

# Geologic Atmospheres

By

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Fig. 01 *Excavation*

Models serve as instruments for replicating phenomena, enabling designers to understand material processes and change over time.

## Abstract

This thesis positions atmospheres as integral to architecture due to its inherent sensorial experience. Material explorations of atmospheric generators deem materiality, reflection, and transparency as central to the creation of atmospheres in architecture. At the same time, the thesis suggests that to design within a contemporary of the Anthropocene requires engaging with the geologic. Material questions of the geologic tie with theories of the neo-sublime and post-nature, particularly when designing in post-industrial landscapes.

This thesis asks, how can concepts of both the atmospheric and the geologic inform a design investigation in complex post-industrial landscapes? The dynamics between the atmospheric and the geologic are explored in three ways. First, through exploration of how select theorists and architects position the atmospheric and geologic in their work. Second, through a series of physical models studying aggregates, casting, reflectivity, and extraction. Finally, through the design of a remediation landscape in Tar Island, Alberta. The thesis suggests that to engage with the atmospheric in design today necessarily entails engaging with its reciprocal condition, the geologic, and that using physical models enables productive engagement between the two.

## Acknowledgements

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## Introduction

The notion that the atmosphere is an immaterial presence which affects one's perception of space has been of interest to me since before my architectural education began. I wondered why I was intrigued by drawings that illustrated light as an element of architectural space-making. Looking back I realize such drawings alluded to the atmosphere of that space. From personal experiences I had an intuition that scale, material, lighting, and interaction with the elements all played a role in creating atmospheres. In the mosques of Istanbul light penetrated the perforated domes while colossal candelabras hung from thin wire, and I experienced the illusion of mysticism. At the entrance of the Architecture school at Carleton the ceiling rose to the top floor connecting every flanking room through windows and open corridors to the atrium, flooding every space with natural light. Even through mundane activities I noticed atmospheres: sitting at my desk in front of a bay window, sun shines through illuminating my room and lifting my spirits. Through these experiences, atmospheres have become a notable space-maker in architecture, and contributors to my aesthetic. Curiosity about what constitutes an architectural atmosphere and how it might inform a design process drives this thesis.

This thesis tests the limits of an atmosphere's potential in a contemporary context of climate change. What intrigued me about my past experiences was the constant presence of the natural world



Fig. 02 *Suleymaniye Mosque, Istanbul, Turkey (2018)*

The domes of the Suleymaniye Mosque in Istanbul are perforated by windows and oculi, and in the centre hangs a colossal candelabra hovering just over our heads. Visiting this mosque as part of my third-year studio project added to my aesthetic experiences.

through the interplay of light. Architecture often creates an illusion of distance from our natural environment, however my personal experiences suggest that our intrinsic connection to the natural world can be sensed through atmospheres.

At a time when environmental stewardship is of the utmost importance, it is difficult not to think of architecture's role in climate change. Specifically, how will architecture adapt to these environmental changes? What interests me is how we might be affected or attuned to the changes we perceive around us. Are there ways we might be more attuned to our environmental surroundings? How might we counteract through design the tendency to become detached from these concerns? Although most people acknowledge climate change as a pressing issue, we fail to deal with it or look away when we are forced to make a decision. This thesis engages with these questions of environmental degradation, and uses atmospheres as a way of developing a dialogue between change and heightened experiences of it.

Architecture and the processes associated with it makes up a large part of the world's degrading landscapes. The scale of the environmental footprint of architecture can be hard to grasp when we take into account the extraction of resources, its shipping from overseas locations, and its maintenance after construction is finished. This thesis incorporates a design proposal for remediation interventions as a way of trying to reconcile scales of environmental destruction. The design operates at two scales – that of the

landscape and that of the individual. Working between a discrete moment and a larger landscape has helped guide design choices, allowing for this speculative design to become grounded.

Throughout the thesis physical model-making and photography allow me to explore these questions. Model-making is an intrinsically tactile process, engaging with all the senses. Such a process is suitable for a project concerned with sensorial perception as a way of sensing atmospheres. Contrastingly, light acts as an invisible material which alters the understanding of a model. Photography allows for decontextualization of these models, making them open for interpretation. Allowing the images to be interpreted in different ways became pertinent as it engages with each viewer's individual perspective. Photographs of model studies and photographs of reference projects operate as a dual strand to writing. In this way, theory explored through writing is explored in parallel to material insights explored through model making and photography.

The thesis is structured into three chapters: the Atmospheric, the Geologic, and Tar Island. The first chapter introduces theories of aesthetics proposed by Gernot Böhme in order to explore how and why atmospheres are created in architecture. Additionally, physical models are used to test how materiality, light, and transparency generate atmospheric qualities. The second chapter focuses on the works of Diana Agrest, Alan Berger, and Design Earth, exploring theories of engaging with a post-industrial landscape. The third and final chapter explores the relationship between the at-

atmospheric and the geologic in the remediation project of an open-pit mine in Tar Island, Alberta. The proposal uses design principles outlined as atmospheric to create interventions in a post-industrial landscape, while making evident processes of reclamation.



01 The Atmospheric

## 1.1 Sensing Atmospheres

Atmospheres are commonly understood as a mood or feeling that an object emanates, and thus tends to be thought of as immaterial. This section positions the atmospheric as a series of spatial conditions that prioritize aesthetic experience. Mark Wigley's article *The Architecture of Atmospheres* (1998) is used to question what it means to design atmospheres in the architectural discipline. Projects from architects Tadao Ando and Peter Zumthor are studied simultaneously, highlighting elements that construct atmospheres in each building. Zumthor's book *Atmospheres: Architectural Environment, Surrounding Objects* (2006) also provides guidelines for designing atmospheres by focusing on materiality and light as key components. Essays from philosopher Gernot Böhme provide links between aesthetic theory and contemporary environmental issues. Böhme refers to the sublime through Immanuel Kant's definition as a way of experiencing atmospheres in the landscape, opening up discussions about aesthetic experience in exterior spaces. This chapter explores the following questions: How can atmospheres be constructed through architecture? And what guidelines do they use to construct an atmosphere?

Architect and theorist Mark Wigley positions atmospheres as intrinsic to architecture since that is what we sense when we enter a space. He begins his article with the following: "How is atmosphere constructed? Atmosphere seems to start precisely where the con-

Atmospheric



Fig. 03 Tadao Ando, *Church of the Light*, 1999, Ibaraki, Japan. Image by Hiroshi Sugimoto  
This photograph of Tadao Ando's Church of the Light captures an ethereal space where the only source of light permeates through a cross-shaped opening. A mystical presence is apparent here through the construction of space with light and shadow.

struction stops. It surrounds a building, clinging to the material object.”<sup>1</sup> Wigley implies that an atmosphere cannot be physically built and architects must design what he calls ‘generators.’ Generators such as light, scale, and air flow construct the atmospheres that we either consciously or unconsciously perceive. In this thesis, these generators are referred to as the *atmospheric* constituting them as part of a buildings atmosphere. Wigley suggests that in aiming to design an immaterial thing like an atmosphere, an architect fails. We must therefore think of it as designing the material and spatial conditions that can elicit an atmosphere. Thus, he writes “Any specific proposal for constructing atmosphere, no matter how changeable or indeterminate, is no longer atmospheric.”<sup>2</sup> This is a starting point for regarding the atmosphere as something to be designed. Unlike a clay sculpture that can be moulded to construct a physical object, the atmosphere must be approached through a set of design principles which will allude to the atmospheric.

Pritzker Prize winner Peter Zumthor is known for his meticulous attention to materiality and site as seen in projects such as Kolumba and the Therme Vals. His book *Atmospheres: Architectural Environment, Surrounding Objects* serves as a manifesto, outlining his own design principles used to design buildings that epitomize sensory and experiential qualities. He writes “We perceive atmo-

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1 Mark Wigley, “The Architecture of Atmosphere,” *Daidalos* 68 (1998): 18, <http://www.arch.mcgill.ca/prof/klopp/arch678/fall2008/3%20Student%20exchange/M1%20Aaron:s%20Studio/M1%20reader/Wigley,%20Daidalos%2068,%20Architecture%20of%20Atmosphere.pdf>.

2 Wigley, 27.



Fig. 04 Peter Zumthor, Model of Bruder Klaus Chapel from *Atmospheres: Architectural Environment, Surrounding Objects*

Zumthor emphasizes materiality, light, and sensorial experiences in his built projects. This photograph of the Klaus Bruder Chapel captures the charred texture of this unconventional surface, accentuated by natural light from above.

sphere through our emotional sensibility – a form of perception that works incredibly quickly, and which we humans evidently need to help us survive.”<sup>3</sup> Throughout the text, Zumthor mentions scenarios in which he experiences unique atmospheres, and describes these through his sensorial experience. He defines his experience of sitting in a public square as follows, “So what moved me? Everything. The things themselves, the people, the air, noises, sound, colours, material presences, textures, forms too...”<sup>4</sup> By describing his experience of such a mundane activity through what he sees, hears, touches, and smells, Zumthor confirms that we perceive atmospheres through our senses. The human body now becomes the gateway through which the atmospheric is translated as a feeling. Zumthor puts to practice Wigley’s suggestion for designing generators by emphasizing materiality, light, and sensorial experiences in his built forms.

Theories of phenomenology that are catalyst to Zumthor’s works are notably studied by philosopher Gernot Böhme. Throughout the series of essays compiled in *The Aesthetics of Atmospheres*, Böhme positions the atmosphere as a co-presence between of subject and object. In one of these essays titled “Atmosphere as the Fundamental Concept of a New Aesthetics” (1993) Böhme writes, “...to talk about atmospheres, you must characterize them by the way they affect you. They tend to bring you into a certain mood,

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<sup>3</sup> Peter Zumthor, *Atmospheres: Architectural Environments, Surrounding Objects* (Basel: Birkhäuser, 2006), 13.

<sup>4</sup> Zumthor, 17.

and the way you name them is by the character of that mood.”<sup>5</sup> He describes atmospheres with the premise of a feeling or emotion, however he elaborates more on the link between embodied experiences and the emotional. He writes, “Atmosphere is the common reality of the perceiver and the perceived. It is the reality of the perceived as the sphere of its presence and the reality of the perceiver, insofar as in sensing the atmosphere s/he is bodily present in a certain way.”<sup>6</sup> Experiencing atmospheres is described as a way of sensing the reality of the object we perceive and the reality of our existence in the world. Whereas Zumthor and Wigley regard the atmospheric in the realm of architecture, Böhme opens the discussion to atmospheres in exterior spaces. He refers to art as a form of visually promoting this, using land art as an example of the ephemeral.<sup>7</sup>

Experiences of atmospheres in exterior spaces are further studied through theories of the sublime, in particular Immanuel Kant’s *Critique of Judgment* (1790). Kant’s theory of beauty says that indefinite shapes are beautiful because we contemplate them and that creates joy in the search for form.<sup>8</sup> Such indefinite shapes were seen in natural phenomena by Kant, connecting aesthetics to the natural world. Kant talks of beauty in the same way that Böhme talks

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5 Gernot Böhme, *The Aesthetics of Atmospheres* (London: Taylor & Francis Group, 2016), ProQuest Ebook Central, 2.

6 Böhme, 20.

7 Böhme, 6.

8 Böhme, 59-60.



Fig. 05 Tadao Ando, *Soseikan-Yamaguchi House*, 1975-76, Hyogo, Japan

Böhme's notion that experiencing atmospheres is a dual experience of sensing our reality and the presence of the world around us might apply to any building, but can be amplified. This photograph of Tadao Ando's *Soseikan-Yamaguchi House* captures the experience of walking down a dark hallway to then be inundated by natural light. This image prioritizes lighting rather than architectural objects, referring back to Wigley's notion of atmospheric generators.

of atmospheres; they are subjective because they depend on the way one perceives them: “The truly human state, humanity, is not a given for Kant, but must be brought about through education and upbringing. This education is, on the one hand, the prerequisite for aesthetic experience and judgment. On the other hand, aesthetics or, more precisely, beautiful art, for its part, promotes the development of humanity.”<sup>9</sup> Kant argues that in allowing our emotions to come forth in the presence of beauty or an atmosphere, we are indulging in our basic human need to feel. To feel, not in the tangible sense, but the intangible phenomenon that evokes emotions. This means that the atmospheric is a primal concern in architecture, used methodically by architects to elicit a sensorial experiences. Kant’s relation of the aesthetic to natural phenomena also evokes a different perspective of experiencing atmospheres, insinuating that guidelines outlined by Wigley and Zumthor can be thought of at a scale larger than a building.

Mark Wigley, Peter Zumthor, and Gernot Böhme define the atmospheric by establishing sensorial experiences as that which allows us to perceive an atmosphere. Zumthor prioritizes bodily presence in his descriptions of atmospheric experiences, linking atmospheres to sensorial perceptions. As such, methods of interacting with the senses become crucial. Böhme provides a more critical analysis of this phenomena and proposes that aesthetic experiences become ways of sensing our presence in the physical world.

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<sup>9</sup> Böhme, 49.

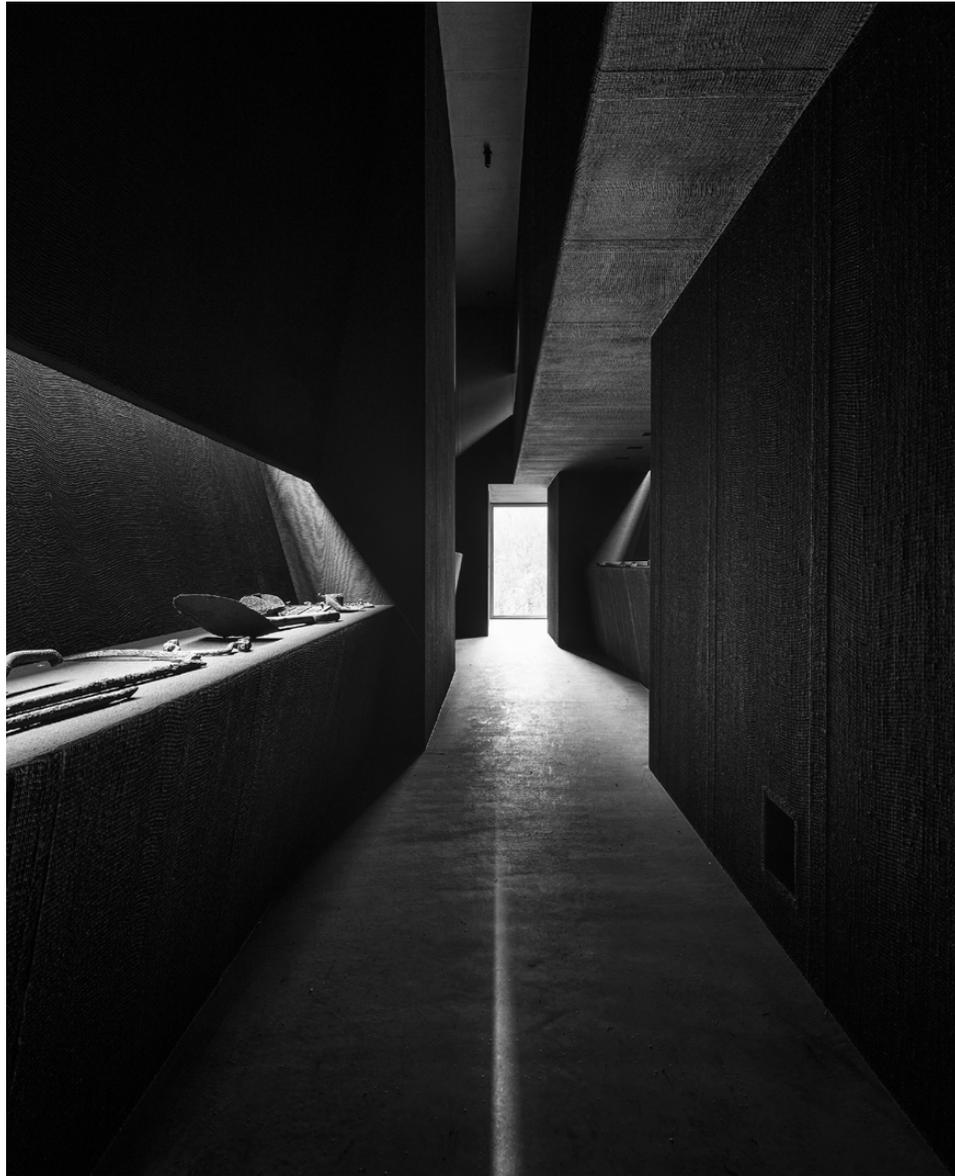


Fig. 06 Peter Zumthor, *Zinc Mine Museum*, 2016, Allmannajuvet, Norway. Image by Aldo Amoretti

When describing Peter Zumthor's Zinc Mining Museum, Jessica Mairs notes: "The angular walls and ceiling of the space are textured with linear markings that appear to reference the cuts made into stone to extract zinc."<sup>10</sup> The tactile relation of wall to landscape suggests ways of experiencing the landscape aesthetically as advocated in Kant's sublime.

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10 Jessica Mairs, "Peter Zumthor's Stilted Zinc Mine Museum Captured in New Photography," *Dezeen*, June 20, 2017, <https://www.dezeen.com/2017/06/02/peter-zumthor-stilted-zinc-mine-museum-buildings-aldo-amoretti-photography-norway/>.

Through these readings, the body is established as the locus of perception of atmospheric conditions. Through sensorial experiences, atmospheric qualities are translated to the mind as emotional experiences, linking the atmospheric with the emotional.

## 1.2 Modelling Atmospheres

If the atmospheric is a sensorial, embodied experience marked by certain effects, how does one *design* the atmospheric? Images in the previous section suggests that light, texture, materiality, reflectivity, and transparency play a particular role in creating atmospheres. Zumthor offers an approach for designing with these qualities in mind: “So the first of my favourite ideas is this: to plan the building as a pure mass of shadow then, afterwards, to put in light as if you were hollowing out the darkness, as if the light were a new mass seeping in ... The second idea I like is this: to go about lighting materials and surfaces systematically and to look at the way they reflect the light.”<sup>1</sup>

Böhme writes, “The materials are, so to speak, emancipated. Their functional liberation enables them to exit as pure appearance...”<sup>2</sup> He goes on to say “Materiality is supposed to show itself, to come forward, to help shape the atmospheres in which we live. Material and materiality thus part ways...”<sup>3</sup> He suggests a shift in the way atmospheres must be studied, saying “The aesthetics of atmospheres shifts attention away from the ‘what’ something represents, to the ‘how’ something is present. In this way, sensory per-

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1 Peter Zumthor, *Atmospheres: Architectural Environments, Surrounding Objects* (Basel: Birkhäuser, 2006), 59.

2 Gernot Böhme, *The Aesthetics of Atmospheres* (London: Taylor & Francis Group, 2016), ProQuest Ebook Central), 142

3 Böhme, 142.



Fig. 07 Peter Zumthor, *Bruder Klaus Chapel*, 2007, Mechernich, Germany. Image by Aldo Amoretti

Zumthor's subtractive method of space-making is most notable in this chapel that was constructed from poured and rammed concrete on a wooden framework. After the concrete settled the wooden frame was burned, leaving a charred surface on the inside.<sup>2</sup>

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<sup>2</sup> Megan Sveiven, "Bruder Klaus Field Chapel / Peter Zumthor," ArchDaily, January 26, 2011, [https://www.archdaily.com/106352/bruder-klaus-field-chapel-peter-zumthor?ad\\_medium=gallery](https://www.archdaily.com/106352/bruder-klaus-field-chapel-peter-zumthor?ad_medium=gallery).

ception as opposed to judgment is rehabilitated in aesthetics ...”<sup>4</sup> Wigley takes a similar view, saying “It [atmosphere] is some kind of sensuous emission of sound, light, heat, smell, and moisture; a swirling climate of intangible effects generated by a stationary object.”<sup>5</sup> In both these descriptions, our senses act as a gateway between an intangible presence to a perceived atmosphere. The atmospheric, defined as “how” something is present and intangible effects, is what links these together.

All three recognize that to design an atmosphere means to design for a sensorial experience. Zumthor thinks about creating atmospheres in terms of how light and materials interact to emphasize texture and reflection. Böhme takes a different stance, separating materials from materiality, which establishes materiality as a generator of atmospheres. Wigley claims that the end goal of architecture should be to design the atmospheric.

In order to build on this understanding of how to design the atmospheric, I completed a series of material model studies. These studies focused on the traits identified as being generators of the atmospheric, including materiality, reflectivity, and transparency. The following pages act as a visual catalog of these material experiments, which guided the design development of this thesis. Questions of experiencing atmospheres in the natural environment arise

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4 Böhme,, 26.

5 Mark Wigley, “The Architecture of Atmosphere,” *Daidalos* 68 (1998): 18, <http://www.arch.mcgill.ca/prof/klopp/arch678/fall2008/3%20Student%20exchange/M1%20Aaron%20Studio/M1%20reader/Wigley,%20Daidalos%2068,%20Architecture%20of%20Atmosphere.pdf>.

through these models. In the next chapter, the dynamics between the atmospheric and the geologic will be further explored, extending Kant's aesthetic theories to that of the neo-sublime.



Fig. 08 *Plaster study*

I first studied materiality in its simplest form, asking myself what the characteristics of a material are. I began with plaster and casting. The material on its own has no texture, however because of its fluid characteristic it can easily attain the texture of the mould its poured into. This image shows how texture is transferred to the plaster block.



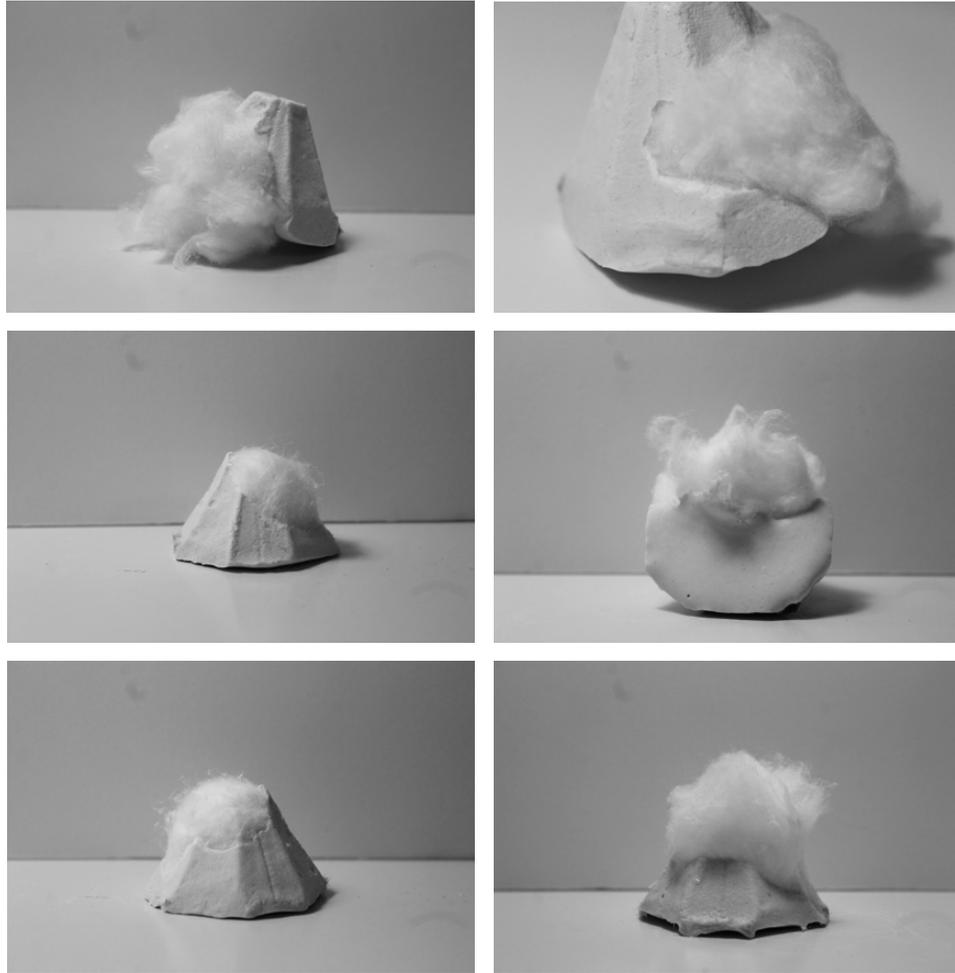
Fig. 09 *Biochar aggregate*

I added biochar as an aggregate to plaster. Biochar is a charcoal-like form of recycled paper typically used in gardening, but because of its lightweight properties it is being experimented on as an aggregate for concrete. The result was a lighter block than the pure plaster model. The model raised interesting questions about material additives, material cycles, and material porosity.



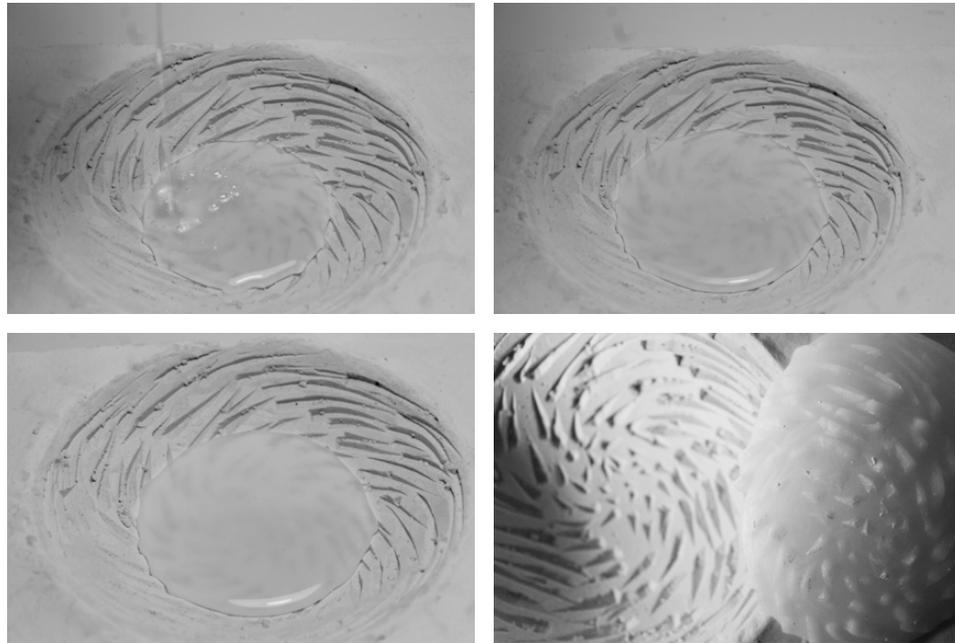
Fig. 10 *Soil aggregate*

I used soil as an aggregate in order to investigate the difference in materiality and porosity of a processed material like biochar and a raw material like soil. I tested the blocks resiliency by carving it, suggesting a way of working subtractively similar to Zumthor's design sensibilities.



**Fig. 11** *Density vs. Airiness*

After experimenting with plaster and aggregates, I studied it in relation to materials which would counter its heavy and malleable characteristics. I added cotton in order to contrast it with plaster as it is light and almost shapeless. These series of model studies are a result of casting plaster onto cotton, resulting in mini casts with cotton embedded in them. These models suggested processes of juxtaposing contrasting materials in terms of their qualities.



**Fig. 12** *Ephemeral Fluidity*

I developed a series of casts that included several material operations: casting, subtracting, and then casting again. I cast a plaster brick with a concave surface, then subtracted it more by carving into it. Melted wax was then poured into the bowl, resulting in a translucent version of plaster, as it also hardens quickly and takes the shape of its mould. The span of time between each of these photographs was seconds, making this process a fleeting moment. As the wax hardened over the plaster, it took the shape of the bowl and the texture of the plaster was transferred onto the wax. These studies opened up ways of thinking about processes of state change over time.



Fig. 13 *Fractured Landscapes*

I studied reflectivity as the interaction of a material with light, and the effects of that in photography. This photograph resembles a mountainous landscape on a waterfront, suggesting sites of intervention that embody atmospheric qualities. Böhme's interpretation of atmospheres as existing in exterior spaces is evident in this and the following photographs.



**Fig. 14** *Relocating Extracted Material*

I completed a series of subtractive models, which suggested ethereal topographies. Photographing these topographies suggesting vast landscapes with peculiar mechanisms. This photograph suggests the piling of extracted material to create topographic variation.

## Atmospheric

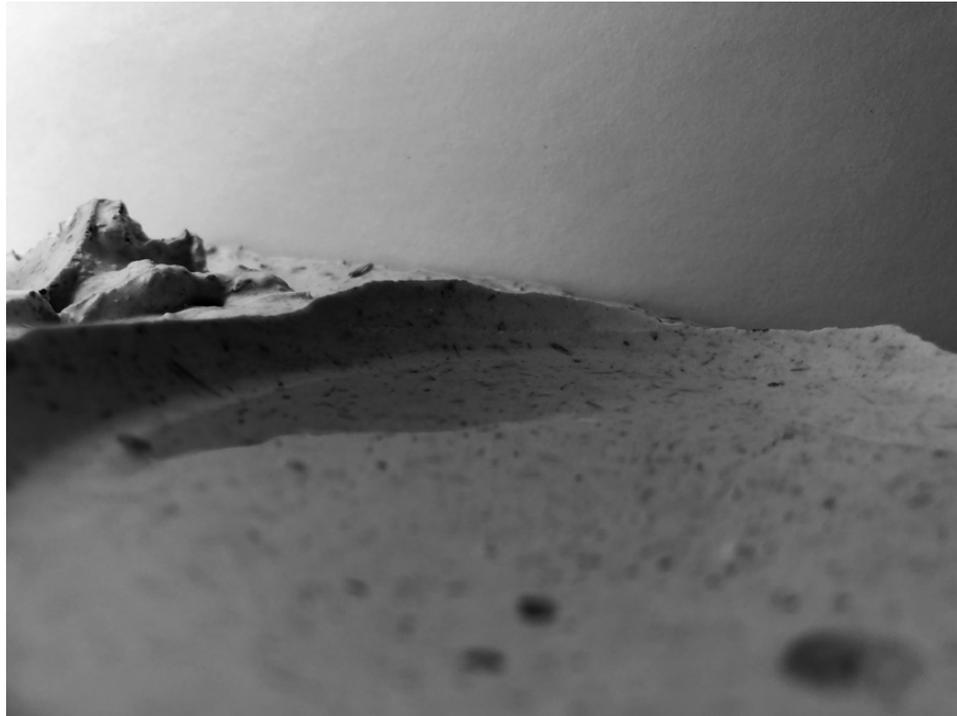


Fig. 15 *Ethereal Landscapes*

I completed further casts, which were read as otherworldly landscapes, suggesting an intervention in an unconventional site. The vast body of water implies some sort of interaction with water mechanisms.

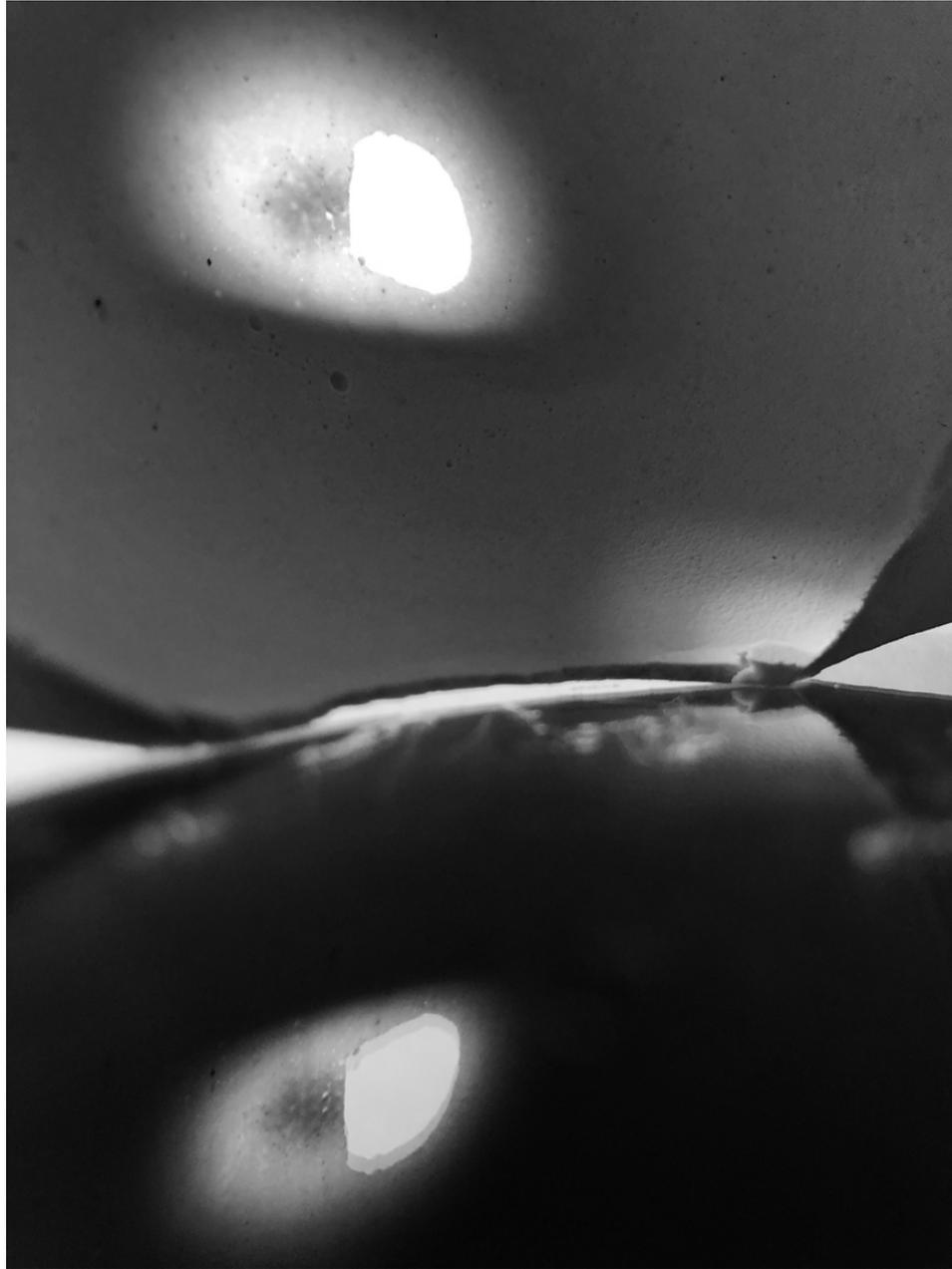
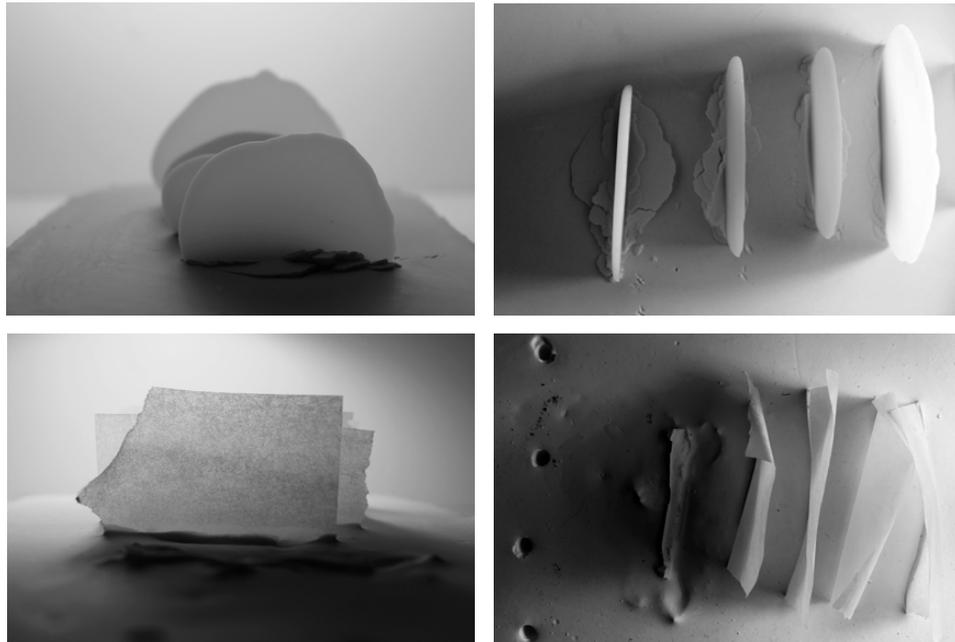


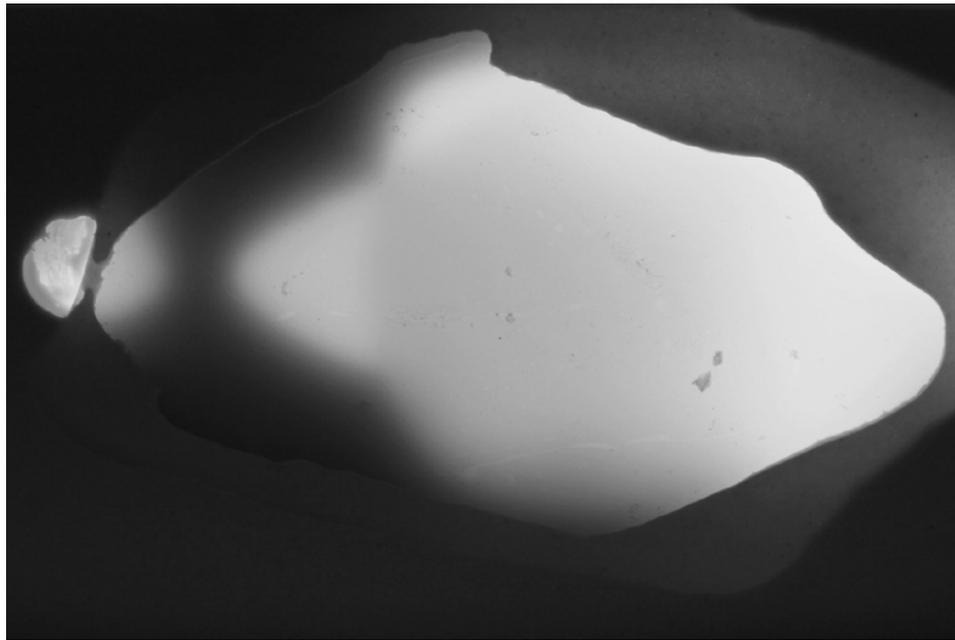
Fig. 16 *Gradience of Plaster*

I developed a series of models to test transparency and translucency as methods of controlling the permeation of light. This photograph suggests different forms of light penetration; through defined openings that frame the exterior and through translucent materials that obstruct views beyond. Tadao Ando's Church of the Light suggests ways of applying these methods into architecture.



**Fig. 17** *Filtration with Paper and Wax*

I aggregated luminous materials to develop gradient conditions with tracing paper and wax, arranging them into layers to observe the diffusion of light. These studies suggested a filtration system of light through multiple translucent layers.



**Fig. 18** *Gradience of Wax*

I layered the wax slabs and the outcome was different zones where light penetrated and where it was fully opaque. These studies suggest a method for diffusing light, creating luminosities and gradients. This model can be interpreted as qualities that a wall could have, positioning a material study as an architectural element.



## 2.1 Designing in the Anthropocene

In the previous chapter, theories from Mark Wigley, Peter Zumthor, and Gernot Böhme positioned atmospheric design as constructing a sensorial experience. Additionally, Kant's sublime proposed that natural landscapes instigate a search for form, resulting in admiration. Simultaneously, buildings of Tadao Ando and Peter Zumthor were investigated as architectures that create atmospheres through traits of materiality, lighting, and the experiential. Material model studies building from these investigations identified generators of the atmospheric, including *materiality*, *reflectivity*, and *transparency*. A dual reading of these models suggested the existence of atmospheric qualities beyond the building, embedded in the geologic landscape. In this chapter, the geologic as atmospheric is defined through insights raised from previous model studies; material cycles and porosity, working subtractively, juxtaposing immaterial with tactile, landscapes that embody atmospheric qualities, and landscapes with mechanisms of retention, piling, carving, and filtration (Fig. 19). Such processes involved in model making replicate processes evident in a geologic landscape. These models thus provide a link between sensorial experience and the landscape one inhabits.

The geologic will first be studied in relation to the term nature and how it is defined in light of climate change. Methods of representing geologic phenomena will then be outlined as primordi-

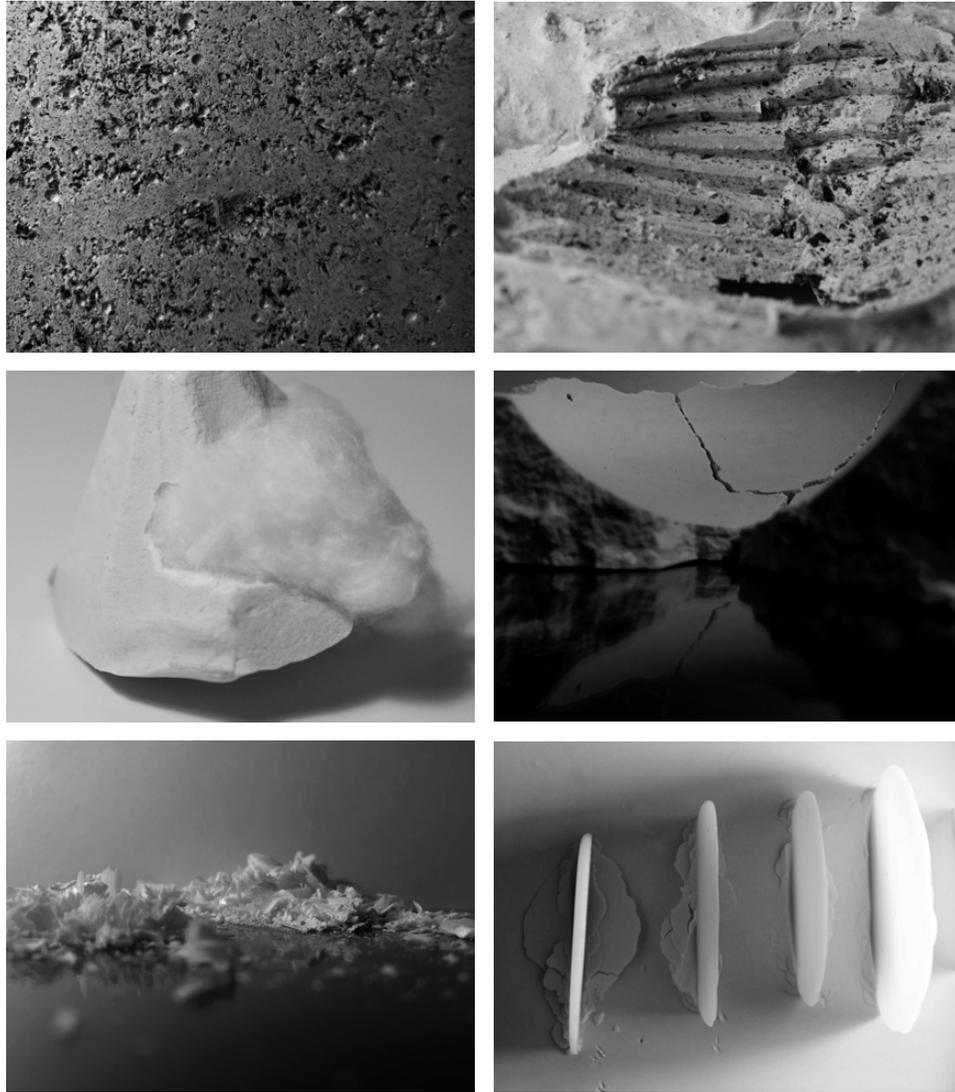


Fig. 19 *Model Studies as suggestive of Geologic Atmospheres*

Material cycles and porosity, working subtractively, juxtaposing immaterial with tactile, landscapes that embody atmospheric qualities, and landscapes with mechanisms of retention, piling, carving, and filtration.

al in understanding their connection to climate change. This section relates Böhme's notion of the atmospheric in exterior spaces to contemporary issues of climate change, raising questions about what constitutes nature in light of the Anthropocene. In *Architecture of Nature: Nature of Architecture* (2018) Diana Agrest introduces the Anthropocene: "One of the most recent constructions of nature proposes the notion of the Anthropocene, in which the effect of anthropogenic activity on Earth is of such magnitude that it merits being considered as a new geological epoch succeeding the Holocene, the epoch in which we were supposedly and stratigraphically still living."<sup>1</sup> Although this term has made us aware of our impact on the Earth, Agrest suggests that it implies a saviorism complex over it.<sup>2</sup> In *Towards a Minor Architecture* (2012) Jill Stoner states the term *nature* no longer has relevance since "the concept of nature is itself a cultural invention..."<sup>3</sup> Bill McKibben's *The End of Nature* (1989) serves as a catalyst for these theorizations in recognizing the imminent death of the term *nature*, and the beginning of the term *post-nature*. This section also explores the work of several contemporary practitioners and theorists who describe approaches to designing within the geologic epoch known as the Anthropocene. Simultaneously, models from the previous chapter are interpreted as existing in a degraded landscape, providing alternative ways of

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1 Diana Agrest, *Architecture of Nature: Nature of Architecture* (Novato, CA: Applied Research and Design Publishing, 2018), 11.

2 Agrest, 11.

3 Jill Stoner, "Reterritorialization: The Myth of Nature," in *Toward a Minor Architecture* (Cambridge, MA: MIT Press, 2012): 94.

designing in the Anthropocene.

In the previous chapter, Gernot Böhme's work was studied in relation to his theorization of aesthetic experience and its relation to the human senses. This section expands on this work and proposes links between aesthetic theories about the atmospheric to how we might define nature. His essays from 1995 to 2002 compiled in *The Aesthetics of Atmospheres* are the point of departure in analyzing these links. In "Body, nature, and art" (1999) Böhme delves into the idea that through personally experiencing our harmful actions on exterior nature we become aware that we are ourselves nature.<sup>4</sup> He uses the terms 'exterior nature' and 'inner nature' to differentiate between the natural world (outside of our human body) and our interior realities (our senses and emotions). He refers to Paracelsus' remark that we live in the passage of elements (we inhale air, we are fed from the earth, we drink water, and our brains are nourished with fire through education)<sup>5</sup> as a way of explaining our interconnectedness with exterior nature. These descriptions of aesthetic experiences position the senses as actors in understanding the geologic world around us. Böhme claims we must be aware of our duality with exterior nature if we are to reinterpret the meaning of *nature*.

This inversion of *nature* from an exterior force to our sensori-

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4 Gernot Böhme, "Body, nature, and art," in catalog *Natural Reality: Artistic Positions between Nature and Culture*, Daco Verlag and Ludwig Forum for International Art Aachen (1999): 112.

5 Böhme, 114.

al experience positions humans as part of this post-natural world. In “Nature as a subject” (2002) Böhme uses the term *natural oblivion* to refer to humans who have forgotten their affiliation with nature, and claims that art (in this case architecture) is an agent in challenging this.<sup>6</sup> He notes that through aesthetic experiences we become aware of our inner-nature, namely our bodily senses, which are neglected as such.<sup>7</sup> While the senses mediate to us the experiential geologic, they are also inherently part of nature. Nature thus surpasses the notion scale, ranging from planetary natural phenomena to our personal sensorial experience. For Böhme, becoming aware of this is essential to confront an Anthropocene world “Because the relation of modern man with nature can only be revised when he experiences himself as nature.”<sup>8</sup>

As an architect and urban designer Diana Agrest is interested in the representation of natural phenomena. In her book *Architecture of Nature: Nature of Architecture* (2018) she compiles student work that documents extreme phenomena (both natural and human-made) while omitting human presence in their representations. She does this to refrain from marginalizing nature as an opposition to the human. Böhme studies this “othering” of nature saying, “Since the

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6 Gernot Böhme, “Nature as a subject,” in catalog *Making nature*, Nikolaj Contemporary Art Center, Copenhagen (2002): 119.

7 Gernot Böhme, “Body, nature, and art,” in catalog *Natural Reality: Artistic Positions between Nature and Culture*, Daco Verlag and Ludwig Forum for International Art Aachen (1999): 115.

8 Gernot Böhme, “Body, nature, and art,” in catalog *Natural Reality: Artistic Positions between Nature and Culture*, Daco Verlag and Ludwig Forum for International Art Aachen (1999): 115.

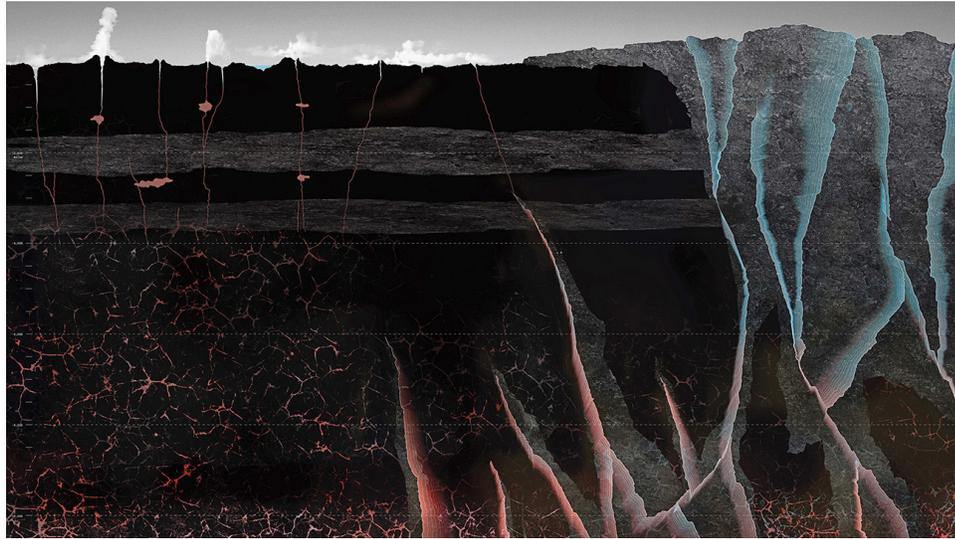


Fig. 20 Chung-Wei Lee, *Liquid Tectonics*, 2018

The lack of the human in this drawing positions this site as an evolving system regardless of human activity. The section shown reveals the complex water system that lies beneath the surface at the Yellowstone caldera, simultaneously narrating the history of the site by unearthing 10,000 miles in depth of subterrain. Omitting human presence in this representation of geologic history allows for an understanding of nature without being opposed to the human.

Greek enlightenment, the outline of the term ‘nature’ has been defined through contrasts: nature and technology, nature and culture, nature and civilization, nature and law are examples of this.”<sup>9</sup> Defying this notion, Agrest defines nature as its own entity, prevalent and evolving regardless of human activity: “... nature is freed from the binary sets of oppositions within which it has been defined, becoming itself the object of study.”<sup>10</sup>

Agrest suggests taking a step back and, “...understanding the Earth as a living organism in its forces and complex material interactions, before and after human intervention, a perspective that is not about the taming of nature but about getting to know its untamable dimensions.”<sup>11</sup> She tackles the use of nature head-on by omitting humans from these representations, framing nature as its own living organism. Although the popularization of the term Anthropocene helped draw attention to our overbearing impacts on the Earth, Agrest claims its etymology suggests man is once again at the centre. Such an ideology suggests that we will find solutions through problem-solving and be framed as saviours of the world.<sup>12</sup> Surpassing this ideology is key to designing in light of climate change, as it was this ideology that positioned us here in the first place.

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9 Gernot Böhme, *The Aesthetics of Atmospheres* (London: Taylor & Francis Group, 2016), ProQuest Ebook Central, 104.

10 Diana Agrest, *Architecture of Nature: Nature of Architecture* (Novato, CA: Applied Research and Design Publishing, 2018), 8.

11 Agrest, 12.

12 Agrest, 11.

Architectural writer Jill Stoner is critical of the use of the term *nature*. In her book *Toward a Minor Architecture* (2012) she writes, “Nature’s place in the discipline of architecture is particularly striking: it is both celebrated and excluded.”<sup>13</sup> Stoner expands on this: “Historically, nature has been cast as an enigmatic ‘other.’ But primordial nature as that which preceded (and precedes) civilization and culture is necessarily mythic; it disappeared at the very moment that it became so explicitly defined.”<sup>14</sup> She talks about the relocation of the peregrine falcon into cities after their habitats were destroyed, and their adaption to this new habitat. She states “Their responsiveness to what all assumed would be an alien landscape has much to teach us about how to redefine “nature” in the context of the contemporary metropolis.”<sup>15</sup> This story alludes to the mythical notion of nature she proposes, reinterpreting what nature means in light of climate change.

Adapting insinuates moving away from ideologies of saviourism, as stated by Agrest. Stoner writes “In anticipation of ongoing climate change and the inevitability of rising water, one of the great debates is whether to include or to exclude...”<sup>16</sup> Designing in an Anthropocene world requires architects to reflect on the professions role in geomorphology, as buildings continue to create a new strata

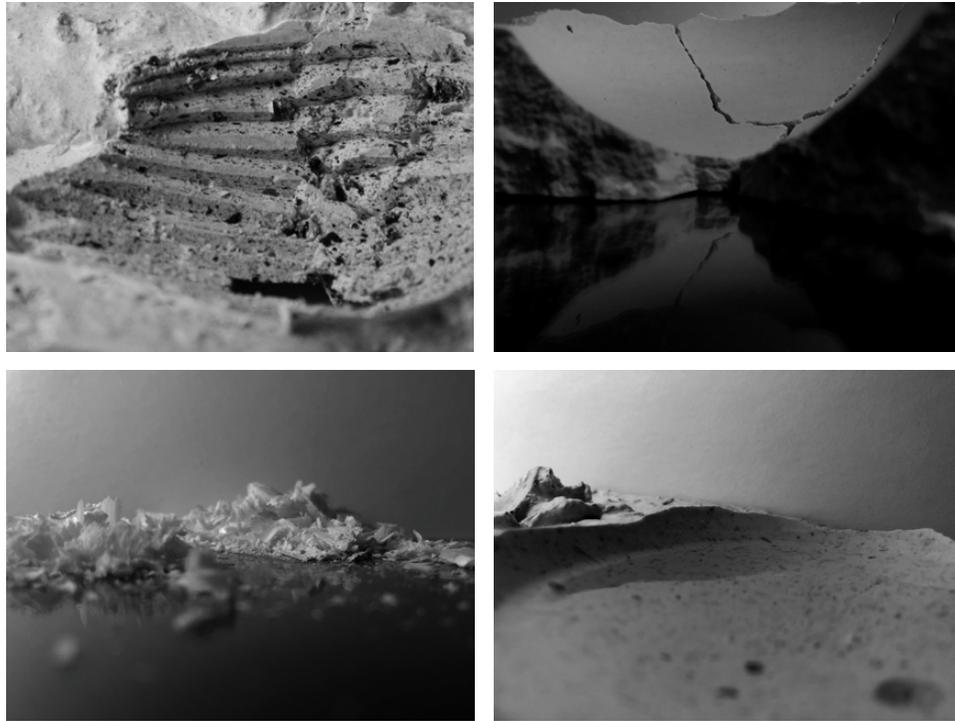
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13 Jill Stoner, “Reterritorialization: The Myth of Nature,” in *Toward a Minor Architecture* (Cambridge, MA: MIT Press, 2012): 94.

14 Stoner, 94.

15 Stoner, 98.

16 Stoner, 94.



**Fig. 21** *Interface of Atmospheric and Geologic*

As model studies progressed, they veered more towards extractive conditions. I began to read material and spatial conditions in the models, which started to inform the framework for a design intervention. This study raised questions about a geology with atmospheric qualities, insinuating a connection between scales of the planetary and the building. The simultaneous readings of these images suggest that I reinterpret the atmospheric and the geologic as two phenomena that make up the interface between immediate sensorial experience and prolonged environmental degradation.

on the Earth's surface. "...the illusion that emerging technologies will recalibrate our relationship with nature, and that architecture can be their handmaiden, holds us in thrall."<sup>17</sup> Both Agrest and Stoner suggest approaching design in a way that is less focused on solutions and more on recalibration.

If the Anthropocene defines the Earth's geologic era as being constructed by humans, then how might we take this concept into account through our design interventions? Böhme, Agrest, and Stoner provide a theoretical background on reconceptions of nature. A recurring theme throughout discourse on the geologic has been the lack of fathomable representation of natural or human-made phenomena central to climate change. By looking at projects from landscape and urbanism architects, modes of representing geological processes at the planetary scale will be outlined, answering the question of designing in the Anthropocene.

Alan Berger is a landscape architect proficient in the reclamation of abandoned mining sites. His book *Reclaiming the American West* (2002) redefines the design process, writing "Reclaiming landscapes requires one to abandon the idea of designing landscapes as finalized objects or images and instead adopt a design approach engaged with open-ended ecological processes."<sup>18</sup> The term 'design' is associated with acts of planning, systemizing, or drawing with a

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17 Stoner, 93.

18 Alan Berger, "Reclaiming the American West," *PRAXIS: Journal of Writing Building*, no. 4 (2002): 85. Accessed March 4, 2021. <http://www.jstor.org/stable/24328960>.



function or result in mind. Landscape design in this view seems to be contradictory to Berger's statement. Thus, he calls designers to reapproach the notion of design as not taking full control over the intended landscape, but to accommodate for ecological processes to take their course.

Berger's design approach resonates with Steven Jackson's 'Broken World Thinking' proposed in *Media Technologies: Essays on Communication, Materiality, and Society* (2014). As the name insinuates, broken world thinking acknowledges "the real limits and fragility of the worlds we inhabit—natural, social, and technological—and a recognition that many of the stories and orders of modernity... are in process of coming apart..."<sup>19</sup> It places dissolution rather than innovation as the primary focus of technology,<sup>20</sup> which can be understood similarly for design disciplines. Broken world thinking essentially flips the design process by looking at the eventual stage of "failure" or "death" in a material, building, and/or landscape in order to inform how it will be designed.

Berger outlines methods of representation of reclaimed landscapes, mainly how to capture the visible and invisible evidence of degradation of these sites. He claims the visible elements are captured through cartography and photography, merely showing what lies on the surface. In turn, the invisible can be depicted through mappings which reveal hidden information. Berger provides a

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19 Steven J. Jackson, "Rethinking Repair," in *Media Technologies: Essays on Communication, Materiality, and Society* (Cambridge (MA): MIT Press, 2014), 221.

20 Jackson, 222.



**Fig. 23** *Gradient wall*

I collaged a model that tested transparency and translucency with photographs of a degraded landscape in order to imagine an intervention in such a site with atmospheric qualities. In this conceptual collage, low opacity walls allow framing of views into the landscape. Processes of extraction and depositing can be overlooked. My inclination to designing in the Anthropocene is to use aesthetic experience as a way of communicating reclamation processes as suggested by Berger.

breakdown of his process for representing reclamation sites: “The first reading is as a collection of visible indicators that document where alterations have occurred over time...The second reading records landscape alterations that are invisible or physically veiled, such as chemical, microscopic, and underground processes and phenomena.”<sup>21</sup> These methods of recording and representing are important to Berger because they can be used to create a hybrid drawing embedded with invisible data and visible geophysical alterations, which he claims is key to making landscapes of the Anthropocene sites of design investigation.

Design Earth is a firm led by Rania Ghosn and El Hadi Jazairy which engages with the geologic as design investigation concerned with architecture and politics. In their book *Geostories*, they position humans as agents of environmental degradation, calling us “geographical leviathan.”<sup>22</sup> As such, they propose designing landscapes of the Anthropocene by acknowledging traces of human activity left on the Earth, and new narratives for such sites based on speculative futures that act as a way of world making.<sup>23</sup> Speculating on a world proliferated with such fractured landscapes, the projects from *Geostories* investigate abandoned mines, oil fields, landfills, and other destructive sites to propose an “architecture with exter-

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21 Alan Berger, “Reclaiming the American West,” *PRAXIS: Journal of Writing Building*, no. 4 (2002): 89. Accessed March 4, 2021. <http://www.jstor.org/stable/24328960>.

22 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 11.

23 Ghosn and Jazairy, 21.

## The Geologic

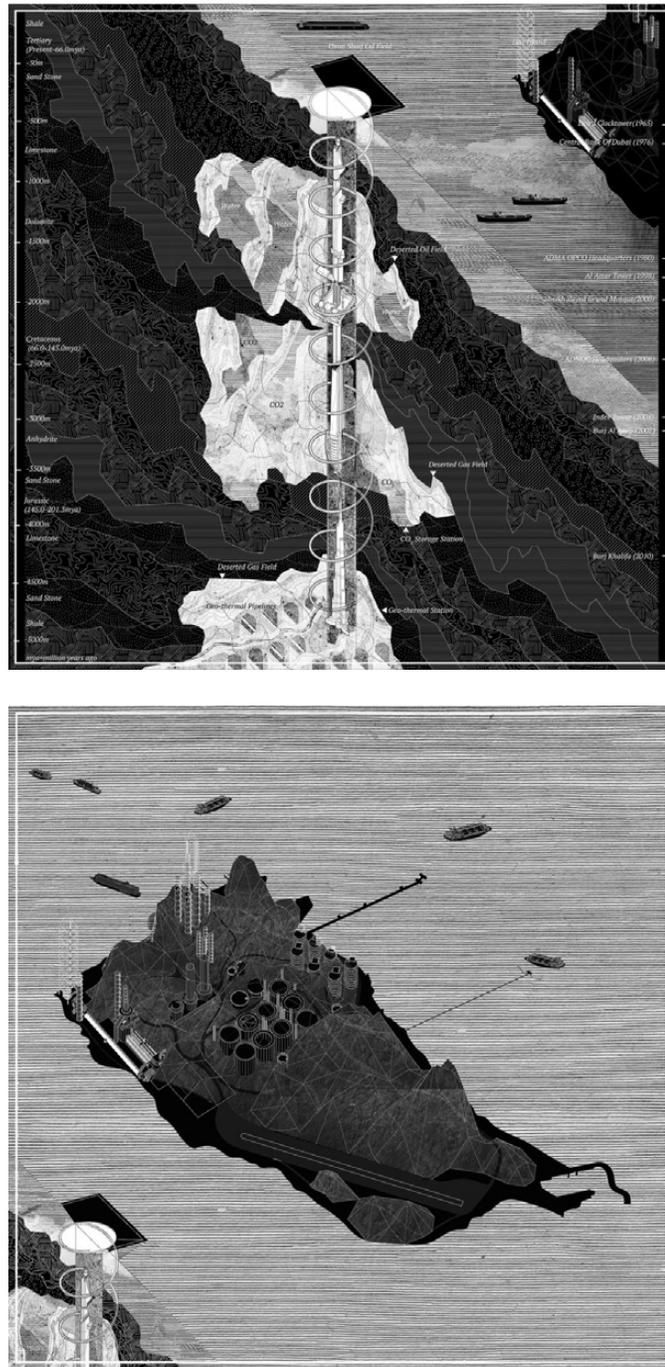


Fig. 24 Design Earth, *After Oil*, 2016

The section places the depth of these rigs in relation to the height of landmark buildings built from oil money, linking activities of the geologic to architectural production. Speculating on a future where oil is no longer used as an energy source, this project touches on similar design strategies to this thesis: making relics out of by-product of industrial technologies as a reminder of the past geologic activities.

nalities' that brings into representation...things, spaces, and scales that are erased from the geographic imagination."<sup>24</sup>

*Geostories* acknowledges issues with representation of geologic phenomena saying, "If environmental issues are un-representable in their scale, their ubiquity, and their duration, then perhaps tableaux vivants – gigantic drawings and model miniatures of the Earth – can present these concerns to the senses."<sup>25</sup> Their projects are presented through axonometric sections "... inviting us to extend our awareness of human settlement of the planet out to the cosmos and down to the Earth's core."<sup>26</sup> These methods of representation become important to them because they materialize invisible processes of climate change, making it an approachable topic in terms of how to design in light of climate change.

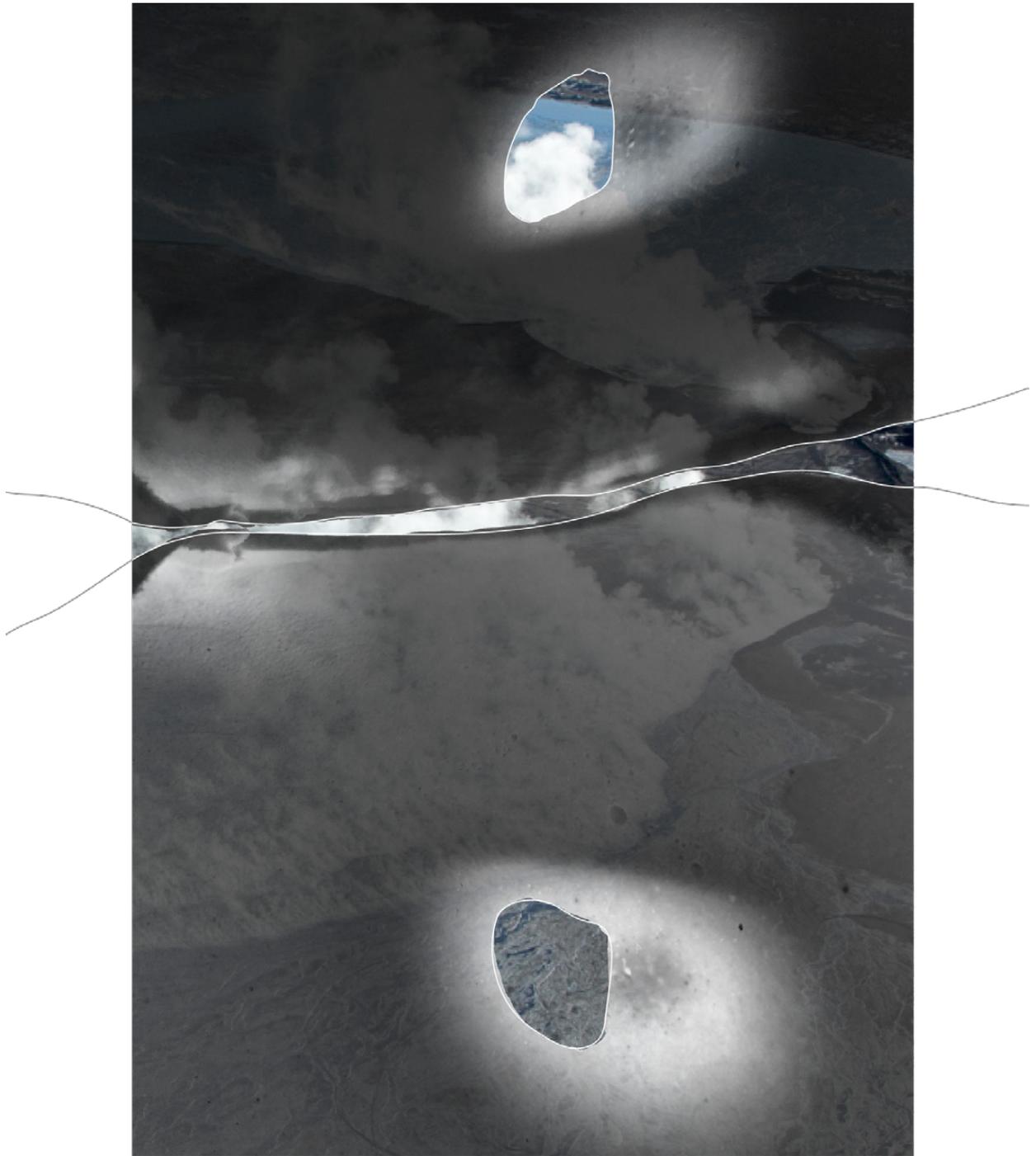
Again the underlying notion of broken world thinking resurfaces in the works presented in *Geostories*. Broken world thinking is based on recognizing the damage that has been inflicted on the geophysical, atmospheric, and biological worlds as a result of our anthropocentric values. It recognizes that everything has limits and at some point breaks, leaving us to scramble for solutions. "Broken world thinking, in contrast, is optimistic about the inevitability of

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24 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 12.

25 Ghosn and Jazairy, 24-5.

26 Ghosn and Jazairy, 24.



**Fig. 25** *Framing*

This conceptual collage begins to imagine all design principles of the atmospheric (materiality, transparency, and reflectivity) at work in a post-industrial landscape. Aerial photographs overlaid with immersive models help to reveal the repurposing of by-product as a material while simultaneously showing its site of extraction.

that breakdown.”<sup>27</sup> Although it is not stated in *Geostories*, it seems broken world thinking is what guides their projects. They write “This series of projects explores aesthetic forms of environmental engagement, and in particular the architectural drawing, to visualize how technological systems change the Earth and to speculate on ways of living with legacy technologies, such as oil fields and landfills, on a damaged planet.”<sup>28</sup>

The designers previously outlined in this section investigate the geologic in terms of planetary scale degradation. In *The Architecture of Closed Worlds, or, What is the power of shit?* (2018), architect Lydia Kallipoliti positions the geologic as a study of cyclical processes of materials. She writes “Circular reasoning defies death, or the end of a material’s useful life, and promises that matter does not come to an end; it changes state.”<sup>29</sup> Geology takes a literal cyclical process in this book, echoing broken world thinking. This closer reading of geologic materials as part of a cyclical process also aligns with practices formulated in *Cradle to Cradle* (2002) by Michael Braungart and William McDonough. Kallipoliti describes cradle to cradle design as “a circular production model in which materials can be repurposed and reused once they have fulfilled their original func-

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27 Kiel Moe and Daniel S. Friedman, “All Is Lost: Notes on Broken World Design,” *Places Journal* (2020). <https://placesjournal.org/article/all-is-lost-notes-on-broken-world-design/> (?)

28 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 12.

29 Lydia Kallipoliti, *The Architecture of Closed Worlds, or: What Is the Power of Shit?* (Zürich: Lars Müller Publishers, 2018), 22.



**Fig. 26** *Mining Site*

Study models previously shown suggest extractive and relocation processes similar to mining: the extraction of earth; relocation of excess material to make new landscapes; the texture of those extracted materials; ethereal landscapes created in the process; and visibly fractured landscapes. Mining landscapes have an abundance of immaterial processes (underground excavation, seepage of toxic water into groundwater, noise pollution, dust clouds, and so on), allowing for an atmospheric intervention that translates these to the geologic.

tion.”<sup>30</sup>

Kallipoliti critiques architects for using digital simulations and diagrams to represent complex ecological processes. Such design methods reveal little about the recycling process,<sup>31</sup> so similarly to *Geostories*, she challenges architects to expose these processes as part of the design. She says “... the language of environmental representation needs to illustrate loss, derailment, and the production of new substances and atmospheres.”<sup>32</sup> This method would allow for the process of material reclamation to become visible, and therefore easily understood by viewers.

However, Kallipoliti goes on to say “The idea of a world in which all resources are recirculated and never wasted was comfortable to a broad, well-intentioned audience, yet it defies the complexities present in both environmental science and creative design.”<sup>33</sup> She insinuates that although the cradle to cradle proposal makes sense on paper, it requires a lot of prototyping in order to perfect this design process. Thus, this positions my thesis as a speculative project which elaborates on existing technologies and theories of reclamation.

In the last chapter I outlined parameters that defined the construction of atmospheres: materiality, transparency, and reflectivity. Böhme’s work offered a useful point of departure for thinking

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30 Kallipoliti, 21.

31 Kallipoliti, 23.

32 Kallipoliti, 23.

33 Kallipoliti, 22.

about design today in light of climate change. He suggests that through aesthetic experiences at the scale of the self we may reflect on our duality with global-scaled phenomena. This section opens up ideas about the role humans play in design within the Anthropocene. Reading previous model studies in relation to concepts of the geologic suggest sites of intervention and approach to design that is less about solutionism and more about recalibration.

A theme that recurs in the context of work focusing on the geologic in relation to materiality is that of waste material in relation to reclamation processes. Berger challenges architects to represent visible and invisible data of sites, allowing processes of reclamation to become visible. Ghosn and Jazairy bring attention to new sites of the Anthropocene, claiming these as geographies of design speculation.<sup>34</sup> As such, speculating on this future through design allows us to create prototypes for landscapes of the Anthropocene.

As an attitude towards phenomena, works studied in this section acknowledge the transcendental existence of nature in relation to the human while simultaneously recognizing our interconnectedness to it. Post-nature theories resist the marginalization of nature against human forces, revealing its “untamable dimensions”<sup>35</sup> as stated by Agrest. These theorists call us to adapt design processes as a result of environmental degradation and engage with the landscape at large.

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34 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 12.

35 Agrest, 12.

## 2.2 Neo-Sublime

While the atmospheric focuses on embodied experience generally of interior spaces, designing within the Anthropocene demands working at much larger scales, often in open landscapes. This section looks at aesthetic experience of degraded sites, focusing on the emergence of a new kind of sublime experience that occurs when we are confronted by degraded landscapes that exhibit a strange, overwhelming beauty. Beginning with Immanuel Kant's *Critique of Judgement*, art theorists and philosophers have written about sublime emotions as synonymous with humility in the face of natural phenomena. Kant's sublime has been critiqued for its inward-looking attitude, bringing about *neo-sublime* theories. With a focus on the environmental crisis and humans part in the destruction of nature, different interpretations of the neo-sublime provide a different vantage point than Kant's sublime. Christopher Hitt proposes a reinterpretation of the sublime in relation to ecological criticism. Emily Brady critiques the sublime because of its "othering" of nature, which she investigates through Kant's descriptions in his *Critique*. Diana Agrest and D. Graham Burnett converse on the intricate systems of the natural world and our inability to comprehend its scale. Lydia Kallipoliti suggests the epoch we reside in is the *Dark Naturalism*, in which the human and nonhuman can no longer be separate. Investigative questions will frame these texts in relation to previous research material: What defines the neo-sub-

lime? And how does it apply to degraded sites? Additionally, photographs from Edward Burtynsky will be analyzed as a way of framing ideas explored through the writing.

In “Toward an Ecological Sublime” (1999) Christopher Hitt critiques European Romanticism for normalizing sublime thinking that has led to current “otherness” attitudes towards nature. He writes “Indeed, it has been the overwhelming tendency of literary criticism over the past few decades to evaluate the aesthetic of the sublime primarily as an expression of asymmetrical power relationships: between human and nature, self and other, reader and text, male and female, conqueror and oppressed.”<sup>1</sup> As a way of understanding climate change in all its entirety, Hitt proposes adapting theories of the sublime to position humans in relation to the environment. A look at Kant’s definition of the sublime was essential to its reframing: “By contrast, the estrangement of subject and object mandated by the Kantian sublime depends, as a matter of course, on logos – on the emergence of what Kant calls ‘reason.’”<sup>2</sup> Hitt defines Kant’s sublime as humancentric since it is used as a means to an end, serving as a way for humans to discover their ability to reason.<sup>3</sup>

Hitt proposes what he calls an *ecological sublime* which reframes our perception of nature. “My starting point, that is, for proposing a

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1 Christopher Hitt, “Toward an Ecological Sublime,” *New Literary History* 30, no. 3 (1999): 603, <https://doi.org/10.1353/nlh.1999.0037>.

2 Hitt, 614.

3 Hitt, 616-7.

reconfigured version of the sublime – an ‘ecological sublime’ – is the recognition that the traditional natural sublime, for all its problems, involves what look to us like ecocentric principles.”<sup>4</sup> Hitt acknowledges that despite its humancentric qualities, Kantian sublime offers a way for humans to understand ecology at large. He continues, “Ideally, then, an ecological sublime would offer a new kind of transcendence which would resist the traditional reinscription of humankind’s supremacy over nature.”<sup>5</sup> Hitt concludes his definition of the ecological sublime: “...the sublime in this case is evoked not by natural objects but by their devastation. Human beings still experience a humbling sense of fear and awe before nature, but in this case – in contradistinction to conventional accounts of the sublime – the threat is of their own making. And worse, the danger is all too real.”<sup>6</sup>

Hitt takes a contradictory view towards the predominant “otherness” attitude of nature: “...as long as there is an ‘I,’ there will always be an ‘other.’ Even if we could change this situation, it seems to me unconscionable that we might want to neutralize completely nature’s ‘sublime’ otherness.”<sup>7</sup> Hitt implies that it is impossible to undo our perception of nature as “other” due to its vast scale and lifetime compared to humans. He proposes this is what makes us have sublime experiences such as an unfathomable connection be-

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4 Hitt, 607.

5 Hitt, 609.

6 Hitt, 619.

7 Hitt, 612.



Fig. 27 Edward Burtynsky, *Nickel Tailings #34*, 1996, Sudbury, Canada

Christopher Hitt writes "...the sublime in this case is evoked not by natural objects but by their devastation. Human beings still experience a humbling sense of fear and awe before nature, but in this case – in contradistinction to conventional accounts of the sublime – the threat is of their own making. And worse, the danger is all too real."<sup>1</sup> This photograph by Edward Burtynsky of tailings in nickel mines provokes us to admire a degraded landscape as we would a painting.

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1 Hitt, 619.

tween the natural environment and the self. However, being aware of this gives us an opportunity to reframe our attitude towards the natural world, as proposed by post-nature thinking.

Geographer Emily Brady critiques issues of the sublime in *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature* by Emily Brady (2013). With a focus on aesthetic judgment of the natural environment, and viewing the ecological world as “other”, Brady questions the Kantian sublime: “In Kant’s influential account, it appears to be humanity that is sublime and not, strictly speaking, nature itself, at least because sublime phenomena, as formless, cannot be contained.”<sup>8</sup> Similarly to Hitt, Brady critiques Kant for shifting the focus of the sublime from natural phenomena back to humans ability to rationalize. She also refers to feminist theorists that claim Kant’s sublime is masculinist and “As such, the sublime also represents an othering of nature, where nature is overpowered, conquered, and colonized.”<sup>9</sup>

Brady’s account of the neo-sublime differs from Kant’s, re-establishing natural phenomena as the sublime object. Whereas Hitt proposes an ecological sublime, Brady terms it the *environmental sublime*. She claims the Romantic sublime is outmoded due to what she calls the historical, metaphysical, and Anthropocentric arguments.<sup>10</sup> She highlights the historical use of the sublime as merely a

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8 Emily Brady, *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature* (New York: Cambridge University Press, 2013), 194.

9 Brady, 194-5.

10 Brady, 183.

category of art theory and argues for its inclusion in contemporary aesthetics: “...it can now contribute to an appreciation of a range of more challenging aesthetic qualities in nature.”<sup>11</sup> In terms of the Anthropocene, she writes “This argument holds that the sublime is inherently anthropocentric given the dualistic, hierarchical relationship that, it is claimed, sublime experience sets up between humans and nature. The first thread of this argument claims that it is humanity that is valued rather than nature, such that the sublime becomes both *self-regarding* and *human-regarding*.”<sup>12</sup> Referring back to Hitt, she argues that this dimension of the sublime stems from Kant’s *Critique*. Thus, she questions these three arguments in relation to contemporary aesthetics and calls for an environmental sublime which she proposes will confront us “with a material experience of a natural world that resists human appropriation.”<sup>13</sup>

Brady claims this reinterpretation of the sublime could allow for landscapes of the Anthropocene to become investigative sites: “New work in environmental aesthetics has argued for the importance of recognizing and understanding the ‘unscenic’ in nature in order to draw attention to ‘scenically challenged’ landscapes which might otherwise be overlooked – and come under threat of development.”<sup>14</sup> It is important to note that despite her thorough research in proposing this neo-sublime, she states that it should not

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11 Brady, 187.

12 Brady, 193.

13 Brady, 195.

14 Brady, 188.

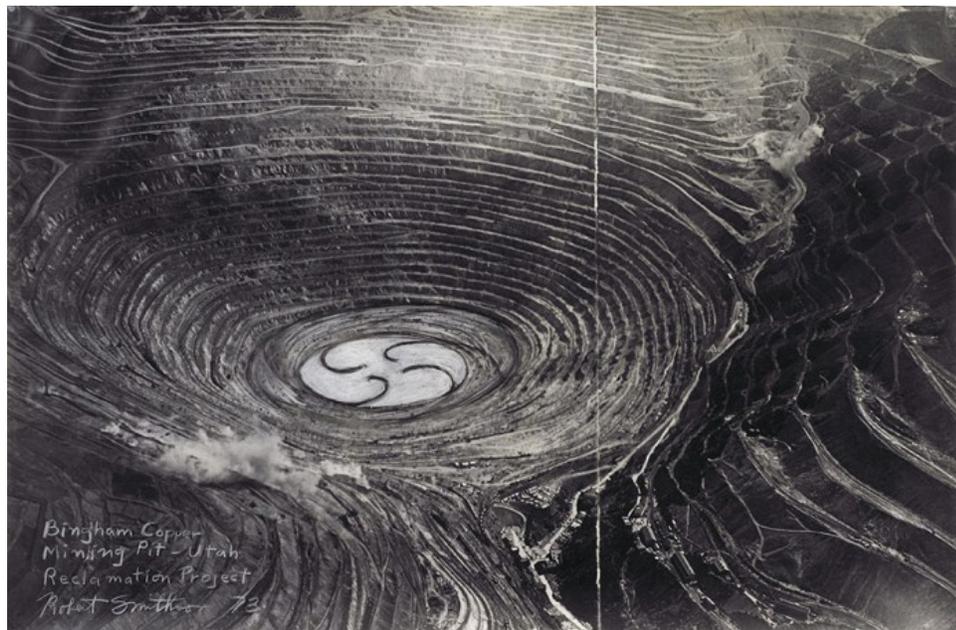


Fig. 28 Robert Smithson, *Bingham Copper Mining Pit*, 1973, Utah, USA

Land art was influential in bringing awareness to reclamation projects. Artists such as Smithson aimed to remind visitors of their connection to nature through the act of travelling to desolate locations and engaging with a larger landscape than we are accustomed to. Such works of art allow us to have neo-sublime experiences in which we recognize our impact on the Earth regardless of scale. Such projects produce ethereal sublime qualities named by Brady as "... darkness, obscurity, greatness, massiveness..."<sup>1</sup>

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1 Brady, 187.

be read as a sole solution to tackling our legacy “otherness” attitude towards nature.<sup>15</sup> Nevertheless, Brady’s environmental sublime allows for the metaphysical – or transcendental existence of nature – to contribute to an appreciation of the natural world.

The notion of the neo-sublime also arises in Diana Agrest’s work in *Architecture of Nature: Nature of Architecture*. In the book, she completes an interview with Historian of Science D. Graham Burnett titled “Sea Cliffs and the Sublime: A Conversation.” Here Agrest gives more insight to the projects included in the book which focus on capturing extreme natural phenomena and positioning nature as its own entity through modes of architectural representation.<sup>16</sup> Burnett remarks how the book engages with “the challenge of scale, the drama of extremes, the limits of the human,”<sup>17</sup> all of which define the necessary qualities required to have a sublime experience. He claims the problem with the sublime is the extremity of scale and absence of the human, which contradicts Kant’s *Critique of Judgement* in which he focuses on a humancentric definition of the sublime. However, Agrest claims the absence of humans in the drawings presented was necessary to avoid placing man in the centre of these projects.<sup>18</sup>

Burnett defines Kant’s sublime as a form of systolic contraction

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15 Brady, 200.

16 D. Graham Burnett and Diana Agrest, “Sea Cliffs and the Sublime: A Conversation,” *Architecture of Nature: Nature of Architecture* (2018), 125.

17 Burnett and Agrest, 125.

18 Burnett and Agrest, 126.

followed by a diastolic relaxation, saying “First, the naked, overwhelming magnitude of the object produces a harrowing realization...”<sup>19</sup> He suggests this first step is what drove the projects in the book as they explore “the grandeur of nature at its largest, deepest, and oldest.”<sup>20</sup> The second stage in Kant’s sublime of realizing our ability to rationalize is defined by Burnett as “something like the narcissistic self-salvage by which we bounce back to ourselves from the nihilistic negation occasioned by a real reckoning with our impotent fragility.”<sup>21</sup> In recognizing our ability to rationalize, Kantian sublime suggests we are superior to nature. In removing the human scale from projects, Agrest’s book contradicts this notion. Burnett provides insight to these projects in relation to the Kantian sublime saying “...what you are up to here is really best understood as a kind of cataloging of contemporary gestures in the direction of a recognizable program – call it the ‘neo-sublime.’”<sup>22</sup> Different to the Kantian sublime which positioned humans as logical beings with the capability to reason, the neo-sublime here positions nature as an intrinsic operating system, leaving us to wonder what our place is in the grand scheme of ecology.

From a disciplinary perspective, the sublime is of interest mainly in landscape architecture. In “History of Ecological Design” (2018) Lydia Kallipoliti terms our current perception on nature as *Dark*

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19 Burnett and Agrest, 127.

20 Burnett and Agrest, 127.

21 Burnett and Agrest, 127.

22 Burnett and Agrest, 127.



Fig. 29 Edward Burtynsky, *Rock of Ages #15*, 1992, Barre, USA

This photograph reveals “the grandeur of nature at its largest, deepest, and oldest”<sup>1</sup> which Burnett claims is also present in the projects in *Architecture of Nature: Nature of Architecture*. Edward Burtynsky similarly describes this site: “The surface of the rock-face would simultaneously reveal the process of its own creation, as well as display the techniques of the quarrymen.”<sup>2</sup>

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1 Burnett and Agrest, 127.

2 Edward Burtynsky, “Photographs: Quarries,” Edward Burtynsky, accessed March 23, 2021, <https://www.edwardburtynsky.com/projects/photographs/quarries>.

*Naturalism*, beginning in the year 2000. “Unlike its anthropocentric predecessor eras, this new world, as posthumanist thinkers argue, does not tolerate the separation of humans from nonhumans.”<sup>23</sup> This post-nature attitude refers to our current state in which material, cultural, and aesthetic issues arise.<sup>24</sup> In this paper, Kallipoliti borrows several terms such as *subnature* and *toxic sublime* to define this era.<sup>25</sup> *Subnature*, a term borrowed from David Gissen, is described as a “fearsome zone” such as smoke, gas, dust, and other components of anthropocentric landscapes which are often marginalized in the architectural discipline.<sup>26</sup> Kallipoliti writes, “Rather than attempting to synthesize or integrate design with nature, the designers in this group create deviant, new natures out of the current contaminated conditions.”<sup>27</sup> Similar to how Agrest avoids marginalizing nature, subnature brings the focus back to landscapes of the Anthropocene in order to acknowledge them as new environmental conditions.

The term *toxic sublime* is borrowed from Jennifer Peeples and is defined as follows: “...the toxic sublime reveals the tensions arising from visual representations of environmental contamination: beauty and ugliness, magnitude and insignificance, known and

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23 Lydia Kallipoliti, “History of Ecological Design,” *Oxford Research Encyclopedias*, April 26, 2018, <https://oxfordre.com/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-144>.

24 Kallipoliti.

25 Kallipoliti.

26 Kallipoliti.

27 Kallipoliti.

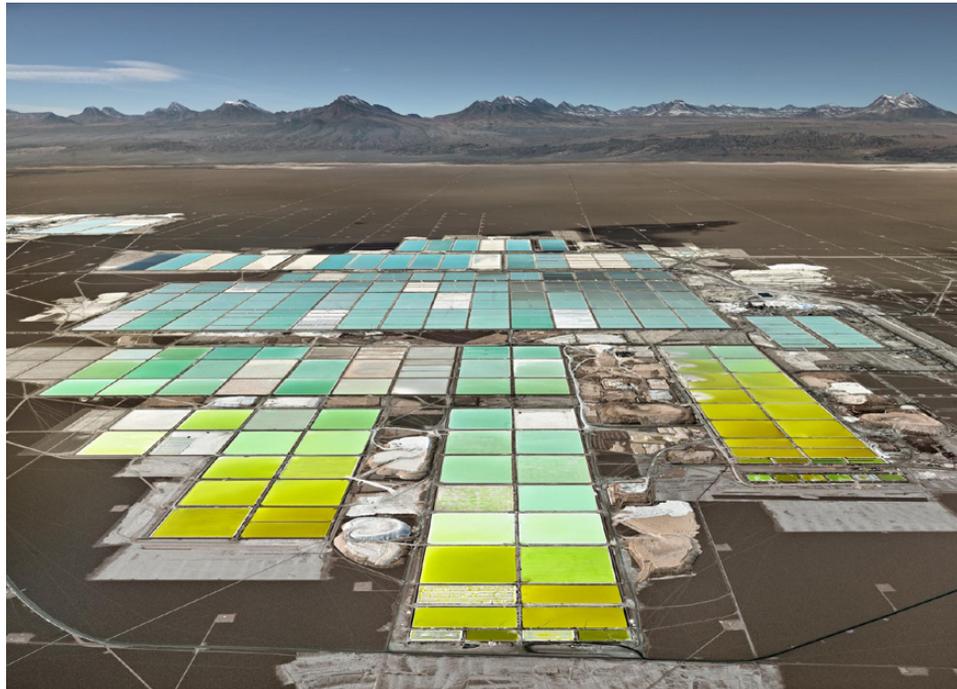


Fig. 30 Edward Burtynsky, *Lithium Mines #1*, 2017, Atacama Desert, Chile

This photograph reveals contradictory qualities that Kallipoliti claims define the toxic sublime, namely beauty and ugliness. These salt flats are photographed like fluorescent colour palettes laid out in a field of gray sand, evoking feelings of admiration and repulsion once we realize their role in climate change.

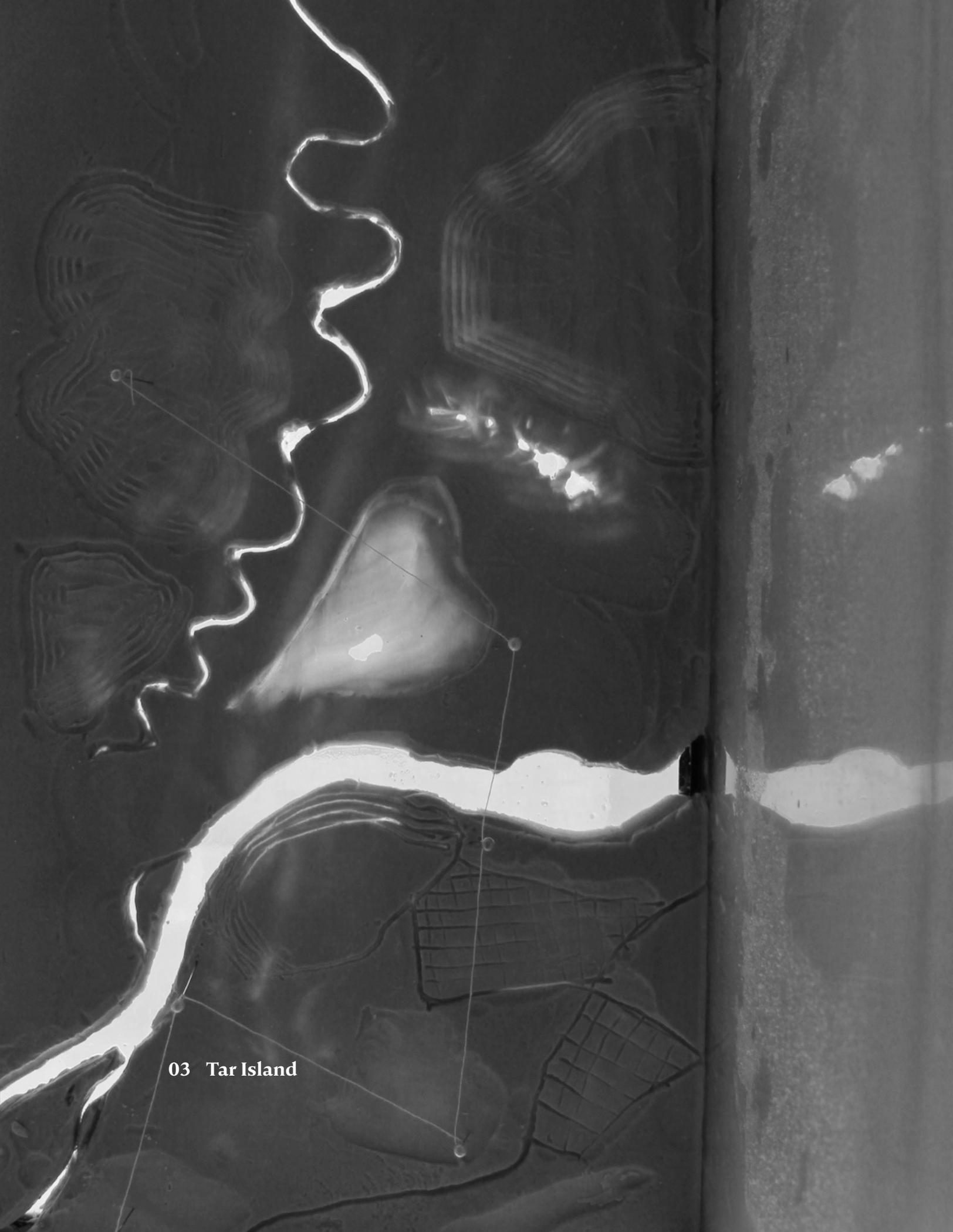
unknown, inhabitation and desolation, security and risk.” Edward Burtynsky’s photographs are used by Kallipoliti to tie this notion to landscapes of the Anthropocene. His photographs reveal such contradictory qualities as those mentioned by Peeples, including grandeur and minuteness. Post-nature is intrinsically tied to these terms of subnature and the toxic sublime, acknowledging landscapes that belong to a new epoch of the Earth’s geomorphology. Reflecting on this, Kallipoliti writes “As emergent types of artificial natures, such places are not *in* the environment; they *are* environments themselves.”<sup>28</sup>

Acknowledging the inward-looking attitude of Kant’s sublime, Hitt and Brady propose an alternative neo-sublime where nature is not diminished to a domesticated “other.” Brady argues that the sublime has been historically used as a category of art, which she challenges by stating it has a new place in the Anthropocene. Landscapes of degradation produce ethereal sublime qualities such as “... darkness, obscurity, greatness, massiveness...”<sup>29</sup> These are visible in Edward Burtynsky’s photographs of quarries, mines, and tailings which make up the epoch of dark naturalism termed by Kallipoliti.

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28 Kallipoliti.

29 Emily Brady, *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature* (New York: Cambridge University Press, 2013): 187.



03 Tar Island

### 3.1 Site Analysis

The aim of this thesis is to operate at two scales regarding the atmospheric (human experiential) and the geologic (anthropocentric landscapes). In chapter 1, I outlined methods for designing the atmospheric borrowed from Mark Wigley, Peter Zumthor, and Ger- not Böhme. These methods were developed using physical mod- els which made evident key principles – materiality, transparency, and reflectivity. These models’ extractive properties, along with Böhme’s connection of aesthetic experience to natural apprecia- tion, led me to study concepts of post-nature, designers in the An- thropocene era, and the neo-sublime in particular to photography. In chapter 2, I showed how atmospheric design principles tied to the geologic by relating Böhme’s notion of the atmospheric in ex- terior spaces to contemporary issues of climate change, namely the afterlife of mining sites: in materiality, waste material from a site is repurposed to create the façade in order to immerse inhab- itants in the same geology as the Earth; in transparency, views of the landscape, sky, and ground are framed through moments of low opacity; and in reflectivity, the inhabitant has a space to un- derstand their environmental surrounding by asking “How are we actors in this grand scheme of *nature*?” This is the catalyst to inves- tigating post-nature in a project that aims to deal with the atmo- spheric self-experience and a geologically fractured landscape. In this chapter I aim to answer the following investigative question:

How can concepts of both the atmospheric and the geologic inform a design investigation?

The site chosen is an open-pit mine prone to leakage of tailings into underground water. Rightfully named, Tar Island is a mining town located in the oil sands of northern Alberta, Canada. Previously shown model studies have illustrated the capacity for photography to capture material and experiential qualities of both the atmospheric and the geologic. In this section, the proposed site of intervention is first analyzed through aerial images from photographers Alex MacLean, Louis Helbig, and Todd Korol. This allows me to create a design methodology around working with modelling and photography. A visual analysis of these photographs located on a map of Tar Island allows me to understand the photographers insights of the site as viewed from above. In comparing these insights I hope to pinpoint specific spots for interventions where the outlined atmospheric design principles (materiality, transparency, reflectivity) can be used to reframe this anthropocentric landscape.

Tar Island

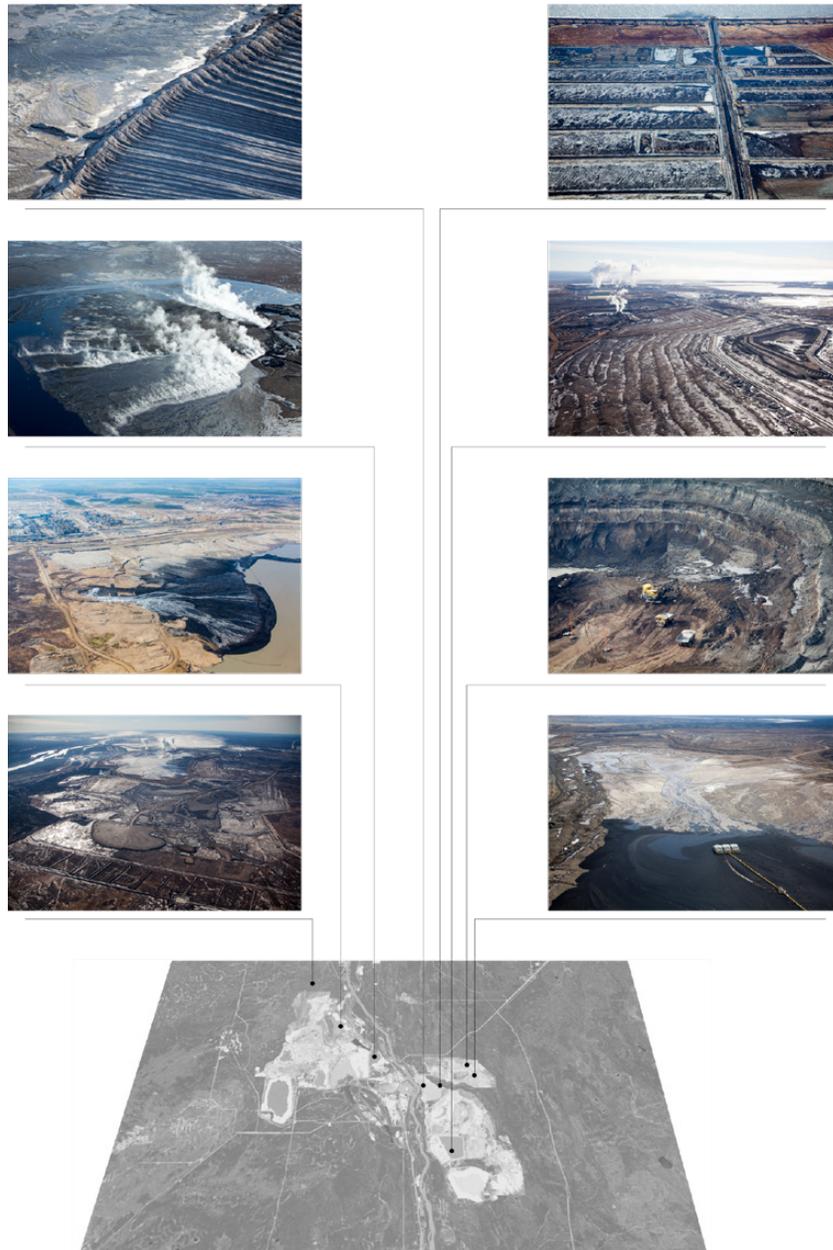


Fig. 31 Alex MacLean, *Syncrude Mildred Lake mining site series*, 2014, Syncrude, Tar Island, Canada

Photographer Alex MacLean captures the human need to control nature, as highlighted in these photographs, capturing the orthogonal organization of earth, the rectangular piling of sulfur, and the gridded sectioning of soil. With a focus on the geometric, MacLean captures this anthropocentric landscape.



Fig. 32 Alex MacLean, *Beds leading up to tailing pond*, 2014, Syncrude, Tar Island, Canada



Fig. 33 Alex MacLean, *Earthen wall to tailing pond*, 2014, Syncrude, Tar Island, Canada

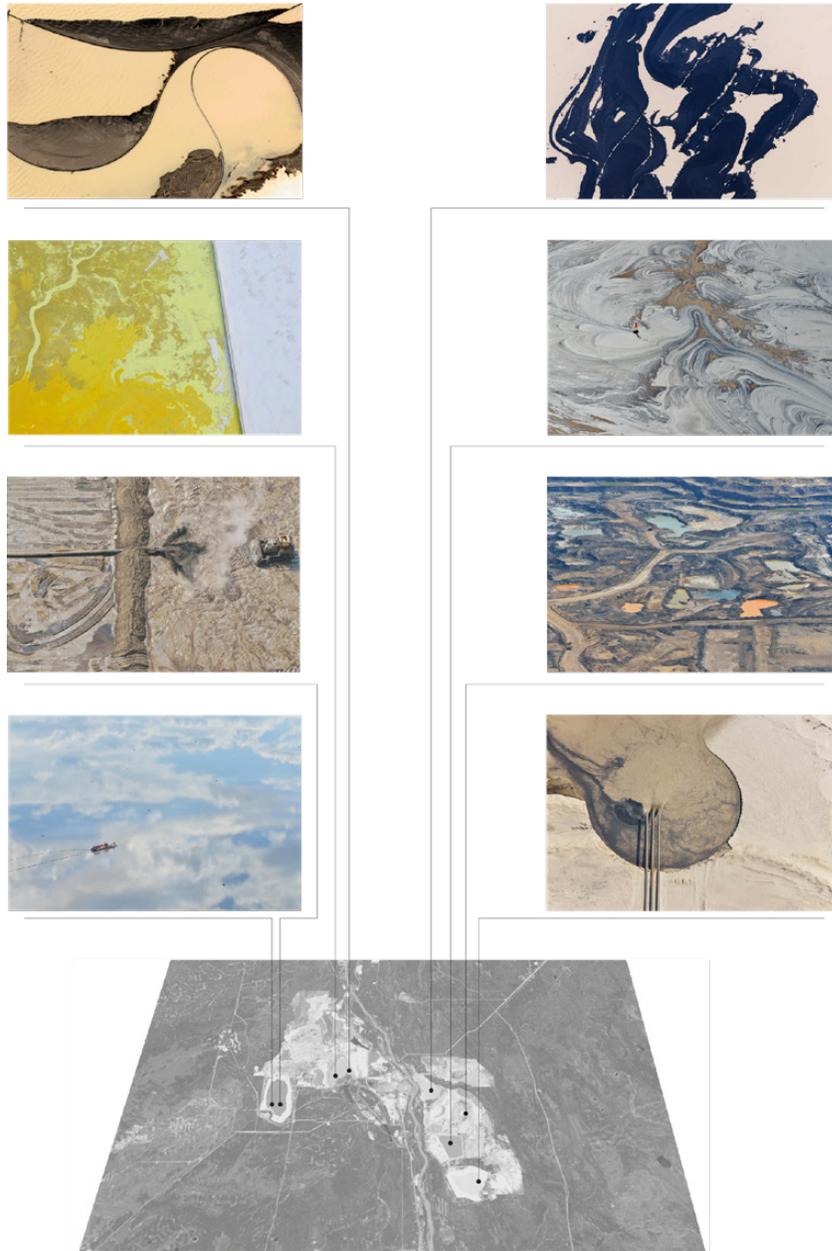


Fig. 34 Louis Helbig, *Beautiful Destruction series*, 2014, Syncrude, Tar Island, Canada  
Louis Helbig's photographs resemble abstract paintings, giving the landscape a sense of beauty. Like a venomous flower the tailings ponds from these photographs attract birds to them, slowly devouring them. These ethereal images make for an intriguing view of a toxic landscape, reflecting ideas about the toxic sublime. One could imagine seeing these views from above and contemplating the beauty in these damaged landscapes. An inner conflict arises as you admire the beauty of these picturesque landscapes while contemplating the polluted reality of these waters. These paint-like photographs give the site an other-worldly perception.



Fig. 35 Louis Helbig, *Residual Bitumen*, Suncor South Tailings Pond, 2014, Syncrude, Tar Island, Canada

Tar Island

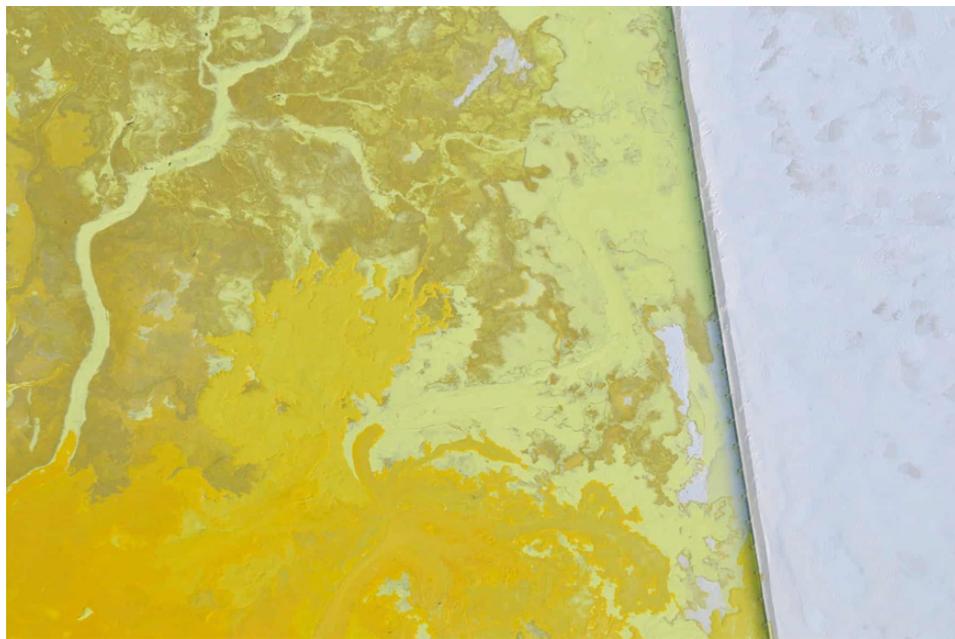


Fig. 36 Louis Helbig, *Sulfur and Snow*, 2014, Syncrude, Tar Island, Canada

Tar Island

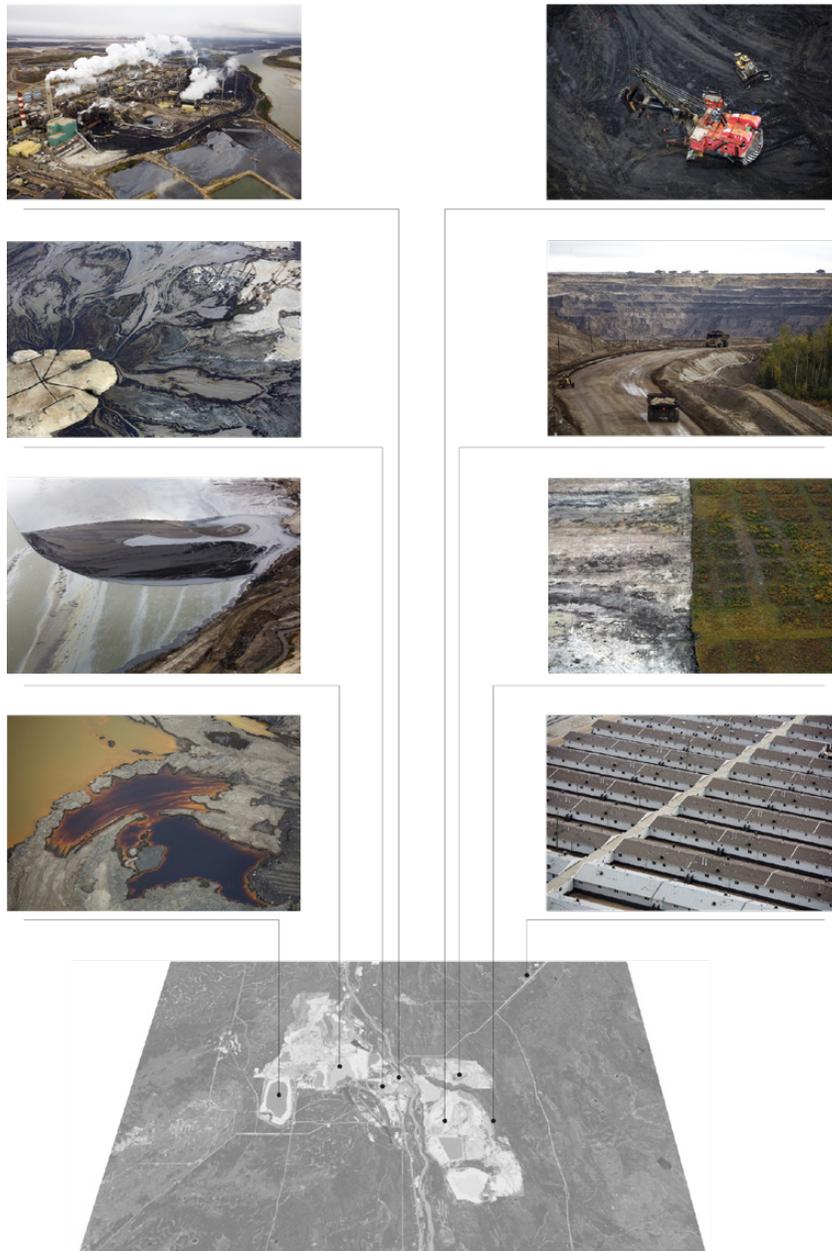


Fig. 37 Todd Korol, *Fort McMurray series*, 2014, Syncrude, Tar Island, Canada

Todd Korol's work comprises of photographs of the site that capture points where the toxic by-product of the mining industry is visible: The colossal machinery used to excavated tons of earth, creating the step-like cuts in the landscape; the seepage of vivid, rust colour water from tailing ponds which are meant to retain toxins; and the reality of worker housing based on efficiency rather than aesthetic experience. Korol doesn't over-aestheticize what he sees, rather he captures the tarry, mundane reality of mining sites.



Fig. 38 Todd Korol, *The top layer of muskeg and earth (right), and the underlying tar sands (left) after the removal of the muskeg*, 2014, Syncrude, Tar Island, Canada



Fig. 39 Todd Korol, *Giant earth moving equipment*, 2014, Syncrude, Tar Island, Canada

Canada contains some of the world's largest oil sands – reserves of bitumen that coat sand grains, making the separation process an intensive one. The oil-coated sand is washed with hot, pressurized water to separate the two, resulting in excessive amounts of combined sand and water. This excess mixture is referred to as 'tailings', which are deposited into tailings ponds flanking open-pit mines. These tailings are sulfide-bearing, making them too toxic to be returned to the landscape.<sup>1</sup> They are thus placed into ponds which trap toxins in the water, protecting the oxygen from being polluted. In turn the water absorbs these toxins, mainly sulfur, which then seeps into underground water and eventually reaches bodies of water.

Tar Island, which contains some of Suncor's largest mines, is prone to leakages from tailings ponds into the Athabasca River which then transports toxins to communities located along the river, going as far as the Northern Territories.<sup>2</sup> Fort Chipewyan, a town 200 km upstream from Tar Island, was a town affected by this toxic seepage. It was suspected that the high rate of cancer in this small town was due to the fact that the Athabasca River was being polluted by mining activities from Suncor's facilities. It was later found that the greatest source of pollution came from the tailing

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1 "World of Change: Athabasca Oil Sands," NASA (NASA), accessed February 11, 2021, <https://earthobservatory.nasa.gov/world-of-change/Athabasca>.

2 Heather Stocking, "Study Proves Tailings Ponds Seeping into Athabasca River," *TownAndCountryToday.com*, December 10, 2019, <https://www.townandcountrytoday.com/local-news/study-proves-tailings-ponds-seeping-into-athabasca-river-1894415>.

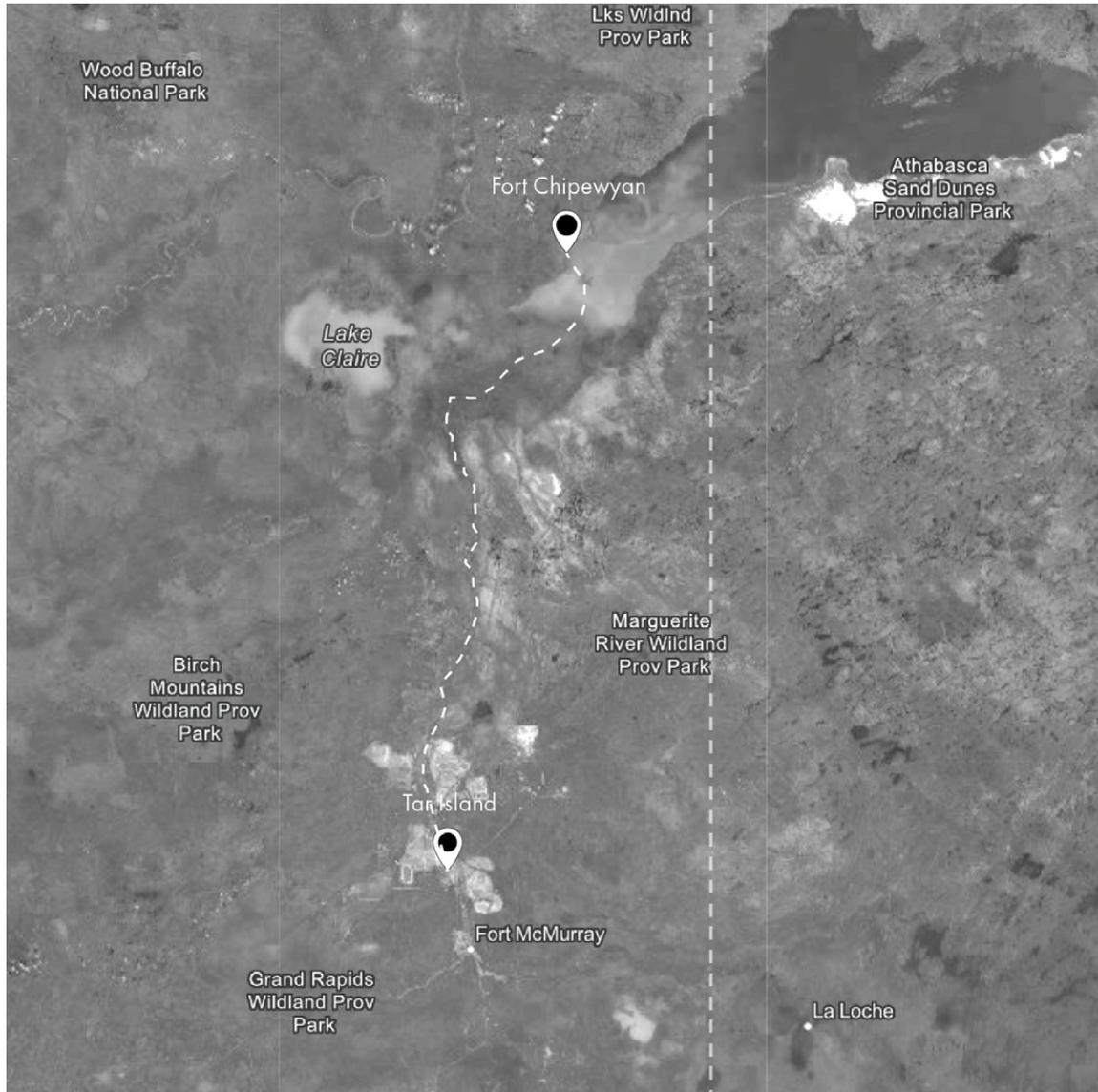


Fig. 40 Map of Athabasca River

Travelling as far as the Northern Territories, toxins from tailings ponds seep into the Athabasca River polluting communities along the way.



**Fig. 41 Mapping processes of excavation, retention, and reclamation**

This map shows active sites of reclamation, which informs where additional reclamation processes are implemented. The West side is left unaltered since the processing factory and most reclaimed ponds are on that side. The East is the most active side so it will hold sites of remediation and architectural interventions.

ponds, raising concerns for their remediation.<sup>3</sup>

This thesis proposes two methods of action in the remediation of Tar Island. First, the existing toxins in tailings ponds are neutralized through strategies of phytoremediation and evapotranspiration.<sup>4</sup> Second, neutralized tailings are repurposed into geopolymer bricks closing loops of material production on site and transforming Tar Island over time materially and experientially.<sup>5</sup> Existing conditions of the site will be adapted through these remediation processes, while architectural interventions will employ design principles of the atmospheric.

Lydia Kallipoliti's study of cyclical processes as the new norm in design insinuates the repurposing of a by-product material as a construction material. In a mining site the by-product is tailings, thus in repurposing them the site will have a closed loop of material production. This thesis will exist as its own "architecture with externalities,"<sup>6</sup> recuperating toxic by-products as useful materials. Through the repurposing of tailings and implementing them into architectural interventions in the landscape, components of the atmospheric and geologic are reconciled. Studying components of

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3 Lori Waller, "'We Can No Longer Be Sacrificed,'" Briarpatch Magazine, 2018, <https://briarpatchmagazine.com/articles/view/we-can-no-longer-be-sacrificed>.

4 Ilhwan Park and Carlito Baltazar Tabelin, "A Review of Recent Strategies for Acid Mine Drainage Prevention and Mine Tailings Recycling," *Chemosphere* 219 (November 28, 2018): pp. 588-606, <https://doi.org/10.1016/j.chemosphere.2018.11.053>. See Appendix B for more information on these processes.

5 See Appendix B for current investigations on the reclaiming of tailings.

6 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 12.

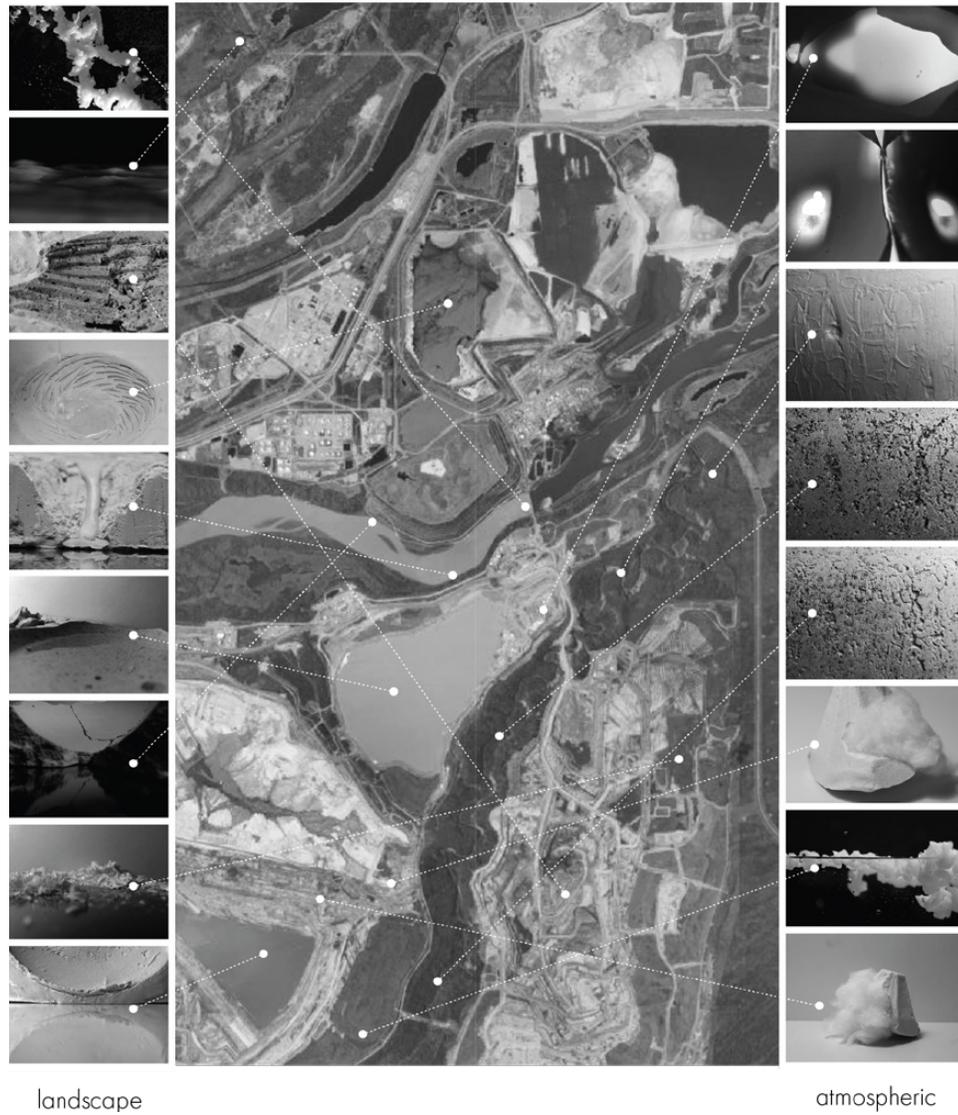


Fig. 42 *Atmospheric in the Geologic*

Placing models of the atmospheric into a map of Tar Island allows me to make links between their atmospheric qualities to that of the sites geomorphology. These study models now begin to engage with questions of an anthropocentric landscape.

the landscape through model studies, along with architectural details of these interventions, a comprehensive reading of both scales simultaneously will be achieved.



Fig. 43 Alex MacLean, *View south to upgrading facility with rising plumes of steam and smoke*, 2014, Syncrude, Tar Island, Canada

Currently, Suncor claims to be recycling 92% of wastewater, surface run-off water, and groundwater from their Fort Hills mine, 60km north of the chosen site. This decreases the necessity to withdraw fresh water from the Athabasca river. They also started a new initiative called ‘Site Monitoring’ in which the Indigenous community can collaborate with them on reclamation processes of the land.<sup>7</sup>

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<sup>7</sup> “Water Stewardship,” Report on Sustainability, 2021, <https://sustainability.suncor.com/en/environment/water-stewardship>.



Fig. 44 *Agrostis tenuis* and *Festuca rubra*

Phytoremediation is a cost-effective restoration technology that uses plants and associated soil microbes to reduce toxic effects of contaminants. Phytostabilization is a subcategory which specifically traps contaminants in the soil to prevent further dispersion. This is the most common remediation strategy for mine tailings since it requires little maintenance. The most widely used metal tolerant grasses are *Agrostis tenuis* and *Festuca rubra* as shown above.<sup>8</sup>

<sup>8</sup> Sigurdur Greipsson, "Phytoremediation," Nature News (Nature Publishing Group, 2011), <https://www.nature.com/scitable/knowledge/library/phytoremediation-17359669/#:~:text=Phytoremediation%20basically%20refers%20to%20the,cost%2Deffective%20environmental%20restoration%20technology.>

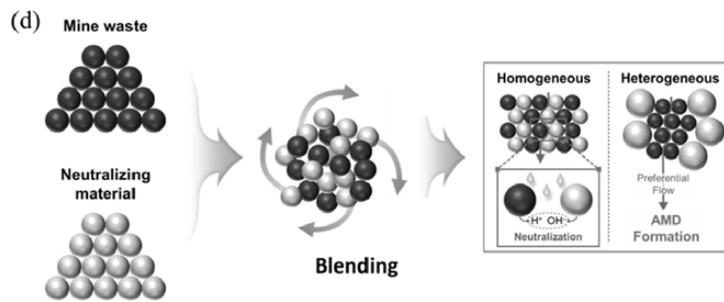


Fig. 45 *Dry Stack and Neutralization of Tailings*

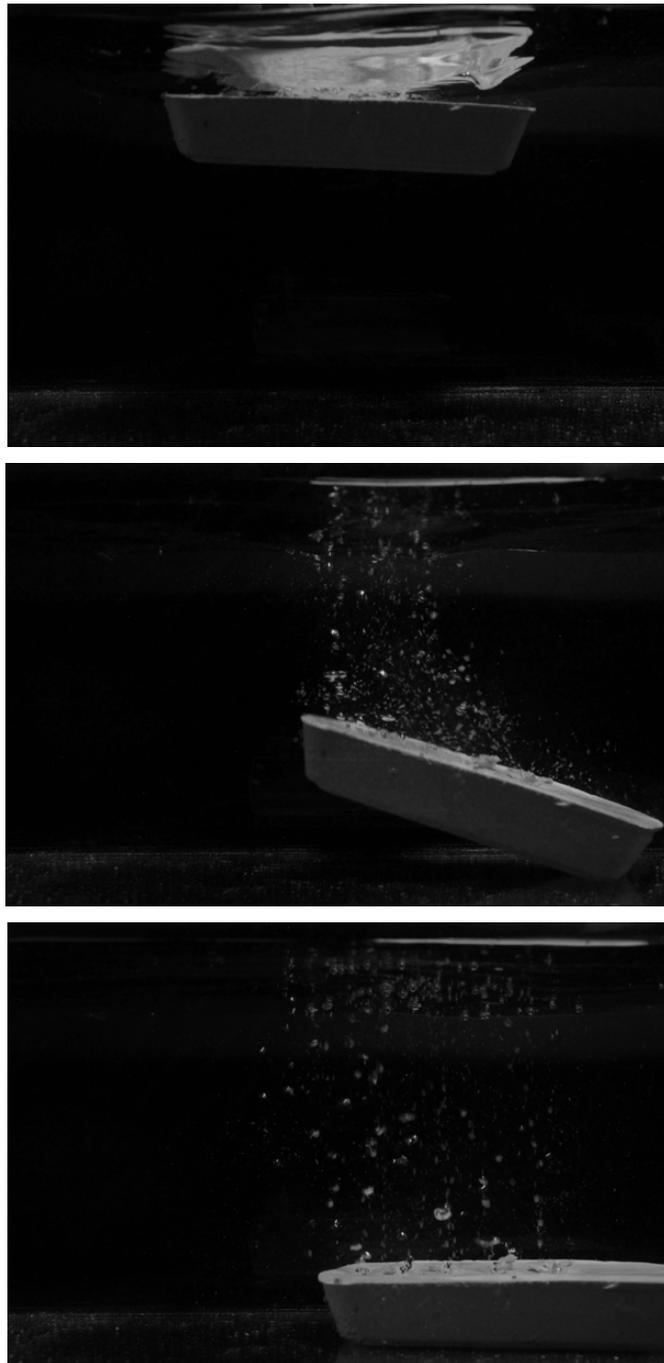
One of the newest and cleanest methods of tailing disposal is dry stacking. This process involves compressing the tailings in a compact state and disposing of it on the surface, decreasing the need for water to be used. Although this is still exposing the toxins, an alternative could be found in which the dry stacks are mixed with a neutralizer to contain the toxins. Once this is done, the mix could be used as a building material.<sup>9</sup>

<sup>9</sup> Leo C. Botham, "A Look at Ways of Controlling Tailings to Avoid Future Liability," *Canadian Mining Journal*, December 1, 2015, <http://www.canadianminingjournal.com/features/a-look-at-ways-of-controlling-tailings-to-avoid-future-liability/>.

### 3.2 Reflection through Modelling

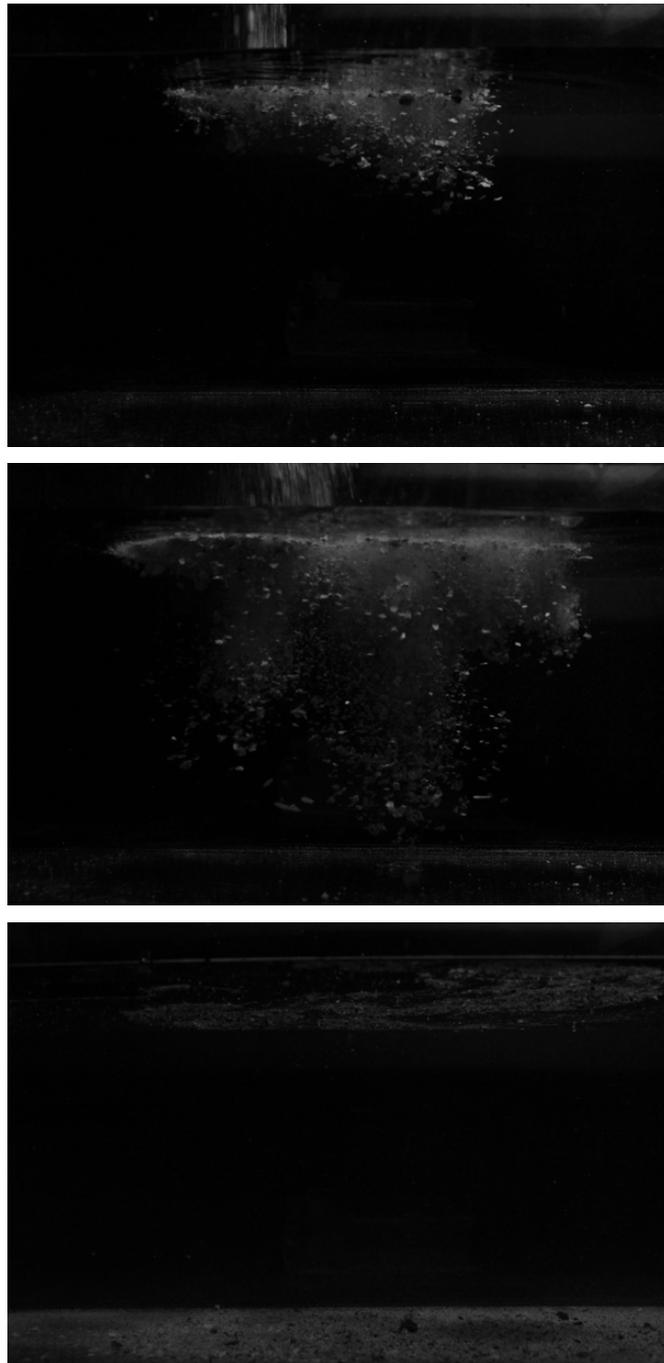
In order to build on insights of how to design the geologic, I completed a series of tank model studies. These studies focused on mechanisms of retention, dispersion, and extraction identified as geologic components in Chapter 2. Rania Ghosn and El Hadi Jazairy identified model miniatures as a method of representing large-scaled interventions, revealing hidden layers beneath the surface of the earth as in a section. Alan Berger provides insight on capturing invisible evidence of degradation and overlapping it with visible evidence such as aerial images. Diana Agrest provided an alternate perspective to representing extreme natural phenomena, omitting humans to avoid marginalization of nature. Lydia Kallipoliti suggested cyclical production of materials as a way of designing in the Anthropocene, aligning with the repurposing of tailings as a building material.

In addition to these models, further investigations on the atmospheric were made. Analyzing previous atmospheric models as enclosures allowed for insights on how to design with lighting in enclosures, how it interacts with textured surfaces, and how transparency alters a space. The following photographs can thus be read as continuations of model studies from Chapter 1 with the aim to create links between the geologic and the atmospheric.



**Fig. 46** *Porous Geology*

As with the leakage of toxic water into the earth at Tar Island, these photographs establish that an apparent solid geology can be porous. These photographs show a plaster brick in a solid state, being submerged into a tank of water. It immediately sank to the bottom, emitting air bubbles from the inside as it sank.



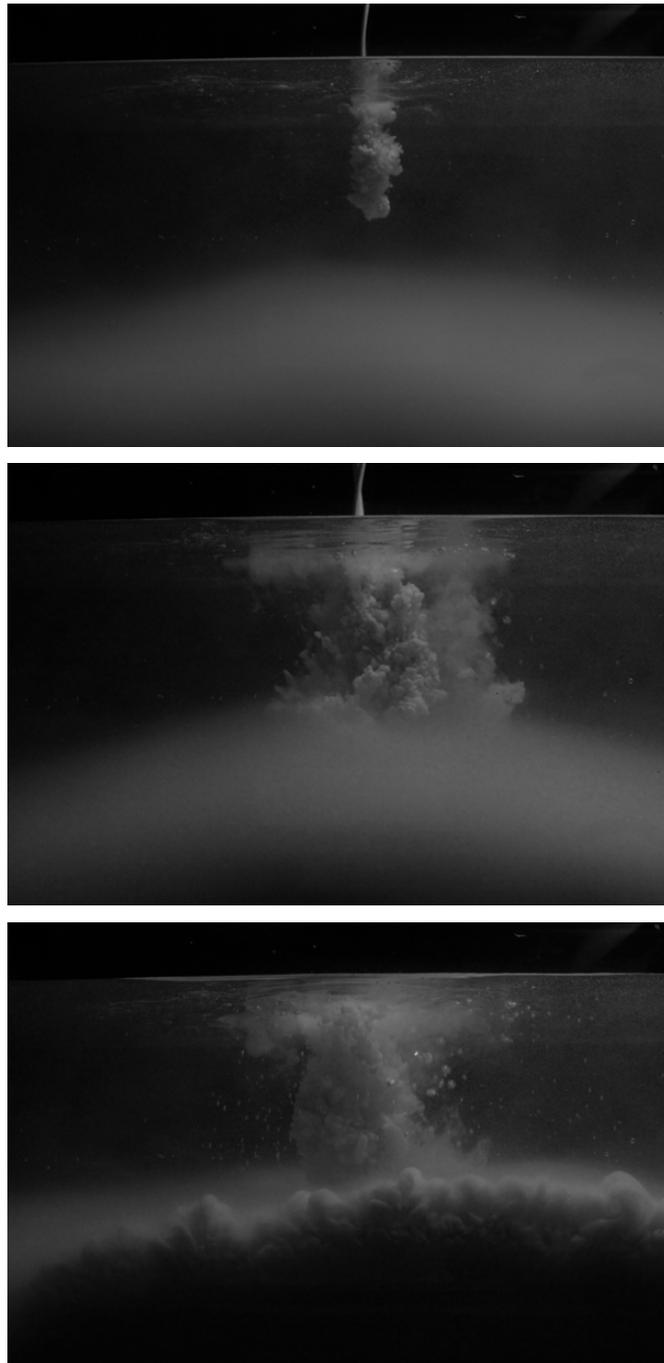
**Fig. 47** *Rubble*

As a subnature, similar to dust and smoke, tailings make up part of this dark naturalism period proposed by Lydia Kallipoliti. They arise as a new product of the Anthropocene, and although in this case they are a by-product of more valuable resource extractions, they also make up a substantial area of Earth's geology. These photographs capture plaster in a rubble consistency dispersing through the tank as tailings would in a pond.



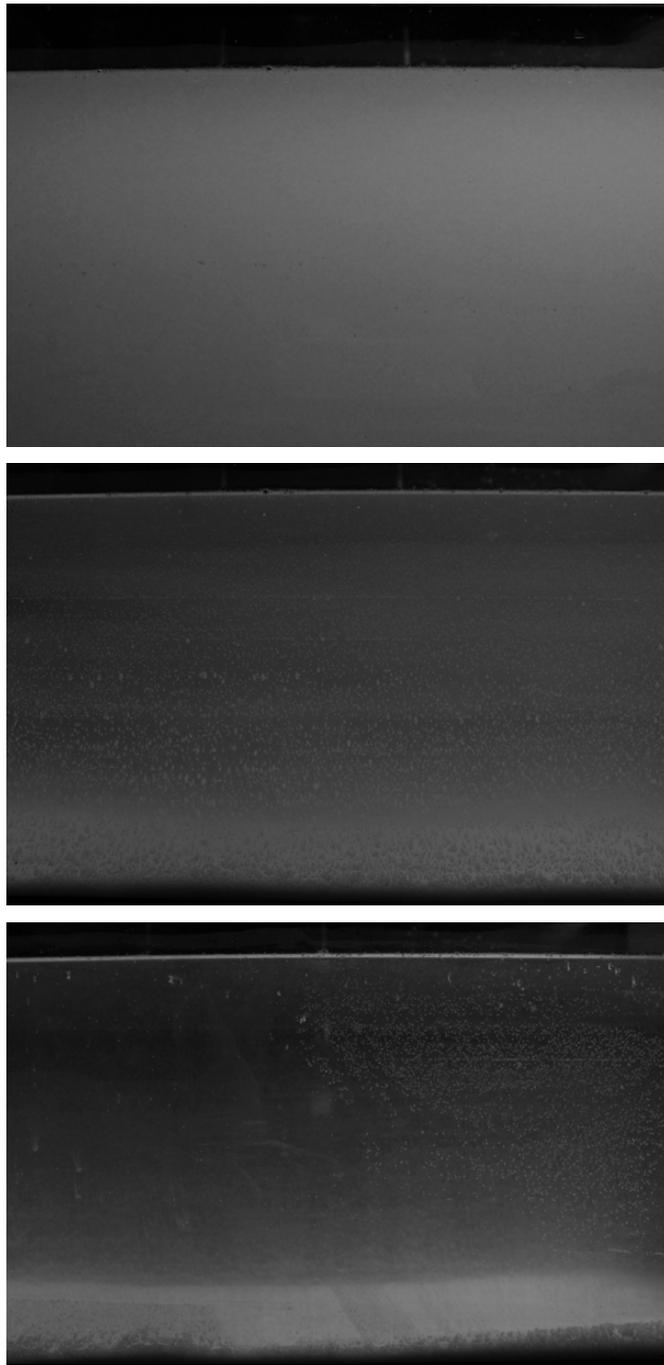
**Fig. 48** *Liquid*

These photographs capture the pouring of liquid plaster into water. I assumed that at some point the plaster would harden, however it assumed a state similar to sand and water mixture. This slurry-like mixture closely resembles tailings consistency, providing me with a material that I can further test.



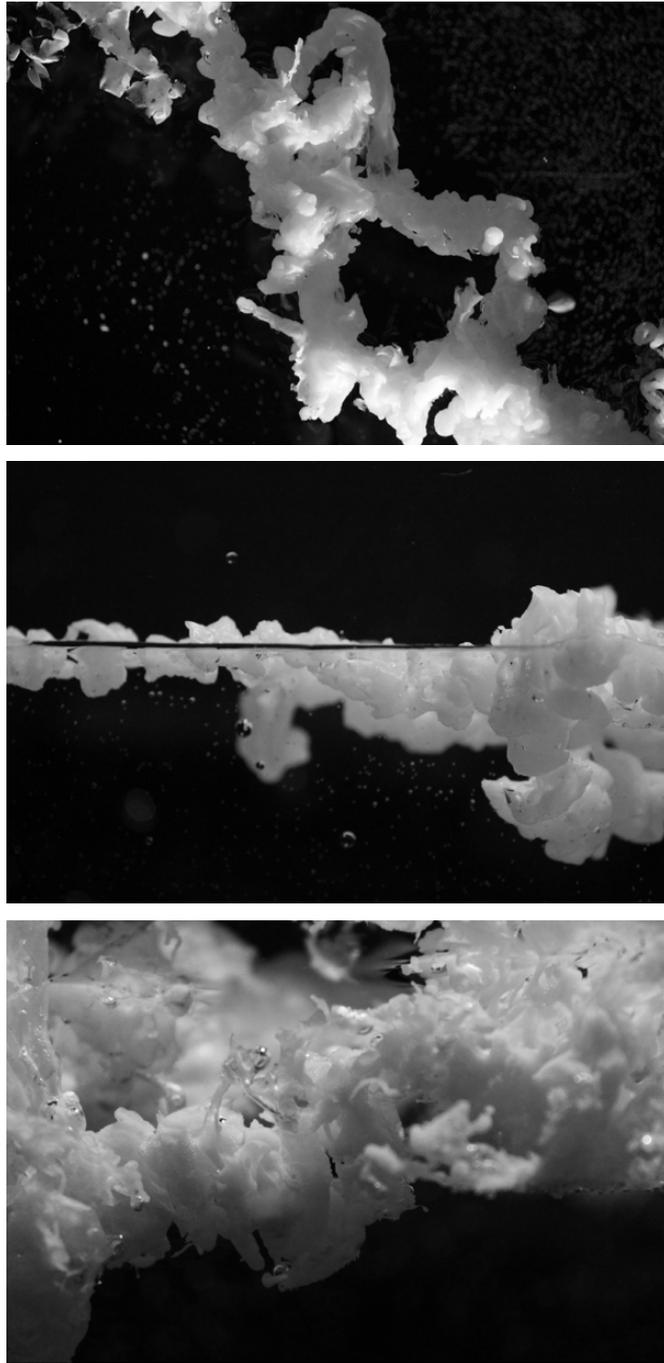
**Fig. 49** *Liquid + Dust*

In these images the same liquid plaster is being poured into the existing liquid plaster which at this point is still a dust-like consistency. The pouring disturbs the somewhat settled dust-plaster. This can be read as what happens when new tailings are dumped into an already settled tailings pond, ultimately extending the timeline for remediation as it must settle before being reclaimed.



**Fig. 50** *Dust*

These photographs were taken with hours in between each one. This shows how long the process of separation takes when tailings are placed in ponds, and even then the water in between still holds particles of this liquid/dust combination. Any slight disturbance to this tank would cause the dust to rise again, showing how delicate of a system this is.



**Fig. 51** *Tailing Pond Leakage*

Wax was studied in these tank models in order to test different materials reaction to water. The result was a crystallization of the wax, hardening immediately into these unique shapes. The light-weight quality allowed it to float on the surface, resembling photographs of tailings ponds by Louis Helbig (Fig. 35).



**Fig. 52** *Wall of Repurposed Tailings*

The following models aims to create an intrinsic connection with the landscape of Tar Island, whether through visual framing or through local material implementation. In this photograph the inhabitant is facing a wall of reclaimed tailings, illuminated from above by a sliver of light, reminding them of the process of reclamation occurring simultaneous to the mining process. A once toxic material, now neutralized, makes up the walls of this relic.



**Fig. 53** *Wall of Texture*

The horizontal carvings in this wall serve as a reminder of the excavation of the landscape. As this wall is excavated, it reveals chunks of tailings that make up the wall assembly, reminding inhabitants that tailings are a product of mining.



**Fig. 54** *Wall of Opacity*

This photograph was collaged with a photograph of Tar Island in order to contextualize it. Through each wall of opacity a scene unfolds. This wall allows inhabitants to witness the last stage of the reclamation process, the shipping out of repurposed materials. The inhabitants are able to overlook this process through gradients in the wall.



**Fig. 55** *Skylight*

Miners' senses are constantly heightened, whether from the smell of tar, or from the loud noise of machinery, or the taste of sand as they inhale. In a site where the workers' senses are constantly engaged, a breathing room is necessary. With nothing but a skylight open to the clear skies above, this room mutes all senses except for vision. This room will allow inhabitants to meditate and take a break from the overwhelming life of a miner.

### 3.3 Design Proposal

In the previous sections I analyzed the site of Tar Island through aerial photographs from photographers Alex MacLean, Louis Helbig, and Todd Korol. Study models of the geologic and atmospheric were further developed in order to elaborate on guidelines set out by designers of the geologic. The investigative question still holds: How can concepts of both the atmospheric and the geologic inform a design investigation?

A map of Tar Island (Fig. 56) locates model studies as interventions on the site, connecting existing conditions of the site to proposed interventions, both at the scale of the landscape and at the building scale. The descriptive words for existing conditions are borrowed from Emily Brady's *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature*: "Paradigm cases of the natural sublime are characterized principally by perceptual and expressive qualities relating to great height or vastness (the mathematically sublime) or tremendous power (the dynamically sublime). A range of more specific multi-sensory qualities can be identified, such as darkness, obscurity, greatness, massiveness, the tremendous, towering, dizzying, shapeless, formless, boundless, blasting, thundering, roaring, raging, disordered, dynamic, tumultuous, and so on."<sup>1</sup> As such, they make evident dual neo-sublime characteristics of the existing and proposed, merging at one point in this experiential landscape. Six

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<sup>1</sup> Emily Brady, *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature* (New York: Cambridge University Press, 2013), 187.



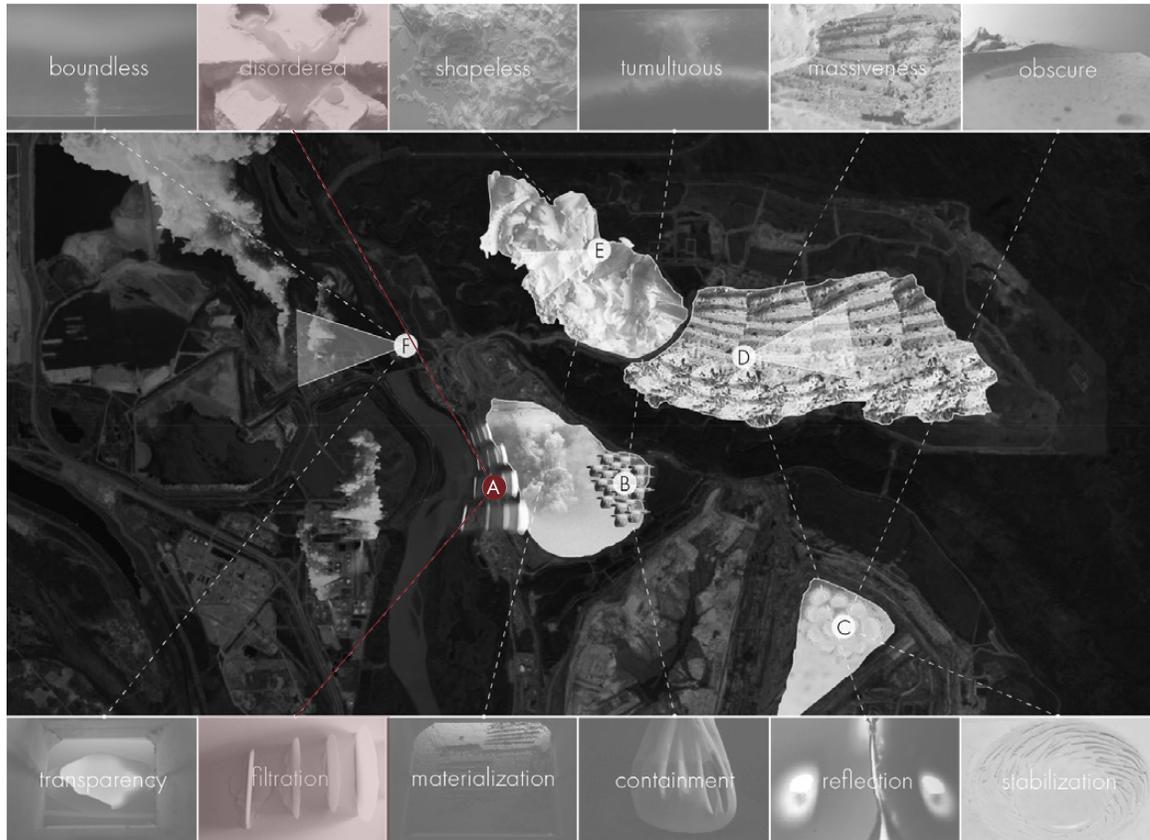
Fig. 56 Site Map

This map links models with qualities that constitute an experiential intervention (bottom) to models with qualities of a neo-sublime, post-industrial landscape (top).

interventions that connect with existing conditions are proposed: boundless-transparency, disordered-filtration, shapeless-materialization, tumultuous-containment, massiveness-reflection, and obscure-stabilization. Each intervention consists of an existing condition and a proposal through atmospheric and geologic design. Three of these interventions (A. disordered-filtration, B. tumultuous-containment, and C. obscure-stabilization) propose remediation processes aiming to neutralize and remove tailings from ponds, underground water, and the Athabasca river. This are proposed as

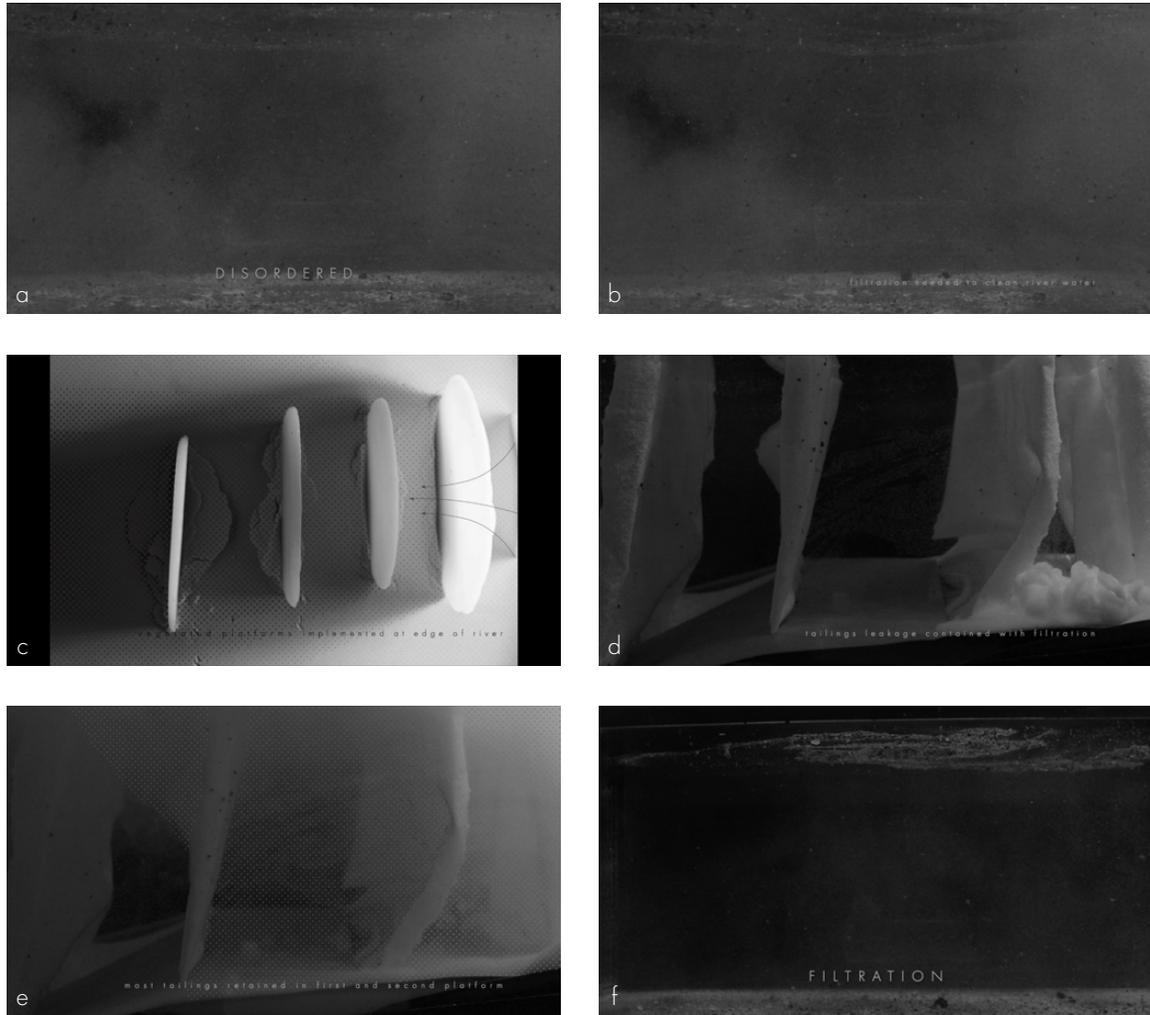
initial strategies in reusing tailings as a building material. The other three interventions (D. boundless-transparency, E. shapeless-materialization, and F. massiveness-reflection) use the neutralized tailings to create an aesthetic experience within this neo-sublime landscape.

Model studies and photography have illustrated the capacity these methods have in informing experiential qualities of both the atmospheric and geologic. To represent remediation processes, dynamic model studies are captured through video. Photographs are used as the primary method of representation of the atmospheric interventions, overlaying them with photographs of Tar Island previously studied. Line drawings suggest ways of reading these photographs as mechanics of reclamation and intervention. Sections through these landscapes provide context for the surroundings within which each intervention lies. While the landscape experiential interventions are represented through these hybrid drawings, interventions at the self-experiential scale are represented through collaged details focusing on sensorial experience. The interventions are categorized as architectural or landscape proposals, however both reconcile the geologic and atmospheric. The interventions are arranged first showing three remediation proposals, followed by three atmospheric proposals. These interventions act as paradigms for creating atmospheric experiences in a post-industrial landscape, making evident remediation design in light of climate change.



**Fig. 57** *Disordered-Filtration*

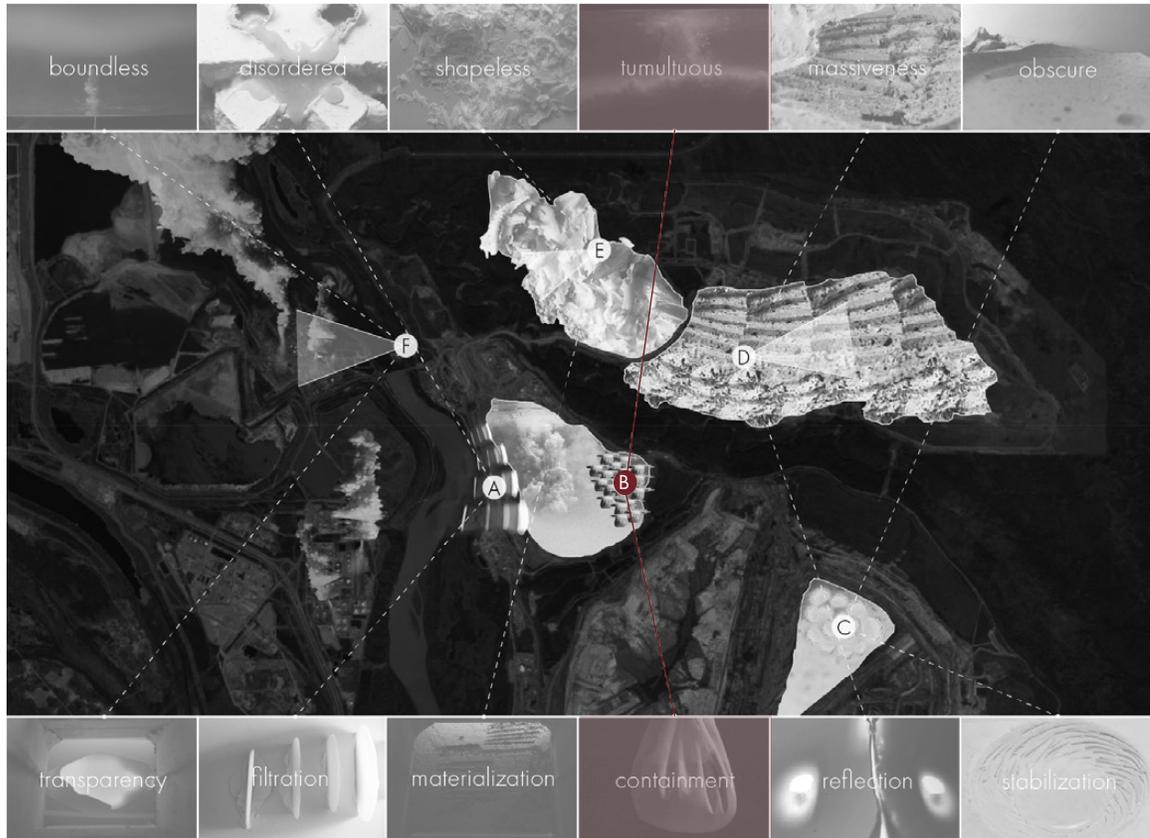
Disordered refers to the mismanaged leakage of tailings into the Athabasca river. Filtration is the remediation process proposed to suppress the leakage. The intervention can be viewed from multiple vantage points along a path starting at the bridge crossing the river and ending on the north side of the tailings pond.



**Fig. 58** *Disordered-Filtration stills*

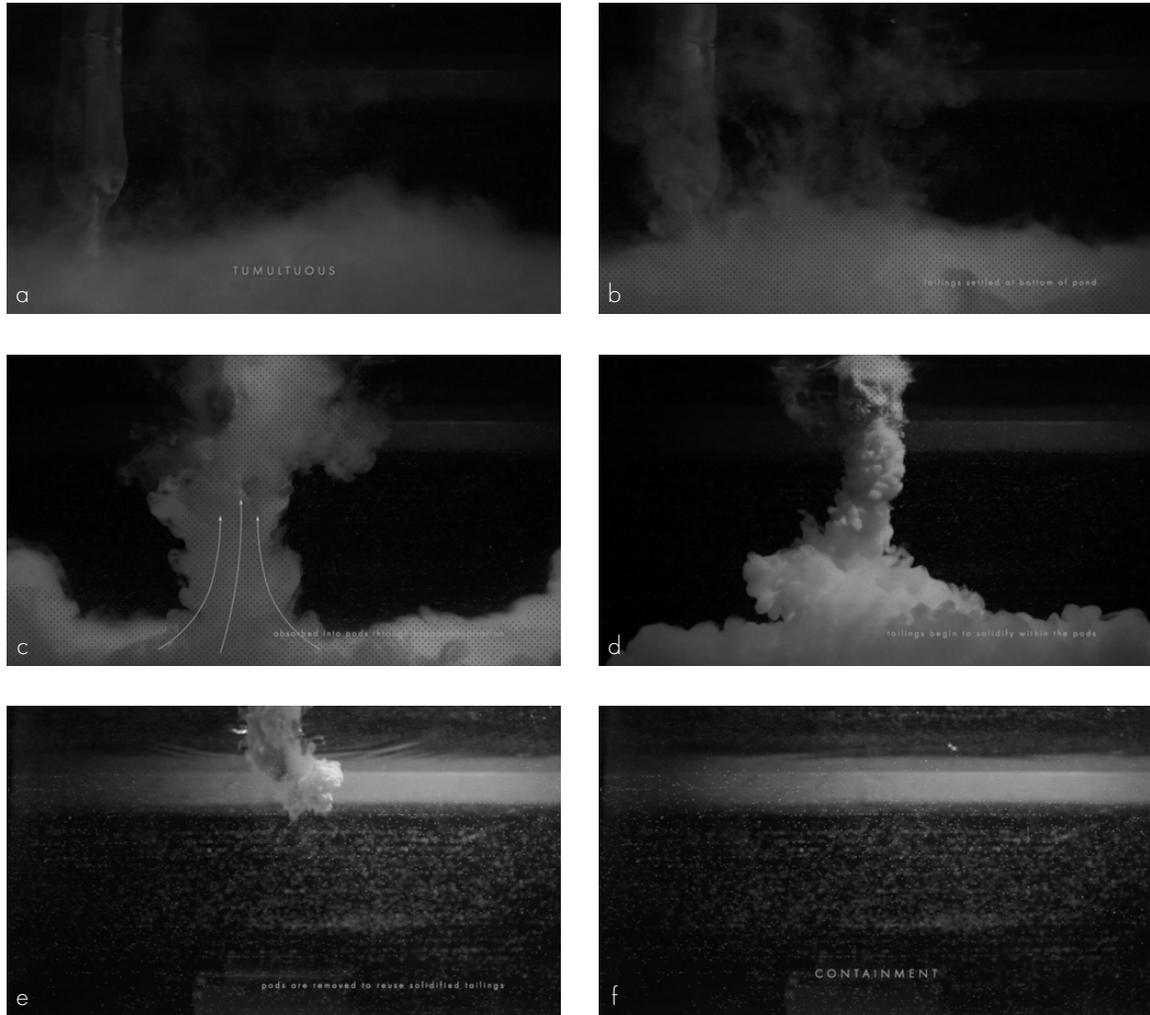
(a) still at 00:00 the river is shown polluted with tailings that seep from retention ponds through underground water (b) still at 00:06 filtration of water suggested to clean the river (c) still at 00:17 vegetated platforms implemented at the edge of the river to filter toxic water seeping underground through phytoremediation (d) still at 00:21 section of toxic underground water seeping through filters (e) still at 00:31 filters retain toxins in the first two platforms (f) still at 00:37 river is cleaner after filtering platforms are implemented.

video link: <https://youtu.be/JuXh-yj9uwg>



**Fig. 59** *Tumultuous-Containment*

Tumultuous refers to the pollution of tailings within retention ponds, and containment is proposed to trap toxins in one place, limiting the spread of toxins away from the site. This intervention is linked to the previous intervention through the same path, creating a linear experience of viewing remediation of tailings from its dumping point in the pond to its leakage point at the river.



**Fig. 60** *Tumultuous-Containment stills*

(a) still at 00:02 the retention pond is shown polluted with tailings (b) still at 00:06 tailings are settled at the bottom of the pond which leads to seepage into underground water (c) still at 00:16 a vegetated pod is placed into the pond and tailings are absorbed into the pod through evapotranspiration (d) still at 00:24 tailings begin to solidify within the pods insinuating they are neutralized (e) still at 00:28 pod is removed to reuse solidified tailings (f) still at 00:35 the pond is cleaned through the implementation of pods.

video link: <https://youtu.be/QvaXmr5q7pA>



**Fig. 61** *Obscure-Stabilization*

Obscure refers to the state of retention ponds, fogged with the constant movement of tailings creating a neo-sublime landscape. Stabilization is proposed to clear the pond by implemented several pods that will capture tailings leaving behind a clear pond. This intervention is placed in another retention pond and is accessed by a boardwalk running along the north-east of the pond.

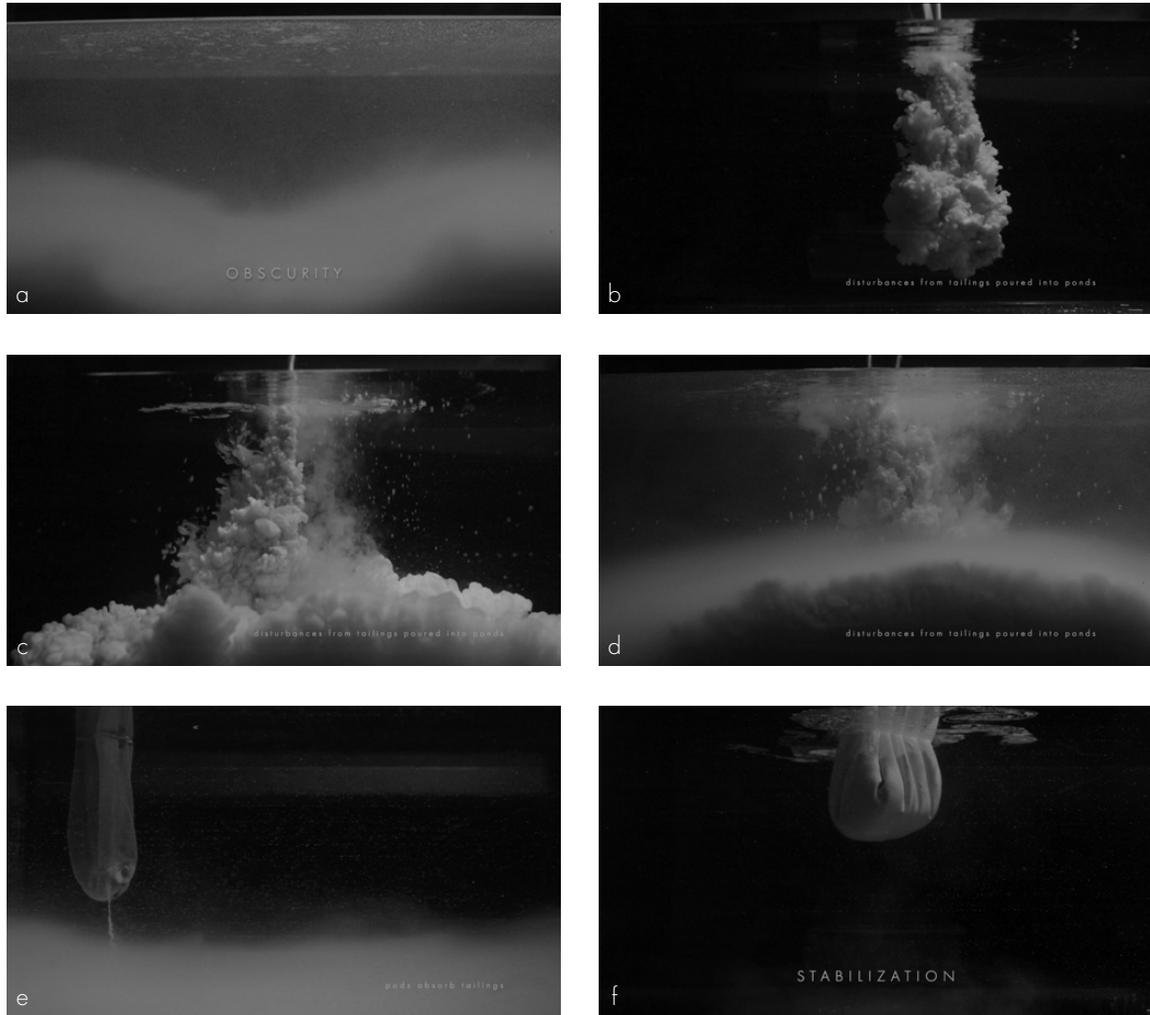


Fig. 62 *Obscure-Stabilization stills*

(a) still at 00:04 retention pond shown in constant motion making it hard for tailings to harden (b) still at 00:06 movement is caused by disturbances from tailings poured into pond (c) still at 00:07 (d) still at 00:10 every time tailings are poured into the pond the existing settled tailings are disrupt-ed (e) still at 00:23 pods placed in the pond absorb the tailings regardless of motion (f) still at 00:29 pods absorb all tailings through evapotranspiration leaving the pond clear of tailings.

video link: <https://youtu.be/ztisaJqll6g>



**Fig. 63** *Massiveness-Reflection*

This intervention shows how the architecture is informed by the existing landscape and does not disrupt it. Massiveness refers to the vast, incomprehensible scale of this post-industrial landscape, while the architecture encourages reflection of such processes. A trail north of this intervention provides access through zigzagging ramps leading down to the bottom of the open pit. This allows miners and visitors to observe the landscape before experiencing it through the intervention.

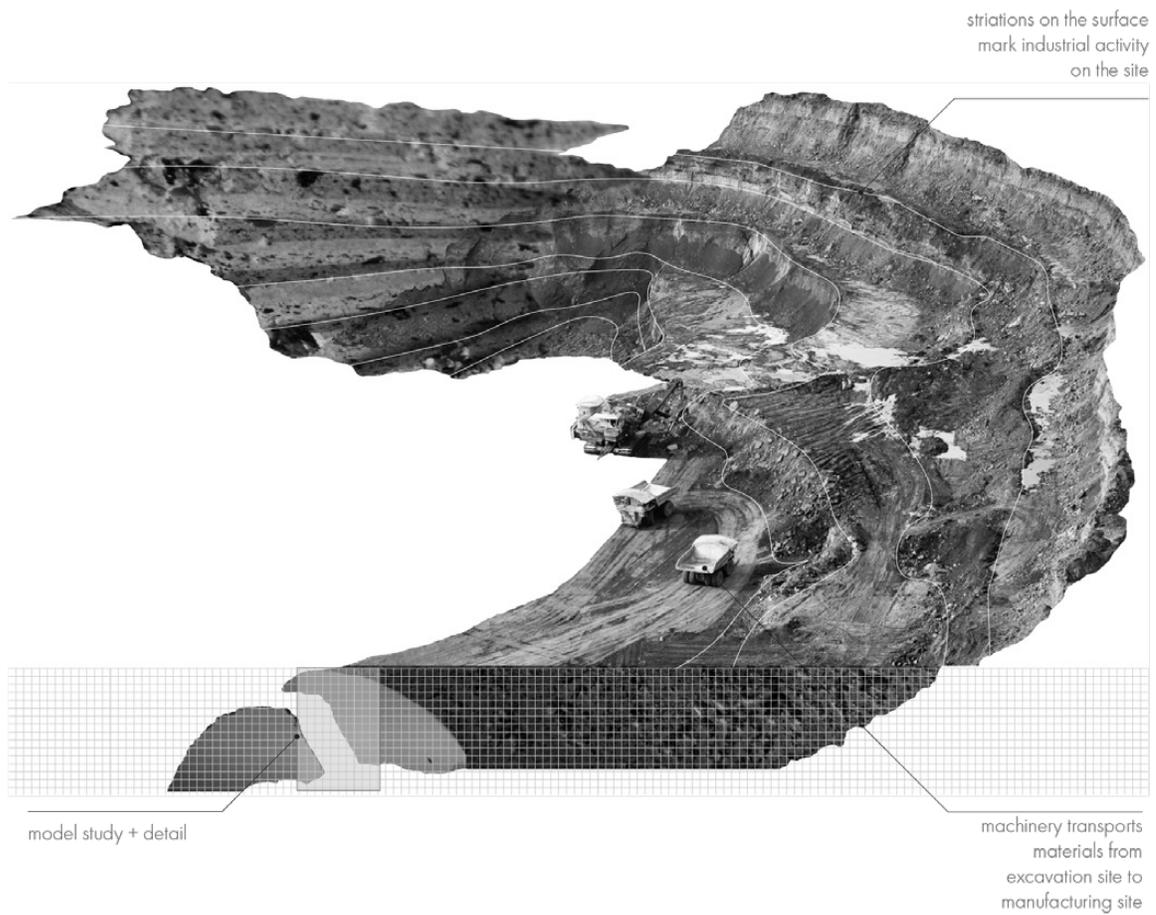
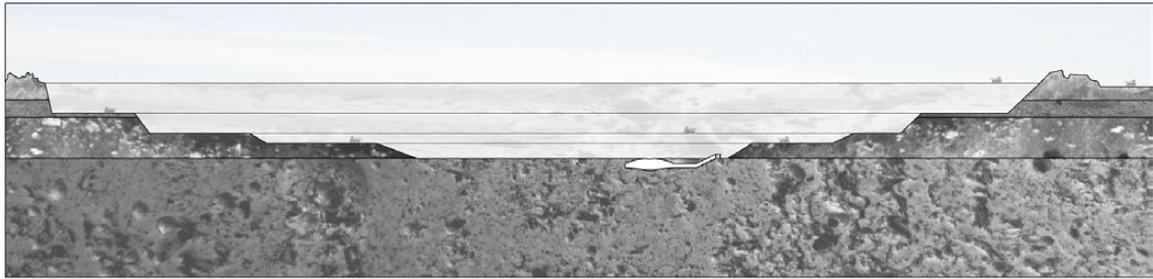


Fig. 63 (a) *Massiveness-Reflection collage*

From an aerial view, striations on the surface mark industrial activity as actors of this geologic epoch we live in. The large machinery transports excavated materials from the site, increasing the surface area this sand occupies. The surface is left unaltered while the architecture is embedded into the landscape previously excavated by mining activities.

Tar Island



Cross-Section 1:5000

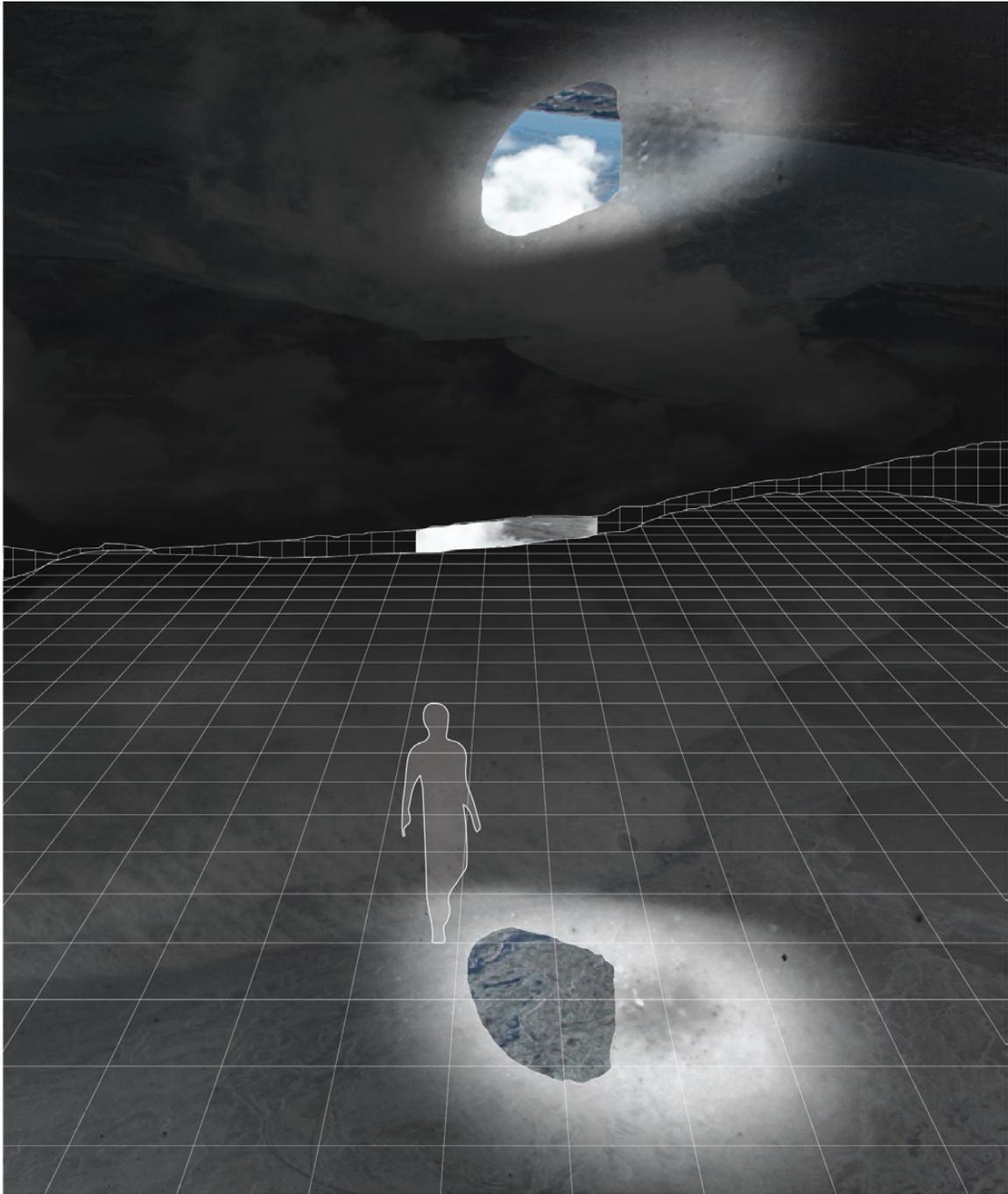


model study + detail

Cross-Section 1:1000

**Fig. 63 (b) Massiveness-Reflection sections**

The proposed intervention lies beneath the striated surface, returning neutralized tailings back into their site of extraction. Miners enter a dark tunnel meant to decontextualize them from their surroundings. At the end, a domed room lit only from an oculus above lends the miners a place of reflection.



**Fig. 63 (c) *Massiveness-Reflection vignette***

The oculus is mimicked by a glass floor, providing linear connection from the geology beneath to the open sky above. Here, miners have a place of contemplation as they encounter vastly different scales: the cosmos and the excavated site. The cosmos provide miners a moment of being transported away from the site, while the geology beneath grounds them to this very moment, serving as a reminder of the ongoing degradation of the site.

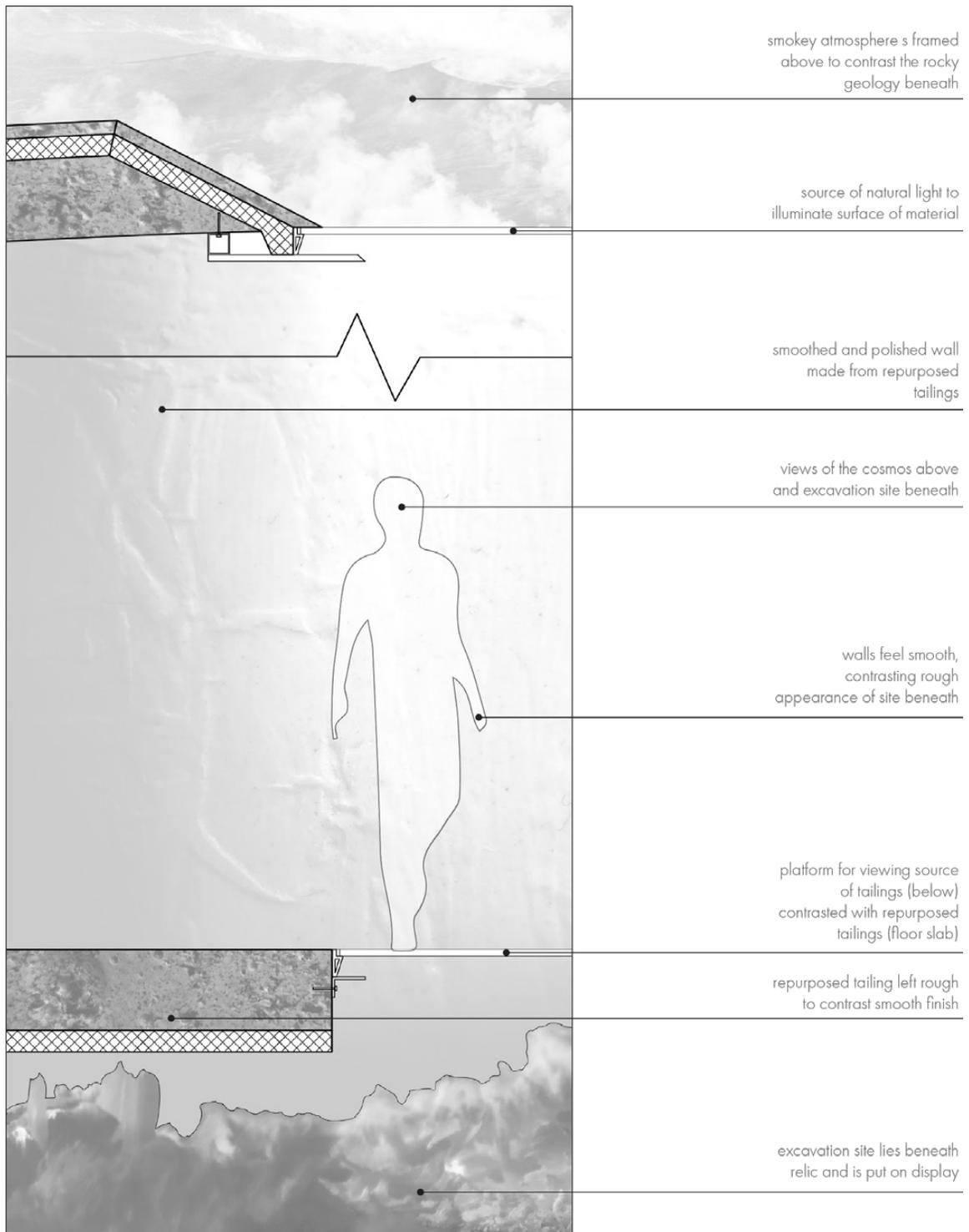
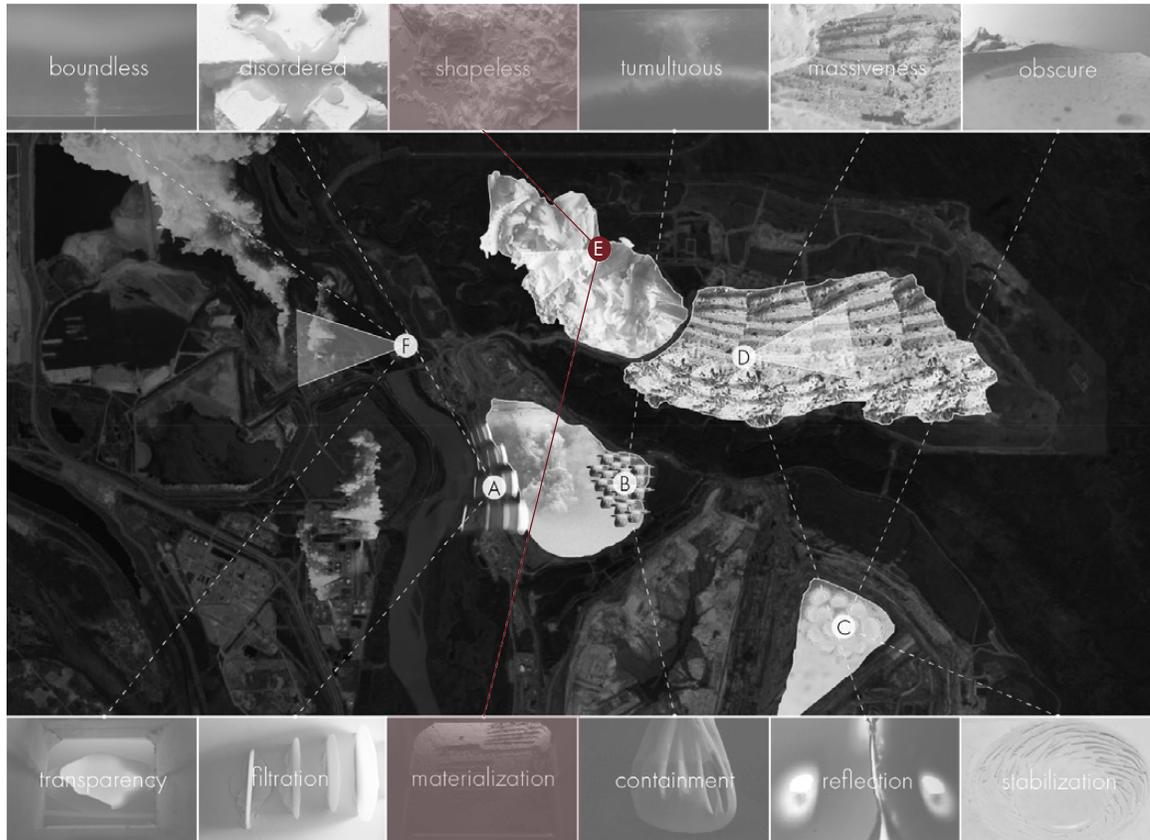


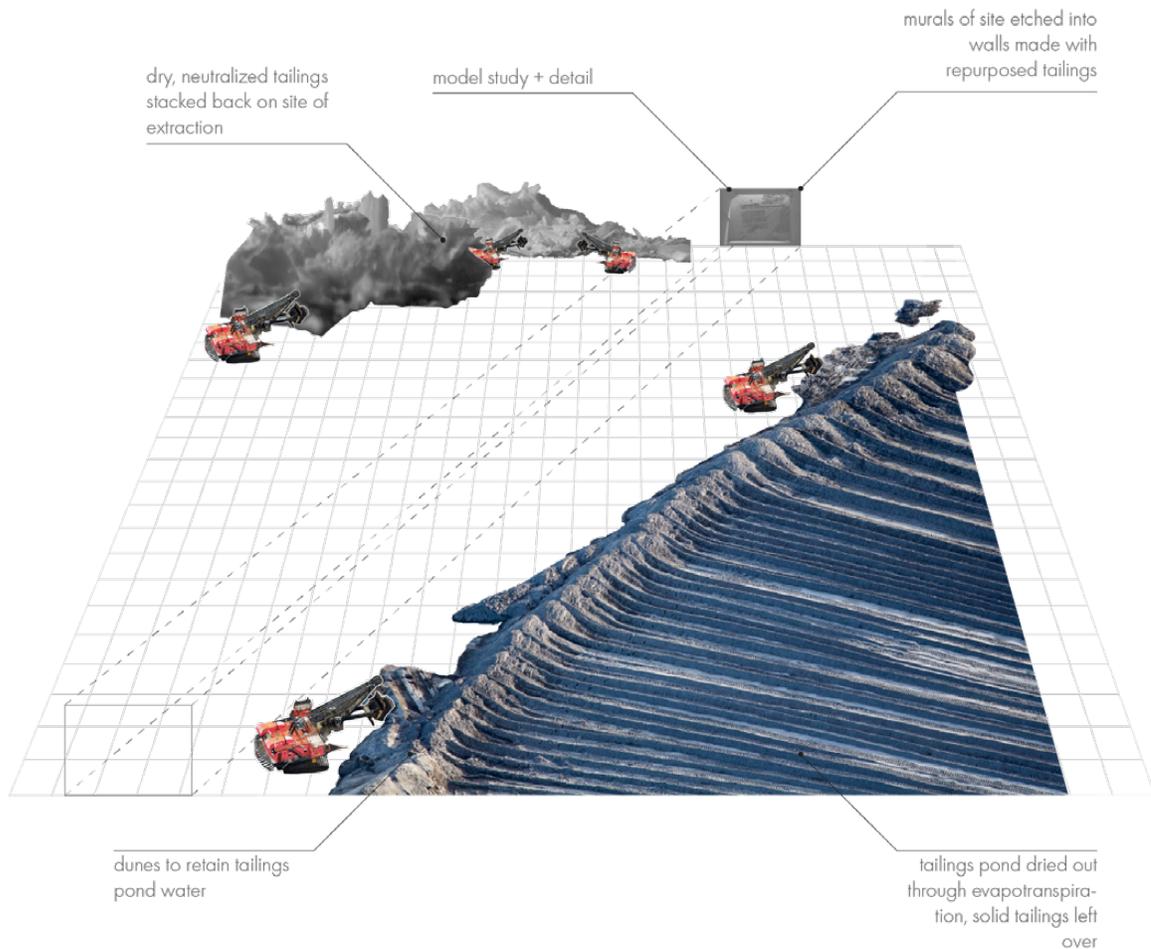
Fig. 63 (d) *Massiveness-Reflection detail*

A closer look at the linear connection between the oculus and glass floor reveals contrasting experiences that are had simultaneously as the miners stand here in reflection.



**Fig. 64** *Shapeless-Materialization*

Access to the second intervention is possible through a trail connected to the first intervention. After reflecting on the site through decontextualization, the second intervention immerses miners into a new landscape. The shapeless refers to the current underuse of tailings, specifically how they are retained in ponds. Materialization comes to play when that underused material is repurposed as a building material. This intervention consolidates the topography of the site into a textured wall, reducing the scale of the geologic to the building.

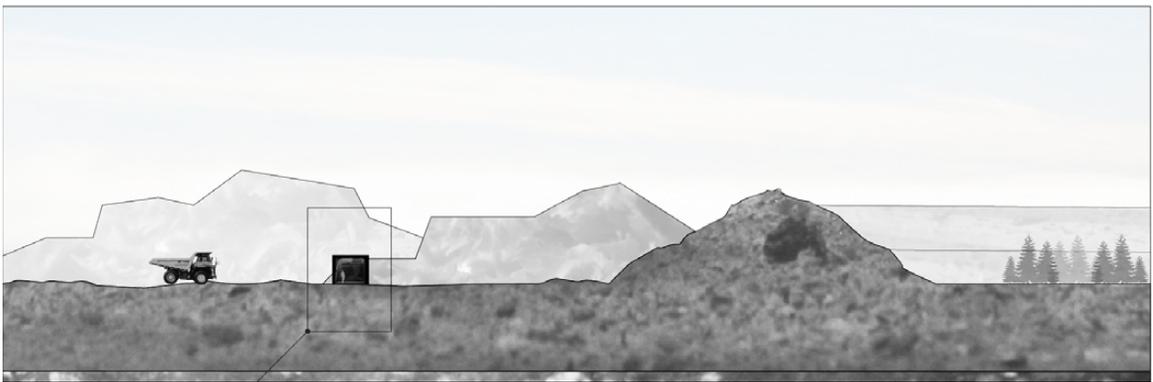


**Fig. 64 (a) Shapeless-Materialization collage**

This collage shows the site where a tailings pond would normally be held back by mounds of sand, but instead a pile of neutralized tailings takes its place. In the centre is a wall that captures the site through etchings, and is made from the repurposed tailings.



Cross-Section 1:5000

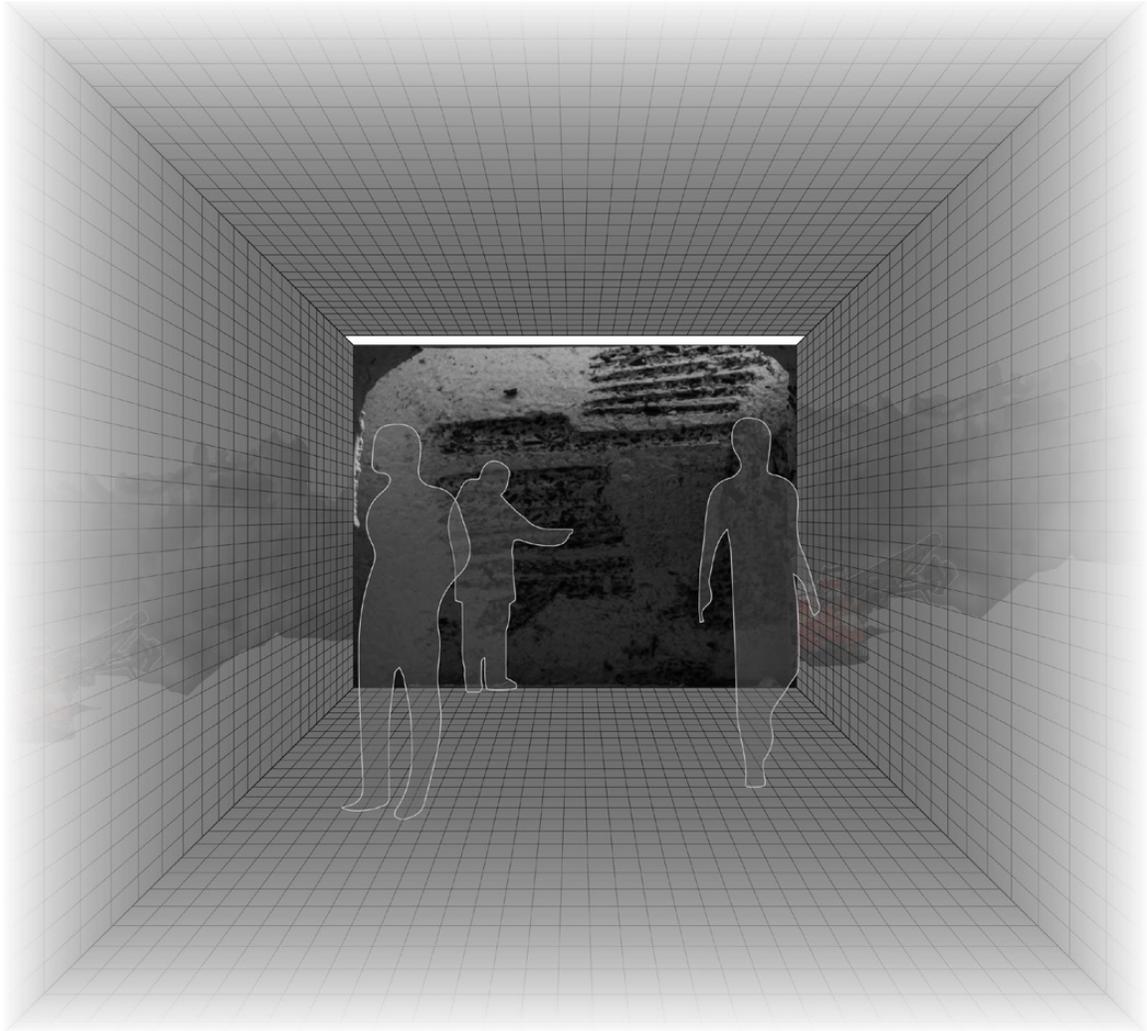


model study + detail

Cross-Section 1:1000

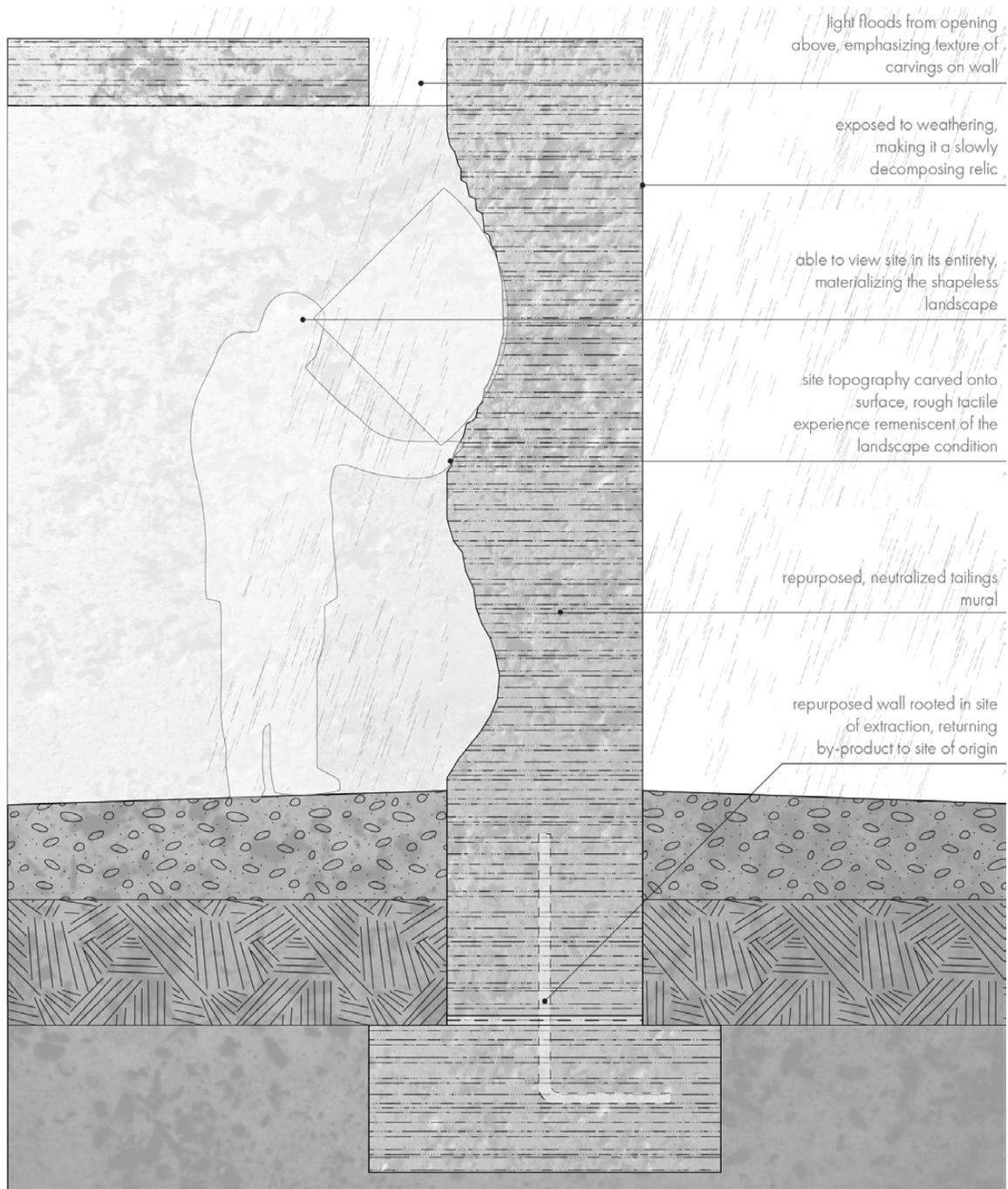
**Fig. 64 (b) *Shapeless-Materialization sections***

Miners come here to be familiarized with this remediated landscape that serves a new purpose: to reuse waste as a valuable product. The previously existing tailings pond is planted with trees in order to neutralize the toxic tailings settled at the bottom of this pond. On the other side of this dam, the neutralized tailings are piled up to be used as construction material.



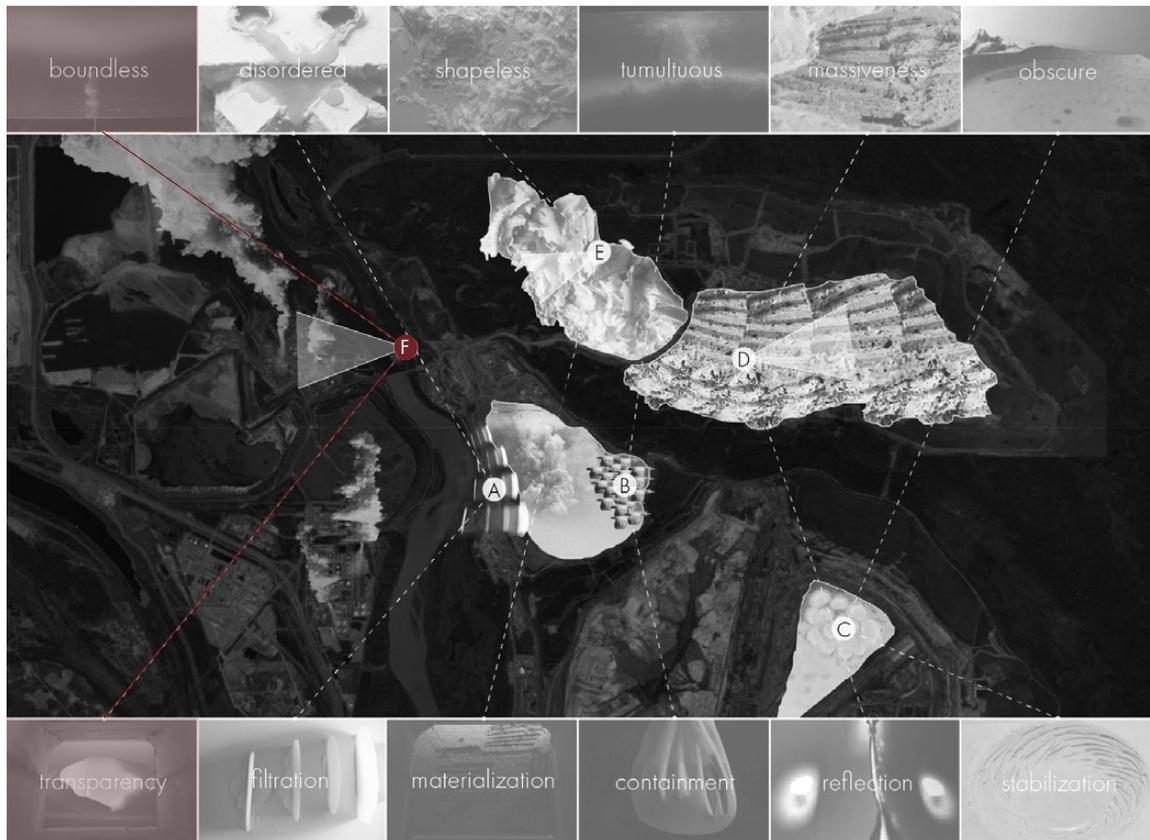
**Fig. 64 (c) *Shapeless-Materialization vignette***

The miners can view different components of this vast landscape simultaneously through this wall of tailings. The wall is carved to replicate the topography of the new landscape, allowing for a tactile experience, materializing the once shapeless. It is covered on all sides except for a sliver at the top allowing light to wash the wall from above, emphasizing the carving made in it. Beyond this intervention lies the piles of neutralized, dry tailings that were used to build this wall.



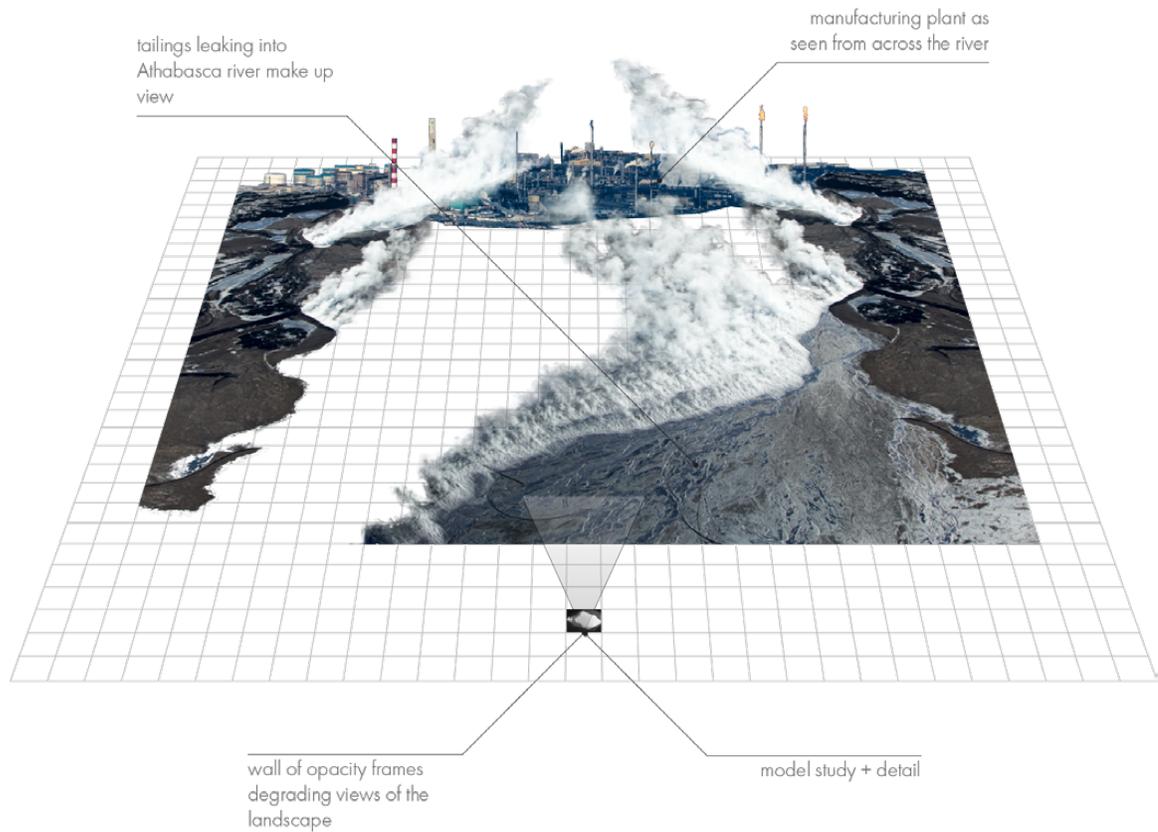
**Fig. 64 (d) Shapeless-Materialization detail**

The wall is made of neutralized tailings, adding a second dimension of consolidation of scales to the intervention. Thus, this wall is a celebrated space in this relic to the landscape. Exposed to the elements, the mural is meant to degrade as time passes, emphasizing the temporality of mines on site.



**Fig. 65** *Boundless-Transparency*

The last intervention is located closest to the existing processing plant, where the bitumen is refined into crude oil. The boundless alludes to the apparent seamless landscape, covered in smoke and dust from mining activities. It also refers to the leakage of tailings which go into the Athabasca river and are transported away from the site, extending the degradation of mining away from the site. This intervention uses key moments of transparency to frame this anthropocentric landscape.



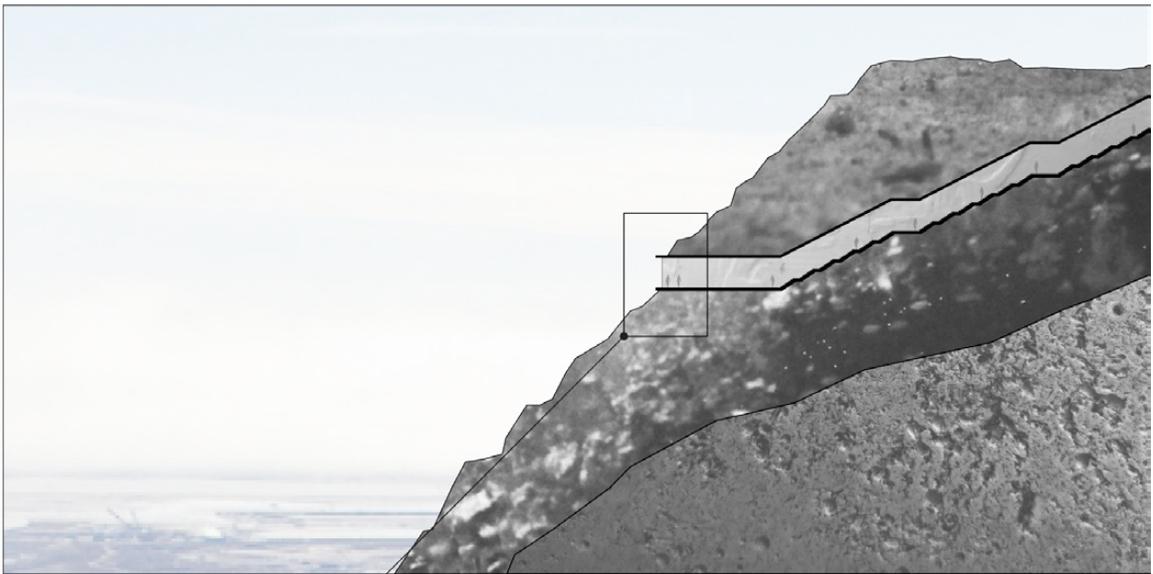
**Fig. 65 (a) Boundless-Transparency collage**

The intervention looks out to the anthropocentric landscape, emphasizing the pollution which comes directly from the processing plant. The smoke stacks emit toxic gasses into the atmosphere, while pipes dump tailings directly into the river. The current of the river carries toxins away from the site, extending the surface area polluted by mining activities.

Tar Island



Cross-Section 1:5000



model study + detail

Cross-Section 1:1000

**Fig. 65 (b) Boundless-Transparency sections**

Embedded into the hillside across the Athabasca river, the intervention brings miners from an elevated area into an enclosed, crammed space. At the end of this tunnel, the only source of light comes from the wall of transparency which frames the processing plant and the degrading landscape.

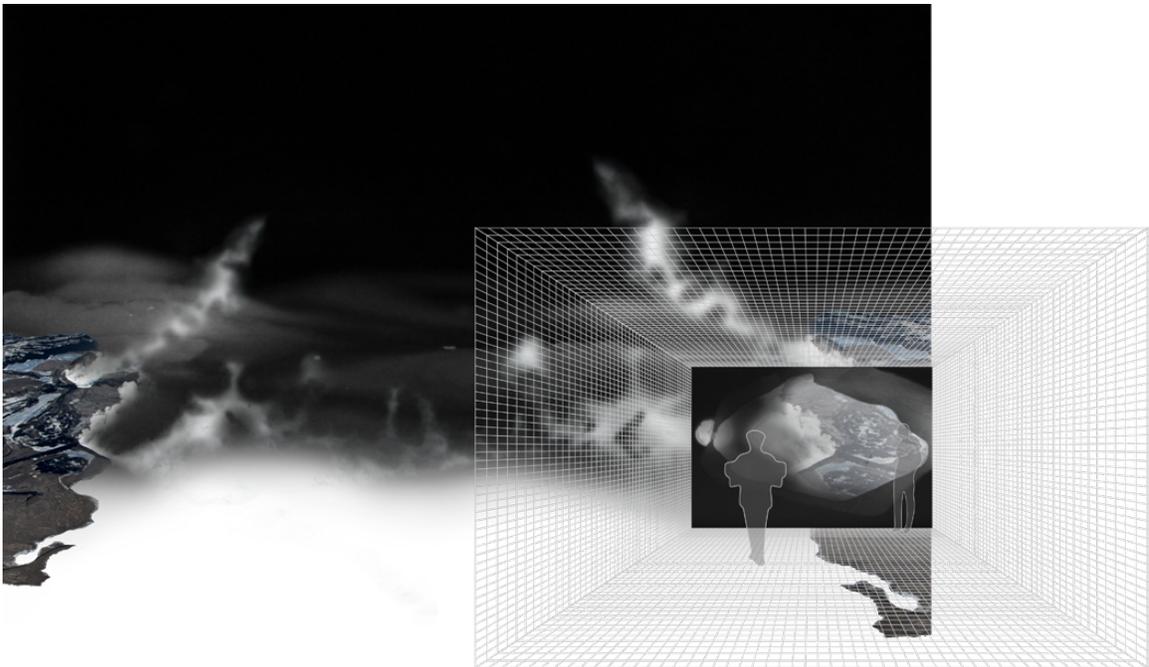
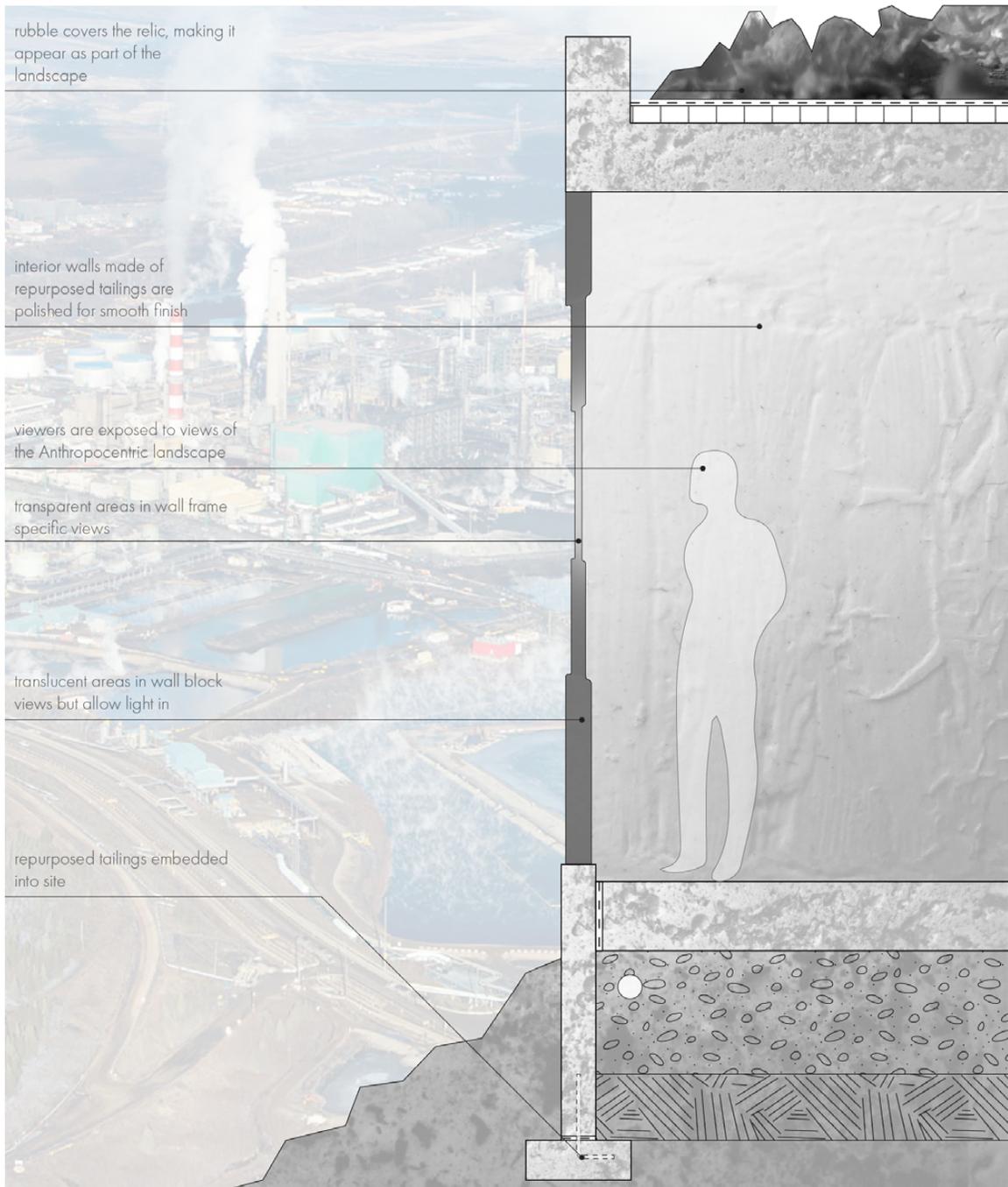


Fig. 65 (c) *Boundless-Transparency vignette*

The wall of transparency at the end of this tunnel provides views of the degrading landscape beyond. Moments of opacity block unrequited views, while transparent moments highlight areas of degradation.



**Fig. 65 (d) Boundless-Transparency detail**

The wall is depicted as a moment of clarity embedded in between the rubble of the landscape. From outside, this relic appears to be part of the landscape as it is anchored in this hillside. From the inside the miners experience views of the degrading landscape while being enclosed in a structure made from repurposed tailings.

## Conclusion

In the introduction to this thesis I questioned what constituted an architectural atmosphere. This project has helped me develop a method of designing with atmospheres, however it was an intrinsically personal experience. I was driven by a curiosity on atmospheres that started before architecture school. My instincts allowed me to make decisions on what method of working would be suited for this topic. Model-making was always meant to be a means of developing design work, however, through experimenting with photography I was able to read my models from a different perspective. Although I did not realize it at first photography allowed me to elevate my models, and evidently guided most design choices made throughout this thesis. Atmospheres are tied to our sensorial and emotional experiences, making them intrinsically personal. This thesis has taught me that there can be no one method for designing with atmospheres. However, I found that certain methods gave me more advantages than others. I found that a combination of model-making and photography was easily read as moments with atmospheric presences or geologic attributes. This method of working was also suitable to the constant trial-and-error process I tasked myself with. A model was a tactile object that I could fit in the palm of my hand and easily manipulate while in photographs it could appear as a vast landscape. I was able to work simultaneously at radically opposing scales, never tying me down

## Conclusion



**Fig. 66** *Model-making and Photography*

Model-making was always meant to be a means of developing design work, however, through experimenting with photography I was able to read my models from a different perspective. A model was a tactile object that I could fit in the palm of my hand and easily manipulate while in photographs it could appear as a vast landscape.

to a set typology. Digital modelling and line drawing would not be able to achieve this due to its constricting attributes.

The idea that there is no one method of designing with atmospheres is further suggested in aesthetics theory and how other architects created atmospheres in their built projects. Mark Wigley proposed that architects should design atmospheric ‘generators’. These generators, which I called the atmospheric, evolved to be *materiality*, *reflectivity*, and *transparency* after several model studies that tested their effects on the built environment. In search for how an atmosphere – which as stated before emanates from a physical object – could affect emotions, Peter Zumthor provided an answer. Our senses and therefore the human body act as the gateway between the two, allowing us to perceive our surrounding through personalized experiences. Gernot Böhme opened up this discussion of aesthetic experience past the boundaries of architecture and into the natural world by introducing the concept of the sublime as posed by Immanuel Kant. This initiated the search for atmospheres at a larger, planetary scale.

With the inclusion of the sublime – which focused on aesthetics of landscapes – came the geologic which concerned itself with degrading landscapes and theories of post-nature and neo-sublime. Linking the atmospheric and the geologic was one of the most challenging aspects of this thesis, and I believe there is still more to be said about what constitutes these two terms. Böhme and Kant were the catalyst in informing the choice to implement the atmo-

spheric, a personal experience, into a landscape of degradation. In order to experience atmospheres at the scale of the landscape it became important to reflect on Böhme's theories of nature. He suggested that in personally experiencing our harmful actions on exterior nature we become aware that we are ourselves nature. This inward-outward dual reflection is prevalent in the sublime, thus a landscape with sublime qualities was essential. The neo-sublime – which deals with landscapes of degradation – suited this project, raising questions about what it meant to intervene in a fractured landscape in need of remediation. This became a guiding concern in designing atmospheric interventions on Tar Island, turning the interventions into places of self and outwardly reflection.

As with the atmospheric, various theory work from landscape architects, designers, and geographers impacted my design guidelines for working within the geologic. Alan Berger provided precedents for mine remediation and methods of representing invisible degradation such as tailings toxins. Rania Ghosn and El Hadi Jazairy proposed designing landscapes of the Anthropocene by acknowledging traces of human activity left on the Earth, traces such as the excavation marks left on Tar Island. Lydia Kallipoliti was crucial in studying the geologic as a cyclical process of material, allowing me to think about the evolution of the interventions from waste material, to repurposing, to their eventual degradation.

Ultimately all this research taught me that many solutions already exist, positioning my thesis as a speculative project. I devel-

oped a method of working that engaged with existing technological and theoretical practices. Similar to Design Earth's methodology, I found established remediation techniques such as phytoremediation and evapotranspiration, and elaborated on what a future that included such processes would look like. I designed this project by foregrounding the geologic, which required attention across radically diverging scales. At the molecular scale, phytoremediation neutralizes toxins within tailings and soil. At the scale of the building, this neutralized material is embedded back into its site of extraction closing loops of material production. At the scale of the landscape, Tar Island develops a new geologic strata of neutralized tailings marking our geologic epoch. And at the regional scale, the toxins that have reached larger bodies of water are the last remains of toxic seepage from the mine. As a system that performs at different scales, affecting both our sensorial experience and the environment, this project suggests what it could mean to design a geologic atmosphere.

Finding a way to experientially intervene in a way that the miners could recalibrate the way they viewed the site – past a mere site of resource extraction – was crucial to engage with the atmospheric and the geologic. Changing the site experientially meant revealing it as a site of the neo-sublime: “...darkness, obscurity, greatness, massiveness, the tremendous, towering, dizzying, shapeless, formless, boundless, blasting, thundering, roaring, raging, disordered,

dynamic, tumultuous, and so on.”<sup>1</sup> This degrading site, when viewed from new perspectives made possible by the interventions, exhibits a strange, overwhelming beauty characteristic of the neo-sublime. The interventions use atmospheric ‘generators’ – materiality, reflectivity, transparency – to outline heightened experiences of geologic changes in the landscape, whether from an existing process from the mining industry or an implemented remediation process. Foregrounded in the first intervention “Massiveness-Reflection” is the inward-outward dual reflection characteristic of the sublime, allowing miners to be embedded in the landscape while decontextualizing them to their surroundings. In the second intervention “Shapeless-Materialization”, miners are brought into a new landscape formed by remediation processes. They familiarize themselves with its topography through tactility, coming in direct contact with repurposed tailings and the site simultaneously. The last intervention “Boundless-Transparency” reflects on the immensity of the site and the icon of degradation, the power plant. Views of the landscape and the plant are framed at the end of a dark tunnel, encouraging miners to confront the harmful effects of mining. These atmospheric interventions become places of reflection, allowing miners to embody Gernot Böhme’s suggestion: “Drastically thrown back onto our own nature by what we are inflicting on out-

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<sup>1</sup> Emily Brady, *The Sublime in Modern Philosophy: Aesthetics, Ethics and Nature* (New York: Cambridge University Press, 2013), 187.

## Conclusion

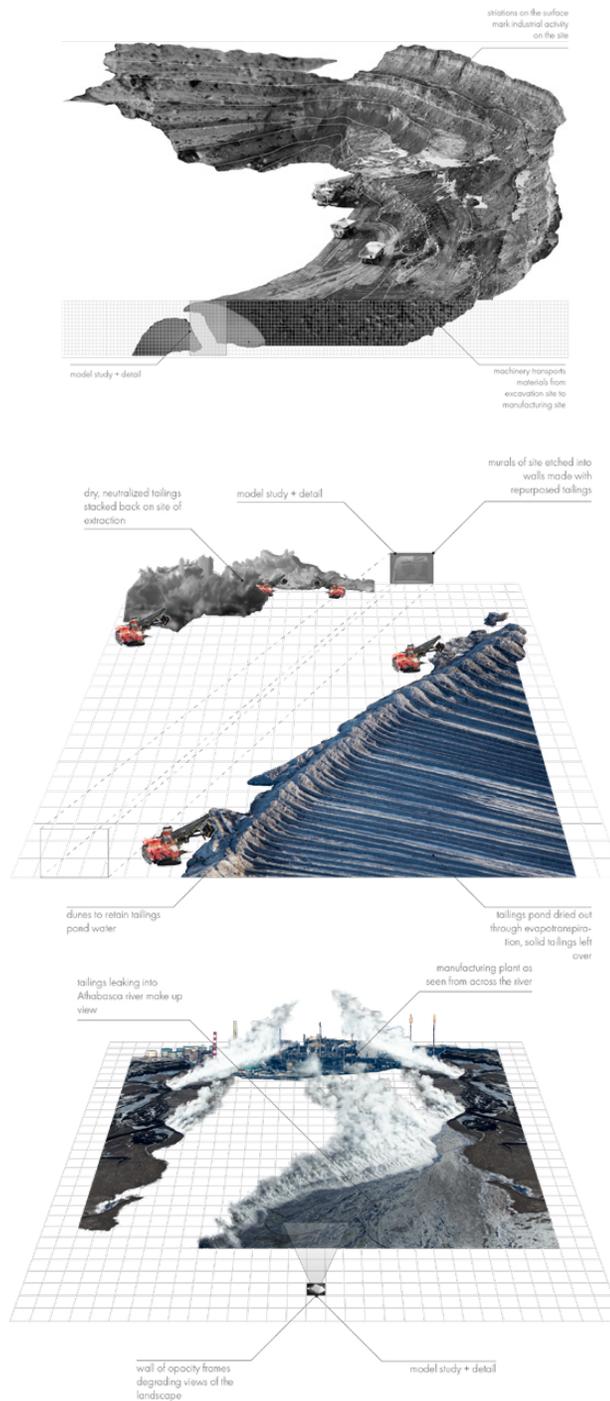


Fig. 67 *Atmospheric Interventions*

The interventions use atmospheric 'generators' – materiality, reflectivity, transparency – to outline heightened experiences of geologic changes in the landscape, whether from an existing process from the mining industry or an implemented remediation process.

er nature, we become aware that we are ourselves nature.”<sup>2</sup>

Atmospheres are commonly thought of as immaterial, however this thesis sought to give material presence to the atmospheric through calibrated interventions within a geologic landscape. The atmospheric ‘generators’ – materiality, reflectivity, and transparency – were products of model-making and methodical photography. These terms that embody what it means to design the atmospheric provided a guideline for me in designing the interventions. They became the bridge from understanding atmospheres as a phenomenological presence to being able to inhabit it. Having guided most design choices, the atmosphere transformed from an immaterial presence to a material intervention in a geologic landscape, bringing forth the Geologic Atmosphere.

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2 Gernot Böhme, “Body, nature, and art,” in catalog *Natural Reality: Artistic Positions between Nature and Culture*, Daco Verlag and Ludwig Forum for International Art Aachen (1999): 112.

## Conclusion



Fig. 68 *Geologic Atmosphere*

Having guided most design choices, the atmosphere transformed from an immaterial presence to a material intervention in a geologic landscape

## A.1 Matrix of the Atmospheric

Author	Definition of Atmosphere	Constructed through Architecture	Guidelines for Designing
Mark Wigley, <i>The Architecture of Atmospheres</i> (1998)	Wigley positions atmospheres as intrinsic to architecture since that is what we sense when we enter a space.	Wigley implies that an atmosphere cannot be physically built and architects must design what he calls 'generators.'	Generators such as light, scale, and air flow construct the atmospheres that we either consciously or unconsciously perceive.
Peter Zumthor, <i>Atmospheres: Architectural Environments, Surrounding Objects</i> (2006)	"We perceive atmosphere through our emotional sensibility – a form of perception that works incredibly quickly, and which we humans evidently need to help us survive." <sup>1</sup>	By describing his experience of such a mundane activity through what he sees, hears, touches, and smells, Zumthor confirms that we perceive atmospheres through our senses.	His design principles used in his notable buildings epitomize sensory and experiential qualities.
Gernot Böhme, <i>The Aesthetics of Atmospheres</i> (2016)	Böhme positions the atmosphere as a co-presence between of subject and object. Experiencing atmospheres is described as a way of sensing the reality of the object we perceive and the reality of our existence in the world.	Böhme opens the discussion to atmospheres in exterior spaces. He refers to art as a form of visually promoting this, using land art as an example of the ephemeral.	Similar to Zumthor, he suggests methodically using atmospheres to elicit a sensorial experiences.

<sup>1</sup> Peter Zumthor, *Atmospheres: Architectural Environments, Surrounding Objects* (Basel: Birkhäuser, 2006), 13.

## A.2 Matrix of the Geologic

Author	Definition of Geologic	Method of Representation	Anthropocentric Landscapes
Alan Berger, "Reclaiming the American West" (2002)	An altered landscape, approached as an evolving entity regardless of human intervention, which he claims should be taken into account in the design process. Post-mined landscapes are of interest since they will make up a vast area in years to come.	"The first reading is as a collection of visible indicators that document where alterations have occurred over time ... The second reading records landscape alterations that are invisible or physically veiled, such as chemical, microscopic, and underground processes and phenomena." <sup>1</sup>	His view on reclaiming degraded sites is to take into consideration that they will keep evolving after the reclamation process is done. He calls to "adopt a design approach engaged with open-ended ecological processes." <sup>2</sup>
Rania Ghosn & El Hadi Jazairy, <i>Geostories</i> (2019)	They speculate on a world inhabited by abandoned mines, oil fields, landfills, etc. They look at geographer Alexander von Humboldt's illustrations as methods of world-building (ie. studying the world as a whole system).	"If environmental issues are un-representable in their scale, their ubiquity, and their duration, then perhaps tableaux vivants – gigantic drawings and model miniatures of the Earth – can present these concerns to the senses." <sup>3</sup>	Call humans "geographical leviathan," <sup>4</sup> placing us at the centre of environmental degradation. The sites of inquiry are at a global scale, and they propose "architecture with externalities" <sup>5</sup> concerning invisible phenomena.
Steven J. Jackson, "Rethinking Repair" (2014)	Although the concern here is on technology, the geologic is seen as the world which is prone to fragility and limitations.	He references Ed Burtynsky's photos of unscenic landscapes as ways of visually understanding broken world thinking.	Broken world thinking is based on recognizing the damage that has been inflicted on the geophysical, atmospheric, and biological worlds as a result of our anthropocentric values.

1 Alan Berger, "Reclaiming the American West," *PRAXIS: Journal of Writing Building*, no. 4 (2002): 89. Accessed March 4, 2021. <http://www.jstor.org/stable/24328960>.

2 Berger, 85.

3 Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (Barcelona: Actar Publishers, New York, 2019), 24-25.

4 Ghosn and Jazairy, 11.

5 Ghosn and Jazairy, 12.

Author	Definition of Geologic	Method of Representation	Anthropocene Critique
Lydia Kallipoliti, "History of Ecological Design" (2018)	Refers to our time period as that of "Dark Naturalism", evident through hyperobjects. Also refers to "subnatures" - smoke, gas, exhaust, dust - which are often marginalized in architecture.	Refers to Ed Burtynsky, David Gissen, and Design Earth.	"The Earth now contains throughout its circumference a thin layer of radioactive materials that began being deposited in 1945. The deposition of this layer marks a decisive geological moment – a geological time marked by humans shaping the Earth." <sup>1</sup>
Diana Agrest, <i>Architecture of Nature: Nature of Architecture</i> (2018)	She refrains from marginalizing "nature" as an opposition to the human. She defines "nature" as its own entity, prevalent and evolving regardless of human activity.	Works shown in this book capture extreme phenomena, without any architectural intervention. Large sections through sites, deep into the earth's core reveal hidden phenomena.	"While the Anthropocene as a position has directed attention to critical environmental issues, as a construction of nature it also carries an ideology of problem-solving and object-making that serves the powers that be." <sup>2</sup>
Jill Stoner, "Reterritorialization: The Myth of Nature" (2012)	"Nature" is redefined not as an external "other", but also including our built environment. The geologic is not identified.	A study showing falcons that were relocated into the city at high points such as the Brooklyn Bridge or ledges of skyscrapers to provide them with a new habitat.	"How sad that architecture (the "useful" art) becomes the physical, visible manifestation of that which is no longer useful." <sup>3</sup>

1 Lydia Kallipoliti, "History of Ecological Design," Oxford Research Encyclopedias, April 26, 2018, <https://oxfordre.com/view/10.1093/acrefore/9780199389414.001.0001/acrefore-9780199389414-e-144>.

2 Diana Agrest, *Architecture of Nature: Nature of Architecture* (Novato, CA: Applied Research and Design Publishing, 2018), 11.

3 Jill Stoner, "Reterritorialization: The Myth of Nature," in *Toward a Minor Architecture* (Cambridge, MA: MIT Press, 2012): 100.

## B.1 Reclamation Processes

Amongst other remediation strategies, phytoremediation is taking the lead as the most promising solution. This cost-effective method uses plants to remove toxins from tailing ponds. By planting certain plant species, the roots capture toxins without affecting the topsoil. For this process to be possible organic matter must be added to the soil in order to prompt plant growth.<sup>1</sup> This method is appealing to most mining companies because it can become a walk away situation. Once the vegetation is planted the only thing left to do is let it grow and absorb toxins from the tailing ponds. There is little maintenance needed and no need to relocate the tailings, as is necessary in other remediation processes. A once barren landscape can become a 'greenscape' with this simple method.

Using similar concepts as phytoremediation, evapotranspiration is a newer reclamation process being researched by scientist of remediation and biotechnology Victoria Collins. In contrast to phytoremediation, evapotranspiration uses plants to extract water from tailing ponds and evaporate it through their leaves. Collins describes the outcome of a recent study: "The more the plants grew, the drier — and more solid — the tailings became. After 3.5 months, the plants had not only dried out the tailings, they had enriched them with organic material such as root fibres, and improved the

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<sup>1</sup> Li Wang and Bin Ji, "A Review on in Situ Phytoremediation of Mine Tailings," *Chemosphere* 184 (June 7, 2017): pp. 594, <https://doi.org/10.1016/j.chemosphere.2017.06.025>.

structure of the tailings solids by secreting organic molecules.”<sup>2</sup> The result of drying tailings is a soil-like material with an organic coating, rendering it a possible material to be used in rammed earth construction.

According to “A review of recent strategies for acid mine drainage prevention and mine tailings recycling” (2018) published in *Chemosphere* journal, various advantages of using tailings in geopolymer bricks are “... (1) rapid development of mechanical strength, (2) high resistance to acidic attack, (3) superior adherence to aggregates, (4) immobilization of toxic and hazardous substances, and (5) reduced consumption of energy and emission of greenhouse gas ...”<sup>3</sup> These bricks have been tested for their strength, water absorption, and abrasion resistance and met the requirements set out by the American Concrete Society for Testing and Materials (ASTM). However, little research has been done regarding the bricks durability and leachability.<sup>4</sup>

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2 Victoria Collins, “How Plants Can Help Clean up Oilsands Tailing Ponds,” The Conversation, December 11, 2020, <https://theconversation.com/how-plants-can-help-clean-up-oilsands-tailing-ponds-148158>.

3 Park and Tabelin, pp. 601.

4 Park and Tabelin, pp. 601-602.

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