs	Rate	Cost of Wall	PV & Event Rate	PV Including Events Costs
		(m)	Select Yes/No	Select (mm)	Select	(€/m)	(€)	(€/m)	(€)
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
								Total Cost	€ 0.00

3a. Flood Gate

3a. Flood Gate		No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
Select Flood Gate from Dropdown	Comments							
Capital Cost					€ 0.00	Total PV Cost	€ 0.00	
						Total Cost	€ 0.00	
Overall Capital Cost					€ 0.00	Overall PV Cost	€ 0.00	
						Overall Cost	€ 0.00	

4. In-Channel Excavation

Select Excavation Type from Dropdown	Comments	Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³ (m³)	(€/m³)	(€)
Total Cost					€ 0.00

Volume of Dredging		Rate	Cost of Dredging
		Select a Rate from Dropdown	
Dredging	(m³)	(€/m³)	(€)
Total Cost			€ 0.00

Total Excavation Costs € 0.00

5. Excavation on Land

Select Excavation Type from Dropdown	Comments	Volume of Excavation	Rate	Cost of Excavation
		(m³)	(€/m³)	(€)
Total Cost				€ 0.00

6. Weir Construction

Select Weir Height from Dropdown	Comments	Width of Weir	Rate	Capital Cost of Weir	Maintenance Costs Estimate	PV Cost/Weir
		Min 10m Max 20m (m)	(€/m)	(€)	Select H/L Average	(€/weir)
					Average	
Capital Cost				€ 0.00	Total PV Cost	€ 0.00
					Total Cost	€ 0.00

7. Weir Removal

Description of Weir	Length of Weir	Rate	Cost of Construction
	(m)	(€/m)	(€)

14. Hydrometric Gauging Stations		Number of Units	Maintenance Select H/L	Rate	Capital Cost of Units	PV Rate	PV Costs
Hydrometric Gauging Station	Comments			(€)	(€)	(€)	(€)
				Capital Cost	€ 0.00	PV Cost	€ 0.00
				Total Cost		€ 0.00	

15. Flood Forecasting		Signage Select Yes/No	Maintenance Select	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
Category	Comments				(€)	(€)	(€)	(€)
				Capital Cost	€ 0.00	PV Cost	€ 0.00	€ 0.00
				Total Cost		€ 0.00		

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
0.02 m3/s							
0.05 m3/s							
0.1 m3/s							
0.5 m3/s							
1.0 m3/s							
2.0 m3/s							
3.0 m3/s							
				Capital Cost	€ 0.00	PV Cost	€ 0.00
				Total Cost		€ 0.00	

17. Channel Maintenance		Length of Channel	Rate	Maintenance Costs
Channel Type	Comments	(m)	(€)	(€)
		Total Cost	€ 0.00	

18. Bank Protection		Fluvial/Coastal	Maintenance	Length	Rate	Cost of Construction	PV Rate	PV Cost
		Select	Select					
Description of Bank Protection		(m)	(€/m)	(€)	(€)	(€)	(€)	(€)
	Fluvial	High						
				Capital Cost	€ 0.00	PV Cost	€ 0.00	€ 0.00
				Total Cost		€ 0.00		

19. Manhole Sealing		No. of Manholes	Rate	Cost of Construction
Manhole Type	Comments		(€)	(€)
		Total Cost	€ 0.00	

Summary

UoM	22	Optimism Bias	35.76%
AFA	Milltown	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	18%
Description	Flood Defences	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 25,500.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 232,733.19	€ 648.23	€ 233,381.42
2	Embankments	€ 97,814.00	€ 38,318.84	€ 136,132.84
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 0.00	€ 0.00	€ 0.00
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising			€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 0.00	€ 0.00	€ 0.00
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 330,547.19	€ 38,967.07	€ 369,514.26
		Basic Construction Costs		€ 330,547.19
		Preliminaries		€ 59,498.49
		Optimism Bias		€ 139,498.69
		Construction Costs (Excl VAT)		€ 529,544.37
		Design Fees		€ 68,840.77
		Σ Construction Costs and Fees		€ 598,385.14

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 79,431.66
Allowance for Compensation and Land Acquisition	€ 52,954.44
Site Investigation	€ 50,000.00
Art Allowance	€ 25,500.00
PV O&M	€ 38,967.07
PV O&M Optimism Bias	€ 13,936.46
Σ Other Items	€ 260,789.62

Option Cost for Cost Benefit Analysis € 859,174.77

CFRAM Unit Cost Development Project					
Optimism Bias Calculator					
Prepared by:	MM	Date:	December 2015		
Site Reference:		Site Name:	Milltown	1 - Flood Defences	

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default weighting defined by OPW for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default risk value defined for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Automated function cell (no input required)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">User defined - risk value, comments, justification</div> </div>	
Procurement	Weight	Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Low	30%	Small scheme with low complexity - flood defence embankments and short section of walls	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Low	30%	Unknown - no significant services expected in rural area	
Ground conditions	3	Medium	50%	Unknown	
Health and Safety	3	Low	30%	Small scale scheme with no unusual risks associated with works	
Other	1	Very Low	10%	None	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Low number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Low number of stakeholders and interferences	
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals	
Amenity and art	1	Low	30%	Small rural scheme with low number of stakeholders	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Low	30%	Unknown - small scheme which can be adequately scoped	
Other	1	Very Low	10%	None	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Medium	50%	Low number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68		41%		
Weighting to apply:				0.429	
				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
				Calculated Optimism bias:	36%

1. Walls

2. Embankments

3. Demountable Barrier

3a. Flood Gate

4. In-Channel Excavation

5. Excavation on Land

6. Weir Construction

7. Weir Removal

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Total Cost € 0.00

16. Pumping Stations

16. Pumping Stations		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
Pumpstation Capacity	Comments		(€)	(€)	(€)	(€)	(€)
0.02 m3/s							
0.05 m3/s							
0.1 m3/s							
0.5 m3/s							
1.0 m3/s							
2.0 m3/s							
3.0 m3/s							
Capital Cost				€ 0.00	PV Cost		€ 0.00
Total Cost				Total Cost		€ 0.00	

17. Channel Maintenance

Channel Type	Comments	Length of Channel	Rate	Maintenance Costs
		(m)	(€)	(€)
Total Cost				€ 0.00

18. Bank Protection

Description of Bank Protection	Fluvial/Coastal	Maintenance	Length	Rate	Cost of Construction	PV Rate	PV Cost
	Select	Select	(m)	(€/m)	(€)	(€)	(€)
	Fluvial	High					
Capital Cost					€ 0.00	PV Cost	€ 0.00
Total Cost					€ 0.00		

19. Manhole Sealing

Manhole Type	Comments	No. of Manholes	Rate	Cost of Construction
			(€)	(€)
Total Cost				€ 0.00

Summary

UoM	22	Optimism Bias	36.47%
AFA	Milltown	Site Investigation Estimate	€ 50,000.00
Option	2 - Flow Diversion	Preliminaries	18%
Description	Flow Diversion	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 25,500.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 0.00	€ 0.00	€ 0.00
2	Embankments	€ 0.00	€ 0.00	€ 0.00
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation			€ 0.00
5	Excavation on Land			€ 0.00
6	Weirs	€ 0.00	€ 0.00	€ 0.00
7	Weir Removal			€ 0.00
8	Bridges	€ 0.00	€ 0.00	€ 0.00
9	Bridge Underpinning			€ 0.00
10	Culverts	€ 497,452.04	€ 200,179.98	€ 697,632.02
11	Sluice Gates	€ 0.00	€ 0.00	€ 0.00
12	Road Raising			€ 0.00
13	Individual Property Protection	€ 0.00	€ 0.00	€ 0.00
14	Hydrometric Gauging Stations	€ 0.00	€ 0.00	€ 0.00
15	Flood Forecasting	€ 0.00	€ 0.00	€ 0.00
16	Pumping Stations	€ 0.00	€ 0.00	€ 0.00
17	Channel Maintenance			€ 0.00
18	Bank Protection	€ 0.00	€ 0.00	€ 0.00
19	Manhole Sealing			€ 0.00
		€ 497,452.04	€ 200,179.98	€ 697,632.02
		Basic Construction Costs		€ 497,452.04
		Preliminaries		€ 89,541.37
		Optimism Bias		€ 214,079.95
		Construction Costs (Excl VAT)		€ 801,073.36
		Design Fees		€ 104,139.54
		Σ Construction Costs and Fees		€ 905,212.89

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 120,161.00
Allowance for Compensation and Land Acquisition	€ 80,107.34
Site Investigation	€ 50,000.00
Art Allowance	€ 25,500.00
PV O&M	€ 200,179.98
PV O&M Optimism Bias	€ 73,006.82
Σ Other Items	€ 548,955.14

Option Cost for Cost Benefit Analysis € 1,454,168.03

CFRAM Unit Cost Development Project						
Optimism Bias Calculator						
Prepared by:	AEP	Date:	December 2013			
Site Reference:		Site Name:	Milltown	2 - Flow Diversion		

Project risk components that influence total project cost	Weight 1-3 (3 being a higher weight)	Risk value (0-100%) 0% = no risk 100% = risk expected and not mitigated		Key:	
				<div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default weighting defined by OPW for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FF00FF; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Default risk value defined for all CFRAM projects</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">Automated function cell (no input required)</div> </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></div> <div style="font-size: 0.8em;">User defined - risk value, comments, justification</div> </div>	
Procurement	Weight	Risk score		Comment/justification	
Complexity of Contract Structure	1	Medium	50%	Default risk value	
Late Contractor Involvement in Design	2	Medium	50%	Default risk value	
Poor Contractor Capabilities	1	Medium	50%	Default risk value	
Government Guidelines	1	Medium	50%	Default risk value	
Dispute & Claims Occurred	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgeting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Low	30%	Small scheme with low complexity - flood defence embankments, short section of wall and flow diversion	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Low	30%	Unknown - no significant services expected in rural area	
Ground conditions	3	Medium	50%	Unknown	
Health and Safety	3	Low	30%	Small scale scheme with no unusual risks associated with works	
Other	1	Medium	50%	Risks associated with flow diversion	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Medium	50%	Low number of stakeholders	
Funding Availability	2	Medium	50%	Default risk value	
Project Management Team	1	Medium	50%	Unforeseeable	
Poor Project Intelligence	2	Medium	50%	Potential risk - same for all AFAs	
Other	1	Very Low	10%	None	
Environment					
Public Relations	2	Medium	50%	Low number of stakeholders and interferences	
Site Characteristics	2	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	Medium	50%	No anticipated delays associated with permits, consents or approvals	
Amenity and art	1	Low	30%	Small rural scheme with low number of stakeholders	
Contaminated land	3	Medium	50%	Unknown	
Archaeology	3	Low	30%	Unknown - small scheme which can be adequately scoped	
Other	1	Medium	50%	Risks associated with flow diversion	
External Influences					
Political	3	Medium	50%	Default risk value	
Economic	2	Medium	50%	Default risk value	
Legislation / Regulations	1	Medium	50%	Default risk value	
Multiple river users / stakeholders	2	Medium	50%	Low number of stakeholders and interferences	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68		44%		
Weighting to apply: 0.441				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 36%	

1. Walls

2. Embankments

3. Demountable Barrier

3a. Flood Gate

4. In-Channel Excavation

5. Excavation on Land

6. Weir Construction

7. Weir Removal

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Capital Cost	€ 0.00	PV Cost	€ 0.00
		Total Cost	€ 0.00

16. Pumping Stations

		Number of Units	Rate	Capital Cost	Operation Cost	Running Cost	PV Cost
Pumpstation Capacity			(€)	(€)	(€)	(€)	(€)
0.02 m3/s							
0.05 m3/s							
0.1 m3/s							
0.5 m3/s							
1.0 m3/s							
2.0 m3/s							
3.0 m3/s							
Capital Cost				€ 0.00		PV Cost	€ 0.00
				Total Cost		Total Cost	€ 0.00

17. Channel Maintenance

		Length of Channel	Rate	Maintenance Costs
Channel Type		(m)	(€)	(€)
Total Cost				€ 0.00

18. Bank Protection

		Fluvial/Coastal	Maintenance	Length	Rate	Cost of Construction	PV Rate	PV Cost
Description of Bank Protection		Select	Select	(m)	(€/m)	(€)	(€)	(€)
		Fluvial	High					
Capital Cost						€ 0.00	PV Cost	€ 0.00
						Total Cost	Total Cost	€ 0.00

19. Manhole Sealing

		No. of Manholes	Rate	Cost of Construction
Manhole Type			(€)	(€)
Total Cost				€ 0.00

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment		
Prepared by:	T. Donovan	Date:	01/03/2016
Checked by:	B. O'Connor	Date:	02/03/2016

Project reference	SWCFRAM	Project name:	Castleisland AFA - Glenshearoon
Base date for estimates (year 0)	Mar-2016	Construction Price Index (CPI)	1.000
Scaling factor (e.g. €m, €k, €)	€	Method Factor - to take into account particular site issues /constraints	1.00

This sheet should only be used when assessing single method options as double counting may occur when method costs are added. Costing of complex forecasting over a catchment will depend on the number of gauges, type of forecast model and degree of existing forecast systems (hardware/software). Indicative costs for each element of a forecast model are provided. Appraisers must enter the units required to generate a total cost.

Single Method Capital Cost Tool for complex forecast

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost		Comment/justification
	Lower	Upper				(€)	(€)	
Specification and procurement of system	€2,000	€4,000	No.	1	€2,000	€2,000		
Site visit to determine gauge locations	€2,000	€4,000	No.	1	€2,000	€2,000		
Warning area survey			No.			€0		
Gauging and telemetry								
Raingauges	€3,000	€4,000	No.	2	€3,000	€6,000		
River gauges	€4,000	€5,000	No.	2	€4,000	€8,000		
Forecast model set-up, calibration, configuration and testing								
Hydrological model build and calibration (PDM/routing)	€10,000	€35,000	No.	1	€10,000	€10,000		
Testing and configuration of system	€2,000	€5,000	No.	1	€2,000	€2,000		
Reporting	€3,000	€5,000	No.	1	€3,000	€3,000		
Forecasting system development								
Purchase of development of forecasting platform and licence costs	€40,000	€120,000	No.	1	€40,000	€40,000		
Computer hardware and backup systems	€5,000	€15,000	No.	1	€5,000	€5,000		
Web viewable forecast system (web server, licence, set up costs)	€60,000	€130,000	No.	1	€60,000	€60,000		
Design and plan of training package								
Design, preparation and documentation	€3,000	€8,000	No.	1	€3,000	€3,000		
Delivery and facilitation of training	€2,000	€4,000	No.	1	€2,000	€2,000		
Public awareness campaign								
% of full time equivalent at €30,000/year for year 1	N/A	N/A	%			€0		
Total costs						€143,000		
Apply update to unit rate (CPI) if appropriate (cell N15)						€143,000		
Enter appropriate preliminaries estimate (%) if applicable						0%		
Enter other applicable costs (€)						0		
Total capital cost (€)						€143,000		
Consider amendments based on site issues/constraints (cell N16)						€143,000		
Total capital cost (€)						€143,000		

Operation and Maintenance Cost Tool

	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost	
	Lower	Upper				(€)	(€)
Raingauge maintenance and telemetry	€1,000	€2,000	No.	2	1000	€2,000	
River gauge maintenance and telemetry	€1,000	€5,000	No.	2	1000	€2,000	
Data (GPRS/GSM) costs	€200	€1,500	No.	1	200	€200	
Forecasting management software shell maintenance	€5,000	€20,000	No.	1	5000	€5,000	
Forecast model updates and re-calibration	€1,000	€2,000	No.	1	1000	€1,000	
Hardware and backup system maintenance	€1,000		No.	1	1000	€1,000	
Total O&M cost (€)						€11,200	

Other costs

Other costs (user defined - consider the need for additional longer term or intermittent costs)	€0
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Total PV Cost

Total PVC costs (see PVC calculator below)	€382,024
Optimism bias rate (from external sheet)	44%
Total Cost including Optimism Bias	€550,115

Whole life cost and Pvc analysis - for Complex Forecast for Catchment

Enter applicable costs (enabling, capital and O&M)

Enter year of capital works (all other costs start after this year)

Enter 'other' costs and frequency (e.g. replacement costs) if applicable

Enabling costs assume to start in year 0 (amend manually if required)

Enabling cost (€) (if applicable, may be sunk cost)	
Year of capital works (year)	0
Capital cost (€)	€143,000.0
Annual maintenance cost (€)	€11,200.0
Other cost (€)	€0.0
Other works frequency (years)	

Key

	Information
	Calculation
	Cost Input

Discount rate:		4.0%	Present Value Factor: 22.341		Total Pvc (€k): 382024		
Cash sum		0	143000	548800	0	691800 382024	
year	Discount Factor	Cost Elements				TOTALS:	
		Enabling	Capital	Maint.	Other	Cash	PV
0	1.000	0	143000			143000.0	143000.0
1	0.962			11200		11200.0	10769.2
2	0.925			11200		11200.0	10355.0
3	0.889			11200		11200.0	9956.8
4	0.855			11200		11200.0	9573.8
5	0.822			11200		11200.0	9205.6
6	0.790			11200		11200.0	8851.5
7	0.760			11200		11200.0	8511.1
8	0.731			11200		11200.0	8183.7
9	0.703			11200		11200.0	7869.0
10	0.676			11200		11200.0	7566.3
11	0.650			11200		11200.0	7275.3
12	0.625			11200		11200.0	6995.5
13	0.601			11200		11200.0	6726.4
14	0.577			11200		11200.0	6467.7
15	0.555			11200		11200.0	6219.0
16	0.534			11200		11200.0	5979.8
17	0.513			11200		11200.0	5749.8
18	0.494			11200		11200.0	5528.6
19	0.475			11200		11200.0	5316.0
20	0.456			11200		11200.0	5111.5
21	0.439			11200		11200.0	4914.9
22	0.422			11200		11200.0	4725.9
23	0.406			11200		11200.0	4544.1
24	0.390			11200		11200.0	4369.4
25	0.375			11200		11200.0	4201.3
26	0.361			11200		11200.0	4039.7
27	0.347			11200		11200.0	3884.3
28	0.333			11200		11200.0	3734.9
29	0.321			11200		11200.0	3591.3
30	0.308			11200		11200.0	3453.2
31	0.296			11200		11200.0	3320.4
32	0.285			11200		11200.0	3192.6
33	0.274			11200		11200.0	3069.9
34	0.264			11200		11200.0	2951.8
35	0.253			11200		11200.0	2838.3
36	0.244			11200		11200.0	2729.1
37	0.234			11200		11200.0	2624.1
38	0.225			11200		11200.0	2523.2
39	0.217			11200		11200.0	2426.2
40	0.208			11200		11200.0	2332.8
41	0.200			11200		11200.0	2243.1
42	0.193			11200		11200.0	2156.8
43	0.185			11200		11200.0	2073.9
44	0.178			11200		11200.0	1994.1
45	0.171			11200		11200.0	1917.4
46	0.165			11200		11200.0	1843.7
47	0.158			11200		11200.0	1772.8
48	0.152			11200		11200.0	1704.6
49	0.146			11200		11200.0	1639.0

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment			
Prepared by:	T. Donovan	Date:	01/03/2016	
Checked by:	B. O'Connor	Date:	02/03/2016	

Project reference: **SWCFRAM**Project name: **Castleisland AFA - Upper Maine**Base date for estimates (year 0): **Mar-2016**Construction Price Index (CPI): **1.000**Scaling factor (e.g. €m, €k, €): **€**Method Factor - to take into account particular site issues /constraints: **1.00**

This sheet should only be used when assessing single method options as double counting may occur when method costs are added. Costing of complex forecasting over a catchment will depend on the number of gauges, type of forecast model and degree of existing forecast systems (hardware/software). Indicative costs for each element of a forecast model are provided. Appraisers must enter the units required to generate a total cost.

Single Method Capital Cost Tool for complex forecast

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost (€)	Comment/justification
	Lower	Upper					
Specification and procurement of system	€2,000	€4,000	No.	1	€3,000	€3,000	
Site visit to determine gauge locations	€2,000	€4,000	No.	1	€3,000	€3,000	
Warning area survey			No.			€0	
Gauging and telemetry							
Raingauges	€3,000	€4,000	No.	5	€3,000	€15,000	
River gauges	€4,000	€5,000	No.	4	€4,000	€16,000	
Forecast model set-up, calibration, configuration and testing							
Hydrological model build and calibration (PDM/routing)	€10,000	€35,000	No.	1	€15,000	€15,000	
Testing and configuration of system	€2,000	€5,000	No.	1	€3,000	€3,000	
Reporting	€3,000	€5,000	No.	1	€3,000	€3,000	
Forecasting system development							
Purchase of development of forecasting platform and licence costs	€40,000	€120,000	No.	1	€40,000	€40,000	
Computer hardware and backup systems	€5,000	€15,000	No.	1	€5,000	€5,000	
Web viewable forecast system (web server, licence, set up costs)	€60,000	€130,000	No.	1	€60,000	€60,000	
Design and plan of training package							
Design, preparation and documentation	€3,000	€8,000	No.	1	€5,000	€5,000	
Delivery and facilitation of training	€2,000	€4,000	No.	1	€2,000	€2,000	
Public awareness campaign							
% of full time equivalent at €30,000/year for year 1	N/A	N/A	%			€0	
Total costs						€170,000	
Apply update to unit rate (CPI) if appropriate (cell N15)						€170,000	
Enter appropriate preliminaries estimate (%) if applicable						0%	
Enter other applicable costs (€)						0	
Total capital cost (€)						€170,000	
Consider amendments based on site issues/constraints (cell N16)						€170,000	
Total capital cost (€)						€170,000	

Operation and Maintenance Cost Tool

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost (€)
	Lower	Upper				
Raingauge maintenance and telemetry	€1,000	€2,000	No.	5	1000	€5,000
River gauge maintenance and telemetry	€1,000	€5,000	No.	4	1000	€4,000
Data (GPRS/GSM) costs	€200	€1,500	No.	1	200	€200
Forecasting management software shell maintenance	€5,000	€20,000	No.	1	5000	€5,000
Forecast model updates and re-calibration	€1,000	€2,000	No.	1	1000	€1,000
Hardware and backup system maintenance	€1,000	€2,000	No.	1	1000	€1,000
Total O&M cost (€)						€16,200

Other costs

Other costs (user defined - consider the need for additional longer term or intermittent costs)	€0
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Total PV Cost

Total PVC costs (see PVC calculator below)	€515,732
Optimism bias rate (from external sheet)	44%
Total Cost including Optimism Bias	€742,654

Whole life cost and Pvc analysis - for Complex Forecast for Catchment

Enter applicable costs (enabling, capital and O&M)

Enter year of capital works (all other costs start after this year)

Enter 'other' costs and frequency (e.g. replacement costs) if applicable

Enabling costs assume to start in year 0 (amend manually if required)

Enabling cost (€) (if applicable, may be sunk cost)	
Year of capital works (year)	0
Capital cost (€)	€170,000.0
Annual maintenance cost (€)	€16,200.0
Other cost (€)	€0.0
Other works frequency (years)	

Key

	Information
	Calculation
	Cost Input

Discount rate:		4.0%	Present Value Factor:		22.341	Total PVC (€k):		515732
Cash sum		0	170000	793800	0	963800	515732	
		Cost Elements				TOTALS:		
year	Discount Factor	Enabling	Capital	Maint.	Other	Cash	PV	
0	1.000	0	170000			170000.0	170000.0	
1	0.962			16200		16200.0	15576.9	
2	0.925			16200		16200.0	14977.8	
3	0.889			16200		16200.0	14401.7	
4	0.855			16200		16200.0	13847.8	
5	0.822			16200		16200.0	13315.2	
6	0.790			16200		16200.0	12803.1	
7	0.760			16200		16200.0	12310.7	
8	0.731			16200		16200.0	11837.2	
9	0.703			16200		16200.0	11381.9	
10	0.676			16200		16200.0	10944.1	
11	0.650			16200		16200.0	10523.2	
12	0.625			16200		16200.0	10118.5	
13	0.601			16200		16200.0	9729.3	
14	0.577			16200		16200.0	9355.1	
15	0.555			16200		16200.0	8995.3	
16	0.534			16200		16200.0	8649.3	
17	0.513			16200		16200.0	8316.6	
18	0.494			16200		16200.0	7996.8	
19	0.475			16200		16200.0	7689.2	
20	0.456			16200		16200.0	7393.5	
21	0.439			16200		16200.0	7109.1	
22	0.422			16200		16200.0	6835.7	
23	0.406			16200		16200.0	6572.8	
24	0.390			16200		16200.0	6320.0	
25	0.375			16200		16200.0	6076.9	
26	0.361			16200		16200.0	5843.2	
27	0.347			16200		16200.0	5618.4	
28	0.333			16200		16200.0	5402.3	
29	0.321			16200		16200.0	5194.6	
30	0.308			16200		16200.0	4994.8	
31	0.296			16200		16200.0	4802.7	
32	0.285			16200		16200.0	4617.9	
33	0.274			16200		16200.0	4440.3	
34	0.264			16200		16200.0	4269.5	
35	0.253			16200		16200.0	4105.3	
36	0.244			16200		16200.0	3947.4	
37	0.234			16200		16200.0	3795.6	
38	0.225			16200		16200.0	3649.6	
39	0.217			16200		16200.0	3509.3	
40	0.208			16200		16200.0	3374.3	
41	0.200			16200		16200.0	3244.5	
42	0.193			16200		16200.0	3119.7	
43	0.185			16200		16200.0	2999.7	
44	0.178			16200		16200.0	2884.4	
45	0.171			16200		16200.0	2773.4	
46	0.165			16200		16200.0	2666.7	
47	0.158			16200		16200.0	2564.2	
48	0.152			16200		16200.0	2465.6	
49	0.146			16200		16200.0	2370.7	

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment			
Prepared by:	T. Donovan	Date:	01/03/2016	
Checked by:	B. O'Connor	Date:	02/03/2016	

Project reference	SWCFRAM	Project name:	Dingle AFA - Mill River
Base date for estimates (year 0)	Mar-2016	Construction Price Index (CPI)	1.000
Scaling factor (e.g. €m, €k, €)	€	Method Factor - to take into account particular site issues /constraints	1.00

This sheet should only be used when assessing single method options as double counting may occur when method costs are added. Costing of complex forecasting over a catchment will depend on the number of gauges, type of forecast model and degree of existing forecast systems (hardware/software). Indicative costs for each element of a forecast model are provided. Appraisers must enter the units required to generate a total cost.

Single Method Capital Cost Tool for complex forecast

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost	Comment/justification
	Lower	Upper				(€)	
Specification and procurement of system	€2,000	€4,000	No.	1	€2,000	€2,000	
Site visit to determine gauge locations	€2,000	€4,000	No.	1	€2,000	€2,000	
Warning area survey			No.			€0	
Gauging and telemetry							
Raingauges	€3,000	€4,000	No.	2	€3,000	€6,000	
River gauges	€4,000	€5,000	No.	2	€4,000	€8,000	
Forecast model set-up, calibration, configuration and testing							
Hydrological model build and calibration (PDM/routing)	€10,000	€35,000	No.	1	€10,000	€10,000	
Testing and configuration of system	€2,000	€5,000	No.	1	€2,000	€2,000	
Reporting	€3,000	€5,000	No.	1	€3,000	€3,000	
Forecasting system development							
Purchase of development of forecasting platform and licence costs	€40,000	€120,000	No.	1	€40,000	€40,000	
Computer hardware and backup systems	€5,000	€15,000	No.	1	€5,000	€5,000	
Web viewable forecast system (web server, licence, set up costs)	€60,000	€130,000	No.	1	€60,000	€60,000	
Design and plan of training package							
Design, preparation and documentation	€3,000	€8,000	No.	1	€3,000	€3,000	
Delivery and facilitation of training	€2,000	€4,000	No.	1	€2,000	€2,000	
Public awareness campaign							
% of full time equivalent at €30,000/year for year 1	N/A	N/A	%			€0	
Total costs						€143,000	
Apply update to unit rate (CPI) if appropriate (cell N15)						€143,000	
Enter appropriate preliminaries estimate (%) if applicable						0%	
Enter other applicable costs (€)						0	
Total capital cost (€)						€143,000	
Consider amendments based on site issues/constraints (cell N16)						€143,000	
Total capital cost (€)						€143,000	

Operation and Maintenance Cost Tool

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost
	Lower	Upper				(€)
Raingauge maintenance and telemetry	€1,000	€2,000	No.	2	1000	€2,000
River gauge maintenance and telemetry	€1,000	€5,000	No.	2	1000	€2,000
Data (GPRS/GSM) costs	€200	€1,500	No.	1	200	€200
Forecasting management software shell maintenance	€5,000	€20,000	No.	1	5000	€5,000
Forecast model updates and re-calibration	€1,000	€2,000	No.	1	1000	€1,000
Hardware and backup system maintenance	€1,000		No.	1	1000	€1,000
Total O&M cost (€)						€11,200

Other costs

Other costs (user defined - consider the need for additional longer term or intermittent costs)	€0
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Total PV Cost

Total PVC costs (see PVC calculator below)	€382,024
Optimism bias rate (from external sheet)	43%
Total Cost including Optimism Bias	€546,295

Whole life cost and Pvc analysis - for Complex Forecast for Catchment

Enter applicable costs (enabling, capital and O&M)

Enter year of capital works (all other costs start after this year)

Enter 'other' costs and frequency (e.g. replacement costs) if applicable

Enabling costs assume to start in year 0 (amend manually if required)

Enabling cost (€) (if applicable, may be sunk cost)	
Year of capital works (year)	0
Capital cost (€)	€143,000.0
Annual maintenance cost (€)	€11,200.0
Other cost (€)	€0.0
Other works frequency (years)	

Key

	Information
	Calculation
	Cost Input

Discount rate:		4.0%	Present Value Factor: 22.341		Total Pvc (€k): 382024		
Cash sum		0	143000	548800	0	691800 382024	
year	Discount Factor	Cost Elements				TOTALS:	
		Enabling	Capital	Maint.	Other	Cash	PV
0	1.000	0	143000			143000.0	143000.0
1	0.962			11200		11200.0	10769.2
2	0.925			11200		11200.0	10355.0
3	0.889			11200		11200.0	9956.8
4	0.855			11200		11200.0	9573.8
5	0.822			11200		11200.0	9205.6
6	0.790			11200		11200.0	8851.5
7	0.760			11200		11200.0	8511.1
8	0.731			11200		11200.0	8183.7
9	0.703			11200		11200.0	7869.0
10	0.676			11200		11200.0	7566.3
11	0.650			11200		11200.0	7275.3
12	0.625			11200		11200.0	6995.5
13	0.601			11200		11200.0	6726.4
14	0.577			11200		11200.0	6467.7
15	0.555			11200		11200.0	6219.0
16	0.534			11200		11200.0	5979.8
17	0.513			11200		11200.0	5749.8
18	0.494			11200		11200.0	5528.6
19	0.475			11200		11200.0	5316.0
20	0.456			11200		11200.0	5111.5
21	0.439			11200		11200.0	4914.9
22	0.422			11200		11200.0	4725.9
23	0.406			11200		11200.0	4544.1
24	0.390			11200		11200.0	4369.4
25	0.375			11200		11200.0	4201.3
26	0.361			11200		11200.0	4039.7
27	0.347			11200		11200.0	3884.3
28	0.333			11200		11200.0	3734.9
29	0.321			11200		11200.0	3591.3
30	0.308			11200		11200.0	3453.2
31	0.296			11200		11200.0	3320.4
32	0.285			11200		11200.0	3192.6
33	0.274			11200		11200.0	3069.9
34	0.264			11200		11200.0	2951.8
35	0.253			11200		11200.0	2838.3
36	0.244			11200		11200.0	2729.1
37	0.234			11200		11200.0	2624.1
38	0.225			11200		11200.0	2523.2
39	0.217			11200		11200.0	2426.2
40	0.208			11200		11200.0	2332.8
41	0.200			11200		11200.0	2243.1
42	0.193			11200		11200.0	2156.8
43	0.185			11200		11200.0	2073.9
44	0.178			11200		11200.0	1994.1
45	0.171			11200		11200.0	1917.4
46	0.165			11200		11200.0	1843.7
47	0.158			11200		11200.0	1772.8
48	0.152			11200		11200.0	1704.6
49	0.146			11200		11200.0	1639.0

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment		
Prepared by:	T. Donovan	Date:	01/03/2016
Checked by:	B. O'Connor	Date:	02/03/2016

Project reference	SWCFRAM	Project name:	Glenfiesk AFA
Base date for estimates (year 0)	Mar-2016	Construction Price Index (CPI)	1.000
Scaling factor (e.g. €m, €k, €)	€	Method Factor - to take into account particular site issues /constraints	1.00

This sheet should only be used when assessing single method options as double counting may occur when method costs are added. Costing of complex forecasting over a catchment will depend on the number of gauges, type of forecast model and degree of existing forecast systems (hardware/software). Indicative costs for each element of a forecast model are provided. Appraisers must enter the units required to generate a total cost.

Single Method Capital Cost Tool for complex forecast

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost		Comment/justification
	Lower	Upper				(€)	(€)	
Specification and procurement of system	€2,000	€4,000	No.	1	€3,000	€3,000		
Site visit to determine gauge locations	€2,000	€4,000	No.	1	€3,000	€3,000		
Warning area survey			No.			€0		
Gauging and telemetry								
Raingauges	€3,000	€4,000	No.	3	€3,000	€9,000		
River gauges	€4,000	€5,000	No.	4	€4,000	€16,000		
Forecast model set-up, calibration, configuration and testing								
Hydrological model build and calibration (PDM/routing)	€10,000	€35,000	No.	1	€20,000	€20,000		
Testing and configuration of system	€2,000	€5,000	No.	1	€3,000	€3,000		
Reporting	€3,000	€5,000	No.	1	€4,000	€4,000		
Forecasting system development								
Purchase of development of forecasting platform and licence costs	€40,000	€120,000	No.	1	€40,000	€40,000		
Computer hardware and backup systems	€5,000	€15,000	No.	1	€5,000	€5,000		
Web viewable forecast system (web server, licence, set up costs)	€60,000	€130,000	No.	1	€60,000	€60,000		
Design and plan of training package								
Design, preparation and documentation	€3,000	€8,000	No.	1	€4,000	€4,000		
Delivery and facilitation of training	€2,000	€4,000	No.	1	€3,000	€3,000		
Public awareness campaign								
% of full time equivalent at €30,000/year for year 1	N/A	N/A	%			€0		
Total costs						€170,000		
Apply update to unit rate (CPI) if appropriate (cell N15)						€170,000		
Enter appropriate preliminaries estimate (%) if applicable						0%		
Enter other applicable costs (€)						0		
Total capital cost (€)						€170,000		
Consider amendments based on site issues/constraints (cell N16)						€170,000		
Total capital cost (€)						€170,000		

Operation and Maintenance Cost Tool

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost		Comment/justification
	Lower	Upper				(€)	(€)	
Raingauge maintenance and telemetry	€1,000	€2,000	No.	3	1000	€3,000		
River gauge maintenance and telemetry	€1,000	€5,000	No.	4	1000	€4,000		
Data (GPRS/GSM) costs	€200	€1,500	No.	1	200	€200		
Forecasting management software shell maintenance	€5,000	€20,000	No.	1	5000	€5,000		
Forecast model updates and re-calibration	€1,000	€2,000	No.	1	1000	€1,000		
Hardware and backup system maintenance	€1,000	€2,000	No.	1	1000	€1,000		
Total O&M cost (€)						€14,200		

Other costs

Other costs (user defined - consider the need for additional longer term or intermittent costs)	€0	
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Total PV Cost

Total PVC costs (see PVC calculator below)	€473,049	
Optimism bias rate (from external sheet)	42%	
Total Cost including Optimism Bias	€671,729	

Whole life cost and Pvc analysis - for Complex Forecast for Catchment

Enter applicable costs (enabling, capital and O&M)

Enter year of capital works (all other costs start after this year)

Enter 'other' costs and frequency (e.g. replacement costs) if applicable

Enabling costs assume to start in year 0 (amend manually if required)

Enabling cost (€) (if applicable, may be sunk cost)	
Year of capital works (year)	0
Capital cost (€)	€170,000.0
Annual maintenance cost (€)	€14,200.0
Other cost (€)	€0.0
Other works frequency (years)	

Key

	Information
	Calculation
	Cost Input

Discount rate:		4.0%	Present Value Factor: 22.341		Total PVC (€k): 473049			
		Cash sum	0	170000	695800	0	865800	473049
			Cost Elements				TOTALS:	
year	Discount Factor	Enabling	Capital	Maint.	Other	Cash	PV	
0	1.000	0	170000			170000.0	170000.0	
1	0.962			14200		14200.0	13653.8	
2	0.925			14200		14200.0	13128.7	
3	0.889			14200		14200.0	12623.7	
4	0.855			14200		14200.0	12138.2	
5	0.822			14200		14200.0	11671.1	
6	0.790			14200		14200.0	11222.5	
7	0.760			14200		14200.0	10790.8	
8	0.731			14200		14200.0	10375.8	
9	0.703			14200		14200.0	9976.7	
10	0.676			14200		14200.0	9593.0	
11	0.650			14200		14200.0	9224.0	
12	0.625			14200		14200.0	8869.3	
13	0.601			14200		14200.0	8528.2	
14	0.577			14200		14200.0	8200.1	
15	0.555			14200		14200.0	7884.8	
16	0.534			14200		14200.0	7581.5	
17	0.513			14200		14200.0	7289.9	
18	0.494			14200		14200.0	7009.5	
19	0.475			14200		14200.0	6739.9	
20	0.456			14200		14200.0	6480.7	
21	0.439			14200		14200.0	6231.4	
22	0.422			14200		14200.0	5991.8	
23	0.406			14200		14200.0	5761.3	
24	0.390			14200		14200.0	5539.7	
25	0.375			14200		14200.0	5326.7	
26	0.361			14200		14200.0	5121.8	
27	0.347			14200		14200.0	4924.8	
28	0.333			14200		14200.0	4735.4	
29	0.321			14200		14200.0	4553.3	
30	0.308			14200		14200.0	4378.1	
31	0.296			14200		14200.0	4209.7	
32	0.285			14200		14200.0	4047.8	
33	0.274			14200		14200.0	3892.1	
34	0.264			14200		14200.0	3742.4	
35	0.253			14200		14200.0	3598.5	
36	0.244			14200		14200.0	3460.1	
37	0.234			14200		14200.0	3327.0	
38	0.225			14200		14200.0	3199.1	
39	0.217			14200		14200.0	3076.0	
40	0.208			14200		14200.0	2957.7	
41	0.200			14200		14200.0	2843.9	
42	0.193			14200		14200.0	2734.6	
43	0.185			14200		14200.0	2629.4	
44	0.178			14200		14200.0	2528.3	
45	0.171			14200		14200.0	2431.0	
46	0.165			14200		14200.0	2337.5	
47	0.158			14200		14200.0	2247.6	
48	0.152			14200		14200.0	2161.2	
49	0.146			14200		14200.0	2078.0	

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment		
Prepared by:	T. Donovan	Date:	01/03/2016
Checked by:	B. O'Connor	Date:	02/03/2016

Project reference	SWCFRAM	Project name:	Killamey AFA
Base date for estimates (year 0)	Mar-2016	Construction Price Index (CPI)	1.000
Scaling factor (e.g. €m, €k, €)	€	Method Factor - to take into account particular site issues /constraints	1.00

This sheet should only be used when assessing single method options as double counting may occur when method costs are added. Costing of complex forecasting over a catchment will depend on the number of gauges, type of forecast model and degree of existing forecast systems (hardware/software). Indicative costs for each element of a forecast model are provided. Appraisers must enter the units required to generate a total cost.

Single Method Capital Cost Tool for complex forecast

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost (€)	Comment/justification
	Lower	Upper					
Specification and procurement of system	€2,000	€4,000	No.	1	€4,000	€4,000	
Site visit to determine gauge locations	€2,000	€4,000	No.	1	€4,000	€4,000	
Warning area survey			No.			€0	
Gauging and telemetry							
Raingauges	€3,000	€4,000	No.	6	€3,000	€18,000	
River gauges	€4,000	€5,000	No.	9	€4,000	€36,000	
Forecast model set-up, calibration, configuration and testing							
Hydrological model build and calibration (PDM/routing)	€10,000	€35,000	No.	1	€25,000	€25,000	
Testing and configuration of system	€2,000	€5,000	No.	1	€5,000	€5,000	
Reporting	€3,000	€5,000	No.	1	€4,000	€4,000	
Forecasting system development							
Purchase of development of forecasting platform and licence costs	€40,000	€120,000	No.	1	€40,000	€40,000	
Computer hardware and backup systems	€5,000	€15,000	No.	1	€5,000	€5,000	
Web viewable forecast system (web server, licence, set up costs)	€60,000	€130,000	No.	1	€60,000	€60,000	
Design and plan of training package							
Design, preparation and documentation	€3,000	€8,000	No.	1	€4,000	€4,000	
Delivery and facilitation of training	€2,000	€4,000	No.	1	€3,000	€3,000	
Public awareness campaign							
% of full time equivalent at €30,000/year for year 1	N/A	N/A	%			€0	
Total costs						€208,000	
Apply update to unit rate (CPI) if appropriate (cell N15)						€208,000	
Enter appropriate preliminaries estimate (%) if applicable						0%	
Enter other applicable costs (€)						0	
Total capital cost (€)						€208,000	
Consider amendments based on site issues/constraints (cell N16)						€208,000	
Total capital cost (€)						€208,000	

Operation and Maintenance Cost Tool

Specification, site survey and administration	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost (€)
	Lower	Upper				
Raingauge maintenance and telemetry	€1,000	€2,000	No.	6	1000	€6,000
River gauge maintenance and telemetry	€1,000	€5,000	No.	9	1000	€9,000
Data (GPRS/GSM) costs	€200	€1,500	No.	1	200	€200
Forecasting management software shell maintenance	€5,000	€20,000	No.	1	5000	€5,000
Forecast model updates and re-calibration	€1,000	€2,000	No.	1	1000	€1,000
Hardware and backup system maintenance	€1,000		No.	1	1000	€1,000
Total O&M cost (€)						€22,200

Other costs

Other costs (user defined - consider the need for additional longer term or intermittent costs)	€0
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Total PV Cost

Total PVC costs (see PVC calculator below)	€681,781
Optimism bias rate (from external sheet)	44%
Total Cost including Optimism Bias	€981,764

Whole life cost and Pvc analysis - for Complex Forecast for Catchment

Enter applicable costs (enabling, capital and O&M)

Enter year of capital works (all other costs start after this year)

Enter 'other' costs and frequency (e.g. replacement costs) if applicable

Enabling costs assume to start in year 0 (amend manually if required)

Enabling cost (€) (if applicable, may be sunk cost)	
Year of capital works (year)	0
Capital cost (€)	€208,000.0
Annual maintenance cost (€)	€22,200.0
Other cost (€)	€0.0
Other works frequency (years)	

Key

	Information
	Calculation
	Cost Input

Discount rate:		4.0%	Present Value Factor: 22.341		Total PVC (€k): 681781		
Cash sum		0	208000	1087800	0	1295800 681781	
		Cost Elements				TOTALS:	
year	Discount Factor	Enabling	Capital	Maint.	Other	Cash	PV
0	1.000	0	208000			208000.0	208000.0
1	0.962			22200		22200.0	21346.2
2	0.925			22200		22200.0	20525.1
3	0.889			22200		22200.0	19735.7
4	0.855			22200		22200.0	18976.7
5	0.822			22200		22200.0	18246.8
6	0.790			22200		22200.0	17545.0
7	0.760			22200		22200.0	16870.2
8	0.731			22200		22200.0	16221.3
9	0.703			22200		22200.0	15597.4
10	0.676			22200		22200.0	14997.5
11	0.650			22200		22200.0	14420.7
12	0.625			22200		22200.0	13866.1
13	0.601			22200		22200.0	13332.7
14	0.577			22200		22200.0	12819.9
15	0.555			22200		22200.0	12326.9
16	0.534			22200		22200.0	11852.8
17	0.513			22200		22200.0	11396.9
18	0.494			22200		22200.0	10958.5
19	0.475			22200		22200.0	10537.1
20	0.456			22200		22200.0	10131.8
21	0.439			22200		22200.0	9742.1
22	0.422			22200		22200.0	9367.4
23	0.406			22200		22200.0	9007.1
24	0.390			22200		22200.0	8660.7
25	0.375			22200		22200.0	8327.6
26	0.361			22200		22200.0	8007.3
27	0.347			22200		22200.0	7699.3
28	0.333			22200		22200.0	7403.2
29	0.321			22200		22200.0	7118.5
30	0.308			22200		22200.0	6844.7
31	0.296			22200		22200.0	6581.4
32	0.285			22200		22200.0	6328.3
33	0.274			22200		22200.0	6084.9
34	0.264			22200		22200.0	5850.9
35	0.253			22200		22200.0	5625.8
36	0.244			22200		22200.0	5409.4
37	0.234			22200		22200.0	5201.4
38	0.225			22200		22200.0	5001.3
39	0.217			22200		22200.0	4809.0
40	0.208			22200		22200.0	4624.0
41	0.200			22200		22200.0	4446.2
42	0.193			22200		22200.0	4275.2
43	0.185			22200		22200.0	4110.7
44	0.178			22200		22200.0	3952.6
45	0.171			22200		22200.0	3800.6
46	0.165			22200		22200.0	3654.4
47	0.158			22200		22200.0	3513.9
48	0.152			22200		22200.0	3378.7
49	0.146			22200		22200.0	3248.8