A Plan for Van Anda's Future

Concerning access to potable water

March 15th, 2024

Table of contents

Context: Key Challenges

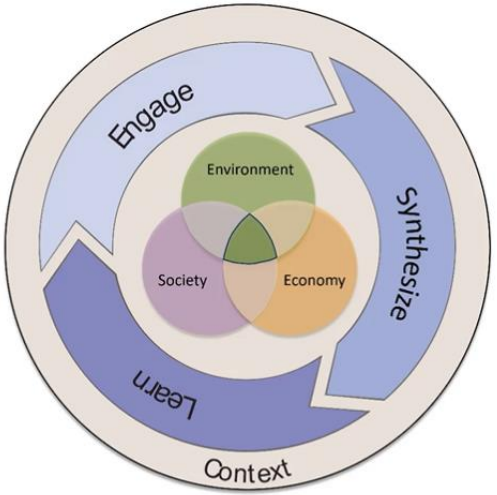
- **Susceptible to environmental risks**
  - Floods and droughts
  - Toxic algae blooms
- **Poor infrastructure**: loss of **1/3** of total water supply
- **Inadequate supply** for growing population

1. Problem Statement

Our Goal

Provide an adequate and reliable supply of clean, safe water to everyone

	Project Goals
1	High resilience
2	Low upfront costs
3	Low long-term costs
4	Minimal environmental impacts
5	High community involvement
6	Sufficient capacity



Proposed Solution

1. Modified Existing Water Treatment System Supplied by Priest Lake

2. Potential Solutions

1

Modified Existing Water Treatment Plant Supplied by Priest Lake

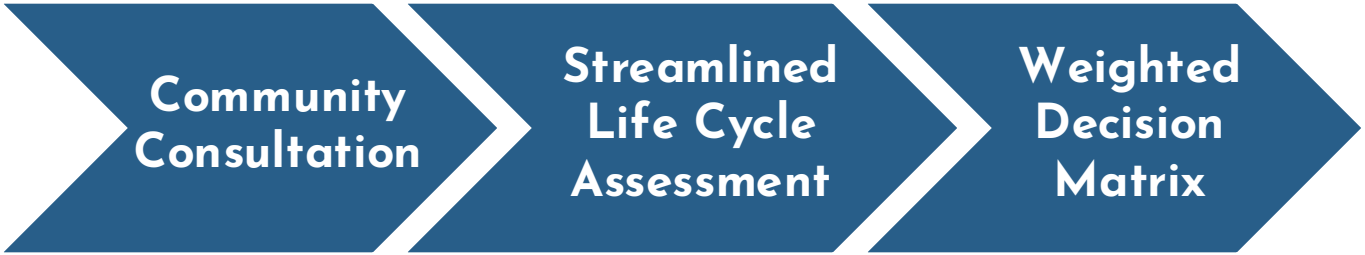
2

Periodic Shipments of Bottled Water to the Community

3

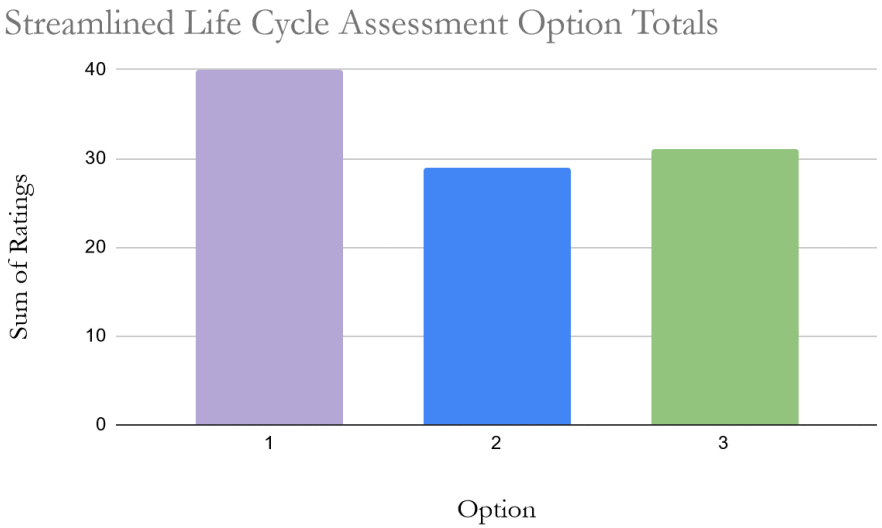
Pipeline from Mainland

Decision Making Process



3. Decision Making Process

Through a Streamlined Life Cycle Assessment, the options were ranked based on their respective environmental impacts.



Key Considerations

Through Community Consultation and Analysis:

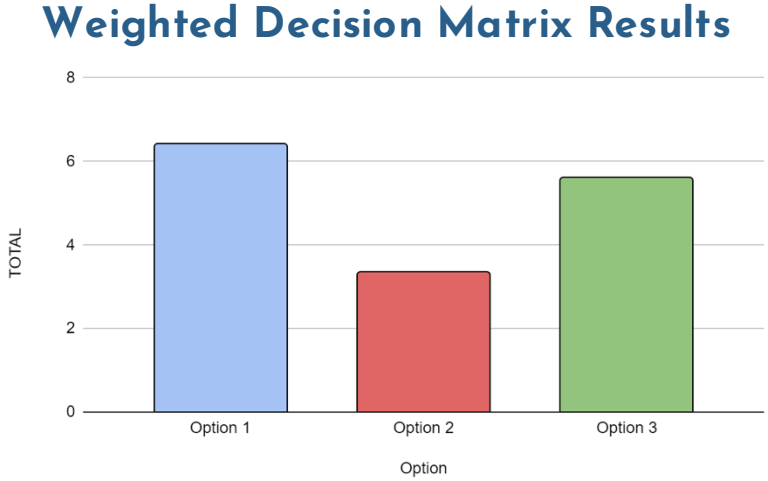
- **Affordability**
- **Resilience**
- **Capacity**

Weighted Decision Matrix

Criteria:

- Community involvement
- Capacity
- Minimal environmental impacts
- Low long-term costs
- Low upfront costs
- Resilience

The Modified Existing Treatment Plant option scored the highest,



Proposed Solution

1. Modified Existing Water Treatment System Supplied by Priest Lake

4. Proposed Solution

Water Source

Primary Source: Priest Lake

Equitable
- Cost-effective

Accessible
- Close to community
- Draws directly from water source

Appropriate
- Local resources

Protection: Cooperation with the mining industry due to their proximity.

4. Proposed Solution

Water Treatment

Extraction

- Raw water pumped from Priest Lake

Double Filtration

Removes impurities and turbidity

Double Disinfection

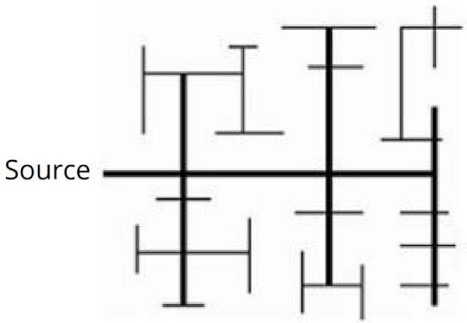
With UV light & Chlorine
Removes viruses, bacteria and protozoa

4. Proposed Solution

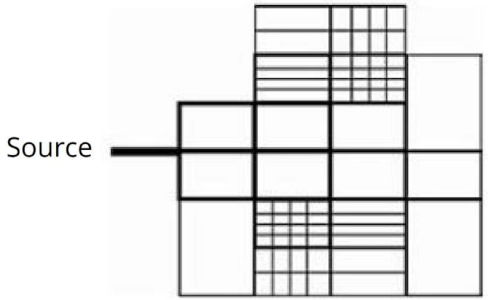
Distribution

Grid pattern helps provide a more reliable distribution system.

Branching Pattern



Grid Pattern



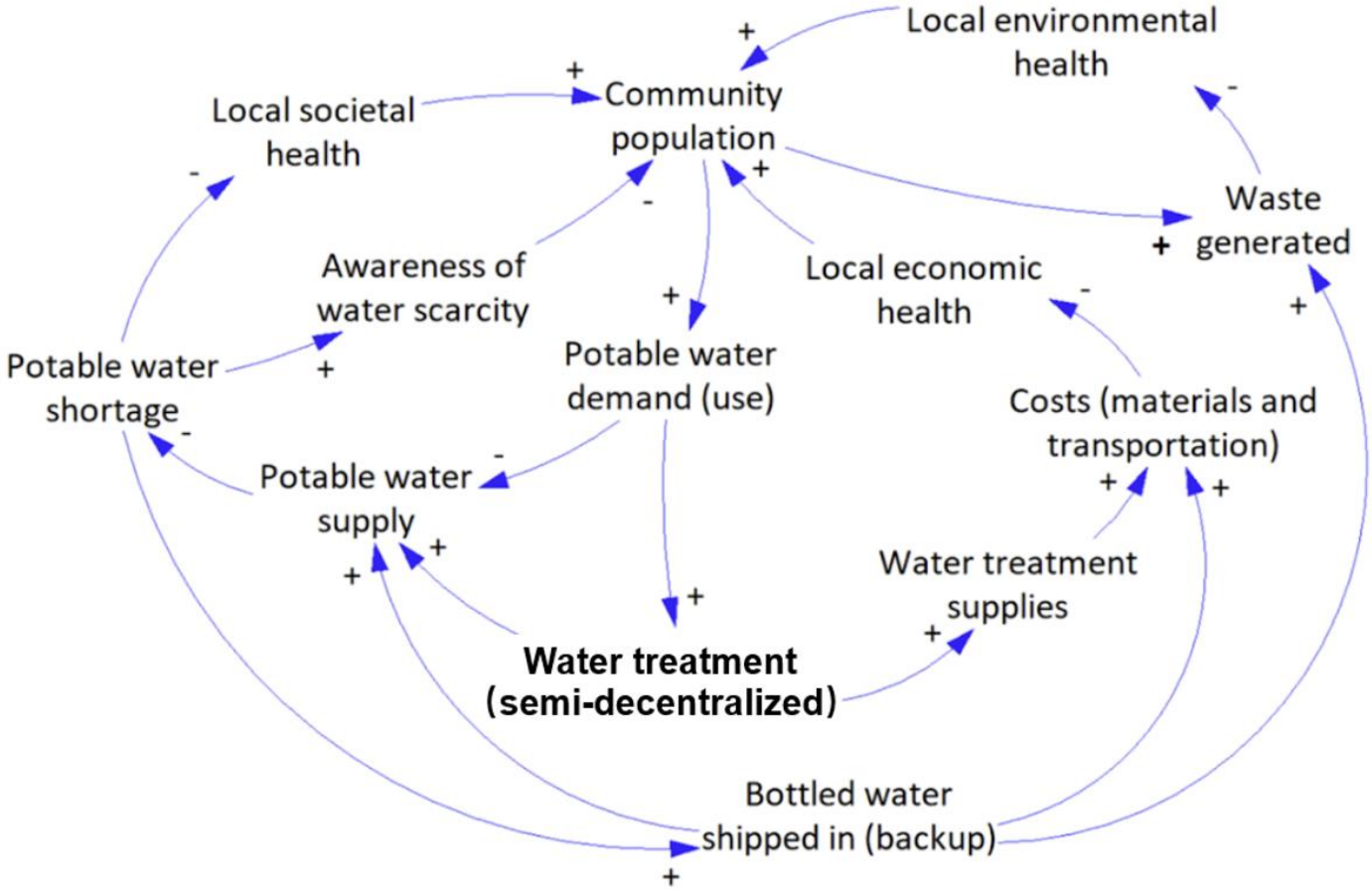
Source: UBC APSC101

Summary

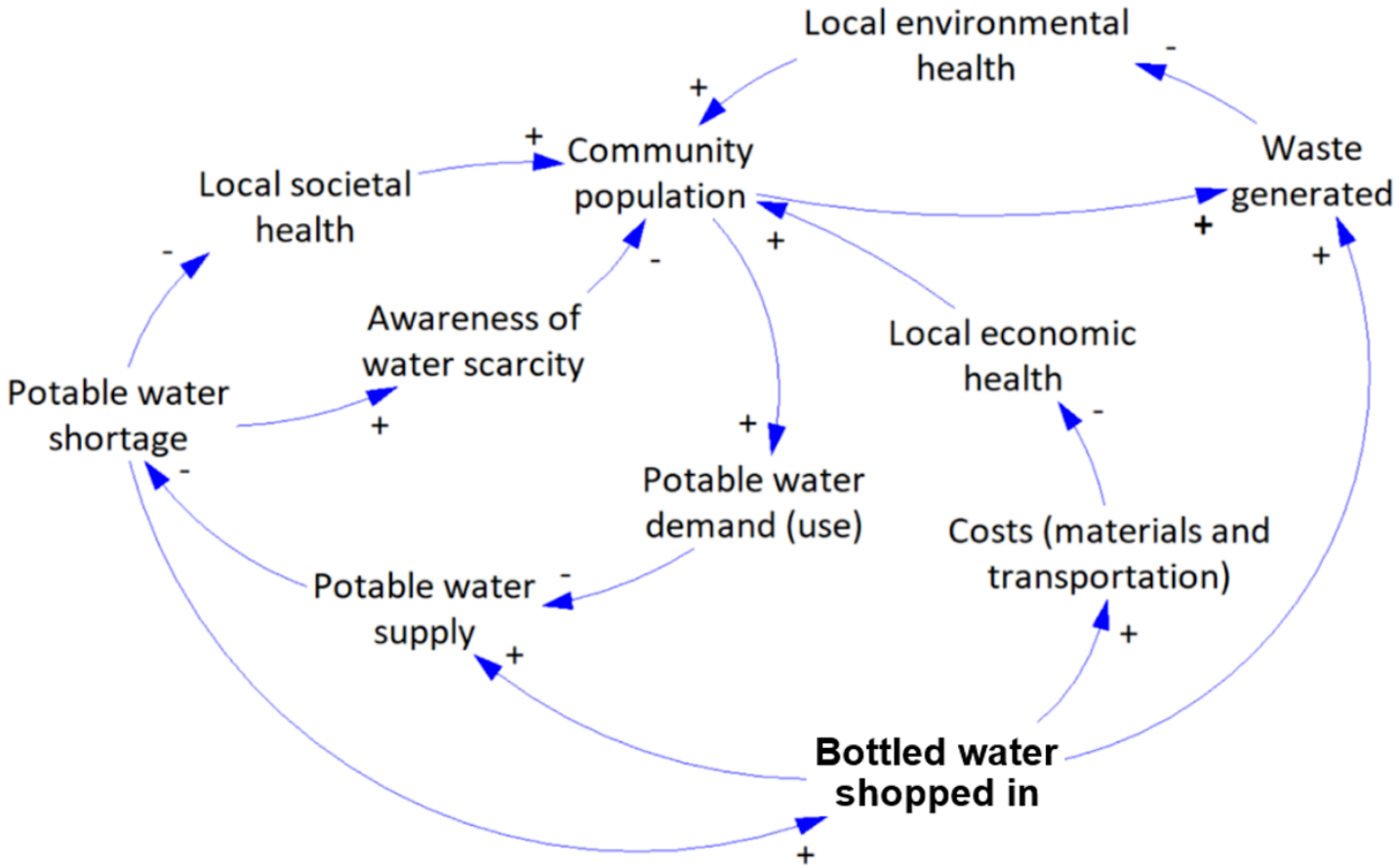
A solution for the community, by the community

Appendix

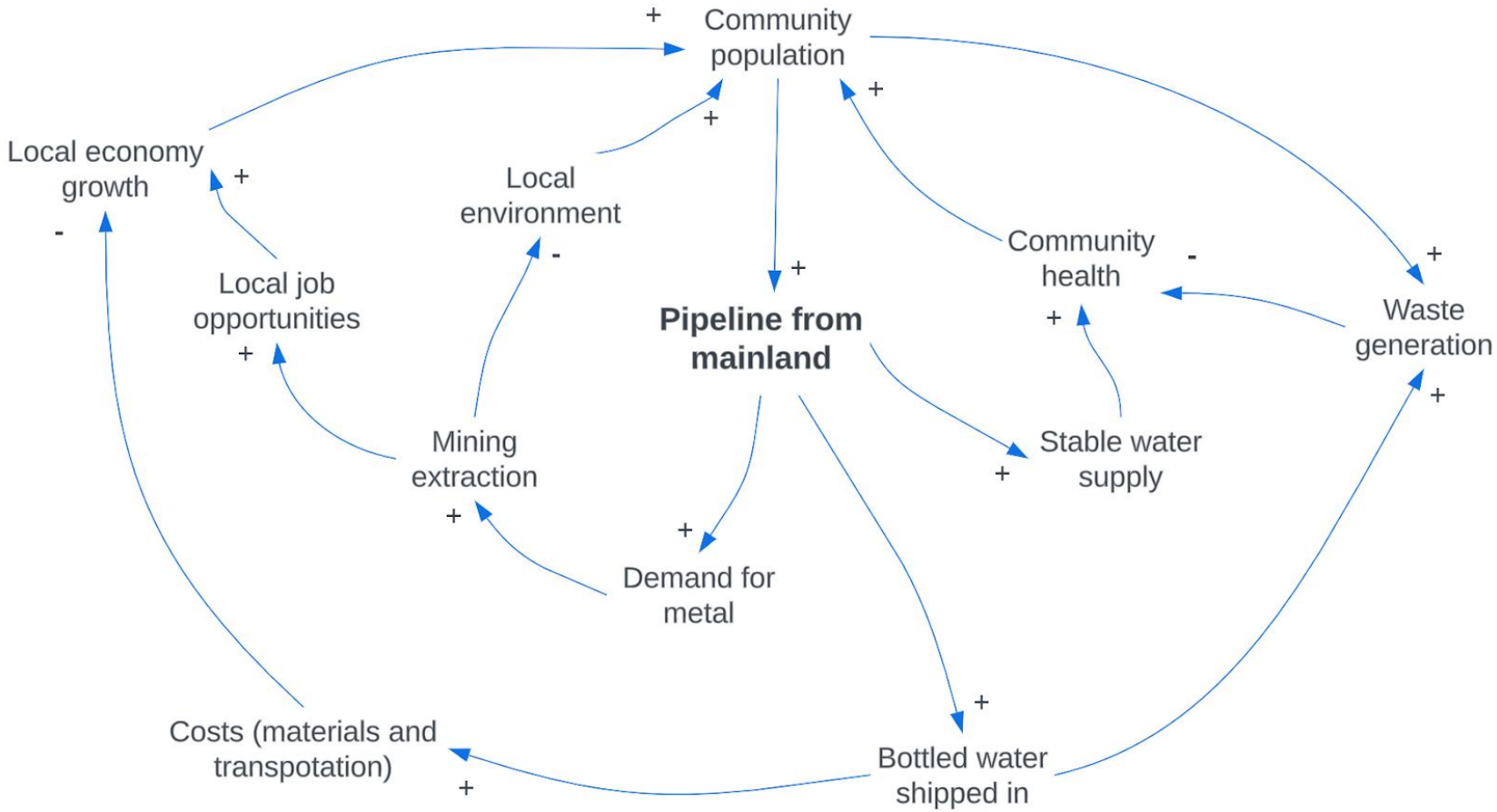
Causal Loop Diagram for Option 1



Causal Loop Diagram for Option 2



Causal Loop Diagram for Option 3



Streamlined Life Cycle Assessment (1)

Option 1 – Water Treatment from Priest Lake (semi-decentralized)					
	Material	**Production**	**Distribution**	**Disposal**	**Total**
Resources used	2	2	2	3	
Energy usage	1	2	3	2	
Waste generation	2	3	3	2	
Public health	3	3	4	3	
Total	**8**	**10**	**12**	**10**	**40**

Option 1: SLCA

SLCA (2)

Option 2 – Supply of bottled water (centralized)					
	Material	**Production**	**Distribution**	**Disposal**	**Total**
Resources used	2	1	1	2	
Energy usage	1	1	2	2	
Waste generation	2	1	3	1	
Public health	2	2	3	3	
Total	**7**	**5**	**9**	**8**	**29**

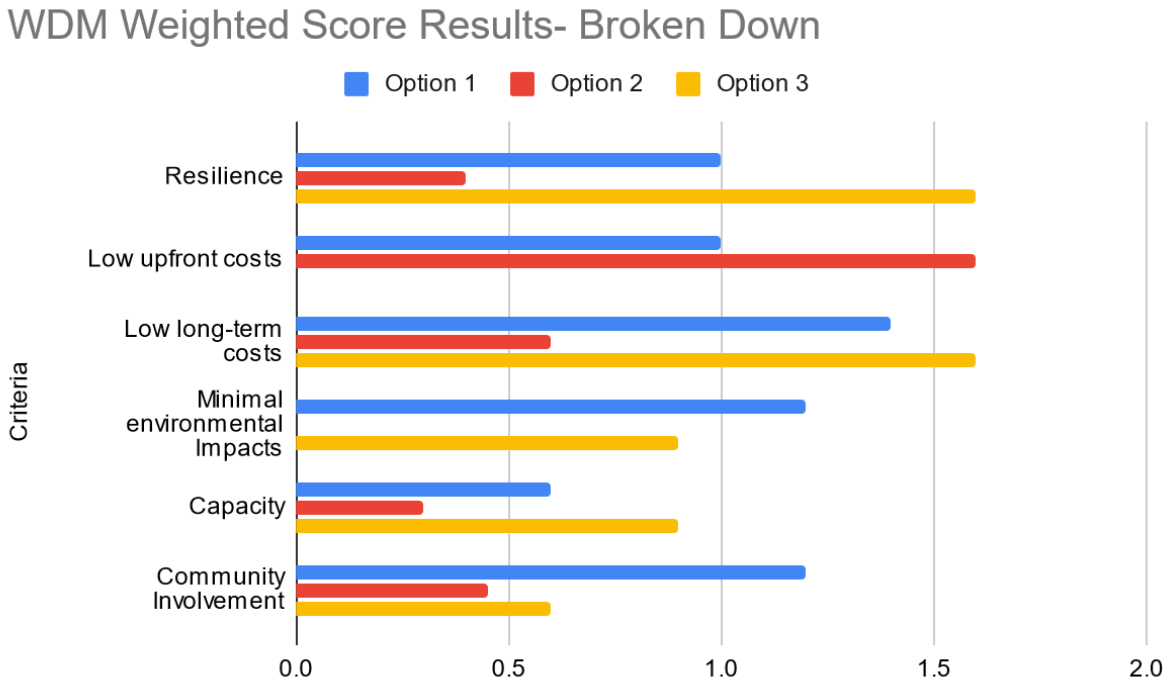
Option 2: SLCA

SLCA(3)

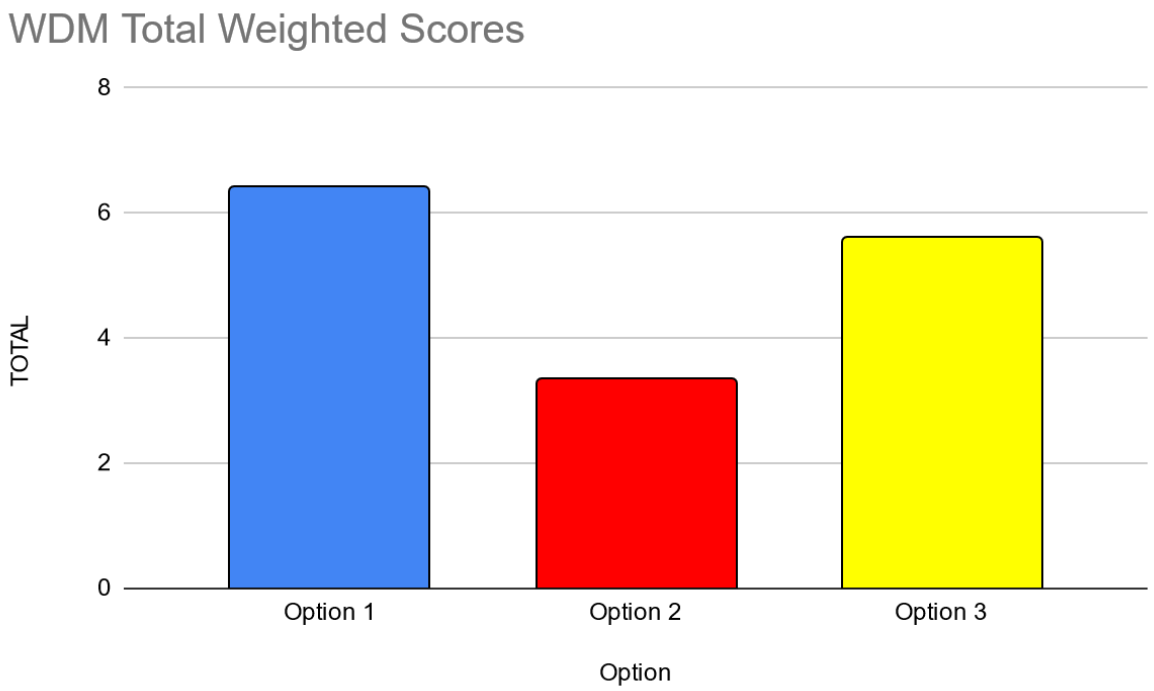
Option 3 – Pipeline					
	Material	**Production**	**Distribution**	**Disposal**	**Total**
Resources used	1	1	2	3	
Energy usage	1	1	2	2	
Waste generation	1	2	3	2	
Public health	2	2	3	3	
Total	**5**	**6**	**10**	**10**	**31**

Table 3: Option 3: SLCA

WDM Data


WDM Weighted Score Results- Broken Down
Option 1
Option 2
Option 3
Criteria
Resilience
Low upfront costs
Low long-term costs
Minimal environmental Impacts
Capacity
Community Involvement
0.0
0.5
1.0
1.5
2.0

WDM Final Results



RESEAU WaterNET Findings Quantitative

Option	Description
A	Cartridge Filtration + Ion Exchange + Ultraviolet (UV) + Chlorination
B	Cartridge Filtration + Ultraviolet (UV) + Chlorination
C	Bank Filtration + Ultraviolet (UV) + Chlorination

Quantitative Metrics	Low (1)	High (5)
Capital Costs	Highest	Lowest
O&M Costs	Highest	Lowest

Quantitative Metrics	Option A	Option B	Option C
Capital Cost	2	4	3
O&M Cost	2	3	4
Total	4	7	7

SOURCE: RESEAU WaterNET VAID 2017

RESEAU WaterNET Findings Qualitative

Qualitative Metrics	Low (1)	High (5)
Treatment Efficiency	Poor	Good
Reliability/Robustness	Poor	Good
Proven Technology	Uncommon	Common
Mechanical Complexity	Very Complex	Least Complex
Operator Requirement	Lots of attention required	Low level of attention required
Operations and Maintenance	Major increase in operations time	No significant change to current operations time
Waste Management	Wastes generated during the treatment	No waste generated during the treatment
Constructability	Complex construction sequencing, difficult	No construction sequencing
Regulatory Acceptance	Highly likely to experience regulatory challenges	regulatory challenges Unlikely to cause regulatory challenges
Community Acceptance	Undesirable	Most Acceptable

Qualitative Metrics	Option A	Option B	Option C
Treatment Efficiency	5	3	3
Reliability/Robustness	5	5	2
Proven Technology	5	3	2
Mechanical Complexity	2	3	4
Operator Requirement	2	2	3
Operations and Maintenance	2	3	4
Waste Management	1	2	3
Constructability	3	3	1
Regulatory Acceptance	5	2	2
Community Acceptance	3	3	3
Total	**33**	**29**	**27**

SOURCE: RESEAU WaterNET 2017

Population Data

2011(Past)	2017 (Current)	2027 (10- Year)
275	282	296

SOURCE: RESEAU WaterNET VAID 2017

Engagement Plan

Activity	Time	Organized by	Details
Q&A Session	Before the project	Engineering team, town council	Community members are able to ask questions to the engineering team regarding the project, and the town council is also able to answer questions regarding logistics of the project before it begins
Door-to-door outreach	Before the project	Engineering team	The engineering team will go door to door to get individual opinions on the project
Community workshops	During the project	Engineering team, town council	While working on the project, the engineering team can connect with the community using workshops, where the community can connect with the engineers
Site visits	During the project	Engineering team	While under construction, the community can visit the site to leam about the system and understand how their water will be treated
Surveys	After the project	Engineering team	The community can give feedback about the system to the engineering team and town council
Feedback session	After the project	Engineering team, system employees	After gathering feedback, the engineering team returns to the island to discuss the system and allow the community to share their ideas on ways to improve or change it