

Assignment 2: PART A Solution

1. Problem Definition

- Reservoir for flood protection of Riverton community

2. Data Collection

- Historical precipitations data for the Riverton → IDF curves
- Water level at the proposed reservoir location
- Discharge rate of river at the proposed reservoir location
- Terrain morphology for the Riverton
- Current flood maps for the Riverton
- Location of existing infrastructure that may obstruct flow (dikes, bridges, dams, etc.)
- Operational rules for existing flood protection structures
- Existing non-structural measures for the Riverton
- Future climate change data predictions → Precipitation (max,min), Temperature (max,min)
- Available project budget
- Existing flood regulations (design flow, floodplains, etc.)

3. Criteria Definition

- Minimize flood damage due to inundation
- Minimize reservoir project implementation cost

4. Formulation of Alternatives

- Dam type (gravity, arch, rock-fill, etc.)
- Dam location (A, B, C, ...)
- Reservoir characteristic
 - Capacity (c_1, c_2, c_3, \dots)
 - Operations (q_1, q_2, q_3, \dots)
 - Spillway capacity (s_1, s_2, s_3, \dots)

5. Evaluation of Alternatives

Alternatives	Criteria	
	Damage	Cost
Alternative 1 (gravity dam, location A, capacity c_1 , spillway s_1)	D1	C1
Alternative 2 (arch dam, location B, capacity c_2 , spillway s_2)	D2	C2
Alternative 3 (rock-fill dam, location C, capacity c_3 , spillway s_3)	D3	C3

6. Selection of the Best Alternative

Alternatives	Criteria	
	Damage	Cost
Alternative 1 (gravity dam, location A, capacity c_1 , spillway s_1)	Min(D)	Min(C)
Alternative 2 (arch dam, location B, capacity c_2 , spillway s_2)		
Alternative 3 (rock-fill dam, location C, capacity c_3 , spillway s_3)		

→ Assume based on results from above table, Alternative 2 is best.

7. Design/Implementation

- Project financing
- Structure design
- Tender documents for construction
- Construction schedule
- Construction
- Release press conference