THE UNIVERSITY OF BRITISH COLUMBIA, OKANAGAN CAMPUS
FACULTY OF APPLIED SCIENCE, SCHOOL OF ENGINEERING

APSC 169
Fundamentals of Sustainable Engineering Design
Project Report #5 - A2

Water and sediments contamination: Develop technologies for detecting and treating contaminants in water and sediments from mining areas to guarantee water quality and protect aquatic ecosystems and human health

Design Lab Section L2L
Team #3 Members:

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Jacky Zhou, #72185630
Zachary Boos, #90058801

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Selected Solution Project Implementation Plan

The implementation of the solution at an individual pilot program will be split into 3 different categories, all of which are able to run simultaneously. The three are “Planning”, “Funding”, and “Construction”. There will be 8 people working on the project. This number was chosen as having 8 people significantly reduces the critical path length and allows the project to be completed much faster, but it’s not redundant at all and everyone has a role at all times. The following roles must be filled:

- Funding full-time - Axel
- Funding full-time - Employee 6
- Funding full-time - Connor
- Funding full-time - Employee 7
- Construction full-time - Zach
- Planning & Construction - Hasan
- Planning & Construction - Jacky
- Planning & Construction - Employee 8

In addition to these roles, a construction crew will be hired to assemble the solution at the chosen building site.

The first part of the project plan will be mandatory research to determine the locations where our solution would best be deployed. Although the original need statement outlined the Pacific Northwest as the area where the solution would be broadly effective, each mine site will have varying conditions that will affect the solution’s effectiveness. This research period

will give the team time to find the ideal mine site to run a pilot. Although the solution is designed to be automatic, the pilot test location should be accessible in case something breaks and needs replacement. Consultations must also be undertaken to ensure that the community is happy to have the solution being deployed in their area.

The second part of the project is funding. The project will not be possible at all if there are not adequate funds available to support the endeavour. A team of people will work full-time to advocate for funding, raise awareness about the severity of Acid Mine Drainage, and apply to various grants and funding sources. The government also has programs that may be able to fund the endeavour as it aims to clean up the environment.

The final part of the project is construction. The goal is to make the system modular so that manufacturing can be localized to a few key areas rather than attempting to manufacture the solution in a remote environment. This will allow the solution to be quickly deployed to areas with minimal build time and minimal cost. For each deployment of the solution, a construction firm must be found, ideally based in the community where the solution is being deployed, that can quickly assemble the solution on site. The onsite construction will include several key steps, including laying the foundation, building the diverting channels, and lifting the entire modular solution into place. Testing is also included in the construction phase as the water leaving the solution must meet the functions and constraints originally set out.

Although this implementation plan only includes the initial implementation, long-term maintenance and testing must also be performed to ensure that the solution is working as intended.

Step by Step Implementation Plan

Planning & Logistics: (up to 4 people)

1. Conduct initial research into potential mine sites - 60 days (4 people)
2. Narrow down the list of sites and consult with local stakeholders - 120 days (4 people)
    a. Speak to local communities and Indigenous groups and determine their support level and how they will be affected
    b. Gauge Mining company's willingness to engage with the project
3. Choose a Mine site and seek government approval for the project - 3 months (2 people)
    a. Might have to follow up many times
4. Determine how the equipment will be transported to the location - 5 days (1 person)
5. Conduct analysis and testing to determine the ideal placement of solution - 20 (1 person)
6. Create a blueprint for construction - 5 days (2 people)

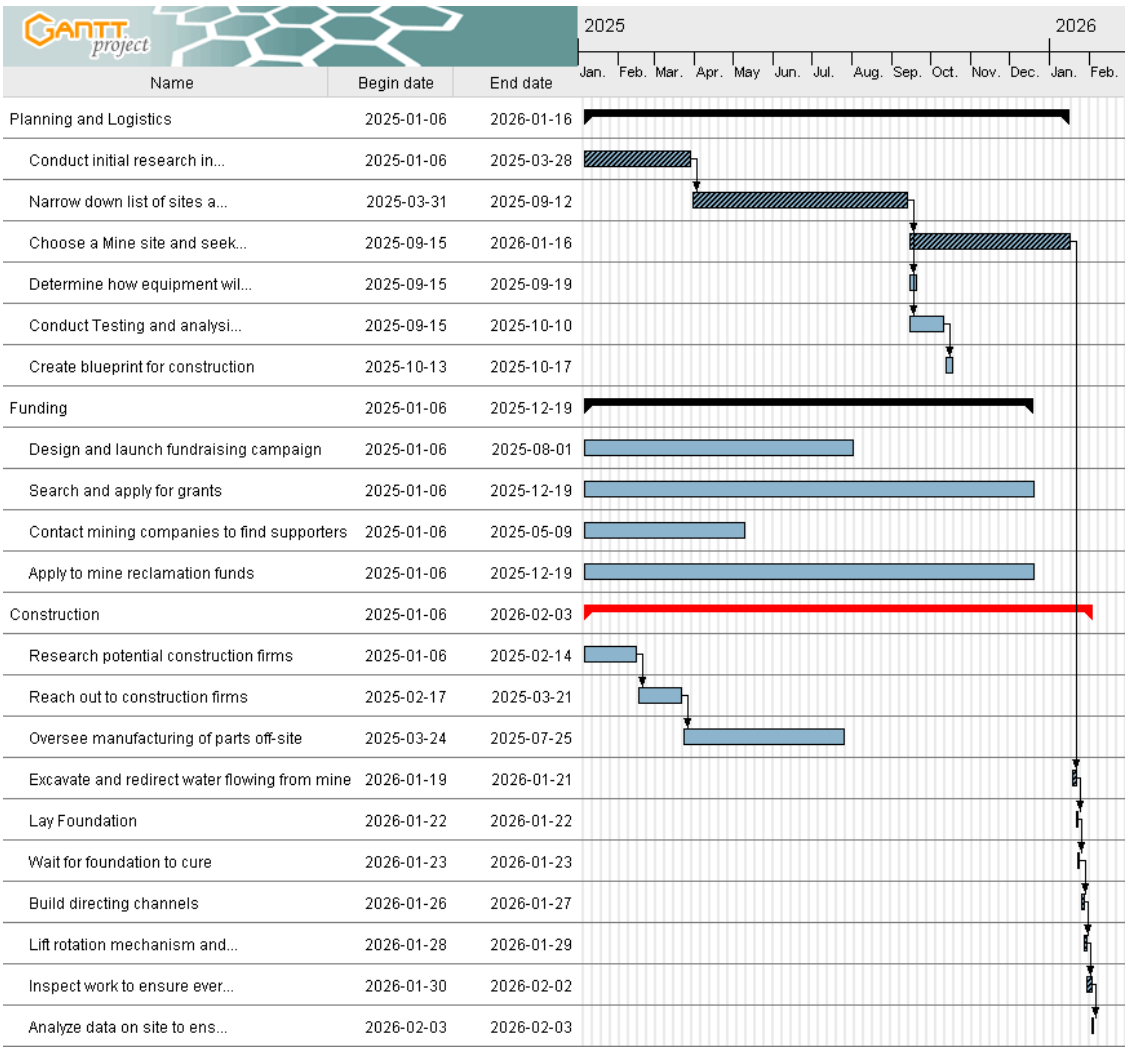
Funding (4 People full time):

1. Design and launch fundraising campaign - full-time (1 person)
2. Search and apply for grants - full-time (1 person)
3. Contact mining companies to find supporters - full-time (1 person)
4. Apply to mine reclamation funds - full-time (1 person)

Construction:

1. Research potential construction firms - 30 days (1 person)
2. Reach out to construction firms - 25 days (1 person)
3. Oversee manufacturing of parts off-site - 90 days (1 person)
4. Excavate and redirect water flowing from mine - 3 days
5. Lay Foundation - 1 day (Construction team)
6. Wait for foundation to cure - 7 days (Construction team)
7. Build directing channels - 2 days (Construction team)
8. Lift rotation mechanism and limestone dispenser into place - 2 days (Construction team)
9. Inspect work to ensure everything has been done correctly - 2 days (2 people)
10. Analyze data on-site to ensure all sensors and connections work - 2 days (2 people)

Using GanttProject, the connection between the tasks was plotted and shown in a Gantt Chart as shown in Figure number. The critical path is shown to be 282 days from the initial fundraising to the completion of the construction.



Name	Begin date	End date
Planning and Logistics	2025-01-06	2026-01-16
Conduct initial research in...	2025-01-06	2025-03-28
Narrow down list of sites a...	2025-03-31	2025-09-12
Choose a Mine site and seek...	2025-09-15	2026-01-16
Determine how equipment wil...	2025-09-15	2025-09-19
Conduct Testing and analysi...	2025-09-15	2025-10-10
Create blueprint for construction	2025-10-13	2025-10-17
Funding	2025-01-06	2025-12-19
Design and launch fundraising campaign	2025-01-06	2025-08-01
Search and apply for grants	2025-01-06	2025-12-19
Contact mining companies to find supporters	2025-01-06	2025-05-09
Apply to mine reclamation funds	2025-01-06	2025-12-19
Construction	2025-01-06	2026-02-03
Research potential construction firms	2025-01-06	2025-02-14
Reach out to construction firms	2025-02-17	2025-03-21
Oversee manufacturing of parts off-site	2025-03-24	2025-07-25
Excavate and redirect water flowing from mine	2026-01-19	2026-01-21
Lay Foundation	2026-01-22	2026-01-22
Wait for foundation to cure	2026-01-23	2026-01-23
Build directing channels	2026-01-26	2026-01-27
Lift rotation mechanism and...	2026-01-28	2026-01-29
Inspect work to ensure ever...	2026-01-30	2026-02-02
Analyze data on site to ens...	2026-02-03	2026-02-03

Figure 1: The Gantt chart of the implementation procedure, with the critical path shown in as the striped line

The largest possibility of delays in the scheduling arises from factors not in our control, such as the funding period and the permit approval process. If we are not able to get enough funding, by the time the construction begins, the pilot program will be delayed or even cancelled. Likewise, it is not guaranteed that we will receive permits from the governments to build our solution, even after consultations. In that case, the proposal would have to be modified, which would certainly increase the required time. Finally, adverse weather could delay the project, as the construction will not be able to proceed if weather conditions do not permit. These risks are mitigated by providing a margin of error so that if

something does go wrong, it is possible to stop momentarily and still remain within the acceptable time range.

Risk Assessment

Table 1: Risk Table showcasing potential risks associated with the project

Risk Category	Risk Item	Potential Impact	Likelihood of Occurrence
PM1	Implementation Delays	2	4
PM2	Required financing cannot be obtained	4	2
PM3	Team Conflict	2	3
D1	Generator doesn’t generate enough electricity	4	3
D2	pH sensor is not accurate (or stops working)	2	2
D3	Technical feasibility of the rotation mechanism not possible	5	1
S1	Water Leaking	3	2
S2	Filters don't purify the water	4	1
S3	Solution Interferes with local ecosystems.	2	2

Potential Impacts

PM1: Setbacks to the project timeline, lead to further issues regarding implementation schedule, and can lead to financial costs.

PM2: Delays the project from being implemented, new unaccounted expenses arise, legal constraints, and can lead to the project going over the intended budget.

PM3: Setbacks to the project timeline, lead to costly mistakes in production/design/assembly, and reduced productivity in implementing the solution.

D1: This would cause pH and flow rate sensors to stop working, and the filters would no longer be able to rotate.

D2: This would cause incorrect amounts of limestone to be dispensed, causing an incorrect pH to be assumed; either wasting materials or not using enough.

D3: Cause the solution to be ineffective, contaminants would continue to be released into the environment, and initial investment in implementation would be lost.

S1: Contaminated water would be entering the environment while the solution is non-operational and repair costs.

S2: Contaminated water would be entering the environment, aquatic life would continue to be negatively impacted, and facilities reliant on the water quality would be affected causing them potential hazards.

S3: Fish spawn routes or decrease the water level.

Table 2: Risk Matrix showcasing the possible severity of the risks posed in the solution

Impact → Probability ↓	Very Low 1	Low 2	Medium 3	High 4	Very High 5
Very Low 1				S2	D3
Low 2		D2, S3	S1	PM2	
Medium 3		PM3		D1	
High 4		PM1			
Very High 5					

Mitigation Strategies

PM1:

- Construct a project plan.
- Constantly update the project plan.
- Focus work toward completing tasks along the critical path.
- Ensure organization among scheduling, construction, and manufacturing.
- Maintain space within the budget to account for the possibility of unaccounted expenses due to delays.

PM2:

- Be prepared with an alternative funding source.
- Use multiple sources for project funding.
- Plan and anticipate to adapt to challenges with funding.
- Maintain a constant flow of communication with the funding organizations to identify any issues or concerns in the early stages of project implementation.

PM3:

- Assign team bonding sessions among workers.
- Assign leading roles to specific people.
- Encourage communication in all aspects of the implementation process.
- Define and reinforce the expected behaviour.
- Provide a system for conflicts to be resolved.
- Perform check-ins with teams to prevent sources of conflict.

D1:

- Utilize multiple ways of generating power for the solution.
- Have extra power sources such as batteries on the job site for a backup option.
- Perform tests to calculate how much energy can be generated and compare to the energy needed.

D3:

- Perform multiple tests with medium and high-fidelity prototypes to ensure it is technically feasible.
- Plan for fixes or alterations of the mechanism if tests or trials fail.
- Ensure engineering on the mechanism is correct before manufacturing.
- Test if the rotation mechanism works in harsh environments before implementation.
- Promote communication of any doubts about the design of the mechanism.

S1:

- Test any water seal designs during prototyping.
- Test to make sure water seals and materials used won't deteriorate while deployed in harsh environments.
- Prepare for leaks or material damage to occur and have a method to fix possible issues.
- Plan for repairs by including it in the project budget.

S2:

- Continuously test water contaminants, pressure, pH, and flow rate to prepare if adjustments to the solution need to be made.
- During the prototyping, test to see how the filters would perform under certain conditions.
- Test how the filters would handle harsh environments.
- Set a plan if different filters need to be used or if filters need to be replaced more frequently than expected.

Inclusivity Assessment

We know that across the Pacific Northwest, there are a variety of different mines, surrounding unique communities and creating unique challenges. We want to tackle those challenges alongside these impacted communities suffering from the consequences of AMD. In the Pacific Northwest, Indigenous groups are the ones most heavily affected by the effects of AMD. This can be seen as in a prominent case where AMD flowed into the once salmon-rich Taku River from the Tulsequah Chief mine in north-western British Columbia (Lavoie, 2019). This led to push-back from the First Nations Energy and Mining Council towards the BC government, as they sought a reform to the Mines Act (Lavoie, 2019). They based their claims on Article 18 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which states: that “Indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures…” We want to make sure their voice is heard, so we have done a framework assessment using the Ladder

of Inclusivity (Heeks, 2013) to provide potential strategies on how to include Indigenous communities in the implementation of our solution for Acid Mine Drainage.

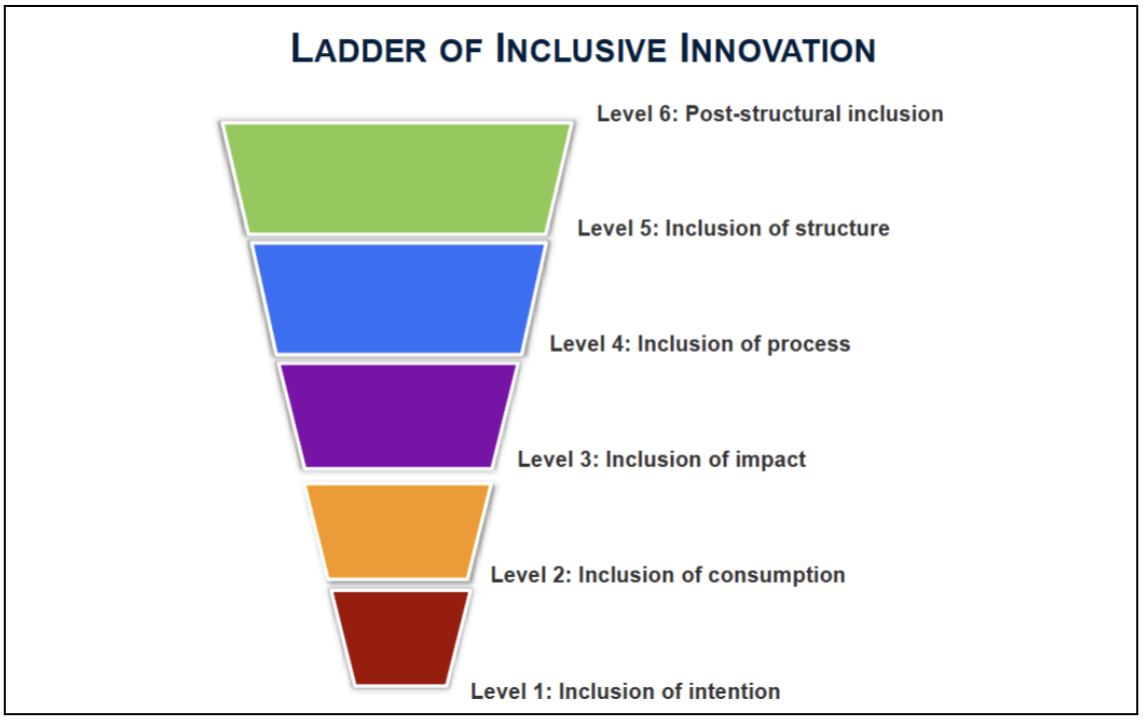


Figure 2: Ladder of Inclusive Innovation (Bam, 2024).

As for level 1, inclusion of intention, our project focuses on water and sediment contamination, which is a critical issue for indigenous communities, whose cultural, spiritual and livelihoods are closely tied to access to clean water. Indigenous groups often have a deep connection to the land and rely on these resources for traditional practices, food security, and community health. Our project aims to protect human health and preserve aquatic ecosystems, which aligns with the priorities of many Indigenous communities. So at the intention level, the project demonstrates inclusivity by recognizing and prioritizing the challenges faced by Indigenous groups.

If our project's solutions are successfully implemented within Indigenous communities, we would fulfil level 2, inclusion of consumption, because they would have direct access to safe-to-use water and be able to live out traditional land-use practices such as

fishing and agriculture without fear of illness. However, Indigenous communities often face barriers such as limited access to financial resources, infrastructure, and technical support, which may hinder their ability to adopt and benefit from these solutions. The equitable distribution of our project's outcomes is crucial to avoid prioritizing any community based on affluence. To promote inclusivity at this level, the project must provide resources and support to the specific needs of Indigenous groups, so that they can participate in the long-term benefits it provides.

If the program is successful, then for level 3, inclusion of impact, our solution will reduce health risks related to the contaminated water and improve environmental conditions. These benefits will be felt regardless of where our solution is set up; including Indigenous communities. There is no form of disclusion in the impact as this is the mere function that our solution set out to do in the first place.

As for level 4, inclusion of process, it's important to have a collaborative mindset; doing with as opposed to doing to (Corbett & Fikkert, 2009). Article 19 of UNDRIP says: "States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them." We hope to include Indigenous communities in key decisions made when implementing our solution. We view them as key consultants, as they know their land best. This could mean pointing out the most ideal location for our filtration system to be set up so it doesn't interfere with local ecosystems, such as salmon spawning routes. Or they may know how acidic or polluted the water is and can therefore give us the necessary information when setting up our solution.

With that said, once construction begins, while many Indigenous firms and companies may be involved, the initial components would have to be trucked in from elsewhere by, likely, non-Indigenous sources. But once construction is completed, it would be very helpful for us if these Indigenous communities could maintain our plant. Since it is mostly autonomous, maintenance would only consist of switching out membrane filters and replenishing lime powder roughly every 6 months. As these communities would be quite close to the contaminated area, it would save time, money, and carbon emissions to have someone local maintain the plant.

Level 5 is not so much applicable to our solution. Inclusivity of structure requires us, as a business, to look at how our company framework is constructed and to make appropriate accommodations for Indigenous groups within it. Seeing as our solution is mostly autonomous, requiring less than a handful of people every 6 months to maintain, there isn't a framework or structure at all. If anything, it is completely open-ended since these maintenance crews can be self-contained within the communities themselves. Our involvement after construction and initial testing will consist of occasional follow-ups as we continue to implement more of our plants around the Pacific Northwest.

Level 6 takes things a step further, requiring us to look beyond our company and ponder if how we do business is inclusive, a.k.a. post-structural inclusion. Again, this goal doesn't fit with how we plan to go about implementing our solutions. We can be respectful to Indigenous communities, and respect their culture, but this doesn't mean it has to be a focal point in how we do business. And we believe mutual respect for each other's way of life is more than enough to share a common goal and fix the problem of AMD in their communities.

In summary, we easily fulfilled 4 out of the 6 “rungs” of the ladder of inclusivity. Inclusivity of Structure, and post-structure, don’t fit conceptually with how we think our business will operate. Despite this, we believe we have a satisfactory framework for inclusive innovation. While we hope to be as inclusive to Indigenous groups as possible when implementing our solution, the majority of the benefits will be felt by everyone, not just specific people groups. Our need statement goes as follows, “A way to purify contaminated water runoff originating from abandoned mining operations located in the Pacific Northwest”. There are no exceptions to that; we hope to provide clean and functional water to all communities impacted by AMD, Indigenous communities included. We respect that every community is different and has unique needs, and we hope to satisfy those needs by working alongside them. Our solution is meant to restore ecosystems, supply irrigation lines, and provide clean water to be enjoyed by generations ahead.

References

Bam, W.. (2024). *APSC 169 L16 Sustainability 7 - 31 October 2024*. University of British Columbia. https://canvas.ubc.ca/courses/150609/files/35844185?module_item_id=7453264

Cleghorn, C.. (1999). *Aboriginal Peoples and Mining in Canada: Six Case Studies*. Mining Watch Canada. https://miningwatch.ca/blog/1999/9/1/aboriginal-peoples-and-mining-canada-six-case-studies

Corbett, S. & Fikkert, B.. (2009). *When Helping Hurts: How to Alleviate Poverty Without Hurting the Poor... and Yourself*. Moody Publishers.

Faro Mine Remediation Project: Yukon. (2024). Government of Canada. https://www.rcaanc-cirnac.gc.ca/eng/1480019546952/1537554989037

Heeks, R.. (2013). *Understanding Inclusive Innovation*. WordPress.com. https://ict4dblog.wordpress.com/2013/08/27/understanding-inclusive-innovation/

Hipwell, W., Mamen, K., Weitzner, V. & Whiteman, G.. (2002). *Aboriginal Peoples and Mining in Canada: Consultation, Participation and Prospects for Change*. The North-South Institute. https://caid.ca/MiningCons2002.pdf

Lavoie, J., (2019). *B.C. First Nations should require full clean-up costs up-front for mines: new study*. The Narwhal. https://thenarwhal.ca/b-c-first-nations-should-require-full-clean-up-costs-up-front-for-mines-new-study/

United Nations (General Assembly). (2007). *Declaration on the Rights of Indigenous People*. United Nations. https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

Appendix A: Report 1 Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Tuesday September 10th, 2024

Location: ART Floor 1; Room #110

Time: 10:35 am – 11:50 am

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Zach Boos

Points of discussion:

- Formed group.
- Created a group chat to keep in contact outside of school hours.
- Decided on open times to meet outside of class hours.
- Created and signed the team contract.
- Agreed on research prompt A2 for our project.

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Research issue of Water and sediments contamination	All Members	
Research what type of mine to look into	All Members	

Next meeting: Monday September 16th, 2024; 12:30pm-2:00pm at the Library

We hope to decide what kind of mines to look into and what problems need to be solved there during our next meeting.

Meeting adjourned: 10:50am

APSC 169 Team 03 Meeting Minutes

Date: Monday September 16th, 2024

Location: Library

Time: 12:30 pm – 1:55 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Zach Boos

Points of discussion:

- Background Research Findings
- Acid Mine Drainage (AMD) Scenarios
- The Treating of Sulphides and Heavy Metals in Water
- What Problem Are We Trying to Solve
- The Scope of Our Project
- Divided Up Research Tasks

Before our next meeting, we hope to:

Task:	Assigned to:	Additional Conditions:
Research what the suitable concentrations for these heavy metals to discharge back into public streams are. (Further Constraints)	Zach	
Research which heavy metals are most commonly the problem. (And other loose ends)	Axel	
Research what the impacts of these heavy metals are.	Connor	
Research ways to detect these heavy metals.	Jacky	
Research how to collect AMD from abandoned mines.	Hasan	

Next meeting: Tuesday, September 17th 2024; 10:00am-12:00pm
in the Arts Building Room #110

In our next meeting, we are hoping to have a more thorough understanding of AMD and its treatments and an idea of the direction we would like to take the project.

Meeting adjourned: 1:55pm

APSC 169 Team 03 Meeting Minutes

Date: Tuesday, September 17th, 2024

Location: Arts Building, Room #110

Time: 10:30am – 11:50pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Zach Boos

Points of discussion:

- Recount Research Findings
- Clarified Scope and Direction of Report
- Divided Who Would Write What For The Report
- Canceled 6:30pm Meeting

Before our next meeting, we hope to complete our respective sections of Report 1. The portions were divided up as follows:

Task:	Assigned to:	Additional Conditions:
Functions, Objectives and Constraints	Zach	
Intro and Background Research	Axel	
Table of Contents and Justification	Connor	
Adding Supporting Data	Jacky	
Significance and Citations	Hasan	

Next meeting: Monday, September 23rd 2024; 12:30pm - 2:00pm
in the Library

In our next meeting, we are hoping to proofread and edit our report before submission.

Meeting adjourned: 11:50pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, September 23rd, 2024

Location: Library

Time: 12:30pm – 2:10pm

Present: Axel Bendl, Zach Boos, Connor Jones (present online), Hasan Mohammad

Regrets: Jacky Zhou (Has COVID)

Note-Taker: Zach Boos

Points of discussion:

- Proofread the full report
- Make edits where needed
- Make sure everyone is on the same page (Report is consistent)
- Dividing up tasks before submission

Before our next meeting, we hope to complete our respective sections of Report 1. The portions were divided up as follows:

Task:	Assigned to:	Additional Conditions:
Finishing touches on each section	Everyone	
Citations/References	Hasan	
Law Citations	Zach	
Submit Report 1	Axel	Only after checking in with everyone to confirm we are all done.

Next meeting: Tuesday, September 24th 2024; 10:30am – 12:00pm
in the Library

We are hoping to have Report 1 done by tonight at 12am. Next meeting we begin Report 2.

Meeting adjourned: 2:10pm

Appendix B: Report 2 Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Monday, September 24th, 2024

Location: ART 110

Time: 10:00 am – 12:00 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Axel Bendl

Points of discussion:

- Introduction to design lab 3
- Working on identifying team strengths, abilities and interests
- Beginning the work breakdown structure table

Task:	Assigned to:	Additional Conditions:
	Connor	
	Hasan	
Create tabular WBS	Zach	
	Axel	
	Jacky	
Complete team strengths and interests	Everyone	

Next meeting: Monday, September 24th 2024; 12:30am – 12:45pm - Whatsapp Call

Meeting adjourned: 12:00pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, September 24th, 2024

Location: Whatsapp Call

Time: 12:30 pm – 12:45 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Axel Bendl

Points of discussion:

- Reviewing the report 1 feedback, evaluating what could have been done better and room for improvement in second report
- Made comments for every piece of TA feedback

Task:	Assigned to:	Additional Conditions:
	Connor	
	Hasan	
	Zach	
Create feedback document	Axel	
Research potential stakeholders	Jacky	
	Everyone	

Next meeting: Tuesday, October 1st 2024; 10:00am – 12:00pm - ART110

Meeting adjourned: 12:45pm

APSC 169 Team 03 Meeting Minutes

Date: Tuesday, October 1st, 2024

Location: ART 110

Time: 10:00 pm – 12:00 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Axel Bendl

Points of discussion:

- Introduction to design lab 4
- Starting graphical work breakdown structure
- Assigning tasks to each member

Task:	Assigned to:	Additional Conditions:
Network flow diagram	Connor	
Graphical work breakdown structure, Gantt Chart	Hasan	
	Zach	
Gather details about current solutions	Axel	
Money flow chart	Jacky	
	Everyone	

Next meeting: Tuesday, October 7th 2024; 12:30 pm – 1:15 pm - Library

Meeting adjourned: 12:45pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, October 7st, 2024

Location: Library

Time: 12:30pm – 1:15pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Axel Bendl

Points of discussion:

- Going over what needs to be done, and what has been completed so far
- Assigning further tasks to each member

Task:	Assigned to:	Additional Conditions:
	Connor	
	Hasan	
Existing solutions table	Zach	
Existing solutions table	Axel	
Create stakeholder table	Jacky	
	Everyone	

Next meeting: Friday, October 11st 2024; 5:30pm – 6:00pm - Whatsapp Call

Meeting adjourned: 1:15pm

APSC 169 Team 03 Meeting Minutes

Date: Friday, October 11st, 2024

Location: Whatsapp Call

Time: 5:30pm – 6:00pm

Present: Zach Boos, Hasan Mohammad, Jacky Zhou

Regrets: Axel Bendl, Connor Jones

Note-Taker: Axel Bendl

Points of discussion:

- Finish rough draft before monday, to do final edits before handing in
- Checking in with everyone, what needs to be done

Task:	Assigned to:	Additional Conditions:
Solution landscapes	Connor	
	Hasan	
	Zach	
Stakeholder plot	Axel	
Justification for stakeholders	Jacky	
	Everyone	

Next meeting: Monday, October 14th 2024; 12:30pm – 1:30pm - Whatsapp Call

Meeting adjourned: 6:00pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, October 14th, 2024

Location: Whatsapp Call

Time: 12:30pm – 1:30pm

Present: Zach Boos, Hasan Mohammad, Connor Jones, Axel, Bendl

Regrets: Jacky Zhou

Note-Taker: Axel Bendl

Points of discussion:

- Proofread the full report
- Make edits where needed
- Make sure everyone is on the same page (Report is consistent)
- Ensure citations and formatting is correct

Task:	Assigned to:	Additional Conditions:
Solution landscape analysis	Connor	
Citations and formatting	Hasan	
Justification of existing solutions	Zach	
Justification of existing solutions	Axel	
	Jacky	
	Everyone	

Next meeting: Tuesday, October 15th 2024; 10:00am – 12:00pm - ART 110

Meeting adjourned: 1:30pm

Appendix C: Report 3 Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Tuesday Oct 15th, 2024

Location: ART Floor 1; Room #110

Time: 10:00 am – 11:50 am

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Hasan Mohammad

Points of discussion:

- Discussion of ideation techniques
- Brainstorming of novel ideas
- Decomposition of current solutions
- Regrading Report 1

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Break down 1 novel solution each	All Members	
Email Dr. Eisenstein to inquire about regrading	Jacky	

Next meeting: Monday October 21, 2024; 12:30pm-2:00pm at the Library

Meeting adjourned: 11:50am

APSC 169 Team 03 Meeting Minutes

Date: Monday October 21th, 2024

Location: Commons Building

Time: 12:30 pm – 2 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Hasan Mohammad

Points of discussion:

- Lots of brainstorming
- Used Sticky notes and 5-3-1 brainstorming to generate novel ideas and discuss their pros+cons

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Continue thinking about novel solutions!	All Members	

Next meeting: Monday September 16th, 2024; 12:30pm-2:00pm at the Library

We hope to decide what kind of mines to look into and what problems need to be solved there during our next meeting.

Meeting adjourned: 10:50am

APSC 169 Team 03 Meeting Minutes

Date: Tuesday October 22nd, 2024

Location: Art Room 110

Time: 10 am – 11:50 am

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad

Regrets: Jacky Zhou

Note-Taker: Hasan Mohammad

Points of discussion:

- Finish breakdown of all existing solutions
- Create HIT charts 1 and 2
- Create Morph chart

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Finish Morph Chart	Hasan and Zach	
Finish HIT Charts	Connor and Axel	

Next meeting: Monday September 16th, 2024; 12:30pm-2:00pm at the Library

Meeting adjourned: 11:50am

APSC 169 Team 03 Meeting Minutes

Date: Wednesday, October 23rd, 2024

Location: Video Call

Time: 6:50pm-7:50pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou
Regrets: N/A

Note-Taker: Hasan Mohammad

Points of discussion:

- Choose and refine the 6 novel solutions
- What are differentiating features of each solution?
- How can the solutions be made unique?

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Finish the last 2 solutions	Connor	
Finish Research for All Solutions table	Hasan and Zach	
Create Weighted Summation Matrix	Axel	

Next meeting: Monday September 16th, 2024; 12:30pm-2:00pm at the Library

We hope to decide what kind of mines to look into and what problems need to be solved there during our next meeting.

Meeting adjourned: 7:50pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, October 28th, 2024

Location: COMS/Online

Time: 12:30pm-2:45pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad

Regrets: Jacky Zhou

Note-Taker: Hasan Mohammad

Points of discussion:

- We need to make solutions more interesting and different - they all are similar
- What weights to assign each criteria
- What rankings should each solution get
- Formatting

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Finish Lab!	All Members	

Next meeting: Tuesday, October 29th, 2024; 10-12 Art 110.

Meeting adjourned: 2:45pm

Appendix D: Report 4 Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Tuesday October 29th, 2024

Location: ART Floor 1; Room #110

Time: 10:23 am – 11:50 am

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad

Regrets: Jacky Zhou

Note-Taker: Connor Jones

Points of discussion:

- Determined what tasks needs to be started
- Assigned tasks to group members

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Develop meaningful solution description	Hasan and Zach	none
Create Sketches	Connor	none
Test riskiest assumptions with low fidelity prototypes	All members	none

Next meeting: Monday November 4st, 2024; 12:30pm-2:00pm at the Library/online

We hope to share our progress on our tasks and make sure the report is on schedule for completion.

Meeting adjourned: 11:50am

APSC 169 Team 03 Meeting Minutes

Date: Monday November 4th, 2024

Location: UBCO Library / Online

Time: 12:30 am – 2:00 pm

Present: Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: Axel Bendl

Note-Taker: Connor Jones

Points of discussion:

- Determined what tasks needs to be started
- Assigned tasks to group members

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Develop meaningful solution description	Hasan and Zach	none
Create Sketches	Connor	none
Test riskiest assumptions with low fidelity prototypes	All members	none

Next meeting: Tuesday, November 5th, 2024; 10:25 am - 11:50 am.

We hope to share our progress on our tasks and make sure the report is on schedule for completion along with discuss the topics of the lecture.

Meeting adjourned: 1:54pm

APSC 169 Team 03 Meeting Minutes

Date: Tuesday November 5th, 2024

Location: ART Floor 1, Room #110

Time: 10:25 am – 11:50 am

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Connor Jones

Points of discussion:

- Confirmed tasks
- Assigned new tasks to group members
- Discussed lecture topic
- Discussed low fidelity prototype designs

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Cost Benefit Analysis And additional justification.	Jacky, Zach, Connor	none
Medium fidelity Prototypes	Axel and Hasan	none

Next meeting: Friday, November 15th, 2024; 3:15 am - 4:25 am.

We hope to share our progress on our tasks and make sure the report is on schedule for completion.

Meeting adjourned: 11:50pm

APSC 169 Team 03 Meeting Minutes

Date: Friday, November 15th, 2024

Location: ART Floor 1 / Online

Time: 3:15 pm – 4:25 pm

Present: Axel Bendl, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: Zach Boos

Note-Taker: Connor Jones

Points of discussion:

- Confirmed tasks
- Assigned new tasks to group members
- Discussed medium fidelity prototype designs and test results

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Cost Benefit Analysis	Jacky, Zach, Connor	none
Medium fidelity Prototypes	Axel and Hasan	none

Next meeting: Monday, November 18th, 2024; 12:30 pm - 2:00 pm.

We hope to share our progress on our tasks and make sure the report is on schedule for completion.

Meeting adjourned: 4:25pm

APSC 169 Team 03 Meeting Minutes

Date: Monday, November 18th, 2024

Location: Library / Online

Time: 12:30 am – 2:00 pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Connor Jones

Points of discussion:

- Confirmed tasks
- Assigned tasks to finish report
- Discussed medium fidelity prototype test results and modifications

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Cost Benefit Analysis	All Group Members	none

Next meeting: Tuesday, November 19th, 2024; 10:00 am - 12:00 am.

Meeting adjourned: 2:05pm

Appendix E: Final Video Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Tuesday, November 19th, 2024

Location: ART Floor 1 Room #110

Time: 10:30 am – 11:55 am

Present: Connor Jones, Hasan Mohammad

Regrets: Axel Bendl, Zach Boos, Jacky Zhou

Note-Taker: Connor Jones

Points of discussion:

- Plan script for final video project
- Set meeting times for video filming

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Final Video script	All Group Members	none

Next meeting: Friday, November 22nd, 2024; 8:00 pm - 9:30 pm.

Meeting adjourned: 11:55 am

APSC 169 Team 03 Meeting Minutes

Date: Friday, November 22nd, 2024

Location: Video-Call

Time: 8:05pm – 9:15pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad

Regrets: Jacky Zhou

Note-Taker: Zach Boos

Points of discussion:

- Video Script
- Filming location
- Dividing up Report 5 Tasks

Before our filming tomorrow, we hope to finish our assigned portions of the script. These are listed below, as well as roles assigned for Report 5:

Task:	Assigned to:	Additional Conditions:
Write Script for the Video	Everyone	Specifics Shown Below
Need Statement / Background	Connor	
Solution Explanation	Axel	
Solution Testing	Hasan	
Cost Benefit Analysis	Zach	
Tasks for Report 5	Everyone	Specifics Shown Below
Gantt Chart	Hasan	
Risk Assessment	Connor	And Axel will help.
Ladder of Inclusivity	Zach	And Jacky will help.

Next meeting: Saturday, November 23rd 2024; 3:00pm – 4:30pm
At Mission Creek Park for filming.

We are hoping to film the video in its entirety tomorrow..

Meeting adjourned: 9:15pm

APSC 169 Team 03 Meeting Minutes

Date: Saturday, November 23rd, 2024

Location: Mission Creek Regional Park

Time: 3:00pm – 5:00pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad

Regrets: Jacky Zhou

Note-Taker: Zach Boos

Itinerary of the Day:

- Met at Mission Creek
- Found a place to record
- Set up camera and did a microphone check
- We recorded are respective portions of the video
- Packed up and disbanded

Before our next meeting, I, Zach, hope to have a rough copy of the video completed to show to the group. Otherwise we hope to continue work on Report 5.

Task:	Assigned to:	Additional Conditions:
Edit together the video	Zach	May need videos from the others
Continue working on Report 5	Everyone	Same tasks as described in the previous meeting minutes

Next meeting: Monday, November 25th 2024; 12:30pm – 2:00pm
In the Commons at the University.

I, Zach, am hoping to have the majority of the video complete for Monday's meeting.

Meeting adjourned: ~5:00pm

Appendix F: Report 5 Meeting Minutes

APSC 169 Team 03 Meeting Minutes

Date: Monday, November 25th, 2024

Location: UBCO - Commons

Time: 12:30pm – 2:00pm

Present: Axel Bendl, Zach Boos, Hasan Mohammad, Jacky Zhou

Regrets: Connor Jones

Note-Taker: Jacky Zhou

Points of discussion:

- Editing the video.
- Working on Report 5

Before our next meeting, we hope to do:

Task:	Assigned to:	Additional Conditions:
Assisting Zach with Final Video	All Group Members	
Gantt Chart	Hasan	
Risk Assessment	Connor	And Axel will help.
Ladder of Inclusivity	Zach	And Jacky will help.

Next meeting: Tuesday, November 26th, 2024; 10:00 pm - 12:00 pm.

Meeting adjourned: 2:00 pm

APSC 169 Team 03 Meeting Minutes

Date: Tuesday, November 26th, 2024

Location: ART-110

Time: 10:00am – 12:00pm

Present: Axel Bendl, Zach Boos, Connor Jones, Hasan Mohammad, Jacky Zhou

Regrets: N/A

Note-Taker: Jacky Zhou

Points of discussion:

- Watched our Final Video
- Working on Report 5

Before our finishing Report 5, we hope to do:

Task:	Assigned to:	Additional Conditions:
Gantt Chart	Hasan	
Risk Assessment	Connor	And Axel will help.
Ladder of Inclusivity	Zach	And Jacky will help.

Meeting adjourned: 12:00 pm