



South Western CFRAM Study

Preliminary Options Report UoM 18

July 2016

The Office of Public Works



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July 2016

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	March 2016	TD / RM / JD	B. O'Connor	F. McGivern	Draft Issue
B	May 2016	T. Donovan	B O'Connor	F McGivern	Draft Final
C	June 2016	T. Donovan	B. O'Connor	F. McGivern	Final
D	July 2016	J Desmond	T. Donovan	F. McGivern	Final

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Appendices

Appendix A. Estimate of Costs	97
Appendix B. Drawings of Potential FRM Options	98
Appendix C. Draft SEA Options Appraisal Report	99
Appendix D. Draft Screening for Appropriate Assessment under the Habitats Directive	100
Appendix E. Climate Change Adaptability	101
Appendix F. Multi Criteria Assessment	102

Appendix A. Estimate of Costs

Summary

UoM	18	Optimism Bias	35.94%
AFA	Aglish	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	32%
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	€ 38,816.97	€ 792.08	€ 39,609.05
2	Embankments	€ 20,339.14	€ 9,280.58	€ 29,619.72
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

€ 59,156.11	€ 10,072.66	€ 69,228.77
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Basic Construction Costs	€ 59,156.11
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Preliminaries	€ 18,929.95
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Optimism Bias	€ 28,065.05
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Construction Costs (Excl VAT)	€ 106,151.11
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Design Fees	€ 13,799.64
-------------	-------------

Σ Construction Costs and Fees	€ 119,950.75
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 10,615.11
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Allowance for Compensation and Land Acquisition	€ 10,615.11
---	-------------

Site Investigation	€ 50,000.00
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Art Allowance	€ 25,500.00
---------------	-------------

PV O&M Costs	€ 10,072.66
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PV O&M Costs - Optimism Bias	€ 3,620.23
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Σ Other Items	€ 110,423.12
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Option Cost for Cost Benefit Analysis	€ 230,373.88
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013
 Site Reference: Site Name: Aglish 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
		Select from Dropdown			
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 Occured	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgetting	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 - short sections of walls and embankments	
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	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	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%			
				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
Weighting to apply:		0.432	Calculated Optimism bias:		36%

1. Walls

[illegible]

2. Embankments

[illegible]

3. Demountable Barrier

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

3a. Flood Gate

[illegible]

4. In-Channel Excavation

4. In-Channel Excavation		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m ³ Max 1,000m ³ (m ³)	(€/m ³)	(€)
No. Select Excavation Type from Dropdown	Comments				
				Total Cost	€ 0.00

Volume of Dredging		Rate	Cost of Dredging
(m ³)		Select a Rate from Dropdown (€/m ³)	(€)
		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
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							
4 0.5 m3/s							
5 1.0 m3/s							
6 2.0 m3/s							
7 3.0 m3/s							
				Capital Cost	€ 0.00		
				Total Cost			
					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	18	Optimism Bias	37.00%
AFA	Ballyduff	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	18%
Description	Flood Defences & Road Raising	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	€ 24,073.67	€ 275.41	€ 24,349.07
2	Embankments	€ 279,517.42	€ 60,485.65	€ 340,003.06
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	€ 272,903.25
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
		€ 303,591.08	€ 60,761.06	€ 637,255.39
		Basic Construction Costs		€ 303,591.08
		Preliminaries		€ 54,646.39
		Optimism Bias		€ 132,547.87
		Construction Costs (Excl VAT)		€ 490,785.34
		Design Fees		€ 63,802.09
		Σ Construction Costs and Fees		€ 554,587.44

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 73,617.80
Allowance for Compensation and Land Acquisition	€ 49,078.53
Site Investigation	€ 50,000.00
Art Allowance	€ 25,500.00
PV O&M Costs	€ 60,761.06
PV O&M Costs - Optimism Bias	€ 22,481.59
Σ Other Items	€ 281,438.98

Option Cost for Cost Benefit Analysis € 836,026.42

CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013
 Site Reference: Site Name: Ballyduff 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
		Select from Dropdown			
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 Occured	3	Medium	50%	Default risk value	
Information Management	1	Medium	50%	Default risk value	
Budgetting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Medium	50%	Small scheme with low complexity - embankments, road raising and short section of wall	
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	Low	30%	Small scale scheme with no unusual risks associated with works	
Other	1	Medium	50%	Issues with road raising and alignment	
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	44%			
				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
Weighting to apply: 0.450				Calculated Optimism bias:	37%

1. Walls		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	(€/m)	PVC * Length (€)
No. Select Wall Type from Dropdown	Comments							
1	Retaining Wall, Rural (no stone cladding), <50m in length (€/m)	32.67	2.00	€ 736.67	€ 24,073.67	Average	€ 8.43	€ 275.41
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
Capital Cost					€ 24,073.67	Total PV Cost		€ 275.41
						Total Cost		€ 24,349.07

2. Embankments		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	(€/m)	PVC * Length (€)
No. Select EmbankmentI from Dropdown	Comments								
1	Rural clay embankment (€/m) 100 - 200m	Yes	115.98	2.00	€ 284.53	€ 33,000.18	Average	€ 70.68	€ 8,197.73
2	Rural clay embankment (€/m) < 100m	Yes	51.9	2.00	€ 301.03	€ 15,623.60	Average	€ 70.68	€ 3,668.41
3	Rural clay embankment (€/m) 100 - 200m	Yes	128.26	2.50	€ 400.21	€ 51,330.79	Average	€ 70.68	€ 9,065.71
4	Rural clay embankment (€/m) > 100m	Yes	254.06	2.50	€ 390.11	€ 99,110.80	Average	€ 70.68	€ 17,957.54
5	Rural clay embankment (€/m) < 100m	Yes	56.73	2.50	€ 419.87	€ 23,819.18	Average	€ 70.68	€ 4,009.81
6	Rural clay embankment (€/m) < 100m	Yes	30.26	2.50	€ 419.87	€ 12,705.24	Average	€ 70.68	€ 2,138.85
7	Rural clay embankment (€/m) > 100m	Yes	218.55	1.50	€ 201.00	€ 43,927.63	Average	€ 70.68	€ 15,447.61
Capital Cost						€ 279,517.42	Total PV Cost		€ 60,485.65
							Total Cost		€ 340,003.06

3. Demountable Barrier		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)	(€)
No. Select Demountable Barrier Span from Dropdown	Comments								
Capital Cost							€ 0.00	Total PV Cost	
								Total Cost	
								€ 0.00	

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

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 Cost					€ 0.00

		Volume of Dredging	Rate	Cost of Dredging
		(m³)	Select a Rate from Dropdown (€/m³)	(€)
No. 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 Min 10m Max 20m (m)	Rate (€/m)	Capital Cost of Weir (€)	Maintenance Costs Estimate Select H/L Average	PV Cost/Weir (€/weir)
No. Select Weir Height from Dropdown	Comments					
		Capital Cost	€ 0.00		Total PV Cost	€ 0.00
				Total Cost	€ 0.00	

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

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

10c. Culverts (Headwall)		Length of Culvert (m)	Culvert Size Select (m)	Rate (€/m)	Cost of Construction (€)
No. Description of 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	Capital Cost	PV Cost	Total Cost
No. Select Gate Type	Comments					(€)	(€)	(€)
Capital Cost						€ 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	Road raised to a max height of 2.0m	128.7	€ 778.39	€ 100,178.69
1	Road raised to a max height of 1.5m	98.9	€ 778.39	€ 76,982.69
1	Road raised to a max height of 1.5m	123	€ 778.39	€ 95,741.87
Total Cost			€ 2,335.17	€ 272,903.25

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						
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	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	18	Optimism Bias	42.29%
AFA	Kanturk	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	10%
Description	Fluvial flood defence of town using walls and embankments	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 38,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 2,736,295.90	€ 7,739.06	€ 2,744,034.95
2	Embankments	€ 305,065.63	€ 84,173.75	€ 389,239.38
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	€ 260,400.00	€ 417,944.95	€ 678,344.95
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

€ 3,301,761.53	€ 509,857.76	€ 3,811,619.29
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Basic Construction Costs	€ 3,301,761.53
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Preliminaries	€ 330,176.15
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Optimism Bias	€ 1,536,095.99
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Construction Costs (Excl VAT)	€ 5,168,033.67
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Design Fees	€ 671,844.38
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Σ Construction Costs and Fees	€ 5,839,878.05
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 775,205.05
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Allowance for Compensation and Land Acquisition	€ 516,803.37
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Site Investigation	€ 50,000.00
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Art Allowance	€ 38,000.00
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PV O&M Costs	€ 509,857.76
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PV O&M Costs - Optimism Bias	€ 215,639.84
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Σ Other Items	€ 2,105,506.02
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Option Cost for Cost Benefit Analysis	€ 7,945,384.07
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013

Site Reference: Site Name: Kanturk 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
		Select from Dropdown			
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
Budgetting	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	Medium	50%		Unknown
Health and Safety	3	Medium	50%		Large scale scheme but no unusual risks associated with works
Other	1	Medium	50%		Surface water drainage and pump stations
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	High	70%		Himalayan balsam identified
Environmental Impact	3	High	70%		Potential for environmental impacts
Permits / Consents / Approvals	2	High	70%		Number of species of conservation importance present - Lamprey / Salmon
Amenity and art	1	Medium	50%		Town centre - large number of stakeholders
Contaminated land	3	High	70%		Unknown - industries within the town centre
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	51%			
Weighting to apply: 0.538				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 42%	

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			
No.	Select Wall Type from Dropdown	Comments	(m)	(m)	(€/m)	(€)	H/L	PVC * Length	
							(€/m)	(€)	
1	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		39.152	1.80	€ 3,786.92	€ 148,265.41	Average	€ 8.43	€ 330.05
2	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		41.662	1.20	€ 2,220.88	€ 92,526.41	Average	€ 8.43	€ 351.21
3	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		33.907	1.10	€ 2,060.26	€ 69,857.20	Average	€ 8.43	€ 285.84
4	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		52.006	1.10	€ 2,060.26	€ 107,145.83	Average	€ 8.43	€ 438.41
5	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		42.168	1.10	€ 2,060.26	€ 86,877.00	Average	€ 8.43	€ 355.48
6	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		60.881	2.60	€ 6,141.40	€ 373,894.78	Average	€ 8.43	€ 513.23
7	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		47.813	1.40	€ 2,742.89	€ 131,146.01	Average	€ 8.43	€ 403.06
8	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		73.726	1.50	€ 3,003.90	€ 221,465.56	Average	€ 8.43	€ 621.51
9	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		54.871	1.10	€ 2,060.26	€ 113,048.47	Average	€ 8.43	€ 462.56
10	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		51.858	1.10	€ 2,060.26	€ 106,840.91	Average	€ 8.43	€ 437.16
11	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		57.884	1.10	€ 2,060.26	€ 119,256.03	Average	€ 8.43	€ 487.96
12	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		9.788	1.10	€ 2,060.26	€ 20,165.81	Average	€ 8.43	€ 82.51
13	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		83.792	1.10	€ 2,060.26	€ 172,633.22	Average	€ 8.43	€ 706.37
14	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		58.37	1.60	€ 3,264.91	€ 190,572.58	Average	€ 8.43	€ 492.06
15	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		20.99	2.50	€ 5,530.58	€ 116,086.85	Average	€ 8.43	€ 176.95
16	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		51.698	2.40	€ 5,835.99	€ 301,709.07	Average	€ 8.43	€ 435.81
17	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		51.023	1.10	€ 2,060.26	€ 105,120.59	Average	€ 8.43	€ 430.12
18	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		86.449	1.50	€ 3,003.90	€ 259,684.18	Average	€ 8.43	€ 728.76
							Average		
							Average		
Capital Cost					€ 2,736,295.90			Total PV Cost	€ 7,739.06
Total Cost					€ 2,744,034.95				

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	Comments	Yes/No	(m)	(m)	(€/m)	(€)	H/L	(€/m)	(€)
1	Rural clay embankment (€/m) 100 - 1,000m		Yes	352.821	2.50	€400.21	€141,202.09	Average	€70.68	€24,938.19
2	Rural clay embankment (€/m) < 100m		Yes	80.982	2.00	€301.03	€24,378.23	Average	€70.68	€5,723.99
3	Rural clay embankment (€/m) 100 - 1,000m		Yes	118.234	1.50	€206.19	€24,378.70	Average	€70.68	€8,357.05
4	Rural clay embankment (€/m) < 100m		Yes	90.093	1.50	€219.85	€19,807.05	Average	€70.68	€6,367.98
5	Rural clay embankment (€/m) < 100m		Yes	75.837	1.40	€203.61	€15,441.54	Average	€70.68	€5,360.33
6	Rural clay embankment (€/m) < 100m		Yes	40.159	1.50	€219.85	€8,829.00	Average	€70.68	€2,838.53
7	Rural clay embankment (€/m) < 100m		Yes	48.358	1.40	€203.61	€9,846.40	Average	€70.68	€3,418.05
8	Rural clay embankment (€/m) < 100m		Yes	51.03	1.80	€268.56	€13,704.62	Average	€70.68	€3,606.92
9	Rural clay embankment (€/m) < 100m		Yes	11.007	1.70	€252.32	€2,777.33	Average	€70.68	€778.00
10	Rural clay embankment (€/m) < 100m		Yes	25.467	1.00	€138.67	€3,531.50	Average	€70.68	€1,800.07
11	Rural clay embankment (€/m) < 100m		Yes	66.075	1.00	€138.67	€9,162.59	Average	€70.68	€4,670.33
12	Rural clay embankment (€/m) < 100m		Yes	78.574	1.00	€138.67	€10,895.82	Average	€70.68	€5,553.79
13	Rural clay embankment (€/m) < 100m		Yes	67.01	1.00	€138.67	€9,292.24	Average	€70.68	€4,736.42
14	Rural clay embankment (€/m) < 100m		Yes	85.228	1.00	€138.67	€11,818.52	Average	€70.68	€6,024.11
						Capital Cost	€ 305,065.63		Total PV Cost	€ 84,173.75
						Total Cost	€ 389,193.25			

3. Demountable Barrier

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

3a. Flood Gate

<u>3a. Flood Gate</u>		No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
No.	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
No. Select Excavation Type from Dropdown	Comments	Select	Min 100m ³ Max 1,000m ³ (m ³)	(€/m ³)	(€)
				Total Cost	€ 0.00

No. Dredging	Volume of Dredging	Rate	Cost of Dredging
	(m ³)	Select a Rate from Dropdown (€/m ³)	(€)
		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 Yes/No	(m ²)	(€/m ²)	(€)	(€/bridge)

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	Select	Select		(m)	(€/m)	(€)	Select	(€/m)	(€)	
		Soil/Rock	(m)	(m)					H/L			
		Soil	2.5						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	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	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		2	€ 130,200.00	€ 260,400.00	€ 80,429.30	€ 17,873.18	€ 196,604.95
4 0.5 m3/s							
5 1.0 m3/s							
6 2.0 m3/s							
7 3.0 m3/s							
Capital Cost				€ 260,400.00	PV Cost		€ 417,944.95
				Total Cost	Total Cost		€ 678,344.95

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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	18	Optimism Bias	45.82%
AFA	Kanturk	Site Investigation Estimate	€ 50,000.00
Option	2 - Storage & Flood Defences	Preliminaries	14%
Description	Storage and Flood Defences	Design Fees	13%
		Compensation and Land Acquisition	15%
		Archaeology and Environmental	15%
		Art Allowance	€ 38,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 1,250,518.64	€ 4,480.53	€ 1,254,999.17
2	Embankments	€ 1,283,894.70	€ 135,613.48	€ 1,419,508.18
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	€ 170,201.64	€ 185,460.14	€ 355,661.78
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	€ 260,400.00	€ 417,944.95	€ 678,344.95
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

€ 2,965,014.98	€ 743,499.11	€ 3,708,514.08
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Basic Construction Costs	€ 2,965,014.98
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Preliminaries	€ 415,102.10
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Optimism Bias	€ 1,548,888.94
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Construction Costs (Excl VAT)	€ 4,929,006.01
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Design Fees	€ 640,770.78
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Σ Construction Costs and Fees	€ 5,569,776.80
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 739,350.90
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Allowance for Compensation and Land Acquisition	€ 739,350.90
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Site Investigation	€ 50,000.00
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Art Allowance	€ 38,000.00
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PV O&M Costs	€ 743,499.11
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PV O&M Costs - Optimism Bias	€ 340,697.53
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Σ Other Items	€ 2,650,898.44
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Option Cost for Cost Benefit Analysis	€ 8,220,675.24
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013

Site Reference: Site Name: Kanturk 2 - 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><div></div> Default weighting defined by OPW for all CFRAM projects</div> <div><div></div> Default risk value defined for all CFRAM projects</div> <div><div></div> Automated function cell (no input required)</div> <div><div></div> User defined - risk value, comments, justification</div>	
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	
Budgetting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	High	70%	Large scheme with storage area, walls, embankments and pump stations	
Degree of Innovation	2	Medium	50%	Standard and proven methods	
Technology	2	High	70%	Storage area controls, pump stations and associated equipment required	
Services	3	High	70%	Unknown - town centre with large amount of services expected	
Ground conditions	3	High	70%	Unknown - risk associated with large storage area	
Health and Safety	3	Medium	50%	Large scale scheme but no unusual risks associated with works	
Other	1	Medium	50%	Storage area, surface water drainage and pump stations	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Very High	90%	High number of stakeholders including critical stakeholders associated with storage area	
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%	High number of stakeholders and interferences including storage area	
Site Characteristics	2	High	70%	Himalayan balsam identified	
Environmental Impact	3	High	70%	Potential for environmental impacts	
Permits / Consents / Approvals	2	Very High	90%	Number of species of conservation importance present - Lamprey / Salmon / Otter	
Amenity and art	1	Medium	50%	Town centre - large number of stakeholders	
Contaminated land	3	Very High	90%	Unknown - risk associated with storage area and industries within the town centre	
Archaeology	3	Medium	50%	Unknown	
Other	1	Medium	50%	Specific risks associated with storage area	
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%	High number of stakeholders and interferences including storage area	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68	57%			
Weighting to apply: 0.597				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 46%	

1. Walls		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	(€/m)	PVC * Length (€)
No. Select Wall Type from Dropdown	Comments							
1	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	39.152	1.10	€ 2,060.26	€ 80,663.26	Average	€ 8.43	€ 330.05
						Average		
						Average		
						Average		
						Average		
6	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	60.881	2.10	€ 4,614.34	€ 280,925.76	Average	€ 8.43	€ 513.23
7	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	47.813	1.10	€ 2,060.26	€ 98,507.16	Average	€ 8.43	€ 403.06
8	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	73.726	1.10	€ 2,060.26	€ 151,894.65	Average	€ 8.43	€ 621.51
9	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	57.884	1.10	€ 2,060.26	€ 119,256.03	Average	€ 8.43	€ 487.96
10	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	9.788	1.10	€ 2,060.26	€ 20,165.81	Average	€ 8.43	€ 82.51
11	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	83.792	1.10	€ 2,060.26	€ 172,633.22	Average	€ 8.43	€ 706.37
12	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	51.023	1.10	€ 2,060.26	€ 105,120.59	Average	€ 8.43	€ 430.12
13	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	86.449	1.10	€ 2,060.26	€ 178,107.33	Average	€ 8.43	€ 728.76
14	Retaining Wall, Urban with sheet piling, <100m in length (€/m)	20.99	1.10	€ 2,060.26	€ 43,244.84	Average	€ 8.43	€ 176.95
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
Capital Cost					€ 1,250,518.64		Total PV Cost	€ 4,480.53
							Total Cost	€ 1,254,999.17

2. Embankments		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	(€/m)	PVC * Length (€)
No. Select EmbankmentI from Dropdown	Comments								
1	Rural clay embankment (€/m) 100 - 1,000m	Yes	352.821	1.90	€ 268.86	€ 94,861.13	Average	€ 70.68	€ 24,938.19
2	Rural clay embankment (€/m) < 100m	Yes	80.982	1.00	€ 138.67	€ 11,229.73	Average	€ 70.68	€ 5,723.99
3	Rural clay embankment (€/m) 100 - 1,000m	Yes	118.234	1.00	€ 127.85	€ 15,115.88	Average	€ 70.68	€ 8,357.05
4	Rural clay embankment (€/m) < 100m	Yes	90.093	1.00	€ 138.67	€ 12,493.15	Average	€ 70.68	€ 6,367.98
5	Rural clay embankment (€/m) < 100m	Yes	75.837	1.00	€ 138.67	€ 10,516.28	Average	€ 70.68	€ 5,360.33
6	Rural clay embankment (€/m) < 100m	Yes	40.159	1.00	€ 138.67	€ 5,568.83	Average	€ 70.68	€ 2,838.53
7	Rural clay embankment (€/m) < 100m	Yes	48.358	1.00	€ 138.67	€ 6,705.78	Average	€ 70.68	€ 3,418.05
8	Rural clay embankment (€/m) < 100m	Yes	51.03	1.00	€ 138.67	€ 7,076.30	Average	€ 70.68	€ 3,606.92
9	Rural clay embankment (€/m) < 100m	Yes	11.007	1.00	€ 138.67	€ 1,526.34	Average	€ 70.68	€ 778.00
10	Rural clay embankment (€/m) < 100m	Yes	25.467	1.00	€ 138.67	€ 3,531.50	Average	€ 70.68	€ 1,800.07
11	Rural clay embankment (€/m) < 100m	Yes	66.075	1.00	€ 138.67	€ 9,162.59	Average	€ 70.68	€ 4,670.33
12	Rural clay embankment (€/m) < 100m	Yes	78.574	1.00	€ 138.67	€ 10,895.82	Average	€ 70.68	€ 5,553.79
13	Rural clay embankment (€/m) < 100m	Yes	67.01	1.00	€ 138.67	€ 9,292.24	Average	€ 70.68	€ 4,736.42
14	Rural clay embankment (€/m) < 100m	Yes	85.228	1.00	€ 138.67	€ 11,818.52	Average	€ 70.68	€ 6,024.11
15	Rural clay embankment (€/m) 100 - 1,000m	Yes	399.229	8.00	€ 2,361.10	€ 942,619.59	Average	€ 70.68	€ 28,218.41
16	Rural clay embankment (€/m) 100 - 1,000m	Yes	328.531	2.50	€ 400.21	€ 131,481.02	Average	€ 70.68	€ 23,221.32
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 1,283,894.70	Total PV Cost	€ 135,613.48	
							Total Cost	€ 1,419,508.18	

3. Demountable Barrier		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)	(€)
No. Select Demountable Barrier Span from Dropdown	Comments								
Capital Cost						€ 0.00	Total PV Cost	€ 0.00	
							Total Cost	€ 0.00	

3a. Flood Gate		No. of Flood Gates	Height	Width	Rate	Cost of Flood Gate	PV & Event Rate	PV Costs
			Select (m)	Select (m)	(€/gate)	(€)	(€/gate)	(€)
No. 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		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 Cost					€ 0.00
		Volume of Dredging	Rate Select a Rate from Dropdown (€/m³)	Cost of Dredging	(€)
No. Dredging		(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 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)	(€)
			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					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	Maintenance	Operation	Maintenance Costs Estimate	Capital Cost	PV Cost	Total Cost	
No.	Select Gate Type	Comments	Select	Select	Select	Select H/L	(€)	(€)	(€)
1	Penstocks	Storage embankment is 8m high. Increased rate by 4	1800	Woodland/open public or open non public locations with lower debris loads	Electric Operation	Average	€ 170,201.64	€ 185,460.14	€ 355,661.78
Capital Cost						€ 170,201.64	PV Cost	€ 185,460.14	
						Total Cost		€ 355,661.78	

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	2	€ 130,200.00	€ 260,400.00	€ 80,429.30	€ 17,873.18	€ 196,604.95
4	0.5 m3/s						
5	1.0 m3/s						
6	2.0 m3/s						
7	3.0 m3/s						
Capital Cost				€ 260,400.00	PV Cost		€ 417,944.95
				Total Cost		€ 678,344.95	

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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	18	Optimism Bias	44.06%
AFA	Kanturk	Site Investigation Estimate	€ 50,000.00
Option	3 - Conveyance & Flood Defences	Preliminaries	14%
Description	Fluvial flood defence of town using walls and embankments and removal of weirs	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 38,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 1,668,859.09	€ 5,032.53	€ 1,673,891.62
2	Embankments	€ 283,856.41	€ 82,640.09	€ 366,496.50
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	€ 706,149.40	€ 9,241.05	€ 715,390.45
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	€ 260,400.00	€ 417,944.95	€ 678,344.95
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
		€ 2,919,264.90	€ 514,858.63	€ 3,434,123.52
		Basic Construction Costs		€ 2,919,264.90
		Preliminaries		€ 408,697.09
		Optimism Bias		€ 1,466,260.90
		Construction Costs (Excl VAT)		€ 4,794,222.88

Design Fees	€ 623,248.97
Σ Construction Costs and Fees	€ 5,417,471.85

Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 719,133.43
Allowance for Compensation and Land Acquisition	€ 479,422.29
Site Investigation	€ 50,000.00
Art Allowance	€ 38,000.00
PV O&M Costs	€ 514,858.63
PV O&M Costs - Optimism Bias	€ 226,840.65
Σ Other Items	€ 2,028,255.00

Option Cost for Cost Benefit Analysis € 7,445,726.85

CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by:	AEP	Date:	December 2013
Site Reference:		Site Name:	Kanturk 3 - Conveyance & 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
Budgetting	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 the removal of weirs
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	Medium	50%		Unknown
Health and Safety	3	High	70%		Large scale scheme - risks associated with removal of weirs and working in channel
Other	1	Medium	50%		Removal of weirs, surface water drainage and pump stations
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	High	70%		Himalayan balsam identified
Environmental Impact	3	Very High	90%		Potential for environmental impacts - removal of weir
Permits / Consents / Approvals	2	Very High	90%		Number of species of conservation importance present - Lamprey / Salmon - removal of weir
Amenity and art	1	Medium	50%		Town centre - large number of stakeholders
Contaminated land	3	High	70%		Unknown - industries within the town centre
Archaeology	3	Medium	50%		Unknown
Other	1	Medium	50%		Removal of weir
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	54%			
Weighting to apply: 0.568				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 44%	

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			Select		PVC * Length
No.	Select Embankment from Dropdown	Yes/No	(m)	(m)	(€/m)	(€)	H/L	(€/m)	(€)
1	Rural clay embankment (€/m) 100 - 1,000m	Yes	352.821	2.50	€ 400.21	€ 141,202.09	Average	€ 70.68	€ 24,938.19
2	Rural clay embankment (€/m) < 100m	Yes	80.982	2.00	€ 301.03	€ 24,378.23	Average	€ 70.68	€ 5,723.99
3	Rural clay embankment (€/m) 100 - 1,000m	Yes	118.234	1.40	€ 190.52	€ 22,526.13	Average	€ 70.68	€ 8,357.05
4	Rural clay embankment (€/m) < 100m	Yes	90.093	1.40	€ 203.61	€ 18,344.27	Average	€ 70.68	€ 6,367.98
5	Rural clay embankment (€/m) < 100m	Yes	75.837	1.00	€ 138.67	€ 10,516.28	Average	€ 70.68	€ 5,360.33
6	Rural clay embankment (€/m) < 100m	Yes	40.159	1.00	€ 138.67	€ 5,568.83	Average	€ 70.68	€ 2,838.53
7	Rural clay embankment (€/m) < 100m	Yes	26.66	1.30	€ 187.38	€ 4,995.51	Average	€ 70.68	€ 1,884.39
8	Rural clay embankment (€/m) < 100m	Yes	51.03	1.30	€ 187.38	€ 9,561.92	Average	€ 70.68	€ 3,606.92
9	Rural clay embankment (€/m) < 100m	Yes	11.007	1.30	€ 187.38	€ 2,062.47	Average	€ 70.68	€ 778.00
10	Rural clay embankment (€/m) < 100m	Yes	25.467	1.00	€ 138.67	€ 3,531.50	Average	€ 70.68	€ 1,800.07
11	Rural clay embankment (€/m) < 100m	Yes	66.075	1.00	€ 138.67	€ 9,162.59	Average	€ 70.68	€ 4,670.33
12	Rural clay embankment (€/m) < 100m	Yes	78.574	1.00	€ 138.67	€ 10,895.82	Average	€ 70.68	€ 5,553.79
13	Rural clay embankment (€/m) < 100m	Yes	67.01	1.00	€ 138.67	€ 9,292.24	Average	€ 70.68	€ 4,736.42
14	Rural clay embankment (€/m) < 100m	Yes	85.228	1.00	€ 138.67	€ 11,818.52	Average	€ 70.68	€ 6,024.11
					Capital Cost	€ 283,856.41		Total PV Cost	€ 82,640.09
					Total Cost	€ 366,496.50			

3. Demountable Barrier

3. Demountable Barrier							Length of Wall	With Ground Beam Installation	Height	Additional Costs	Rate	Cost of Wall	PV & Event Rate	PV Including Events Costs
No.	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

<u>3a. Flood Gate</u>		No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
No.	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
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 Select a Rate from Dropdown (€/m³)	Cost of Dredging (€)
			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	(€/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)	(€)
1 u/s weir to be removed, rate is urban so Padiham used		23.36	13,430	€ 313,724.80
1 d/s weir to be removed, rate is urban so Padiham used		29.22	13,430	€ 392,424.60
		Total Cost	€ 706,149.40	

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		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	Select	Select	(m)	(€/m)	(€)	Select	(€/m)	(€)
		Soil/Rock	Soil	(m)	(m)				H/L		
				2.5					High		
									Average		
									Low		
									Average		
									Average		
									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					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)	(€)
		</			

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		2	€ 130,200.00	€ 260,400.00	€ 80,429.30	€ 17,873.18	€ 196,604.95
4 0.5 m3/s							
5 1.0 m3/s							
6 2.0 m3/s							
7 3.0 m3/s							
Capital Cost				€ 260,400.00	PV Cost		€ 417,944.95
Total Cost					Total Cost		€ 678,344.95

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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	18	Optimism Bias	37.18%
AFA	Rathcormack	Site Investigation Estimate	€ 50,000.00
Option	1 - Storage	Preliminaries	20%
Description	Storm attenuation of flood waters	Design Fees	13%
		Compensation and Land Acquisition	15%
		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	€ 129,357.41	€ 32,134.28	€ 161,491.69
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	€ 25,135.00	€ 46,365.04	€ 71,500.04
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	€ 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
		€ 154,492.41	€ 78,499.32	€ 232,991.73
		Basic Construction Costs		€ 154,492.41
		Preliminaries		€ 30,898.48
		Optimism Bias		€ 68,921.79
		Construction Costs (Excl VAT)		€ 254,312.68
		Design Fees		€ 33,060.65
		Σ Construction Costs and Fees		€ 287,373.33
<u>Other Items</u>				
		Allowance for Archaeology and Environmental Mitigation Measures		€ 25,431.27
		Allowance for Compensation and Land Acquisition		€ 38,146.90
		Site Investigation		€ 50,000.00
		Art Allowance		€ 25,500.00
		PV O&M Costs		€ 78,499.32
		PV O&M Costs - Optimism Bias		€ 29,183.28
		Σ Other Items		€ 246,760.76

Option Cost for Cost Benefit Analysis € 534,134.09

CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013

Site Reference: Site Name: Rathcormack 1 - Storage

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	
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	
Budgetting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Medium	50%	Small scheme with low complexity - single storage area with flow control structure	
Degree of Innovation	2	Medium	50%	Standard and proven methods	
Technology	2	Medium	50%	Storage area and flow controls	
Services	3	Low	30%	Unknown - no significant services expected in rural area	
Ground conditions	3	Medium	50%	Unknown - limited to one field currently used for agriculture	
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	Medium	50%	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	44%			
Weighting to apply: 0.453				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 37%	

1. Walls		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	(€/m)	PVC * Length (€)
No. Select Wall Type from Dropdown	Comments					Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
Capital Cost					€ 0.00	Total PV Cost		€ 0.00
						Total Cost		€ 0.00

2. Embankments		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	(€/m)	PVC * Length (€)
No. Select EmbankmentI from Dropdown	Comments								
1	Rural clay embankment (€/m) 100 - 1000m	Yes	454.63	2.00	€ 284.53	€ 129,357.41	Average	€ 70.68	€ 32,134.28
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 129,357.41	Total PV Cost		€ 32,134.28
							Total Cost		€ 161,491.69

3. Demountable Barrier		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)	(€)
No. Select Demountable Barrier Span from Dropdown	Comments								
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
								Total Cost	€ 0.00

3a. Flood Gate		No. of Flood Gates	Height	Width	Rate	Cost of Flood Gate	PV & Event Rate	PV Costs
			Select (m)	Select (m)	(€/gate)	(€)	(€/gate)	(€)
No. 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		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ 1,000m³ Max (m³)	(€/m³)	(€)
No. Select Excavation Type from Dropdown	Comments				
				Total Cost	€ 0.00
		Volume of Dredging	Rate	Cost of Dredging	
		(m³)	Select a Rate from Dropdown (€/m³)	(€)	
No. 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 20m (m)	Max		Select	
				(€/m)	(€)	H/L
					Average	

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	Select	Select	(m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)	
		Soil	2.5						High			
									Average			
									Low			
									Average			
									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					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				(€)	(€)	(€)
1	Sluice Gates		1800	Urban/suburban locations with high debris loads	Electric Operation	Average	€ 25,135.00	€ 46,365.04
						Capital Cost	€ 25,135.00	€ 46,365.04
						Total Cost		€ 71,500.04

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	€ 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
					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
						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		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
						Total Cost		€ 0.00

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

Summary

UoM	18	Optimism Bias	36.29%
AFA	Rathcormack	Site Investigation Estimate	€ 50,000.00
Option	2 - Flow Diversion	Preliminaries	18%
Description	Divert flow to from Kilbrien stream to Shanowen River	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	€ 0.00	€ 0.00	€ 0.00
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	€ 375,627.41	€ 200,179.98	€ 575,807.39
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

€ 375,627.41	€ 200,179.98	€ 575,807.39
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Basic Construction Costs	€ 375,627.41
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Preliminaries	€ 67,612.93
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Optimism Bias	€ 160,870.17
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Construction Costs (Excl VAT)	€ 604,110.52
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Design Fees	€ 78,534.37
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Σ Construction Costs and Fees	€ 682,644.88
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 60,411.05
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Allowance for Compensation and Land Acquisition	€ 60,411.05
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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 Costs	€ 200,179.98
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PV O&M Costs - Optimism Bias	€ 72,653.56
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Σ Other Items	€ 469,155.64
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Option Cost for Cost Benefit Analysis	€ 1,151,800.52
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013
 Site Reference: Rathcormack 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:	
					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	
Budgetting	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	
Degree of Innovation	2	Low	30%	Standard and proven methods	
Technology	2	Low	30%	No assets sensitive to technology	
Services	3	Medium	50%	Unknown - no significant services expected in rural area	
Ground conditions	3	Medium	50%	Unknown - limited to three agricultural fields and a road crossing	
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 - but critical to storage area	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68	42%			
				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
Weighting to apply: 0.438				Calculated Optimism bias:	36%

1. Walls		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	(€/m)	PVC * Length (€)
No. Select Wall Type from Dropdown	Comments					Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
						Average		
Capital Cost					€ 0.00	Total PV Cost		€ 0.00
						Total Cost		€ 0.00

2. Embankments		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	(€/m)	PVC * Length (€)
No. Select EmbankmentI from Dropdown	Comments						Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 0.00	Total PV Cost		€ 0.00
							Total Cost		€ 0.00

3. Demountable Barrier		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)	(€)
No. Select Demountable Barrier Span from Dropdown	Comments								
Capital Cost							€ 0.00	Total PV Cost	
								Total Cost	
								€ 0.00	

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

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 Cost					€ 0.00

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

Total Excavation Costs € 0.00

5. Excavation on Land

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

6. Weir Construction

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	(€/weir)
		(m)				H/L	
						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)

<u>10a. Culverts (Rural)</u>		Disposal of Spoil	Ground Type	Invert	Culvert Size	Length of Culvert	Rate	Cost of Construction	Maintenance Costs Estimate	PV Cost
No.	Description of Culvert	Select	Select	Select	Select	(m)	(€/m)	(€)	Select H/L	(€/m)
1	Culvert to connect Kilbrien stream with Shanowen River	Surplus excavated material carted to licenced tip	Soil	4	1.5m dia	582	€ 609.60	€ 354,786.82	Average	€ 200,179.98
							Capital Cost	€ 354,786.82	Total PV Cost	€ 200,179.98
							Total Cost		Total Cost	€ 554,966.80

10b. Culverts (Urban)

10b. Culverts (Urban)										
No.	Description of Culvert	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	PV Rate (€/m)	PV Cost (€)
								High		
								Average		
								Low		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
						Capital Cost	€ 0.00		Total PV Cost	€ 0.00
						Total Cost	€ 0.00		Total Cost	€ 0.00

10c. Culverts (Headwall)

<u>10c. Culverts (Headwall)</u>		Number of Headwalls	Culvert Size	Rate	Cost of Construction
No.	Description of Culvert		Select (m)	(€/m)	(€)
1	Culvert to connect Kilbrien stream with Shanowen River	2	1.5m dia	€ 10,420.29	€ 20,840.59
				Capital Cost	€ 20,840.59
Overall Capital Cost			€ 375,627.41	Overall PV Cost	€ 200,179.98
				Overall Cost	€ 575,807.39

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	PV Cost	€ 0.00
						Total Cost		€ 0.00

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							
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		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	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	18	Optimism Bias	36.29%
AFA	Rathcormack	Site Investigation Estimate	€ 50,000.00
Option	3 - Flood Defences	Preliminaries	18%
Description	Flood Defence Walls	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	€ 287,703.71	€ 6,722.16	€ 294,425.88
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	€ 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

€ 287,703.71	€ 6,722.16	€ 294,425.88
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Basic Construction Costs	€ 287,703.71
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Preliminaries	€ 51,786.67
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Optimism Bias	€ 123,215.04
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Construction Costs (Excl VAT)	€ 462,705.42
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Design Fees	€ 60,151.70
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Σ Construction Costs and Fees	€ 522,857.13
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 46,270.54
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Allowance for Compensation and Land Acquisition	€ 46,270.54
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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 Costs	€ 6,722.16
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PV O&M Costs - Optimism Bias	€ 2,439.75
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Σ Other Items	€ 177,203.00
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Option Cost for Cost Benefit Analysis	€ 700,060.12
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013
 Site Reference: Site Name: Rathcormack 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:	
					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
		Select from Dropdown			
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	
Budgetting	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	Low	30%	No assets sensitive to technology	
Services	3	Medium	50%	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 - but critical to storage area	
Flood events during construction	3	Medium	50%	History of flooding	
Other	1	Very Low	10%	None	
	68	42%			
Weighting to apply: 0.438				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 36%	

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		
No.	Select Wall Type from Dropdown	Comments	(m)	(m)	(€/m)	(€)	H/L	PVC * Length (€)
1	Retaining Wall, Rural (no stone cladding), >100m in length (€/m)		465.8	1.25	€ 368.31	€ 171,556.73	Average	€ 8.43 € 3,926.69
2	Retaining Wall, Rural (no stone cladding), >100m in length (€/m)		331.61	1.20	€ 350.25	€ 116,146.98	Average	€ 8.43 € 2,795.47
							Average	
							Average	
							Average	
							Average	
							Average	
							Average	
							Average	
Capital Cost					€ 287,703.71		Total PV Cost	€ 6,722.16
							Total Cost	€ 294,425.88

2. Embankments		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)	(€)	Select H/L	(€/m)	PVC * Length
No.	Select EmbankmentI from Dropdown	Comments							(€)
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
							Average		
Capital Cost						€ 0.00	Total PV Cost		€ 0.00
							Total Cost		€ 0.00

3. Demountable Barrier		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)	(€)
No.	Select Demountable Barrier Span from Dropdown	Comments							
Capital Cost							€ 0.00	Total PV Cost	€ 0.00
								Total Cost	€ 0.00

3a. Flood Gate		No. of Flood Gates	Height	Width	Rate	Cost of Flood Gate	PV & Event Rate	PV Costs
			Select (m)	Select (m)	(€/gate)	(€)	(€/gate)	(€)
No.	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		Urban or Rural	Volume of Excavation	Rate	Cost of Excavation
		Select	Min 100m³ Max 1,000m³	(€/m³)	(€)
No.	Select Excavation Type from Dropdown	Comments			
Total Cost					€ 0.00

		Volume of Dredging	Rate	Cost of Dredging
		(m³)	Select a Rate from Dropdown	(€)
No.	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)	(€/m)	(€)	Select H/L	(€/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
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 Cost
No. Description of Culvert		Select	Select Soil/Rock	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)
									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 New/Replacement	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)
								High Average Low		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
								Average		
		Capital Cost	€ 0.00		Total PV Cost	€ 0.00		Total Cost	€ 0.00	

<u>10c. Culverts (Headwall)</u>		Length of Culvert	Culvert Size	Rate	Cost of Construction
No.	Description of Culvert	(m)	Select (m)	(€/m)	(€)

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	PV Cost	€ 0.00
						Total Cost		€ 0.00

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							
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	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	18	Optimism Bias	42%
AFA	Youghal	Site Investigation Estimate	€ 50,000.00
Option	1 - Flood Defences	Preliminaries	10%
Description	Flood Defences	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 38,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 2,871,073.93	€ 10,420.40	€ 2,881,494.34
2	Embankments	€ 0.00	€ 0.00	€ 0.00
3	Demountable Walls and Gates	€ 117,600.00	€ 7,917.27	€ 125,517.27
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	€ 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

€ 3,118,873.93	€ 227,310.15	€ 3,346,184.08
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Basic Construction Costs	€ 3,118,873.93
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Preliminaries	€ 311,887.39
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Optimism Bias	€ 1,438,901.66
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Construction Costs (Excl VAT)	€ 4,869,662.99
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Design Fees	€ 633,056.19
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Σ Construction Costs and Fees	€ 5,502,719.18
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 730,449.45
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Allowance for Compensation and Land Acquisition	€ 486,966.30
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Site Investigation	€ 50,000.00
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Art Allowance	€ 38,000.00
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PV O&M Costs	€ 227,310.15
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PV O&M Costs - Optimism Bias	€ 95,336.55
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Σ Other Items	€ 1,628,062.45
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Option Cost for Cost Benefit Analysis	€ 7,130,781.63
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013
 Site Reference: Site Name: Youghal 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
		Select from Dropdown			
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	
Budgetting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	High	70%	Large scheme with coastal 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 with large amount of services expected	
Ground conditions	3	Medium	50%	Unknown	
Health and Safety	3	Medium	50%	Large scale scheme - risks associated with working on coastal walls	
Other	1	Medium	50%	Surface water drainage and pump stations	
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	Medium	50%	Presence of invasive non-native species unknown	
Environmental Impact	3	Medium	50%	No significant environmental impacts	
Permits / Consents / Approvals	2	High	70%	Potential delays associated with foreshore license requirements	
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	Very High	90%	History of frequent flooding	
Other	1	Very Low	10%	None	
	68	51%			
Weighting to apply: 0.532				Minimum Optimism Bias: 10%	
				Maximum Optimism Bias: 70%	
				Calculated Optimism bias: 42%	

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)	(€)	H/L	(€/m)	PVC * Length
			(m)		(€/m)	(€)		(€/m)	(€)
1	Retaining Wall, Urban with sheet piling, >100m in length (€/m)		218.464	1.40	€ 2,608.88	€ 569,945.90	Average	€ 8.43	€ 1,841.65
2	Retaining Wall, Urban with sheet piling, >100m in length (€/m)		122.776	1.30	€ 2,364.71	€ 290,329.35	Average	€ 8.43	€ 1,035.00
3	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		15.443	1.30	€ 2,481.89	€ 38,327.80	Average	€ 8.43	€ 130.18
4	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		49.834	1.30	€ 2,481.89	€ 123,682.43	Average	€ 8.43	€ 420.10
5	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		84.785	1.30	€ 2,481.89	€ 210,426.92	Average	€ 8.43	€ 714.74
6	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		82.752	1.30	€ 2,481.89	€ 205,381.24	Average	€ 8.43	€ 697.60
7	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		37.33	1.30	€ 2,481.89	€ 92,648.90	Average	€ 8.43	€ 314.69
8	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		61.631	1.30	€ 2,481.89	€ 152,981.27	Average	€ 8.43	€ 519.55
9	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		41.89	1.10	€ 2,060.26	€ 86,304.25	Average	€ 8.43	€ 353.13
10	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		38.924	1.10	€ 2,060.26	€ 80,193.52	Average	€ 8.43	€ 328.13
11	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		130.446	1.10	€ 1,965.89	€ 256,443.01	Average	€ 8.43	€ 1,099.66
12	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		67.999	1.10	€ 2,060.26	€ 140,095.55	Average	€ 8.43	€ 573.23
13	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		38.49	1.10	€ 2,060.26	€ 79,299.37	Average	€ 8.43	€ 324.47
14	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		41.612	1.20	€ 2,220.88	€ 92,415.37	Average	€ 8.43	€ 350.79
15	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		41.766	1.10	€ 2,060.26	€ 86,048.78	Average	€ 8.43	€ 352.09
16	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		38.089	1.10	€ 2,060.26	€ 78,473.20	Average	€ 8.43	€ 321.09
17	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		25.068	1.10	€ 2,060.26	€ 51,646.57	Average	€ 8.43	€ 211.32
18	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		17.726	1.30	€ 2,481.89	€ 43,993.96	Average	€ 8.43	€ 149.43
19	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		47.714	1.10	€ 2,060.26	€ 98,303.20	Average	€ 8.43	€ 402.23
20	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		6.396	1.90	€ 4,047.92	€ 25,890.52	Average	€ 8.43	€ 53.92
21	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		10.532	1.60	€ 3,264.91	€ 34,385.99	Average	€ 8.43	€ 88.78
22	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.235	1.10	€ 2,060.26	€ 6,664.94	Average	€ 8.43	€ 27.27
23	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		3.004	1.10	€ 2,060.26	€ 6,189.02	Average	€ 8.43	€ 25.32
24	Retaining Wall, Urban with sheet piling, <100m in length (€/m)		10.204	1.10	€ 2,060.26	€ 21,022.88	Average	€ 8.43	€ 86.02
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2. Embankments

[illegible]

3. Demountable Barrier

[illegible]

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 (€)
No. Select Flood Gate from Dropdown	Comments							
1	Lift Hinge Gate	7	1.2	4	€ 16,800.00	€ 117,600.00	€ 1,131.04	€ 7,917.27
					Capital Cost	€ 117,600.00	Total PV Cost	€ 7,917.27
							Total Cost	€ 125,517.27
					Overall Capital Cost	€ 117,600.00	Overall PV Cost	€ 7,917.27
							Overall Cost	€ 125,517.27

4. In-Channel Excavation

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

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

Total Excavation Costs € 0.00	
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5. Excavation on Land

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

[illegible]

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15. Flood Forecasting		Signage	Maintenance	Number of Units	Rate	Cost of Construction	PV Cost	PV Cost
No. Category	Comments	Select Yes/No	Select		(€)	(€)	(€)	(€)
					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	110670
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

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

18. Bank Protection		Fluvial/Coastal	Maintenance	Length	Rate	Cost of Construction	PV Rate	PV Cost
No. Description of Bank Protection		Select	Select	(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	18	Optimism Bias	47.41%
AFA	Youghal	Site Investigation Estimate	€ 50,000.00
Option	2(a) - Tidal Barrage Location A	Preliminaries	6%
Description	Tidal Barrage - Inner Barrage	Design Fees	13%
		Compensation and Land Acquisition	10%
		Archaeology and Environmental	15%
		Art Allowance	€ 64,000.00

Element Reference	Element	Capital Costs	PV O&M Costs	Total Costs
1	Walls	€ 64,839,808.44	€ 656,243.58	€ 65,496,052.02
2	Embankments	€ 0.00	€ 0.00	€ 0.00
3	Demountable Walls and Gates	€ 0.00	€ 0.00	€ 0.00
4	In-Channel Excavation	€ 1,385,056.93	€ 0.00	€ 1,385,056.93
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	€ 19,191,985.90	€ 656,243.58	€ 19,848,229.48
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

€ 85,416,851.27	€ 1,312,487.16	€ 86,729,338.43
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Basic Construction Costs	€ 85,416,851.27
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Preliminaries	€ 5,125,011.08
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Optimism Bias	€ 42,927,494.74
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Construction Costs (Excl VAT)	€ 133,469,357.08
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Design Fees	€ 17,351,016.42
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Σ Construction Costs and Fees	€ 150,820,373.50
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Other Items

Allowance for Archaeology and Environmental Mitigation Measures	€ 20,020,403.56
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Allowance for Compensation and Land Acquisition	€ 13,346,935.71
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Site Investigation	€ 50,000.00
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Art Allowance	€ 64,000.00
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PV O&M Costs	€ 1,312,487.16
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PV O&M Costs - Optimism Bias	€ 622,273.33
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Σ Other Items	€ 35,416,099.76
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Option Cost for Cost Benefit Analysis	€ 186,236,473.26
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CFRAM Unit Cost Development Project

Optimism Bias Calculator

Prepared by: AEP Date: December 2013

Site Reference: Site Name: Youghal 2(a) - Tidal Barrage Location A

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	
Budgetting	2	Medium	50%	Default risk value	
Other	1	Medium	50%	Default risk value	
Project Specific					
Design Complexity	2	Very High	90%	Specialised and complex design - tidal barrage	
Degree of Innovation	2	Very High	90%	Specialised design and construction methods	
Technology	2	Very High	90%	Tidal barrage gates and operation	
Services	3	Very Low	10%	Unknown - potential for services adjacent to barrage	
Ground conditions	3	Very High	90%	Unknown - tidal barrage required to significant depth	
Health and Safety	3	Very High	90%	Offshore construction	
Other	1	Medium	50%	Unknown risks associated with tidal barrage	
Client Specification					
Inadequacy of the Business Case	3	Medium	50%	Default risk value	
Large No. of Stakeholders	2	Very High	90%	High number of stakeholders - local residents, businesses. Youghal is a shipping port.	
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%	High number of stakeholders - significant impact on shipping	
Site Characteristics	2	Low	30%	Presence of invasive non-native species unknown	
Environmental Impact	3	Very High	90%	Potential for significant impact	
Permits / Consents / Approvals	2	Very High	90%	Potential delays associated with foreshore license requirements etc.	
Amenity and art	1	Medium	50%	Large town with significant stakeholders	
Contaminated land	3	Very High	90%	Unknown - significant cost with any removal / disposal of material	
Archaeology	3	Low	30%	Unknown	
Other	1	Medium	50%	Unknown risks associated with tidal barrage	
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 stakeholders - significant impact on shipping	
Flood events during construction	3	High	70%	History of frequent flooding	
Other	1	Medium	50%	Unknown risks associated with tidal barrage	
	68	60%			
Weighting to apply: 0.624				Minimum Optimism Bias:	10%
				Maximum Optimism Bias:	70%
				Calculated Optimism bias:	47%

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	(€/m)	(€)	(€/m)
									Capital Cost	€ 0.00	

3a. Flood Gate

<u>3a. Flood Gate</u>						No. of Flood Gates	Height Select (m)	Width Select (m)	Rate (€/gate)	Cost of Flood Gate (€)	PV & Event Rate (€/gate)	PV Costs (€)
No.	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
No. Select Excavation Type from Dropdown	Comments	Select	Min 100m ³ Max 1,000m ³ (m ³)	(€/m ³)	(€)
				Total Cost	€ 0.00

No. Dredging	Volume of Dredging	Rate	Cost of Dredging
	(m ³)	Select a Rate from Dropdown (€/m ³)	(€)
		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	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)
			Soil	2.5					High		
									Average		
									Low		
									Average		
									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 New/Replacement	Select (m)	Select (m)	(m)	(€/m)	(€)	Select H/L	(€/m)	(€)
								High		
								Average		
								Low		
								Average		
								Average		
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								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	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			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

CFRAM Unit Cost Development Project

Method

Complex Forecast for Catchment

Prepared by:

Date:

Checked by:

Date:

Project reference

SWCFRAM

Project name:

Kanturk AFA

Base date for estimates (year 0)

Feb-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.	8	€3,500	€28,000	
River gauges	€4,000	€5,000	No.	9	€4,500	€40,500	

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	€4,000	€4,000	
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	€6,000	€6,000	
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	
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Total costs						€222,500	
Apply update to unit rate (CPI) if appropriate (cell N15)						€222,500	
Enter appropriate preliminaries estimate (%) if applicable						0%	
Enter other applicable costs (€)						0	
Total capital cost (€)						€222,500	
Consider amendments based on site issues/constraints (cell N16)						€222,500	
Total capital cost (€)						€222,500	

Operation and Maintenance Cost Tool

	Typical Rate (€)		Quantity	Unit	Rate (€)	Total cost (€)	
	Lower	Upper					
Raingauge maintenance and telemetry	€1,000	€2,000	No.	8	1000	€8,000	
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 (€)						€24,200	

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)						€738,964	
Optimism bias rate (from external sheet)						47%	
Total Cost including Optimism Bias						€1,086,277	

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 (€)	€222,500.0
Annual maintenance cost (€)	€24,200.0
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): 738964			
		Cash sum	0	222500	1185800	0	1408300	738964
			Cost Elements				TOTALS:	
year	Discount Factor	Enabling	Capital	Maint.	Other	Cash	PV	
0	1.000	0	222500			222500.0	222500.0	
1	0.962			24200		24200.0	23269.2	
2	0.925			24200		24200.0	22374.3	
3	0.889			24200		24200.0	21513.7	
4	0.855			24200		24200.0	20686.6	
5	0.822			24200		24200.0	19890.6	
6	0.790			24200		24200.0	19125.6	
7	0.760			24200		24200.0	18390.0	
8	0.731			24200		24200.0	17682.7	
9	0.703			24200		24200.0	17002.6	
10	0.676			24200		24200.0	16348.7	
11	0.650			24200		24200.0	15719.9	
12	0.625			24200		24200.0	15115.2	
13	0.601			24200		24200.0	14533.9	
14	0.577			24200		24200.0	13974.9	
15	0.555			24200		24200.0	13437.4	
16	0.534			24200		24200.0	12920.6	
17	0.513			24200		24200.0	12423.6	
18	0.494			24200		24200.0	11945.8	
19	0.475			24200		24200.0	11486.3	
20	0.456			24200		24200.0	11044.6	
21	0.439			24200		24200.0	10619.8	
22	0.422			24200		24200.0	10211.3	
23	0.406			24200		24200.0	9818.6	
24	0.390			24200		24200.0	9440.9	
25	0.375			24200		24200.0	9077.8	
26	0.361			24200		24200.0	8728.7	
27	0.347			24200		24200.0	8393.0	
28	0.333			24200		24200.0	8070.2	
29	0.321			24200		24200.0	7759.8	
30	0.308			24200		24200.0	7461.3	
31	0.296			24200		24200.0	7174.3	
32	0.285			24200		24200.0	6898.4	
33	0.274			24200		24200.0	6633.1	
34	0.264			24200		24200.0	6378.0	
35	0.253			24200		24200.0	6132.7	
36	0.244			24200		24200.0	5896.8	
37	0.234			24200		24200.0	5670.0	
38	0.225			24200		24200.0	5451.9	
39	0.217			24200		24200.0	5242.2	
40	0.208			24200		24200.0	5040.6	
41	0.200			24200		24200.0	4846.7	
42	0.193			24200		24200.0	4660.3	
43	0.185			24200		24200.0	4481.1	
44	0.178			24200		24200.0	4308.7	
45	0.171			24200		24200.0	4143.0	
46	0.165			24200		24200.0	3983.7	
47	0.158			24200		24200.0	3830.4	
48	0.152			24200		24200.0	3683.1	
49	0.146			24200		24200.0	3541.5	

CFRAM Unit Cost Development Project

Method	Complex Forecast for Catchment		
Prepared by:		Date:	
Checked by:		Date:	

Project reference	SWCFRAM	Project name:	Freemount AFA
Base date for estimates (year 0)	Feb-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	€3,500	€7,000		
River gauges	€4,000	€5,000	No.	2	€4,500	€9,000		
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	€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						€147,000		
Apply update to unit rate (CPI) if appropriate (cell N15)						€147,000		
Enter appropriate preliminaries estimate (%) if applicable						0%		
Enter other applicable costs (€)						0		
Total capital cost (€)						€147,000		
Consider amendments based on site issues/constraints (cell N16)						€147,000		
Total capital cost (€)						€147,000		

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.	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)	€386,024	
Optimism bias rate (from external sheet)	47%	
Total Cost including Optimism Bias	€567,456	

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 (€)	€147,000.0
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): 386024		
Cash sum		0	147000	548800	0	695800	386024
		Cost Elements				TOTALS:	
year	Discount Factor	Enabling	Capital	Maint.	Other	Cash	PV
0	1.000	0	147000			147000.0	147000.0
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	9573.3
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	1639.9