Appendix B

Multi-Criteria Decision Making Assessment Process

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Option Ranking by Area & Weighting Scheme

Rank Legend

Most Preferred						Least Preferred
1	2	3	4	5	6	7

Most Preferred					Least Preferred
1	2	3	4	5	6

Note: A ranking of 6 or 7 may indicate failure of one or more mandatory conditions.

Basin	Area	Weighting Scheme	Structural Options							Non-Structural Options					
			Wet Dam	Dry Dam	Levee / Dyke	By-Pass Channel	Erosion Protection	Improve Conveyance	Sediment/Debris Control	Managed Retreat	Warning / Forecasting / Management	Land Zoning (Restricted Development)	Buy-Outs	Flood Proofing	Building Code Changes
Bow River	Canmore	AMEC	6	7	2	4	5	1	3	2	6	3	1	5	4
		Equal Weighting	6	7	1	4	5	1	3	2	6	2	1	5	4
		Exclude Cost	6	7	3	4	5	1	2	2	4	3	1	6	5
		Exclude Environment	6	7	2	4	5	1	3	2	5	3	1	6	4
Bow River	Exshaw	AMEC	5	5	3	5	3	1	2	6	4	1	2	5	3
		Equal Weighting	5	5	3	5	4	1	2	6	3	1	2	3	3
		Exclude Cost	5	5	3	5	4	1	2	6	1	2	3	5	4
		Exclude Environment	5	5	3	5	3	1	2	6	4	1	2	5	3
Bow River	Kananaskis Country	AMEC	6	6	4	4	3	1	2	2	3	4	1	6	5
		Equal Weighting	6	6	4	4	3	1	2	2	3	4	1	6	5
		Exclude Cost	6	6	4	4	3	1	1	2	3	4	1	6	5
		Exclude Environment	6	6	4	4	3	1	2	2	3	4	1	6	5
Bow River	Cochrane	AMEC	5	4	1	6	2	7	2	5	3	4	5	2	1
		Equal Weighting	4	4	1	4	2	7	2	5	3	4	5	1	1
		Exclude Cost	5	4	1	6	2	7	2	5	3	4	5	1	2
		Exclude Environment	5	4	1	6	2	7	2	5	3	4	5	2	1
Bow River	City of Calgary	AMEC	4	5	1	6	2	3	6	2	5	4	1	3	6
		Equal Weighting	4	5	1	6	2	3	6	4	5	2	1	2	5
		Exclude Cost	3	5	1	6	2	4	6	3	4	5	1	2	6
		Exclude Environment	4	5	1	6	2	3	6	2	5	4	1	3	6
Bow River	First Nations (Siksika)	AMEC	5	3	1	7	6	2	4	2	5	4	1	3	6
		Equal Weighting	5	3	1	7	6	2	3	3	4	4	1	2	4
		Exclude Cost	3	2	1	7	5	4	5	2	4	5	1	3	6
		Exclude Environment	4	3	1	7	6	2	5	2	5	4	1	3	6
Bow River	Priddis	AMEC	4	5	1	6	2	7	2	3	2	1	6	4	5
		Equal Weighting	4	6	1	5	2	7	2	5	2	1	6	2	4
		Exclude Cost	2	3	1	4	5	7	5	2	1	3	6	4	5
		Exclude Environment	2	3	1	6	4	7	4	5	2	1	6	3	4
Elbow River	Bragg Creek	AMEC	4	5	2	6	1	6	3	5	6	2	3	1	4
		Equal Weighting	4	5	1	6	1	6	3	5	5	2	3	1	4
		Exclude Cost	3	4	2	6	1	6	5	6	4	3	2	1	5
		Exclude Environment	3	5	2	6	1	6	4	5	6	2	3	1	4

Option Ranking by Area & Weighting Scheme

Rank Legend

Most Preferred						Least Preferred
1	2	3	4	5	6	7

Most Preferred					Least Preferred
1	2	3	4	5	6

Basin	Area	Weighting Scheme	Structural Options							Non-Structural Options					
			Wet Dam	Dry Dam	Levee / Dyke	By-Pass Channel	Erosion Protection	Improve Conveyance	Sediment/Debris Control	Managed Retreat	Warning / Forecasting / Management	Land Zoning (Restricted Development)	Buy-Outs	Flood Proofing	Building Code Changes
Elbow River	Upstream of Glenmore Dam	AMEC	4	2	1	5	3	5	5	4	3	1	6	2	5
		Equal Weighting	4	2	1	5	3	5	5	4	3	1	5	2	5
		Exclude Cost	3	1	2	5	4	5	5	3	2	1	5	4	6
		Exclude Environment	3	2	1	5	3	5	5	4	3	1	6	2	5
Elbow River	Downstream of Glenmore Dam	AMEC	4	7	2	1	3	6	5	3	2	5	1	6	4
		Equal Weighting	4	7	1	1	3	6	4	3	1	5	1	6	3
		Exclude Cost	3	4	2	1	5	7	6	3	2	6	1	4	5
		Exclude Environment	4	5	2	1	3	5	7	3	2	5	1	6	4
Oldman River Basin	Pincher Creek	AMEC	5	6	2	7	4	3	1	3	6	1	5	2	4
		Equal Weighting	5	6	1	7	3	3	1	3	3	1	3	1	3
		Exclude Cost	3	4	2	7	6	4	1	5	2	3	4	1	6
		Exclude Environment	5	6	2	7	3	4	1	3	6	1	5	2	4
Oldman River Basin	Crowsnest Pass	AMEC	4	4	3	4	4	1	2	5	5	2	4	1	3
		Equal Weighting	4	4	3	4	4	1	2	5	5	2	4	1	3
		Exclude Cost	4	4	3	4	4	1	1	5	5	2	4	1	3
		Exclude Environment	4	4	3	4	4	1	2	5	5	2	4	1	3
Oldman River Basin	Cardston	AMEC	5	5	4	7	2	1	3	3	6	1	2	4	5
		Equal Weighting	5	6	4	7	2	1	3	4	5	1	1	3	5
		Exclude Cost	2	2	4	7	5	1	5	3	4	1	2	5	6
		Exclude Environment	5	5	4	7	2	1	3	3	6	1	2	4	5
Oldman River Basin	Lethbridge	AMEC	4	5	2	6	1	6	3	1	4	2	6	5	3
		Equal Weighting	4	5	2	6	1	6	3	2	3	1	6	4	4
		Exclude Cost	1	4	3	6	2	6	5	1	4	2	6	3	5
		Exclude Environment	3	5	2	6	1	6	4	1	4	2	6	5	3
Oldman River Basin	Fort MacLeod	AMEC	4	5	3	6	1	6	2	1	4	3	2	5	6
		Equal Weighting	4	5	3	6	1	6	2	1	3	4	2	4	6
		Exclude Cost	4	5	3	6	1	6	2	1	3	4	2	5	6
		Exclude Environment	4	5	3	6	1	6	2	1	4	3	2	5	6

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Score and Ranking Summary

Rank Legend

Most Preferred						Least Preferred	Most Preferred					Least Preferred
1	2	3	4	5	6	7	1	2	3	4	5	6

Weighting Scenario: AMEC

			Structural Options							Non-Structural Options					
Basin	Area		Wet Dam	Dry Dam	Levee / Dyke	By-Pass Channel	Erosion Protection	Improve Conveyance	Sediment/Debris Control	Managed Retreat	Warning / Forecasting / Management	Land Zoning (Restricted Development)	Buy-Outs	Flood Proofing	Building Code Changes
Bow River	Canmore	Score:	195		241	225	223	258	239	267	223	260	268	224	238
		Rank:	6	7	2	4	5	1	3	2	6	3	1	5	4
Bow River	Exshaw	Score:			216		216	280	261	208	213	224	217	209	214
		Rank:	5	5	3	5	3	1	2	6	4	1	2	5	3
Bow River	Kananaskis Country	Score:			203	203	256	273	265	242	226	219	247		214
		Rank:	6	6	4	4	3	1	2	2	3	4	1	6	5
Bow River	First Nations (Stoney/Nakoda)	Score:													
		Rank:													
Bow River	Cochrane	Score:	149	153	257	141	210		210	190	221	214	190	235	238
		Rank:	5	4	1	6	2	7	2	5	3	4	5	2	1
Bow River	City of Calgary	Score:	168	166	251		203	191		245	224	239	255	244	222
		Rank:	4	5	1	6	2	3	6	2	5	4	1	3	6
Bow River	First Nations (Siksika)	Score:	208	219	257		197	227	210	249	219	220	265	246	214
		Rank:	5	3	1	7	6	2	4	2	5	4	1	3	6
Bow River	Priddis	Score:	208	206	260	202	210	190	210	220	221	231	196	217	214
		Rank:	4	5	1	6	2	7	2	3	2	1	6	4	5
Elbow River	Bragg Creek	Score:	196	192	219		224		201	212	206	229	226	235	223
		Rank:	4	5	2	6	1	6	3	5	6	2	3	1	4
Elbow River	First Nations (Tsuu Tina)	Score:													
		Rank:													
Elbow River	Upstream of Glenmore Dam	Score:	190	210	225		197			244	245	288	209	250	214
		Rank:	4	2	1	5	3	5	5	4	3	1	6	2	5
Elbow River	Downstream of Glenmore Dam	Score:	205	196	241	252	225	203	204	237	247	217	250	211	226
		Rank:	4	7	2	1	3	6	5	3	2	5	1	6	4
Oldman River Basin	Pincher Creek	Score:	196	187	233		210	214	235	216	211	229	212	227	214
		Rank:	5	6	2	7	4	3	1	3	6	1	5	2	4

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Assessment of Flood Mitigation Options
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April 1, 2014

Score and Ranking Summary

Rank Legend

Most Preferred						Least Preferred	Most Preferred					Least Preferred
1	2	3	4	5	6	7	1	2	3	4	5	6

Weighting Scenario: AMEC

			Structural Options							Non-Structural Options						
Basin	Area		Wet Dam	Dry Dam	Levee / Dyke	By-Pass Channel	Erosion Protection	Improve Conveyance	Sediment/Debris Control	Managed Retreat	Warning / Forecasting / Management	Land Zoning (Restricted Development)	Buy-Outs	Flood Proofing	Building Code Changes
Oldman River Basin	Crowsnest Pass	Score:			216			265	257			255	202	266	214
		Rank:	4	4	3	4	4	1	2	5	5	2	4	1	3
Oldman River Basin	Cardston	Score:	194	194	207		222	247	215	238	221	251	245	233	226
		Rank:	5	5	4	7	2	1	3	3	6	1	2	4	5
Oldman River Basin	First Nations (Pikani)	Score:													
		Rank:													
Oldman River Basin	First Nations (Blood)	Score:													
		Rank:													
Oldman River Basin	Lethbridge	Score:	199	187	211		217		205	242	212	238	158	210	214
		Rank:	4	5	2	6	1	6	3	1	4	2	6	5	3
Oldman River Basin	Fort MacLeod	Score:	181	176	216		250		230	265	224	226	241	221	214
		Rank:	4	5	3	6	1	6	2	1	4	3	2	5	6
Oldman River Basin	River Bottoms - A	Score:													
		Rank:													
Oldman River Basin	River Bottoms - B	Score:													
		Rank:													

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Elbow River
Area	Bragg Creek

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam			Dry Dam			Levee / Dyke			By-Pass Channel			Erosion Protection			Improve Conveyance			Sediment/Debris Control		
					Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			1			4			1			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4						4						4		
			Test Result:		**Pass**			**Pass**			**Pass**			**Fail**			**Pass**			**Fail**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36		4	36		4	36			0		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure)	8	1 = negative outcome 4 =positive outcome		4	32		4	32		4	32			0		3	24			0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		2	10		1	5			0		2	10			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		3	24		3	24		2	16			0		2	16			0		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24	Related to flood volume, not peak flow rate	3	24	Related to flood volume, not peak flow rate	4	32			0		3	24			0		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8	Related to flood volume, not peak flow rate	2	8	Related to flood volume, not peak flow rate	4	16			0		2	8			0		2	8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		4	16		1	4		1	4			0		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6		1	6		2	12			0		2	12			0		3	18	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		1	7		1	7		3	21			0		3	21			0		3	21	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		1	7		1	7		2	14			0		2	14			0		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		2	20		2	20		1	10			0		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		2	6		3	9			0		4	12			0		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		2	8		2	8		3	12			0		3	12			0		3	12	
			Desired Outcomes Score:		**196**			**192**			**219**			**0**			**224**			**0**			**201**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Elbow River
Area	Bragg Creek

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Managed Retreat		Warning / Forecasting / Management		Land Zoning (Restricted Development)		Buy-Outs		Flood Proofing		Building Code Changes	
				Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4		4		4		4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**	
		Weighting Scenario = AMEC	**Scoring System**	**Score** / **Weighted Score**										
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	3 / 27		3 / 27		3 / 27		3 / 27		3 / 27		3 / 27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3 / 24		3 / 24		3 / 24		4 / 32		3 / 24		3 / 24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1 / 5		1 / 5		1 / 5		1 / 5		1 / 5		1 / 5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1 / 8		2 / 16		1 / 8		1 / 8		2 / 16	Ensure access to communities (e.g., subdivision entrances need to be made floodproof)	1 / 8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	1 / 8		1 / 8		2 / 16		2 / 16		2 / 16		2 / 16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	1 / 4		1 / 4		2 / 8		2 / 8		2 / 8		2 / 8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	1 / 4		1 / 4		1 / 4		1 / 4		1 / 4		1 / 4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	4 / 24		3 / 18		4 / 24		2 / 12		3 / 18		4 / 24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	4 / 28		2 / 14		4 / 28		4 / 28		4 / 28		4 / 28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	3 / 21		3 / 21		3 / 21		3 / 21		3 / 21		3 / 21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	4 / 40		4 / 40		4 / 40		4 / 40		4 / 40		4 / 40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1 / 3		3 / 9		4 / 12		3 / 9		4 / 12		2 / 6	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	4 / 16		4 / 16		3 / 12		4 / 16		4 / 16		3 / 12	
		Desired Outcomes Score:		**212**		**206**		**229**		**226**		**235**		**223**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Canmore

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam			Dry Dam			Levee / Dyke			By-Pass Channel			Erosion Protection			Improve Conveyance			Sediment/Debris Control		
					Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			1			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4			4		
				Test Result:	**Pass**			**Fail**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27			0		3	27		3	27	- Cougar Creek/Mountain Creek Tributaries at the apex of the alluvial fan	4	36	- Silvertip Creek (back to original path) - On the mountain creeks; not necessarily on the Bow River	4	36		4	36	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure)	8	1 = negative outcome 4 =positive outcome		3	24			0		3	24		2	16		4	32		4	32		4	32	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5			0		3	15		2	10		1	5		3	15	Some can be negative (e.g., dredging)	3	15	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		3	24			0		4	32		4	32		3	24		4	32		3	24	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		4	32			0		4	32		4	32		1	8		2	16		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		4	16			0		4	16		4	16		1	4		2	8		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		4	16			0		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6			0		3	18		2	12		3	18		2	12		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		1	7			0		4	28		3	21		2	14		3	21		2	14	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		1	7			0		2	14		2	14		2	14	Just the Bow River area	3	21	Dredging is negative (2)	2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		2	20			0		1	10		2	20		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3			0		3	9		3	9		4	12		3	9		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		2	8			0		3	12	Timing issue	3	12		3	12		3	12		3	12	
			Desired Outcomes Score:		**195**			**0**			**241**			**225**			**223**			**258**			**239**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Canmore

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36		3	27		3	27		4	36		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure)	8	1 = negative outcome 4 =positive outcome		2	16		4	32		3	24		2	16		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		3	15		1	5		4	20		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		3	24		4	32		3	24		4	32		2	16		3	24	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24		1	8		2	16		4	32		2	16		2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		3	12		1	4		2	8		4	16		1	4		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		2	8		1	4		1	4		2	8		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		4	24		3	18	Management included	4	24		1	6	Look at areas other than floodway (e.g., affected by debris)	3	18		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		2	14	Management included	4	28		4	28		3	21		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		2	14		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		4	12		4	12		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		4	16	Management included (3)	3	12		4	16		4	16		3	12	
			Desired Outcomes Score:		**267**			**223**			**260**			**268**			**224**			**238**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Cardston

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		1		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4	May be some transboundary input required because it originates in US	4		4				4		4		4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Pass**		**Pass**	
		Weighting Scenario = AMEC	**Scoring System**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36	4	36	3	27		0	3	27	4	36	3	27
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32	4	32	3	24		0	3	24	4	32	3	24
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5	1	5	2	10		0	1	5	1	5	1	5
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8	1	8	1	8		0	1	8	1	8	1	8
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	3	24	4	32	3	24		0	2	16	4	32	2	16
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	3	12	4	16	3	12		0	2	8	4	16	2	8
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16	1	4	1	4		0	1	4	1	4	1	4
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6	1	6	2	12		0	4	24	3	18	4	24
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7	1	7	3	21		0	4	28	3	21	3	21
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7	1	7	2	14		0	2	14	2	14	2	14
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	3	30	3	30	3	30		0	4	40	4	40	4	40
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3	1	3	3	9		0	4	12	3	9	4	12
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8	2	8	3	12		0	3	12	3	12	3	12
		Desired Outcomes Score:		**194**		**194**		**207**		**0**		**222**		**247**		**215**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Cardston

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	0		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score					Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			0			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			0			4		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**0**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27		3	27		3	27		3	27		3	27			0			3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		4	32		3	24		3	24			0			3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		2	10		1	5		1	5			0			1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		1	8		1	8		1	8		1	8		1	8			0			1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		4	32		2	16		3	24		3	24		2	16			0			2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		4	16		2	8		3	12		3	12		2	8			0			2	8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		2	8	management of st mary reservoir	1	4		1	4		1	4			0			1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		3	18		3	18		4	24		4	24		4	24			0			4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		3	21		4	28		4	28		4	28			0			4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21			0			3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40			0			4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		3	9		4	12		4	12			0			3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		3	12		4	16		3	12		4	16		4	16			0			3	12	
			Desired Outcomes Score:		**238**			**221**			**251**			**245**			**233**			**0**			**226**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	City of Calgary

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		1		4		4		1	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4				4		4			
		Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Pass**		**Fail**	
		Weighting Scenario = AMEC	**Scoring System**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36	4	36	4	36		0	3	27	3	27		0
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32	4	32	4	32		0	3	24	3	24		0
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5	1	5	2	10		0	3	15	1	5		0
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	2	16	2	16	3	24		0	1	8	1	8		0
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	1	8	1	8	4	32		0	1	8	1	8		0
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	1	4	1	4	3	12		0	1	4	1	4		0
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16	1	4	1	4		0	1	4	1	4		0
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6	1	6	3	18		0	3	18	2	12		0
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7	2	14	4	28		0	3	21	4	28		0
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7	1	7	3	21		0	2	14	2	14		0
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	2	20	2	20	1	10		0	4	40	4	40		0
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3	2	6	4	12		0	4	12	3	9		0
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8	2	8	3	12		0	2	8	2	8		0
		Desired Outcomes Score:		**168**		**166**		**251**		**0**		**203**		**191**		**0**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	City of Calgary

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat			Warning / Forecasting / Management			Land Zoning (Restricted Development)			Buy-Outs			Flood Proofing			Building Code Changes		
					Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
				Test Result:	Pass			Pass			Pass			Pass			Pass			Pass		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36	All floodway plus Bowness	4	36	Includes management	3	27		4	36		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		3	24		4	32		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		3	15		2	10		3	15		2	10		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		2	16		3	24		1	8		1	8		3	24		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		2	16		1	8		2	16		4	32		3	24		2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8		1	4		2	8		4	16		2	8		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		3	18		3	18	Management included	4	24		1	6		3	18		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		2	14	Management included	4	28		4	28		3	21		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		4	12		2	6		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		3	12		3	12		4	16		4	16		3	12	
				Desired Outcomes Score:	245			224			239			255			244			222		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Cochrane

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		4		4		1		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4		4		4		4		4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Fail**		**Pass**	

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	3	27		3	27		4	36		3	27		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3	24		3	24		4	32		3	24		3	24			0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		1	5		2	10		1	5		1	5			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8		1	8		2	16		1	8		1	8			0		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	1	8		2	16		4	32		1	8		1	8			0		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	1	4		2	8		4	16		1	4		1	4			0		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	3	12		1	4		1	4		1	4		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6		1	6		3	18		2	12		4	24			0		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7		1	7		4	28		2	14		4	28			0		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7		1	7		2	14		1	7		2	14			0		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	3	30		3	30		3	30		1	10		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		1	3		3	9		2	6		4	12			0		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8		2	8		3	12		3	12		3	12			0		3	12	
			Desired Outcomes Score:	**149**			**153**			**257**			**141**			**210**			**0**			**210**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Bow River
Area	Cochrane

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
				Test Result:	Pass			Pass			Pass			Pass			Pass			Pass		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27		3	27		3	27		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		3	24		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		1	8		2	16		1	8		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		1	8		2	16		1	8		1	8		3	24		3	24	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		1	4		2	8		1	4		1	4		3	12		3	12	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6		3	18		4	24		1	6		3	18		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		3	21		4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		3	9		1	3		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		3	12		3	12		3	12		3	12		3	12		3	12	
			Desired Outcomes Score:		190			221			214			190			235			238		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Crowsnest Pass

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	1		1		4		1		1		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met					4						4		4	
		Test Result:	**Fail**		**Fail**		**Pass**		**Fail**		**Fail**		**Pass**		**Pass**	

		Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		0			0		3	27			0			0		4	36		4	36	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		0			0		3	24			0			0		4	32		4	32	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		0			0		2	10			0			0		2	10		2	10	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		0			0		2	16			0			0		4	32		4	32	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		0			0		2	16	Crowsnest River only		0			0		3	24	Tributaries (not Crowsnest River)	3	24	Tributaries (not Crowsnest River)
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		0			0		2	8			0			0		3	12		3	12	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		0			0		1	4			0			0		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		0			0		3	18			0			0		2	12	CPR crossing bridges plus a road bridge on multiple creeks	3	18	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		0			0		4	28			0			0		4	28		2	14	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		0			0		2	14			0			0		2	14		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		0			0		3	30			0			0		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		0			0		3	9			0			0		3	9		3	9	Does not include forestry management practice
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		0			0		3	12			0			0		3	12		3	12	
		Desired Outcomes Score:		**0**			**0**			**216**			**0**			**0**			**265**			**257**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Oldman River Basin
Area	Crowsnest Pass

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Managed Retreat		Warning / Forecasting / Management		Land Zoning (Restricted Development)		Buy-Outs		Flood Proofing		Building Code Changes	
				Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	1		1		4		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met					4		4		4		4	
		Test Result:	**Fail**		**Fail**		**Pass**		**Pass**		**Pass**		**Pass**	

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Managed Retreat Score	Managed Retreat Weighted Score	Managed Retreat Comment	Warning / Forecasting / Management Score	Warning / Forecasting / Management Weighted Score	Warning / Forecasting / Management Comment	Land Zoning (Restricted Development) Score	Land Zoning (Restricted Development) Weighted Score	Land Zoning (Restricted Development) Comment	Buy-Outs Score	Buy-Outs Weighted Score	Buy-Outs Comment	Flood Proofing Score	Flood Proofing Weighted Score	Flood Proofing Comment	Building Code Changes Score	Building Code Changes Weighted Score	Building Code Changes Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		0			0		4	36		3	27		4	36		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		0			0		4	32		3	24		4	32		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		0			0		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		0			0		1	8		1	8		2	16		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		0			0		3	24		1	8		3	24		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		0			0		3	12		1	4		3	12		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		0			0		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		0			0		4	24		3	18		4	24		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		0			0		4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		0			0		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		0			0		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		0			0		3	9		1	3		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		0			0		3	12		3	12		3	12		3	12	
		Desired Outcomes Score:			**0**			**0**			**255**			**202**			**266**			**214**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Elbow River
Area	Downstream of Glenmore Dam

Definition

Weighting	1 = Low Importance to 10 = High Importance
Weighted Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam			Dry Dam			Levee / Dyke			By-Pass Channel			Erosion Protection			Improve Conveyance			Sediment/Debris Control		
					Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4			4		
				Test Result:	Pass			Pass			Pass			Pass			Pass			Pass			Pass		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36		4	36		4	36		4	36		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		4	32		4	32		4	32		4	32		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		2	10		2	10		3	15		3	15		3	15		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		3	24		3	24		4	32		4	32		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24		3	24		4	32		4	32		2	16		2	16		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		3	12	Glenmore Dam provides additional protection	3	12	Glenmore Dam provides additional protection	3	12		4	16		2	8		1	4		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		4	16		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6		1	6		2	12		1	6		4	24		2	12		3	18	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		1	7		1	7		3	21		3	21		3	21		4	28		3	21	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		1	7		1	7		2	14		2	14		2	14		2	14		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		2	20		2	20		1	10		3	30		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		2	6		3	9		2	6		4	12		3	9		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		2	8		2	8		3	12		2	8		3	12		3	12		3	12	
			Desired Outcomes Score:		205			196			241			252			225			203			204		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Elbow River
Area	Downstream of Glenmore Dam

Definition

Weighting	1 = Low Importance to 10 = High Importance
Weighted Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
				Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36		4	36		3	27		4	36		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		4	32		4	32		3	24		4	32		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		1	8		2	16		1	8		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24		3	24		1	8		4	32		2	16		2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8		3	12		1	4		4	16		2	8		2	8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		2	12		3	18		4	24		1	6		2	12		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		2	14		4	28		4	28		3	21		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		4	12		2	6		3	9		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		4	16		3	12		4	16		4	16		3	12	
			Desired Outcomes Score:		**237**			**247**			**217**			**250**			**211**			**226**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Exshaw

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
	Mandatory Conditions Scoring Scheme																							
			1 = cannot be met 4 = can be met	1		No place on Exshaw Creek or Jura Creek, or upstream on the Bow to put a dam	1		No place on Exshaw Creek or Jura Creek, or upstream on the Bow to put a dam	4			1			4			4			4		
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.																							
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).		1 = cannot be met 4 = can be met							4						4			4					
	Test Result:			Fail			Fail			Pass			Fail			Pass			Pass			Pass		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		0			0		3	27			0		3	27		4	36		4	36	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		0			0		3	24			0		3	24		4	32		4	32	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		0			0		2	10			0		2	10		2	10		2	10	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		0			0		2	16			0		2	16		4	32		4	32	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		0			0		4	32			0		1	8		4	32		2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		0			0		3	12			0		1	4		4	16		2	8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		0			0		1	4			0		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		0			0		2	12			0		4	24		2	12		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		0			0		3	21			0		3	21		4	28		3	21	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		0			0		2	14			0		2	14		2	14		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		0			0		2	20			0		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		0			0		4	12			0		4	12		4	12		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		0			0		3	12			0		3	12		3	12		3	12	
	Desired Outcomes Score:				**0**			**0**			**216**			**0**			**216**			**280**			**261**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Exshaw

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat Score	Managed Retreat Weighted Score	Managed Retreat Comment	Warning / Forecasting / Management Score	Warning / Forecasting / Management Weighted Score	Warning / Forecasting / Management Comment	Land Zoning (Restricted Development) Score	Land Zoning (Restricted Development) Weighted Score	Land Zoning (Restricted Development) Comment	Buy-Outs Score	Buy-Outs Weighted Score	Buy-Outs Comment	Flood Proofing Score	Flood Proofing Weighted Score	Flood Proofing Comment	0 Score	0 Weighted Score	0 Comment	Building Code Changes Score	Building Code Changes Weighted Score	Building Code Changes Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4		Suggested that this should be N/A - nothing really to manage retreat of (unless flood mapping changes)	4			4			4		Suggested that this should be N/A - nothing really to buy out	4						4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4						4		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**0**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27		3	27		3	27		3	27		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		3	24		3	24		2	16	Includes industrial areas in the flood fringe		0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		3	15		1	5		1	5			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		1	8		2	16		1	8		1	8		1	8			0		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		1	8		1	8		1	8		1	8		1	8			0		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4			0		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		2	8		1	4		1	4		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		4	24		3	18		4	24		4	24		4	24			0		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		3	21		4	28		4	28		4	28			0		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21			0		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		3	9		4	12		4	12			0		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		3	12		3	12		3	12		3	12		3	12			0		3	12	
			Desired Outcomes Score:		**208**			**213**			**224**			**217**			**209**			**0**			**214**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Fort MacLeod

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4	For the campground	1		4		1		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4				4				4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Fail**		**Pass**	

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	3	27		3	27		3	27			0		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3	24		3	24		3	24			0		3	24			0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		1	5		2	10			0		1	5			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	3	24		3	24		1	8			0		4	32	Highway 811 abutment protection		0		2	16	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	2	16		2	16		3	24			0		4	32			0		2	16	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	2	8		2	8		3	12			0		4	16			0		2	8	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16		1	4		1	4			0		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6		1	6		3	18			0		3	18			0		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7		2	14		3	21			0		2	14			0		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7		1	7		2	14			0		2	14			0		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	3	30		3	30		3	30			0		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		1	3		4	12			0		4	12			0		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8		2	8		3	12			0		3	12			0		3	12	
		Desired Outcomes Score:		**181**			**176**			**216**			**0**			**250**			**0**			**230**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Fort MacLeod

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Non-Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	0		Comment	Building Code Changes		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4			4			4			4			4				0		4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4			4			4			4			4				0		4		
		Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**0**			**Pass**		
			Weighting Scenario = AMEC	**Scoring System**	**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**	
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36		3	27		3	27		3	27		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32		3	24		3	24		4	32		3	24			0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		1	5		1	5		1	5		1	5			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8		1	8		1	8		1	8		1	8			0		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4	32		2	16		2	16		2	16		1	8			0		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	4	16		2	8		2	8		2	8		1	4			0		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	1	4		2	8		1	4		1	4		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	4	24		3	18		4	24		4	24		4	24			0		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	4	28		3	21		4	28		4	28		4	28			0		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	3	21		3	21		3	21		3	21		3	21			0		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	4	40		4	40		4	40		4	40		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		4	12		3	9		4	12		4	12			0		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	4	16		4	16		3	12		4	16		4	16			0		3	12	
		Desired Outcomes Score:			**265**			**224**			**226**			**241**			**221**			**0**			**214**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Kananaskis Country

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	1		1		4		4		4		4	Hood creek and other highway crossings	4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4		4		4		4		4	
		Test Result:	**Fail**		**Fail**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**	
		Weighting Scenario = AMEC	**Scoring System**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		0		0	2	18	2	18	3	27	3	27	3	27
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		0		0	2	16	2	16	3	24	4	32	4	32
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		0		0	3	15	3	15	4	20	4	20	4	20
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		0		0	1	8	1	8	3	24	4	32	4	32
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		0		0	4	32	4	32	3	24	3	24	3	24
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		0		0	4	16	4	16	4	16	4	16	4	16
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		0		0	1	4	1	4	1	4	1	4	1	4
	8. Development and construction costs.	6	1 = high cost 4 = low cost		0		0	2	12	2	12	3	18	2	12	3	18
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		0		0	3	21	3	21	3	21	4	28	2	14
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		0		0	1	7	1	7	2	14	2	14	2	14
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		0		0	3	30	3	30	4	40	4	40	4	40
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		0		0	4	12	4	12	4	12	4	12	4	12
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		0		0	3	12	3	12	3	12	3	12	3	12
			Desired Outcomes Score:		**0**		**0**		**203**		**203**		**256**		**273**		**265**

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Bow River
Area	Kananaskis Country

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.		1 = cannot be met 4 = can be met	4			4			4			4			1			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).		1 = cannot be met 4 = can be met	4			4			4			4			4			4		
			Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Fail**			**Pass**		
			Scoring System	**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**		**Score**	**Weighted Score**	
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	3	27		3	27		3	27		3	27			0		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3	24		3	24		3	24		3	24			0		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		2	10		2	10		2	10			0		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8		2	16		1	8		1	8			0		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4	32		2	16		1	8		4	32			0		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	4	16		2	8		1	4		4	16			0		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	1	4		1	4		1	4		1	4			0		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	2	12		3	18		4	24		2	12			0		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	4	28		3	21		4	28		4	28			0		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	4	28		3	21		3	21		4	28			0		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	4	40		4	40		4	40		4	40			0		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	2	6		3	9		3	9		2	6			0		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	3	12		3	12		3	12		3	12			0		3	12	
			Desired Outcomes Score:	**242**			**226**			**219**			**247**			**0**			**214**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Lethbridge

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
					Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4		4		4		1		4		1		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4		4		4				4				4	
				Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Fail**		**Pass**	
					Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27	3	27	3	27		0	3	27		0	3	27
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24	3	24	3	24		0	3	24		0	3	24
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		3	15	3	15	2	10		0	2	10		0	1	5
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		4	32	4	32	2	16		0	1	8		0	2	16
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		2	16	2	16	3	24		0	3	24		0	1	8
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8	2	8	2	8		0	3	12		0	2	8
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		4	16	1	4	1	4		0	1	4		0	1	4
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6	1	6	2	12		0	2	12		0	4	24
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		1	7	1	7	3	21		0	3	21		0	2	14
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		1	7	1	7	2	14		0	2	14		0	2	14
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		3	30	3	30	3	30		0	4	40		0	4	40
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3	1	3	3	9		0	3	9		0	3	9
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		2	8	2	8	3	12		0	3	12		0	3	12
			Desired Outcomes Score:		**199**		**187**		**211**		**0**		**217**		**0**		**205**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Lethbridge

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Non-Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Managed Retreat		Warning / Forecasting / Management		Land Zoning (Restricted Development)		Buy-Outs		Flood Proofing		0		Building Code Changes	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met											0			
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met											0			
		Test Result:	**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**0**		**Pass**	
			Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score			Score	Weighted Score
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	3 27		3 27		3 27		3 27		3 27		0		3 27
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3 24		3 24		3 24		3 24		3 24		0		3 24
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1 5		1 5		1 5		1 5		1 5		0		1 5
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	3 24		1 8		1 8		1 8		2 16		0		1 8
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4 32		1 8		3 24		1 8		1 8		0		1 8
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	4 16		1 4		3 12		1 4		1 4		0		1 4
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	1 4		3 12		1 4		1 4		1 4		0		1 4
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1 6		3 18		4 24		2 12		2 12		0		4 24
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	4 28		3 21		4 28		4 28		3 21		0		4 28
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	3 21		3 21		3 21		3 21		3 21		0		3 21
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	4 40		4 40		4 40		1 10		4 40		0		4 40
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1 3		4 12		3 9		1 3		4 12		0		3 9
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	3 12		3 12	Includes reservoir management	3 12		1 4		4 16		0		3 12
		Desired Outcomes Score:	**242**		**212**		**238**		**158**		**210**		**0**		**214**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	First Nations (Pikani)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met																					
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met																					
				Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0			0	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0			0	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0			0			0			0			0			0			0	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0			0	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0			0	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0			0	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0			0	
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0			0			0			0			0			0			0	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0			0			0			0			0			0			0	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0			0	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0			0			0			0			0			0			0	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0			0			0			0			0			0			0	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0			0			0			0			0			0			0	
			Desired Outcomes Score:		**0**			**0**			**0**			**0**			**0**			**0**			**0**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	First Nations (Pikani)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met																		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met																		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0			0			0			0			0			0	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0			0			0			0			0			0	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0			0			0			0			0			0	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0			0			0			0			0			0	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0			0			0			0			0			0	
			Desired Outcomes Score:		**0**			**0**			**0**			**0**			**0**			**0**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Oldman River Basin
Area	Pincher Creek

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		1		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4		4		4		4		4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Pass**		**Pass**	

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36		4	36		4	36			0		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32		4	32		4	32			0		3	24		3	24		4	32	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		1	5		1	5			0		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8		1	8		1	8			0		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4	32		4	32		4	32			0		1	8		2	16		3	24	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	4	16		4	16		3	12			0		1	4		2	8		3	12	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16		1	4		1	4			0		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6		1	6		3	18			0		4	24		2	12		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7		1	7		4	28			0		4	28		4	28		3	21	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7		1	7		2	14			0		2	14		3	21		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	2	20		2	20		2	20			0		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		2	6		4	12			0		4	12		3	9		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8		2	8		3	12			0		3	12		3	12		3	12	
			Desired Outcomes Score:	**196**			**187**			**233**			**0**			**210**			**214**			**235**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Oldman River Basin
Area	Pincher Creek

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
				Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27		4	36		3	27		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		3	24		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		1	8		1	8		1	8		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		1	8		1	8		2	16		1	8		2	16		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8		2	8		2	8		1	4		2	8		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		4	24		3	18		4	24		3	18		3	18		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		2	14		4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		3	9		4	12		3	9		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		4	16		3	12		4	16		4	16		3	12	
			Desired Outcomes Score:		**216**			**211**			**229**			**212**			**227**			**214**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	Priddis

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4		4		4		4		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4		4		4		4		4	
		Test Result:	Pass		Pass		Pass		Pass		Pass		Pass		Pass	
		Weighting Scenario = AMEC	Scoring System	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36	4	36	4	36	3	27	3	27	3	27	3	27
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32	4	32	4	32	3	24	3	24	3	24	3	24
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5	1	5	1	5	1	5	1	5	1	5	1	5
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	3	24	3	24	3	24	2	16	1	8	1	8	1	8
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4	32	4	32	4	32	2	16	1	8	1	8	1	8
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	3	12	3	12	4	16	2	8	1	4	1	4	1	4
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16	1	4	1	4	1	4	1	4	1	4	1	4
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6	1	6	3	18	2	12	4	24	3	18	4	24
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7	1	7	4	28	4	28	4	28	3	21	4	28
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7	1	7	2	14	2	14	2	14	2	14	2	14
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	2	20	3	30	3	30	3	30	4	40	4	40	4	40
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3	1	3	3	9	2	6	4	12	3	9	4	12
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8	2	8	3	12	3	12	3	12	2	8	3	12
		Desired Outcomes Score:		208		206		260		202		210		190		210	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014
Scenario ID: 1

Basin	Bow River
Area	Priddis

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
			Mandatory Conditions Scoring Scheme																		
				Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.		1 = cannot be met 4 = can be met	4			4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).		1 = cannot be met 4 = can be met	4			4			4			4			4			4		
			Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36		3	27		4	36		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	4	32		3	24		4	32		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		1	5		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	1	8		2	16		1	8		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	2	16		2	16		1	8		1	8		1	8		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	2	8		2	8		1	4		1	4		1	4		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	2	12		3	18		4	24		2	12		4	24		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	4	28		3	21		4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	4	28		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		3	9		3	9		1	3		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		0		3	12		3	12		3	12		3	12		3	12	
			Desired Outcomes Score:	**220**			**221**			**231**			**196**			**217**			**214**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	First Nations (Siksika)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met	4	Dam to be built between Calgary and reserve	4	Dam to be built between Calgary and reserve	4		1		4		4		4	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met	4		4		4				4		4		4	
		Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Pass**		**Pass**	

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Wet Dam Score	Wet Dam Weighted Score	Wet Dam Comment	Dry Dam Score	Dry Dam Weighted Score	Dry Dam Comment	Levee / Dyke Score	Levee / Dyke Weighted Score	Levee / Dyke Comment	By-Pass Channel Score	By-Pass Channel Weighted Score	By-Pass Channel Comment	Erosion Protection Score	Erosion Protection Weighted Score	Erosion Protection Comment	Improve Conveyance Score	Improve Conveyance Weighted Score	Improve Conveyance Comment	Sediment/Debris Control Score	Sediment/Debris Control Weighted Score	Sediment/Debris Control Comment
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome	4	36		4	36		4	36	Would need to be localized		0		3	27		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome	3	24		4	32		4	32			0		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit	1	5		2	10		1	5			0		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit	4	32		4	32		4	32			0		1	8		4	32		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit	4	32		4	32		4	32			0		1	8		2	16		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit	3	12		3	12		4	16			0		1	4		1	4		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit	4	16		1	4		1	4			0		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost	1	6		1	6		4	24			0		3	18		2	12		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost	1	7		2	14		4	28			0		3	21		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome	1	7		1	7		2	14			0		2	14		2	14		2	14	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk	2	20		2	20		1	10			0		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years	1	3		2	6		4	12			0		4	12		3	9		4	12	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all	2	8		2	8		3	12			0		3	12		3	12		3	12	
		Desired Outcomes Score:		**208**			**219**			**257**			**0**			**197**			**227**			**210**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	First Nations (Siksika)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4			4			4			4		Relates to relocation of residences	4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4		Assume that this could be administered by the Band Council.	4			4		Assume that this could be administered by the Band Council.	4		Assume that this could be administered by the Band Council.	4		Assume that this could be administered by the Band Council.	4		Assume that this could be administered by the Band Council.
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		4	36		4	36		4	36		4	36		3	27		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		3	24		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		1	5		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		2	16		3	24		1	8		2	16		2	16	Includes self-access to things like power & water	1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24		1	8		1	8		4	32		3	24		1	8	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		2	8		1	4		1	4		4	16		2	8		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		4	24	Assumes houses destroyed in 2013 are rebuilt in current locations.	3	18		4	24		3	18		4	24		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		2	14	Includes management	4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		3	21		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3	Assumes houses destroyed in 2013 are rebuilt in current locations.	3	9		2	6		3	9	Assumes people currently without housing would be relocated now, rather than after rebuilding	3	9		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		3	12		3	12		4	16		4	16		3	12	
			Desired Outcomes Score:		**249**			**219**			**220**			**265**			**246**			**214**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	First Nations (Stoney/Nakoda)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met														
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met														
		Test Result:	**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**	
		Weighting Scenario = AMEC	**Scoring System**		**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0		0		0		0		0		0
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0		0		0		0		0		0
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0		0		0		0		0		0
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0		0		0		0		0		0
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0		0		0		0		0		0
		Desired Outcomes Score:			**0**		**0**		**0**		**0**		**0**		**0**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Bow River
Area	First Nations (Stoney/Nakoda)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat			Warning / Forecasting / Management			Land Zoning (Restricted Development)			Buy-Outs			Flood Proofing			Building Code Changes		
					Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment	Score	Weighted Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met																		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met																		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0			0			0			0			0			0	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0			0			0			0			0			0	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0			0			0			0			0			0	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0			0			0			0			0			0	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0			0			0			0			0			0	
			Desired Outcomes Score:		**0**			**0**			**0**			**0**			**0**			**0**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Elbow River
Area	First Nations (Tsuu Tina)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
				Comment		Comment		Comment		Comment		Comment		Comment		Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.	1 = cannot be met 4 = can be met														
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).	1 = cannot be met 4 = can be met														
		Test Result:	**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**		**Pass**	
		Weighting Scenario = AMEC	**Scoring System**		**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**	**Score**	**Weighted Score**
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0		0		0		0		0		0
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0		0		0		0		0		0
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0		0		0		0		0		0
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0		0		0		0		0		0
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0		0		0		0		0		0
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0		0		0		0		0		0
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0		0		0		0		0		0
		Desired Outcomes Score:			**0**		**0**		**0**		**0**		**0**		**0**	

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Elbow River
Area	First Nations (Tsuu Tina)

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met																		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met																		
			Test Result:		**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit			0			0			0			0			0			0	
	8. Development and construction costs.	6	1 = high cost 4 = low cost			0			0			0			0			0			0	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost			0			0			0			0			0			0	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome			0			0			0			0			0			0	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk			0			0			0			0			0			0	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years			0			0			0			0			0			0	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all			0			0			0			0			0			0	
			Desired Outcomes Score:		**0**			**0**			**0**			**0**			**0**			**0**		

Flood Mitigation Feasibility Study

Assessment of Flood Mitigation Options
Prepared by AMEC Environment & Infrastructure
Project No. CW2174
April 1, 2014

Scenario ID: 1

Basin	Elbow River
Area	Upstream of Glenmore Dam

Definition

Weighting	1 = Low Importance to 10 = High Importance
Score	Weighting Scenario x Scoring System Result = Weighted Score

Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Wet Dam		Dry Dam		Levee / Dyke		By-Pass Channel		Erosion Protection		Improve Conveyance		Sediment/Debris Control	
					Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment	Score	Comment
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4		4		4		1		4		1		1	
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4		4		4				4					
				Test Result:	**Pass**		**Pass**		**Pass**		**Fail**		**Pass**		**Fail**		**Fail**	
					Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27	4	36	3	27		0	3	27		0		0
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24	4	32	3	24		0	3	24		0		0
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		2	10	2	10	2	10		0	1	5		0		0
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		2	16	2	16	1	8		0	1	8		0		0
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		3	24	4	32	4	32		0	1	8		0		0
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		3	12	4	16	4	16		0	1	4		0		0
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		4	16	1	4	1	4		0	1	4		0		0
	8. Development and construction costs.	6	1 = high cost 4 = low cost		1	6	1	6	3	18		0	3	18		0		0
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		1	7	1	7	3	21		0	3	21		0		0
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		1	7	1	7	2	14		0	2	14		0		0
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		3	30	3	30	3	30		0	4	40		0		0
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3	2	6	3	9		0	4	12		0		0
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		2	8	2	8	3	12		0	3	12		0		0
				Desired Outcomes Score:	**190**		**210**		**225**		**0**		**197**		**0**		**0**	

Notes:
- Includes protection of Discovery Ridge in the flood fringe
- Less risk than upstream

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Scenario ID: 1

Basin	Elbow River
Area	Upstream of Glenmore Dam

Definition

Weighting	1 = Low Importance to 10 = High Importance
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Legend

4		Strongly Positive
3		Positive
2		Negative
1		Strongly Negative

Non-Structural Options

Category	Criteria	Weighting Scenario = AMEC	Scoring System	Mandatory Conditions Scoring Scheme	Managed Retreat		Comment	Warning / Forecasting / Management		Comment	Land Zoning (Restricted Development)		Comment	Buy-Outs		Comment	Flood Proofing		Comment	Building Code Changes		Comment
					Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score		Score	Weighted Score	
Mandatory Conditions	1. Ensure flood control infrastructure can be designed and built in a suitable location. Ensure non-structural options can be implemented.			1 = cannot be met 4 = can be met	4		No infrastructure in the floodway; Lott Creek potentially affected (under review on the floodplain map)	4			4			4			4			4		
	2. Must meet existing transboundary legal commitments (i.e., downstream volumes to other users).			1 = cannot be met 4 = can be met	4			4			4			4			4			4		
				Test Result:	**Pass**			**Pass**			**Pass**			**Pass**			**Pass**			**Pass**		
Desired Outcomes	1. Improve existing shelter, sustenance and security for individuals within the basin (compared to current situation and not increase flood impacts to other users/basins both upstream and downstream.	9	1 = negative outcome 4 =positive outcome		3	27		4	36		4	36		3	27		4	36		3	27	
	2. Increase property protection for residents, business, and First Nations (note: business includes agriculture and irrigation, as well as provincial and municipal infrastructure).	8	1 = negative outcome 4 =positive outcome		3	24		3	24		4	32		3	24		3	24		3	24	
	3. Protection of designated natural areas (traditional use, recreation, historical resources).	5	1 = low benefit 4 = high benefit		1	5		1	5		3	15		1	5		1	5		1	5	
	4. Ensure access to life-line services (fire, police, hospital, water & wastewater etc.) for all residents within the basin.	8	1 = low benefit 4 = high benefit		2	16		3	24		3	24		1	8		1	8		1	8	
	5. Provide adequate protection for at least the 1% annual exceedance probability event.	8	1 = low benefit 4 = high benefit		4	32		2	16		3	24		1	8		3	24		1	8	Assuming that there are already stringent building codes in place for Lott Creek & Discovery Ridge
	6. Provide adequate protection for the largest historical flood of record.	4	1 = low benefit 4 = high benefit		4	16		2	8		3	12		1	4		2	8		1	4	
	7. Be designed and operated to meet multi-purpose objectives (e.g., manage water resources for both floods and droughts).	4	1 = low benefit 4 = high benefit		1	4		1	4		1	4		1	4		1	4		1	4	
	8. Development and construction costs.	6	1 = high cost 4 = low cost		2	12		3	18		4	24		2	12		4	24		4	24	
	9. Operating and maintenance costs.	7	1 = high cost 4 = low cost		4	28		3	21		4	28		4	28		4	28		4	28	
	10. Ensure species (fish, wildlife, vegetation, etc.) are not adversely impacted.	7	1 = negative outcome 4 =positive outcome		3	21		3	21		4	28		3	21		3	21		3	21	
	11. Must not increase potential for flood-related loss of life (compared to existing situation).	10	1 = high risk 4 =low risk		4	40		4	40		4	40		4	40		4	40		4	40	
	12. Protection is implemented in the near term.	3	1 = 10+ years 2 = 5-10 years 3 = 2-5 years 4 = <2 years		1	3		4	12		3	9		4	12		4	12		3	9	
	13. Meets existing federal and provincial policies and regulations.	4	1 = meets few/none 2 = meets some 3= meets most 4 =meets all		4	16		4	16		3	12		4	16		4	16		3	12	
			Desired Outcomes Score:		**244**			**245**			**288**			**209**			**250**			**214**		