SOCIOCULTURALLY FOCUSED RECLAMATION:

Reimagining the Post-extraction Landscape of Giant Mine

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Canada is a nation of extraction, a truism that predates its confederation and is as iconic as its fur trade. Though the modern reality of extraction differs widely from this historical archetype natural resources continue to be a critical part of the Canadian economy. Today the minerals industry is one of the biggest in Canada and accounts for about five percent of the country's annual GDP.[1] This economic stimulus is the product of thousands of mines and quarries operating across the country to deliver the mineral wealth of Canadian ground to the global market. This production process is lengthy, intensive and necessitates the disturbance and contamination of vast tracts of land to extract the substances deemed vital to modern society. Once extraction is complete mines leave behind an atrophied and often toxic landscape, creating an expensive and demanding liability in the form of reclamation, a responsibility that is easily neglected or eschewed by the owner. As a result, many mines are insufficiently remediated or abandoned all together making them orphans of the state that plague local communities with hazards and Canadian taxpayers with cleanup costs.

These orphan mines are particularly common in the north where natural resource extraction is the backbone of the economy and the land is sparsely populated and developed. One of these sites is Giant Mine, a former gold mine that operated for over fifty years outside Yellowknife, Northwest Territories and is one of the most contaminated sites in Canada. The property is now the responsibility of the federal government and is slated for an interminable remediation project that only addresses immediate human health and safety risks. This is emblematic of most abandoned mines and numerous reclamation projects where biophysical restoration is frequently the sole priority. This technical focus is often problematic as it overlooks the specificity and complexity of context. In the case of Giant Mine this includes a complex sociocultural fabric of Indigenous-settler relations and a multifaceted history of extraction.

This thesis uses Giant Mine as a case study for exploring alternative, place-based post-closure strategies. It proposes a holistic, phased plan for the site informed by community research and principles of exposition and reconciliation. The plan serves as a hypothesis for how to engage meaningfully with post-extraction sites and their embedded histories while testing answers to design related questions. What are appropriate programs for a former mining site? How can a community engage with a toxic landscape? Is it possible to simultaneously memorialize and critique extractive histories? Giant Mine is representative of thousands of abandoned mines across Canada whose fraught histories colour their future and present opportunities for new interpretations of reclamation. This is the foundation of this thesis which reimagines the future of post-extraction landscapes through design steeped in representation and memory.

1"Minerals and Mining," Canada, Natural R., Natural Resources Canada, Accessed Sep 22, 2019, https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/10858.

ACKNOWLEDGEMENTS

I would like to acknowledge that my thesis research was conducted on the Haldimand Tract, land that was promised to the Haudenosaunee of the Six Nations of the Grand River, and is within the territory of the Neutral, Anishinaabe, and Haudenosaunee peoples. Additionally, Giant Mine, the subject of the thesis proposal exists as a result of the forced dispossession of Indigenous peoples, members of the Yellowknives Dene First Nation (YKDFN), from their traditional ancestral lands.

No creative or academic work is created in isolation and this thesis is no exception. This thesis would not be possible without the support and guidance of a number of individuals throughout the research and development process.

I would to like to thank my committee for their considerate feedback and time spent reviewing my thesis material. Specifically, I'd like to thank my supervisor Lola Sheppard for her thoughtful direction, motivation and numerous references that pushed me to do better work. Thank you to my committee member Andrew Levitt for his inspiration and critiques that helped shape the outcome of this thesis. Thank you to my internal reader Jane Hutton for her guidance in the initial development of my thesis topic and positioning and her thoughtful comments on the final product. Thank you also to my external reader Chris Alton for taking the time to review my thesis and commenting on my defence.

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INTRODUCTION

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2018

INTRODUCTION

CANADA THE COLONY: CROWN LAND & EXTRACTION

The history and identity of Canada are inextricably linked to speculative resource development. Early European colonization was largely dependent on the wealth of natural resources North America had to offer and Canada's early boundaries demarcated frontiers of extraction. The natural resource industry in Canada has evolved over centuries from fur, fish and forestry to iron, gold, nickel and uranium. In the past century, Canada has become a mining powerhouse and according to Natural Resources Canada is now home to over 200 producing mines.[1] These operations extract base and precious metals, industrial minerals, diamonds, coal and oil. Beyond the country's borders, Canada is an international leader in mineral extraction and Canadian companies operate over half of the mining projects worldwide.[2] Additionally the Toronto Stock Exchange hosts the majority of public mining companies globally, this makes it the number one mining listing venue in the world.[3]

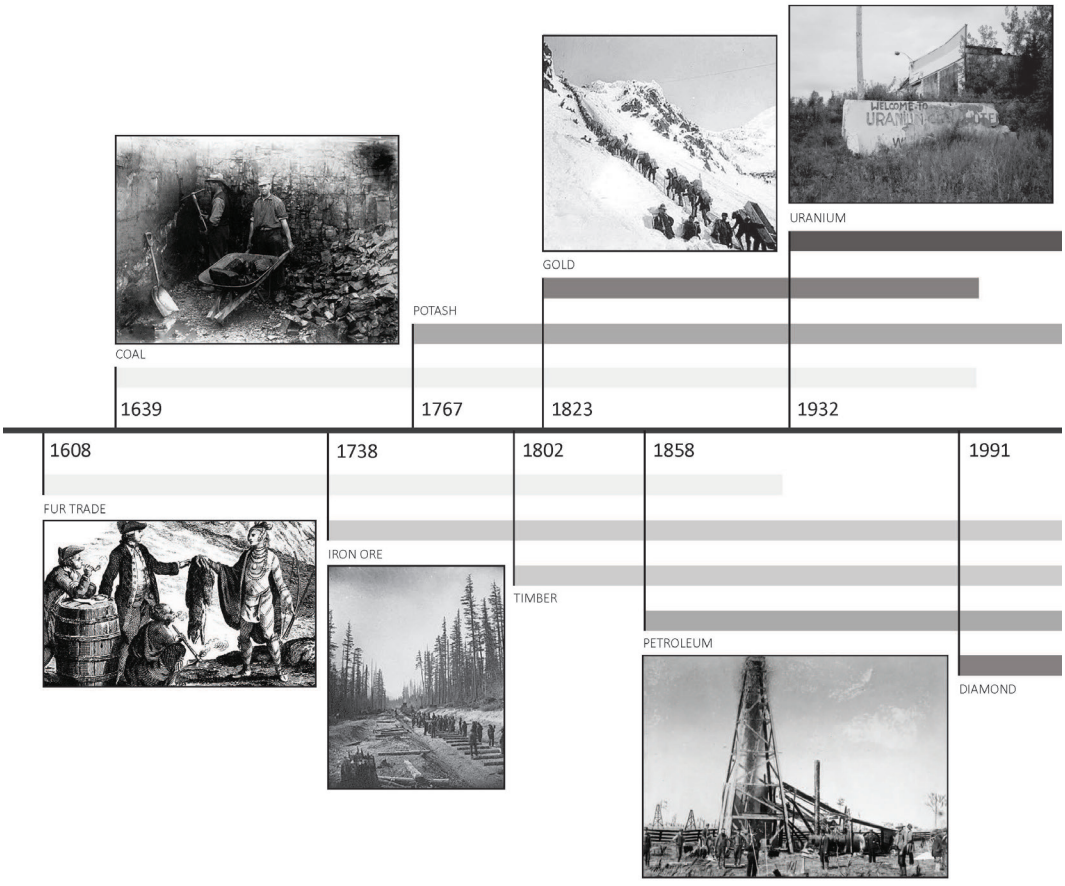


Figure 0.2: *Timeline of Extraction in Canada*

A great deal of this industry success can be attributed to the legal and constitutional systems upon which the country is founded. The Canadian constitution is based on the Magna Carta charter of rights, one of the most important historical documents in the western world as well as a symbol of liberty and democracy.[4] The charter lists an important caveat to this liberty: the law of the land, a qualification that justifies property dispossession and expulsion based on the legal tenure of terra firma.[5] Another statutory contributor is the legal reality that surface and subsurface land rights are two separate entities in Canada.[6] Subsurface or mineral rights give the Crown, or any freehold owners, the unique ownership of everything below grade, regardless of the surface property owner.[7] This enactment directly prioritizes natural resource development over private land ownership.[8] Furthermore, the law of free entry which entitles anyone with mineral rights to access, register a claim and explore any land that may contain minerals illustrates the colonizing view that resource extraction is the best use of Crown land and supersedes existing claims including Aboriginal land rights.[9]

This legal framework hints at the overarching condition of the mining industry and standards that currently exist in Canada. Mining universally follows a staged life cycle with four distinct phases: prospecting, development, active extraction and reclamation. Ideally, reclamation in this model is meant to close this cycle for the land and restore it to its original condition. The Canadian government currently requires mine reclamation plans and financial security for any mine to begin development in an effort to see this life cycle through, but company finances aren't strictly regulated and there are no provisions for bankruptcy and mine receivership.[10] This has resulted in thousands of abandoned mines across Canada that have become public liabilities.[11] Mines that are reclaimed are often substandard due to insufficient funding, fragmented approaches or partial completion. This legacy is particularly prevalent in the North which has become the heartland of Canadian zombie mines. This is a term coined to describe the abandoned mines that haunt northern communities with their environmental and fiscal liabilities.[12] These mines: Faro, Giant, Bullmoose, Colomac, Tundra and Eldorado to name a few, have been undermining public trust for decades and have already accumulated $2.37 billion in anticipated cleanup costs.[13]

In Canada the mining industry uses reclamation, remediation and restoration as terms synonymous with social and environmental responsibility.[14] Mining advocates are quick to show images of extraction ravaged landscapes rehabilitated by vegetation but this visual aesthetics focus conceals the deeper, more nuanced impacts of mining on people and the environment.[15] Although Canadian mine reclamation policies have generally improved in scope and efficacy over time, there remains a deficit of holistic reclamation practices. This is illustrated by the number of mine closure plans that require maintenance in perpetuity or prohibit future public land use due to contamination or safety concerns. Zombie mines clearly demonstrate this deficiency of reclamation standards and Giant Mine is unfortunately, an exemplary case of a mine that falls short of comprehensive management and closure.

GIANT MINE AND THE NORTHWEST TERRITORIES MINERAL LEGACY

The Northwest Territories has always been defined by its minerals. Even the Indigenous peoples relied heavily on the mineral copper for their tools giving the capital the name of Yellowknife. Mineral exploration started in the territory as early as 1770 when Samuel Hearne, an explorer and fur trader, was dispatched by the Hudson Bay Company

Figure 0.3: *Aerial Photo of Faro Mine*

Figure 0.4: *Aerial View of Giant Mine*

to search for copper near the mouth of the Coppermine River.[16] Hearne was guided over two thousand miles by a group of Chipewyan Dene who, upon reaching the river, attacked a group of camped Inuit.[17] This violent incident is now known as the Massacre at Bloody Falls, a story first told from Hearne's personal account. His representation of the events depicted the Dene as ruthless and bloodthirsty and cast himself as a helpless, impartial bystander forced to arm himself lest an Inuit mistake him for the enemy.[18] Hearne's account which portrayed a civilized European witnessing an act of unprovoked barbarism is now the version told in history but this is only one side of the story.[19] Emilie Cameron's research done in Kugluktuk, Nunavut reveals that local Indigenous populations consider the Bloody Falls Massacre as early evidence of colonization in the area and hold Hearne responsible for leading the Dene into enemy territory with the sole purpose of mineral exploitation.[20] This historical event is one of many examples where the narrative of extraction is controlled by capitalistic and colonial interests. This demonstrates the legacy of strained relationships between colonizers and Indigenous populations, which is amplified in the context of extraction in the Northwest Territories.

In the case of Giant Mine the social context is made more complex by a mining community culture competing with Indigenous culture over many decades. Yellowknife is the native land of the Yellowknives Dene First Nation (YKDFN) who have occupied the land for thousands of years. The Giant Mine site was once covered in blueberries and used for hunting and fishing by the Dene.[21] Since mining began in the 1930s the YKDFN

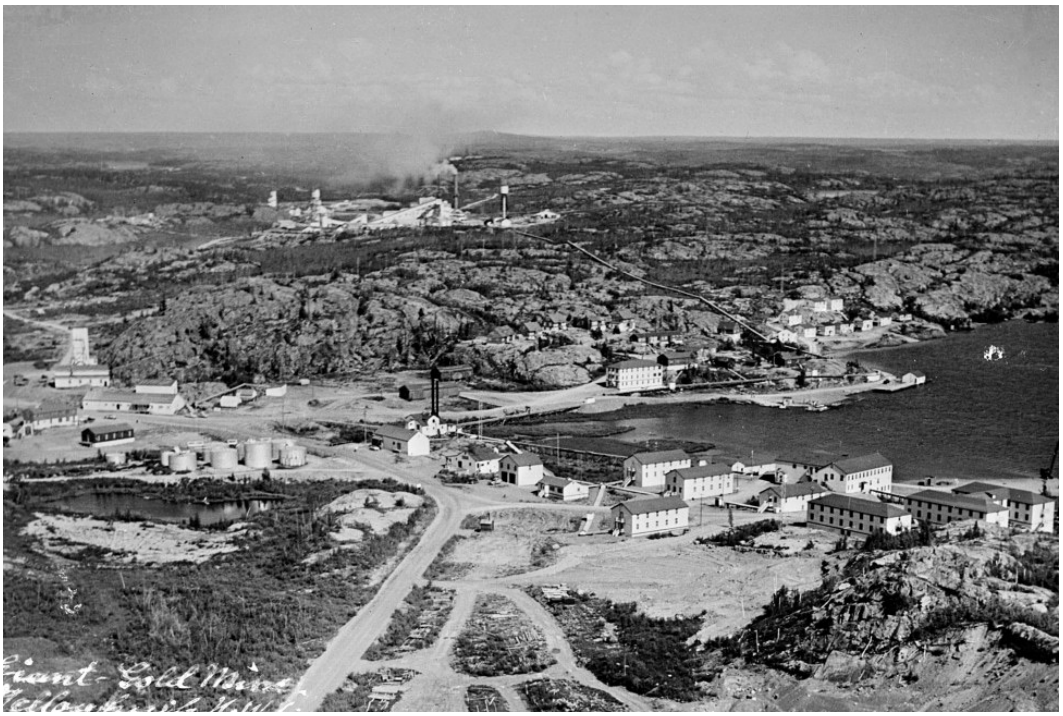


Figure 0.5: *Historical Aerial Photo of Giant Mine*

have been marginalized: being denied jobs and corralled into settlements by Indian Affairs Officials.[22] Having operated for over fifty years, Giant Mine is a unique case of longevity for a mining settlement. Journalist-conducted community interviews affirm the fact that former residents of the company town reminisce about its heyday and the cultural identity it created.[23] In addition to these cultural histories is the well-publicized toxic waste legacy of the site. Currently 237,000 tons of arsenic trioxide sit beneath Giant Mine contaminating the soil and surrounding groundwater.[24] Arsenic is a non-threshold carcinogen and the amount sitting beneath the mine is enough to kill the population of the earth several times over.[25] Consequently, this environmental hazard has been the primary focus of government research and plans for the area since the mine's closure in 2004. Indigenous and Northern Affairs Canada has a detailed reclamation plan for managing the unprecedented amounts of industrial waste. This plan is largely focused on the environmental remediation of the site which includes sequestering and freezing the arsenic in former mining chambers, filling in open pits and disposing of over eighty existing buildings, this proposal requires maintenance in perpetuity.[26] The planning process has included community consultation but due to the highly technical nature of the plan, has failed to successfully engage in community dialogue or acknowledge the cultural histories of the place.[27]

Figure 0.6: *Arsenic in Underground Mine Workings*

PRE-INDUSTRY

STAKEHOLDERS LEGEND

Indigenous Peoples

Miners

Yellowknifers

Researchers

Visitors

- *Indigenous woman finds gold in area that would become Giant Mine*
- *Yellowknife Game Preserve established*

Village of Yellowknife

Shaft Testing

7000+ *years*

MINERAL EXPLORATION BEGINS

1750

-Traditonal site use by WYKDFN

Small whitefish later replaced by larger black ones due to mine

Caribou hunting along baker creek

1770

1899

1923

1935

GIANT MINE OPENS

1948

YELLOWKNIFE POP.

1000

-Initial mineral exploration in region by Samuel Hearne

-First gold discovered in area that would become Yellowknife
-Treaty 8 Signed

-Claims for Giant mine staked

EXTRACTION

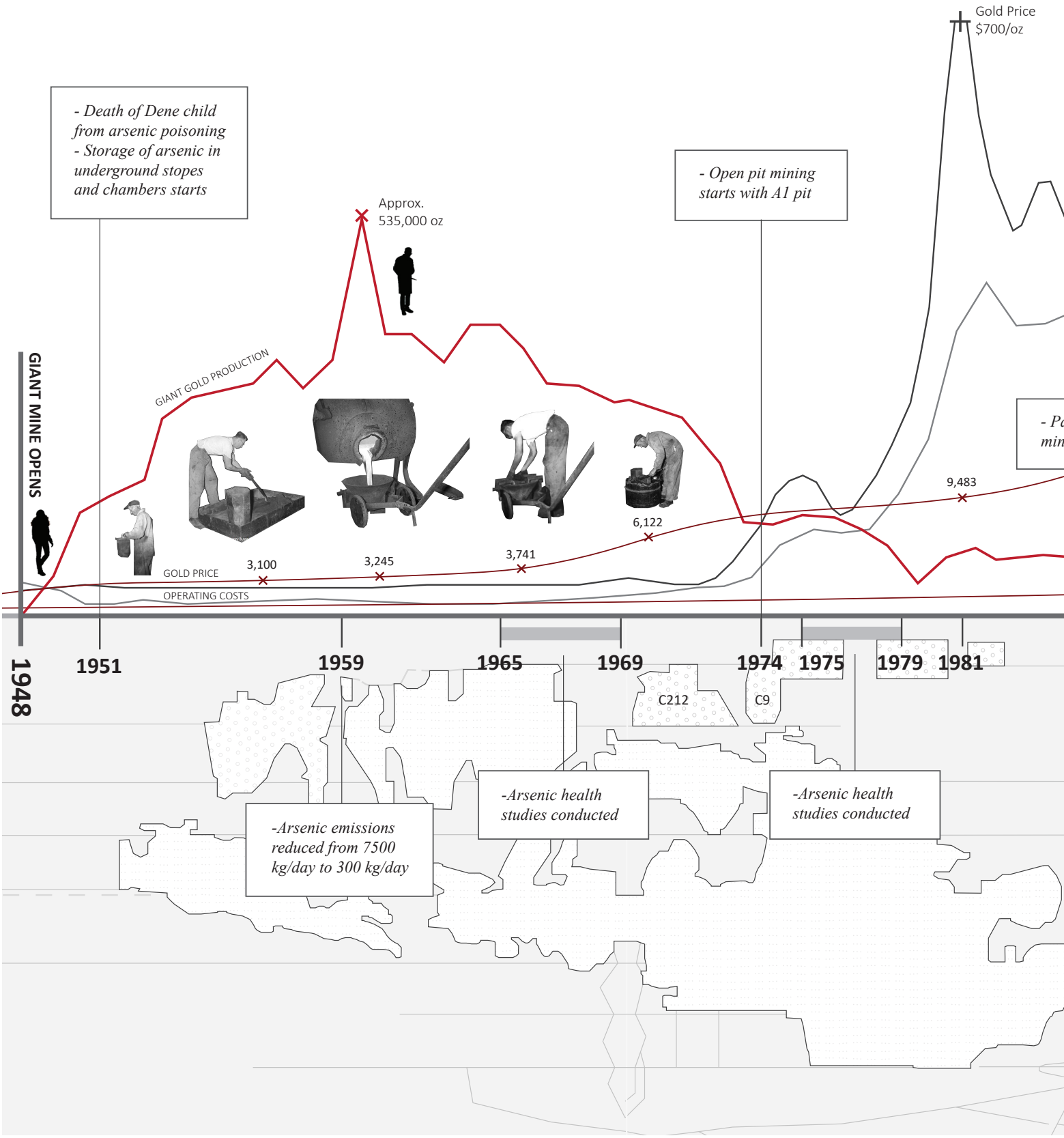
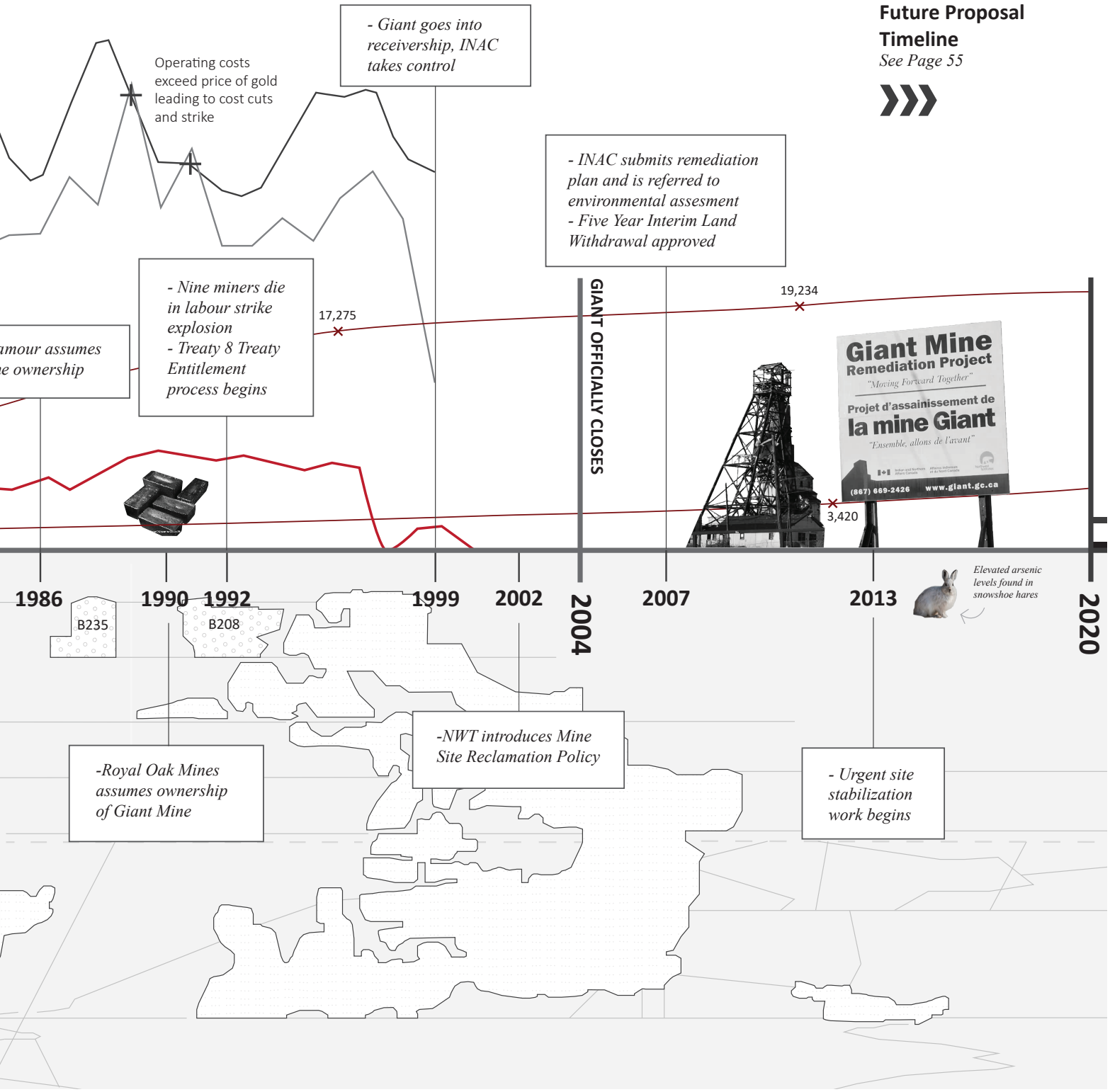
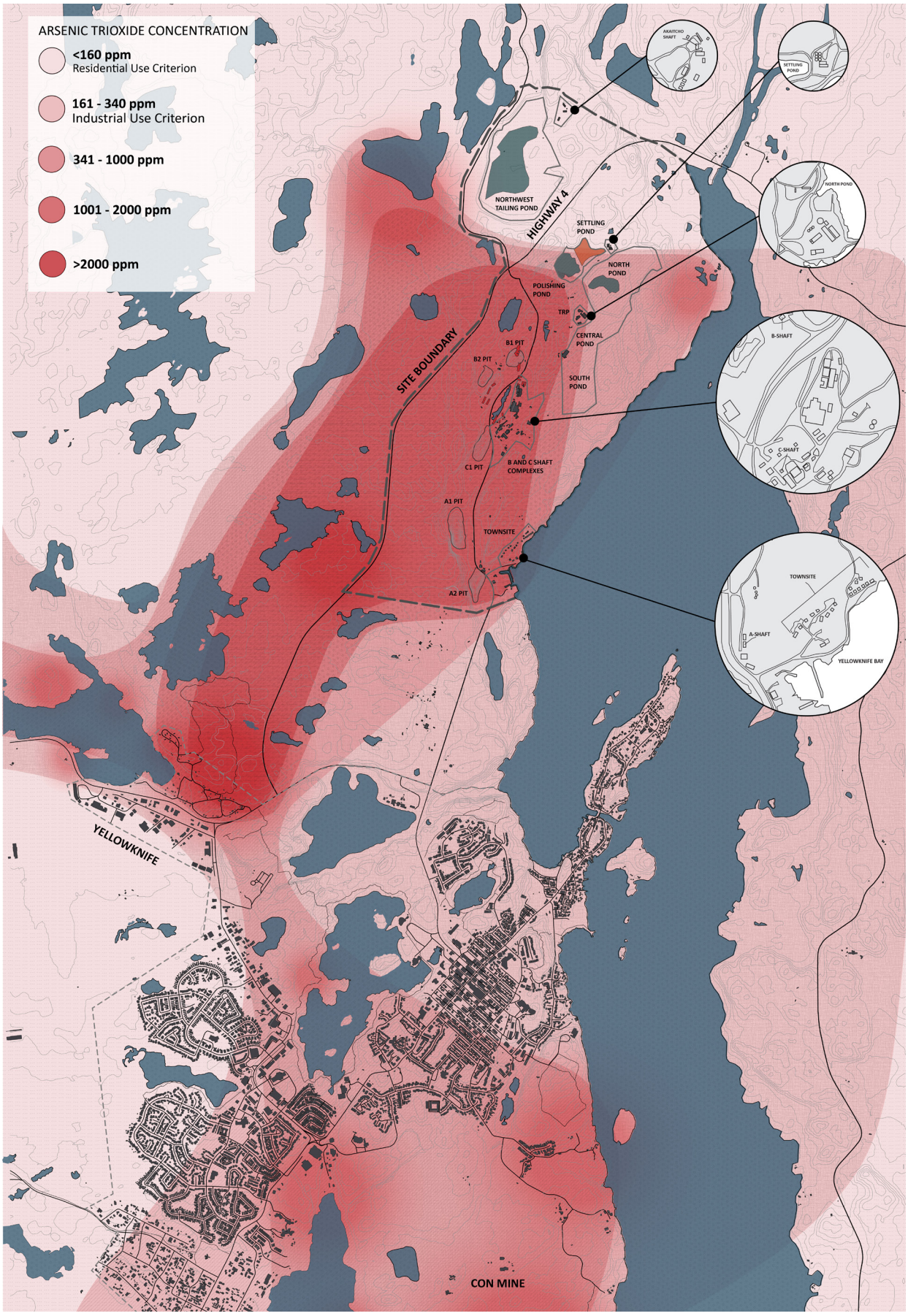

Gold Price
$700/oz
- Death of Dene child from arsenic poisoning
- Storage of arsenic in underground stopes and chambers starts
- Open pit mining starts with A1 pit
Approx.
535,000 oz
GIANT GOLD PRODUCTION
GIANT MINE OPENS
GOLD PRICE
OPERATING COSTS
3,100
3,245
3,741
6,122
9,483
1948
1951
1959
1965
1969
1974
1975
1979
1981
C212
C9
-Arsenic emissions reduced from 7500 kg/day to 300 kg/day
-Arsenic health studies conducted
-Arsenic health studies conducted

Figure 0.7: *Giant Mine Timeline*




ARSENIC TRIOXIDE CONCENTRATION
<160 ppm
Residential Use Criterion
161 - 340 ppm
Industrial Use Criterion
341 - 1000 ppm
1001 - 2000 ppm
>2000 ppm
ARAITCHO SHAFT
SETTLING POND
NORTHWEST TAILING POND
HIGHWAY 4
SETTLING POND
NORTH POND
POLISHING POND
TRP
CENTRAL POND
SOUTH POND
SITE BOUNDARY
B1 PIT
B2 PIT
C1 PIT
B AND C SHAFT COMPLEXES
A1 PIT
TOWNSITE
A2 PIT
B-SHAFT
C-SHAFT
A-SHAFT
YELLOWKNIFE BAY
YELLOWKNIFE
CON MINE

THESIS POSITIONING AND STRUCTURE

This thesis exists within the rich context of extraction history and local culture which it strives to engage through design. *Socioculturally Focused Reclamation* is a critique of ineffectual reclamation practices in Canada, enabled by the compartmentalization of mine management and closure. The mining industry's view of reclamation as a purely technical issue inhibits holistic remediation strategies and restores little more than trees. This thesis realizes that reclamation has the potential to acknowledge the exploitative history of extraction while recreating sites of cultural and functional value for affected communities. Additionally, it recognizes that abandoned mine sites present an opportunity to educate an underinformed public on the realities of extraction and foster reformation advocacy. The research is an exercise in community informed design, including cultural investigation and author interviews. This thesis explores themes of community identity and placemaking while viewing reclamation as a potential healing and decolonizing strategy. The work acknowledges the colonial nature of extraction practices both as part of Canada's defining history and in the effects of Giant Mine, particularly on the YKDFN. It also recognizes the role of mining culture in forming community character and seeks alternative sources of collective identity. Given the substantial body of existing research and the author's area of education, the project forgoes recommendations or analysis of the technical aspects of reclamation except for cursory considerations in relation to the design process. Instead, the research focuses on the sociocultural effects of mining and reclamation and how these impacts can be recognized in a way that advocates for industry reform. This thesis asks: how can design be used to reimagine the post-closure landscape of Giant Mine as a place of reconciliation and new mining pedagogies?

This thesis is an exercise in landscape design, reclamation and placemaking that proposes a program brief and site design that engages with the challenges presented by the site and its stakeholders. This was achieved through archival, site and interview-based research conducted remotely due to the global COVID-19 pandemic which closed the NWT to outside visitors, forcing the cancellation of a previously planned field research trip. Based on this research the design is curated to address five key site planning criteria and a series of stakeholder groups. The thesis consists of three chapters divided into parts. The first is a description of mine reclamation laws and practice, precedents for design in post-extraction landscapes and a primer on the context of Giant Mine. This is followed by a chapter on the competing sociocultural dynamics surrounding the mine in the form of stakeholder inspired essays. The final chapter presents the design methodology and proposed community plan while exploring potential applications for the research.

Figure 0.8: *[Previous Page] Map of Arsenic Toxicity in Yellowknife*

ENDNOTES

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25 France Benoit, *Guardians of Eternity,* Sheba Films, 2015.
26 “Giant Mine Remediation Plan,” Indigenous and Northern Affairs Canada, Last modified April 13, 2018, https://www.aadnc-aandc.gc.ca/eng/1100100027364/1100100027365
27 Benoit, *Guardians of Eternity*

CHAPTER 1

Figure 1.1: [Previous Page] David Brosha,
C-Shaft Headframe

CONTEXT AND THE CASE FOR ALTERNATIVE POST-CLOSURE SOLUTIONS

Canada has been home to mining operations and development for over five centuries. During that time mining as an industry has evolved tremendously but the practice of reclamation has not progressed at an equivalent rate. This is reflected in the relative absence of reclamation legislation prior to the 1980s[1] and the compartmentalization of the practice into purely technical disciplines. As a result, mine reclamation projects typically only address environmental and economic concerns, despite the known sociocultural impact of extraction sites. Part A of this chapter explores this existing context of mine reclamation through analysis of legislation and industry practices and investigates its effect on abandoned mines such as Giant. The insufficiency of current methods will be contrasted against a series of precedents that illustrate the efficacy of community informed reclamation strategies. Part B will detail the history and operations of Giant Mine before describing and analyzing local community stakeholder perspectives. Cumulatively this chapter will articulate the case for socioculturally-minded reclamation and form the basis for the design proposal in chapter three.

PART 1: MINING LAW & STANDARDS

MINING AUTHORITY AND LEGISLATION

For the majority of Canada's history, mine site remediation practices were purely voluntary and even early regulation may have been a perfunctory response to foreign reclamation legislation such as the *Surface Mining Control and Reclamation Act* south of the border in 1977.[2] Two early pieces of reclamation related legislation in Canada were the *Fisheries Act* and the *Environmental Rights Act* in the late 1980s. These acts established minimal requirements for mining effluent management and reclamation and were followed by more robust legislation in the 90s and 2000s such as the *Environmental Protection Act* and the *Canadian Environmental Assessment Act*.[3] As evidenced by their titles, these documents focus on the environmental impacts of industries such as mining, predominantly by regulating byproduct disposal and remediation of contaminants[4] with virtually no consideration of the broader socioeconomic effects.

The control of Canadian mining activity is a federal jurisdiction that is derived from the constitution and is delegated to the provinces as applicable. Authority is more complex in northern Canada as historically territorial resources were subject to federal ownership.[5] This is gradually changing as land and resource responsibilities have been devolved to the territorial level in both the Yukon and the Northwest Territories.[6] Mining in the Northwest Territories is subject to a range of further legislation including: the *Territorial Lands Act,* the *Mackenzie Valley Resource Management Act,* the *Northwest Territories Waters Act,* and the *Mine Health and Safety Act.*[7] In addition to these legally binding regulations,

the territory developed a *Mine Site Reclamation Policy* in 2002 to provide more specific expectations for reclamation in the NWT. Similar to federal regulation these policies and legislation have a predominantly technical focus with supplementary consideration for economic impacts such as receivership.

The *Mine Site Reclamation Policy*[8] represents the most current governmental expectations for reclamation in the Northwest Territories. It was designed to work in conjunction with existing legislation and provides clear definitions and principles for reclamation to evaluate. The policy asserts that it is intended to address environmental and liability considerations related to mine closure and explicitly states that it does not apply to abandoned mines or sites of mineral exploration.[9] Furthermore, it defines the desired standard of reclamation as "returning mine sites and affected areas to viable and, wherever practicable, self- sustaining ecosystems that are compatible with a healthy environment and with human activities."[10] The document goes on to list important elements of a mine closure plan which mostly address the decommissioning, closure and remediation of buildings, infrastructure, tailings, open pits and shafts while meeting standards for environmental contaminants.[11]

Cumulatively these governmental regulations and guidelines are designed to hold mining companies responsible by requiring a degree of financial surety and environmental remediation but their overall standards for reclamation are quite lenient and allow for very basic and atomistic practices. Their focus on technical and financial matters overlooks the comprehensive impact of mining on its sociocultural context. This is a loaded term intended to cover a wide range of societal issues that can be affected by mining including but not limited to: access to economic opportunities, community welfare and identity as well as cultural diversity and expression. This one-sided approach often results in a solution equally fraught as the problem, as even a well-orchestrated, technically considered reclamation plan may be damaging if it does not consider its comprehensive social and ecological context.[12] This is particularly true in single industry communities whose identities and livelihood stem from mining. In these contexts, revegetation and decontamination strategies are merely a partial fix for a complex issue.

INDUSTRY RECLAMATION PRACTICES

Although this chapter critiques Canadian reclamation laws and standards it would be inaccurate to imply that current industry practices are entirely incorrect. Remediation, revegetation and deconstruction are necessary steps in the mine closure process, but they only address part of the problem of reclamation. According to landscape architect and ecologist Jon Bryan Burley there are two key areas of mine reclamation: technical aspects and the creation of usable land.[13] He states that the latter is the specialty of design professionals, but this is a very narrow definition of the abilities and interests of the design field. This classification of the purposes of reclamation is consistent with contemporary industry standards and suggests that the impacts of mining are purely ecological and economical, promoting the idea that trees and a recreation complex or commercial development are adequate solutions to a complex and multifaceted problem. These conventional reclamation strategies simultaneously conceal the lasting impacts of mining on communities and the environment and ignore opportunities to engage in placemaking and reconciliation.

Since mining as an industry has a vested interest in presenting a positive image, pursuing these opportunities would be generally good business. If mining companies could

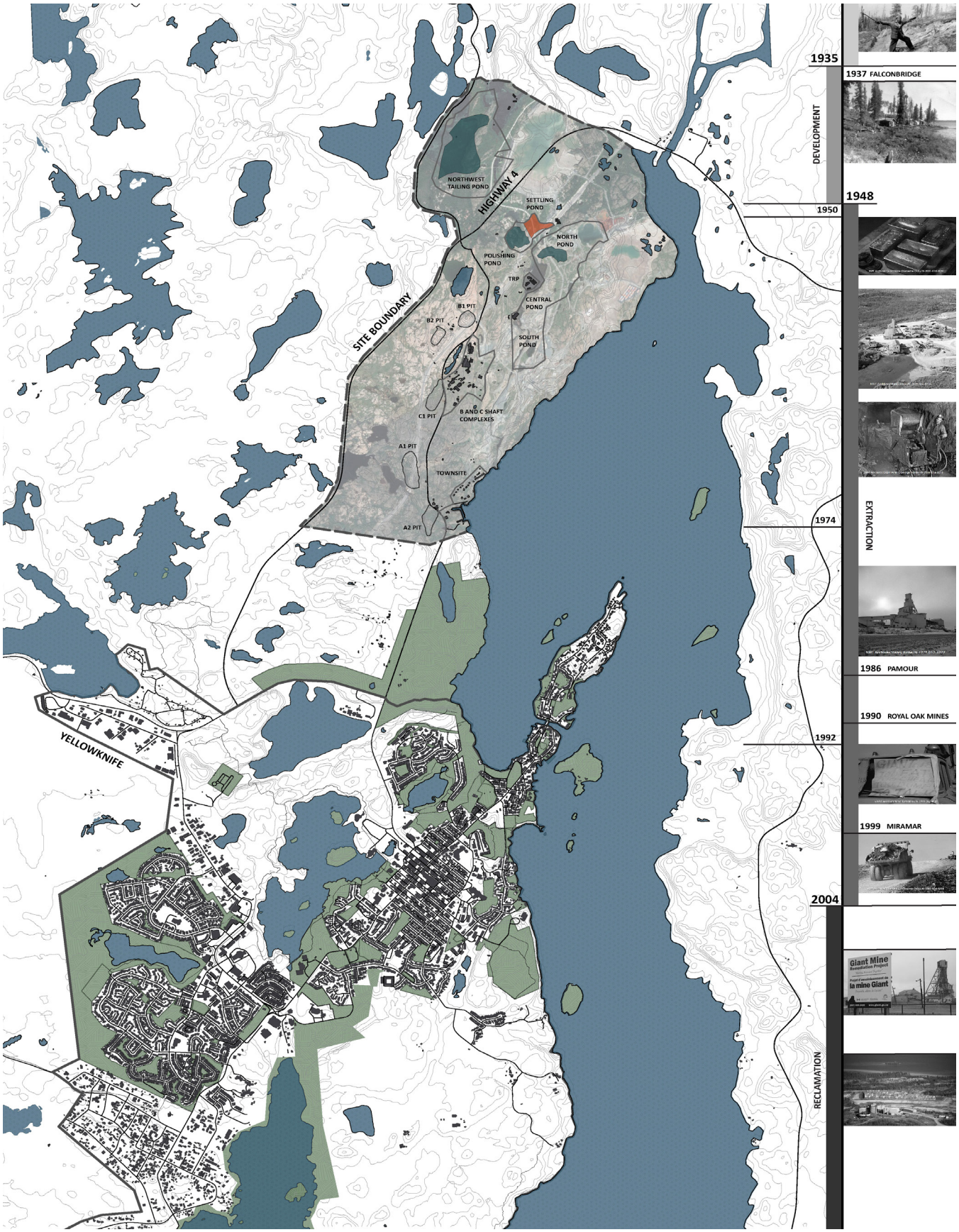
genuinely leave sites with net positive contributions to their communities, they would be largely spared the expenses and setbacks of resistance to future development. This intention of improving a mine site post closure is clearly articulated in Ken Schellie's principles of mine reclamation.[14] Schellie was an influential landscape architect and planner during the twentieth century who actively shaped the aggregate industry and created six principles that are transferrable to all forms of mining.[15] Specifically, his fourth principle states that land can be made more valuable post-mining than its previous condition through strategic reclamation.[16] This assertion provides sufficient grounds for critiquing current mine reclamation practices and prompts this thesis to reimagine what value-added reclamation means.

PART 2: SITE HISTORY AND CONTEXT

HISTORY AND OPERATIONS

Giant Mine is located about four kilometers north of the Yellowknife city limits and is approximately nine square kilometers in area. The mining claims for the site were first staked in 1935 alongside neighbouring claims for Con, Negus and Burwash mines.[17] Over the next decade the site was developed, and operations began in 1948.[18] Over the course of its life Giant Mine had four owners: Falconbridge, Pamour, Royal Oak Mines and Miramar who went into receivership and abandoned the mine in 2004.[19] During this time Giant produced over 7,000,000 ounces of gold and 237,000 tons of arsenic trioxide waste, a byproduct of the gold roasting process.[20] Since its closure the mine has become property of the federal government and Indigenous and Northern Affairs Canada (INAC) is responsible for its reclamation.

Figure 1.2: *[Next Page]*
Giant Mine Context Plan


NORTHWEST TAILING POND
HIGHWAY 4
SETTLING POND
NORTH POND
POLISHING POND
TRP
CENTRAL POND
B1 PIT
B2 PIT
SITE BOUNDARY
SOUTH POND
C1 PIT
B AND C SHAFT COMPLEXES
A1 PIT
TOWNSITE
A2 PIT
YELLOWKNIFE
1935
1937 FALCONBRIDGE
DEVELOPMENT
1948
1950
1974
EXTRACTION
1986 PAMOUR
1990 ROYAL OAK MINES
1992
1999 MIRAMAR
2004
Giant Mine Remediation Project
Projet d'assainissement de la mine Giant
RECLAMATION

The mining operations at Giant evolved significantly over time. During its fifty-six-year lifespan gold was extracted from three shafts and five open pits at depths of up to 2000 feet.[21] All necessary processing facilities were onsite including a mill, roaster and refinery. The transformation of ore into marketable gold is a lengthy and multistep process that varies from site to site. At Giant Mine the high-level gold processing steps were as follows: ore extraction, crushing, grinding, flotation, fluosolids roasting, gas and dust treatment, carbon plant, calcine washing, calcine cyanidation, precipitation and refining.[22] This procedure can be broken down into further detail: gold ore was first fed through the underground jaw crusher then hoisted up the central mining shaft to be further crushed and either conveyed or surface trucked to the milling complex.[23] From there the ore was ground in a ball mill and processed through three rounds of flotation.[24] Waste material from this stage onward is sent to the tailing ponds.[25] Next the gold material is sent through a thickener, agitator, filter and pump in sequence before being roasted.[26] During this stage arsenic trioxide is released as a byproduct through the roasting stack or is pumped into subsurface chambers.[27] Other gold byproducts are sent through the carbon plant to produce gold bearing carbon.[28] The bulk of roasted gold goes through a cyclone and three more rounds of thickening, agitating, ball milling and filtering.[29] This prepares it for clarifying and precipitation, the final step before the refinery furnace which produces liquid gold that is poured into doré bars for market.[30]

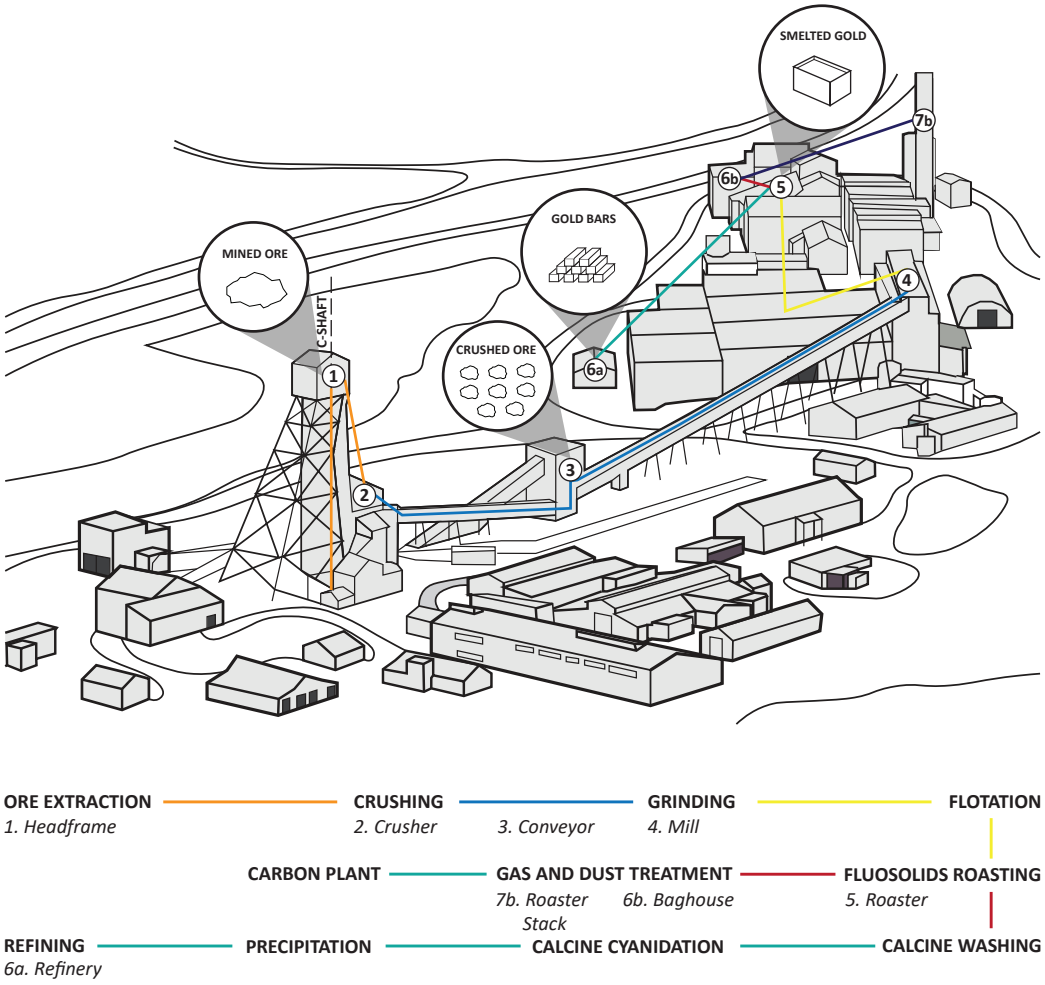


Figure 1.3: *Giant Mine Gold Processing Diagram*

Figure 1.4: *Central C-shaft Buildings*

For over fifteen years INAC has been planning the reclamation under the moniker of the Giant Mine Remediation Project. As the name suggests the aim of this initiative is to remediate the site for environmental and safety concerns.[31] This includes freezing the arsenic trioxide dust in mined out chambers and stopes using thermosyphons to stabilize the byproduct and capping all the tailing ponds.[32] These are necessary steps in the reclamation process particularly given the staggering levels of contamination but, restoring a former mine to a condition where its simply no longer dangerous to visitors is a low bar. Furthermore, the plan calls for the infill of open pits and deconstruction of all onsite buildings and infrastructure except for the townsite.[33] INAC cites safety concerns for these actions[34] but applying a tabula rasa approach to such a loaded site seems rash and ill-conceived. This is particularly true upon deeper consideration of the local stakeholder groups each of whom have complex, nuanced interests in the site's history and future development. Finally, the remediation plan explicitly states that it will require maintenance in perpetuity[35], a fact that places a substantial burden on both Canadian taxpayers and the local community.

SETTLING POND

B1 PIT

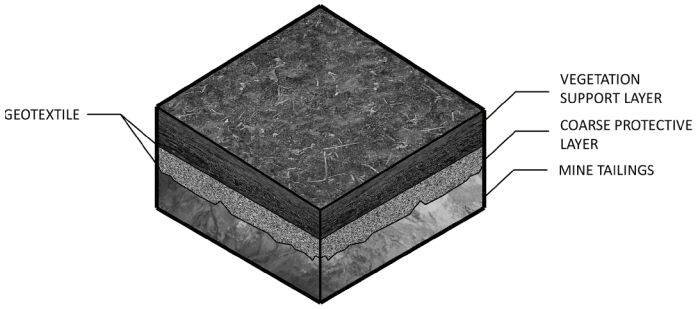
B-SHAFT COMPLEX

DISMANTLED ROASTER COMPLEX

TOWNSITE

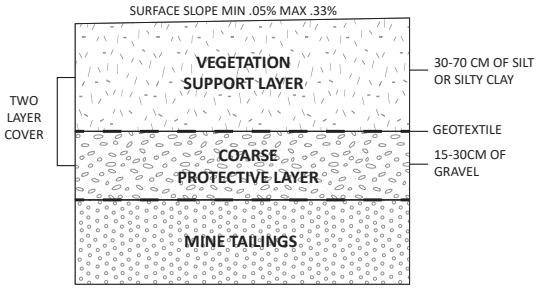
THERMOSYPHONS

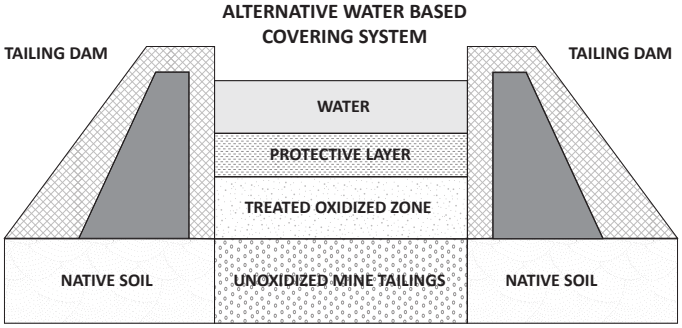
COOLING PIPES

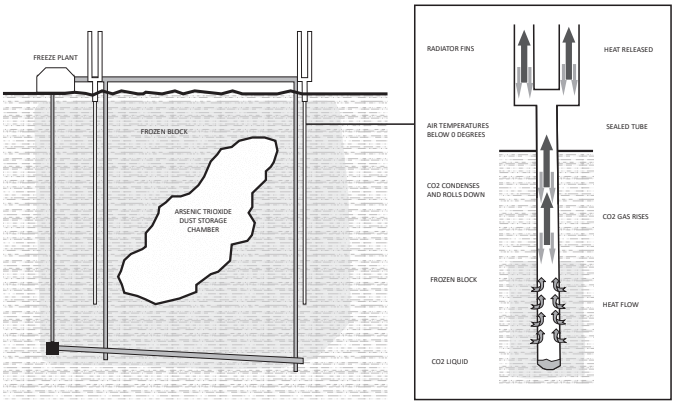


TAILING PONDS CAPPING DESIGN

TAILINGS COVER CONCEPTUAL DESIGN







FROZEN BLOCK METHOD

Figure 1.5: *INAC Remediation Plan*

INDIGENOUS GROUPS

Arguably the group most profoundly affected by Giant Mine is Indigenous Peoples. In Yellowknife these include the Yellowknives Dene First Nation (YKDFN) and the North Slave Metis. This section will focus on the YKDFN as Yellowknife is a central part of their traditional lands that was dispossessed due to the development of Giant and other mines. From the beginning mining in Yellowknife created a rift between Indigenous and settler groups as the YKDFN were neither offered jobs nor revenues from the gold mining operations occurring on their land.[36] Tensions continued to escalate in the 1950s when Indian Affairs Officials coerced the YKDFN to move to concentrated settlements at Dettah and Latham Island and arsenic trioxide pollution from Giant Mine poisoned community members resulting in the death of a child.[37] Following this incident, the mine installed pollution control equipment that directed the toxic dust underground instead of into the air.[38] This was only a partial solution as the earth was still being pumped full of the contaminants that haunt the site to this day. For over 7000 years the YKDFN called the region of Yellowknife their home and the site where Giant Mine now sits was used for berry foraging, caribou hunting and fishing.[39] Today the site is too contaminated for wildlife and studies show increased arsenic concentrations in local animal populations such as the snowshoe hare.[40]

Some residents, particularly the YKDFN, worry about the toxic legacy of the site and how to communicate this to future generations hundreds of years from now.[41] Elders and other YKDFN members have expressed interest in the creation of Dene cultural stories, land art or some form of memorial on the site to convey the dangers sitting beneath

Figure 1.6: *Dene Drum Ceremony*

the surface of the earth.[42] In community engagement sessions with INAC Indigenous individuals have expressed their grievances with how the site has been used and feel that previous consultation has been inadequate.[43] Members of the YKDFN have also expressed fear of the environmental contamination and outrage at the potential historical glorification of a site of extraction and dispossession.[44] Ultimately Giant Mine sits on the traditional lands of the YKDFN and the North Slave Metis and is part of their aboriginal rights and title. Since the mine is federal property the government has a duty to consult with both of these Indigenous groups before finalizing their remediation plan.[45]

MINERS AND YELLOWKNIFERS

In the 1930s Giant Mine was one of a handful of mines being staked and developed along Yellowknife Bay, these mineral claims prompted the development of a boom town that would later become the City of Yellowknife.[46] During peak operations in the 1950s and 60s Giant Mine employed between 360 and 425 employees[47] which accounted for over ten percent of the city's population.[48] Most miners and their families lived at Giant's self-sufficient townsite while some opted for company housing in downtown Yellowknife.[49] The townsite consisted of twenty-four private homes, six bunkhouses, a laundry plant, staff house, firehall, commissary, garage, cookhouse, curling rink and a recreation hall. Following several renovations and additions the recreation hall eventually housed a gym, pool hall, game room, theater, kitchen and a library.[50] All these amenities meant the employees had little need to leave the mine and the townsite quickly became a community of its own. Many former residents of mining towns have fond memories of their time spent living there and Giant is no exception.[51] Despite the widely publicized problems of contamination the townsite is still a place of nostalgia for some as this was their childhood home and the place where they celebrated many of life's milestones.[52] Giant Mine also provided residents with a respectable income and company-sponsored events such as banquets, bonspiels and Christmas parties. According to researchers, northern mining towns like the one at Giant were extremely effective and promoted a sense of solidarity and common identity.[53] These tight-knit mining communities prompt the question "are these contaminated sites or cultural sites?"[54]

One event that changed the dynamic of the Giant Mine community was the miners strike from 1992 to 1993. This was the result of controversial cost cutting measures proposed by Royal Oak to cap benefits and future wage increases to the cost of gold.[55] The union was opposed to this deal and voted against it, putting 230 employees on strike for almost a year and a half.[56] During this time the striking escalated and became violent: some individuals vandalized and bombed the mining facilities culminating in the murder of nine miners when striker Robert Warren set off an explosion on a tramway line.[57] The mine was closed for a period of time for investigations, but the strike continued upon its reopening until the Canada Labour Board stepped in, requiring Royal Oak to present a new agreement.[58] Instead they tabled the original offer and the union agreed to return to work.[59] The corporate penny-pinching and loss of life soured many residents' opinion of the mine prompting some to move away shortly after.[60]

Figure 1.7: *Giant Mine Strike Sign*

STAKEHOLDERS AS DESIGN DRIVERS

These descriptions of the mining community and local Indigenous groups begin to reveal the multifaceted and intricate narratives of Giant Mine. The subsequent chapters explore these narratives in greater detail and extrapolate the design interests of different stakeholders in relation to a design proposal. The previous sections have discussed the perspectives of Indigenous groups and the mining community, two key participants in Giant's history but the future may bring other stakeholders such as researchers and temporary visitors adding further considerations to the potential of the site. The land in itself is also a stakeholder as it has suffered great physical and ecological damage that cannot be knowingly overlooked in the development of a holistic design proposal.

This context is made even more striking when one considers the more than a billion dollars in reclamation costs which became the responsibility of Canadian taxpayers upon Giant's abandonment, and the irreparable environmental damage that is the mine's legacy. The current remediation plan is unequipped to address these issues that define the site and create opportunities for meaningful engagement. It is at this intersection of stakeholder ethos and ecological ruin that this thesis intervenes, asking how can design be used as a tool to rethink the post-closure landscape of mining? And who does the land really belong to?

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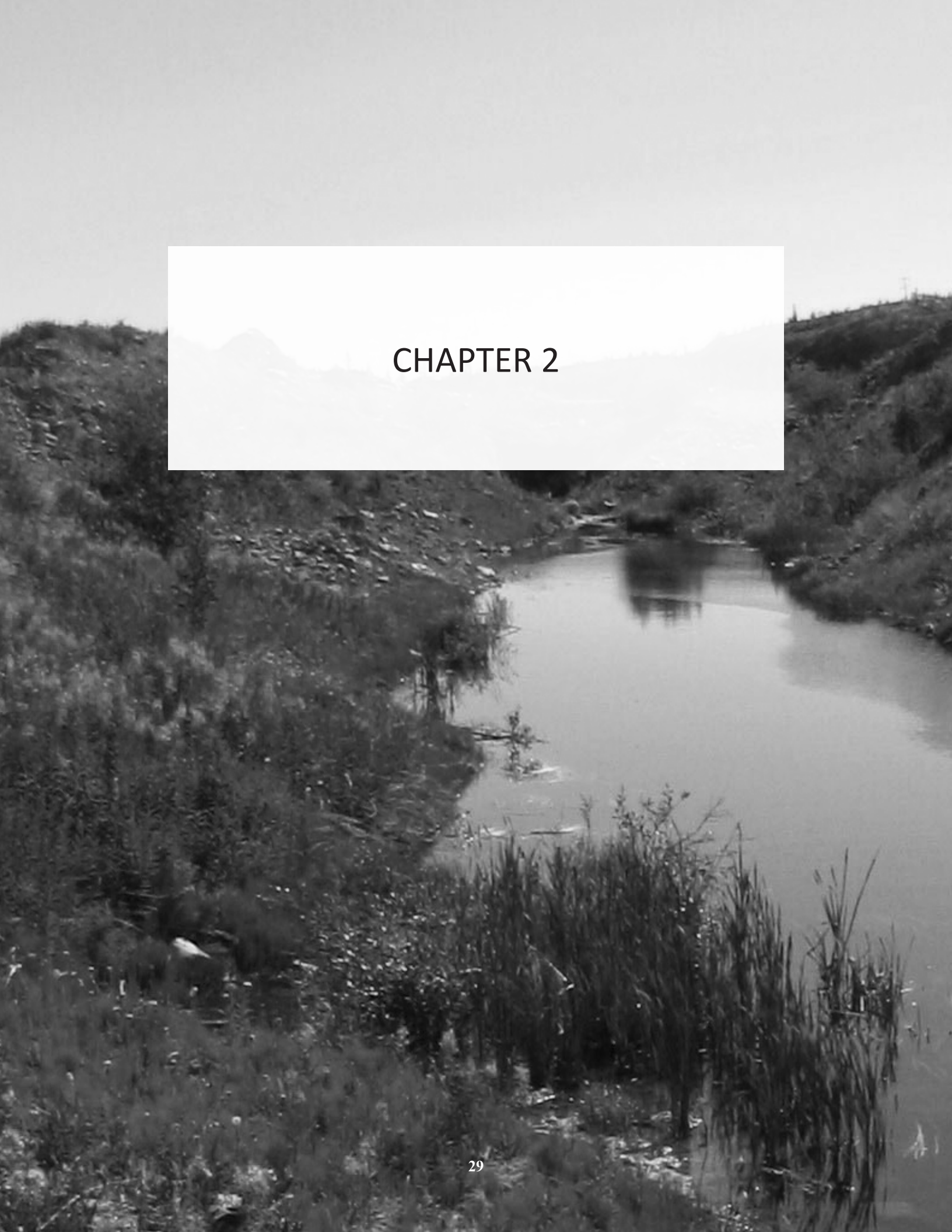

CHAPTER 2

Figure 2.1: [Previous Page]
Giant Mine, Baker Creek

CONTESTED HISTORIES

As outlined in the introduction and the first chapter of this thesis, Giant Mine is a complex and controversial site rooted in competing sociocultural histories. Chapter 2 seeks to particularize the details of these contested histories in a pair of essays written from opposing stakeholder viewpoints informed by community interviews and research conducted by the author. The first essay is an Indigenous history and reveals the cultural and ecological impact of the extractive records of the mine within the oral tradition of the Yellowknives Dene First Nation. The narrative in this essay is founded on a number of sources. These include articles featuring direct quotes from Indigenous community members, the Giant Mine remediation project's public consultation meeting reports and an interview with a staff member of the Yellowknives Dene First Nation organization conducted by the author of this thesis. The second essay is a mining history and tells the story of Yellowknife's evolution from a boomtown to a mineral resource capital of Canada. This section is based on published historical accounts of Yellowknife and interviews with former miners and a local historian conducted by the author. Neither of these essays are intended to express the author's personal views or appropriate the voices of stakeholders, rather they are meant to highlight certain narratives surrounding Giant Mine. These essays pursue a more nuanced understanding of the site's elaborate stakeholder context and are foundational in informing the design proposal discussed in Chapter 3.

ESSAY 1: The Extraction of Denendeh

The Dene people have lived on the land since the beginning, giving their territory its namesake: *Denendeh* or land of the people.[1] By Western conventions Denendeh is the tract of land that stretches from northern Alaska south to British Columbia and east to Hudson Bay. Giant Mine forms a small portion of this geographical area and is a central part of the YKDFN's traditional territory. The Dene are intrinsically connected to the earth as it is their origin, wellbeing and identity; this is evidenced in their oral tradition and ways of life. The following paragraphs outline this spiritual connection with the land, as documented in articles and interviews, and detail the ramifications of its dispossession and degradation in the context of Giant Mine.

It is critical to understand the Dene's cultural history in order to fully appreciate their spiritual connection with the land. In their oral tradition or *þqtú hoghena nüsí hotßü honü*, the Dene originated from animals and at the beginning of time there was no distinction between animals and humans, instead, there were giant creatures that roamed the earth.[2] The accounts vary between Dene groups, but these creatures are consistent motifs across the origin stories of *Denendeh*.[3] Another intrinsic part of Dene culture is *ink'on*, an enigmatic term that refers to special abilities bestowed upon Dene people by creation in the form of a plant or animal, this ritual can happen in physical or surreal settings.[4] This concept is intrinsic to the Dene worldview which depicts all of life as interconnected and spiritual in nature while recognizing animals as self-determinate beings that grant the Dene unique insights.[5] This ideology of a nonhierarchical, living network means the Dene do not believe in conventional land ownership, this is widely documented and shared by a variety of Dene

groups as part of their core values.[6] Instead there is a cultural expectation of collective responsibility for the environment as all of creation is considered equal.[7] This philosophy is in direct conflict with mineral rights and the modern extraction industry which establish a clear dominance of humanity over the earth.

Figure 2.2: Archie Beaulieu, *Depiction of the legend of Yamozha*

Despite this spiritual connection to the land virtually all of *Denendeh* has been taken or exploited by colonizers, and Giant Mine is no exception. Giant Mine and the city of Yellowknife are part of Treaty 11 lands, originally negotiated in 1921. The treaty has been characterized as vague in content and rushed in execution as the federal government pushed to gain access to northern natural resources.[8] Furthermore, the treaty document was never translated to the Indigenous signatories, creating discrepancies in understanding and supporting its future contestation.[9] Treaty 11 set up a system of reserves and compensation for land use between the Canadian Government and the YKDFN.[10] This agreement was first violated by the gold mines that sprung up on the shores of Great Slave Lake in the 1930s, exploiting the mineral wealth of *Denendeh* without the consent of its people. The treaty was further breached in the 1950s when federal Indian Affairs officials coerced the Yellowknives Dene to abandon their nomadic camps in favour of permanent settlements at Dettah and Ndilo, resulting in a dispossession of most of Yellowknife region.[11]

Beyond the appropriation of land, employment opportunities at the mines were limited for the YKDFN.[12] The Dene also suffered the worst of the arsenic pollution due to their location immediately downwind of Giant and a language barrier nullifying the existence of contamination warning signs placed throughout town.[13] These increased risk factors tragically resulted in the death of a Dene child, who unknowingly ate arsenic tainted snow.[14] The Giant Mine site is also of specific cultural and spiritual significance to the YKDFN: the land was historically a place of rich harvests and was so respected by the Dene that they wouldn't live on it, making its exploitation an even greater offense.[15] This objectionable history has steeped the YKDFN's relationship with Giant Mine and the federal government in deep-rooted distrust.

As of 2020 the YKDFN have yet to receive any revenues or compensation from the government for Giant and are in the midst of reconciliation negotiations with both the City of Yellowknife and the federal government.[16] The YKDFN are seeking an apology, financial compensation in the amount of $75 million,[17] and the reclamation of their aboriginal title as part of the Akaitcho Land Claim. Regarding Giant's remediation the Yellowknives Dene's reactions during community consultation have been mixed. Many see Giant as a site of environmental and cultural ruin that cannot be redeemed and should be left grey and ugly as a reminder of its horrific history.[18] Others feel the site ought to be revegetated and brought back to nature.[19] Regardless of their opinion on Giant's future, there is a degree of unanimity among the Indigenous community of fear and uncertainty surrounding the current site and its contamination.[20] Although there is a concerted desire for the site to return to its traditional uses the Dene currently avoid hunting or berry picking in the area and their return to the site would require great ecological restoration assurances and a dramatic cultural shift.

ESSAY 2: Yellowknife the Mining Town

The city of Yellowknife was built on mining. Gold claims staked in the 1930s were the basis for settlement and years of mineral prosperity led to the city's eventual incorporation in 1967.[21] Gold was the substance on which the community was built and sustained, and Giant Mine was its largest producer. During its lifetime Giant produced over 200,000 kg of gold which, adjusted for inflation, is valued at more than eight billion American dollars,[22] providing substantial economic stimulus to the Northwest Territories and promoting advanced infrastructure development in the city of Yellowknife. Beyond financial prosperity the gold mines fostered a close-knit community and strong regional identity, evidenced by the apparent nostalgia of former miners. Although the physical presence of mining in the city has tapered over the past thirty years Yellowknife will always be a mining town in the eyes of its residents and in its underlying geology.

From its opening in 1948 the mine was a source of opportunity for locals and immigrants alike creating hundreds of jobs in its first years of operation.[23] Miners took pride in their ability to contribute to a prosperous community while serving on town council and embracing a sense of friendly rivalry between the local mines.[24] This common livelihood combined with industry wealth promoted substantial development and advancements in the quality of life in Yellowknife, establishing it as the only city in the Northwest Territories.

Giant was particularly well known for its generous treatment of its employees and their families. High quality housing was provided at a competitive rental rate both on and

off site alongside various subsidies and numerous amenities.[25] The Giant townsite provided daily meals at the cookhouse, a commissary to purchase goods at cost and ample recreation opportunities including dancing, curling and billiards. Furthermore, the infrastructure and utilities at the townsite vastly exceeded those in town as all the buildings had heat and running water, two luxuries rarely found in Old Town Yellowknife.[26] The central heat and plumbing infrastructure necessitated by the mine set the standard for future housing developments and were the precursors to Yellowknife's contemporary utilities system.[27]

There were two pivotal points in Giant Mine's history: the first was when Yellowknife became the capital of the northwest territories in 1967 and the second was the deadly strike of 1992. Both events occurred during periods of declining profitability causing a shift in public opinion and breeding skepticism around the mineral resource extraction industry in Yellowknife. The designation of capital came with an influx of new government workers and a subsequent dilution of mining culture as the city's revenue

Figure 2.3: *Giant Mine Underground Workers*

stream diversified.[28] The growth of municipal and territorial government also led to underinformed mining regulation which alongside industry greed ultimately resulted in Giant Mine's abandonment.

Slowly evolving mining regulations and corporate cost cutting meant Giant Mine changed hands four times over its history. In 1990 Royal Oak Mines was the third company to assume ownership during a period of declining gold prices, a threat to profitability that eventually led to the miners' strike in 1992.[29] Management pursued aggressive cost cutting measures including restricting benefits and seeking to tie wage increases to the price of gold, terms which the union rejected causing the strike.[30] During this time Royal Oak hired replacement workers and a number of unionized workers crossed the picket line resulting in escalating violence.[31] This tension culminated in one striker setting an explosion in an underground tramway that killed nine workers. The strike continued for over a year before ending with the union accepting the original offer.[32]

Royal Oak Mines continued their ownership for another six years before going bankrupt and due to insufficient reclamation bond regulations were able to shirk the responsibility of closure, which ultimately landed on the federal government. The subsequent public liability of Giant is the unfortunate byproduct of the mine's operation spanning a vast cultural and ideological shift without continuity of ownership.[33] Giant was opened at a time when environmental responsibility and reclamation were nonexistent concepts, an oversight that future regulation was unable to remedy due to grandfathering and a growing price tag for remediation.[34] The failed management and orphaning of Giant Mine is a misfortune that has coloured the public opinion of a productive site, a shift in attitude that would be better directed towards shaping future industry practices.

Figure 2.4: *Sign from the 1992 Miner's Strike*

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CHAPTER 3

Figure 3.1: [Previous Page] Priscilla Hwang,
INAC Thermosyphons,

DESIGN PRECEDENTS FOR EXTRACTION SITES

In order to visualize and propose an alternative, design-based approach to reclamation this thesis must first analyze existing projects to differentiate between strategies that are effective and problematic. This will serve as a precedent-based foundation for designing in extraction contexts and articulate the unique challenges facing a proposal for the Giant Mine site. The following paragraphs will examine four projects with different approaches to post-mining land use and reclamation through a design lens. The projects evaluated are *The Eden Project, The Brick Ring Pit, The Allmannajuvet Zinc Mine Museum* and *Freshkills Park.*

CASE STUDY ANALYSIS

The Eden Project is an educational conservatory complex in Cornwall, England designed by Grimshaw Architects[1]. The design is comprised of a series of geodesic biomes surrounded by lush, meticulous landscaping nestled in the basin of a former china clay pit. Since opening in 2001 the project has become increasingly popular and is frequently touted as a poster child for successful post mine closure design.[2] At face value *The Eden Project* is idyllic with its creative use of existing mine topography, surging profits and reputation as an oasis of education and leisure.[3] All these characteristics make the project a strong precedent for context specific massing, placemaking and economic viability in former mining sites but also present a misleadingly shiny image of a complex and potentially problematic setting. The reality of any mining site is that they have some enduring history of ecological damage and sociocultural impacts. This complexity is not addressed in *The Eden Project* and is considered a necessary factor in this thesis.

The Brick Ring Pit is an environmental interpretive centre and outdoor exhibition in Sydney Olympic Park, Australia. The structure was designed by Durbach Block Architects in 2005 as an educational and experiential armature within an extracted landscape.[4] The project features a large circular elevated walkway suspended above a flooded former brick pit. It also serves as an armature for the conservation of endangered green and golden bell frogs.[5] Although more elegant and provocative in its approach than *The Eden Project* this design also succumbs to the rote beautification and sensational portrayal of a post-mining site. *The Brick Ring Pit* is a compelling precedent for intervening delicately upon the landscape and the creative use of programming. It also has the added benefit of embracing and expressing some of the site's history through design though this notion could be pushed further. Unfortunately, this precedent addresses a quarrying operation which lacks the complex toxicity concerns of base metal mines like Giant. It also neglects to address the critical sociocultural dynamic of mining.

The third precedent is *The Allmannajuvet Zinc Mine Museum,* a building complex along a tourist trail in Norway, from the office of Peter Zumthor.[6] The design consists of three modest black buildings: two perched on stilts and one hanging from a stone wall dispersed across the rocky post-mining landscape. The former buildings house a mining history museum and a café, and the latter is solely for services.[7] Zumthor expressed that he wanted the design to convey "the drudgery" and "strenuous everyday lives" of the

Figure 3.2: *The Eden Project by Grimshaw Architects*

Figure 3.3: *The Brick Pit Durbach Block Architects*

Figure 3.4: *The Allmannajuvet Zinc Mine Museum by Peter Zumthor*

mine and its workers.[8] This intention speaks to the project's consideration of the site's sociocultural identity and extractive history. *The Allmannajuvet Zinc Mine Museum* is beautifully evocative of its nuanced context and embraces the dark sublimity of post-extraction landscapes. The one major complication of this project as a precedent is the site's mining operations ended in 1898,[9] giving the land over a hundred years to heal before development. Therefore, this project lacks some of the ecological concerns that are present on most contemporary post-mining sites.

The most comparable precedent is *Freshkills Park,* a multi-use masterplan for the world's largest landfill located on Staten Island, New York. Similar to Giant Mine, *Freshkills* is a contaminated former industrial site of almost identical size with over 2000 acres of land.[10] The finalized master plan was designed by landscape architecture firm Field Operations and proposes a zoned, phased plan to manage the vast scope of the site, a strategy that is directly applicable to the complex nature of Giant. Field Operations' scheme addresses and balances ecology, infrastructure and programming considerations, three pressing areas for the Giant Mine remediation. Specifically, the *Freshkills* masterplan proposes regreening and habitat restoration, a multi-faceted circulation strategy and various cultural and recreational programs.[11] The key discrepancies between *Freshkills* and Giant Mine is the former is substantially less contaminated and is not actively involved in Indigenous relations and title. The *Freshkills* proposal also falls into the same traps as many other masterplans: the problematic simplification of complex issues such as industrial contamination and the related premise that regreening and recreational programming are the designer's universal solution for reclamation.

Figure 3.5: *Freshkills Park by Field Operations*

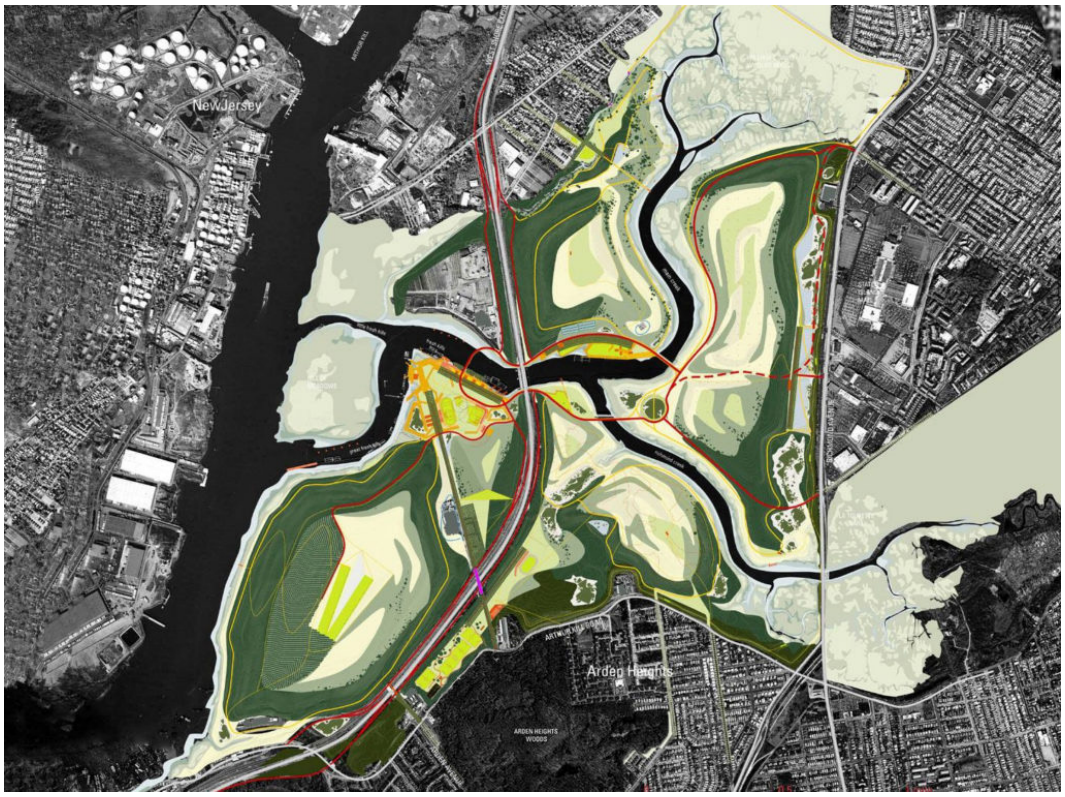


Figure 3.6: *Freshkills Park Masterplan by Field Operations*

These precedents help bring substance and form to the concept of alternative and value-added reclamation practices. They illustrate the architectural and placemaking potential of mining sites post-closure and articulate some of the challenges these settings inherently create. The precedent analysis has also demonstrated the importance of context in post-mining environments. The legal and architectural contextualization of reclamation and post-mining landscapes presented in this first part of the chapter provide an appropriate foundation to now address the specific context and history of the Giant Mine site.

ENDNOTES

1 "The Eden Project Masterplan," Grimshaw Architects, https://grimshaw.global/projects/the-eden-project-master-plan/

2 John Sandlos, Arn Keeling, "Zombie Mines and the (Over)burden of History" *The Solutions Journal* 4*,* No. 3 (2013): 80-83.

3 Grishaw, "The Eden Project."

4 Durbach Block Architects, "The Brick Ring Pit," Landezine, published January, 30th 2012, http://landezine.com/index.php/2012/01/the-brick-pit-ring-by-durbach-block-architects/

5 Durbach Block Architects, "The Brick Ring Pit"

6 Amy Frearson, "Peter Zumthor creates buildings on stilts for tourist trail at a Norwegian mine," Dezeen, published June 10, 2016, https://www.dezeen.com/2016/06/10/peter-zumthor-architecture-wooden-buildings-on-stilts-tourist-trail-norway-allamannajuvet-mine/

7 Frearson, "Peter Zumthor."

8 Frearson, "Peter Zumthor."

9 Frearson, "Peter Zumthor."

10 Field Operations, "Freshkills Park: Lifescape Draft Masterplan," (March 2006).

11 Field Operations, "Freshkills Park."

CHAPTER 4

Figure 4.1: [Previous Page] David Brosha,
Giant Mine Townsite,

COMMUNITY PLAN & DESIGN TACTICS

Building on the contextual foundation and sociocultural exploration of the previous sections this chapter articulates the author's design proposal for the Giant Mine site. A thorough synthesis and analysis of background research forms the basis for the design approach which is outlined in the following pages. The chapter starts with a detailed account of the site conditions as they pertain to design considerations, this is followed by a description and accompanying rationale of the design proposal in both concept and application. Finally, the design decisions are reviewed and extrapolated to prospective scenarios and similar cases. This will ground the proposal in the larger context of abandoned mines and the future of extractivism. The design devices discussed in this chapter are proposed as placemaking and reconciliatory strategies rather than technical solutions and are based on historical and community research.

BACKGROUND AND SCOPE

Giant Mine sits on an over two-thousand-acre tract of land at the base of the Ingraham trail, a roughly seventy-kilometer-long stretch of road known for its scenic vistas and ample recreation opportunities. The site is approximately four kilometers long north-south and almost two kilometers across. Giant's orebodies sit within the Yellowknife Volcanic Belt which forms the edge of the Yellowknife Metasedimentary Basin.[1] This Precambrian geology, better known as the Canadian Shield, manifests as a rocky, dramatic terrain, populated by small lakes, coniferous trees and other robust plants. This distinctive landscape is evocative of Yellowknife's continental subarctic climate as it rests about four hundred kilometers south of the tree-line, which combined with its location along Great Slave Lake results in warm, frost-free summers providing respite from the prolonged, frigid winter months.[2] Long summer days that stretch into night sit in stark contrast to the dark, arctic winters only broken by impressive displays of northern lights. The Giant Mine property is framed by two bodies of water, Great Slave Lake which dominates its eastern border and the historically significant Baker Creek which meanders through the central mine workings, exposing it to contamination and degradation.

Yellowknife is in the 0a plant hardiness zone,[3] making it one of the toughest climates for growing and limiting the number of plant species typically found. Some common local plants include spruce, pine, sedges and some wildflowers and shrubs. On a whole the northern Great Slave lake region is exceptionally biodiverse, though ecologically fragile due to the unforgiving climate. This delicate environmental balance has been severely disrupted in and around Giant Mine as a byproduct of its operations. Historically, the site was home to a variety of species including snowshoe hares, wolves, caribou, mink, bear, grouse and whitefish. Extraction and pollution have obstructed migration paths and directly contaminated a number of these species.[4]

North Great Slave Lake's characteristic undulating topography and harsh climate form the foundation of a sublime landscape punctuated by rugged expanses of weathered rock, hardy pine trees and dark, glassy lakes. This raw wilderness has sustained and grounded the Dene people for centuries and captivated visitors and artists alike with its

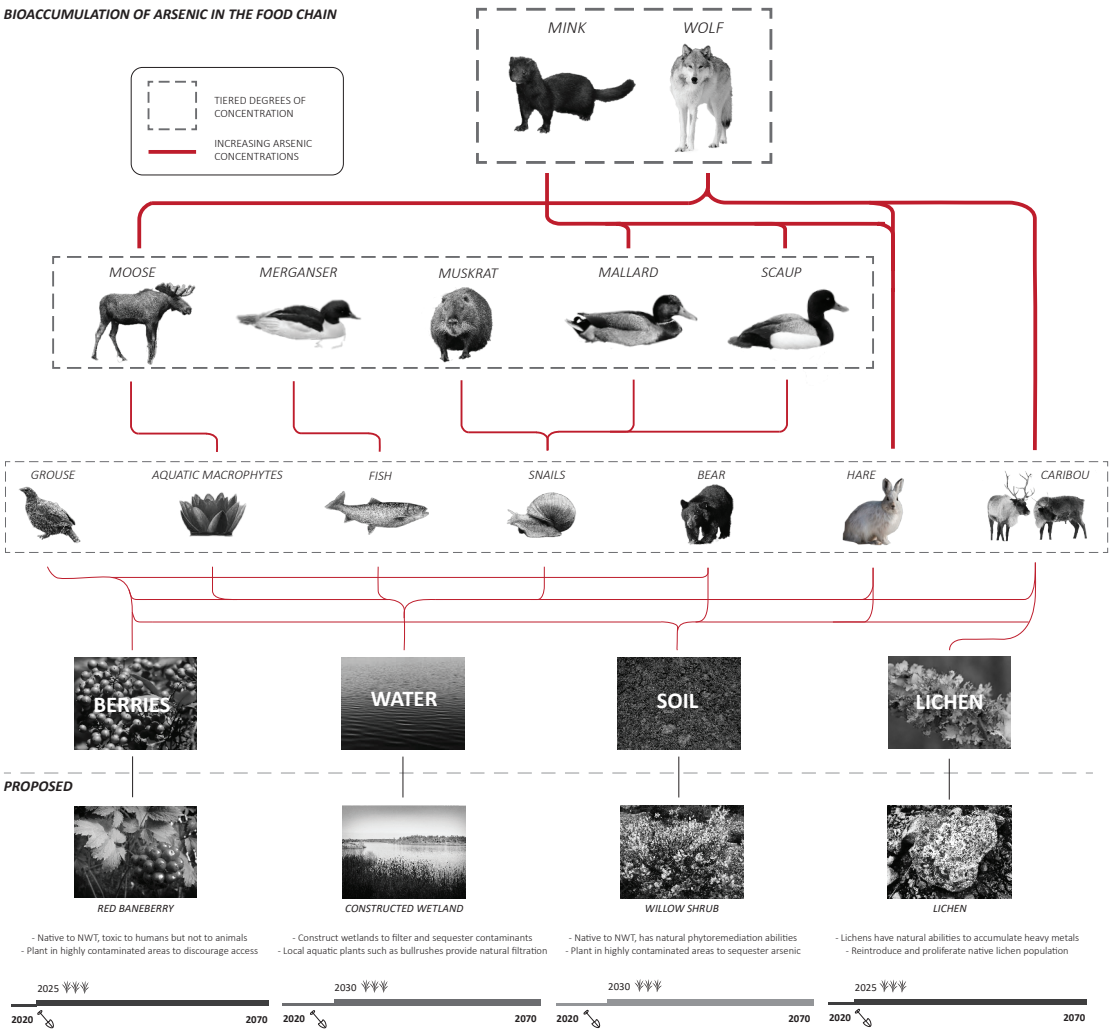


Figure 4.2: *Giant Mine Ecology and Bioaccumulation Diagram*

beauty. Yellowknife and the Giant Mine site interrupt this austere yet fragile landscape with dynamite blasted rock, contextually inappropriate developments and the insidious threat of arsenic contamination.

The Giant Mine site can be divided into four major areas: the centrally located B and C-shaft complexes, the band of open pits that run to the west of this, the tailing ponds to the north and the townsite at the southernmost edge. There are three shafts ranging from 750' to 2000' in depth and eight open pits scattered between them, a product of nearly fifty five years of continuous excavation.[5] The four tailing ponds account for approximately 16 million tonnes of waste material, enough to cover three hundred football fields.[6] Furthermore, the mine hosts some one hundred buildings in various states of dilapidation, some of which have already been dismantled by the government due to safety concerns.[7] This includes the roaster complex and the A and B shaft headframes. These extensive workings and infrastructure amount to a devastating yet immeasurable scar upon both the landscape and the community.

Figure 4.3: *Yellowknife Landscape*

Figure 4.4: *Yellowknife Country, Northwest Territories by A.Y. Jackson*

The other obvious safety concern and design consideration is the arsenic trioxide, whose sequestration and management are not the expertise of the author and therefore will not be addressed in these terms in the proposal. Instead, the contamination is a baseline and omnipresent consideration in the design and a determining factor in the areas of site accessibility and wayfinding. The current frozen block arsenic containment plan was chosen as a best-case scenario following years of in-depth study of several possible solutions conducted by field experts,[8] consequently it will be the assumed method for this design proposal. This strategy consists of using thermosyphons to freeze the arsenic in place in existing mining chambers, using the natural cooling abilities of the ground.[9] The thermosyphons will create a significant visual footprint on the site, with their relentless numbers and mass defining whole swaths of the landscape for the indefinite future.

This indeterminate timeline for the arsenic management plan raises another critical issue for site planning, the current frozen block method requires maintenance in perpetuity.[10] This means that the design proposal must be both forward thinking and adaptable to accommodate a variety of potential futures. Adaptability is also critical due to the controversial and everchanging views towards Giant Mine. Some of the more prominent perspectives on the site were outlined in the previous chapter but are not representative of the whole spectrum of perceptions concerning Giant.

To date, the Giant Mine Remediation project has dismantled a number of high-risk structures, implemented a freeze optimization study testing thermosyphons and completed a number of site maintenance and clean up tasks in relation to the site stabilization plan.[11] The outstanding reclamation activities are predominantly related to freezing the remaining arsenic, soil remediation and capping the tailing ponds.[12] Other site conditions to note include the highly trafficked Yellowknife Bay Marina at the southern border of the site and the Yellowknife Historical Society proposed museum location in the same area, both of which are of community interest. The subsequent site following remediation will certainly be safer, but it will also be barren save for fields of thermosyphons and endless miles of fence, an unnecessarily desolate end for such a significant site.

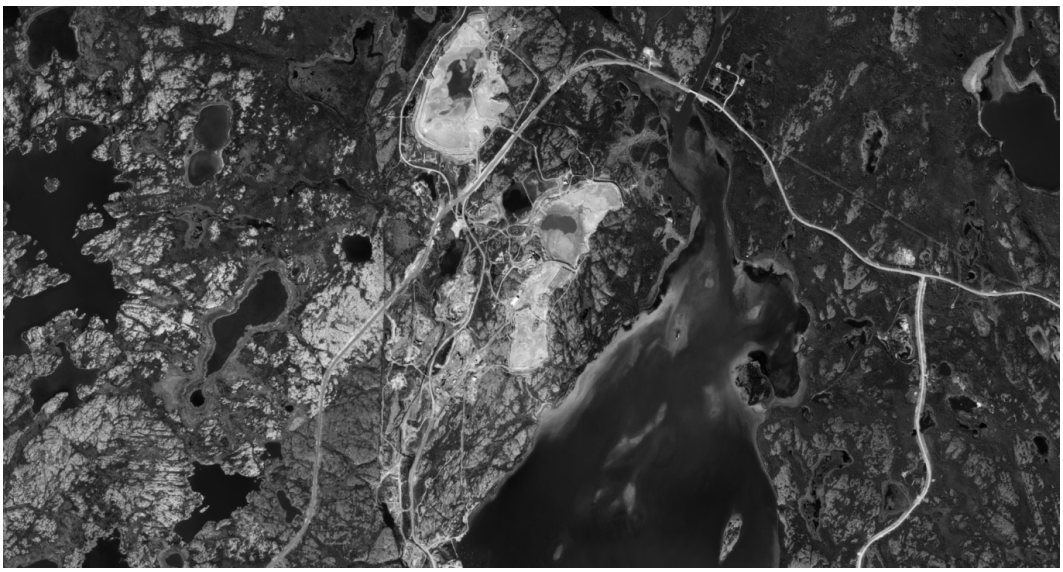


Figure 4.5: *Aerial View of Giant Mine Site*

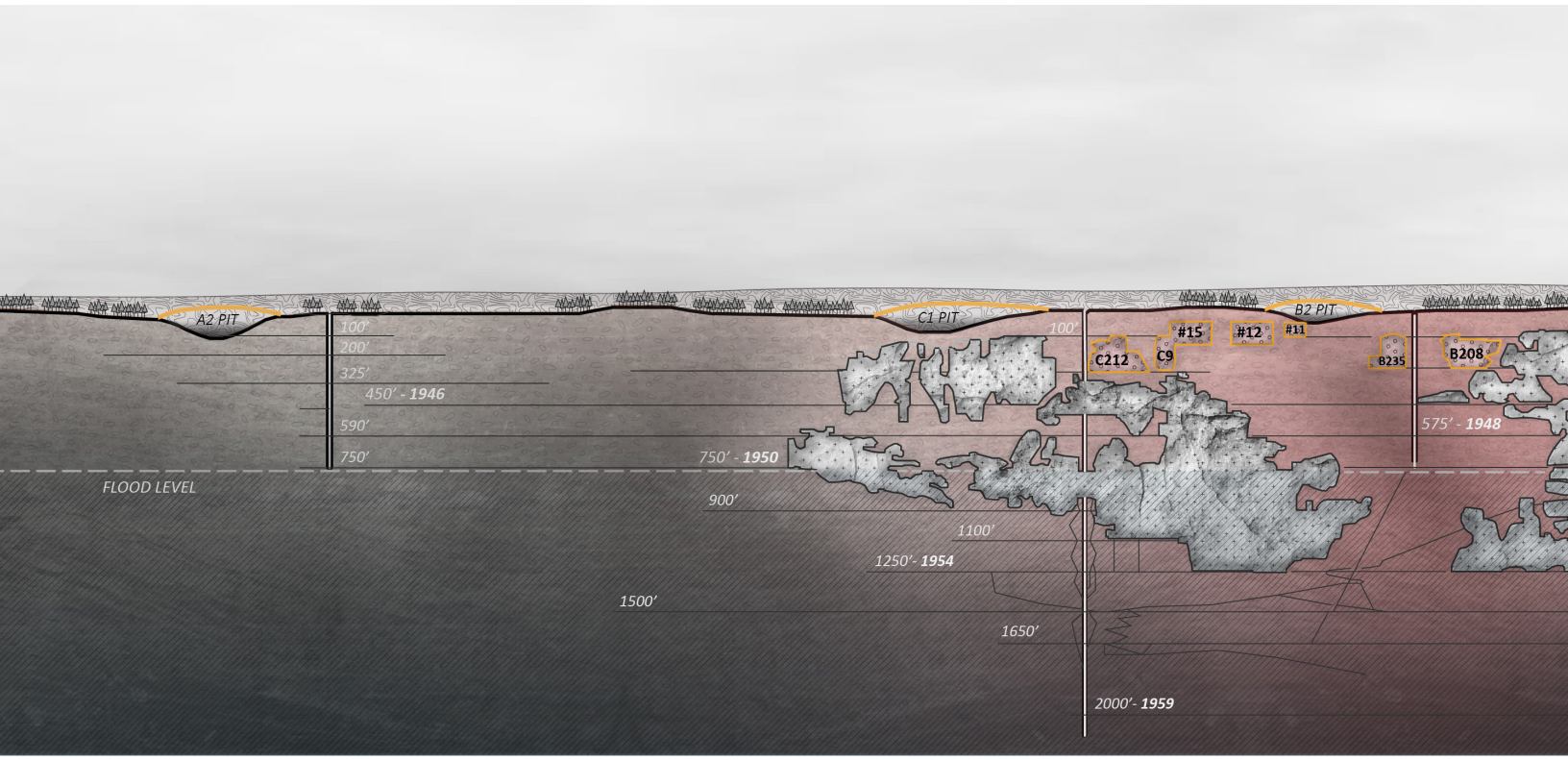
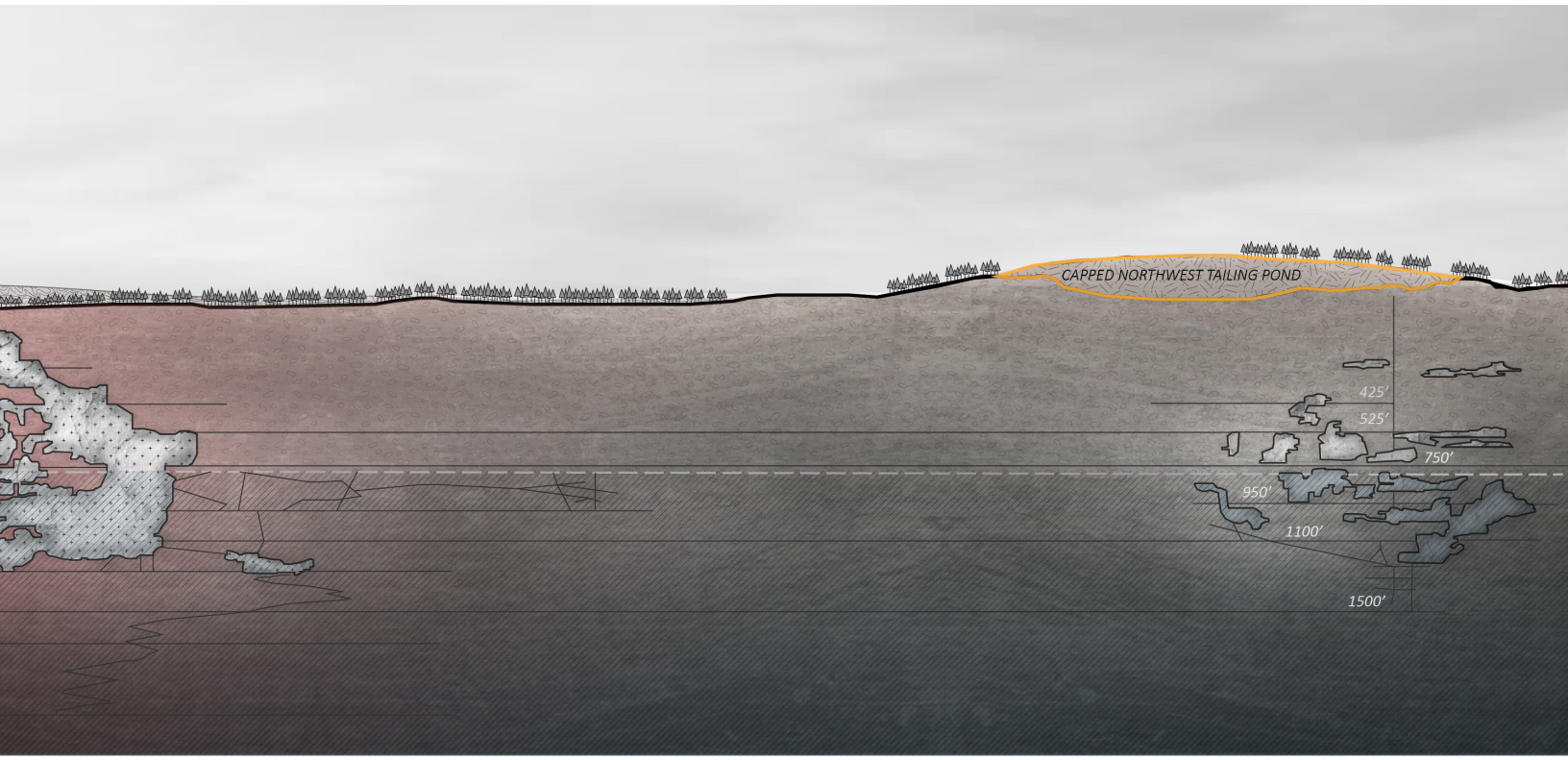


Figure 4.6: *Site Section showing Mining Stopes*


CAPPED NORTHWEST TAILING POND
425'
525'
750'
950'
1100'
1500'

DESIGN PROPOSAL

This thesis proposes an alternative future for Giant Mine as a site of transition, reconciliation and learning. Giant is a truly complex and fragmented site with a myriad of competing interests and a host of seemingly unsolvable problems. Consequently, it is unrealistic to imagine that a conventional masterplan, conceived as a discrete and overarching ideal would be successful when imposed on such a dynamic and complicated site. Instead, this proposal is modest in scope and humble in its aims, endeavoring to tread lightly on the site and only intervene to acknowledge or amplify stakeholder narratives. The proposal is also intended to work in concert with community interests allowing design elements to adapt to and accommodate changing demands and conditions. This is also in response to the indeterminate time scale of the site and the imperative for perpetual care. As a result, the proposal opts for a slow and graduated implementation of its components except for actions that have been deemed urgent and universal by the community. As the design is intended to be part of a process of reconciliation with local Indigenous populations and increasing awareness of the problematic realities of mining, it is deliberately open-ended, operating for whatever period it is in the interest of the site and community.

In the context of this thesis this involves the proposal of several design interventions that can be deployed in combination across the site over time to establish varying site narratives and allow people to safely and conscientiously interface with the site. The design interventions were developed based on their ability to represent or assist different stakeholders while navigating some of the challenges of the site. To clarify and rationalize the overall design each of the interventions meet at least one of five action-based design criteria: rehabilitate, block, connect, recognize and shelter. These criteria, although simplified, are representative of the recurring issues discovered in the author's investigation through site analysis, historical research and community interviews. Each of the site design criteria though clear on their own also have more nuanced, evocative interpretations.

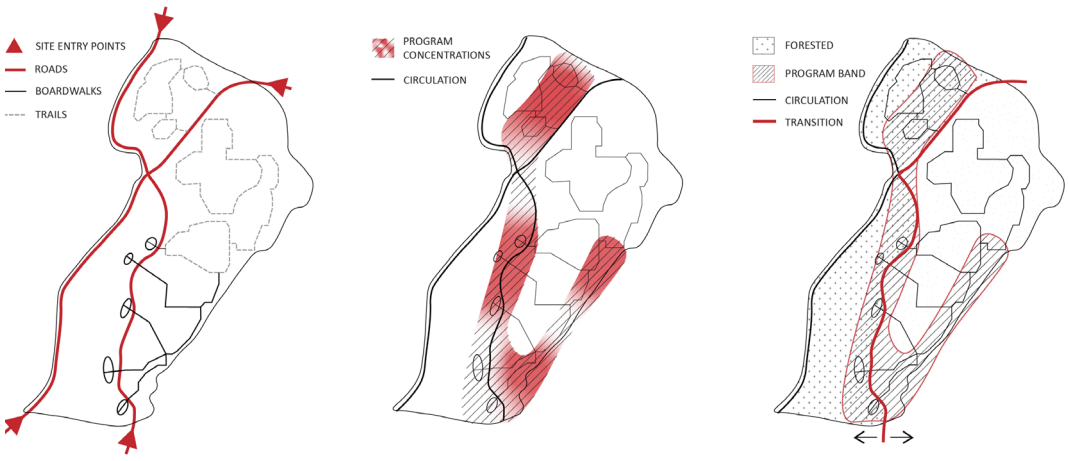


Figure 4.7: *Site Diagrams*

LEGEND

- *OBSTRUCTION*
- *ROAD*
- *BOARDWALK*
- *TRAIL*

DESIGN DEVICES

1. TRANSIENT MEETING SPACE
2. MARINA
3. RESEARCHERS IN RESIDENCE
4. OPEN PIT VIEWING PLATFORMS
5. SITE INTERPRETATION PAVILION
6. BOARDWALKS
7. REFORESTATION
8. RETROFITTED MINING INFRASTRUCTURE
9. ARSENIC WARNING SYSTEM
10. LAND ART INSTALLATION
11. MINER'S MEMORIAL
12. CAPPED TAILING PONDS
13. WALKING TRAIL
14. TRADTIONAL BURIAL GROUND
15. CEREMONY CIRCLE

Figure 4.8: *Community Plan*

RECLAMATION

DESIGN DEVICES LEGEND

Rehabilitate

Block

Connect

Recognize

Shelter

TRADITIONAL BURIAL GROUNDS

ARSENIC WARNING SYSTEM

MARINA

SITE SPECIES CATALOGUE

- Temporary community meeting building erected

TRANSIENT MEETING SPACE

PHYTOREMEDIATION

RETROFITTED MINING INFRASTRUCTURE

CAPPING AND EARTHWORK

REFORESTATION

BOARDWALKS

RESEARCH CENTRE

DIGITAL BROADCASTING

Community Site Visit

Planting

Researcher Residences

Rehabilitate, Connect, Shelter

Rehabilitate, Block

2021

Rehabilitate, Block, Connect, Recognize

2032

2044

Reclamation and Reconciliation

2020

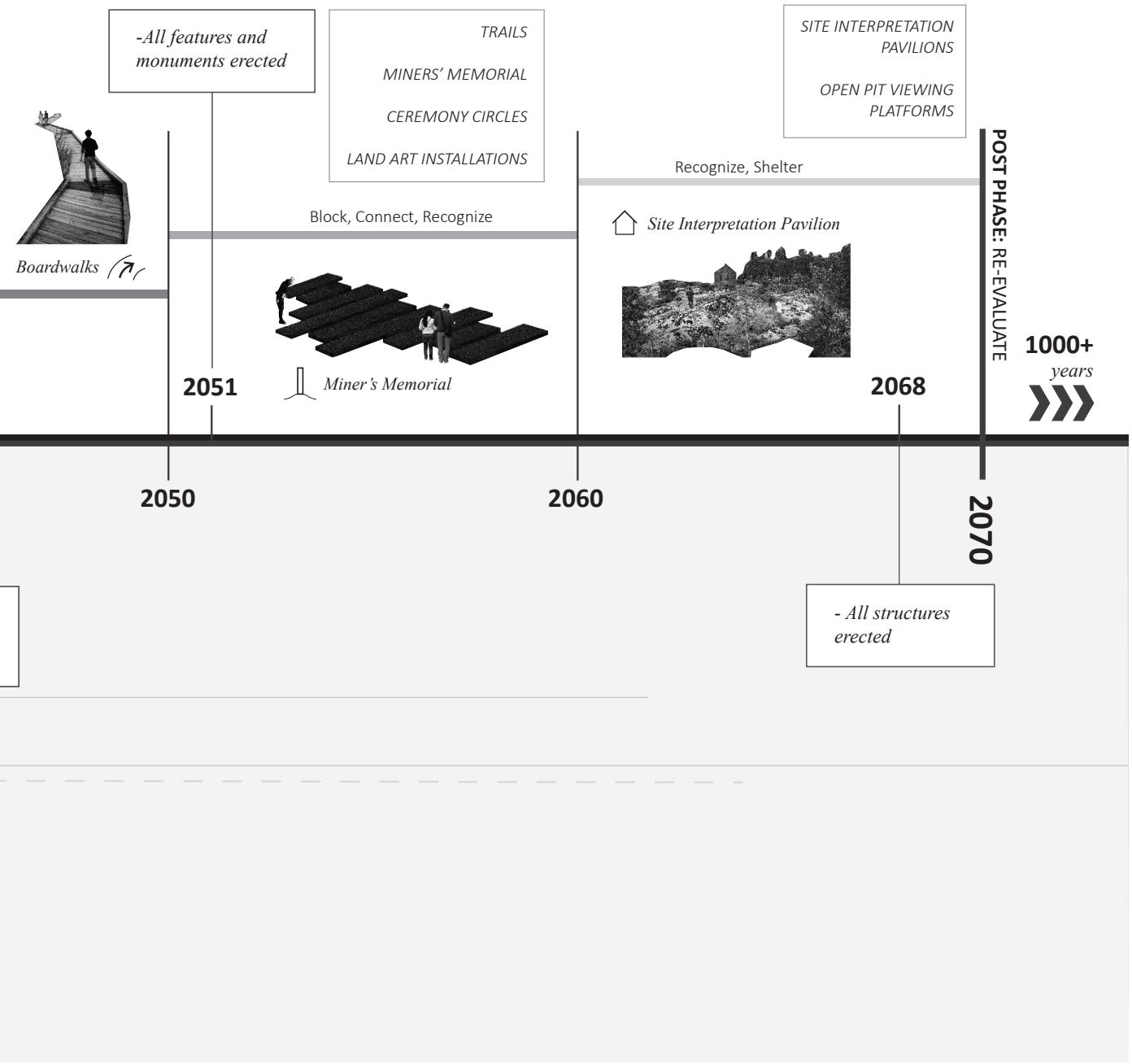
2030

2040

-Comprehensive site catalaloguing completed

- Access points and circulation completed

Figure 4.9: *Giant Mine Reclamation Proposal Timeline*



Rehabilitate

Rehabilitate is conventionally defined as returning something to its previous condition or restoring someone to health. Both definitions can be applied to the context of Giant Mine, the former as the necessity to restore the ecology to its original state and the latter as the desire to heal the community and landscape of its physical and psychological scars. Interventions that meet this criterion range from fulfilling conventional reclamation goals of cleaning up and repairing mining remnants to tackling the conceptual and elusive goal of repairing community relations.

Block

As a design criterion there are three applicable definitions of the word block. The first is an obstacle stopping the normal advancement of things, the second is preventing flow or movement in a specific location, and the third seemingly unrelated definition refers to the act of planning where actors will move in space during a scene. These three descriptions when considered in concert paint a vivid image of how the block criterion might manifest itself on the site. At a high-level blocking interventions are meant to choreograph the movement of people across the site in an unobtrusive way that ensures dangerous, contaminated or sensitive areas remain inaccessible to the public. Most of these interventions are landscape based, allowing them to be integrated and respectful of the site.

Connect

Connect has many definitions but the commonality between them is the bringing together, linking or relating of disparate things. This is relevant at multiple levels in the proposal improving connectivity both physically and visually across the site and ideally amongst various members of the community through their shared stewardship of the Giant property. Generally, connecting interventions improve circulation and grant controlled access throughout the site in a way that upholds the safety of visitors and is clear to navigate.

Recognize

The most important definition of recognize for this proposal is the acknowledgment of the presence, legitimacy or legality of something. In the context of Giant Mine acknowledgment is a critical part of the reconciliation process, it's also an effective method of validating and amplifying community narratives. In the proposal *recognizing* interventions manifest as installations or demarcations upon the land that refer to historical events or ongoing activities that are significant to the development of the site or may otherwise be marginalized.

Shelter

The definition of shelter that is most appropriate in the context of a Giant Mine site proposal is a place that provides temporary protection from inclement weather or hazards. This is the primary purpose of the shelter criterion, to provide some form of physical protection from the harsh Yellowknife climate by mediating the wind, snow and sun in key locations, particularly near interventions that encourage visitors to congregate or spend time engaging with them.

These design criteria form the basis of the plan and inform the interventions proposed. The term design interventions is used to cover the wide range of built, ecological and conceptual strategies that are included in the proposal. There are eighteen design interventions that serve five stakeholder groups. These groups are Indigenous peoples, Yellowknifers, miners, researchers and visitors. Indigenous peoples refers to the YKDFN whose traditional land includes Giant Mine as well as the North Slave Metis and other aboriginal peoples in the region. Yellowknifers is the term used for the people who live in the City of Yellowknife, of mixed background but predominantly settlers. Miners refers to individuals who worked at Giant Mine or are part of the mineral industry in the Northwest Territories. Researchers includes scientists, stewards or other individuals studying the site for educational or professional purposes. Finally, visitors refers to people who are not local and are either tourists, business travelers or visiting friends and family and come to the site for educational or recreational purposes. The core goals of this proposal are to address the specific sociocultural ramifications of the mine and position Giant as the nucleus of a new pedagogy of extraction without impeding on the potential for further reclamation in the future. The design interventions are described in detail over the following pages.

DESIGN SYMBOLS

Rehabilitate - 

Block - 

Connect - 

Recognize - 

Shelter - 

Figure 4.10: *Community Cataloguing Site Visit*

Site Species Catalogue

This intervention is proposed as one of the first actions in the plan as an opportunity for community members of various backgrounds to come together and document the ecology of the site. Detailing the flora and fauna species prevalence on site would further quantify the environmental damage caused by Giant and clarify the road map for future reclamation activities while enabling knowledge sharing and a sense of shared responsibility among stakeholder groups. This is particularly significant for the Yellowknives Dene as an opportunity to share their traditional knowledge of the site and advocate for land stewardship practices while advising on reclamation directives for the site.

Figure 4.11: *Temporary Meeting Structure*

Transient Meeting Space

This intervention is deliberately elusive in nature as its core intention is to provide a neutral space on the Giant Mine property for stakeholder groups to discuss controversial issues and competing interests surrounding the site's reclamation. As the structure is meant to represent and support various community groups its details can not be prescribed by an observer. For the purposes of this proposal only its general characteristics are fixed: the meeting space should be a modest, impermanent structure built by the community for the community as a physical representation of its constituents and their reconciliatory efforts. Since the space is intended for conversations surrounding the reclamation it may need to adapt in response to dynamic site and cultural conditions, ideally the structure will eventually be dismantled once the community has reached a consensus on reclamation efforts.

Figure 4.12: *View Towards Revitalized Marina*

Marina

The Marina is an existing location at the southern end of the property where the steep rock face demarcating the edge of the townsite relents and slopes down into Great Slave Lake. It belongs to the city and currently provides crucial water access for local residents, a rare occurrence due to the precipitous topography and largely privatized land in Yellowknife. This access will be maintained and improved as a key point of connectivity between the land and water, a critical action for Indigenous conceptions of land and to the recreational benefit of the larger local population. Established water access also provides an opportunity for research and education initiatives surrounding the effects of arsenic uptake in water on bioaccumulation and potability concerns.

Figure 4.13: *Retrofitted Giant Mine Townsite*

Research and Stewardship in Residence

This intervention proposes to retrofit the existing Giant Mine townsite into a research and stewardship community. This would entail the renovation of the single-family homes into accommodations for researchers and stewards in residence while converting the service buildings into research facilities. This intervention though unorthodox in nature enables the comingling of competing stakeholder interests by redeveloping land of great financial value while fostering a critical culture around extraction and promoting land stewardship practices. The intervention also affords Indigenous peoples employment opportunities and the chance to re-establish relationships with the land as stewards. Creating a research community at Giant Mine could also facilitate increased public awareness of the realities of extraction and the need for industry reform.

Figure 4.14: *Research Recording for Digital Broadcast*

Digital Broadcasting

This intervention dovetails with the previous one to increase exposure for the Giant Mine site at the scale of the global community. Research, reclamation and stewardship efforts on site would be digitally streamed to a broad audience promoting a new, transparent pedagogy surrounding extraction and reclamation. Currently, Canadian mines in operation or being reclaimed are inaccessible to the public due to safety concerns and the evasive nature of the mineral industry, this only serves to further shroud mining practices from society protecting them from critique. Digitally broadcasting site activities makes them universally accessible and encourages collective conversations and critical analysis of extraction. This is particularly important as Giant is emblematic of many abandoned industrial sites across Canada that must be illuminated to prevent their recurrence.

Figure 4.15: *Open Pit Bridge*

Open Pit Viewing Platforms

It is conventional practice in mine reclamation to either fill in surface mining pits or leave them open and fence them. Neither of these approaches is particularly compelling as they seem to ignore the scope and reality of physical damage to the landscape while simultaneously being unable to fully restore the land to its original condition. This intervention proposes that pits be left open and grant controlled access to them as a pedagogical tool, enabling visitors to view and recognize the scope and repercussions of mining operations. This necessitates the realization of a series of bridges and platforms spanning the lengths of the central open pits on site. They are conceived of as light airy structures formulated of exposed steel, representative of both the fragility of landscape and the austerity of industry. Furthermore, the transparency of steel gratings would allow for unimpeded views of the pits in their entirety as they gradually flood in the absence of drainage.

Figure 4.16: *Site Interpretation Pavilion*

Site Interpretation Pavilions

The site interpretation pavilions are the most architectural element of the proposal, creating a series of modest, well-considered structures at key locations across the site to establish a sense of design continuity and wayfinding. The primary purpose of these pavilions is to provide additional information about various site narratives and interventions, giving physical credence to the accounts and histories of community stakeholders. The pavilions are designed with consideration for Indigenous vernaculars taking inspiration from the Dene caribou lodge giving them their nonhierarchical form and tessellations. They will be constructed out of simple, local materials, predominantly plywood with minimal steel frames for support. Community narratives and wayfinding information will be laser cut into the wood panels for ease of integration. These structures are intended to be simple and transient in nature, constructed by the community as employment and knowledge sharing opportunities that offer moderate shelter to site visitors and can be easily disassembled if impeding on future reclamation work.

Figure 4.17: *Boardwalk*

Boardwalks

Boardwalks are the primary form of circulation in the proposal, they will provide comprehensive, controlled access to large areas of the site. Delaminating the circulation from the ground will allow visitors to safely view and contemplate contaminated and sensitive areas of the site while also improving wayfinding. Obtrusive, native plantings will grow along the edge of the boardwalks to discourage visitors from departing from the path without the need for restrictive and conspicuous fencing. The boardwalks will be constructed out of a combination of locally sourced wood and steel grates in homage to the temporal and industrial aspects of the site and allow for easy disassembly to accommodate any future reclamation work.

Figure 4.18: *Willow Shrub*

Phytoremediation

This intervention appeals directly to the community's desire to heal the Giant Mine landscape of its contamination and defacement. It proposes that plants with natural bioremediatory properties be planted throughout the site to help sequester arsenic and other mining contaminants while improving flora prevalence on the property. Some native plants with known phytoremediatory abilities include willow shrubs and lichen which can be implemented in forested areas, and bulrushes which will form a critical part of a constructed wetland along the shore of Yellowknife bay. The wetland will help to manage arsenic uptake in the bay - a potential pathway for water supply contamination - and foster biodiversity in aquatic ecosystems.

Figure 4.19: *Area Undergoing Reforestation*

Reforestation

Reforestation incorporates elements of the phytoremediation intervention as part of a larger ambition to rehabilitate swaths of the site and effectively restore them to their natural state. This will be a long process with a potentially unattainable end, but a critical part of this activity is the preliminary reforestation and regreening of the site. This intervention is specifically proposed for the Western half of the site as its inland location and minimal development make it ideal for reforestation. This will include the gradual reintroduction of a variety of native plant species starting with coniferous trees and lichens in an effort to combat habitat loss and heal the landscape while allowing unprogrammed recreation.

Figure 4.20: *Retrofiited Mining Infrastructure*

Retrofitted Mining Infrastructure

This intervention is a proposal to stabilize and retrofit the existing mining buildings and infrastructure associated with the C-shaft complex as a pedagogical tool. Local creatives will be invited to submit proposals for installations and retrofits for the buildings that will encourage visitors to engage critically with the mining history of the site while blocking public access to the contaminated, dilapidated buildings. One proposal is to create metallic shrouds for each of the buildings that obscure their appearance and evoke the elusive yet severe nature of the mineral industry. This intervention will allow for the partial preservation of the infrastructure in the interest of some members in the mining community without glorifying the wide-ranging exploitation caused by Giant Mine.

Figure 4.21: *Red Baneberry*

Arsenic Warning System

This intervention is designed to fully embody the block design criterion by choreographing the movement of people through integrated, landscape-based strategies. The arsenic warning system will consist of native plants with naturally toxic properties planted in areas with high arsenic contamination levels to warn and discourage site visitors from these locations. Plants such as the red baneberry are common in the Northwest Territories and are toxic to humans while remaining safe for animal consumption. Their bright red berries are distinctive and characteristic of conventional warning signs in colour. Fields of red baneberries scattered between the thermosyphons will create a foreboding scene, starting to answer the Dene posed question of how to communicate the dangers of the site to future generations. This proposal leverages natural phenomena and inherent community knowledge to create a warning system with realistic implementation and compliance.

Figure 4.22: *Migration Pattern Land Art Installation*

Land Art Installations

This intervention is wholly about recognition and acknowledgment in its design intent, it proposes a series of artistic installations manifested as markings upon the land evocative of various community narratives. These land art works would serve as pedagogical tools documenting the histories of the landscape and its people for the reference of locals and visitors alike. They will be located strategically across the property in elaboration of different site stories. One proposed installation would demarcate the migratory paths of animals that historically inhabited the site using bound branches to create extensive serpentine forms along the landscape. This work would draw upon Indigenous traditional knowledge of the land and provide a boundary between accessible and inaccessible regions of the site.

Figure 4.23: *Miner's Memorial*

Miner's Memorial

This intervention is proposed to honor the nine miners who died in the 1992 strike explosion. This was a pivotal event in Giant Mine history that permanently altered its public perception and was ultimately the product of relentless profit driven pressure from ownership. A miner's memorial would not only recognize the miners' untimely deaths but would also serve as a reminder of the effects of purely capital interests in the mineral industry. The intervention proposes a modest memorial composed of nine black granite slabs laying in a simple configuration on the ground near the central c-shaft complex. Over time the memorial would become integrated with the landscape with the growth of plants and during the winter snow.

Figure 4.24: *Capped Northwest Tailing Pond*

Capping & Earthwork

Tailing pond capping and earthwork are a critical part of the conventional remediation process but in this proposal, they take on an alternative approach. Capping and earthwork will be treated both as rehabilitative and land art strategies, this means that capping will be done in a conspicuous way as a commentary on the substantial scale of the tailings that Giant left behind. At the north pond, the existing shipping containers filled with debris from the roaster will be used in conjunction with earthwork to create a dramatic ascending hill from which visitors will be able to see the entirety of the site and realize its vast size and scope.

Figure 4.25: *Hiking Trail*

Trails

This is a connecting intervention designed to improve site accessibility and connection to the land. Trails will allow the Yellowknives Dene to go out on the land and support their reestablished relationship with the site while allowing some amount of recreational use. Trails will be created as the primary form of circulation in areas with low contamination levels and where other interventions require direct access.

Figure 4.26: *YKDFN Burial Ground Memorial*

Traditional Burial Grounds

This intervention is designed to start to address the complex and nebulous issue of Giant Mine's impact on the Yellowknives Dene people. At its most basic this intervention is a physical marking of the presence of traditional burial grounds on the site according to the historical accounts of the Dene. At a deeper level it will be representative of all the Indigenous lives impacted or lost because of Giant Mine and act as a witness to the mine's history of dispossession and exploitation. This intervention will be manifested as a field of scattered boulders each of unique character sitting within a clearing in the forested northwestern corner of the site. Each boulder will be representative of an Indigenous life and is evocative of some aboriginal burial ground marking practices.

Figure 4.27: *Ceremony Circle*

Ceremony Circles

This intervention will work in conjunction with the former to help reestablish an Indigenous relationship with the site. Ceremony circles will provide the Yellowknives Dene and other Indigenous groups the option of using the Giant Mine site for their traditional use such as drum circles and other ceremonial practices. This intervention will help to validate the Giant Mine site as part of the ancestral lands of the YKDFN, a critical step in the reconciliatory process. The ceremony circles will exist as clearings in the forest whose edges will be demarcated by rings of boulders suitable for any traditional use that Indigenous groups are comfortable using it for.

ANALYSIS AND APPLICATIONS

This proposal is devised as a case study for alternative post-closure strategies for abandoned mines with the intention that the basic design principles can be applied universally to mining settings. Specifically, the focus on sociocultural narratives and increasing public awareness of extraction are both widely transferrable and have the potential to make Giant Mine a space for critical thought and action around extraction reform. Central to this thesis is the concept that design can be used as a tool of reconciliation and mediation between competing interests and stakeholder groups. At its end the questions become does this proposal achieve this, what are its constraints and does design really have this potential? The following paragraphs extrapolate these ideas in greater detail and explore ways to push the thesis research further going forward.

During the process of developing this thesis there were several discoveries made about the realities of designing in the multifaceted, challenging context of Giant Mine. The recurring theme of these insights was the need to reevaluate the conventions of the design process, particularly its hierarchical and impositional structure, and to scale back the role of the designer out of respect for the community and landscape. In the proposal this is manifested as a rejection of the formal master plan in favor of a diversified, incremental and minimal approach to site design. This method also allows for grass roots contributions to the plan and easy integration and adaptation by the community. Related to this was the recognition that the proposal is indeterminate in length and impact, both of which are ultimately determined by community acceptance of the plan and the changing requirements of the site over time.

Retrospectively another question has become apparent: are the YKDFN correctly characterized as stakeholders? The Yellowknives Dene are the original occupants of the Giant property which was taken from them without express consent or compensation, violating their aboriginal rights and title to the land. This implies that they are rights holders having a greater entitlement to the land than the other stakeholders previously listed. If taken into consideration this perspective on the Yellowknives Dene's role may illicit some modifications to the design proposal or at least suggest new avenues for future research regarding the Giant Mine site.

The analysis begins to recognize some of the limitations of the proposal, the most significant being the community's confidence and interest in the plan something that has only been established through extrapolation of research in this thesis. Additionally, the proposal is deliberately community and context specific, which is simultaneously an asset for the predicted success of its implementation and a constraint for its ability to be a precedent for other sites. Specifically, interventions like the marina, arsenic warning system, miner's memorial and traditional burial grounds may not be transferrable to other mining sites. Finally, as the proposal is nontechnical in nature the feasibility of some interventions may be brought into question if subjected to a detailed technical review.

Constraints aside, this methodology of post-closure design presents a promising alternative for the future of mining and reclamation. The core objectives of this proposal are to acknowledge the cultural and extractive histories of the Giant Mine site, validate its respective community narratives and to raise public awareness about the problematic realities of extraction in Canada. In conclusion it achieves these aims, at least to the degree that it prioritizes community perspectives and fosters conversation around extraction and what mining practices should be, in the hope that this is a first step towards systemic change.

ENDNOTES

1 Ryan Silke, "The Operational History of Mines in the Northwest Territories, Canada," 2009.
2 Reinhard Pienitz, John P. Smol and David R.S Lean, "Physical and chemical limnology of 24 lakes located between Yellowknife and Contwoyto Lake, Northwest Territories (Canada)," *University of Laval,* 1997, https://web.archive.org/web/20080409145807/http://www.cen.ulaval.ca/paleo/publications/Articles/Pienitz.1997b.pdf
3 "Plant Hardiness of Canada," Natural Resources Canada, January 14, 2017, http://planthardiness.gc.ca/
4 Som Niyogi, "Toxic legacy of Giant Mine found in snowshoe hares," The Narwhal, published June 14, 2018, https://thenarwhal.ca/toxic-legacy-giant-mine-found-snowshoe-hares/
5 Silke, "The Operational History of Mines."
6 "Remediating the Surface of Giant Mine," Indigenous and Northern Affairs Canada, April 13, 2018, https://www.aadnc-aandc.gc.ca/eng/1100100027407/1100100027408#tailings.
7 Natalie Plato, "An Interview with Natalie Plato, Deputy Director of the Giant Mine Remediation Project," interview by Haley Gamble, August 19, 2020.
8 Plato, interview.
9 "Arsenic trioxide and underground issues at Giant Mine," Indigenous and Northern Affairs Canada, April 13, 2018, https://www.aadnc-aandc.gc.ca/eng/1100100027413/1100100027417#arsenic.
10 "Arsenic Trioxide."
11 "Ongoing site management at Giant Mine," Indigenous and Northern Affairs Canada, November 16, 2018, https://www.aadnc-aandc.gc.ca/eng/1340819215801/1340829245644.
12 Plato, interview.

CONCLUSION

As Canada continues to advance its role as a global power in natural resource extraction, many more mines will be developed, and upon depletion of their mineral deposits will require remediation in order to close. Barring radical societal transformation, the existence of these exhausted mines is inevitable, but what has yet to be determined is the nature of how these sites will be reclaimed. Current industry best practices suggest that responsible mine closure is comprised of the decontamination of mining effluent, infill of underground workings and the decommissioning of infrastructure. This thesis challenges that assumption and proposes that mine reclamation should be held responsible to more than just rudimentary government regulations. Contemporary legislation and standards grant mining operations privileges that are disproportionate to their impact with minimal accountability, privileges that are not extended to the rest of the greater community and stakeholder pool.

The design proposal in this thesis endeavors to redistribute some of these powers to grant local communities greater sovereignty over the land through an alternative reclamation process. This raises an important question about what purpose design and the author's discipline of architecture serve in the realm of mine reclamation? As demonstrated in the proposal, design has the capacity to bridge the gap between technical considerations and sociocultural ones, two apparently unrelated criteria that architecture is uniquely adept at balancing. Architecture and design professionals are also practiced arbiters of conflicting stakeholder views, proficient at creating alliances between diverse groups. Additionally, the consultation and design process inherently promote knowledge sharing and increased understanding between community participants. Finally, designers are in essence curators of space with the distinct ability to create place-based narratives, a skill that is applied in the Giant Mine proposal herein by designing a public space that is simultaneously a cautionary tale.

This investigation begins to explore the possibilities for community responsive mine closure design, but despite its opportunities this proposed strategy is not immune to potential setbacks. The most prominent one being reclamation practices are ultimately determined by the mineral industry and government standards, so successfully introducing place-based design mine closure processes would be contingent on both entities' interest and support. Since government and industry also cover the steep costs of reclamation this raises another question of who would pay for the added costs that site design would incur? This is both a potential restriction and an opportunity as the federal government and mining companies are each partially beholden to the general public, the former to taxpayers and the latter to end consumers of mineral based products. This means that the public is able to effectively advocate for more responsible and comprehensive mine closure practices through concerted civil and consumer action. Ideally large-scale societal action would not be necessary to create industry change and the success of a few community responsive design proposals would be enough to prompt companies to reconsider their closure strategies but realistically, further activism efforts may be needed.

The current extraction industry and reclamation practices are a result of a colonial view of entitlement to land and an archaic idea of endless, easy to exploit natural resources in the Canadian North. This thesis challenges these concepts in favour of a decentralized, community-based approach to extraction land management and explores the possibility of

what an abandoned mine could look like following thorough and meaningful consultation that privileges local stakeholder narratives. The systemic abandonment and insufficient reclamation of mines across Canada has failed local mining communities, Indigenous peoples and the environment on a whole. The mine closure process provides an opportunity to not only mediate the impacts of extraction but work towards community reconciliation and increasing public awareness and demand for better mining practices. This thesis begins to imagine the impact of reclamation reform, but this is only an introductory illustration of the potential impact transformation in such a critical industry could have on Canada as a nation.

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APPENDIX: INTERVIEWS

The following pages are a series of excerpts from transcripts of the author's interviews with a number of community members about their experiences and perspectives of Giant Mine. All interviews have received ethics clearance through a University of Waterloo Research Ethics Committee (ORE# 41983). The transcripts are in chronological order of when they were conducted and have been edited for length and clarity.

AN INTERVIEW WITH GORDON HAMRE FROM ALTERNATIVES NORTH

June 10, 2020

Haley: Ok so to start off I want to know what is your overall relationship to or experience of Giant Mine? Did you grow up in Yellowknife and how have you known the site to be over the time you've lived there?

Gordon: Sure, I've lived in Yellowknife since 1984. I came for two years and just never left: I just like living here.

We were all - in the 80s - very aware of Giant for a host of reasons.

I have friends who worked there. Many people I knew worked at Giant and then they would work at Con mine then they'd go back to Giant, people just went back and forth. That's not much recognized in most of the discussions to this point. That's the reality. In terms of my own recollections from the 80s **one of the things that I remember very well was the smell that came from the roasters.** People who don't remember that either weren't here or were too young to remember it. A former mayor who was raised in Yellowknife, I remember him saying as mayor he got more complaints about the Con Mine which used a mechanical process and made noise at night than the Giant mine which was spewing out all kinds of unpleasantness but just stank. Coincident with that the city of Yellowknife used to burn the garbage here, did that for many years. That was a standard practice then in most communities since they started having garbage. But anyways eventually they caught on to the modern age and stopped burning the garbage. So, there was two sources of odour, one was burning garbage the other was the Giant roaster.

I recall very well the Giant mine strike, the unpleasantness associated with that, the death of the miners.

That was an extremely unpleasant period of the history of Giant. That plus the comportment of the then owner - Mrs. Peggy Witte she sort of summed it up that the death of [miners] happens. Which many of us found quite troubling. Anyways I'm just rambling on and I'm not sure that I'm getting to your point but it's my historical association with Giant which I think is the point of departure here.

Haley: Yes. What I'm trying to argue in my research is that the current remediation plan hasn't fully considered the site's rich sociocultural history or community perspectives. So, the interviews are about getting a sense of what it was like to live near Giant during its operation and what it means to the people of Yellowknife. I'm trying to bring that richness to my work, so everything

that you're speaking about is just bringing more depth to my understanding of the place so it's very helpful.

Gordon: [In] the capacity that I've been acting within the last few years since 2012, within the framework of Alternatives North **I occasionally find myself in the somewhat uncomfortable position of not so much defending Giant but explaining to people who just see it as a blight on the landscape and a horrible error that it's a thing to celebrate. It was a gold mine and it provided employment for 60 years and its part of the history of Yellowknife** and cleaning up, well yeah, you've got to clean it up. There's an article that was in - I think the chamber of commerce magazine - the headline was what a winning thing this is we had the mine for 60 years and now we've got a billion dollars being spent on cleaning it up. So, there are a broad range of perspectives on this mine and you've clearly focused on one which is, again my characterization not yours, but the inadequacy of the treatment of its impact upon principally the Yellowknives Dene. But there are other views and I think that some balance, I hate the abuse of that word, but there are other viewpoints on it.

Haley: Yeah, I should clarify; I see mining as a necessary part of our economy. With Giant I recognize it's of great economic and social value because it created a community around it. I acknowledge that there's multiple versions of the story and I want all of them to be part of my research. From my perspective reading the remediation reports it seems very technical, which I realize is typical practice for reclamation because the contamination is the most pressing, front of mind issue. But from an architectural perspective I'm trying to tackle more the sense of place and what the site actually means and how that can be represented on the site.

Gordon: Well, it is technical for the reasons that you pointed out, I think you're spot on. There is also currently going on a stress study that's being led by Dr. Shankardass from Wilfred Laurier. I'll be very up front with you on the stress study. I think it needs a fair bit more work. It's just being framed up now and it won't get underway before the fall. I worry that you could create the problem by doing the study, I'm confident that people working on this have the best of intentions but I really do worry that asking people leading questions in time alters their perception and understanding of the history and the future.

If the sole focus of Giant mine is the harm that it's done to you personally at a familial level and culturally to your environment upon which you rely - it's all cast in the negative [and] that becomes the dominant social narrative on Giant. And that's not to say that it's correct or not correct it's simply to say that it's one perspective.

It's just very important that a study of that nature not create its own results. I'll just make one other comment on the primary work of that stress study, having offered a number of comments on their description of the context of the work, they have some difficulty in getting stuff right. Things need to be worded with clarity when you're talking about the description of the history of an industry like a gold mine in a community like this one. And over the course of a career you come to a few statements that govern how you review things and my thought on this one is if you can't get the easy stuff right who's going to trust you on the more complicated stuff? And the characterization of the preamble to the stress study has been wrong and it comes from careless writing in my view. I don't want to belabor that, the stress study is a good thing. It comes out of the environmental agreement and I think that it will address some of your concerns, or that contested history was your expression. I think it's an accurate description of the situation we find ourselves in now.

Haley: So, one question that I want to ask, and I know this is a bit simplified because you're one individual, but do you have any sense of what the community is looking for out of this reclamation? Do you know if the community wants the site to be accessible or usable in some way? Because from what I've read from public consultation it's been a bit of a mixed bag of stakeholder interests.

Gordon: I guess starting from the big picture **I think most people in Yellowknife don't care. They're satisfied to the degree that they're even aware of what's going on.** They're satisfied that something's happening and it's ok. I'm glad as somebody who lives here that the city of Yellowknife is taking a slightly greater role in determining how this goes forward and that's a good thing.

The Giant mine remediation budget for the next few years exceeds the operating budget for the city of Yellowknife. This has a very significant economic impact upon this community.

So, I'm very grateful to see the city of Yellowknife involved in the working group that Alternatives North is part of, and they have an appointee to the Giant Mine Oversight Board (GMOB) as do we.

Most of the concern now about giant mine from the Yellowknives Dene First Nation - appropriately so - they didn't see many benefits from the mine during its operation. I have no idea how many First Nation members there were working at the mine, I have no doubt there were some, but no one looked at that kind of thing.

No one kept track of whether your employee was Dene or Metis or what not. There were lots of Eastern Europeans working here. When Giant and Con got shut down people either started working in diamond mines years later or they left. My next door neighbour at the time moved from Yellowknife, ended up working in Chile and that's just the nature of [it]. You have to go where the mines are, that's the nature of the business. So, you won't find a lot of people today in Yellowknife who were miners because they've gone on to the next mine. There was a bit of a gap between the closing of Giant and Con and the opening of some of the diamond mines and you can't sit around hoping that you're going to get a job at a mine that hasn't opened yet or that's not going to open for several years. That really significant source of information that is to say the people that actually worked at the mine really hasn't been as widely available as one would hope. So, you end up with people like me who didn't work at the mine and only knew people who worked there, some of whom, friends of mine now are dead. That will be one of the challenges of the research that you're doing. Ok, I led us off track there. Do you want me to speak more on this, maybe either repose the question or pose another one.

Haley: Sure, maybe this is a better way to put it is there anything you or people you know in the community would definitely not want to see happen on the site?

Gordon: Let me reflect on that for a moment … I've never thought about it from that perspective. We've engaged a number of times on the question "what should the site look like?"

And driving the discussion is that it's a contaminated site and it's very difficult to do something to a site that establishes forever that it's dangerous. Then there are a small minority in town that insist that it's not dangerous at all it's just fine. And there are parties who want access to the site [and] want to use it.

That all impacts the remediation standards which have to be met. So, I don't think the questions today even entirely resolves what the site ought to look like. Factors that are influencing that significantly are sources of gravel for filling in holes: whether you take them from the site, or you take them from off site. There's a mining history society here in Yellowknife that seeks to present some of the

history of mining in the Northwest Territories. They wanted one area left because it shows a cross section of the rock viewed from their facility and other parties wanted to take it down and use it as a source of crush. That one isn't worked out yet either.

Personally, I think that the site needs to be finished off in a way that makes it unattractive for use. I know as soon as you do that it becomes attractive for some people. I sometimes joke about this – you fence it as much of it is fenced now, and it's a staggering amount of chainlink fence - but I remember being a kid and every kid knows the interesting stuff is on the other side of the fence

and as a young teenager there wasn't a fence made that I couldn't go over or under or whatever. That's the nature of it and I don't know how you deal with that.

Some people I think would love to see the place rehabilitated to the point where they could go and learn to pick berries and shoot moose and ptarmigan and grouse, but I don't see that happening. I also wouldn't want something to happen on that site that would effectively prevent the actual cleanup of the arsenic trioxide. I wouldn't want something done that would make that impossible or more expensive than necessary. There's a little joke about Giant and it's that at least nuclear waste has a half-life.

This [is the] kind of black humour that you get sometimes. I don't [think] I've really got an answer for you on that.

Haley: That's fine. I'm in the process of creating a counter proposal for the site but I recognize that this site is complicated, so I don't think there's a definitive solution. I'm just trying to engage with this site and its context. One thing I'm considering is that the proposal should exist for years down the road for people who don't know the history of the site or understand that it's contaminated. I'm considering planting plants that are naturally toxic, plants that people would already know not to go near and using other nature-based tools. Or creating boardwalks so that someone could experience the site without coming into contact with the contamination or roaming freely. Establishing controlled access, so people can get an appreciation for its existence and contamination without being at risk. I'm curious what your thoughts are on those kinds of things?

Gordon: Well, my wife's a landscape architect and this idea would interest her, **the notion of planting things that are toxic or unattractive to humans it's an interesting one.** I don't think I've ever heard of that before and I'd have to ask her about that. There's a limit to what you can grow here, you can't plant poison ivy, it's not going to grow. It is an interesting idea. I like it, we need ideas like this. Interesting thought. Yeah, controlled access and contact … **people very quickly forget particularly things that are unpleasant, and some aspects of Giant are unpleasant.** One of the discussion points during the environmental assessment panel hearings was centered on this very question, whether the knowledge of the site ought to be promulgated or not. And one of the board members – and I don't think it was just in a challenge capacity – basically was arguing people want to come to Yellowknife so why would we let them know it's a contaminated site. Which is interesting. That discussion degenerated from there unfortunately.

Haley: In relation to that, part of the reason I'm looking at this site is it's an extreme example of a common condition across Canada: the socioculturally complex abandoned mine. And this phenomenon isn't always publicized at least not to the general public. Especially in southern Canada there's no real connection to, or understanding of, the production of goods through extraction and mining. And these industries are a necessary part of our society, so I think there's

an opportunity for education, for people nationwide to have a better understanding of the supply chain and that this is a part of our country's identity.

Gordon: We've been dealing with these things for a very long time. You have lots of examples too I'm sure. Faro mine some people tell me is worse. Other things, like here in the North the cleanup of DEW line sites, I've been told they did two things with unpleasant things, they buried them, or they put them out on the ice and they disappeared in the spring. I like to believe we don't do that anymore. There is the uranium mine on Great Bear Lake which was never really properly cleaned up. It has been the practice just to abandon these things and we're in a part of the country where there are lots of abandoned mines. This is an issue I've raised on the stress study, that there's a whole bunch of gold mines around Yellowknife. It's not just Giant and people go back and forth and worked at different ones and we're focusing on Giant as if that's it, but the Con mine had lots of arsenic as well, less because they used a different roaster process to extract the arsenic but there was lots there. I've talked to people who've worked there that talked about arsenic at Con. The other abandoned mines, historically companies just walked from them to be sold to a company and then to another and the last company would go bankrupt.

If there's a legacy for Giant that leads to adequate cleanup bonds that would be a good thing. So, yes, I think there is an opportunity, indeed I think there's probably an imperative for education.

It would need to be cast in an informed light because it touches on the relationship with the First Nations and Metis here, much of which is not that good. A better story is the history of Giant as context over cleanup so remediation of the site and addressing concerns it looks at how reconciliation can work. You'd need buy-in from the Yellowknives Dene on this sort of thing but there is a story to be told there on your question of opportunity for education. Yes, one should hope we would learn from this, the creation of bonds for cleanup, someone could have a spent a billion dollars on. I understand how difficult these things are, but at some point economically we would have been better had no one ever discovered the Giant gold reserve because the economic benefit will be overtaken by the cost of remediating the site and the cost of maintaining it.

Haley: Does the general contamination in Yellowknife, due to the surrounding mines affect your everyday life? For example, I know the water potentially is an issue, I've seen signs about swimming or fishing – how much does that affect general recreational use of the land or things that you would normally do?

Gordon: Good question, the water here is really very good and we drink the water in Great Slave Lake as soon as we're out of Yellowknife Bay. Where there's prohibitions on fishing baker creek and so on, yes, because it runs through the Giant property. There's potentially issues with gardening, on the old Con mine site, there's a small community – very nice place to live – but basically you've got [about] a foot and a half of soil, so I don't know how you garden in that kind of environment but it's hard to garden here at the best of times because there's so little soil. Otherwise there are cautions on collecting berries and eating mushrooms within a radius of town and they do studies on that. There's also background contamination here because there's gold and there's a bit of natural arsenic.

There are so many factors in addition to the arsenic that was blown up the smokestacks for the first few years of operation. In my mind it's hard to separate some of these things and it's very easy to blame everything on Giant, [but] it's not the sole creator of problems here. And it was in its day an economic engine for the entire north. It's so easy these days and seems to be so popular you take something that happened years ago in a different economic, social and environmental context and condemn it on the basis of today's standards. That's easy to do but

I don’t know that it’s always helpful.

And I don’t think you’re doing that, you’ve suggested you’re going to do a counter proposal and you have some obvious thoughts on this that haven’t crossed my mind before or heard expressed so that’s great. That’s the kind of research that we need done.

AN INTERVIEW WITH KYNYN DOUGHTY, COMMUNITY PROJECT COORDINATOR, YKDFN

June 18, 2020

How would you describe your overall experience of or relationship to Giant Mine?

I'm from Ontario originally, and I moved to Yellowknife in 2018 as an Indigenous studies student. I am not Indigenous but have seen Yellowknife from a Dene experience. As a result, **I would not voluntarily drive through the site or pick berries around Yellowknife. There is a collective understanding and fear about arsenic more so for the Dene**

What do you think about the current remediation plan?

I think it's a siloed approach, making it easy to wonder where does the accountability lie? The Dene are requesting an apology and financial compensation, to the detriment of remediation if reconciliation funds are mutually exclusive from reclamation ones. **The plan only considers the site itself, despite the far-reaching larger damage to the community.** The siloed approach makes it easy for the government to not take full accountability for the effects of the site.

How would you describe the Yellowknives Dene relationship to Giant Mine?

Giant Mine is a Breach of treaty, the Canadian government dispossessed the YKDFN of their land through their untrustworthy actions. Therefore, **the relationship between the government and the YKDFN is founded on broken trust** which makes even the scientific research seem untrustworthy.

What do you think should happen to the land that the mine sits on, how do you think it should be treated in a site design proposal?

There's a divided response from the YKDFN, when will they be able to use the site again, traditionally and otherwise? **If there was a way to occupy the site I would be interested. There's so much fear of that site, I don't know what it would take for people to use it.** Plants and animals can use the site. Take the arsenic out. It's so hard to imagine it any other way.

Is there anything you wouldn't want to see included in a proposal for the site?

I wouldn't want to see the site not reflect the history of arsenic there. I wouldn't want to see the site just turned into another part of the city of Yellowknife. I wouldn't want to see a healthy tourist ecosystem or a soccer field.

Is there anything else you would like to discuss about this site?

The site is of specific cultural significance to the YKDFN, **it was a rich harvesting area deeply respected,** with a nuanced meaning. **It was such a respected site that people wouldn't even live there, they lived on the other side of Yellowknife bay.**

AN INTERVIEW WITH TOM HOEFER, EXECUTIVE DIRECTOR OF THE CHAMBER OF MINES

July 13, 2020

Haley: How would you describe your overall experience of or relationship to Giant Mine?

Tom: Maybe before we get there let me tell you who I am, maybe we'll set some context. I was born and raised in Yellowknife in the 50s and my father worked at the Con gold mine, so I spent all my life here basically.

I grew up in this town as a mining town so the perspective I bring into it is probably much friendlier than some people who look at Giant Mine as just a reclamation site. So, call that establishing my bias if you want but that's how I'll come at this.

So back to your first question?

Haley: How would you describe your overall experience of or relationship to giant mine, so some of that back story is useful I just want to know how you understand the site or how you feel about it?

Tom: Ok so what I was saying is part of that answer, having grown up here it was an operating mine that was relatively new, it was built in 48' so when I was a young fella it was the newer of the two gold mines here. **It was a very normal kind of operation to us, nothing strange or unusual about it** and of course I grew up watching kids whose parents worked at Giant. And I worked at the mine and my father worked at the other mine so there were all these things like friendly rivalry between the mines, with a lot of people working hard and the mines provided opportunities.

My parents were immigrants, a lot of immigrants worked at both mines and they provided opportunities for people to have a new life.

We were pretty remote back then and **when I was very young, we didn't even have a road connection to the South, it was all by airplane or barges in the summertime. It was a close-knit community as a result, and everybody was a contributor to a good community.** A lot of the mining people actually served on town council and they were also contributors to building this new town of Yellowknife which really started to go when Giant came along and started to give it that extra momentum. In addition to the Con Mine it helped to [grow] the new town and those kinds of developments. It helped increase power to Yellowknife. All of those are positive things and that's how I feel about it.

Haley: OK, as a follow up can you speak a bit to the economic impact of Giant Mine or its legacy in more depth?

Tom: Yeah, I don't have economic figures for those periods, but **this was a mining town so I would say virtually everything that fueled growth here was around those two mines** as well as the discovery mine which was miles out of Yellowknife. There were consultants and mining contractors that worked out of Yellowknife to supply the miners so **I would say over 50% of the economy was created by the mines and again I don't have exact figures. I was trying to think of any competing economic opportunities and there weren't a lot.**

Haley: Sure, then this next question could be twofold if you consider the mines' operation versus now. How would you characterize the community of Yellowknife's relationship with or attitude towards giant mine?

Tom: Well there's a lot that's happened since the times that I'm talking about but **probably the biggest thing that happened here is when Yellowknife was made capital in 67'. And that introduced a whole pile of new people and a period of significant growth and in essence it diluted Yellowknife down as a mining town.** The mines were still operating and there wasn't any change in their size for example, so their economic contributions would've been similar it's just that we got diluted out by a whole new population. And it's continued, today it's probably less apparent because the mines now are so distant that you'd have a hard time understanding that our diamond mines for example put 800 million dollars into the northern economy two years ago. It's not as obvious as when the mines are right in town like Con and Giant were. We also had things like aboriginal rights recognized in the constitution, and environmental responsibility increased tremendously, there's been so many different changes that I guess it's hard to really characterize one thing. I think when you have a huge growth of government and this is not an accusation against you but I would say **what you've got is a pretty young population that basically builds careers in the government and don't have experience in the minerals industry yet they're given responsibilities to care for, police or work with the industry and I think we've seen a loss of recognition in its importance as a result.**

Haley: Yeah, that's what I want to get at because there's a lot of complex attitudes towards the site and I'm not trying to cherry pick individual ones. I'm trying to get a full picture because I see that there's a lot of nostalgia and positivity in terms of livelihood and community building on one hand and people who feel it's been very detrimental on the other, I want to get a comprehensive understanding of the range of views so I can better respond.

Tom: Ok good for me to know that too. I don't know if you're aware of what I do, I'm [the] executive director for the chamber of mines and we're basically like the chamber of commerce that promotes the minerals industry. So, I deal with issues of public awareness all the time. I worked for the chamber of mines in 1990-96 and that was after I did a masters and then I came back ten years ago. I've seen lots happening, in the middle of that I worked for a diamond mine for eleven years and got into operation, so that's kind of my experience. Back in the late 80s early 90s there was a fella wrote an editorial and he described Yellowknife as some - Balkan city was the term he used - like a town behind the Iron Curtain. Back then it was drab, it had nothing to differentiate it, there was nothing special about it really. And a lot of people took offense to that, but **the reality was you were in a mining town, but you didn't know you were in a mining town. At one time you did because the mines were right in town operating, but you started to lose that as soon as you had the fly in fly out [operations]. So we tried to start an initiative to get a mining museum back then and there was another suggestion that we should start to theme the town, if you go to Whitehorse you'll get the feeling that you're in a Klondike town because they kept the history from the old Klondike goldrush going for 120 years. In Yellowknife we lost that** and there's a few little items now that are scattered around town but they're very small. The other day the city took a mining artifact which is basically a bucket, it might be 6 feet diameter, maybe 5 feet and about five feet tall and there's room for about three guys to stand in it, there's a chain on it and it goes on a winch and they would lower this into the shaft [to] take guys up and down. Well the city put it on display right in front of City Hall full of flowers, and that's sort of an apt thing to do, to try and portray some of your history. And a lady who writes an editorial column paper took huge offense to this, first she didn't know what it was then when she found out that it was a relic from mining she was aghast that the city hadn't gone out and done a big consultation with Indigenous people here in Yellowknife to get approval to do this and blah blah blah. And she's way over on one side **but that kind of outrage over something that's part of our history is just bizarre.** So again we struggle here and as I

said using the latest stats from the diamond mines it pumped 800 million dollars through northern businesses you can bet that the vast majority of those businesses, I'd probably say 90% of them are based out of Yellowknife so that's 800 million dollars flowing through this city and nobody knows it because nobody takes the time to advertise it. We try to do this all the time in my job but when you look at the city you don't get that feeling that you're in a mining town. If you look at the vast numbers of civil servants that we have these are people that are being paid and don't understand where their pay comes from. **Things like mining and resource development and all kinds of other private sector things in the country pay lots of taxes, and it's what pays for civil servants' jobs and pension plans. So, there's consequences if you don't have resource development** but this is a territory that lives in a bit of a never neverland economically because Ottawa feeds us a welfare check, transfer payments and grants every year and they pump money into government jobs so people can live in this world around me. So that's some of the things that have been lost over time by not being a mining town like it once was.

Haley: Yeah, that's part of my argument for an alternative approach to reclamation, a lot of mine sites if they're reclaimed to a high level you might never know they were mines in the first place. And part of me thinks that's kind of a shame because that's such a huge part of Canada's history and identity. I think especially in the South there's so many people who have no concept of extraction and it is critical to our country. So, I think it would be significant for Giant to be a place people could visit and actually appreciate what happens at a mine and what that really means.

Tom: If you have a chance, there is a website that was put together by former residents of the pine point mine which is outside of Great Slave Lake. That was a mining town, it was built in 1964 approximately and the mine was a base metal mine, so it mined zinc and it required a railway, so a railway was built for that mine. It required a lot of power, so they built another hydro facility on the south side of the lake. The mine operated for about 25 years and then closed because the cost of mining was prohibitive at that point. And that's why the decision was made to close the town and all of the houses were sold off, put on trucks and moved to other communities and if you go there today you can drive around the subdivisions and you can see where there were homes at one time and it's kind of eerie. If you look at the website that these people put together there is just a huge huge feeling of loss because these are people who grew up at a mine, some of them were basically born there and their town is no more, it's wiped off the map. So talk about perceptions or emotions that people have from the past, it's quite something. Another one is Nanisivik which was probably the last mining town in Canada in 1975 or 76'. Another base metal mine and it operated for about 25 years and then it was reclaimed, and every building was removed. And people have gone back and taken pictures of these blank streets [that] used to be homes. But again, there's this big sense of loss of good times and memories that sort of thing. **I guess what I'm reinforcing is if you talk to the right people, here in Yellowknife too, and I'm one but I have a very good friend that I grew up with here and he** worked at giant and he worked at con then he worked at giant on the reclamation work as well and worked at the discovery mine. He grew up as a kid at the discovery mine. He **has a very similar and maybe even stronger sense of community around what mining was, it's nothing evil it's just left a mess.**

Haley: Interesting. OK, what is your reaction to the arsenic contamination, both on the giant mine site and in Yellowknife in general?

Tom: **I guess to me it's quite normal, I don't look at it in shock or those kinds of emotions that some people do.**

I grew up with this being a town that had two roasters, giant was the bigger one, con had one but con closed theirs down about 1969 or so whereas giant didn't have that opportunity and continued to operate the way they did. I wasn't a follower of environmental regulations if there were any when I was young cause you know you're young you have other things in your life.

The only thing that I can think about is we always had things around town posted saying don't drink the water because of arsenic so you didn't drink the water.

But most of them were small lakes it wasn't Great Slave Lake because there's so much dilution there. I remember being young and they would say don't eat the snow because these stacks are putting out stuff and there was a concern that maybe you shouldn't do that, but they were just worries. I don't know anybody that got sick from it, not even close. When I was young my mother volunteered when they did the first arsenic testing in Yellowknife and maybe that was around 1967 or so. But she was helping to do the sample collecting for this big study to determine what the effects of arsenic were on people. And there was nothing that came out of that that was any big danger. I myself participated in the next project study which was in about 1976 perhaps 77' and there was nothing that came back that said you have anything to worry about. And arsenic, as I understand it, you flush it out of your body in a matter of days so even workers that might be exposed to a lot of it just go off the job and they flush it out through their system. Probably worst case I ever had is I worked for the government as a surveyor. And the highway went right through the giant mine property at the time, they moved it since as part of this whole move to let Giant be reclaimed.

You drove right through almost the heart of the mine site and I worked on the highway surveying it, so I got to stand there for some time taking measurements and all the other surveying. I worked pretty close to the stack and I remember the awful taste in my mouth because basically the stack was putting out sulfur dioxide.

If you had the right ingredients in the summertime, like a hot day, some of that could curl down off the shaft and it wasn't the healthiest of things but for the most part the stack was high, and it went out over the landscape. I never had a sense of heightened concerns or anything around arsenic.

Haley: As a follow-up what is your reaction to the possibility of people accessing the site as part of a proposal?

Tom: **Oh, piece of cake. I have no worries at all, I think it's really overblown. It's convenient for people that have an agenda trying to get a certain message out against mining. Things like we have enough arsenic buried here to kill every human being on the planet, well I guess technically yes but what's the risk of that sort of thing.**

So, it's overblown and I think it's pretty well contained right now, and I think the idea of continuing the freezing operation is a sound system. I would hope that in time they'll find some bacteria that can go in there and break the arsenic into a different form that's more benign. As for going on site I don't have any issues at all, I've gone on site myself a number of times. Both Con and Giant were built in, to me, pretty locations.

The whole community part of Giant is perched on the rocks overlooking Great Slave Lake it's really beautiful. If they offered me one of those houses right now, I would take in an instant and I would rebuild it.

There are all these fears around it, I don't even know if it's arsenic so much as there's asbestos. I think especially with asbestos, sometimes it's better to leave it alone, don't try to move it that just creates more problems.

I think that site has got huge potential.

If they said we'll knock all the houses over and offer up the lots and said would you buy that I would say in an instant because of the location and the lack of fear over any consequences of arsenic. I think the site could very easily be turned into a community. I think you could turn it into an industrial site just as easily, that's what happens with sites they get turned into industrial standards because you can have higher levels of the leftover arsenic there for industrial usage compared with residential usage. But I don't have any feelings like that, none.

Haley: OK that's good to know. Do you have any specific opinions about what should be done with the site beyond reclamation or anything that you wouldn't want to see happen on the site?

Tom: Yeah, you know what I have a cherry-picked idea I don't know if you've ever heard of the twin sisters' nursery? In northeastern BC there is an area where there's coal mining and oil and gas development. So, these guys were working for a coal company up there after Diavik, and they shared the work with the community on an opportunity to develop a nursery. And the concept is that both the oil and gas companies and the mining companies will be required to do reclamation work and the move in reclamation today is [towards] using native plants, Indigenous grasses that sort of thing.

What they did is they helped the community establish what is called the twin sisters nursery. There are two Indigenous groups that had ownership in this, and they've got two big green houses and they grow native plants that they sell back to the coal mines and to the oil and gas industry. The beautiful thing is that native plants are also traditional plants to Indigenous communities so they have the opportunity to do something really cool and the elders tend to know lots about these plants from their lives and can introduce the youth to them and work with the youth in the greenhouses to grow these plants. So, they're working on something to strengthen their own traditional knowledge and using their traditional knowledge as an economic opportunity to help with resource development in the region.

I've been trying to get people interested here in doing the same thing, so I tried the Yellowknives Dene business arm and they find it very intriguing. Anyways I think there's opportunities and Giant's going to need reclamation, Diavik's going to need reclamation, Ekati will need reclamation, all these mines need reclamation. There's an opportunity I think to use a site like that, **what cooler thing to do then use a former mine site as a site of rebirth if you will,** and those plants selling them back to other mine sites and helping them return back to the best possible natural environment. So that's an industrial usage of the land the difficulty isn't huge, but I think it's a cool thing that could help twist people's mind's up a little bit especially the ones that just think it's all bad.

A little confusion is good I think, people get locked into one opinion, but if you're confused a little bit that's good, because it's not all black and white.

And as I said where the community is, I would take one of those houses in a heartbeat. We're perched on the Precambrian shield, so there's this landscape of moderate rolling rock outcrop and lakes and trees. And what we do with Yellowknife now in the city is we come in with dynamite and blast the shit out of it, we flatten it down and we turn it back into basically a prairie landscape, so we can put our flat housing development plans on it like every city in southern Canada. So rather than blast everything down they built the houses where it made sense where you could get a little road access to it, and where you had a view, then they linked all the houses with utilidors. We called them pipe boxes when I was a kid because you could run on top of them, we weren't supposed to, but it was a quick way to get from house to house. The boxes were probably 4' wide and 3' feet deep and inside of those insulated boxes they had the sewer, water and heating lines. If you look at the Giant mine today, you'll see all of these houses perched all over the place on the rock in really pretty locations and they have views over Great Slave Lake. It's wonderful and they're all joined by the utilidors which all went back to a central heating system. But you could go in there today and

rebuild that same thing, central heating system, all these houses perched on the landscape, beautiful views and people would pay a million bucks for a house. Now would they all have yards that were 50 by 100 feet, no they would have different yards but that's good. It's a different way of living. I think that usage is still there, and I think it's overblown some of this oh but there's arsenic buried in the soil. Well go dig up the soil and live on the rock I guess and it's not a problem.

Haley: Was that a traditional approach to building throughout Yellowknife before? Because I'm having difficulties finding many historical records on traditional ways of building in Yellowknife. Were they typically built that way, on top of the landscape rather than blowing out rock to regularise everything?

Tom: Not really, if I were to compare the gold mines back then to the diamond mines of today, I would say that they probably have a much higher standard as mines then the community did. And that's typical, if I look at the diamond mines they have huge safety standards and performance standards and they're the model. People who work at the mines bring stuff home which is good because they raise our own standards. I think the very first hospital in Yellowknife was at the Con Mine so there was no hospital other than that. The way they built the community they had a standard that they wanted to provide. And the Con Mine built a hydro plant on the Yellowknife river, that was the very first hydro facility we had. That serviced the mine and their community and then whatever is left over serviced the Yellowknife community. That's why the Yellowknife community grew up perched on the rocks too in what's called our Old Town today. But it was not the same style, they didn't have the central heating system for example like the mines did, and these were all individual because they were all owned by individual people. And there would have been no building standards, so people would just build their own shack. In those days because they were built in Old Town, they had no running water, they had no toilets, they had power and that was about it. And they each had an oil stove for heat. And that's the way all these houses basically operated. Over time they got running water in the summer with surface lines and it's still the same way today actually. Right now there's pipes on top of the ground that are running fresh water into all the houses in Old Town. The sewage isn't in the honey bucket anymore it goes into a tank that's buried under your house and the truck comes once a week and sucks it dry. That's the modern way of those homes.

The mines were ahead of their time, having a higher standard of providing utilities and modern homes.

The Giant mine homes, I visited them, they had gyprock walls and 2 stories, they were modern homes and I was living in a bit of poor man's house. So, they were very much ahead.

Haley: OK, in contrast to my earlier question is there anything that you feel would be completely wrong or you wouldn't want to see happen on the site?

Tom: **I wouldn't want to see it become some memorial to everything bad, that I don't want to see.**

I think there was a commitment made to put some signage up so that people could read about the site. There is an acidic bunch here in the community that are really strong environmentalists to the point [that] there's no way they would ever support mining, no way they could. They would want to have some big edifice to what's [wrong with] giant mine, and I don't think that's fair to what this place was. We all can look back with 2020 hindsight and say well there's things we should have done differently. I think that's the same with society, the environmental rules were very lax and so we pay the price some years later and that's what we're doing here.

I would like to see it treated respectfully too. I know there's a story about a regional child that died, I never heard that story when I was a kid, I never heard that story until probably the last 10 or 15 years. I don't know where that story was, it's tragic but it's certainly a story I've heard often.

Haley: For sure. So as a final question is there anything else that you think is significant to discuss about the site or anything else you think that I should know?

Tom: There were people in the industry in the 90s [when] Giant went through a very bad period under Peggy White and there was the fight between her and the union. It was a very ugly period and I'm sure there's people who want to remember the men that it killed, and they should but you haven't talked about that. The stuff the union was doing was terrorism and it was thought to be justified because of the approach that the mine owner had taken. There was a lot of fear in the community as a result, it was very ugly. The observation that some mine people made prior to the strike was that Falconbridge should have never sold that mine, they should have closed it responsibly. And that's a story you can look at today and I think there's questions to be asked similarly. For example, I worked at Diavik from before we even knew it was doing to become a mine. So, I was a participant in creating this model of a mine: what it was going to be and what it was going to do. And we had a very strong position on how we were going to be different than other mines and how we were going to contribute so much to stay responsible. And we were ahead of our time, I think, in the whole concept of sustainable development and community involvement. Now that mine has a closure date of 2025 which is coming relatively quickly and whenever I can I say to them don't sell the mine whatever you do don't sell it to somebody else, just take it all the way through to closure. So that you'll have taken that operation from cradle to grave and then you're in control of it. The risk is – and what happened with Falconbridge was they reached a point where they said this mine isn't good enough for our standards anymore, it isn't a performer like we need so they put it up for sale. So other people of course say well we could probably squeeze something out of it. And that's the problem we've then got this real squeezing period to try and make it profitable and that took it down a dark chapter there.

Had Falconbridge, which is an international company, just held on to it and closed it and done all that work then we wouldn't be sitting here talking about this because they would have assumed those responsibilities. Just like at the other side of Yellowknife Con mine was briefly owned by Miramar and you never hear anything about it.

Haley: Yeah, Giant is an interesting case, there was quite the turnover in ownership over the 50 plus years. I can imagine that could be negative in terms of continuity and ensuring that things go according to plan. Also, I'm imagining that in 1950 there was very different expectations for mine closure than now.

Tom: Well that'll be the same case in 50 years from now too, because we're always ending up with new technology and that means we change our expectations. **The other thing is timing, so Giant is what we would call a grandfathered mine today.** The way industry operates with government is this: government invites industry to come and look for minerals and if they find enough and they're economic they can build and operate a mine. **The mines are required to follow rules, so they go through all kinds of mandatory processes to operate. Giant would have been in that situation except that back in those days environmental regulation was pretty skinny because society thought the world had no end to resources and unending healing power.** Then the environmental movement started to emerge in the 70s. So, when there's radical change, and I'll make up an example, the government says we want to make sure there is enough security in place in

case you go bankrupt, you need to put up 150 million dollars in reclamation security, the company would go are you nuts? 150 million dollars is a lot of money and that's a lot of profits, so to impose that kind of a burden on a company that's operating could destroy them if you imposed it right away. So that's the term grandfathering which happens if the government says we'll make this new rule for any mine that starts from this year forward. They will have to put up 100% security for their environmental liabilities and you guys that are grandfathered have an accommodation, every year we're going to ask you for 10 million dollars into this fund. So, after a period of 15 years you'll have 150 million.

There's a reason to treat existing mines differently than new mines because existing mines might be at a disparity making the profit, if you load up the fines you can kill them. What happened was Giant got caught being a grandfathered mine under the old rules, so they had insufficient security in place, and then went bankrupt.

If you look at Diavik today or you look at Ekati, Ekati has something like 200 million dollars in reclamation security, that was unheard of in the past. So, the worries we have today about these kinds of problems occurring should be gone because everybody is following the rules. Giant is following the rules too, but the rules got changed in a big way and Giant never had a chance to be adjusted to the new rules. What can prevent that from happening is if the owner doesn't go bankrupt or in other words, they are very financially strong. So, if Falconbridge for example would have said no, they're a vibrant company so they have money that they can assign to the reclamation of the site. Same thing with the Con mine, at one time it was owned by Cominca which is a big company, which my dad worked for, but they sold off too. And they ended up getting bought by Miramar and Miramar is one of the largest gold mining companies in the world. Miramar has deep pockets, so Miramar has the ability to clean up the site even though [they] never mined [it], they own it now so they're cleaning it up.

AN INTERVIEW WITH MIKE BORDEN, FORMER MINER

July 22, 2020

Haley: Could you tell me a little bit about your background, how long you've lived in Yellowknife and what kind of work you've done over the years?

Mike: I was born in Yellowknife in 1953. My father came up here in 1947 and I believe was one of the first employees actually at the mine. I think he even set up the payroll system for them back in 1947 – 48'. My mom came over from England and they got married and settled here in 1950. We lived on the island which is just across from Giant Mine through 1953 and if we ever get into the arsenic emissions those were the peak years of arsenic aerial emissions from the Giant Mine stack. We were in Yellowknife until 1962 then we moved into Discovery for 6 years and came back in 1968 and my father worked at Giant Mine from 68' through 76' when he retired. I had summertime jobs at Giant the first one [when] I was a grade 11 student then summertime work during college years. Came back and worked at Giant for three years then went back to university. Worked at Con mine from 1979 to 82. Then eventually 2009 I was back at Giant again as mine manager on behalf of joint venture which was the company in charge of the mine maintenance at Giant Mine at the time. So that's my involvement through working at Giant. In terms of living in the actual townsite it was only one summer when I was going to university and I lived in the staff house, ate at the cookhouse things like that. I was not one of the Giant Mine brats that lived out there for years and years.

Haley: OK, good to know. How would you describe your overall experience of or relationship to Giant Mine?

Mike: Overall it was good. I guess the strike of 92' and the death of those miners was probably the most significant event in my whole association – I wasn't working at Giant at the time I was working at Con. **Giant Mine was a very proud place to work, the people were extremely proud of Giant,** and that was a black mark to anybody who worked there before, during or after. I always thought that was a real pivotal point in the operation, in the way people viewed Giant Mine. It is, as you are well aware, a highly contaminated site and there's a pending reclamation program coming up.

There is a great deal of concern about arsenic, I hesitate to say that hysteria has got something to do with it.

People who walk around today thinking there's a problem with arsenic at Giant Mine don't have their head screwed on right. The problem was 1949, 50', 51' when there were 7,400kg or so a day of arsenic trioxide going up into the air we breathe, and we haven't had that since 1999 when they shut down the roaster. The issues of arsenic concentrations and lakes and everything else there are values but there's hysteria, they say arsenic and people just freak right out and really, you'd have to drink four lakefuls worth of water to get any kind of serious health issue. So those are two things that strike me about Giant, but my experience is very good. The mining industry in general is just a phenomenal group of people and even today if I were to go out to a mine probably in fifteen minutes, we'd jointly find somebody that we knew in the industry from way back when.

The company was very good to their people.

We lived in company housing when dad was the chief accountant at Giant from 68'-76'. They were extremely generous with their support, the rental rate was something like fifty dollars a month for the house, there was a power subsidy [and] a fuel subsidy, they'd take care of the maintenance so if the house had to be painted they'd have a painter come over. They were very, very supportive that way.

Haley: OK, because you did bring up the emissions during the late 40s and early 50s did you or your family experience any negative impacts health wise or in the way you carried on your daily life or not so much?

Mike: **On a day to day basis, summer especially, the biggest impact probably would have been the garden. It was common knowledge that you washed your vegetables before you ate them,** the leafy vegetables, the root vegetables well you've got to wash the dirt of them anyways. But in later years they started looking at the uptake of arsenic into the actual plants like berries and the studies done in the 80s or 90s suggested that there was very little uptake of arsenic into the berries. The one thing that did pick up an awful lot of arsenic were mushrooms. Dr. Koch, Iris has done I think masters and PhD theses on the uptake of arsenic into mushrooms at the Giant Mine site and the Con mine site and has done extensive research on that. Water is another issue with the accumulation, the arsenic that has come up the stack and fallen on the ground has, since 1999 when they shut the roaster down, all washed down to the low spots. So, there was a moment when people realized there's high arsenic in the low spots. Well, yeah absolutely there is, you'd probably have to eat several shovelfuls of dirt before you'd get any kind of arsenic into your system. Like I say there's a hysteria, yeah there's a high result there but are you gonna sit there and eat that dirt, no. Other than that, on a day to day basis, no.

My dad was telling me in 49' there was one or two local Indigenous children [who] ate the contaminated snow and died as a result. And I remember him telling me there were notices put by the department of health in the paper and out in the field [saying] don't eat the snow kind of thing. I remember dad talking about that probably even back as far as the 60s and 70s and it wasn't until the last twenty years I suddenly realized the Indigenous people were out on the land they just hadn't gone in as far as the assimilation, they couldn't read English. So, there's quite a spread there, between the two different populations.

Haley: Yes. Another question is what do you think about the current remediation plan both in terms of how they're dealing with the arsenic, but also generally is it addressing what you would want it to address?

Mike: I think they're going about it the right way and this is a really hard thing for most people to wrap their head around but **when they went looking for their license, they still don't have all the permits, but they're looking at the ability to deal with it in perpetuity. And the licensing board would not let them do that, they gave them a hundred years. The thing that people are going to have a hard time realizing is that this is a short-term solution and short term may be a thousand or more years. But it is a short-term solution and there will be a better solution come out of it.** I've got a bit of background in this and although most of my career has been in the underground mining engineering planning field I got into environmental at Con and Giant. And in 1996 they had a weeklong set of meetings where a bunch of international experts came in and joined a bunch of us that were local and then a couple of three years later there's another four- or five-day session. Anyways we got to listen to all of the thoughts of what have we got, how we can deal with it, the options. Ultimately from those sessions the government was able to nail down something like fifty-six potential solutions, narrowed it down to four and ultimately came up with the freeze in place.

So, I've got a bit of background on that one, there's no doubt in my mind it is the best solution for the short term, a thousand years maybe, but it's the best solution we have.

The biggest issue with the proposed solution is the process, the place has been down for twenty-one years and it shouldn't take twenty-one years to address a significant issue like this. We had to do

a whole bunch of fighting and screaming and I had to write whole bunch of really nasty emails to the government about the dangers of what lies on the property and the exposure of the public and the employees at the mine, and finally they took the roaster down and thank god they did. They had five hundred tonnes of arsenic sitting in a flue thirty feet in the air and the government wanted us to go down there and bring it down. If it goes to the ground dust goes in the air and every regulatory agency in the Northwest Territories is going to be instantly aware of it, you can't hide that stuff. So, they spent – I can't remember – like tens of millions of dollars to tear it down. But it's really a sad situation when something is obviously that bad, why did it take the government having the minister at the time come up here and essentially say this is an emergency, and we're going to take it out of EA. Then they did the same thing for C-shaft and a bunch of other things.

The sad story was the joke amongst us on site was we're going to take this place down one emergency at a time because the process is taking so long. So that's the thing I'm disappointed at is the time that it's taken to address such an urgent situation.

Haley: OK, what do you think should happen to the land that the mine sits on or how do you think it should be treated in a design proposal? Would you like to see the site be accessible to the public in some way or not?

Mike: **I think it's important for the industry especially, that every part of the property that could be used safely by the public should be used. I don't think it should be isolated and held up as oh my god look what could happen** because with the exception of the tailing ponds and the area where the freeze zone is going to be – you have to keep people away certainly from the freeze zone. Tailings ponds if they're capped and revegetated and all drainage is treated there's absolutely no reason that couldn't be used as green space for a golf course or something like that. And if it can be shown that it can be used safely, I think absolutely it should.

The townsite and things like that, it would be an absolute crime not to utilize that for something for the public, housing, there's a billion dollars' worth of real estate sitting there and it's just a beautiful place to have housing. Like I said I'd hate to see that withdrawn from the opportunity.

A lot of the mechanisms for something like that are already in place. Iris Koch is with the environmental sciences group which is at queen's university and the military college RMC. Chris Olsen and Iris Koch did a lot of work on Giant mine and Con mine properties. But anyways through people like ESG and other people we were tasked with finding what a safe remediation level was for arsenic levels in soil. And ultimately it came down, I want to say from memory, it was 150ppm for residential and I want to say commercial was 352ppm. So anyway, those things are already in place and there's absolutely no reason why they can't be applied to the Giant Mine because they cleaned up Con Mine townsite to those 150ppm and people are living there quite happily.

Haley: OK, the counter question to my previous question is there anything you definitively wouldn't want to see included on the site or in a proposal for the site?

Mike: No, you have to be fairly open on that one.

I'd be disappointed if they decided to close it down to the public because it'd be good to show the people that you can have a mining operation and still be able to use it at the end of the day. Other than that, though I think they talked about creating trails through there and I guess that would be better than nothing.

Haley: OK. Now is there anything we haven't already discussed that you think is important to discuss about the site or you would want me to consider in a proposal?

Mike: No, not of the top of my head. I'll give it a little bit more thought and reread your scope of work that you sent me and see if I could fit anything else in there.

Like I say it would really be nice to come out as a win-win situation for everybody here. Not to be held up forever as something to beat on as being the most evil thing in the world but at the same time have respect for the fact that there has been damage done to the community physically and the population as well. We have to respect that but there's got to be common ground, I don't want to see anybody lose on this thing.

AN INTERVIEW WITH RYAN SILKE, HISTORIAN

July 28, 2020

Haley: Could you give me a primer on your background, how long you've lived in Yellowknife and what kind of work you've done?

Ryan: Sure, yeah born and raised in Yellowknife, I'm 38 years old, my family has a long history of living here. My dad worked at the mines, so we grew up in a mining community. Not just Yellowknife as a whole, but our family was all basically miners. Currently I work for the Prince of Whales Northern Heritage Centre and my side project, for many years, has been documenting Yellowknife history. I've written a number of publications and books on my own but also through government contract to research mining operations around Yellowknife. A lot of that's gone towards **the Yellowknife Historical Society and I'm presently the vice president of it. Our property is on the Giant Mine site, so we have buildings at Giant Mine that we are currently renovating into a community museum of sorts.** Not just to be a mining museum but a place to disseminate Yellowknife's story.

Haley: How would you describe your overall relationship to or experience of Giant Mine?

Ryan: Very deep, certainly in the past twenty years. My role at the society has always been one of a curator, where I'm managing the collection, the artifacts and the documents. Outside of the mine's owners our group has a huge stake in what happens there because we are occupants of the site. We've certainly been involved having been impacted by the decisions around us and wanting to make sure that Giant mine is remediated to good standards.

[We're] very invested in the future of Giant Mine and as knowledge holders we have a lot information that can inform on what's happened in the past.

Haley: What are your memories of when it was operating when you were a kid or a young adult?

Ryan: Yeah, I was pretty young, Giant shut down in 1999. I got my first tour of the mine that year when I started to become interested in local history and documenting some of the old mine sites. Giant has always been this really run-down operation, back then the highway heading out of town passed right through the mine.

It was always a very omnipresent thing on the landscape for Yellowknifers.

And driving through it every day to get to a cabin or go back and forth to Dettah, it was always there.

Just a real impact on the landscape, not just environmentally, but as this dominating thing on the horizon that you'd be driving through.

You go down the hill towards Giant and you're basically entering this river valley, baker creek valley. So, you drive through this canyon to get through Giant Mine and it's a very formidable experience. I was too young to really [remember] the strike of 1992, 93' but my dad having worked at con mine, certainly had perspectives on what all that meant. My dad was staff, we were never a union family, so we saw the disconnect between the union and the staff members in the community.

It was a very difficult time in Yellowknife history for sure, but I really don't have a lot of personal memories of it. The mines were always there for us growing up and it was something we were raised with. Although I never lived on a mine site, we had a house in town. So, we weren't super well insulated by the mining lifestyle because we weren't living on the property. The families that grew up there, they had a different experience than the people living in town.

Haley: OK. If you could give me a description or any information that you think might be useful about the townsite and more specifically what some of the homes are like, that would be a good place to start.

Ryan: Yeah, sure. When the mines in Yellowknife got their start back in the 30s and 40s it was very common to have a corporate townsite.

They basically had their own little, insulated community where they could have more control over things like people drinking. It was a very paternalistic attitude, but it worked and these townsites were very well loved by the families.

They were these little safety nets over the uncertainty of boom town, because Yellowknife got its start because of these mines opening up. They were starting off unregulated, so the mines had to make their own little townsites and services for their employees and also make them an attractive place to live, that was a part of their mandate.

Haley: What are your thoughts about the current remediation plan proposed by INAC?

Ryan: That's a big one. Again, we have been involved in the content as tenants of the site. It's complicated because the city had negotiated a lease of the townsite from the NWT way back in 2000, so we are subleasing a portion of the site from the city. And with remediation entering full swing the city decided to reevaluate their land use and they've basically given up the lease to let remediation happen. With the townsite the remediation is going to be to a whole different standard because the city wants to maybe use the townsite for residential use again. Which I think is a mistake because to remediate the townsite to residential standards they'd have to remove every piece of vegetation and all the soil. You're leaving a barren landscape and it's not going to be a very attractive place to build.

What I think should be built is a cottage country kind of a feel, which is what it currently is, you have these really nice little bungalows, cottage style houses. What's probably going to happen is they're going to blast it all into one flat thing and build a big condo with a parking lot on it. And that's not very aesthetic, it's not very respectful to the history of what was there before. So why are we even bothering remediating it to that standard? Why not just remediate it to a parkland, recreational standard and be respectful of the history and it could still be used. The whole thing has become this crazy big project that really is a detriment to the landscape itself.

And as tenants of the site we've basically lost our own tenure, we have grandfathered rights, we no longer have a signed lease because the city gave it up. So, now we're left in limbo not really having any land security and that's messed up our future planning. We did speak and intervene at the water hearings, arguing for not only our continued use of the site and all that we've built up there the past twenty years, but also in terms of the wider site aesthetic. You have this remediation plan that in order to complete to the standards of the day, we kind of feel like they're making more of a mess to clean up a mess. With that I mean that sources become a big issue, like where to find all the crushed rock that they need to cover up the tailings and all that kind of stuff.

And if the philosophy of the project is let's make a hole to fill a hole that doesn't make a lot of logical sense, especially if your treating this as a project that's supposed to heal the land. What it really is, is another mining project in order to cover up an old mining project.

This is a very public site, even though the highway has been rerouted around giant mine, there's a portion of it that still cuts through the north end of Giant Mine.

This is the gateway to the Ingraham Trail, which is a recreational area for Yellowknife heading towards the east. Campgrounds, cottage country, really nice scenic hikes are all accessible, but first you have to go through Giant Mine.

Under the current plan that's not really a consideration. The consideration is what rock is safe to use, which is fair, and what is the closest distance to the site, because you don't want to be hauling rock twenty kilometers. There's lots of things to weigh, but for us at least it's all about the aesthetic of the landscape.

Yellowknife has become this place over the past years where development aesthetics are no longer really enforced or thought about. It's a standard we've become used to, but it doesn't make it right, or ethically responsible if people want to see it that way. That's one of our perspectives on the remediation plan: don't make it look even worse than it already does, and there's some people out there that want that. There's people that want Giant Mine to be this blight on the landscape forever, as a reminder of what happened there, but I think that's really irresponsible for land use planning, because the intent of remediation is to heal the land to bring it back to "the way it was before".

Which isn't always possible but it's a guiding philosophy and with Giant Mine it seems like people want to make it look terrible in order to send a message. But the Giant landscape is beautiful, despite the stuff on the ground and the potential for fallout in the soils from the arsenic, it's a beautiful place to hike and it's beautiful rocks.

There's some world class geology in the Giant Mine area and there's those of us who believe that it could become something else in the future, so why ruin it for future generations?

Haley: Expanding on that, what kind of things would you want or not want to see on the site in terms of a proposal?

Ryan: Well currently, the townsite is used by a sailing club, our little mining museum operation and the public boat launch is there. And the challenge with Yellowknife is that there's only so many waterfront accessible properties because of all the rock and a lot of it now is private property.

First and foremost, we want it to remain a recreational area, we want there to be a boat launch [and] waterfront access.

It looks like for the amount of time it takes to clean up the townsite, which could be five years it could be longer who knows, there won't be a boat launch, it'll be shut down. At the end of the day we want this site, I'm sure the city does as well because there's no other place to do this.

At the very least bring it back to what it is now and then think about long term use of the land, because there are lots of spots for an RV park or a hiking trail.

I've always thought we could have a new garbage dump out there at some point, because there's lots of land. Lots of possibilities, and a lot of these have been looked over and proposed and are being developed but of course until the remediation's done there's not really any point putting too much money into it.

Haley: Is there anything else you would like to discuss about the site that we haven't talked about yet that you think would be important to cover?

Ryan: Well, we haven't talked about the arsenic yet, there's a lot of information out there about that already.

Our philosophy right now is let's just get this project done, let's clean up this mess so we can think about what it's going to look like afterwards. It's not surprising but still kind of ridiculous that it's taken twenty years to get where we are now and we're still not even ready to get shovels in the ground.

At least we've had time to think about how to do it right and bring in all those perspectives from the community on how this should look and what people want to get out of it. I guess I'm thankful for that, but still, twenty years it's a long time.

Haley: I'm curious if you have any apprehension about the toxicity of the site?

Ryan: I don't know enough about the science to understand just how [good] the freezing method will be.

At the end of the day, leaving it in the ground means they're going to have to maintain the site forever, there's no walking away from the site. And that is scary, and that's why there's been discussions about what to leave behind as a monument. How do you communicate the nature of Giant Mine to future generations in a thousand years? What the hell does a danger sign mean to somebody who can't read English? What do you leave behind that says danger there's something really bad under the ground here?

Something's eventually going to fuck up, whether we all die of covid-19 next year and then it's up to the birds to deal with.

It's not a very good way of being a steward to the landscape after humans are gone. Maybe most people don't give a shit, but there's people out there that do. I think the best solution is to remove it, and that's a huge challenge how do you move arsenic safely, what do you do with it and who's going to pay for that?

But generally speaking, I've been tested for arsenic and most people have been tested for arsenic and we're fine, there's no long-term exposure happening to Yellowknifers. I'm a bit concerned that our water source is changing. Right now, we get our water from Yellowknife river, which is upstream from Giant Mine and there's an underwater pipeline that was put in 1969 into Yellowknife. And now here we are fifty years later, and that water pipeline is past its end life. So, the city built this massive, ugly water treatment plant with the idea of eventually just drawing water directly from the bay and filtering out all those heavy metals. And there's a lot of concern in the community about what if something fails down the road and we can no longer draw water from the bay. I think that's a totally valid concern and I agree with this idea of just replacing the pipeline, get the water from where we know it's safe.

AN INTERVIEW WITH NATALIE PLATO, DEPUTY DIRECTOR OF THE GIANT MINE REMEDIATION PROJECT

Aug 19, 2020

Haley: If you could just tell me a little bit about your background, how long you've been in Yellowknife and what your position is within the Giant Mine Remediation Project?

Natalie: Sure, I'm the deputy director for the Giant Mine Remediation Project, so I'm the lead person in Yellowknife for the federal government. Crown Indigenous relations northern affairs Canada is the department responsible for the site. I'm an environmental engineer or engineering chemistry specifically so my whole career I've been working on contaminated sites and remediation. I previously was in Nunavut for quite some time running the Nunavut contaminated sites program and then my boss at the time said you need to come to Yellowknife and work on Giant. She convinced me to switch over to Giant in 2014, so I've been on this project for six years now.

Haley: How likely do you think it is that the arsenic will be removed one day and something else done with it?

Natalie: That's really tough to answer because you don't know what could happen.

We believe the freeze is the best solution, it's certainly going to work, it's a great solution.

What could happen, I don't know. We're committed to funding that research until something else is found, so there's no timeline. I hope if we're going to put all this effort and energy into research that we find something.

Haley: What would you characterize as the priorities of the remediation project?

Natalie: **100% the freeze. Getting the arsenic trioxide frozen, that is the priority, that is our critical item.**

But it's not going to happen overnight, it's going to take a bit of time to get that done. That's why it's the priority because it's going to take some time.

Haley: How do you feel about the current remediation plan, do you feel like it's holistic or do you see it as one part of a larger puzzle?

Natalie: The whole remediation plan, **it's not just the freeze, we're covering tailings, we're removing contaminated soil, we're doing some sediment work. So, in that perspective it is holistic, it addresses all of the elements on the site that have been deemed high risk or concerns to the community** as well. I would say it's a holistic plan.

Haley: I should clarify, obviously yes you are addressing all of the safety and contamination concerns. I'm looking beyond that. Do you see that there's potentially other issues beyond technical and contamination-based concerns? I don't know if you consider yourself a part of the community of Yellowknife but how do you see the future of the site because it had such sociocultural history to the community? Do you think that's something important to be addressed in the future that isn't currently a part of the scope of most reclamation projects?

Natalie: To answer your first question, 100% I'm a part of the Yellowknife community. I think I get what you're saying in terms of post remediation what the site will look like, we did extensive consultation to get people's input. That was a bit of challenge, because people had different opinions, not everyone is in agreement.

For instance, some people, the Yellowknives Dene in particular, said leave it grey so people remember what it was and don't ever forget what it was used for and people start living there for example. Whereas other community members have a very different view, this is a valuable piece of real estate let's make sure we can maximize its benefit when remediation's done, hiking trails, soccer fields, recreation, even potential residential. There were conflicting desires so from the remediation perspective we're trying to do the best job we can with the cleanup so that the options are maximized to the extent possible.

That work in terms of post remediation still has to happen, we as a remediation team haven't made those decisions because we don't feel like they're ours to make. We certainly have committed to some kind of monument or museum that could be left on site; working with the stakeholders to make sure they understand what limitations the site has.

Haley: Is there anything that you would really want to see or really not want to see on the Giant Mine site in the future?

Natalie: **It's a prime piece of real estate in the city of Yellowknife so from a personal perspective and professional as well, I would hope that there would be some future use and we would maximize that use. For instance, I can see recreation being a potential there, hiking trails, ski trails, the snow mobile club uses part of it in the winter now anyways and I hope that would continue and perhaps grow.**

We're doing the townsite area to residential, recreational standards so that's a prime piece of real estate for boating so I hope that would continue. From a professional perspective there's going to be some constraints. A big one is there's eight open pits on site, we're planning to fill them and there's underground workings, so there's going to be limitations.

I would hate to see the constraints lost, for instance you wouldn't want someone to build something on a filled in open pit that had underground mine workings, it doesn't meet the technical specifications for buildings.

Those kinds of constraints we have to be really clear on what they are, and I don't want to see that lost.

I'd like to respect what the Yellowknives Dene, as the chief land occupiers here, have stressed that they don't want people to build houses over there, so I would want to respect that as well.

Haley: Ok. That was my list of specific questions that I had for you. Is there anything you think is really critical to know about the site or significant to consider when approaching the site that isn't already obvious?

Natalie: Nothing that I haven't mentioned. I think from the work you're doing in terms of alternative mine reclamation **it's just understanding that the site's quite contentious and people have very different perspectives, like miners versus traditional land users have very different perspectives.** So that's going to be a challenge to come up with uses and that sort of thing.