Valuing Extreme Alteration

a multi-scalar landscape approach to new narratives for the central Appalachian Coal Region

Delft University of Technology Master Thesis Landscape Architecture Martijn Bisschops - 2024

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Martijn Bisschops

Colophon

Master Thesis Landscape Architecture

Flowscapes Graduation Studio
Section of Landscape Architecture, Faculty of Architecture and the Built Environment
Delft University of Technology

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a multi-scalar landscape approach to new narratives for the Appalachian Coal Region

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Stichting NHBos



EFL Stichting

Cover Image: Google Earth, 2024

Abstract

This thesis explores landscape architectural design approaches for the reclamation of mined landscapes in the Appalachian Coal Region, aiming to foster public appreciation and emotional connection. The study delves into the concepts of scale continuum and ecological grief, using a landscape-based narrative approach to reclamation for developing design principles that can transform post-industrial sites into spaces of cultural, ecological, and social significance.

Addressing ecological grief, characterized by emotional responses to environmental loss and degradation, the research advocates for strategies that emphasize accessibility, new appreciation, and adaptability. Ensuring open access to reclaimed landscapes fosters a sense of ownership and responsibility, while providing educational opportunities about the reclamation process enhances transparency. Promoting an open-minded approach, the design integrates artistic and cultural elements that highlight history and transformation, challenging traditional aesthetics and conflicting reclamation practices. The principle of open-ended design emphasizes flexibility, supporting the natural processes and ecological succession, allowing for continuous community engagement, both physically and mentally.

The final design, titled the ‘Appalachian Memorial of the Mined Landscape,’ reflects large-scale regional narratives trough site-specific design interventions, ensuring that reclamation efforts resonate across different spatial dimensions. This integrated approach applies the strategies of accessibility, new appreciation, and adaptability, allowing the grand themes and stories of the Appalachian region’s history and ecological context to be experienced in a detailed, intimate setting of individual sites, connected by intelligible routing.

Through these strategies, the research aims to create resilient landscapes that honor the region’s history and ecological context, offering new opportunities for public interaction and stewardship. The findings contribute to the broader discourse on landscape reclamation, providing actionable insights for practitioners and policymakers aiming to rehabilitate and reimagine mined environments.

Keywords:
Mountain Top Removal, Reclamation, Ecological Grief, Scale Continuum, Appalachian Coal Region

The Map is not the Territory

What a useful thing a pocket-map is!' I remarked.

'That's another thing we've learned from your Nation', said Mein Herr, 'map-making. But we've carried it much further than you.
What do you consider the largest map that would be really useful?'

'*About six inches to the mile'.*

'Only six inches!' exclaimed Mein Herr. 'We very soon got to six yards to the mile. Then we tried a hundred yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a mile to the mile!'

'*Have you used it much?' I enquired.*

'It has never been spread out, yet', said Mein Herr
'the farmers objected: they said it would cover the whole country, and shut out the sunlight!
So, we now use the country itself, as its own map, and I assure you it does nearly as well'.

Sylvie and Bruno Concluded
(Carroll, 1893)



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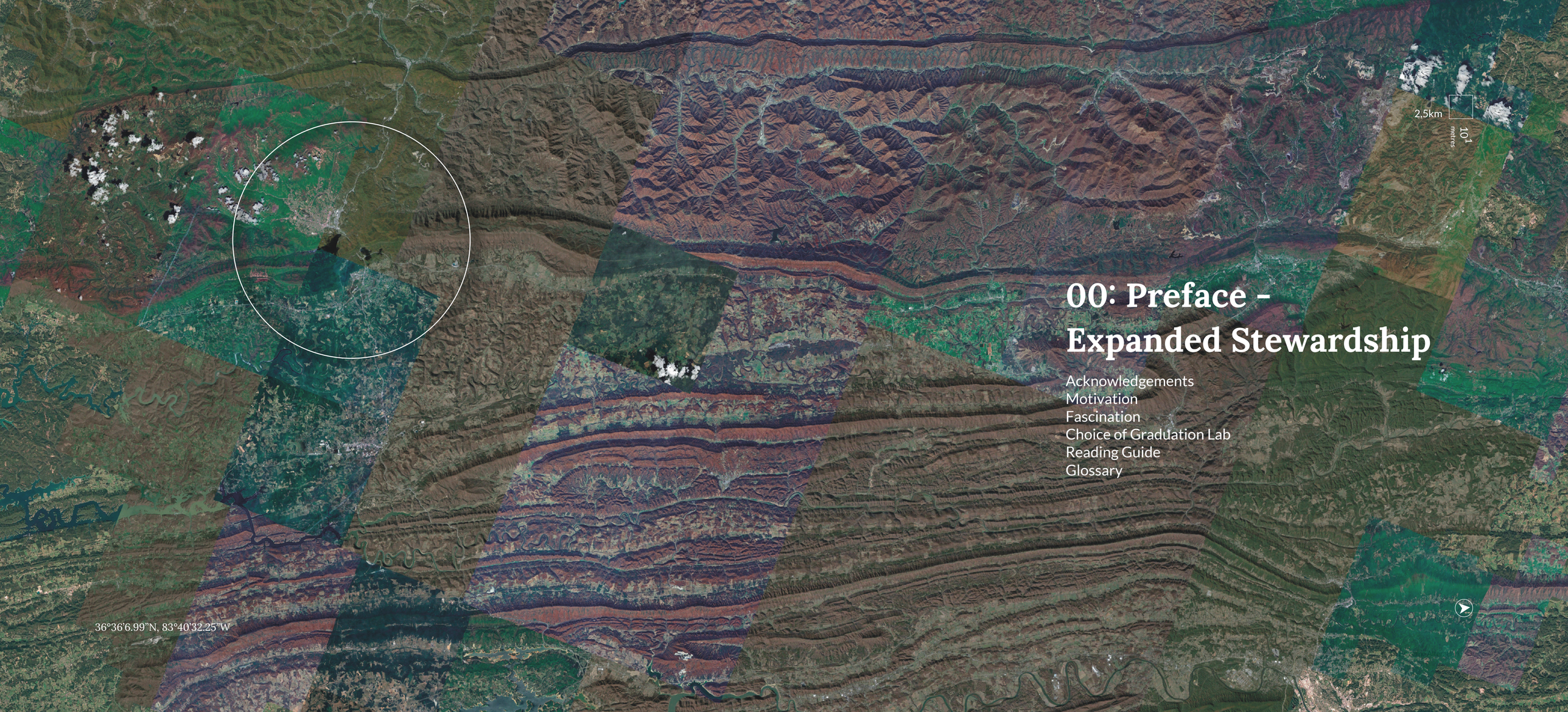
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00: Preface – Expanded Stewardship

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Cumberland Gap
In 1755, pioneer and frontiersman Daniel Boone led a party of settlers west of the Appalachian Mountains at the tripoint of today's Kentucky, Virginia and Tennessee. Under resistance of Native Americans, they blazed a trail known as the Wilderness road, paving the way for thousands of families to migrate west.

From: Google Earth, 2023

Acknowledgements

Trough writing this master's thesis I found myself meeting many incredible people, discovering landscape architecture at the other side of the ocean. It was a deliberate choice to extend my horizon is this way, but I never could have dreamed of the way Appalachia has opened my eyes. All thanks to the support of the NHBos and EFL Stichting. There are some people I would like to thank specifically.
First and foremost, my girlfriend Anežka, for joining me on this adventure but even more for her patience, endless support, and insipration over the last years. I want to thank my first and second mentors, Denise Piccinini and Taneha Kuzniecow Bacchin for their guidance and critical support. For sharing their expertise with me, I want to thank Jeff Skousen, Billy Fleming, and Frederick Steiner. A special thanks to David Saville for being a big inspiration. Thanks to Nick and Julie Schaer for inviting us to their beautiful farm, our expedition on mud-river road, and the GIS support. For their true West-Virginian hospitality and a great time I want to thank the honourable Dave Bowman and William Pack from Hatfield McCoy Trails. Big thanks to all the 'landschappers' from this, and last year. Finally, I want to thank my family and friends for their support and belief in me at times I needed it. Dankjewel!



Fig. 2| Hambach open cast mine, Germany

Made by Author, 2021

Motivation

2024: more than 50 years after the publication of Ian McHarg's influential book 'Design with Nature' we have mapped and crossed six out of nine planetary boundaries (Richardson et al., 2023). We are in the midst of the sixth mass extinction and a global climate crisis (Cowie et al., 2022). Being aware of this problem makes you responsible. So, McHarg's message that we are supposed to become stewards of the earth now comes with a serious burden.

Even without being part of a frontline community, living in the age of the Anthropocene means there is no escaping the always-present global context of the climate crisis. That is why terms like climate change worry, eco-anxiety, and ecological grief are now used to describe the predicament we are in (Ojala et al., 2021). This is a topic I have been interested after visiting places like the Hambach lignite mine in Germany.

Alan Berger and Jonah Susskind write in the updated Design with Nature Now (2019) that 'Our planetary perspective, far removed from local nuance [...] has created a double-edged effect of expanded stewardship plus oversimplification.' If this were to be true, it only motivates me for this thesis to go BIG. If the double-bladed knives are out for today's landscape architects, I want to explore, if not for my own sake, how we can aid this ecological grieving process.

Fascination

West Virginia: Wild and Wonderful. The heart of the Appalachian Coal Region. Home to close-knit communities that distrust the government and value an independent lifestyle. Despised by the rest of the country for their traditions, folklore and distinctive ‘mountain culture’. A region being robbed of all natural resources. Sick of outsiders who decide for them or re-enforce the negative stereotypes about unemployment, poverty and drug abuse.

It is easy to imagine the despair caused by hundreds of surface mines across Appalachia. Over 500 mountain tops were levelled, removing more than one million acres of forest. (Skytruth, 2009). Reclaiming these sites is a massive operation and makes us think about the value of the current, historical and possible future landscapes. Perhaps just as important, who is to decide what these values are?

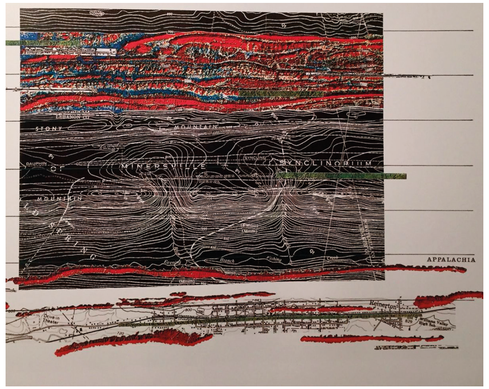


Fig. 3| Appalachia in “Taking Measures Across the American Landscape” from James Corner and Alex McLean, 2000

Something I learned from the book ‘Taking Measures Across the American Landscape’ by James Corner and Alex McLean, where I first read about the Appalachian landscape. “Coal was strip-minded along linear beds on the hillsides, the open cuts running in the same direction as the geologic and settlement patterns. Scars and derelict quarries remain today as evidence of exhaustion, both of human bodies and of geological seams” (Corner & MacLean, 2000).

Coming from the Netherlands, a small and densely populated country, I have always dreamed about doing a project in a vast mountainous area like the Appalachians. The NHBos- and EFL Stichting enabled me to even visit the location myself. Now, I can confirm that all above mentioned stereotypes are probably true. But where admittedly I came looking for extremes, I also ended up finding, besides spectacular nature and shocking devastation, a more intricate and nuanced view of the landscape thanks to the kind and welcoming people I met there.

I was fascinated by their loss and inspiring search for a better future. But there is so much value already there to be discovered. Alan Turner (2008) believes that if we could use what poet Gerard Hopkins (1935) calls the intrinsic or inner destiny of the landscape itself: the “Inscape”, we can alter the land in a way that is even ‘grander’ than its original. Let me, as an ‘outsider’ try to represent this landscape. Because as James Corner (2000) shows in the book, “landscape representation is more than descriptive it can also instruct and construct how people perceive, shape, and transform the land.

Fig. 4| The Central Appalachian Coal Region based on Nasa, 2024

Choice of Graduation Lab

In 1998, Sebastien Marot outlined his four-step approach, like the concept of 'innscape', to uncover the destiny of a site or 'place':

1 - Anamnesis - recollection of previous history

2 - Preparation and staging of new conditions

3 - Three-dimensional sequencing, choreographing materials and spaces

4 - Relational structuring, forging relationships with adjacent areas, environments, and wider contexts

In the Landscape Architecture Principles Lab we are exploring these four principles that have become the foundational pillars our Landscape Architecture Master's programme at TU Delft. Over the years, various names, contributions and suggestions to these principles, lenses, or perspectives have been made. For this thesis the four principles will be referred to as:

-historical palimpsest
-natural processes
-bodily experience
-scale continuum

This year's main theme is the scale continuum. The open-ended, yet relevant character of this principle clearly resonates with the topic of this thesis. Besides being good practice to design 'through the scales', the additional goal of this thesis is to explore more in depth what this exactly means, how to use this concept and why this is relevant for landscape architecture. Can we bring together the local nuances or place making with global thinking in the age of the Anthropocene?

Sense of Place ⟷ Stewards of the Earth

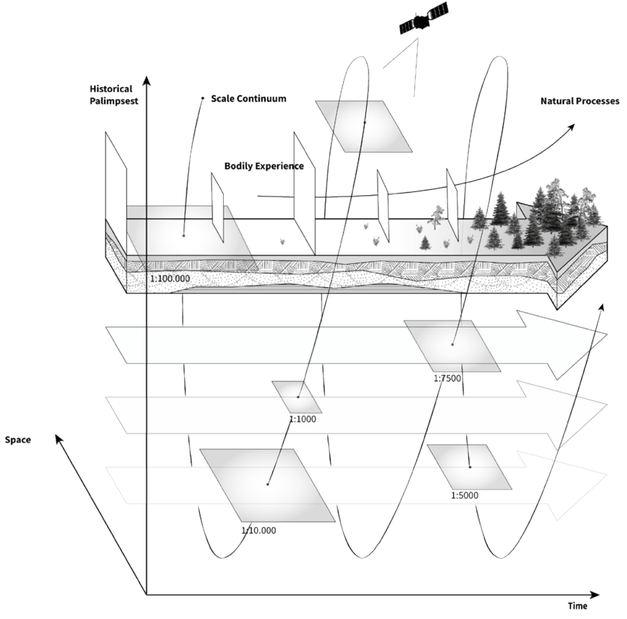


Fig. 5| Landscape Architectural Principles

Made by Author
Insipred by Zhang,2023
adapted from Marot, 1998

Design Location: Hobet-21 Mine , WV



Fig. 6| Design location Hobet-21, West Virginia, United States

Made by Author

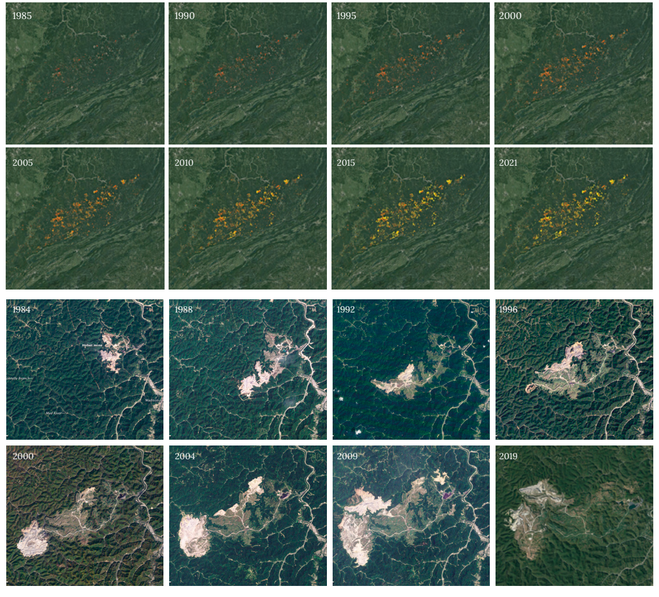


Fig. 7| Top - Development of Surface mines in the Appalachian Coal Region, each dot representing a surface mine.

Skytruth, 2021

Fig. 8| Below - Expansion of the Hobet-21 surface mine. Size comparable to Manhattan.

Google Earth, 2023



Fig. 9| Hobet-21 surface mine

from Google Earth, 2023

A Mountain Top Removal Operation



1 | Clear Cut



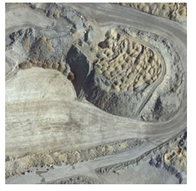
2 | Explosives



3 | Coal Seam



4 | Contour Mining / Highwall



5 | Regrading



6 | Erosion Prevention



7 | Valley Fill



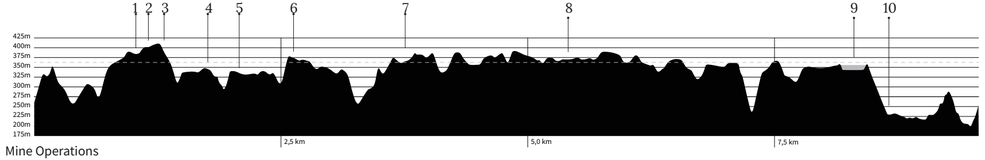
8 | Reclamation



9 | Tailings Pond



10 | Processing Plant



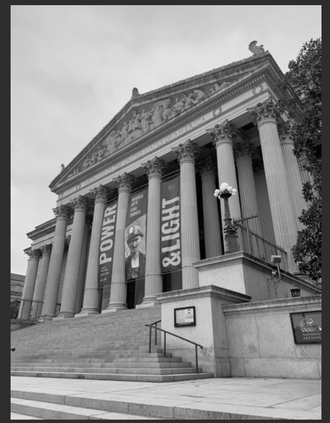
Mine Operations

Fig. 10| Process of surface mining

Made by Author, from Google Earth, 2023

To the Reader

In the latest documentary of filmaker Elaine McSheldon, she organised a funeral for 'King Coal' (2023). Unscripted, locals tell about their memories, experiences and loss related to this piece of rock that is in so many ways elementary to their culture. This project is my contribution to a type of loss and grief, which I belief can be experienced on many places on earth at the moment. Some of these concepts are explained on the following pages, and more in depth later in the booklet. On pages 219-221 an overview of the literature used and recommendations for further readings can be found.



Glossary

MTR – Mountain Top Removal

The process of removing the layer of material (overburden) from the very top of a mountain to access the underlaying coal bed.

Ecological Grief –
the grief and sadness felt in response to the loss of beloved places, ecosystems, and species (Ojala & Cunsalo et al., 2021)

Solastagia –
"the homesickness you have when you are still at home, or the lived experience of negatively perceived environmental change."
(Albrecht, 2005)

AMD – Acid Mine Drainage

The outflow of acidic water from mine sites, resulting from the exposure of minerals with water and air due to unnatural disturbance of rock.

AML – Abandonned Mine Land

EIS – Exotic Invasive Species



Fig. 11| Screening of the King Coal documentary in the National Archives, Washington DC

Made by Author, 2024

Landscape Architecture Principles
The four principles that define the activities of landscape architects according to Urban theorist Sebastien Marot (1998).

Scale Continuum
Forging relationships with adjacent areas, environments and wider contexts

Palimpsest
Recalling and building on history

Perception
Choreographing materials and spaces

Processes
Staging and cultivating new conditions

FRA – Forestry Reclamation Approach

SMCRA – Surface Mining Control and Reclamation Act 1977

"The primary federal law that regulates the environmental effects of coal mining in the United States. SMCRA created two programs: one for reclaiming abandoned mine lands (Title IV) and a second for regulating active coal mines (Title V) (OSMRE,2024)."

AOC – Approximate Original Contour

"Surface configuration achieved by backfilling and grading of the mined area so that the reclaimed area, including any terracing or access roads, **closely resembles** the general surface configuration of the land prior to mining and blends into and complements the drainage pattern of the surrounding terrain, with all highwalls and spoil piles eliminated (SMCRA,1977)."

OSMRE – U.S. Department of the Interior
Office of Surface Mining Reclamation and Enforcement

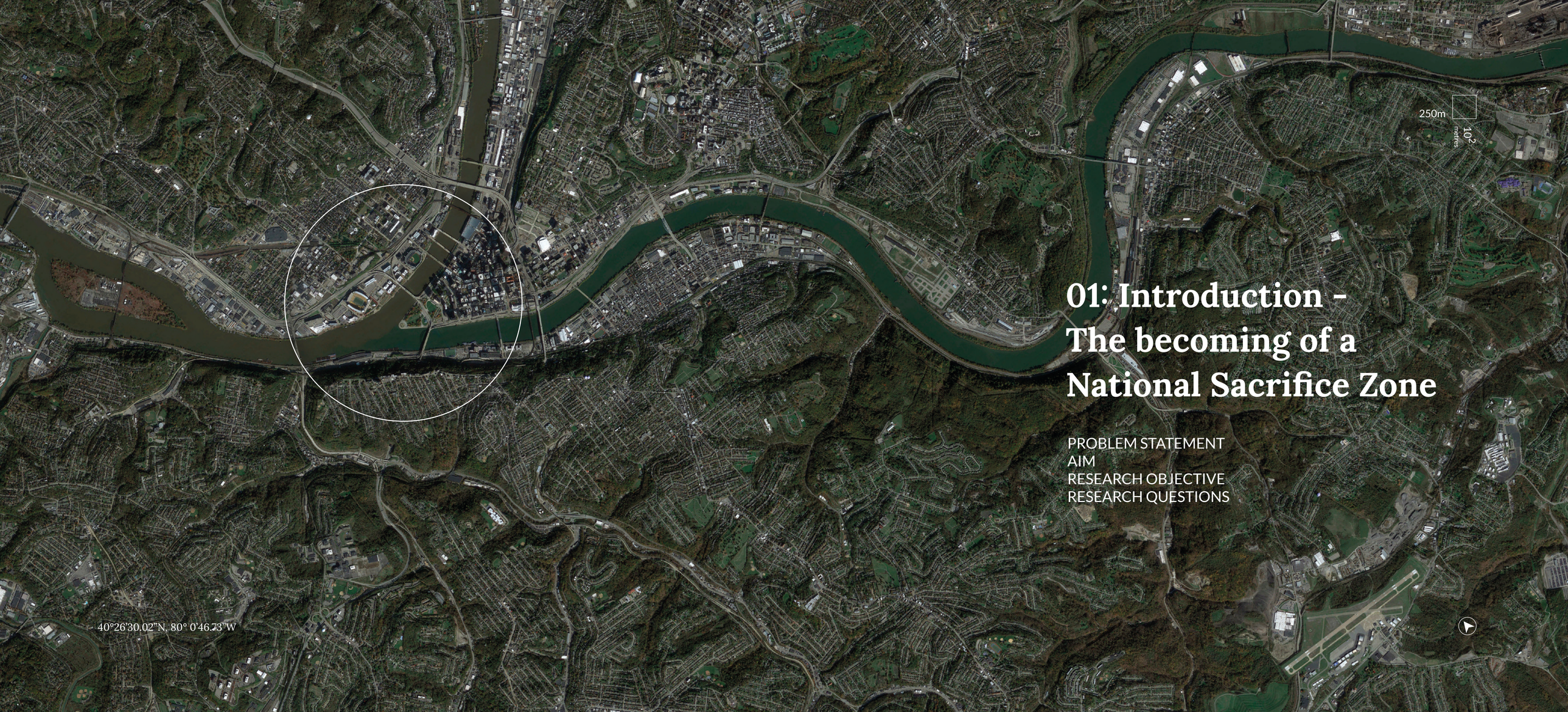
"Provides resources for technical assistance, training, and technology development related to coal production and environmental protection. These activities support and enhance the technical skills that States and Tribes need to effectively operate their regulatory and reclamation programs (OSMRE, 2024)."

(WV)DEP – (West Virginian) Department of Environmental Protection

Enforces state and federal environmental laws in West Virginia to help protect our air, water, and land (WVDEP, 2024).



Fig. 12| Hobet-21
With permission by
Vivian Stockman; Flyover
courtesy SouthWings



01: Introduction – The becoming of a National Sacrifice Zone

PROBLEM STATEMENT
AIM
RESEARCH OBJECTIVE
RESEARCH QUESTIONS



Fig. 13| Pittsburgh
At the point where the Monongahela and Allegheny rivers join to form the Ohio river. It was here where the bituminous Pitssburgh coal bed was first discovered. This was eventually judged to be the most valuable mineral deposit in the U.S.

From: Google Earth, 2023

Coal, fuel of the Anthropocene

The invention of the steam engine by James Watt in 1784 is what Paul Crutzen (2006) calls the start of the Anthropocene. The machine that allowed all other machines to work harder. At that time the Appalachian mountains were home to mostly Scottish settlers seeking refuge from British oppressive rule. With the discovery of large amounts of high bituminous coal, extensive logging was replaced by coal mining as the main industry in the late 1800s. Coal became the most wanted source of energy and a symbol for the challenges of the Anthropocene we encounter today.

In the heart of the Appalachian mountains, a story of resource extraction unfolds - a narrative now deeply intertwined with the region's history, culture, and ecological landscape. As the demand for coal soared, Appalachia fuelled the US to become the industrial powerhouse it is today. Centuries of extraction, from timber to coal and now to gas, have left scars on the land and challenges for the people who live there. The bust and boom cycles of coal became negative feedback loops, as the relentless pursuit of resources led to environmental degradation, economic disparity, and social unrest. The very industries that once promised prosperity now perpetuate a cycle of poverty, addiction, and incarceration difficult to break. The result can be named a 'National Sacrifice Zone': an area permanently im-paired by environmental damage or economic disinvestment (Goodell, 2006).

As the coal seams diminish and the landscape bears the marks of its exploitation, the region's once-thriving ecosystems struggle to recover. Poor living conditions and impaired ecosystem services have made the area increasingly unattractive for residents and outsiders alike. Feeding again to feelings of despair, mistrust and being left alone in local communities. Yet, people are proud of their close-knit communities and traditions in the hollers of northern Kentucky and southern West Virginia. Despised as a region by other Americans, despite their contribution to the nation's economic success, they are what define the Appalachian culture toady.

Amidst these challenges, there is hope. Reclamation efforts, though slow, are steadily underway. Still, approximately 633,000 acres of post-mining sites require some form of landscape restoration according to non-profit organisation Appalachian Voices (2021). It is a journey of resilience and redemption—a testament to the enduring spirit of the Appalachian mountains and the communities that call them home.



Fig. 14| Coal samples

Made by Author, 2024







Fig. 15| Pittsburgh "the steel city", most of Appalachia's coal was shipped here to provide the steel industry.
Made by Author, 2024





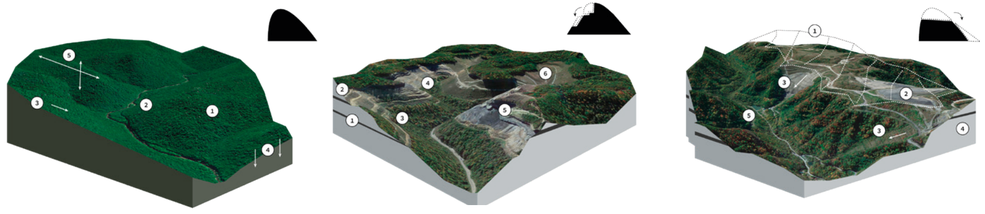




Fig. 16| New York City
Symbol of Peak-Modernism. The profits from mountain top removal are made in Wallstreet.

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Appalachian Coal

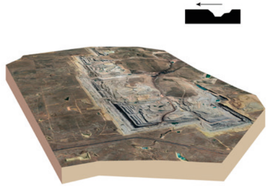


Late 1800s - Underground Mining **>1960s - Contour (Strip) Mine** **>1990s - Mountain Top Removal**

Scope

Coal mining in Appalachia has undergone a significant transition from traditional underground mining to surface mining techniques, primarily due to economic and technological factors. Initially, underground mining was the predominant method, involving labour-intensive processes where miners worked in hazardous conditions to extract coal from deep beneath the earth's surface. However, as lower coal seams became depleted, advancements in mining technology and machinery made surface mining more feasible and cost-effective. Surface mining, methods such as strip mining and mountaintop removal, allows for the efficient extraction of coal by removing entire layers of soil and rock, or overburden, to access coal seams. Although more efficient, in mountainous areas, strip mines produced not more than a third of the tonnage the underground mines were able to produce (E. Zipper et al., 2021). This shift has only led to temporary increased production and lower labour costs, albeit at a much greater expense of environmental disruption and ecological consequences. Therefore, within the large context of Appalachian's coal legacy, this thesis will predominantly focus on surface mining, including strip, contour, and particularly mountain top removal mining.

Midwest Coal



Strip Mine (Wyoming)

Economies of Scale

Due to larger environmental risk, and increasing difficulty to reach remaining reserves in the mountainous terrain, mountaintop removal (MTR) mining in Appalachia struggles to compete with the even more extensive and cost-effective surface mines in China and the western United States (E. Zipper et al., 2021; Zipper, 2020). Their economies of scale significantly reduce production costs and labour costs. Consequently, Appalachian coal's market share has declined, impacting the local economy profoundly. Coal mining in Appalachia is not just an industry but a way of life, deeply embedded in the region's cultural and social fabric. Generations of families have relied on coal jobs for their livelihoods, and the industry's decline has left a substantial economic gap. Communities face high unemployment rates, reduced local revenue, and a loss of identity tied to coal mining. The closure of mines and the lack of alternative employment opportunities have led to widespread economic distress, illustrating the critical need for economic diversification and sustainable job creation.

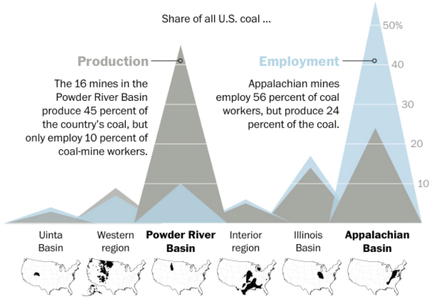


Fig. 19| from Washington Post, 2022

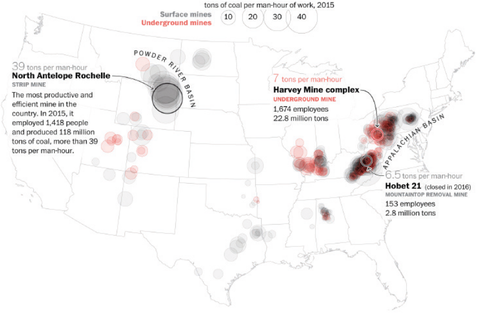


Fig. 17| from Washington Post, 2022

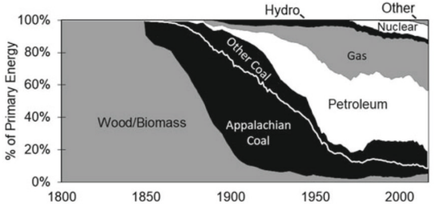


Fig. 18| from Zipper et al., 2021

Fig. 20| Impression of industrial towns. Top left: West Virginian Capitol in Charleston. Below and Right, Madison, WV.

Made by Author, 2024











Fig. 21| Impression of industrial towns. Abandonned gas station,trucks and trailers.

Made by Author, 2024





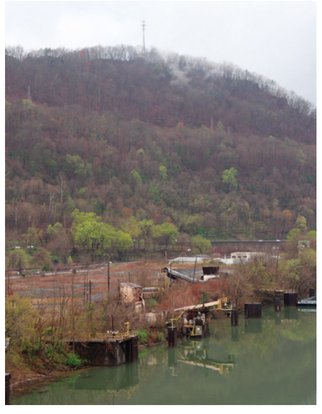






Fig. 22| Coal transport on the Kanawha river.

Made by Author, 2024







Fig. 23| Abandonned Mine Lands.

Made by Author, 2024



Coal's Landscape Legacy

The reduction in coal-related employment has not only disrupted the livelihoods of families but also weakened the economic stability of the region, leading to increased poverty and diminished public services. The search for alternative uses brought Appalachia to having one of the highest densities of prisons on the world. Many of them can be found on former mine sites, together with airports, golf courses and industrial parks (Fleming & McCullough, 2022; Odermann, 2020; Perdue, 2018). Ecologically, MTR has caused irreversible changes to the landscape, including the destruction of forests, the alteration of waterways, and the loss of biodiversity (Santopietro & Zipper, 2021).

In the early days reclamation was not practiced and left highwalls unexposed (1). The subsequent deposition of mining waste into valleys (2) have led to long-term environmental degradation, including risks of landslides, subsidence (3), increased flooding and water contamination (4) soil erosion, toxic fumes (6) and underground fires (7) (Skousen & Zipper, 2021). Although not required any revegetation, spoils in legacy mines typically favour native voluntary vegetation to establish.

However, these changes have not only impacted wildlife habitats but also the health and well-being of local populations who depend on clean water and a stable environment. So, in modern times the demand for more regulation increased and with the passage of the Surface Mining Control and Reclamation Act of 1977, mining operations became more heavily regulated. Requiring operators to compact spoils (I) and backfill highwalls (II) to prevent instability and erosion. Additionally, the approximate original contour (AOC) needs to be restored and operators need to "minimize the disturbances to the prevailing hydrologic balance" (III) both on and off the mine site (Skousen & Zipper, 2021). Proper post-mine planning and a self-bonding system is required so miners will reclaim the land. It needs to support post-mining land uses that preceded mining (mostly forest), or a 'higher' or 'better' use (IV) (Skousen & Zipper, 2021).

The post-mining landuse needs to be 'ecologically sound' and compatible with the surrounding region. Post-mining land uses that require surface development, such as industrial, commercial, and residential, are generally considered to be "higher and better" than extensive land uses such as agriculture, forestry, or wildlife habitat. Land uses that require management, such as hayland or pasture, are generally considered "higher and better" than forestry and wildlife land uses (Skousen & Zipper, 2021). In other words, economic uses are valued more than ecological use.

But this can also be explained by the technical difficulty of restoring the original biodiverse forest. Before the introduction of the Forestry Reclamation Approach in the early 2000s (Adams, 2017; Angel et al., 2009) establishing forest on the compacted SMCRA soils was mostly unsuccessful and could explain why other post-mine land uses were more popular or more lucrative. Easier is to use fast growing pioneer species and grasses that endure poor, compacted soils, fix nitrogen, and stabilize slopes. Many of these species (Robinia pseudoacacia, Elaeagnus umbellata, Schedonorus arundinaceus) are now considered invasive (Burger, n.d.). When native ecosystems cannot restore because of competing invasives or unfavourable conditions it is called 'arrested succession'.

If applied correctly, the FRA can be used to maximize the chance of establishing native hardwood forest on mined lands. Key is to provide proper growing medium (a) that is de-compacted (b), well-draining (c) and use of right planting techniques and monitoring (d) (Angel et al., 2009; Burger, n.d.).

Still, even with enough vegetation cover restored, water management issues could prevent bonds to be released. In many cases, water pollution is a structural issue and treatment systems are expensive to maintain. Growing costs of reclamation and reduced profits from coal forced some companies declaring bankruptcy, meaning mine permits are not released and become abandoned. Ultimately, the state becomes responsible, but funds are often limited. This opens possibilities for alternative uses, research and experimentation on a small scale.

In short, mined lands can be in the following situations.
-Un-reclaimed or re-reclaimed, Pre SMCRA-Legacy mines (mostly underground)
-SMCRA mines that are either still active and bonded, (partially) bonded while being reclaimed to a post-mine use, abandoned after reclamation attempt, or successfully reclaimed to a post-mine use and released of bonds.
-Abandoned Mine Lands (AML) and partially released permits that are looking for alternative land-use

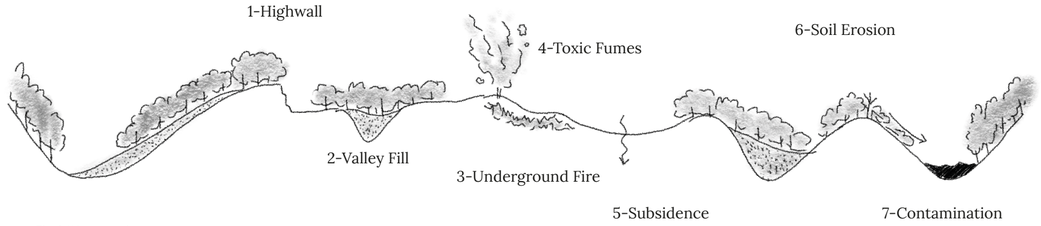


Fig. 24| Legacy mines

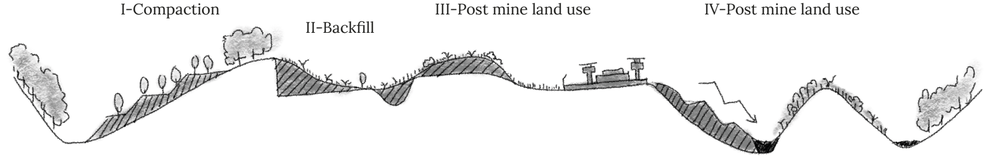


Fig. 25| SMCRA mine

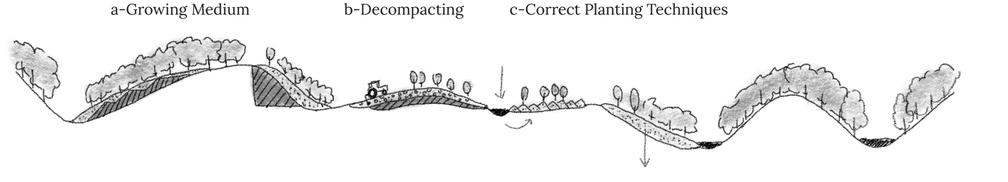


Fig. 26| FRA mine

Post-mine land use

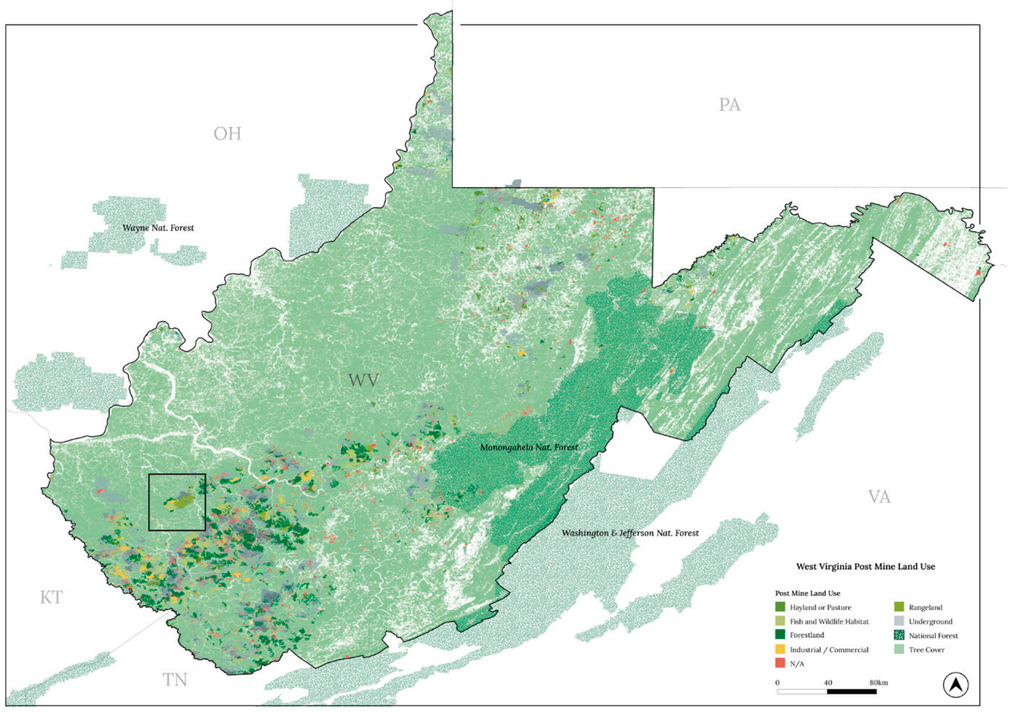


Fig. 27| Post mine land use in West Virginia, Hobet-21 in black square.
Data from OSMRE, 2023









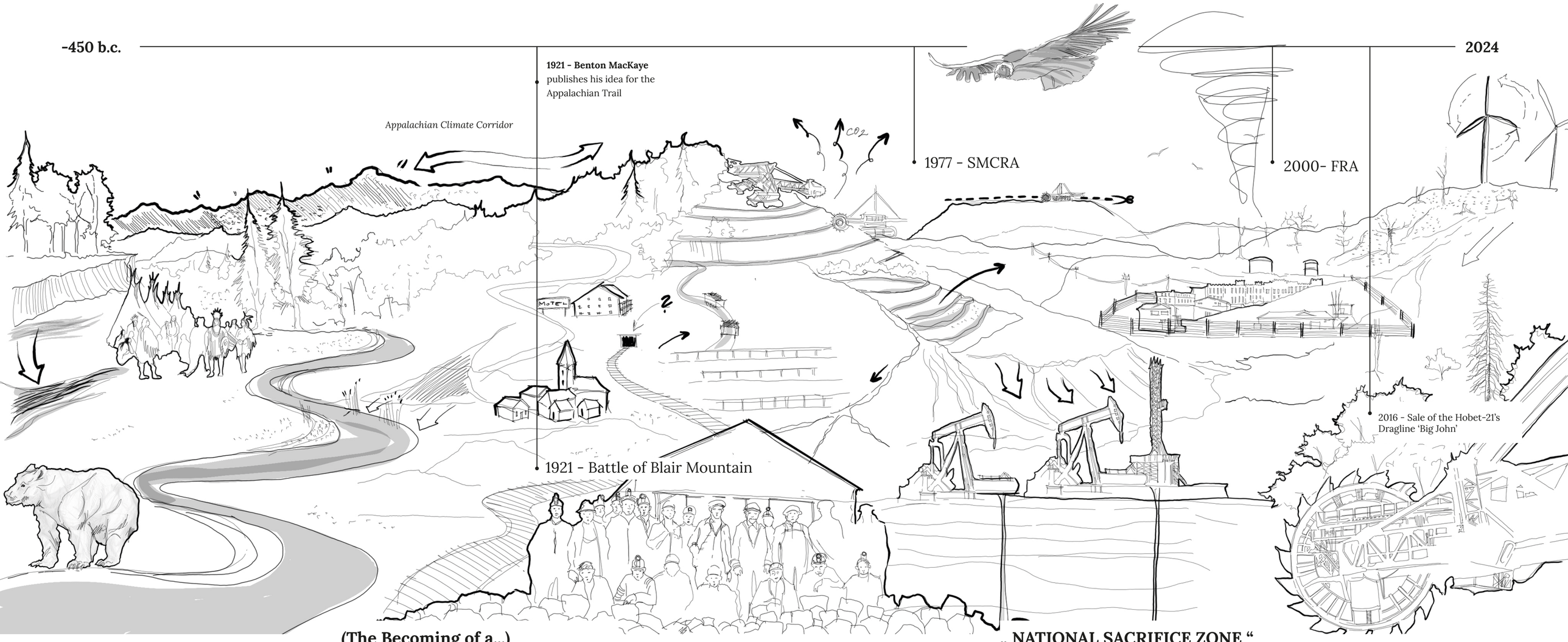

Fig. 28| FRA mine (left to right, top to bottom)
1-Highwall
2-Absentee Land owners
3-Abandonned Treatment Plant
4-Red Dog (Burnt slate)
5-Most common post mine landuses
6-Natural Pioneer forest
7-Acid Mine Drainage (AMD) from legacy mine
8-Arrested Succession

Made by author, 2023



Fig. 29| Holler, or 'Hollow' next to the Hobet 21 Mine.

Made by Author, 2024


-450 b.c.
2024
1921 - Benton MacKaye
publishes his idea for the
Appalachian Trail
Appalachian Climate Corridor
1977 - SMCRA
2000- FRA
MOTEL
2016 - Sale of the Hobet-21's
Dragline 'Big John'
1921 - Battle of Blair Mountain
(The Becoming of a...)
„ NATIONAL SACRIFICE ZONE “

Problem Statement

The immense scale of ecological destruction caused by mountain top removal is evident. Combined with a structural disinvestment in the rebuilding of the region, the Appalachia Coal region is considered a National Sacrifice Zone.

The break from the coal industry, combined with impaired living conditions is affecting a wide community in Appalachia, yet they are often not engaged with in the reclamation process. When mined lands are left abandoned or partially reclaimed, or when absentee landowners, politicians and scientists decide land-use without considering local communities, reclamation can be according to law, ecological sound or economically feasible, but not contributing to the healing of an emotional connection or sustainable relationship with the landscape.

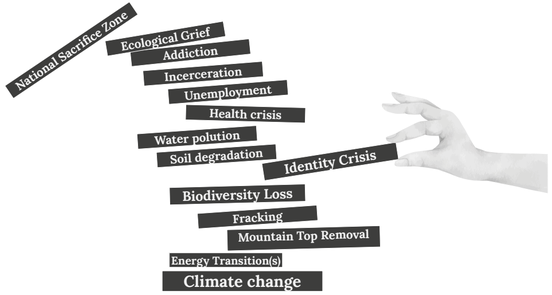
The need for reclamation is clear, yet finding ecological sound and compatible post-mine use have proven to be difficult due to several reasons:
-the overall scale and amount of mine sites
-increased costs of reclamation
-abandoned mine lands
-irreversible ecological damage hindering restoration of native ecosystems
-post-mine use is not matching the societal or ecological context
-invasive species
-absentee landownership

This is because the physical expression of reclamation landscapes is the result of:
-economic feasibility, judged by politicians or coal corporations
-technical possibilities and limitations, either ecological, physical or by law

Summarizing, the Appalachian Coal Region has undergone extensive environmental transformation due to mountaintop removal mining, resulting in significant ecological degradation and the loss of local cultural identities. This phenomenon is known as ecological grief, where communities mourn the loss of their natural landscapes and associated heritage (Boyd, 2023; McMilion Sheldon, 2023; Ojala et al., 2021).

Furthermore, current reclamation solutions often aim to obscure, camouflage, or erase the mined landscape, overlooking its potential significance as a cultural landscape. Additionally, large parts of the mined lands remain inaccessible and not owned by the public, making it difficult for communities to feel a sense of pride or responsibility for these areas, fed by the despise of outside regions.

Consequently, there is a critical need for landscape architectural interventions that disclose the historical and ecological narratives of this region, fostering public appreciation and emotional connection to these altered landscapes. Such interventions should emphasize the current values of the landscape to build upon, rather than solely imagining a distant future, thereby addressing ecological grief and redefining the identity of these communities within the broader national context.



Research Aim

Realizing the Coal industry has a huge legacy but little future, this thesis aims to design for the beginning of the end for the Appalachian Coal Region as a landscape of extraction. After grasping the scale of depletion, new engaging narratives opposing the current industrial perspective on reclamation, are needed to offer a sense of reflection, restore ecological integrity, and provide a positive social and economic outlook for this badly injured landscape. Opting for a more adaptive, nature inclusive approach to reclamation that considers the intrinsic aesthetic values that these landscapes have, the landscape could become more meaningful for a wider audience.

Within the context of the landscape architecture principles lab, the aim is to re-examine and sharpen our knowledge about the foundational pillars commonly used by the TU Delft's section of Landscape Architecture: landscape as a historical palimpsest, processes, a bodily experience, and this year's main theme, landscape as a scale continuum.

To explore how landscape architects can address the scale of depletion in the Appalachians and mark the beginning of the end for the Appalachian Coal Region as a landscape of extraction, drawing meaningful connections between the vastness of mining landscapes and the human perception. The Hobet-21 Surface mine in West Virginia is chosen as design location for it is currently showing all stages of both an active mine site and its reclaimed parts. Through an integrated approach across various scales, the goal is to design new engaging narratives for the region, meaning, breaking the current downward spiral of extraction and depletion for regenerative and nature-inclusive alternatives.

Design Objective and Research Questions

Design Objective
This research aims to explore landscape architectural designs that engage the public with mine reclamation. The following research objective has been formulated:

To create landscape architectural interventions that disclose the cultural and ecological narratives of Appalachian Coal Region, promoting a wider public appreciation and emotional connection to these altered landscapes.

Research Questions:
The research is conducting the research through design approach. To do this, several sub-research questions were formulated to aid the process.

-SRQ1:
The first research question aims to understand the theoretical context related to the graduation lab topic being the scale continuum:

What means Scale Continuum as a Landscape Architectural Principle in the context of this extraction landscape?

-SRQ2:
The second research question aims to define the landscape characteristics of the design location to understand the ecological grieving process.

What are the landscape characteristics of a Mountain Top Removal site that that define the loss and reclamation narratives of the Appalachian landscape?

-SRQ3:
The third research question shall translate previous questions into workable design principles.

What specific (design)principles can be used to disclose the mined landscape and its larger context to the public?

-SRQ4:
The fourth question explores the applicability and spatial implications of the design principles.

How can landscape-based design interventions for mine reclamation add meaning to disprefered landscapes throughout a multitude of scales in the Appalachian Coal Region?

-SRQ5:
The final research question helps to conclude, evaluate, and reflect on the outcomes of the project.

What do the outcomes of the project teach us about scale continuum as a landscape architectural principle?



Fig. 30| Blue Ridge Mountains

Made by Author, 2024



02: Towards a Landscape Reclamation Approach

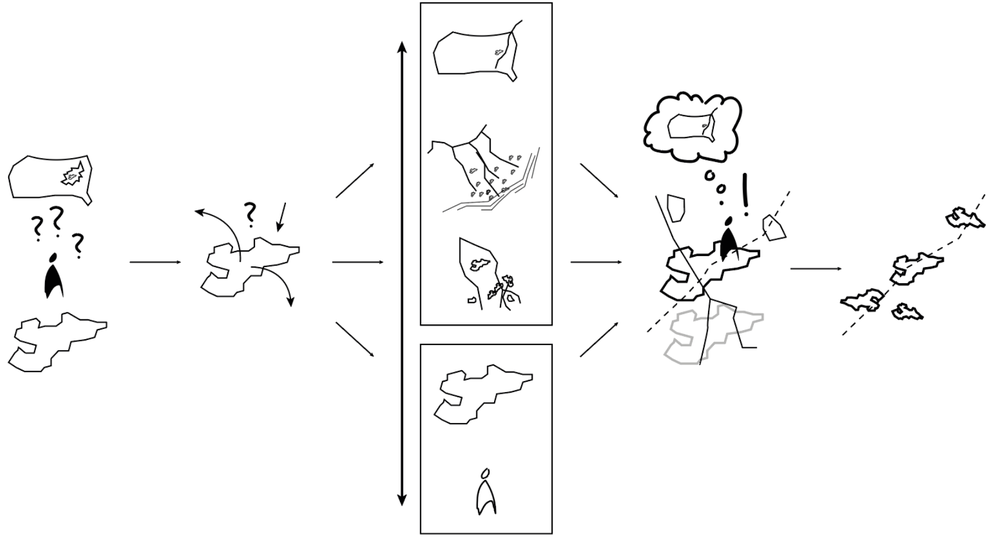
METHODOLOGY

THEORETICAL FRAMEWORK



Allegheny Mountains
Lower and less extreme than the Valley and Ridge province, the Allegheny platteau appears as a seemingly endless matrix of forest, yet deep in the narrow hollers hide countless stories that can explain our relation to this landscape and its destruction.
From: Google Earth, 2023

Research Framework



SRQ1
Understanding

SRQ2
Anlalysing

SRQ3
Synthesis

SRQ4
Design

SRQ5
Reflection

Methods

SRQ1:
-Conducting literature review on scale continuum in landscape architecture and related fields.
-Analyzing case studies of landscape architectural projects that address varying scales in extraction landscapes.
-Site visit to reference projects and design location, coupled with semi-structured interviews to collect photographic material and literature, site specific information and a better sense of scale.
-Synthesizing findings to develop a theoretical framework for applying scale continuum to the Appalachian mining context.

SRQ2:
-Conducting field surveys and site analysis to document landscape characteristics of MTR sites.
Reviewing historical and ecological records to understand changes over time.
-Conducting interviews with residents and scientists to gather narratives of loss and reclamation.
-GIS mapping and sketching to visualize and analyze site characteristics.

SRQ3:
-Synthesizing findings from SRQ1 and SRQ2 to identify relevant design principles.
-Developing visualizations to illustrate the design principles.
-Testing and evaluating the principles through intermediate presentations and mentor sessions.

SRQ4:
-Applying the design principles identified in SRQ3 to create multi-scalar design interventions.
-Developing and implement pilot projects at different scales
-Using spatial analysis and various visualization techniques to assess the impact of design interventions.
-Collecting and analyzing feedback from peers and mentors

SRQ5:
-Analyzing the outcomes and feedback from the design interventions.
-Document lessons learned and best practices.
-Reflecting on the social, professional, and scientific relevance of the project.



Fig. 31| Chief Logan Conference Centre, located on former mine site
Made by Author, 2024

Expected Outcomes

SRQ 1
A better understanding of the four landscape architectural principles. Scale continuum being the lens through which both the chosen site, as well as the other principles will be examined to create a theoretical position for the project. The scale continuum is explored to find out which principles are intrinsic to a certain scale. This will consist of two parts, the first part being a theoretical understanding of the relation between larger landscape systems and the site. Secondly, a site visit and reference study for a deeper understanding of the smaller scales to help understand the human perception when designing for the mine landscape.

This should result in:
-A comprehensive theoretical framework defining the concept of scale continuum in landscape architecture.
-Insights into how scale continuum applies specifically to the context of extraction landscapes, particularly in Appalachia.
-An understanding of how varying scales (micro to macro) influence design decisions and outcomes in mined landscapes.

SRQ2
A deep understanding of the natural and anthropogenic processes, historical events, and perceptional qualities of the Appalachian Coal Region, mapped on a mine site that is representative to the larger region (Hobet-21) resulting in:
-Detailed documentation of the physical, ecological, and cultural characteristics of Mountaintop Removal (MTR) sites.
-Identification of key elements that represent loss and reclamation narratives in the Appalachian landscape and the chosen design location.
-A nuanced understanding of the landscape features that contribute to the ecological grieving process.

SRQ3
A translation of the theoretical basis to a design concept with workable design principles.
-A set of actionable design principles tailored to the context of Appalachian mined landscapes.
-Strategies for revealing the historical, ecological, and cultural narratives of these landscapes to the public.
-Design guidelines that enhance public appreciation and understanding of mined landscapes.

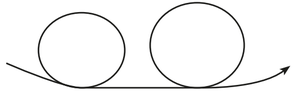
SRQ4
A landscape design for the Hobet-21 mine, across various integrated scales, demonstrated in strategically chosen site interventions:
-Engaging design interventions that enhance the meaning and value of reclaimed mine sites at various scales.
-Examples of multi-scalar design solutions that address both local and regional landscape challenges.
-Increased public engagement and positive perception of reclaimed landscapes.

SRQ5
A critical reflection on the social, professional, and scientific relevance of the project and its applicability to other locations.
-Refined understanding of scale continuum as a landscape architectural principle.
-Insights into the practical applications and implications of working with the concept of scale continuum in reclamation projects.
-Recommendations for future research and practice in landscape architecture.



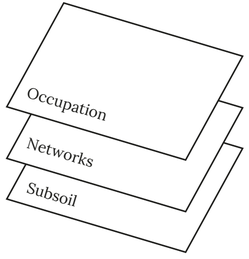
Fig. 32| Railroad crossing
south of Charleston
Made by Author, 2024

Theoretical Framework



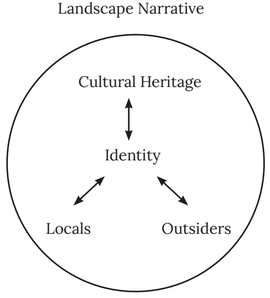
Research Trough Designing

This method (Lenzholzer et al., 2013) involves iterative cycles of designing, testing, and refining ideas, allowing for a hands-on and exploratory process. By constantly refining and enhancing the design concept and objective, the aim is to construct and document a logical reasoning for the design in relation posed problem, rather than creating solely the design itself.



Layer Approach

The layer approach (McHarg, 1969) is utilized in this thesis to systematically analyze and interpret the various elements of the Appalachian landscape. By deconstructing the landscape into its constituent layers—subsoil (centuries), infrastructure networks (decades), occupation (years)—this method provides a comprehensive framework for understanding the interplay between different factors of scale and time.



Narrative Approach

A narrative approach is central to this thesis, emphasizing the importance of storytelling in landscape architecture (Spirn, 1998; Yu, 2019). By crafting compelling narratives around the history, present condition, and future potential of the Appalachian mined landscapes, this method seeks a deeper emotional connection and appreciation among the public. Narratives are used to convey the ecological grief experienced by communities, the transformative journey of the landscape, and the envisioned future that honours both the region's cultural heritage and its identity.

1. Scale Continuum as a Landscape Architectural Principle

Scale continuum refers to the seamless integration of various spatial scales within landscape design, from micro to macro levels. In the context of extraction landscapes, it emphasizes the need to consider both the immediate site-specific details and the broader regional context. This approach ensures that design interventions are coherent and resonate across different scales, enhancing their overall impact.

Relationship Between Site and Context
In the context of mountaintop removal sites, the relationship between site and context is crucial. Effective reclamation must account for the site's historical, ecological, and cultural dimensions, while also considering its role within the broader Appalachian region. This involves recognizing the site as part of a larger continuum, where local interventions contribute to regional and even global ecological health.



2. Hyperobjects

Timothy Morton's concept of hyperobjects describes phenomena that are massively distributed in time and space, such as climate change and pollution. They cannot be reduced to smaller bits, and they cannot be denied. He describes five characteristics of hyperobjects (Morton, 2013):

Viscous: They adhere to any other object they touch, no matter how hard an object tries to resist.

Molten: Hyperobjects are so massive that they refute the idea that spacetime is fixed, concrete, and consistent.

Nonlocal: Hyperobjects are massively distributed in time and space to the extent that their totality cannot be realized in any particular local manifestation.

Phased: Hyperobjects occupy a higher dimensional space than other entities can normally perceive.

Interobjective: Hyperobjects are formed by relations between more than one object. Consequently, objects are only able to perceive the imprint, or "footprint," of a hyperobject upon other objects, revealed as information.

In the context of the Appalachian extraction landscape and the application of the scale continuum, landscape architects must adopt a holistic approach, incorporating environmental, social, and economic factors into their designs to acknowledge the pervasive influence of hyperobjects. Hyperobjects are too vast to grasp so we should emphasize adaptive design, ensuring flexibility and adaptability to accommodate the evolving nature of these large-scale environmental issues. Therefore, it is crucial to balance local design interventions with their global environmental impacts, aligning local actions with broader sustainability goals. Future-oriented planning becomes essential, incorporating long-term monitoring and adaptive management to address the phased nature of hyperobjects, allowing designs to evolve over time.

3. Ecological Grief

Ecological grief has been defined as "the grief felt in relation to experienced or anticipated ecological losses, including the loss of species, ecosystems and meaningful landscapes due to acute or chronic environmental change" (Cunsolo and Ellis 2018, p. 275). Ecological grief is typically due to a combination of tangible loss (such as the disappearance of a species or ecosystem), intangible loss (such as the loss of identity ensuing from the degradation of an affectingly charged landscape, what philosopher Glenn Albrecht defined solastalgia, 2005), and anticipatory grief for future loss (Cunsolo and Ellis 2018; Comtesse et al. 2021). Ecological grief is therefore characterized by the convergence of different emotional states, both past and future-oriented, based on both reality and projection, and engendering a deep sense of diminishment and uncertainty. Notably, ecological grief is embodied (it is felt in the body) and connects with practice: one can perform grief as part of mourning rituals.

Solastalgia
Solastalgia describes the distress caused by environmental change, particularly the loss of familiar landscapes. This adds a layer of understanding to ecological grief, highlighting the need for designs that address the emotional impacts of landscape transformation (Albrecht, 2019).

Stages of Grief
The Kubler-Ross model outlines five stages of grief: denial, anger, bargaining, depression, and acceptance. Applying this model to ecological grief involves recognizing the emotional responses communities experience due to environmental degradation.

Dual Process Model
The Dual Process Model suggests that grieving involves oscillating between loss-oriented and restoration-oriented coping. This model highlights the need for reclamation designs that support both mourning the lost landscape and adapting to the new one.

Ecological Adaptation
Panu Pihkala's concept of ecological adaptation emphasizes the continuous need for emotional and psychological adjustments that individuals and communities must make in response to environmental changes. When engaging with this grief enough, one can get into a more permanent and comfortable state of 'living with' instead of coping or grieving (Pihkala, 2022, 2024).

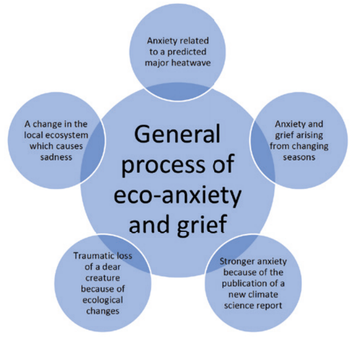
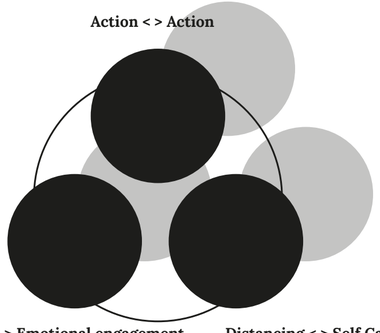
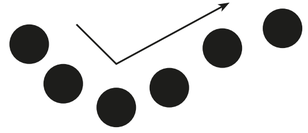


Figure 1. The general process and examples of more particular processes. Note: people n appraise both the particular processes and the general process differently.

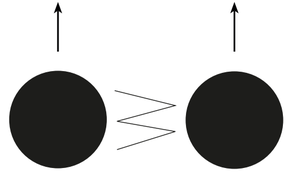
Pihkala, 2022



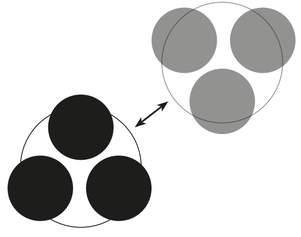
coping and changing anxiety and depression < > living with the ecological crisis



Stages of Grief
Kubler-Ross,1969



Dual Process Model
Stroebe & Schut, 1999 in
Ojala & Cunsalo et al., 2021



Ecological Grief Model
Pihkala, 2022

4. Meaning of Reclamation

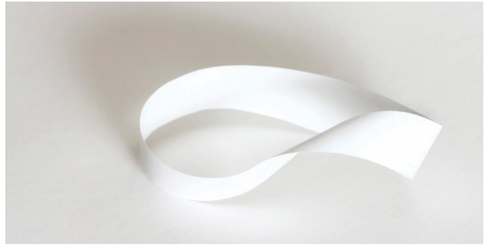
Must Landscapes Mean
Marc Treib (Swaffield, 2002) argues that landscapes should convey meaning, serving as narratives that reflect cultural and historical contexts. Reclamation should thus focus on creating landscapes that tell the story of their transformation and significance. He describes various methods for place-making that developed since the 80s:
-Neoarchaic,
-Genius Loci,
-Zeitgeist,
-Vernacular,
-Didactic

He considers pleasure to be one of the entry points to the significance together with horror and sublime. But as he continues "we have enough horror in our common life". This understates however discussion about the sublime in landscape architecture. Ultimately, he marks that "significance is not the designer's construct but accumulates over time if the conditions are right (Treib, 1995)." This would be a good argument to involve the larger public in mine reclamation.

This is also noted by Robert Thayer, in his text 'Gray World, Green Heart' where he emphasizes the need for green reclamation in post-industrial landscapes, transforming them into ecologically rich and aesthetically pleasing environments. "Environmental guilt, and sense of dissonance, will increase as we struggle to reinvent regenerative landscapes in the face of cultural momentum to the contrary (Thayer, 1994)." We need to accept that guilt over technological impact may never disappear and continue. However, when this results in a "landscape of opacity, concealment and illusion, it is not constructive" (Thayer, 1994). So, for the public to give meaning to a place there needs to be transparency, or congruency as Treib (1994) calls it. Congruency means we need to see the effects of our actions, face them, whether positive or negative.

Waste Landscapes
Mira Engle identifies several approaches to dealing with waste landscapes (Engler, 1995):
- Camouflage: Hiding or disguising the disturbed landscape.
- Restoration: Returning the landscape to its original state.
- Rehabilitation: Improving the landscape's functionality and aesthetics.
- Mitigation: Reducing the negative impacts of the landscape.
- Education: Using the landscape to teach about ecological and historical processes.
- Art: Incorporating artistic elements to enhance the landscape's meaning.
- Integrated Approach: Combining multiple strategies to address the landscape's complexity.





5. Ecological Aesthetics

Dark Ecology
Dark ecology is more of a philosophy then a theory. It challenges traditional notions of beauty and purity in nature, advocating for an aesthetic that embraces the complexities and imperfections of post-industrial landscapes. This perspective encourages a deeper emotional and philosophical engagement with the landscape (Morton,2016).
It is a concept that confronts us with the ecological consequences of human activities in Appalachia and beyond. Dark ecology acknowledges the messy and entangled nature of human-nature relations, challenging us to take responsibility for our actions and work towards more sustainable and equitable ways of inhabiting the Appalachian landscape. "Nature is the Anthropocene in its less obvious, seemingly smooth (for humans) mode (Morton, 2016)"
By embracing dark ecology, we confront the harsh realities of environmental degradation and open up possibilities for ecological renewal and resilience in the region.
"As an alternative to (modern) nostalgia or the (affective) evocation of care, Morton proposes 'dark ecology' as the politicized version of the sublime, or indeed deconstruction, referring to an ethics that refuses ideal form, thus creating an atmosphere of tension and anticipation; a thick space where something is about to happen to confront us with both the freedoms and constraints of critical choice constantly negotiating the distance between the human and non-human (Morton, 2016)".
Although the idea is provoking and challenges our traditional relation with nature, Morton does not provide concrete actions to be applied in a design situation. Closest he gets to actionable principles is raising the question, "how can we coexist non-violently with as many beings as possible? What does that look like?" (Morton,2016)

Sublime
Sublime theory explores the awe-inspiring and overwhelming aspects of landscapes, suggesting that reclamation can evoke powerful emotional responses by highlighting the dramatic changes and scale of the landscape. This approach aims to create landscapes that inspire both wonder and reflection.
By embracing the sublime, we can cultivate a deeper appreciation for the beauty and complexity of the natural world, fostering a sense of ecological awareness and responsibility. Rather than viewing the landscape solely through the lens of resource extraction or economic exploitation, we recognize its intrinsic value and significance beyond its utilitarian functions.

Burke saw nature as the most sublime object, capable of generating the strongest sensations in its beholders. towering mountain ranges, deep chasms, violent storms, rough seas, volcanic eruptions or avalanches that, if actually experienced, would be dangerous and even life-threatening. Importantly, during this same period, the relationship between the sublime and other aspects of the 'beautiful' was probably the key topic discussed among aestheticians
(Llewellyn & Riding, 2013)

The Burkian sublime is about empirical data. Big mountains, deep cliffs, and stormy oceans, it should make you feel scared while observing it from a safe space. Burke (1757) broke the idea of the sublime down into seven aspects:
-Darkness – which constrains the sense of sight (primarily among the five senses)
-Obscurity – which confuses judgment
-Privation (or deprivation) – since pain is more powerful than pleasure
-Vastness – which is beyond comprehension
-Magnificence – in the face of which we are in awe
-Loudness – which overwhelms us
-Suddenness – which shocks our sensibilities to the point of disablement

For Kant: the sublime is something more about imagination. Why are people scared of heights? They are scared of their own minds to imagine themselves jumping. Your fear of heights is the suppressed desire to jump. This in essence is the sublime according to what Kant call the dynamical sublime. Tim Morton (Morton, 2007) calls this mathematical sublime: count to unlimited, you can't! But you then just visualised infinity. These two tendencies lead to the conclusion that, for Kant, respect for sublime nature is more deeply a form of self-respect. "Instead of yelling (spreading alarming and worrying climate news) we need to get friendly with our capacity to visualise because it is really bugging us (Morton, 2007)", meaning, finding new appreciation for the negative aesthetics related to extraction landscapes.

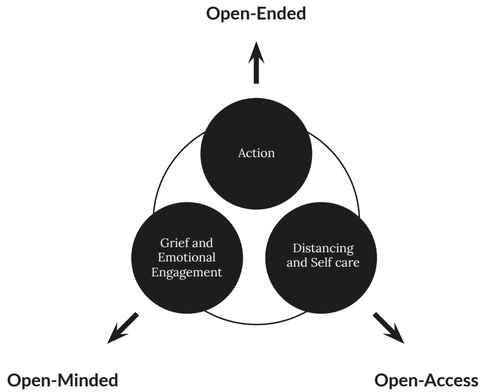
Paul Roncken has developed a method for applying the sublime in landscape architecture (Roncken, 2018). He calls this 'Serious Landscaping', or 'Landscape Machines' and introduces a new future repertoire for sublime archetypical landscapes. Four of these approaches fitting to mine reclamation include:
-Design of Productive Semi-wilderness
-Cultivating Serendipity
-Creative Journey
-Habit Breaking, or introducing a 'Fremkorper' (alien element)



Fig. 33| Roadworks at Rockcreek Development Park / Hobet-21
Made by Author, 2024

Conclusion - Towards a Landscape Reclamation Approach

This theoretical framework outlines a comprehensive approach to landscape reclamation, emphasizing the importance of scale continuum, addressing ecological grief, creating meaningful narratives, embracing alternative aesthetics, and addressing the socio-economic impacts of technical lands. By integrating these theories, the framework provides a robust foundation for developing design principles that foster public appreciation and emotional connection to reclaimed mining landscapes.
The key takeaways for subsequent research questions include the need for multi-scalar design strategies, the incorporation of community involvement and storytelling, the use of diverse reclamation approaches to address the complex challenges of post-industrial landscapes, and the adoption of open, flexible, and emotionally resonant design principles. Ultimately, this approach aims to transform dispreferred landscapes into spaces of ecological, cultural, and emotional significance, ensuring open access, embracing new aesthetics, and allowing for open-ended development.



Guiding Principles

1. Open Access
 - Ensure that reclaimed landscapes are accessible to the public, fostering a sense of ownership and responsibility.
 - Design transparent processes and spaces that allow the public to engage with and understand the reclamation efforts.

2. Open-endedness
 - Avoid strict planning that may be doomed to fail; instead, design for flexibility and adaptability.
 - Encourage serendipitous uses and participation, allowing the landscape to evolve organically over time.

3. Open-mindedness
 - Embrace new aesthetics that respect the complexity and imperfections of post-industrial land-scapes.
 - Foster a respectful attitude towards the history and current state of the landscape, promoting new forms of appreciation.



Fig. 34| Landart installation in the Pitssburgh Botanical Garden
Made by Author, 2024



03: Understanding - Narratives and Manifestations of the Mined Landscape

NARRATIVES
MANIFESTATION
CONCLUSION



Fig. 35| Tailings pond north of Hazard, KT

From: Google Earth, 2019

Narratives of Loss and Restoration

This part is about the second research question aiming to define the landscape characteristics of the design location to understand the ecological grieving process we are dealing with. The dualistic process model describes that there are currently two main narratives around loss and restoration. A literature study and field trip brings us the following narratives to consider (McMilion Sheldon, 2023; Nesbitt & Weiner, 2001; Skousen, 2021; Zipper, 2021).:

The current narratives that have contributed to the despair in the Appalachian coal region can be understood through the lens of loss and restoration. These narratives have shaped perceptions, policies, and practices surrounding coal extraction, leading to environmental degradation, social inequality, and economic decline.

The historical narrative of 'Manifest Destiny' and the frontier mentality in the United States promoted the belief in inexhaustible natural resources and unlimited economic growth. This narrative justified the exploitation of natural landscapes, including the Appalachian coal region, as part of the nation's westward expansion and industrial development.

The industrialization of the United States in the late 19th and early 20th centuries created a growing demand for coal as a primary energy source for manufacturing, transportation, and electricity generation. The economic prosperity of the region became increasingly dependent on coal extraction, leading to a boom-and-bust cycle of economic growth and decline tied to fluctuations in coal markets.

The narrative of resource extraction as a means of economic development and national progress often prioritized short-term profits over long-term environmental sustainability. The Appalachian coal region became a sacrifice zone, where the environmental costs of coal extraction, including deforestation, water pollution, and habitat destruction, were disproportionately borne by local communities and ecosystems.

The coal industry in the Appalachian region was characterized by the dominance of coal companies that owned land, housing, and infrastructure, creating a system of company towns where workers were economically dependent on their employers. This narrative of paternalistic control and labour exploitation perpetuated social inequalities and undermined community autonomy.

The cultural narrative of coal mining as a way of life and a source of community identity contributed to a sense of pride and attachment to the land among residents of the Appalachian coal region. However, this narrative also fostered a resistance to change and a reluctance to challenge the status quo, inhibiting efforts to diversify local economies and transition away from coal dependence.

These old narratives have shaped perceptions and attitudes towards coal extraction in the Appalachian region for generations, reinforcing a cycle of environmental degradation, economic hardship, and social marginalization. By challenging these narratives and proposing new narratives based there is an opportunity to re-imagine the future of the region in more sustainable, equitable, and resilient terms.

Two key narratives are highlighted below in more detail, followed by the GIS desk study and site visit to define the landscape layers and features of the mined landscape that we can use as a storytelling device in the design proposal.

Site Visit

To understand what the role of scale continuum means in this extraction landscape, a site visit was conducted. Besides visiting the design location, experiencing the larger context was crucial to understand the narratives at play in the Appalachian region. Part of the trip was visiting universities, and meeting experts that could help in understanding the challenges and opportunities in working on such a large area. The Appalachian mountains cover a very large part of the US and it was challenging to make a selection of locations to visit within the given timeframe. Therefore the places that could be visited are located around the main design location and people that meetings were arranged with. Along the way there were opportunities to visit several mine sites, national parks and cities to create a complete picture of the Appalachian Coal Fields.





Fig. 36| Visiting an abandoned mine with the maintenance staff of Hatfield McCoy trail, who reclaim the property while promoting tourism in WV.

Made by Author, 2024



Fig. 37| Soil expert Jeff Skousen at the university of West Virginia discussed with me the possibilities and limitations of post-mine landuse. Thanks to their work, technical limitations are often no longer holding back successful reclamation.

Made by Author, 2024



Fig. 38| David Saville showed me his collection of endangered native tree seeds and how he germinates them for reforestation. He learnt me the value of ecosystem restoration and how powerful it is to turn your passion into action.

Made by Author, 2024

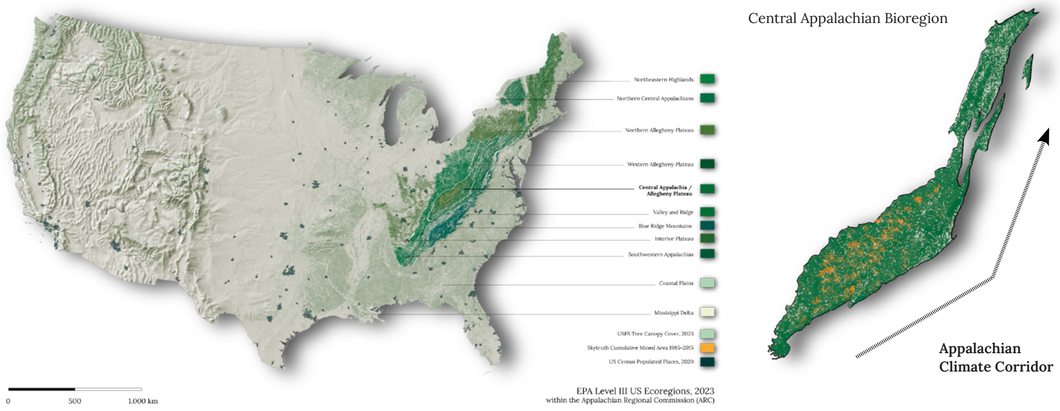


Fig. 39| At PENN university I had the opportunity to meet Dean Frederick Steiner and Landscape Architect Billy Fleming. With them I discussed the concept of Scale Continuum and the role of landscape architects in envisioning new futures for Appalachia. Talking about the long tradition of large scale landscape design at Penn, by masters like Ian McHarg and Richard Weller, I was better able to position my project. Through this, the need for a location to recognise and acknowledge this culturally important landscape came to me.

Made by Author, 2024

Importance of Appalachian Hardwood Forests

01 US Forest Cover and Bioregions in Appalachia



The loss of Appalachia's forests due to the logging industry and mining has significantly affected the region's landscape and its native communities. Once vast and lush, these forests were vital to the cultural and ecological fabric of Appalachia, providing resources, shelter, and spiritual significance to the native populations. Extensive logging and mining have not only stripped the land of its rich biodiversity but also disrupted the traditional ways of life for many native communities who depended on the forests.

Initially, the forests were a primary source of income for early settlers, who harvested timber for construction and fuel. However, this exploitation often came at the expense of native populations, who were evicted from their ancestral lands, adding to the trauma and cultural dislocation they experienced. The industrial scale of logging and the subsequent introduction of mining operations further compounded these issues, leading to widespread deforestation and environmental degradation.

A particularly tragic loss is that of the American giant chestnut, a tree that once dominated the Appalachian forests. Known as the "redwood of the East," the chestnut was a crucial source of food and wood. Its disappearance due to blight, logging, and mining activities symbolizes the broader environmental degradation and cultural dislocation caused by industrial exploitation. This loss contributes to a sense of ecological grief, as the region's natural heritage and the deep connections between the land and its people are irrevocably altered.





Fig. 40| Top: abandonned mine land
Fig. 41| below: Red Spruce
Fig. 42| right: Cherokee 'Marker tree'
by author, 2024

Moreover, the degradation of the landscape now also impacts the communities that were initially responsible for the exploitation. The economic benefits that once flowed from these industries have dwindled, leaving behind environmental damage and economic challenges. The destruction of these forests serves as a reminder of the need to preserve and restore Appalachia's landscapes, honoring both its natural beauty and cultural significance while addressing the ongoing consequences for all communities involved.



Strong Culture of Monuments and Remembrance







Fig. 43| Examples of the many mountain cemeteries in Appalachia
Made by Author, 2024





Fig. 44| In every small town the church has a central role in the communities
Made by Author, 2024

Berry's Branch Cemetry

The Berry's Branch Cemetery is a powerful symbol of resilience in the face of widespread mountaintop removal (MTR) in Appalachia. While much of the land around it has been stripped and damaged by mining, this cemetery was spared, preserving a part of the region's cultural and natural heritage. This small, untouched plot of land contrasts sharply with the surrounding destruction, highlighting what has been lost to MTR. It represents ecological grief—not just for the damaged environment but also for the cultural and emotional ties broken by mining. The cemetery stands as a reminder of the past and the connection to the land that many in the region feel deeply. It emphasizes the need to preserve such places as sources of memory and comfort, helping people cope with the significant changes to their landscape and lives.

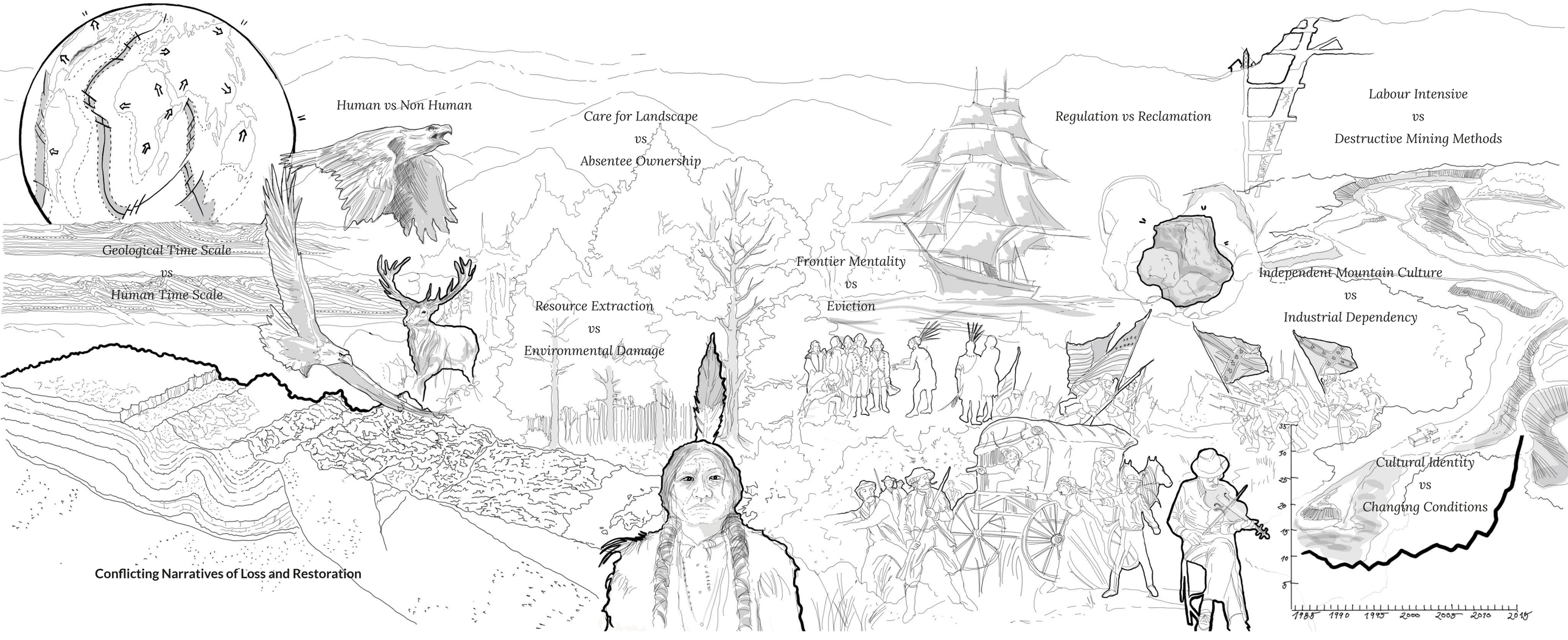
Fig. 45| Cemetery at Hobet-21 in 2006 With permission by Vivian Stockman; Flyover courtesy SouthWings







Fig. 46| Berry's Branch Cemetry. Photo's by Glenda Adkins 26 aug 2019



Conflicting Narratives of Loss and Restoration



Fig. 47| Highwall next to Highway
Made by Author, 2024

Site Visit: Hobet-21



Fig. 48| With Geologist and GIS expert Nick Schaer I visited the Hobet-21 mine site. This site is not only too big to visit in one day, the unpaved roads make it very hard to access by car. From the only publically accessible road we were able to have a closer look at the vegetation, different types of reclamation, water treatment systems, and geological formations.

Made by Author, 2024







Fig. 49| Roadworks at the main entrance of the Hobet-21 mine. Part of the Rock Creek Development Park plan for a large solar installation and recreation opportunities at Hobet-21. Except for the roadworks, development for the site itself has been halted.

Made by Author, 2024



Fig. 50| Mud River

Made by Author, 2024

Infrastructure and Accessibility



Fig. 51| Former workshop and mine entrance from Mud River Road made by author, 2024





Fig. 52| Oversized unpaved Haulroads made by author, 2024

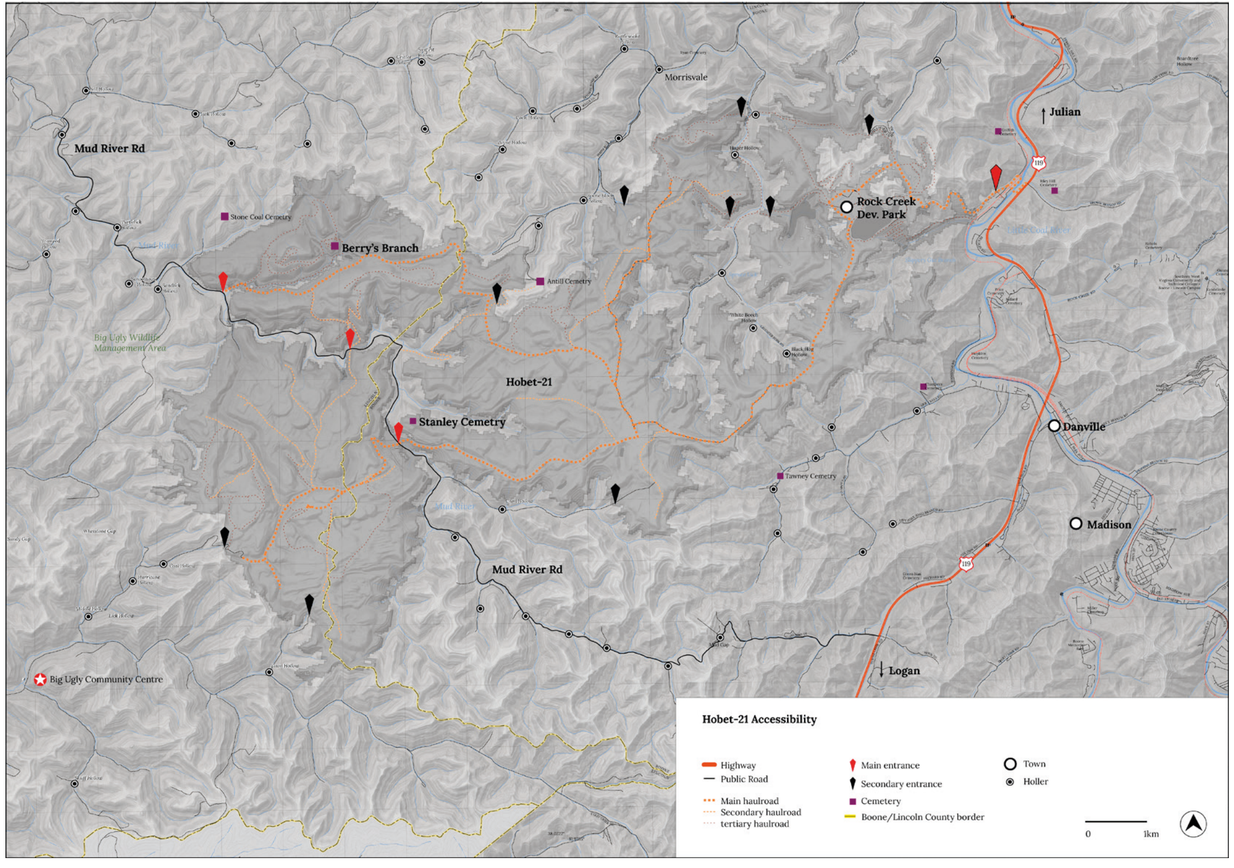


Fig. 53| data from Open Street Map, USCS Topo 2024

Materials

Typical materials found on mountain top removal sites are various types of soils and rock. But also trash and waste products from the mining operation. For example tire dumps, or brush piles. When underground fires happen, slate gets a typical red shade. This ‘red dog’ was used on roads in the past.

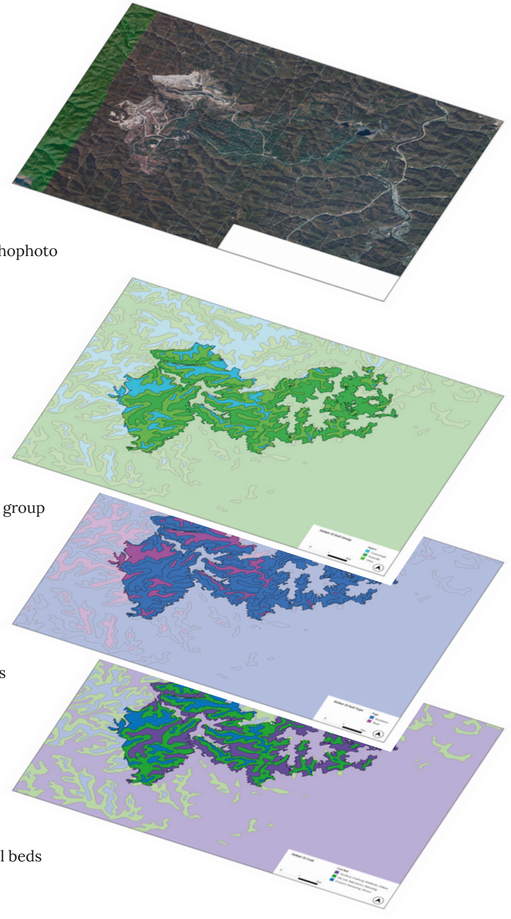




Fig. 54| Unreclaimed highwall in Hobet-21 by author, 2024

Subsurface Layers

Between the subsurface and the visible top surface are several layers that can be distilled to understand the current manifestation of the landscape. The subseurface, meaning the soil type, geomorphology and actual coal seams explain why these locations were selected for mining in the first place. The contours of the mine operation (next page) are defined by the height of the coal beds and the depth of overburden. The irregular shape of the mountains and interflowing streams create irragular patterns that are easily recognisable from satelite imagery and can be tracked precisely.



Orthophoto

Soil group

Soils

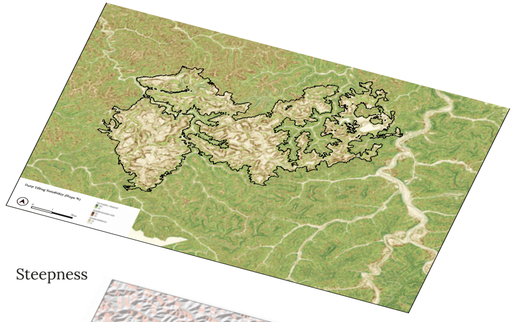
Coal beds

Fig. 55| data from WVGES, 2024

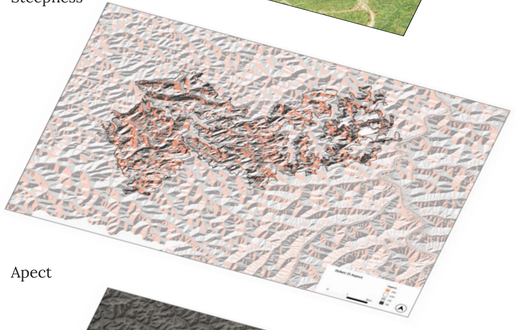


Topography

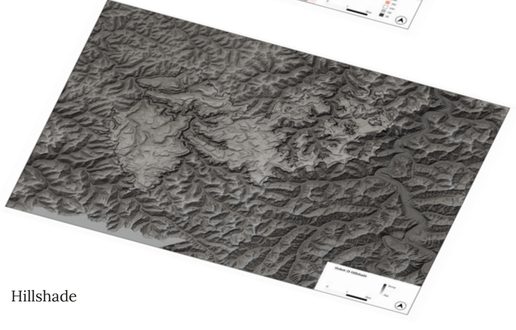
The topography of the mine sites are extremely altered. Overburden is pushed into valleys before it is needed to re-contour the land. Often the AOC does not represent the steepness and height of the original (next page, section). Other landforms can be difined resulting from the mining operation. Particularly artificial teraces and slopes. But also remaining highwalls that are not backfilled yet are a distinct feature of the mining process. Mapping the topography (see appendix) can give clues to possibilities for future land use as well. For example, slopes steeper than 40% are not suitable for large machines to operate on. Flatter sites are generally more suitable for functional use, while slopes tend to have a more impressive aesthetic character.



Steepness

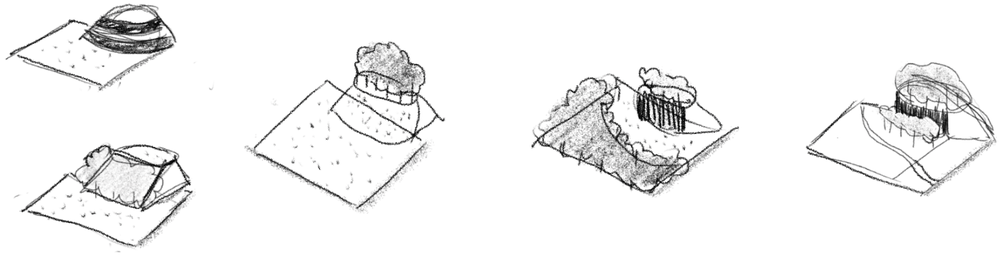


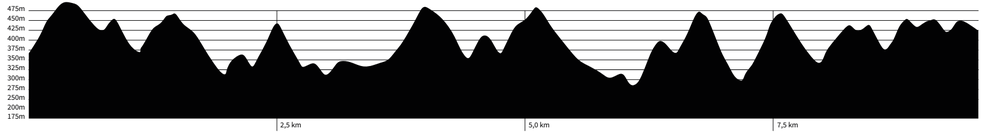
Apect

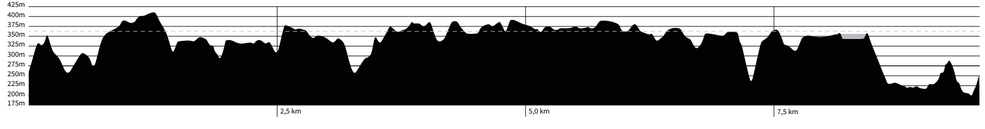


Hillshade

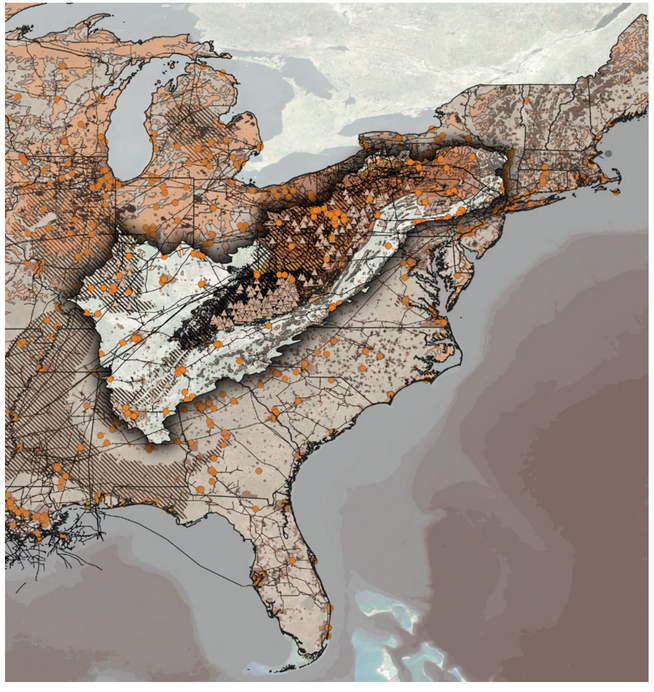
Fig. 56| data from OSMRE Geomine, 2024



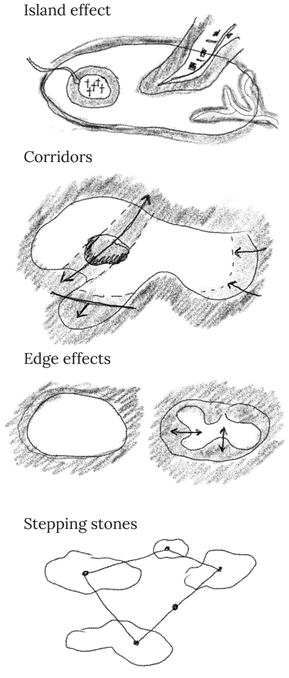




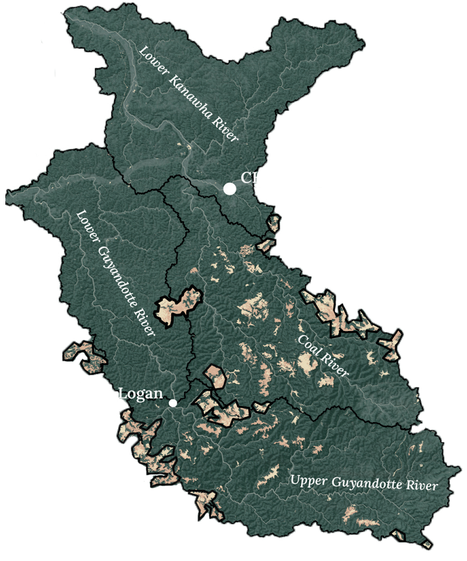
Network Layer



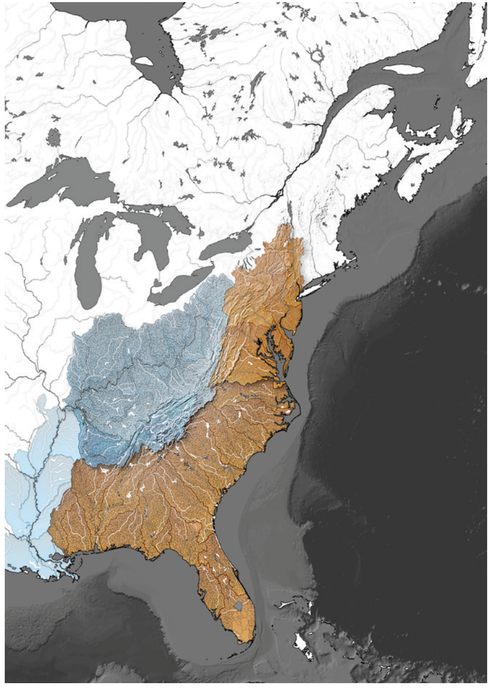
Extraction



Ecological Networks



Coal River Watershed



Watersheds

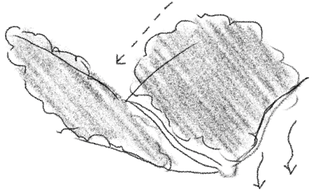
Hydrological Measures



Fig. 57| AMD from a legacy underground mine
made by author, 2024



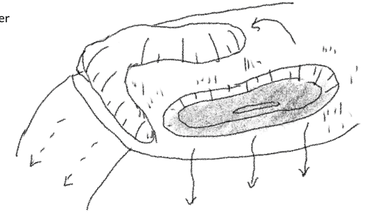
Fig. 58| Abandonned water treatment pond
made by author, 2024



Erosion prevention



Cooling effect



Water infiltration

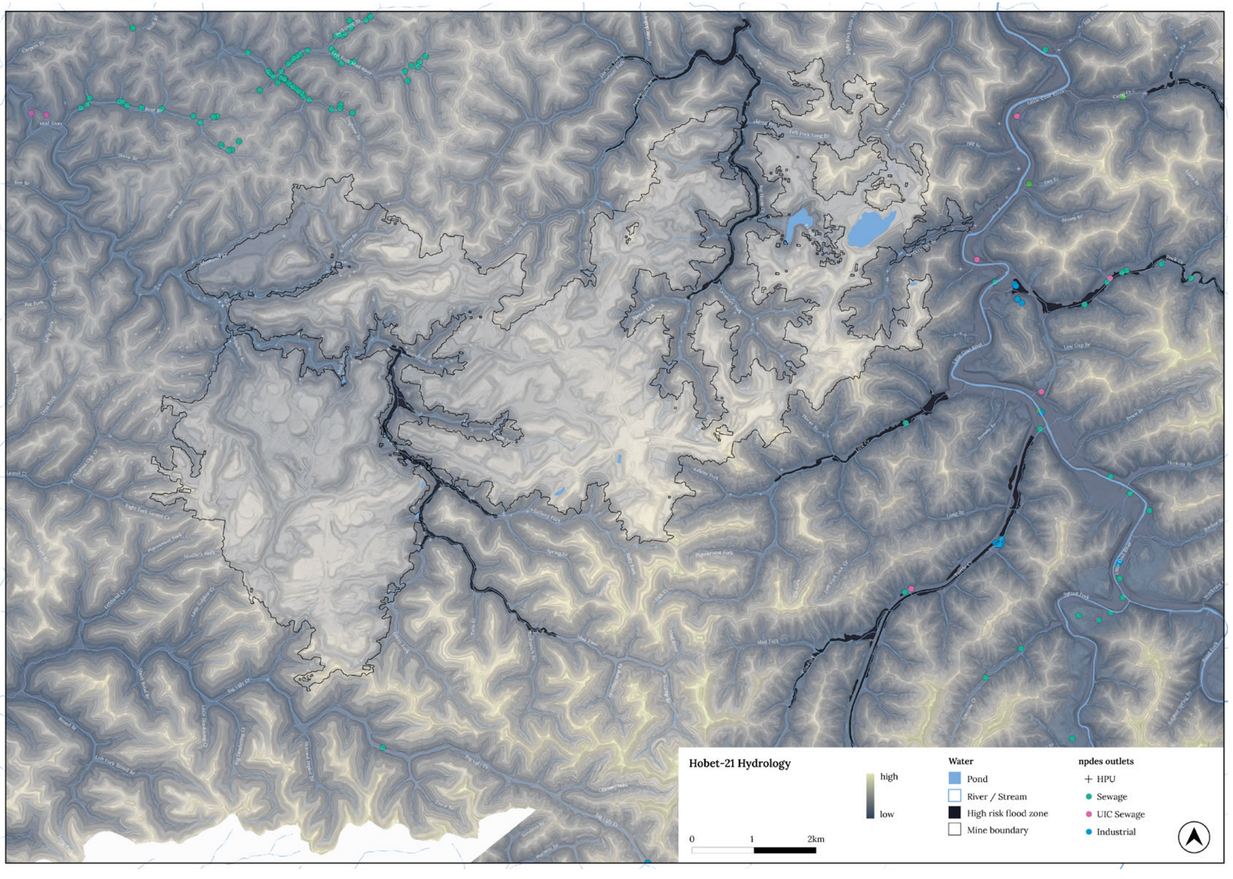


Fig. 59| data from Open Street Map, USCS TopoBuilder, 2024

Occupation Layer - Post mine Land Use (PMLU)

Coal companies owning mine lands determine the post mine land use. For each permit, are bonding scheme is required to generate sufficient funds for reclamation (next page). The PMLU is therfore based on the permit boundaries and reclamation requirements and not on the conditions of the landscape, community benefit or ecological needs. There is a large contrast in revegetation quality depending on the used revegetation method and strategy. Older permits on the eastern part of the mine are reclaimed for rangeland and have gnerally succesfull vegetation cover. Although, usually shurbs and exotic species were used on these older parts, before proper reforestation techniques were develped. More recent permist are not yet reclaimed, or use for industrial purposes (Westridge permit). These hills are not yet revegetated but are intended to be turned into forestland. As shown on the map,none of the permits have ben fully released yet, despite vegetation cover. This suggests hydrological issues limit the reclamation.



Three typical PMLUs: grassland (back), forest (middle) and rangelands (front)
by author, 2024



Fig. 60| Exotic invasive species (Eleagnus

by author, 2024



Fig. 61| Reclaimed rangeland
by author, 2024

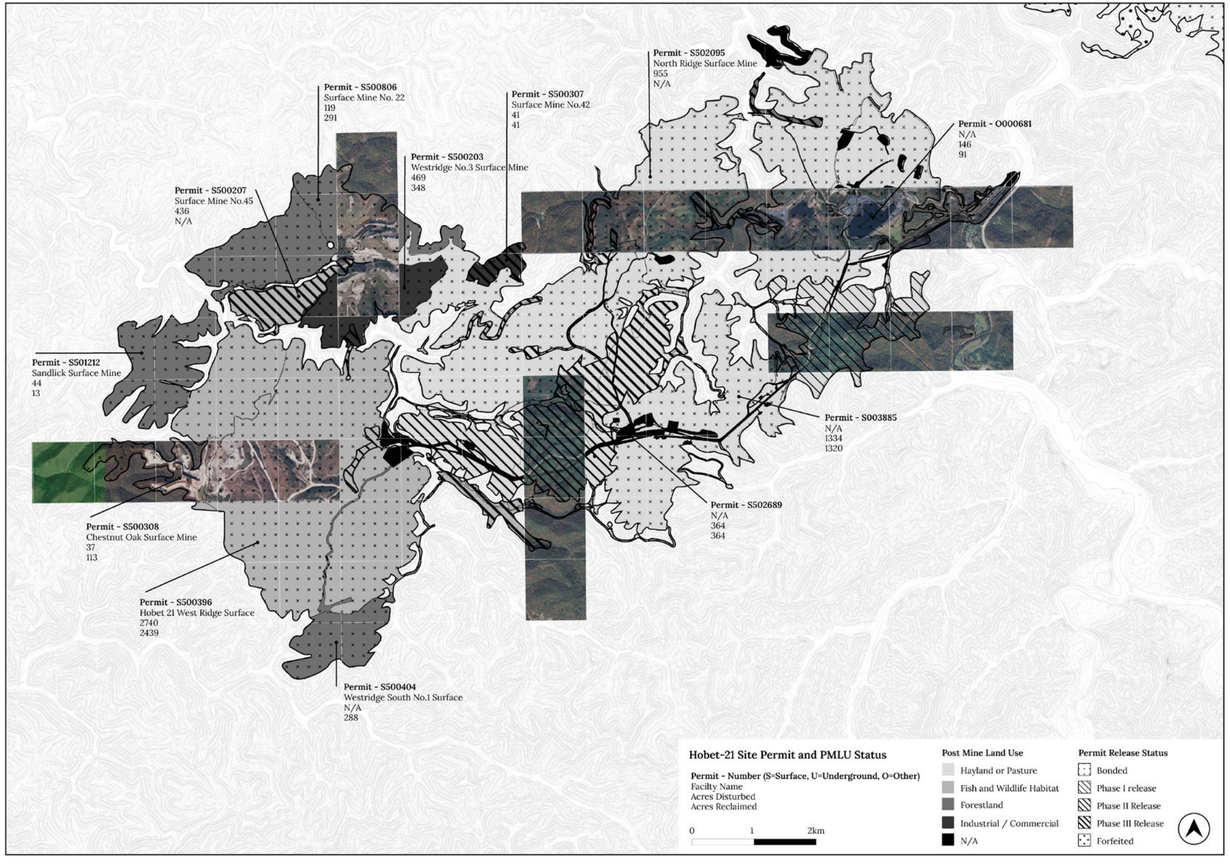


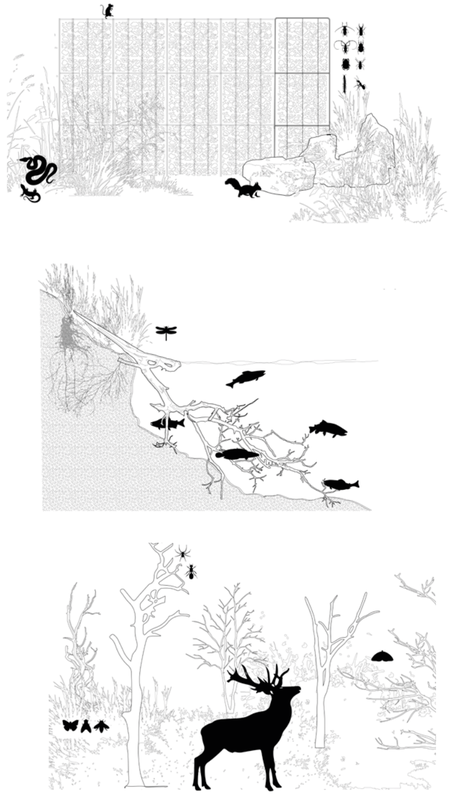
Fig. 62| data from TAGIS, WVDEP, 2024

Arrested Succession

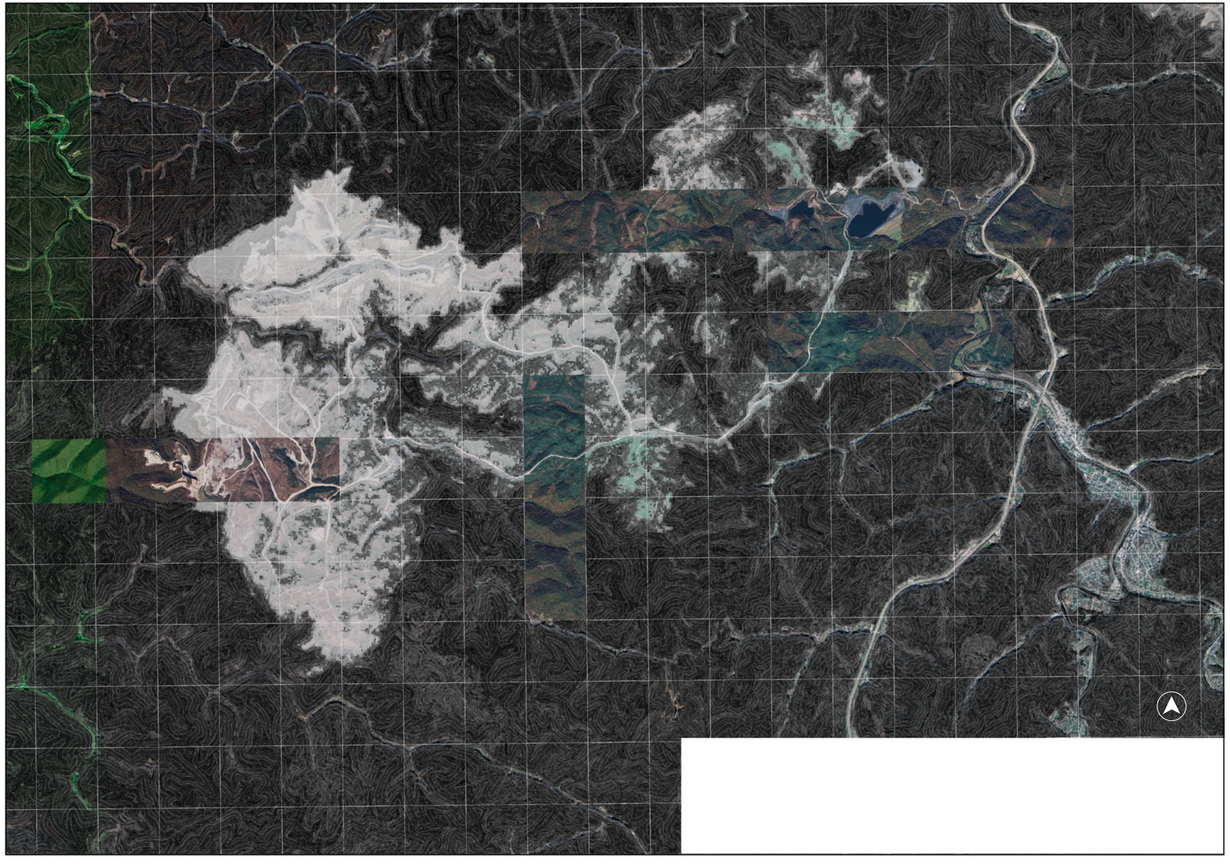


Fig. 63| Arrested Succesion

by author, 2024

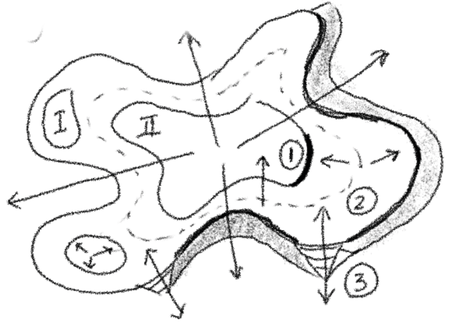


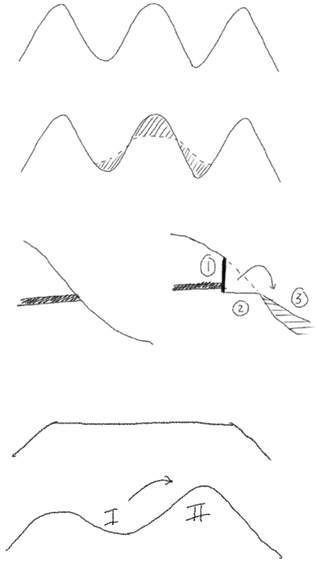
Micro habitats

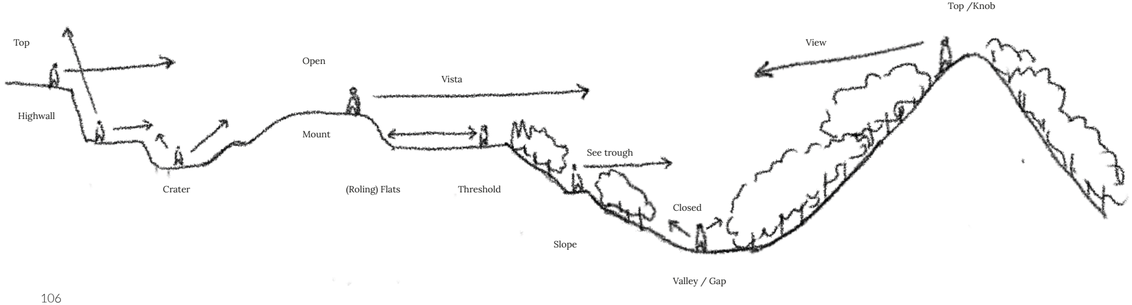


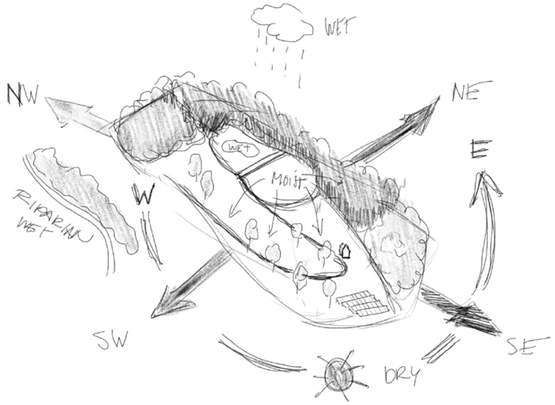
Landforms

Sketches made to study different landforms and (visual) relations between their shape and steepness. The orientation combined with steepness decide the conditions for vegetation type considering there is a suitable growing medium. Otherwise the recontouring of taracces leave compacted flat tops that do not support vegetation as well as the steeper slopes. Different transitions from slope to flats were tested for their usability and aesthetic quality using both the topography and vegetation.





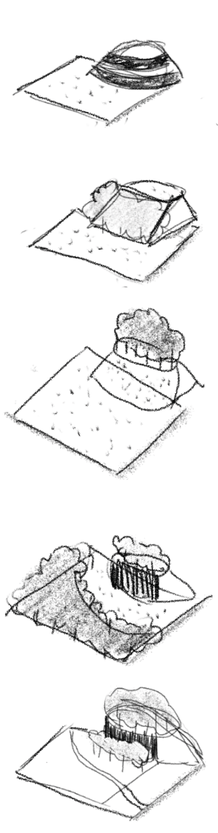




Slope orientation



Steepness



Slope Typologies

Overview of the altered landscape

The altered landforms resulting from the mining and reclamation practice can be summarized in six different stages. As part of the research process, physical models were made to explore the spatial form of each stage, and how that can be used in the design.



The first stage is the undisturbed forest as a reference to the altered. Hills are steeper and more biodiverse. First signs of mine activity can be found in clearing the forest for expansion.



Secondly, the mining process itself can be experienced by the steep highwalls that are created by blasting and excavating until the underlying coal bed is revealed. This can happen merely along the contour of the slope, or the whole mountain top can be blasted off.



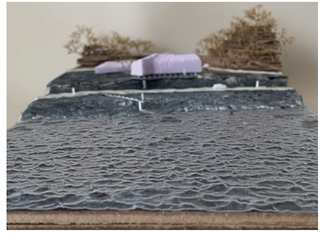
The spoils or overburden is pushed into valleys before there is enough room to work. For stability reasons these fills are stepped and can be easily recognised for their shape and the distinctive vegetation compared to the surrounding slopes. Below the slopes there are often ponds for sediments to settle.



The reclaimed lands can appear green, but contain often different, more invasive, species than the native Appalachian forests. This is due to compacted soils or improper planting methods.



The industrial heritage can be characterised through abandoned installations that are often removed after the mining is finished. Remaining however, is the pollution and coal refuse that needs additional efforts to clean.



Similarly, tailing ponds are a distinct feature in the mined landscape that remain for a long time. These lakes need constant monitoring to prevent disastrous dam breakage. However, they are not easy to remove or reclaim and therefore symbolise the permanent impairment of the landscape.

Conclusion - Starting Conditions

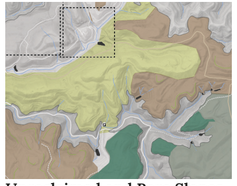
Without being limited to the permit boundaries, four different landscape types and their conditions can be found.

1. The north and west sections of the mine, most recently mined, are unreclaimed and partly unvegetated. The AOC has been partly restored, but highwalls are exposed in some places. This zone is characterised by steep sandy slopes with little vegetation and high chance of soil erosion.

2. Other less recently mined zones are partly reforested but mostly with grasses. They are recognised as plateaus with less steep slopes and relatively large flat tops. They are often compacted and do not support tree growth, so here we find mostly exotic and invasive shrubs.

3. By far the largest part of the mine looks reclaimed but is either revegetated by exotic invasives, or invasive species that were voluntarily established. This zone, intended as rangeland is the oldest mined part but not yet released probably due to water issues. Vegetation-wise it is in arrested succession, although small patches of native hardwood forest can be found to take over on the very long term.

4. The last zone consists of all the man-made infrastructure across the site such as roads, parking lots, water treatment plants and demolished building pads. Also other culturally important features such as cemeteries and private homes are considered to belong in this category.



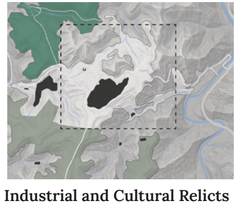
Unreclaimed and Bare Slopes



Partially Reclaimed and Arrested Succession



Overgrown and Succesfully Reclaimed



Industrial and Cultural Relicts





Fig. 64| Appalachian National Scenic Trail
Made by Author, 2024



04: Conceptual Design – Defying the Gap between the Vastness of Depletion and the Human Scale

DESIGN CONCEPT
REFERENCE PROJECTS
DESIGN STRATEGIES AND PRINCIPLES



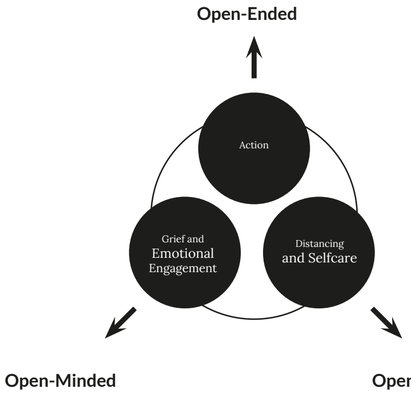
Fig. 65| Summersville lake
Hydroelectric dam built by the Army Corps of Engineers

From: Google Earth, 2023

Design Concept - Disclosing the Mined Landscape

Based on the guiding principles derived from the literature study and narrative analysis, three leading design strategies were chosen to apply on the landscape conditions found in the previous chapter. Combined they from the main design concept:

First strategy is **designing an engaging recreation network that discloses the mined landscape to the public.** Open-access will ensure transparency and opportunity to choose whether or not to engage with the ecological grief.
Following this, we can by involve communities in reclaiming the landscape by **creating continuous adaptive management trajectories based on local conditions.** They need to have an open-ended and experimental character to ensure maximum and continuous educational and experiential qualities.
Finally, within the context of the changing landscape conditions, the last strategy is about **designing for a trancedental experience of the mined landscape through carefully chosen interventions that highlight memorable features of the mined landscape.**



Leading Strategies

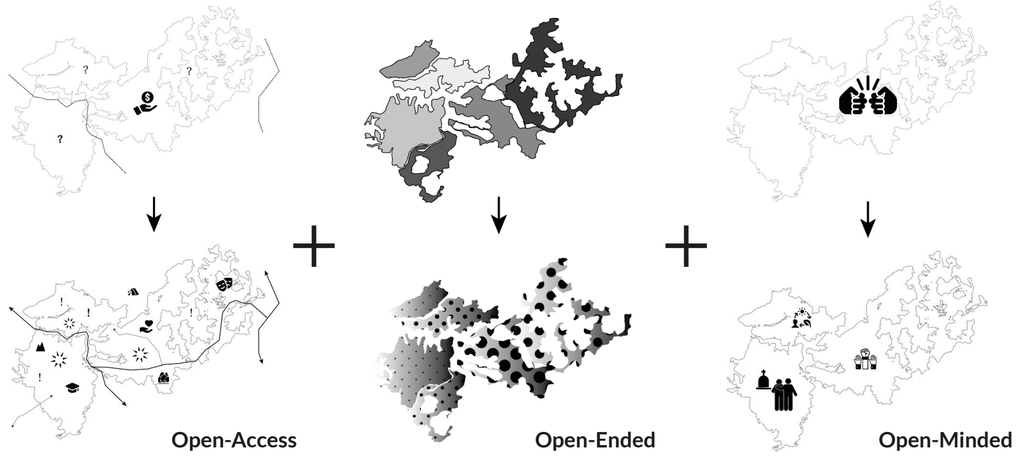




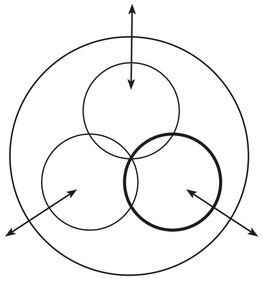
Fig. 66| Mine site visible from highway
Made by Author, 2024

1. Principles for Disclosing the Landscape

The three leading strategies to disclose the mined landscape exist next to each other without a particular hierarchy. However, the first step to access the ecological grieving process is to provide physical access and transparency to the reclamation process. From there, locals and outsiders can witness the landscape development and form their own opinions. Opening up the landscape is a priority, yet, the way by which this is done relates to the other two strategies and therefore needs to be developed together. When possible, the existing haul roads and access routes can be re-used and reserviced to support passenger vehicles. They need to be asphalted, or graded and will connect the main traffic flow to several trailheads across the landscape. From there, smaller trails will head into the park and take visitors along the various highlights that are marked or designed to disclose the landscape. A central parkway will allow visitors passing by to experience the landscape easily and accessibly by car through strategically planned parking lots with views over the landscape interventions.

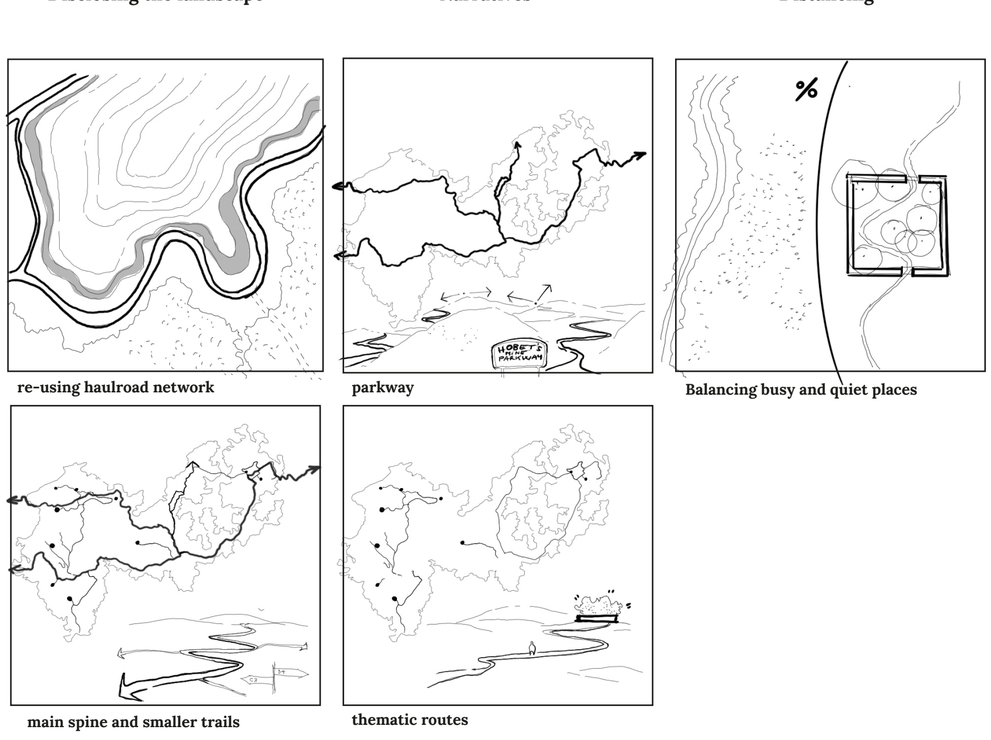
In the early stage, routes will start to show existing views or landforms that are typical for the mined landscape. For example, Berry's branch cemetery, coal refuse piles, and remaining highwalls. Later, locals can also actively contribute to the maintenance and upkeep of the landscape. Additionally, the park could actively reach out to locals that are unemployed, want to volunteer or contribute to the landscape transformation. To attract possible funding the target groups can be expanded to prison inmates, drug addicts and traumatised individuals as part of a mental healing or reintegration program.

As the planned design and reclamation interventions will develop, the routes will explain these as well through a series of thematic routes. These routes can be planned but will be deployed in a later stage to highlight a specific topic using the narrative approach. Ideas for themes are water, succession, erosion, landforms, views, industrial heritage, and mining process. Finally, there will be a main memorial centre close to the highway that acts as a central place for communities and visitors to meet, share ideas and memories, and learn about the future of the Appalachian landscape.

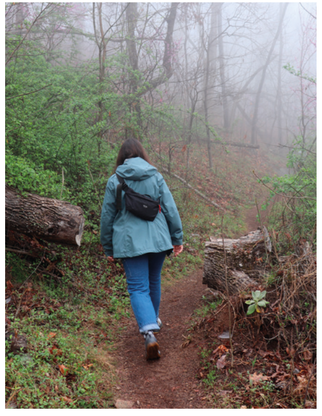


Context











Reference 1. Appalachian National Scenic Trail

The Appalachian Trail celebrates the sublime beauty of the Appalachian nature and connects various nature organizations and communities along its route. With minimal impact on the landscape, this project serves as an example of sustainable development that enhances the natural environment.

The design approach of the Appalachian Trail emphasizes minimal intervention to preserve the natural landscape while promoting public access and enjoyment. By celebrating the sublime beauty of the surroundings, the project fosters a deeper appreciation for the natural world.

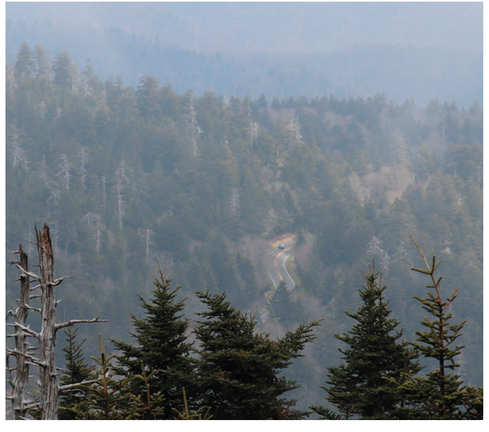
Takeaways: Celebrating the qualities of the site. Starting with a grand vision to connect people with a powerful story.











Reference 2. Blue Ridge Parkway

The Blue Ridge Parkway is a scenic highway that stretches 469 miles through the Appalachian Mountains, connecting the Great Smoky Mountains National Park in North Carolina to Shenandoah National Park in Virginia. Designed for leisurely travel, it showcases the region's natural beauty through carefully planned vistas, trails, and cultural sites. The parkway is renowned for its scenic beauty, biodiversity, and recreational opportunities. It also includes numerous visitor centers, historical landmarks, and overlooks that provide educational insights into the natural and cultural history of the Appalachians.

Similar to the Blue Ridge Parkway, this project should prioritize accessibility and connectivity. This involves creating routes and pathways that offer easy public access to various parts of the reclaimed landscape, ensuring that visitors can explore and experience the site's natural and cultural features. The parkway's emphasis on preserving and showcasing the region's natural and cultural heritage can inspire the creation of monumental installations and interpretive centers. These features can highlight the significant transformations of the mined landscape, embracing the aesthetics of dark ecology and the sublime to create emotionally resonant spaces for contemplation and reflection. The parkway's adaptability to seasonal changes and its focus on long-term preservation can inform a design that promotes flexibility and community engagement.

Takeaways:
Developing pathways and interpretive routes that offer scenic views and educational insights. These routes can connect different thematic zones and iconic features within the reclaimed landscape. Incorporating design solutions that adapt to seasonal changes and long-term ecological processes. Engage local communities in the ongoing maintenance and interpretation of the landscape to ensure it remains relevant and dynamic.

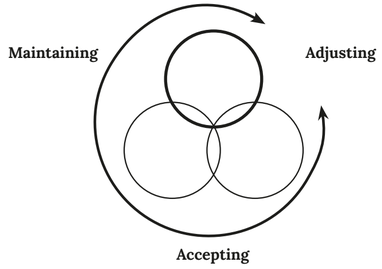


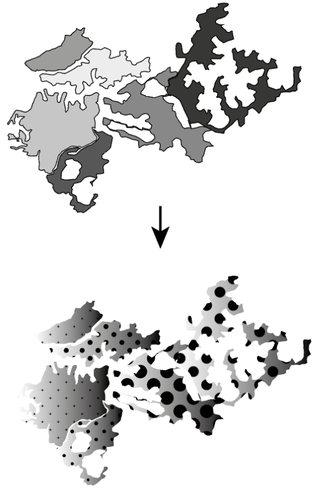
2. Principles for Adaptive Ecological Action

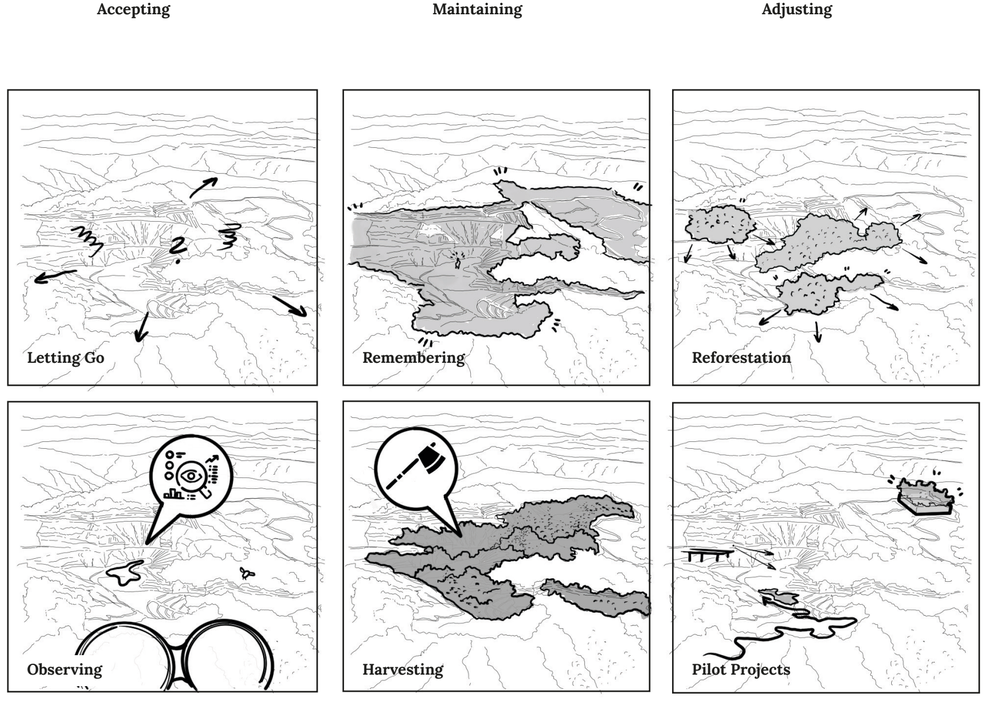
The second strategy revolves around taking action in the landscape itself. This is key in both stages of ecological grief, whether someone experiences climate anxiety or is already comfortable with living in the ecological crisis. The current approach to reclamation is focused on one specific, fixed, end-use. When this cannot be achieved the reclamation is marked as failed and often abandoned until alternative land use is found. But what if we could explore the potential of all stages of succession in engaging and educating the public about the process of reclamation itself?

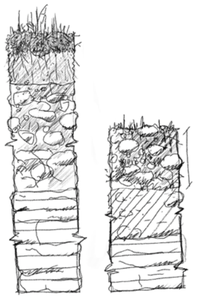
Acknowledging that the scale and technical difficulties are too big to reclaim everything at once, helps us to look for alternative, scalable strategies to reclaim the landscape. Three strategies or attitudes are explored:
1. Accepting. Letting natural succession take over the site, accepting it might take longer and prone to exotic invasive species, and does not address the unfavourable conditions for climax ecosystems.
2. Maintaining. By introducing specific management regimes based on the local conditions instead of mine permit boundaries, locals can find purpose and responsibility for the landscape and look for profitable or meaningful stages in the succession range.
3. Adjusting. Where possible, immediate action can be taken to speed up succession to climax forest when the conditions and available workforce allow it. Over time, alternative small pilot projects can experiment with turning zones with overgrown invasives and arrested succession into biodiverse and attractive landscapes.

Together, these three strategies form the overall context of the routing and local design interventions. The landscape will gradually evolve celebrating the succession process rather than forcing each permit into one specific direction.

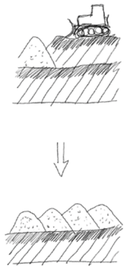




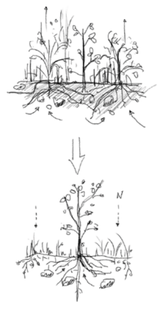




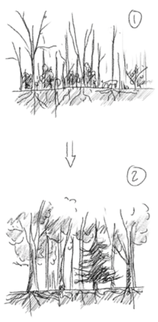
1. Create suitable planting medium >4 feet topsoil, weathered sandstone, or best available



2. Loosely grade rooting medium to create non-compacted medium



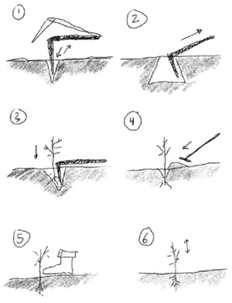
3. Use compatitable ground covers to limit competition slow growing grasses, legumes, clovers



4. Plant two types of trees...
1. early successional for wildlife and stability

2. commercially valuable

matching with



5. Use proper planting techniques
Proper handling and storage

experienced planters

plant late winter-early spring







Reference 3. Forestry Reclamation Approach

The Barton's Knob reforestation project is situated on an old mine site and utilizes the Forestry Reclamation Approach. This approach focuses on restoring forests and wildlife habitats on previously mined lands. The project is technically interesting, employing innovative reforestation techniques to revitalize the landscape. However, there is limited engagement with the public, with minimal efforts to involve the community in the project's development or educate them about the reclamation process.

Forest Reclamation Approach
Aiming for forest based eco-system services such as timber, c02, wildlife habitat, water quality

It involves five steps:
1-suitable rooting medium >four foot deep. topsoil or weathered sandstone, and/or best available material. weathered rocks <10m work best for Appalachian hardwood
2-loosely grade topsoil (substitude) to create non-compacted medium. use smaller equipment, dry conditions. helps also spontanuous vegetation
3-Use less competitative cround covers that are competitable with growing trees. reducing competition accelerates growth and survival of trees ()
4-Plant two types of trees—early successional species for wildlife and soil stability, and commercially valuable crop trees.
5-Use proper tree planting techniques.

The approach of the Barton's Knob project prioritizes ecological restoration through reforestation techniques. While technically sound, there is a missed opportunity to engage the public and foster a deeper connection to the reclaimed landscape.

Takeaways: Learning from the technical aspects of the Barton's Knob project while also emphasizing the importance of public engagement and education.



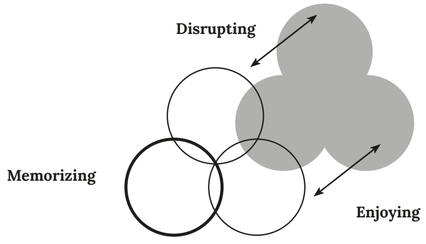
3. Principles for trancedental experience of the mined landscape

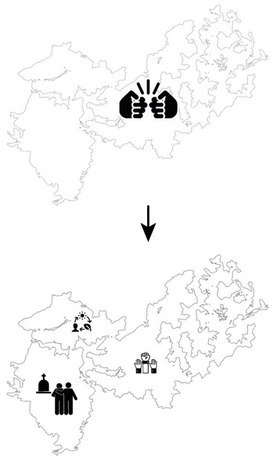
The open-minded approach to design interventions emphasizes three core experiences: disrupting, enjoying, and memorizing. This principle encourages a deep engagement with the landscape by highlighting both existing and designed features of the mined environment.

Disrupting involves challenging conventional perceptions and bringing attention to the raw, altered state of the land through installations and viewpoints that emphasize the sublime aesthetics of vast, scarred terrains. Embracing the aesthetics of dark ecology and the sublime, these interventions create emotionally resonant landscapes that highlight the dramatic transformations and scale of the reclaimed landscape.

Enjoying focuses on creating spaces where visitors can find beauty and pleasure in the reclaimed landscape, such as through trails, picnic areas, and interactive art installations that celebrate the resilience of nature. Design features should use materials and forms that evoke a sense of wonder and contemplation, encouraging deeper emotional connections.

Memorizing provides places for solitude and contemplation, offering quiet, reflective spots where individuals can connect with the historical and ecological narratives of the site, fostering a deeper appreciation and emotional connection. Together, these experiences aim to transform the mined landscape into a place of profound significance, encouraging visitors to understand, appreciate, and find new meaning in its transformation.





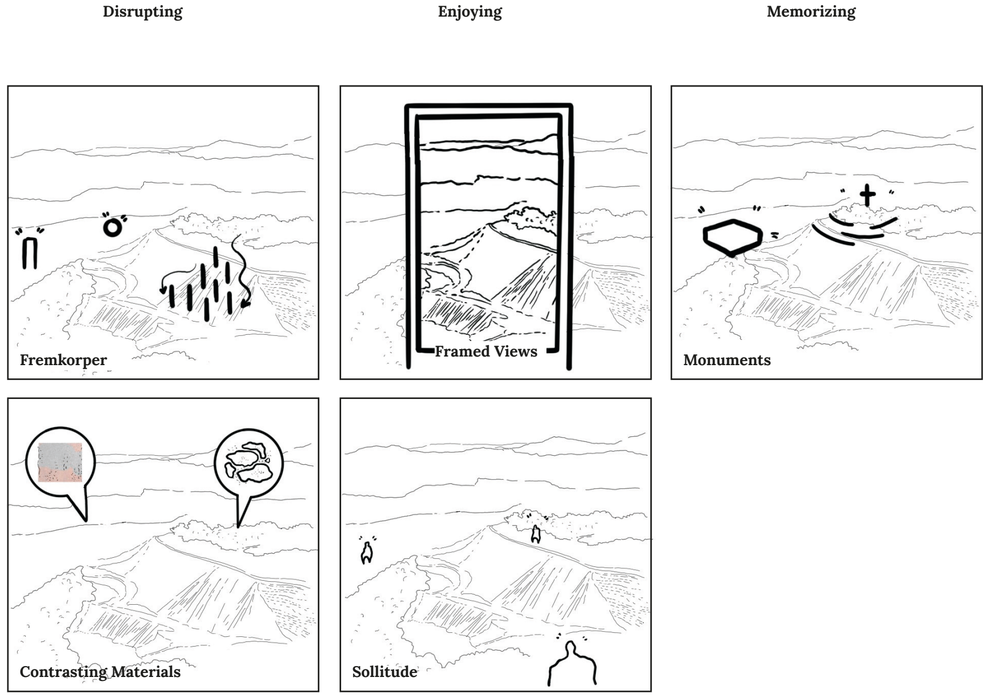






Fig. 67| Freshkills phasing plan.
From FieldOperations,2001





Reference 4. Fresh Kills Park - Field Operations

Freshkills Park exemplifies transparency and engagement with the public, offering a clear narrative of transforming wasteland into new functional spaces. The park's transparent, sublime character engages visitors and educates them about the site's history and transformation.

The design approach of Freshkills Park prioritizes transparency, engaging visitors in the site's reclamation process through clear narratives and interactive exhibits. By showcasing the transformation of wasteland into a vibrant public space, the park fosters a sense of stewardship and appreciation among visitors.

Takeaways: Drawing inspiration from Freshkills Park's emphasis on transparency and narrative storytelling can be used to create an immersive experience that educates and inspires visitors about the site's reclamation journey.















Reference 5. Pittsburgh Botanical Garden

The Pittsburgh Botanical Garden is built on a former mine site and incorporates art installations to engage the public. However, the presence of a lime bed treatment system below the pond is hidden from visitors, detracting from the transparency of the site's reclamation process.

The Pittsburgh Botanical Garden combines traditional botanical garden elements with artistic installations to create an immersive experience for visitors being located on a former mine site. However, a lack of transparency and proudness regarding the site's remediation infrastructure is a missed opportunity for educational outreach.

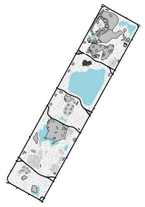
Takeaways: Integrating artistic elements to engage visitors while ensuring transparency about the reclamation process and underlying remediation infrastructure.





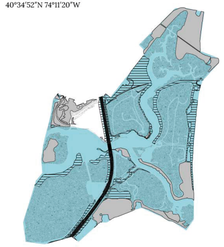
Positioning in Scale

40°46'56"N 73°57'55"W



Central Park
843 acres (341 ha)

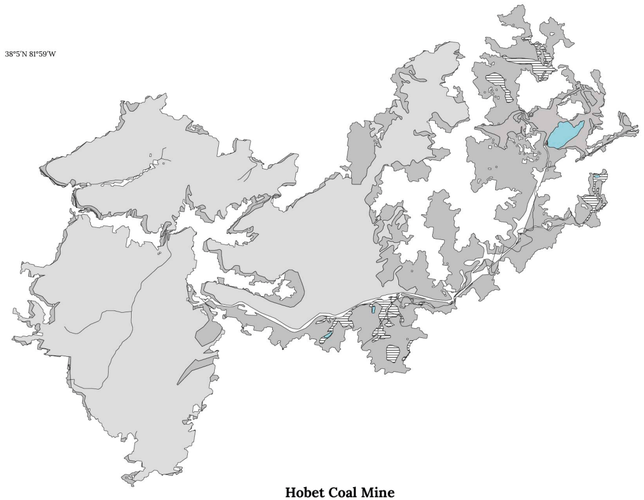
40°34'52"N 74°11'20"W



Freshkills Park
2,200 acres (890 ha)

Appalachian Trail
(3500km)

38°5'N 81°59'W



Hobet Coal Mine
12 000 acres (29652,6 ha)

Conclusion - Breaking down the Scale

Local Scale: At the local scale, the design should focus on restoring ecological integrity and fostering biodiversity within the mined landscape. This could involve reclamation efforts, habitat restoration projects, and the creation of green corridors to reconnect fragmented ecosystems. By integrating dark ecology principles, the design can emphasize the resilience and adaptive capacity of nature in recovering from human-induced disturbances.

Landscape Park Scale is most fitting for the design location. Comparing the site to the reference projects, chosen is to design a park consisting of several smaller interventions. The locations and their context can be visited by car and further explored by foot. Having one central location in the Appalachian Coal Region makes the Hobet-21 site an example of future reclamation approaches.

Regional Scale: On a regional scale, the design can address broader socio-economic and environmental challenges associated with mining activities. This could include initiatives to diversify local economies, support sustainable livelihoods, and promote cultural heritage preservation. By highlighting the interconnectedness of ecological and socio-economic systems, the design can develop narratives that emphasize the importance of holistic approaches to land management and community development.

Global Scale: At the global scale, the design can contribute to larger conversations about the Anthropocene and humanity's collective impact on the planet. This could involve raising awareness about the concept of hyperobjects and the interconnectedness of environmental issues across geographical boundaries. By engaging with the sublime and evoking a sense of planetary interconnectedness, the design can inspire a sense of urgency and solidarity in addressing global environmental challenges.

Overall, we can create new narratives for the mined landscape that transcend traditional dichotomies between nature and culture, human and non-human, and local and global. These narratives have the potential to inspire meaningful reflections, foster ecological awareness, and catalyze positive action towards a more sustainable and equitable future.

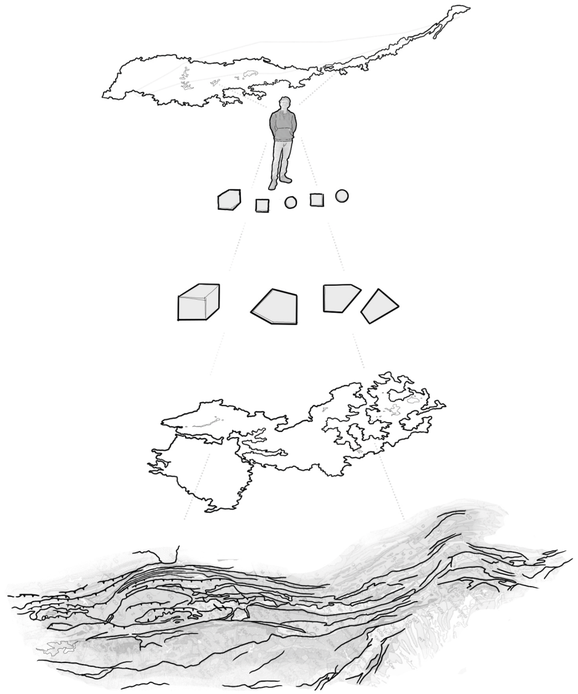




Fig. 68| Deep tilling method and wetland construction, part of Forest Reclamation Approach near Barton's Knob, Monongahela National Forest
Made by Author, 2024



05: Appalachian Memorial of the Mined Landscape

1. DISCLOSING THE LANDSCAPE
2. DIFFERENTIATED MANAGEMENT
3. MEMORIAL GARDENS

Appalachian Memorial of the Mined Landscape

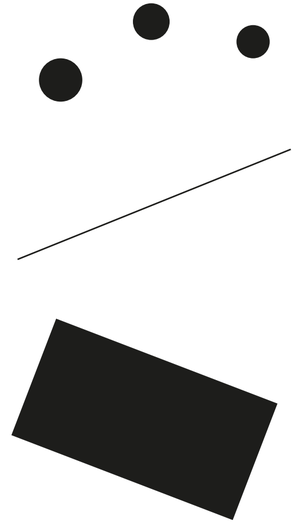
The Appalachian Memorial of the Mined Landscape is a transformative design concept aimed at reclaiming and reimagining the vast, scarred terrains of the Appalachian Coal Region. This project seeks to honor the region's history and ecological context by creating a space that embodies the principles of open access, open-mindedness, and open-endedness. It employs three main architectural languages of lines, shapes, and dots to represent different aspects of the landscape transformation.

Lines symbolize open access, with routes and pathways weaving through the landscape to ensure public engagement and connectivity. These routes guide visitors through the reclaimed areas, making the transformation visible and accessible, and allowing people to explore and interact with the site.

Shapes represent the landscape's transformation and the open-ended nature of the design. The evolving forms within the landscape are designed to accommodate natural processes and community engagement, ensuring that the space remains dynamic and adaptable over time.

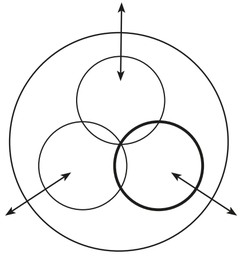
Dots are the landscape monuments, symbolizing the open-minded approach. These focal points highlight significant features of the mined landscape, both existing and newly created. They embrace the aesthetics of dark ecology and the sublime, creating emotionally resonant landmarks that encourage contemplation and a deeper emotional connection to the site.

By integrating these architectural languages, the memorial not only serves as a testament to the resilience of nature and the human spirit but also as a beacon of hope and regeneration. It illustrates how damaged landscapes can be reintegrated into the cultural and ecological fabric of the region, offering new opportunities for public interaction and stewardship.



1. Open-Access: Disclosing the Mined Landscape

The first design interventions come from the open-access strategy to disclose the mined landscape. Not, as cuurently is often done, only when the full reclamation is finished, but during the process. As seen on the map, the main access to the mine will be provided by the main parkway entering from the 119 highway. This will lead to the main Memorial and Community centre next to the Rock Creek Lake. This location is chosen for its proximity to the highway and the existing infrastructure surrounding the lake that can be easily repurposed. This will be a place that brings together local communuties, volunteer groups and others to discuss and experience the future and history of reclamation through organising events or art exhibitions. From this central place, many hiking and mountainbike routes can start. Or, one can continue the parkway to the several trailheads spread across the mine. Form these parking lots, thematic routes will bring visitors to the various monuments. As mentioned in chapter three, there already plenty of landscape qualities ready to be discovered in the Hobet area. Three examples of monuments highlighting existing landscape features are worked out on the following pages.



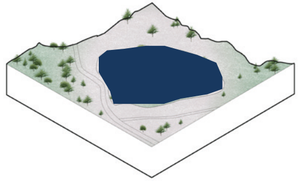
Context

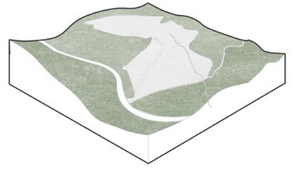
Monuments of the Mined Landscape - Part 1

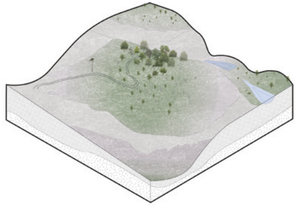












1.1 Rock Creek Memorial Lake

One of the biggest slurry impoundments in the area. It needs to be continuously monitored to maintain the integrity of the dam. This symbolises the infinite future risk of pollution and dam breakage because there are no solutions feasible yet for these lakes. It is also an iconic place for the Hobet-mine and the industry itself.

1.2 Coal Tip Walkway

Similarly, coal tips are places for the solid waste of the coal production process. It creates a moonlike landscape hidden away in the mountains. A great contrast with the surrounding hills.

1.3 Berry's Branch Cemetery

Many cemeteries in Appalachia were removed by mining. Some of them persisted and are now an iconic feature in the landscape. Many narratives about loss and restoration come together here, so it deserves to be made visible again.

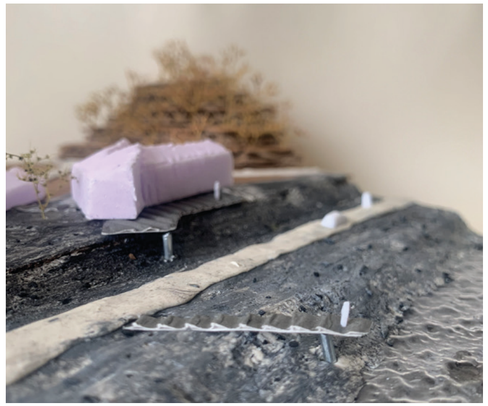


Rock Creek Memorial Lake

The main entrance to the Landscape Memorial Park will be around the slurry impoundment that will be renamed the Rock Creek Memorial Lake. Currently looking for industrial development, the site of the former coal headquarters can be transformed into a community centre with great views of the lake. The parallel wings of the building resemble the Appalachian mountains and are oriented in a way to have different perspectives in observing the future transformations of the lake.
The central building is easily accessible to the large public that cannot explore the larger mined landscape. The high density of coal-related infrastructure and most spectacular landscape features can be easily visited in one day. Therfore this location would be perfect to start with when constructing the memorial park. Surrounding the building will be experimented with various phytoremediation techniques to show the public. It will also be a gathering place from where excursions and group activities for maintaining the landscape will start. From the main parking lot, people can transfer from car to walking or biking to enjoy the surrounding trails and viewpoints.

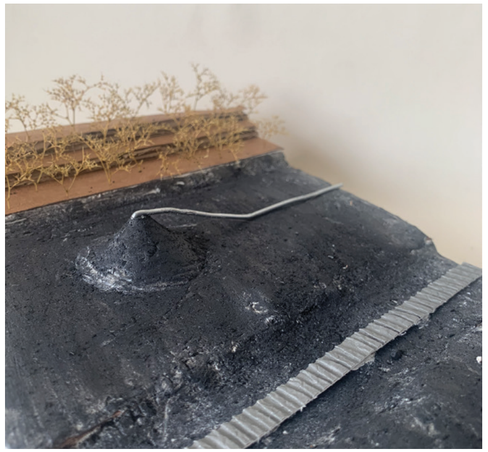
1-Memorial Community Centre
2-Coal Refuse Pile Pathway
3-Viewpoint
4-treatment pond
5-Parkway

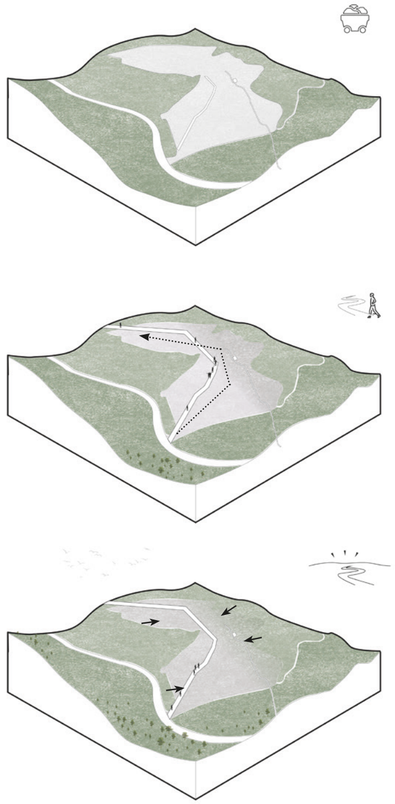




Coal Tip Walkway

A coal tip or coal refuse pile is the place where the dry waste products of the coal washing process are stored. The removal and processing of these piles are often so laborious or expensive that coal companies simply abandon them.
This coal tip at the Hobet-site has been there since the beginning of the operation and will likely stay there for the foreseeable future. By introducing an elevated path, visitors can experience this characteristic moonlike landscape from a safe place. Until plans are made for the cleanup of the waste, natural succession will slowly take over and cover the black mounts. The temporary pathway is designed to be easily removed and repurposed when needed.





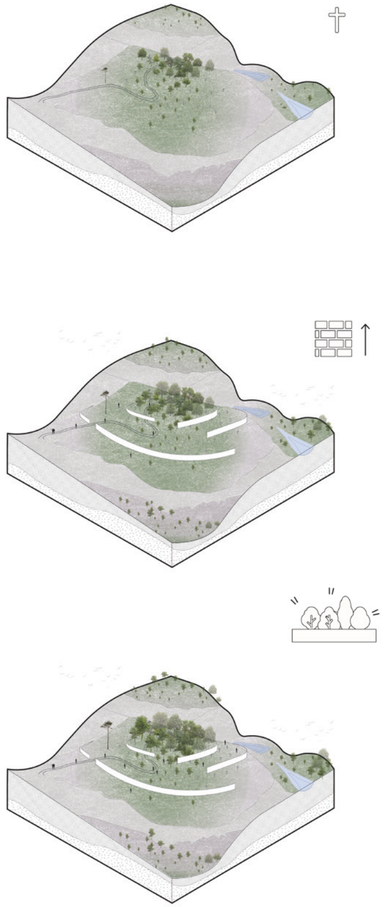


Berry's Branch Cemetery

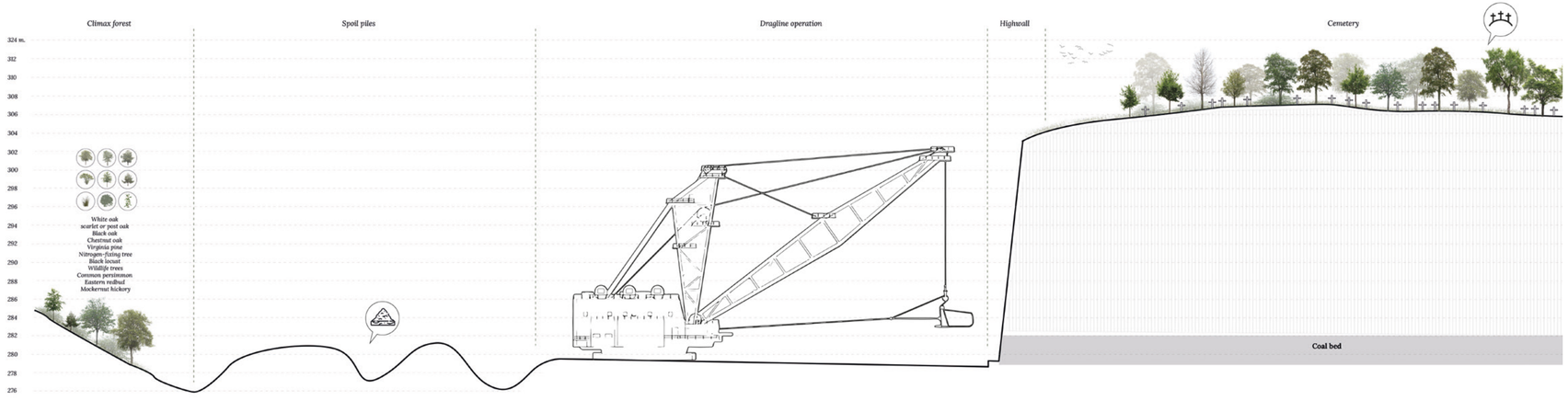
This cemetery is a symbol, like many other family graves in Appalachia, of the people's resistance against the coal mines. Although the cemetery was spared from being excavated, visitors needed to arrange an appointment with the coal company, follow safety instructions and be accompanied by someone to access the place. After all this time, the cemetery deserves a proper entrance, made of gabion walls that reuse the rubble found on site. The walls cut into the re-contoured hill to resemble and remember the high wall that was once created to access the coal. From the trailhead, visitors will first cross a couple of reclaimed hills to reach the final top from where a viewpoint will introduce the site itself. Marking the contours of the cemetery's historical excavation, an additional layer of remembrance is added. This place literally connects traditional grieving of lost ones with grief about the surrounding mined landscape.

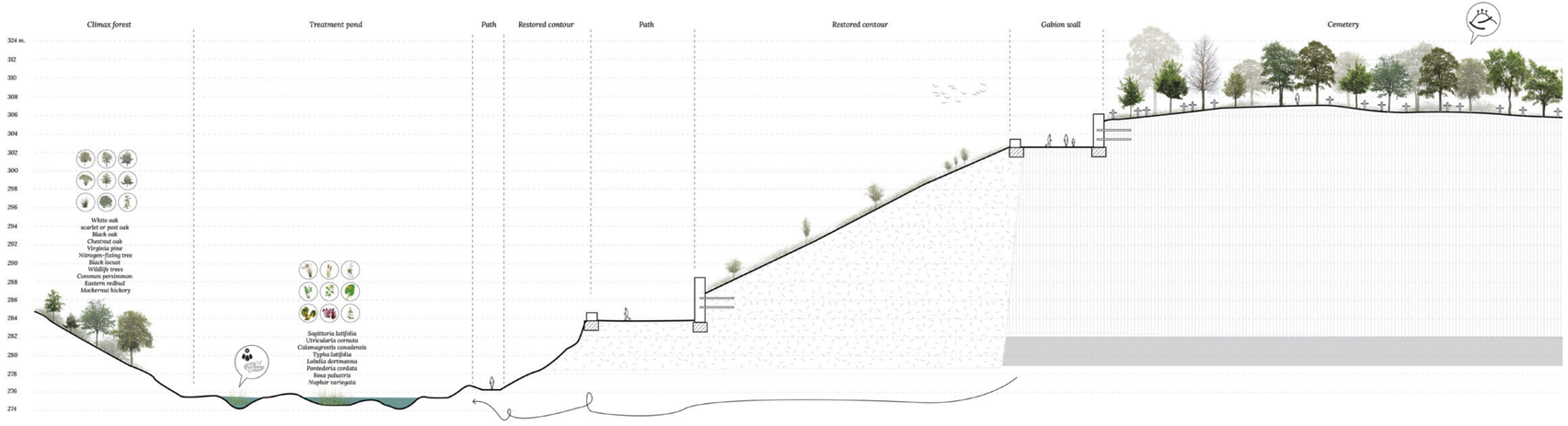


1-Cemetery
2-new formal entrance
3-serviced haulroad
4-treatment pond
5-approach and viewpoint





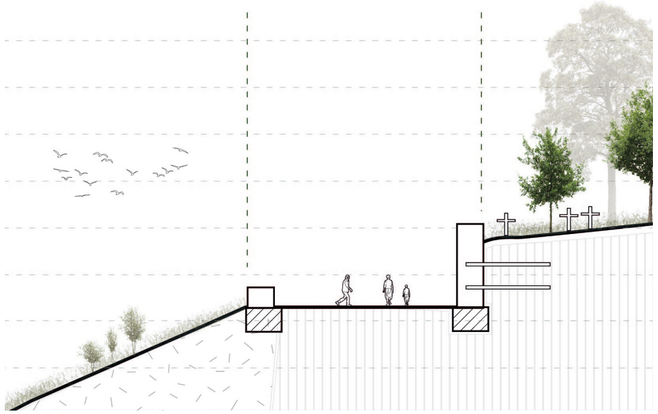

Climax forest
Spoil piles
Dragline operation
Highwall
Cemetery
324 m.
322
320
308
306
304
302
300
298
296
294
292
290
288
286
284
282
280
278
276
White oak
scarlet or pest oak
Black oak
Chestnut oak
Virginia pine
Nitrogen-fixing tree
Black locust
Wildlife trees
Common persimmon
Eastern redbud
Mockernut hickory
Coal bed


Climax forest
Treatment pond
Path
Restored contour
Path
Restored contour
Gabion wall
Cemetery
324 m.
322
320
308
306
304
302
300
298
296
294
292
290
288
286
284
282
280
278
276
274
White oak
scarlet or pest oak
Black oak
Chestnut oak
Virginia pine
Nitrogen-fixing tree
Black locust
Wildlife trees
Common persimmon
Eastern redbud
Mockernut hickory
Sagittaria latifolia
Utricularia cornuta
Calamagrostis canadensis
Typha latifolia
Lobelia dortmanna
Pontederia cordata
Rosa palustris
Nuphar variegata



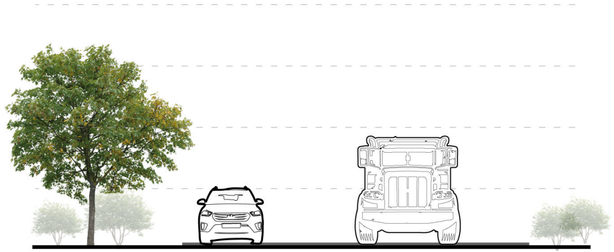


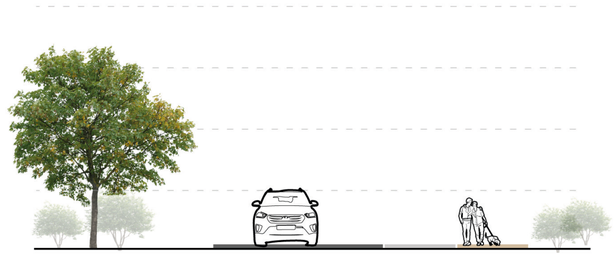
Monument of Resistance



The choice to monumentalise the cemetery is unlike some of the other interventions not to show the permanent impact of mining on the landscape, but to show its resilience. Instead of hiding the impact by recontouring of the slopes around the hill, a visual connection to the former highwall is restored in some places to act as a clue to what happened at this place during the mine operation. Gabion walls will support the weight of the slope trough ankoring them in the sand. The texture of the rocks resembles the sandstone that used to be exposed her during the mining.

Haulroad Transformation







1. Open-Access

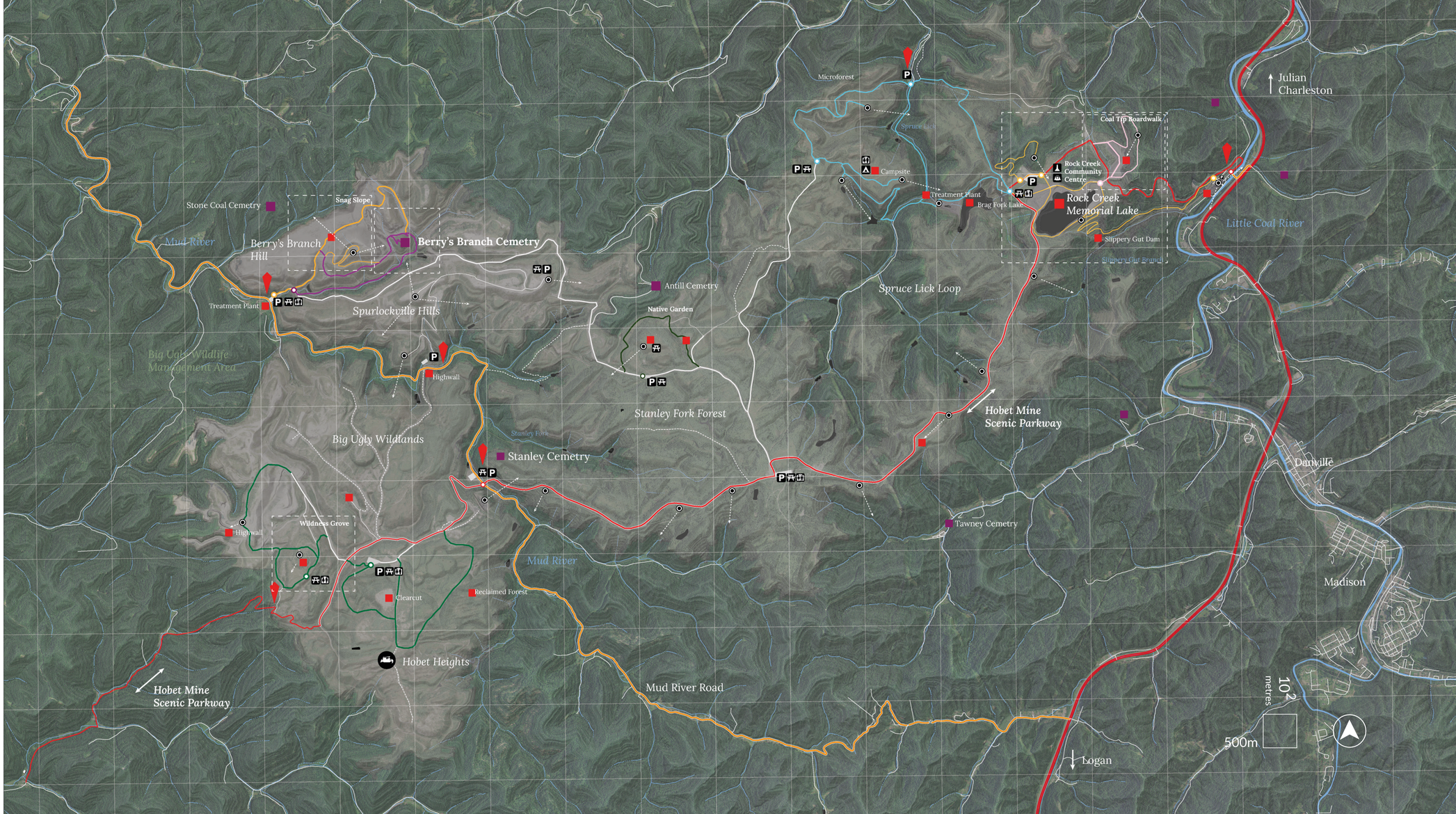
Accessibility

- Memorial
- Community Centre
- Parking / Trailhead
- Rest Area
- Comfort Area
- Campsite

- Parkway
- Main Access Roads
- Serviced Haulroad
- Decommissioned Haulroad
- Trail
- Road
- River / Stream

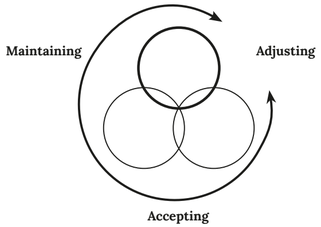
- Invasive Species
- Water
- Erosion
- Cemetery
- Reforestation
- Polution
- Coal

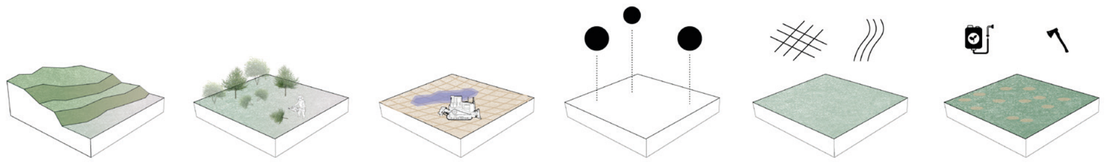
- Point of Interest
- Viewpoint
- Vista



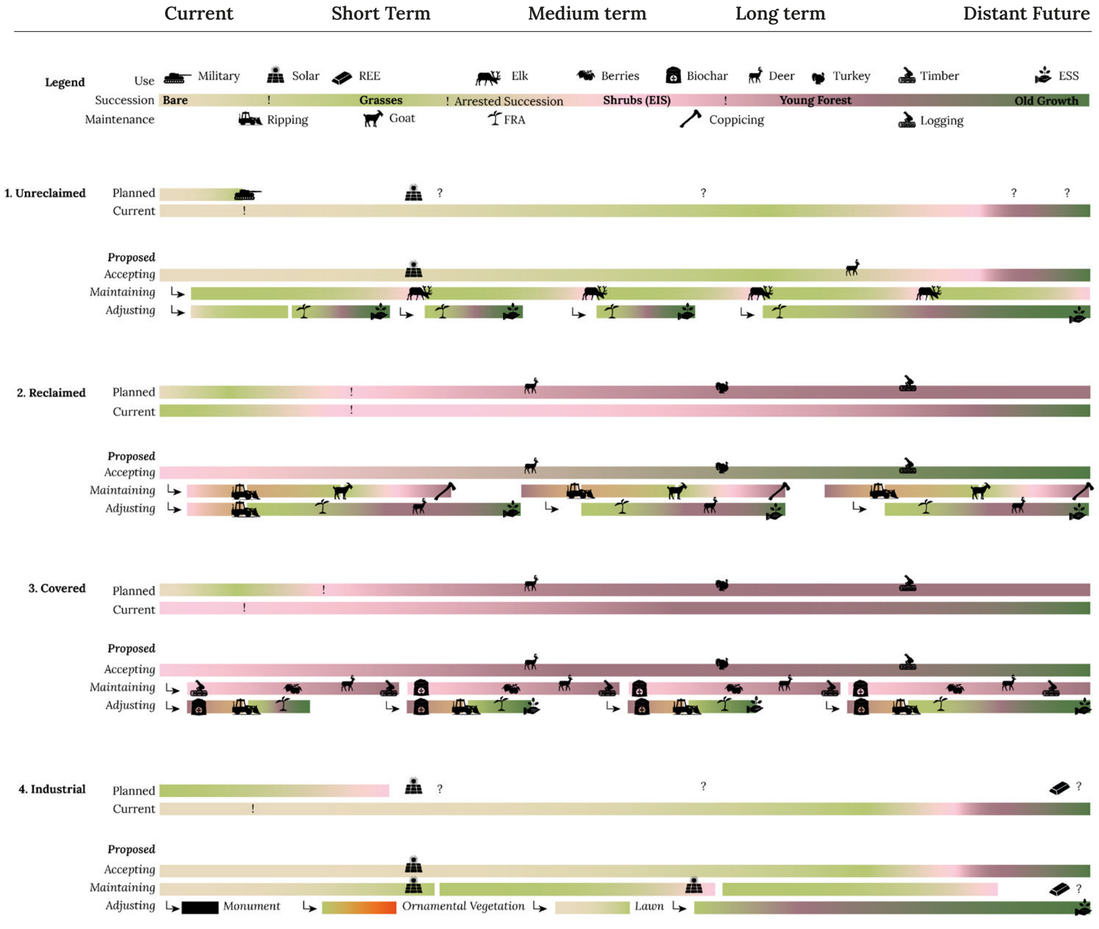
2 . Open-ended: Differentiated Management

Derived from the landscape analysis, roughly four different conditions were found independent of their destined post-mine land use planning or permit status. By looking at the stages of succession there are different ways of restoring a stable climax ecosystem. The only question is in what time period, and what methods are required to do so. In many cases, the forestry reclamation approach will do the trick in restoring forest land, but deep ripping techniques and large amounts of pesticides to remove EIS are needed. On this scale it would be again so disruptive and expensive that other options are prefered. By using a similar approach as the FRA, but focussing on the spatial qualities and present possibilities of low maintenance, low budget and profitable measures (see below) we can analyse each sector and develop new management strategies to slowly transform the landscape to a more attractive and productive version of its current paralysed state. By setting realistic short term goals, the long term goal of reclaiming the landscape becomes feasible again (next page).



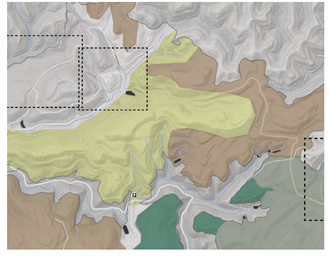


Typical Landforms | Site Assessment | Site Preparation | Species Selection | Planting Method | Management

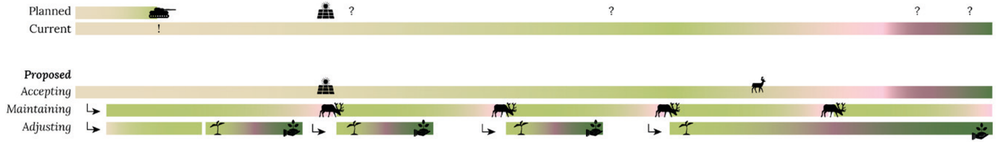


2.1 Unreclaimed and Bare slopes

The unreclaimed hills and steep slopes are curretnly used for military training. Too steep for practical use other than temporary solar energy, the hills are best restored to natural forest before invasive species take over. Meanwhile, spectacular erosion patterns and wildlife can be observed. Commonly, hydroseeding annual rye grass or meadow mix is used to prevent erosion. On the short term hydroseeding is effective for large areas and can be followed up by planting smaller sections of trees along the countours. Alternatively, on the medium term, elk or other big grazers can be introduced to maintain the grass and prevent EIS to establish before trees can be planted properly. Additionally, they will fertilize the soil and provide the option to organise safari's or sell hunting licenses.

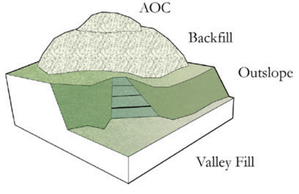


Phasing





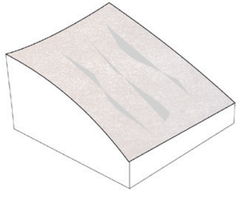
Loose grading



Restored contours



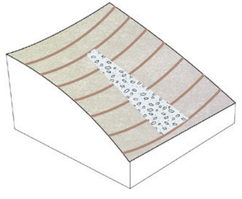
Elk



Erosion risk



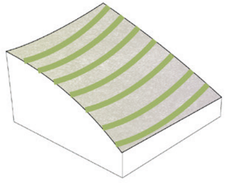
Hydroseeding



Erosion Control



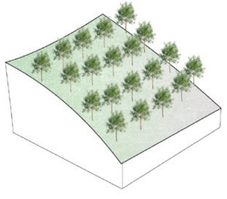
Annual Rye Grass



Non competing groundcover



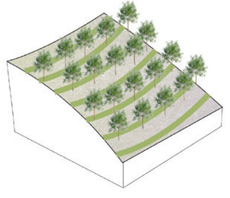
Volunteer planting



Follow Contours

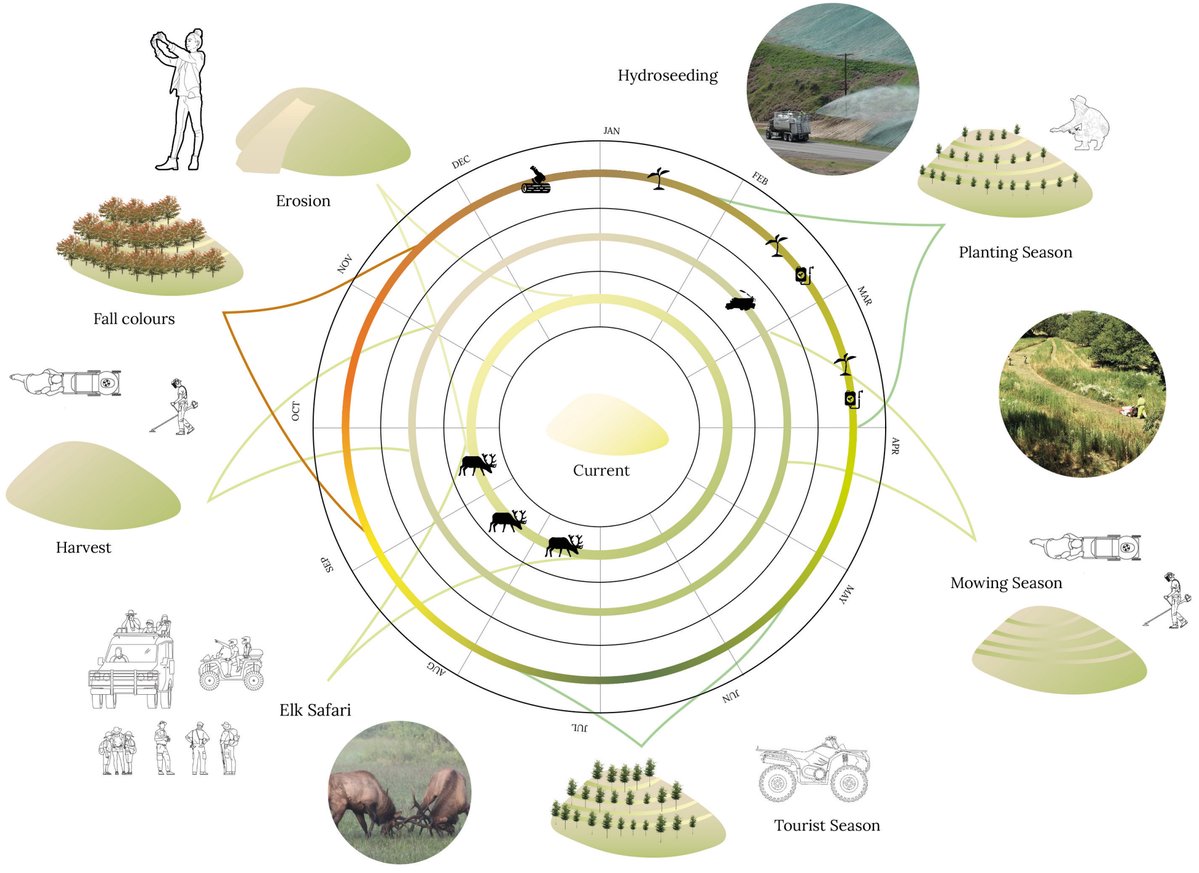


Alternate strip cropping

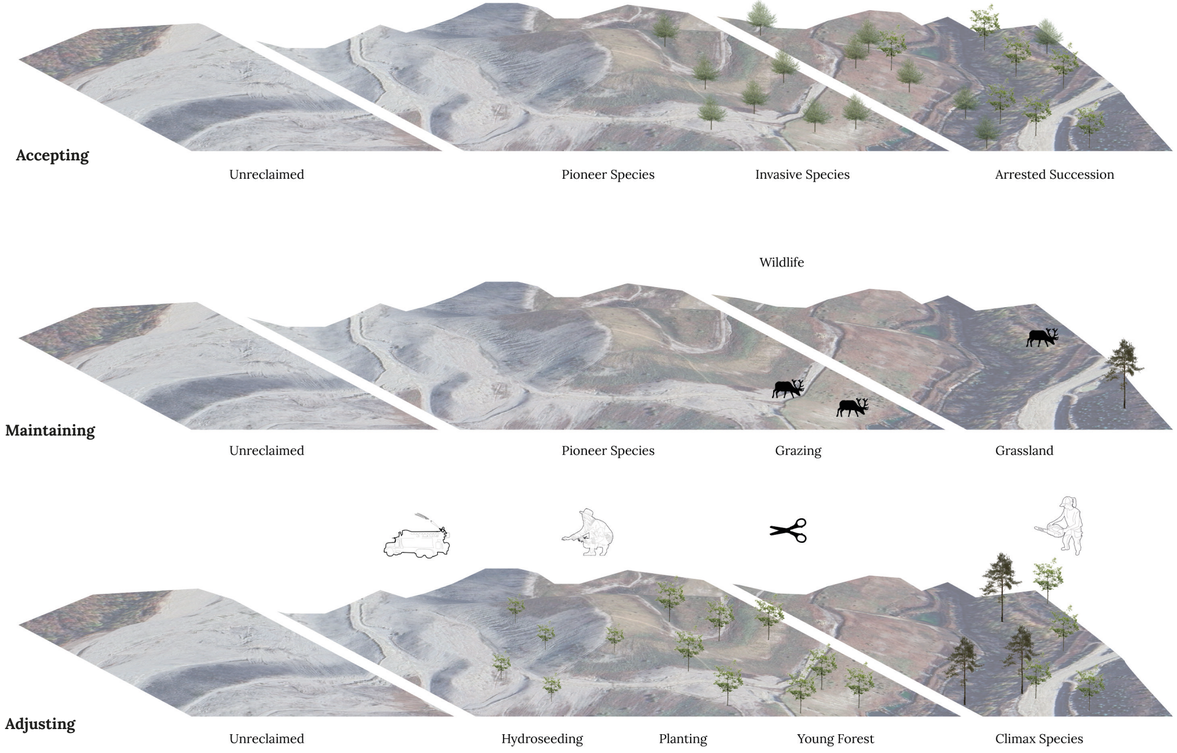


Contour mowing

Seasonal Activities and Experiences



Composition

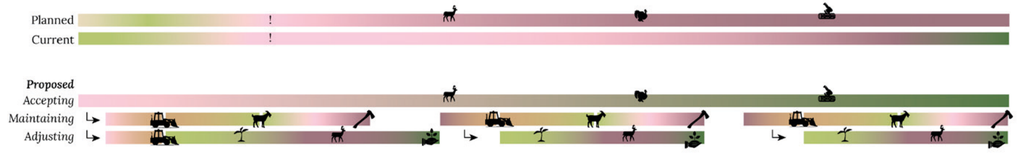


2.2 Partially Reclaimed and Arrested Succession

The more flat and recently reclaimed areas are very suitable for deep ripping and reforrestation. However, the patches of EIS altered with grasslands and native forest also create diversity that can be utilised to create better conditions for both wildlife and human benefit. Open and flat parts are best ripped in larger sections before EIS are too dominant. Top soil containing EIS seeds are pushed on windrows to be treated locally with herbicide or fire. When ripped, high density adaptive grazing with goats in small, regularly moving paddocks will prevent new EIS to grow back while fertilizing the soil and providing jobs. On the long term, sections of native forest and wetlands can be restored to create a more biodiverse, half-open landscape that supports wildife and provide ecosystem services.



Phasing





0-30% 30-40%

Deep ripping possiblities



July-Oct



Deep ripping altered with adaptive grazing
100m2 sections
Constructed wetlands



Groundcover *Wildlife Species* *Crop Species*

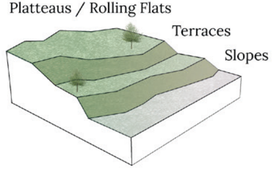


Volunteer planting

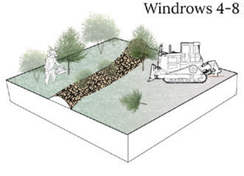
Plant on Rip Crossing
600-700 per Acre



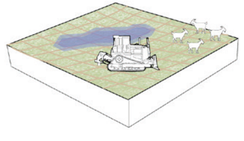
Grazing, Clearing, Afforestation



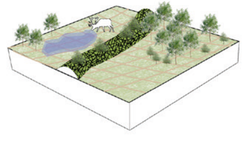
Terraces



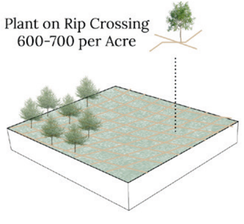
Deep tilling



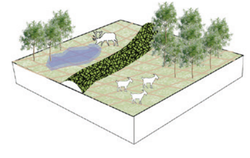
Prepare the soil



Mixed Native Species

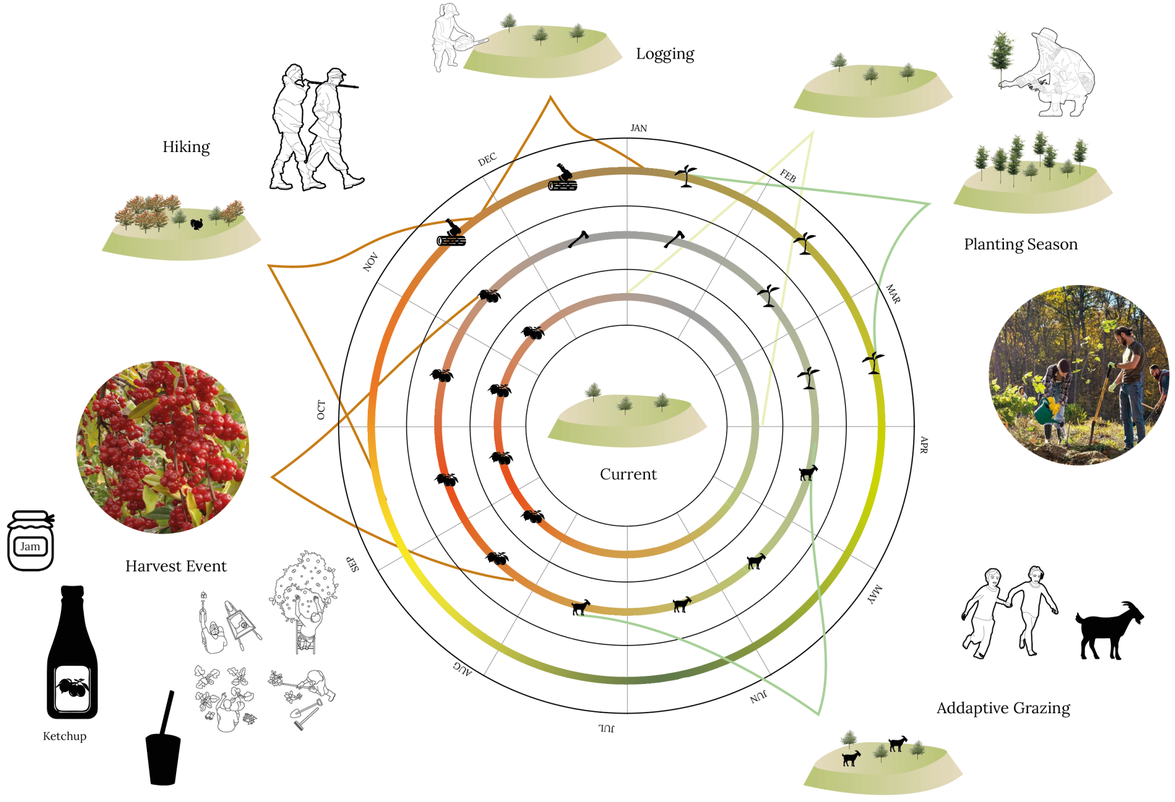


Start with Easiest Patches

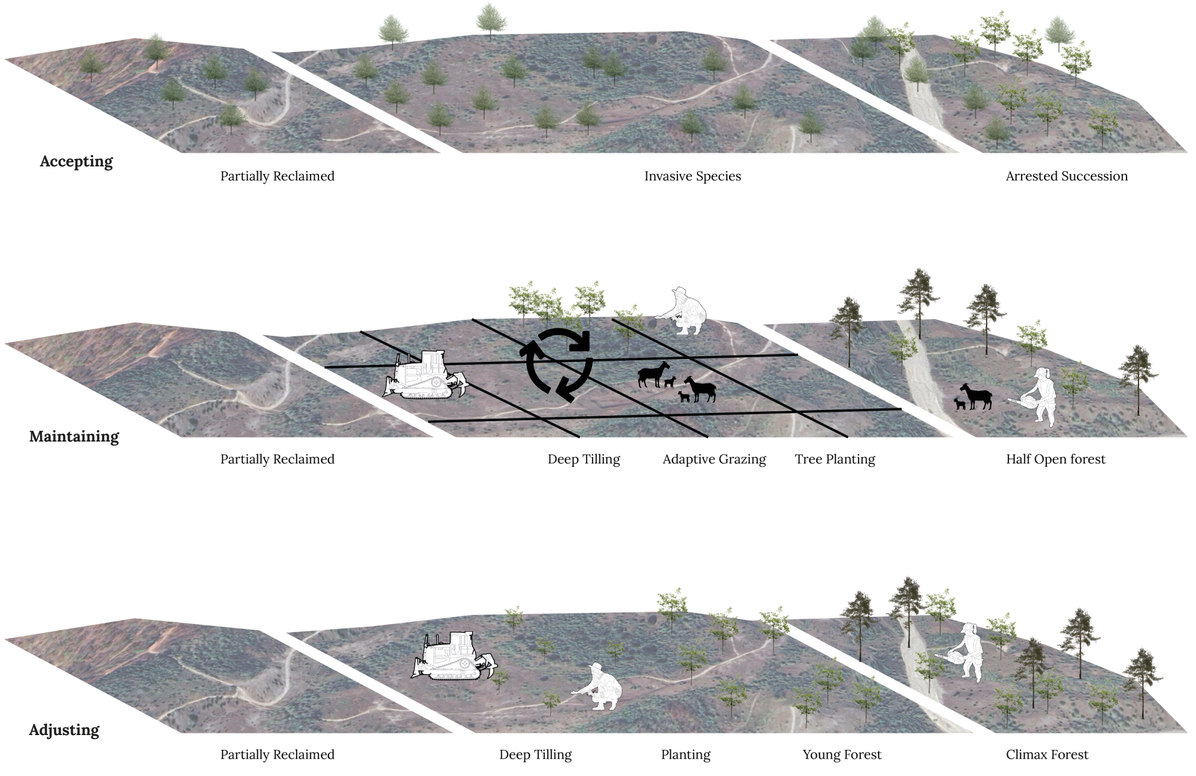


Differentiated Management

Seasonal Activities and Experience



Composition

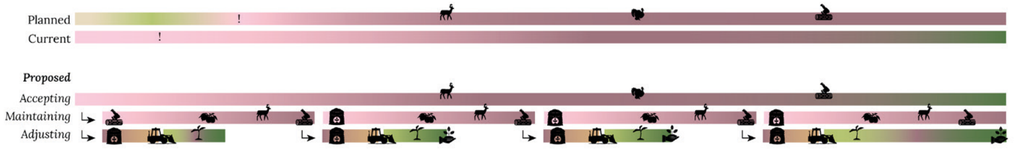


2.3 Overgrown and Succesfully Reclaimed

The places where forests are already developing or where the EIS are so dense ripping and pesticide us would be too destructive, short term profit can be made from harvesting these unwanted crops on a large scale. Robinia is a fast growing hardwood that can be coppiced and cut for multiple products. Autumn Olive berries can be picked to prevent seeding, but also to make products with. When small sections are harvested, remains can be turned into biochar to improve soil quality and create a fresh base for new forest to develop. By planting small sections in very high density, trees will grow faster in their search for light and prevent EIS to establish.



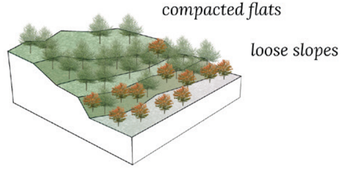
Phasing





mostly EIS

mostly native



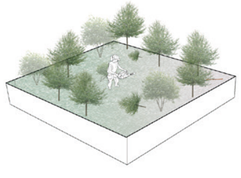
compacted flats

loose slopes

Older reclaimed Terraces



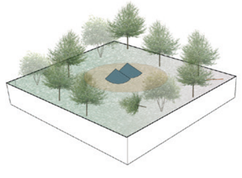
Harvest berries and burn brushpiles



Hand clear small patches



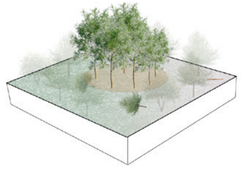
Deep ripping followed by adaptive grazing
small patches
apply biochar



Soil improvement



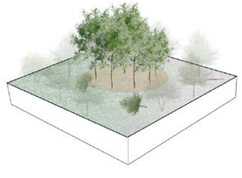
Larger Self seeding Trees



Strong Native Trees and Shrubs



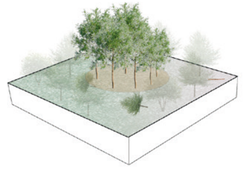
Densely planted
small patches



Miyawaki Method

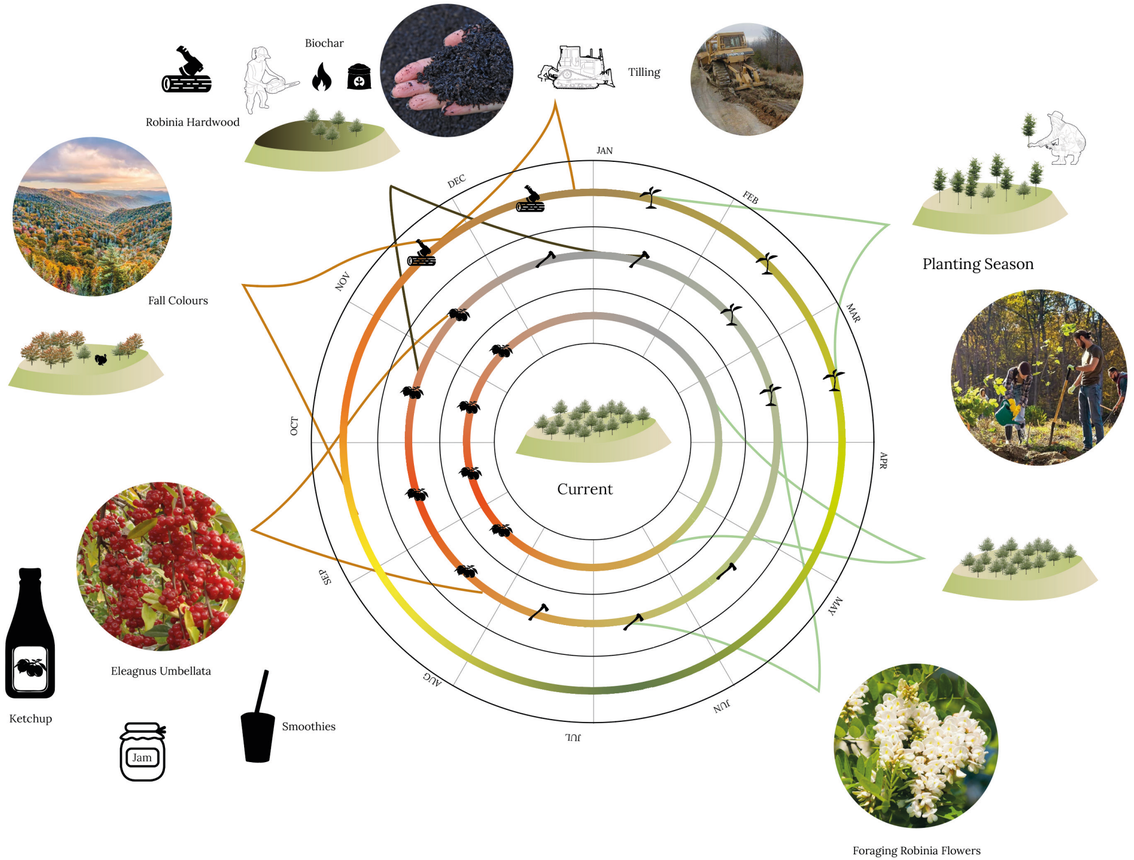


Harvest EIS, selective weeding

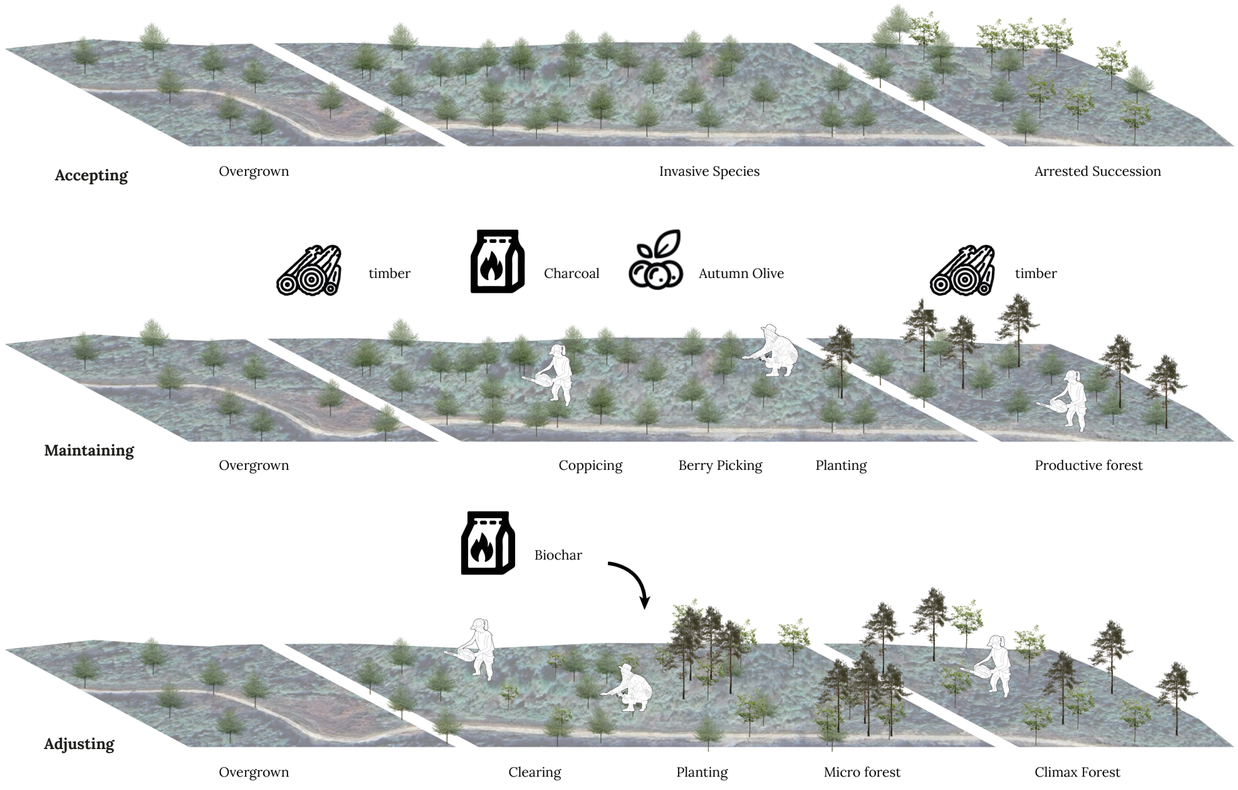


Selective Thinning

Seasonal Activities and Experience



Composition



2 . Open Ended

Conditions+Method

- Platteaus - Deep tilling + FRA
- Unreclaimed Mounts - Annual Rye Grass + FRA
- Dense woodlands - Manually remove EIS + FRA
- Steep Reclaimed Hills - FRA

Zoning
I-Bare Mounts

II-Partially Reclamaimed + Arrested Succession

III-Covered and Arrested Succession

IV-Industrial Complex

Strategy
I-Accepting

II-Adjusting

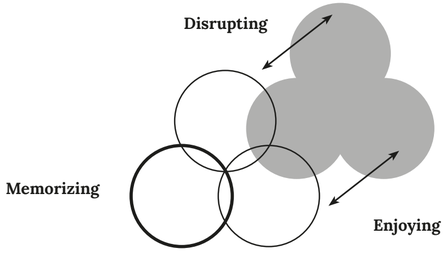
III-Maintaining

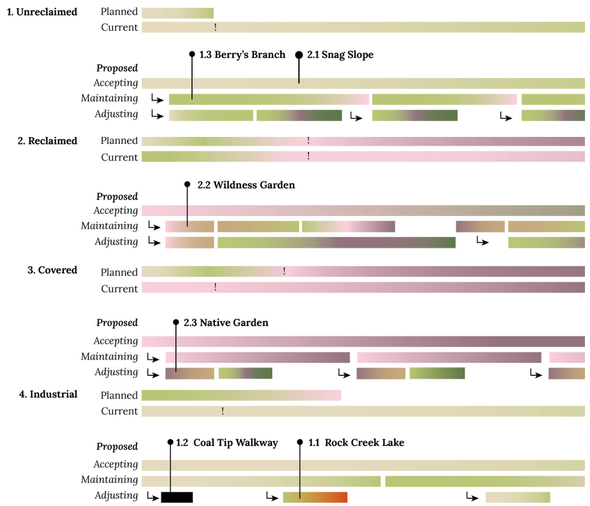
IV-Maintaining



3. Open-minded Memorable Places

Related to the third strategy, three more proposals for monument gardens related to the ecological transformation of the landscape are made (next page). These are, unlike the others, not merely designed to disclose and remember the current landscape features, but are part of the larger evolving context. They are designed to respond in a paradoxical way to the changing landscape around them to show different perspectives and narratives around reclamation.



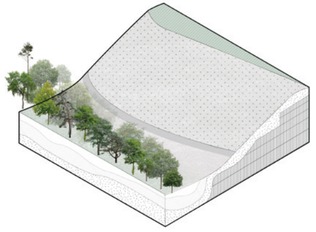


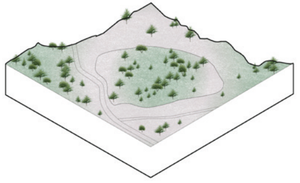
Monuments of the Mined Landscape - Part 2

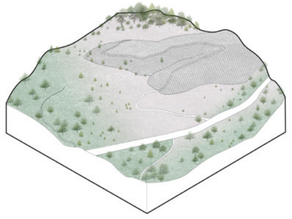












2.1 Snag Slope

These bare hills are prone to erosion. Beautiful water patterns shape the sand but limit plant growth. The contrast with the native forest cannot be bigger in this location.

2.2 Wildness Garden

This recently mined location is marked by a dense part of invasive vegetation amongst open patches of arrested succession.

2.3 Native Garden

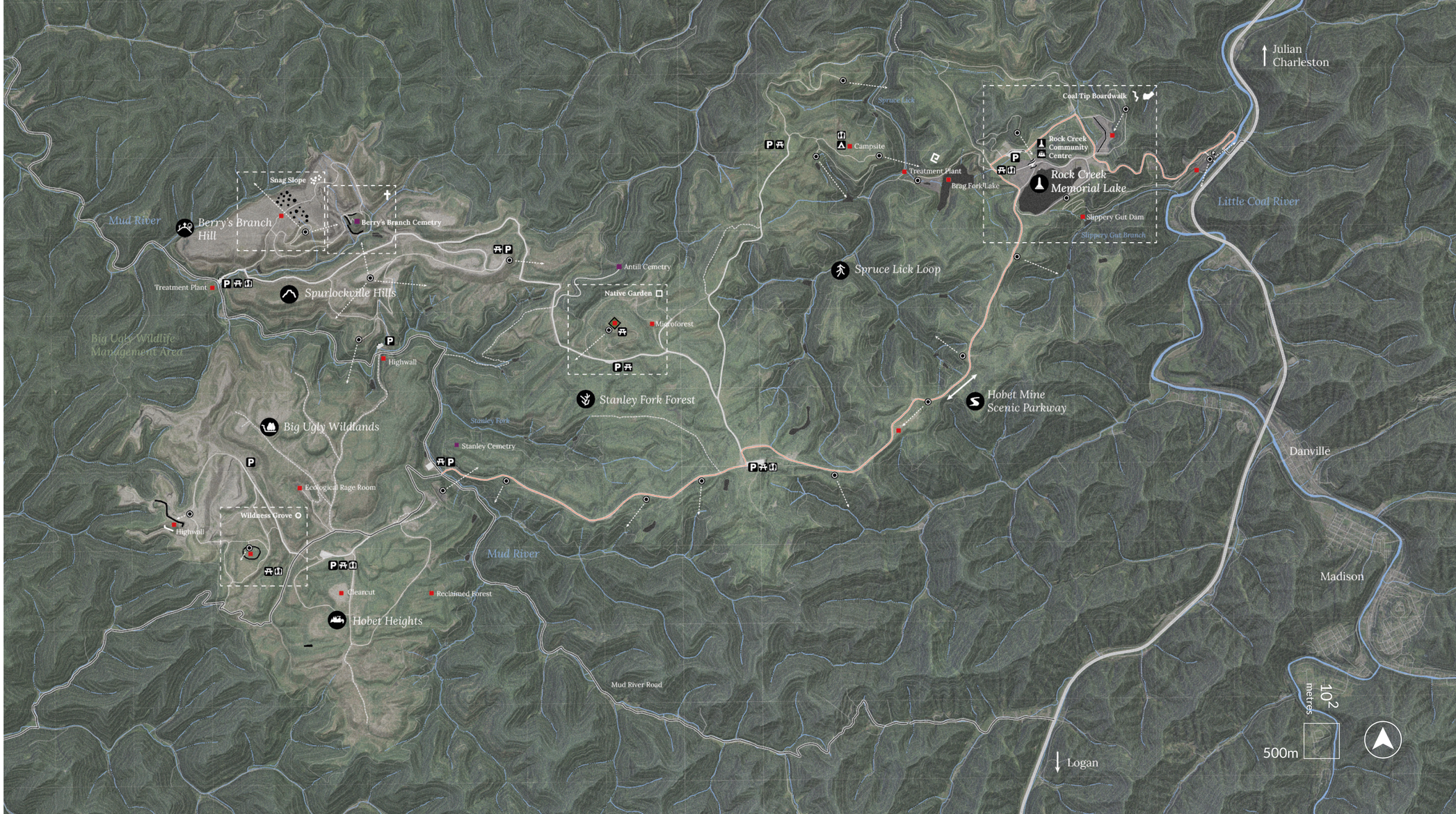
Raclaimed hill formation besides the haulroad in the middle of a large rangeland covered in EIS.

3. Open-Minded

Monuments

- Snag Slope
- Berry's Branch Cemetry
- Native Garden
- Wilderness Garden
- Rock Creek Memorial Lake
- Bragg Fork Dam
- Coal Tip Boardwalk
- Highwall

- Point of Interest
- Viewpoint
- Vista

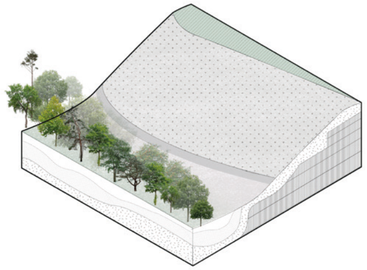


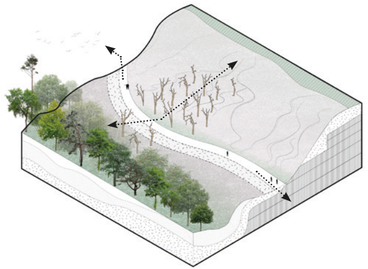
Disrupting - Snag Slope

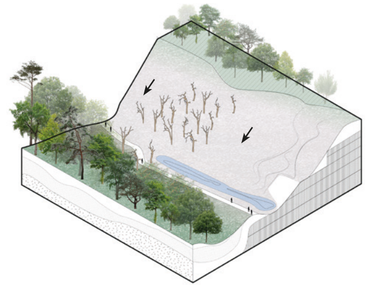
Linking to the opposite native forest and the logging prior to MTR, a series of dead tree trunks or 'snags' are placed on the slope to intervene the erosion process. They act as a Fremkorper, or alien element, catalysing and interupting the erosion and succession processes. Over time the trees will hold back sediment and allow grasses and seeds from the surroundings to establish and eventually real forest will grow back. Meanwhile, wildflowers and the dead wood provides a corridor for insects migrating across the hills. Visitors will have a disrupting experience seeing the stark contrast between lush forest and roughly degraded slopes.



1-Wilderness Garden
2-Picknick Area
3-Ripped and Reforested Landscape
4-Windrows
5-Constructed Wetlands

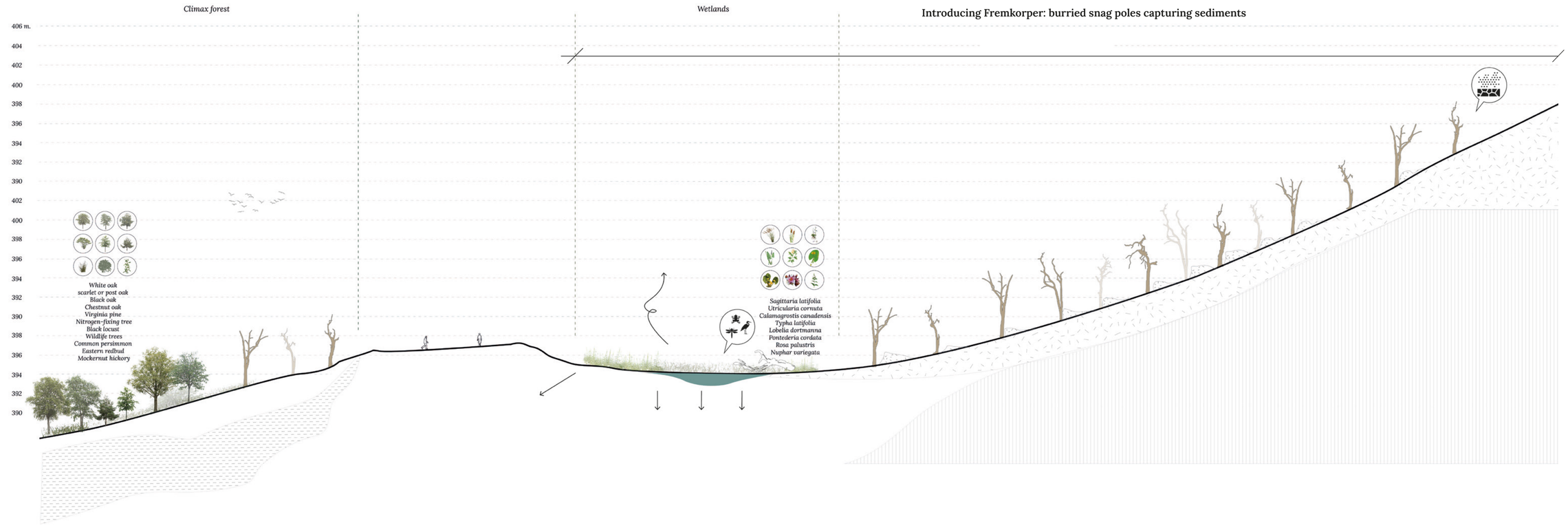


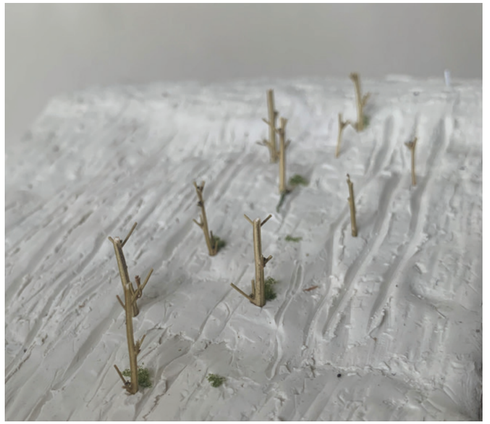


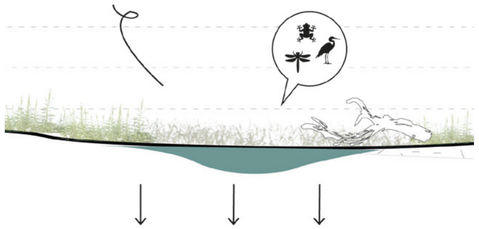




Interventions and Context

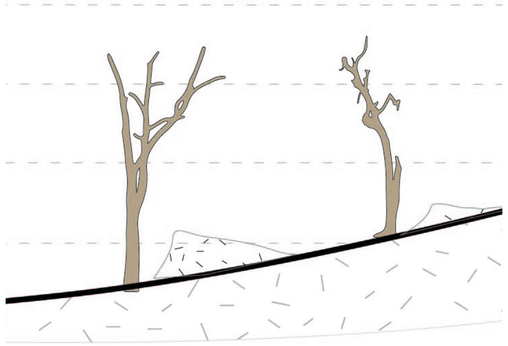






eroded wetlands



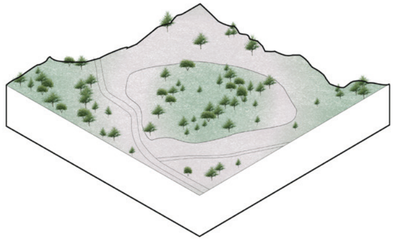


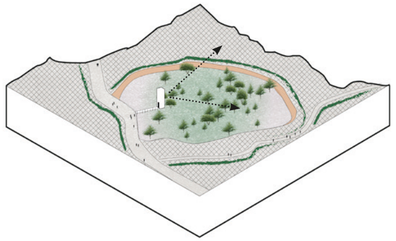
Fremdkorper capturing sediments and voluntary vegetation

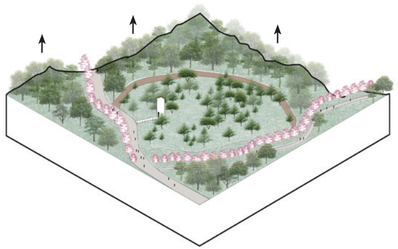
Memorizing - Wilderness Garden

While reclaiming the most accessible, open, flat lands, one large circular patch will be saved. It will highlight the different speeds with which reforested lands using the FRA, and the 'natural' succession will grow back a stable forest ecosystem. A viewtower central to the Autumn olives gives visitors overview on what will become a opening in the taller surrounding forest. In the meantime, it gives visitors to think about what true 'nature' means. Is it replanting native species? Or allowing non-native volunteer species to freely develop? By 'protecting' the unwanted, this garden offers new perspectives on the surrounding landscape and reclamation methods used.



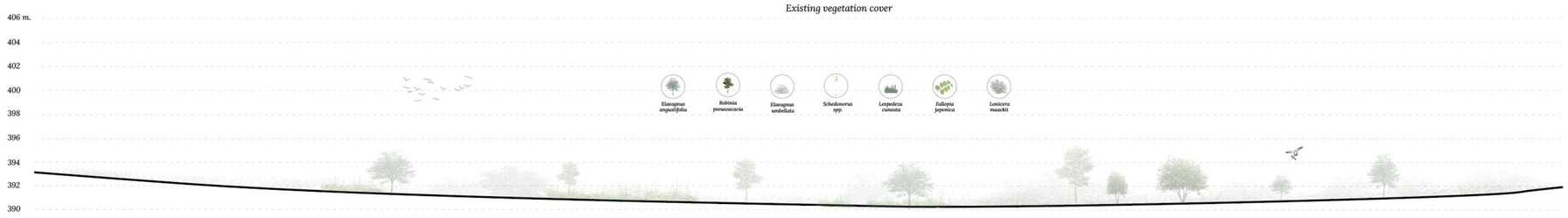


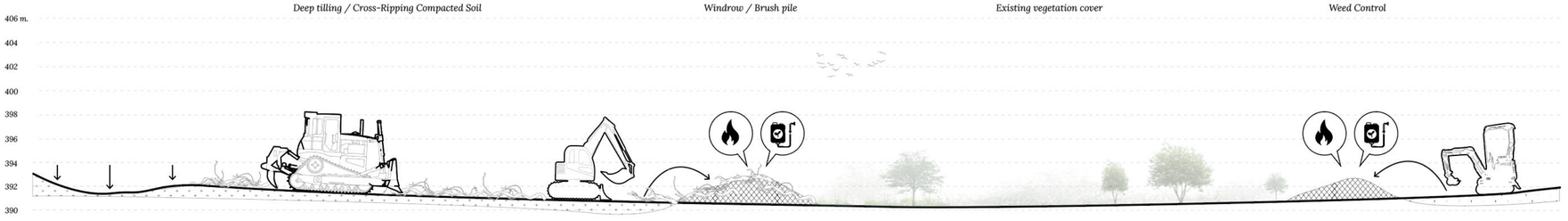


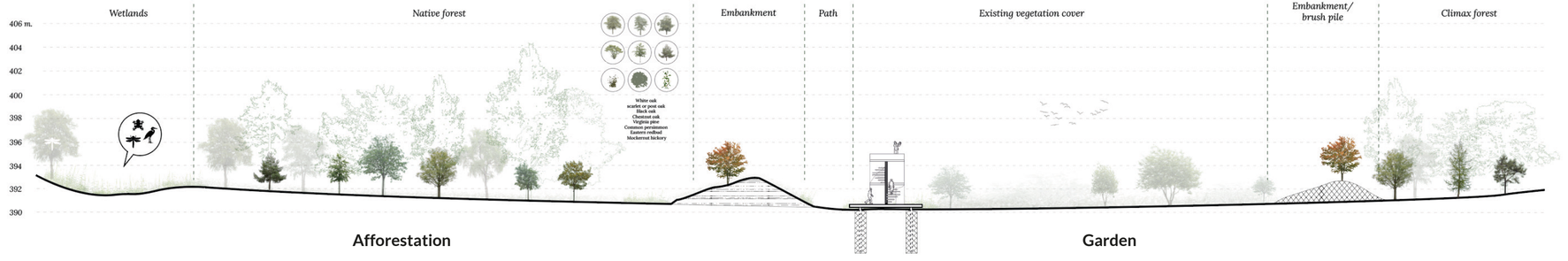


1-Wilderness Garden
2-Picknick Area
3-Ripped and Reforested Landscape
4-Windrows
5-Constructed Wetlands









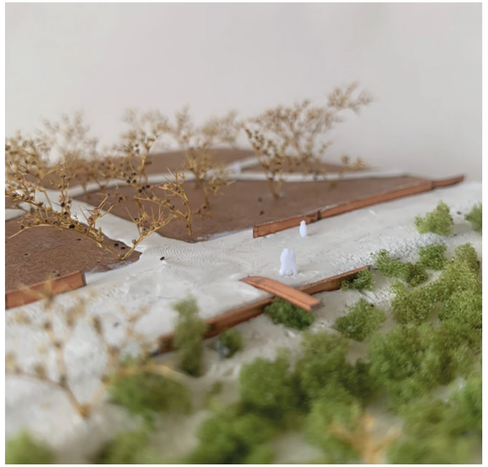
Interventions and Context

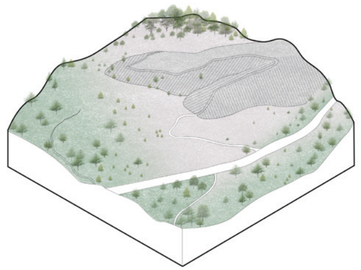
Starting by ripping the existing vegetation and shoving them together with the seed baring topsoil layer onto windrows, or brush piles, the exotic invasive species will be reduced and allowing new trees to be planted successfully. The brushpiles can be either treated by herbicide or fire, depending on the season. Or they can be left untreated to create distinctive embankment features in the landscape that contrast the ripped land and young trees.
While ripping, wetlands are created in wet areas and compacted grounds to allow proper drainage and hold sediments and polution. The brushpiles are also positioned in a way along the contours of the site to prevent erosion and leaking of chemicals. The garden itself will not be ripped, but accentuated by a big circular embankment with Acer rubrum planted on afterwards. They mark the edge between the 'old' and the 'new'. The garden itself will not have paths, but a central viewing tower high enough so watch over most of the shrubs and see the surrounding landscape evolve over time.

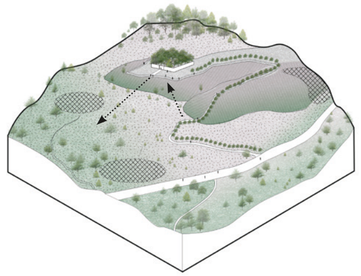


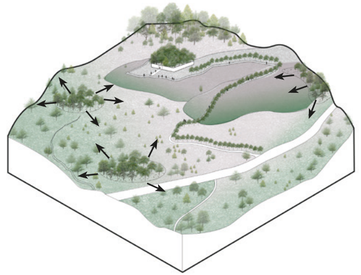
Enjoying - Native Garden

Towering above the Autumn Olive fields, a walled garden with a collection of native species will be made. It could highlight the rich biodiversity of the Appalachian forest amidst the monotonous reclaimed landscape. Corton steel walls give a sense of protection and intimacy in this rough landscape. A viewpoint outside the garden lets visitors look-out and observe the different types of vegetation.



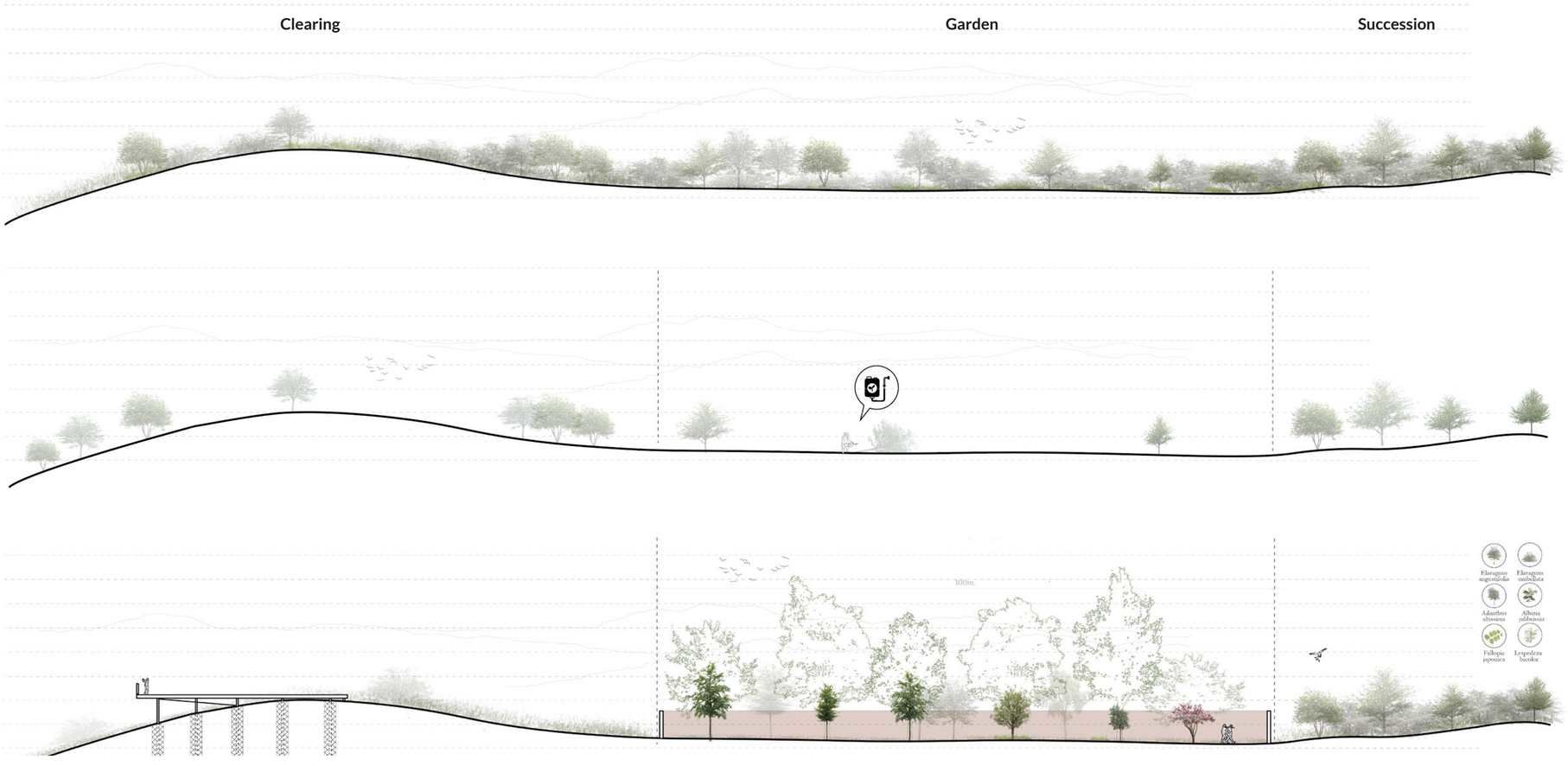






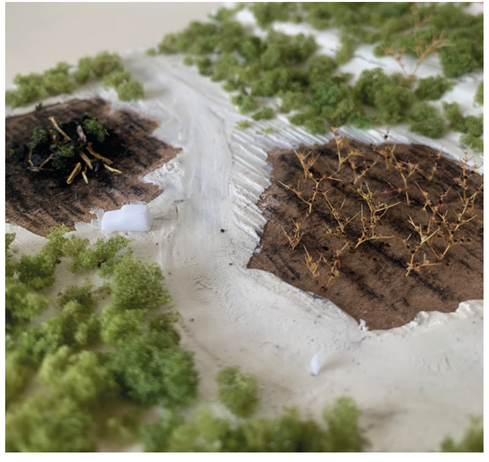
1-Native Botanical Garden
2-Approach
3-Native Forest
4-Planted Micro Forest
5-Trailhead





Interventions and Context

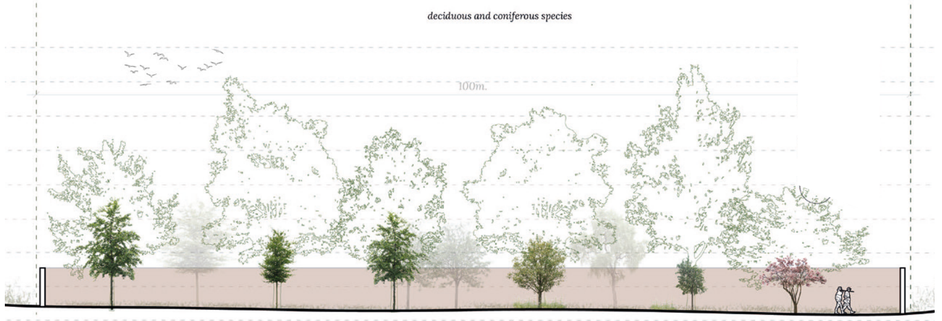
Dense vegetation is removed in smaller sections by hand. Later, the soil is ripped and fertilised to sustain the native species planted in the garden. Similar to a botanical garden, a selection of species representative of the wider Appalachian mountains will be picked and planted. The invasive species surrounding the garden can be slowly harvested for timber or biochar production. Biochar and organic waste can be used to fertilize the garden or other areas in the mine. Additionally it will hold moisture and absorb pollution.





Enclosed Garden

deciduous and coniferous species



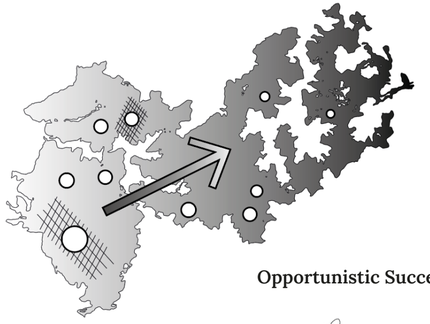


White oak	*Sugar Maple*
scarlet or post oak	*White Ash*
Black oak	*Basswood*
Chestnut oak	*American Beech*
Virginia pine	*Red Maple*
Nitrogen-fixing tree	*Yellow Birch*
Black locust	*Black Cherry*
Wildlife trees	*Ironwood*
Common persimmon	*Butternut*
Eastern redbud	*Hemlock*
Mockernut hickory	*White Pine*

ıis intervention is about the suggestion for a walled native ırden, botanical garden, or 'Heempark' like feature within the ine. The context in which this garden is placed will highlight the ıiqueness and biodiversity of the Appalachian forests even more. ıe wall emphasises this even more by creating also a physical ırrier between the two. A corton steel wall is placed to frame the ırden and make it stand out from a far distance. Its location on ıp of the hill, offers great views from the viewing platform.

Ecological Action

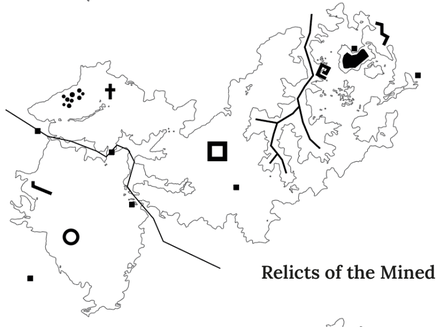
-Accepting and appreciation for the current conditions
-Managing and harvesting to reduce EIS
-Start afforrestation where it is the easiest
-Small patches and slow progress
-Community involvement



Opportunistic Succession

Memorative Places

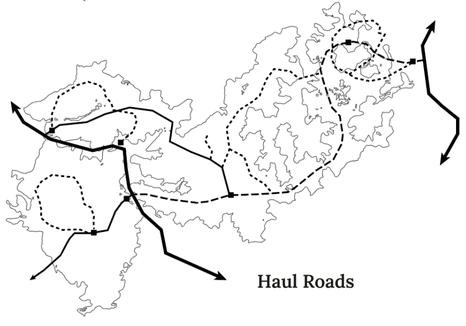
-Rock Creek Memorial Lake
-Coal Tip Boardwalk
-Native Garden
-Berry's Branch Cemetry
-Wilderness Monument
-Snag Slope



Relicts of the Mined Landscape

Interpretive Routing

-Repurpose Haulroads
-Hobet Parkway as a main Spine
-Thematic Trails to the monuments
-New entrances and connections



Haul Roads

Pilot: Multifunctional Memorial Centre

-Starting point for visitors
-Closest to the highway
-Infrastructure ready for building
-Small scale experiment gardens
-Art exhibitions, regular meetings and events



Community Involvement

Spectacular Views and Awe

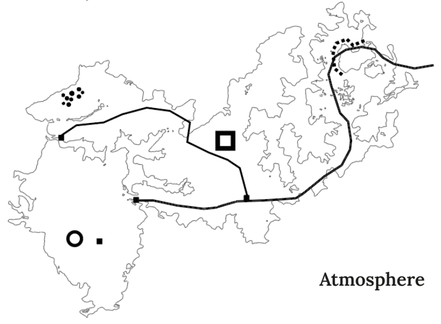
-Outlook and viewpoints
-Industrial heritage sites
-Parkway with stops
-Approach to Monuments



Viewpoints

Accent Planting and Re-use of Materials

-Accentuating roads and monuments
-Repurposing materials
-Contrasting colours and textures
-Seasonal changes



Atmosphere

Overall Plan

Monuments

- Snag Slope
- Berry's Branch Cemetery
- Native Garden
- Wilderness Garden
- Rock Creek Memorial Lake
- Bragg Fork Dam
- Coal Tip Boardwalk
- Highwall

- Point of Interest
- Viewpoint
- Vista

Accessibility

- Memorial
- Community Centre
- Parking / Trailhead
- Rest Area
- Comfort Area
- Campsite

- Parkway
- Main Access Roads
- Serviced Haulroad
- Decommissioned Haulroad
- Trail
- Road
- River / Stream

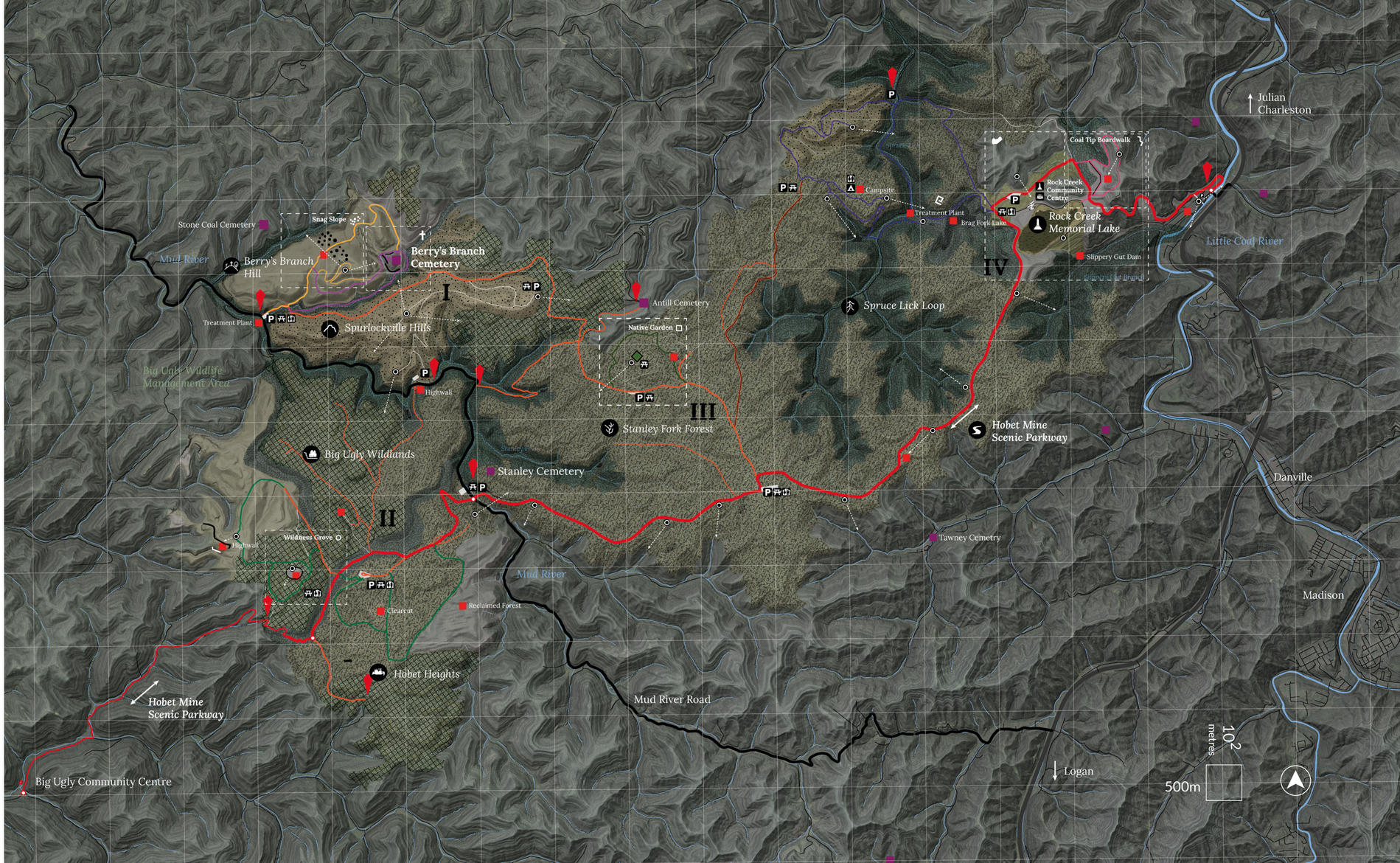
- Invasive Species
- Water
- Erosion
- Cemetery
- Reforestation
- Polution
- Coal

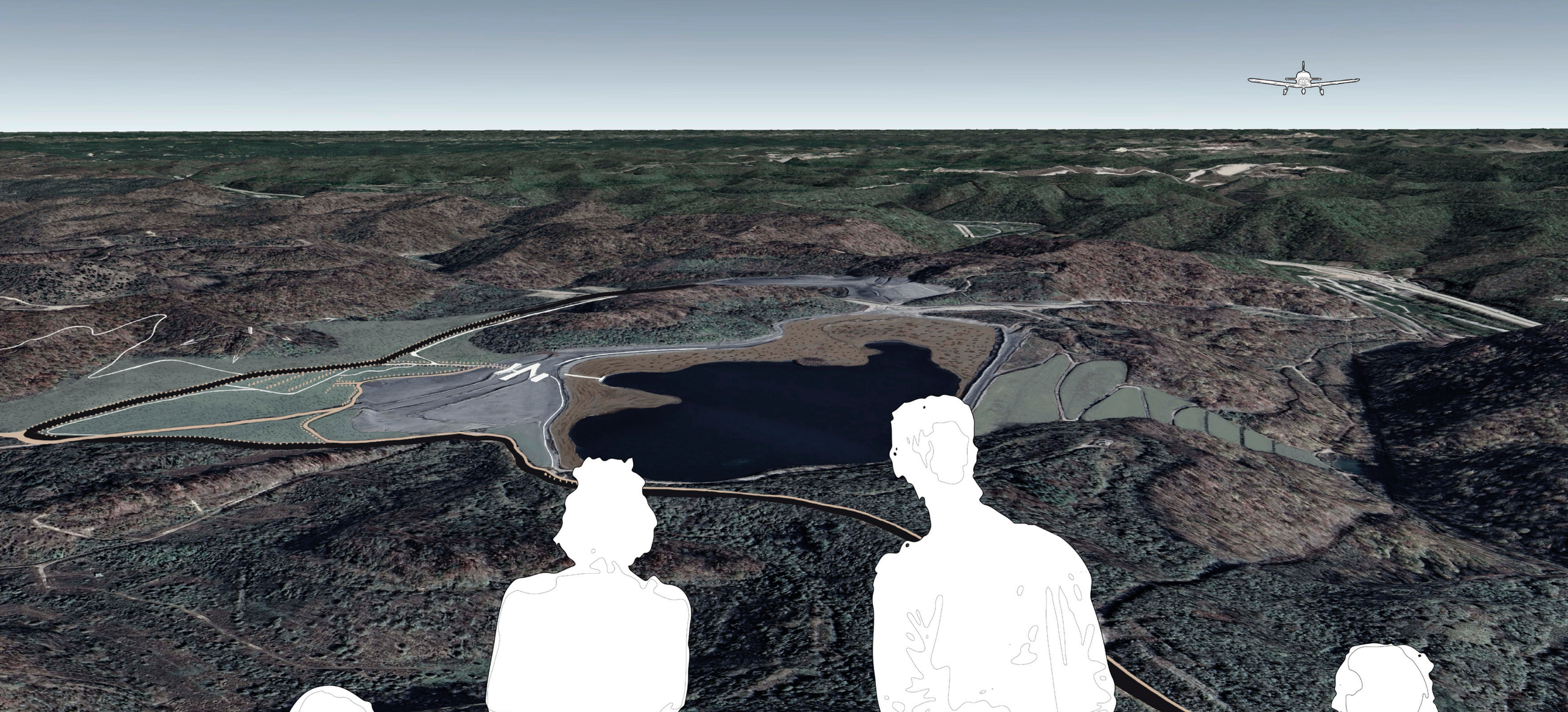
Conditions+Method

- Platteaus - Deep tilling + FRA
- Unreclaimed Mounts - Annual Rye Grass + FRA
- Dense woodlands - Manually remove EIS + FRA
- Steep Reclaimed Hills - FRA

Dominant Strategy

I-Accepting
II-Adjusting
III-Maintaining
IV-Maintaining







07: Conclusion

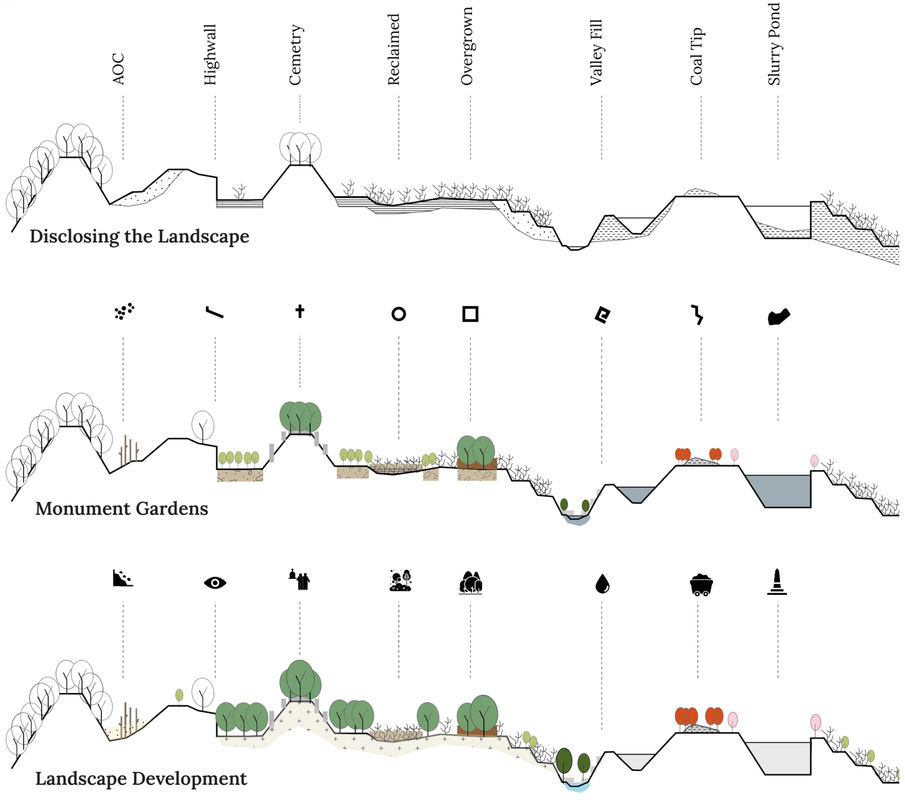
OUTCOMES
REFLECTION
PERSONAL REFLECTION

Valley and Ridge Province
This is often the first landscape people imagine of Appalachia. While it is true that these are the Appalachian mountains, the Appalachian culture is often associated with the coal fields furter west. Can the Appalachian memorial of the mined landscape be a first step into bringing these two extremes, and with it our perception of landscape and nature, closer together?

From: Google Earth, 2023



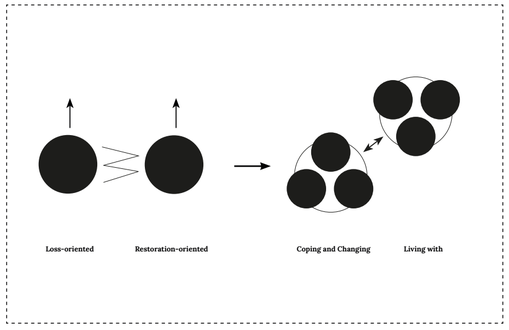
Outcomes



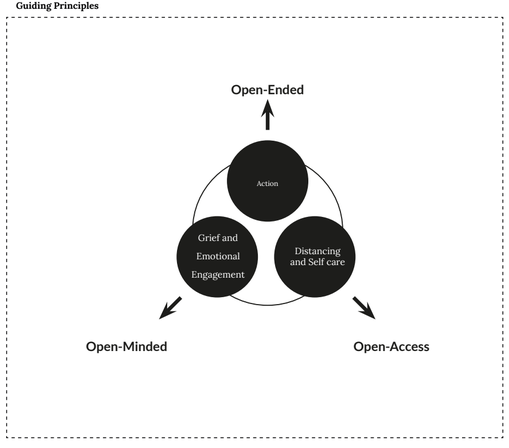
SRQ1 - What means Scale Continuum as a Landscape Architectural Principle in the context of this extraction landscape?

The research explores bridging the vastness of depletion with the human scale through the concept of ecological grief. Analysis of different models for grief concludes that the current narratives around mine reclamation are either focussed on the environmental tragedy of MTR, or on solutions that aim to erase this history. Both narratives are needed but are currently often in conflict with each other.
A more recent model by Pihkala might offer a workable solution for designers when addressing ecological grief. In line with emerging theories about the Anthropocene and ecological aesthetics, we might need to find new ways of living with the ecological crisis, rather then trying to change or fight it. Three factors are essential to take into account: Action, Grief/Emotional Engagement, and Distancing/Self-care. Three guiding principles were formed: Open-ended, open access, open minded, and used throughout the project to test this narrative about ecological grief in the context of the Appalachian extraction landscape.

Theoretical Basis



Guiding Principles



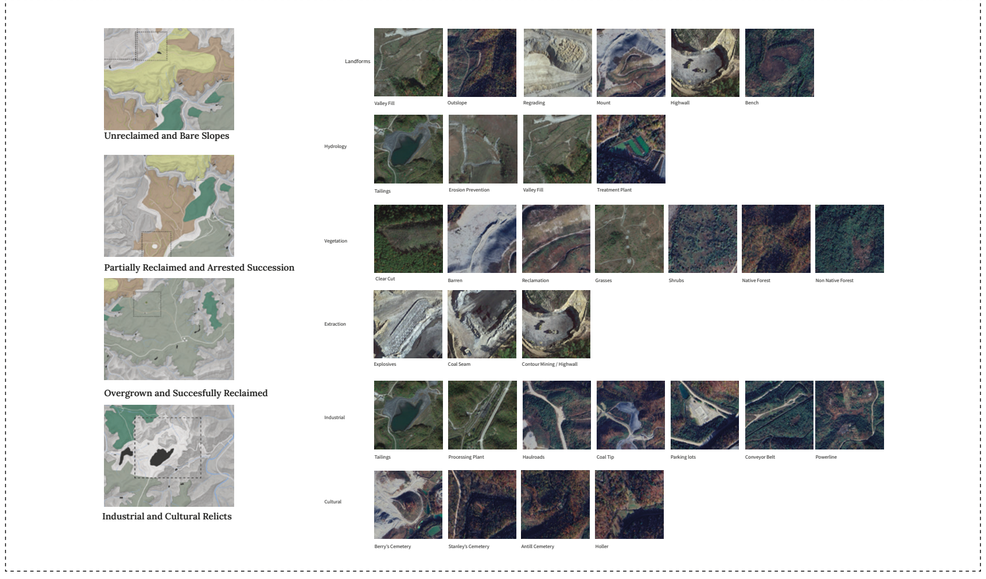
SRQ2 - What are the landscape characteristics of a Mountain Top Removal site that that define the loss and reclamation narratives of the Appalachian landscape?

Resulting from GIS desk research and extensive field work, four distinctive zones were found to have similar characteristics in relation to their reclamation status and possibilities. Additionally an attempt was made to list possible locations that are unique, iconic or representative for the mined landscape. Due to limited access to the site, this list can be narrowed down or expanded further in the future. Six sites have been selected to demonstrate options for design interventions or 'monument gardens' that tell the narratives of the mined landscapes found in the literature study and field work.

Narratives



Manifestation of the Mined Landscape

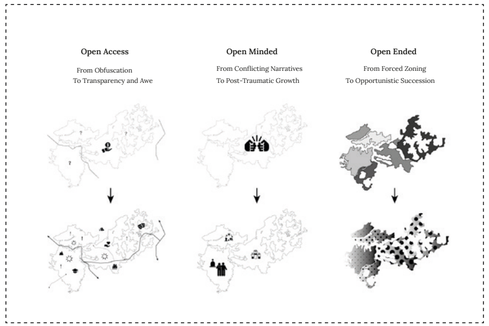


SRQ3 - What specific (design)principles can be used to disclose the mined landscape and its larger context to the public?

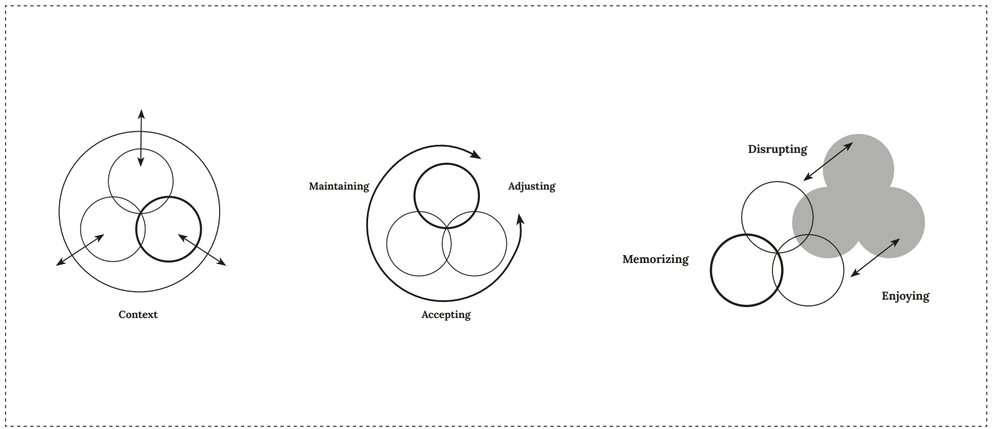
The theoretical basis and site analysis are transformed into three strategies that together make up the conceptual design.
1.Creating an engaging recreational network to disclose the mined landscape.
2. Adaptive ecological management strategy
3. Designing memorable places for a transcendental experience of the mined landscape

Each strategy is analysed accordingly by linking it with the theory and reference projects to generate design principles.

Design Strategies



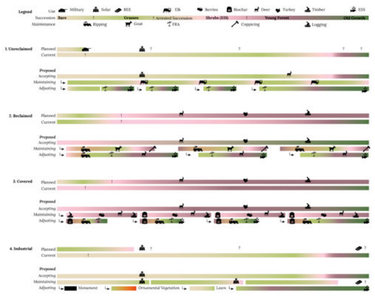
Conceptual Design



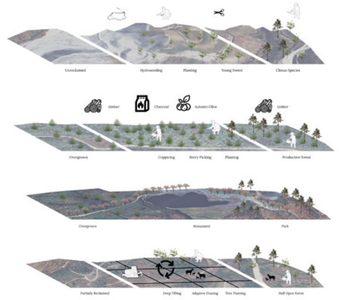
SRQ4 - How can landscape-based design interventions for mine reclamation add meaning to disprefered landscapes throughout a multitude of scales in the Appalachian Coal Region?

To adress the enormous scale of MTR across Appalachia, a proposal is made for a central 'Memorial of the Mined Landscape' that brings together people, stories, debate and rememberance. The Hobet-21 mine is outfitted with a new recreational network that invites visitors to experience this cultural landscape and take part in its reclamation.
Because of the scale of the site, immediate full-scale reclamation is not feasable. Therefore a long term phasing, with flexibility and reasonable goals is proposed. Smaller scale pilot projects give an immediate sense of place while offering insightful and provoking perspectives on mining history and reclamation.

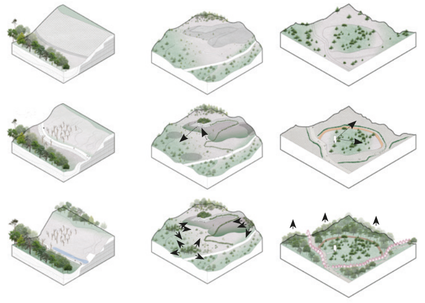
Phasing



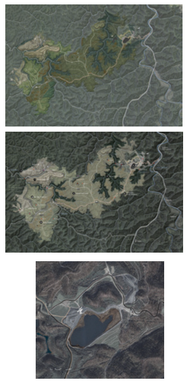
Management Strategies



Site Designs



Reclamation Plan



Reflection

SRQ5 - What do the outcomes of the project teach us about scale continuum as a landscape architectural principle?

My thesis project explores landscape architectural design approaches for the reclamation of mined landscapes in the Appalachian Coal Region, aiming to foster public appreciation and emotional connection. Within the Landscape Architecture Principles Lab, the main topic of Scale Continuum is studied. In this reflection, I will cover the outcomes of the project itself, its relation to the lab's topic and its broader academic and societal relevance. Finally, I will reflect on the methods and design process, as well as my personal learning process.

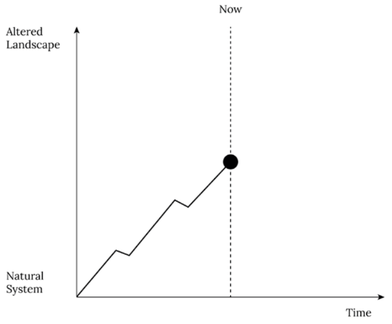
Outcomes
In this project, I used two theories that describe scale and site. Reflecting on how I apply these in my project, the design of a landscape memorial at the Hobet-21 mine can be seen as a pars pro toto. A place that represents a larger whole. The method tested there; the "Landscape Reclamation Approach" is more of a copy-paste situation. A framework that can be applied in other locations as well. In time, this method could have a cause-effect relation that, hopefully, positively impacts the environmental and mental healing process of the larger region.

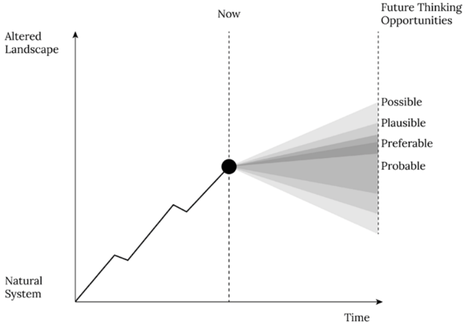
Finding the right place and way to intervene has been a question central to my research. Every project has an area of control, or site. I chose this site based on its variety of reclamation and bonding statuses, but in the larger context of the Appalachian coalfield I could have picked many other locations. Important therefore was also the area of influence. The Hobet-21 site is near the West Virginian capital Charleston and perhaps the only location with such proximity to the interstate freeway. This increases the possibilities for economic or touristic development. By envisioning a framework together with a site design, I hope to enlarge the area of effect to other locations. When illustrated at Hobet-21, perhaps the design can inspire a larger audience or area.

Another conclusion is that the four principles cannot be seen as independent from each other. Therefore, it makes me question the use of them as a theoretical or methodological framework. In the end, my project could also be about the historical palimpsest, natural processes, or bodily experience since it uses these two lenses to communicate the problems of the larger landscape scale.

Feasibility
The location choice is also argued with by the feasibility of the project. The Hobet-21 mine is the biggest surface mine in West Virginia and a well-known, iconic place. Therefore, it makes the ideal place for a central memorial and is easy to access and find for the larger public.
The choice for a memorial or the topic of ecological grief can be seen as controversial in an area that is so deeply tied to the coal industry. Given there is already a shortage of reclamation funds, you could argue that the proposal might be too idealistic, or unrealistic without proper public support. However, the insufficient funds for reclamation also demonstrate the need to look for alternative approaches to reclaiming mine lands. Through public involvement, I believe we can create new appreciation and responsibility for their direct surroundings. By introducing phasing and adaptive succession strategies, reclamation becomes more manageable and enjoyable for people to participate in, while producing marketable produce. Additional funds could be achieved by involving wider target groups such as inmates, drug addicts and unemployed locals as part of a reintegration program. The more expensive and demanding interventions can be realised through income from tourism and visitors to the park.

Methods
-How do you assess the value of your way of working (your approach, your used methods, used methodology)?
I believe that my methodology fits the required or expected approach of research through design. With this comes, however, the inevitable moments of doubt and the need to alter your proposition. Through my research I gained a lot of knowledge on a subject and landscape I was not familiar with before, and the methods I chose helped me to do so. However, I am aware I still need to document this process more clearly for the wider audience. Also, there is plenty of work that I chose to not include in the report because I see it no longer relevant. I am still unsure how I can document this and my design choices clearly and transparently, without losing the 'storyline' of the project. The site visit and interviews with people around my location were extremely helpful. It totally changed my perspective (of scale), but it actually brought me back to a concept I had thought of and disregarded before, ecological grief. After mapping the narratives that have formed the current conditions of the landscape, one can project it into the future to visualise different scenario's. These fit within a range of possible, probable and ultimately preferable options. For a long time I was searching for new scenario's next to the promising existing developments and experiments going on at the moment. However, in my search for originality or suitability I was not able to find a satisfying approach that could be the 'ultimate' solution for the larger coal region.





I had to switch from future thinking, to thinking about the current needs and issues that limit these scenario's from reaching their goals. In the end, what I called the narrative approach, helped me to combine the complex history and different opinions but it might not be sufficiently argued for as a design method and what steps are needed to achieve the goals defined. To do this I would like to have more time to study methods of storytelling and include them better in the design proposal. The same goes for the layer or landscape approach. I used this method many times before and it helps to structure my thoughts, however, I acknowledge the gap in connecting different scale levels which would have been very powerful in regards to the lab topic.

Process
-How did your research influence your design/recommendations and how did the design/recommendations influence your research?
In research through designing, it is common to have iterative feedback loops between research and design. Together with our lab, we started by exploring the four principles of landscape architecture: Scale continuum, palimpsest, bodily experience, and natural processes (Flowscapes guide, 2023/2024). At that time, I was still unsure of a topic and therefore the exercises did not help me to formulate a specific design assignment. Yet it helped me to read a lot of literature, especially focused on our main theme: scale continuum.

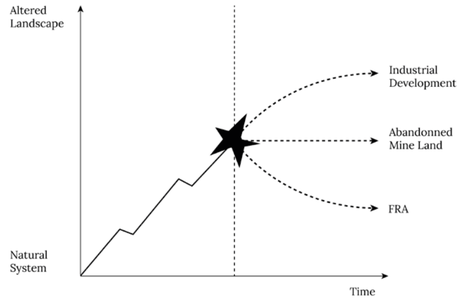
In my attempt to address all four principles, all the mines in the Coalfield region, and my fascination for environmental aesthetics I tried working with scenarios. My thought was that exploring three options for a regional vision, demonstrated in one or two locations could provide insightful answers to the future landscape of Appalachia. My initial design proposal consisted of a large-scale recreational network that could make accessible and connect the whole Coalfield region. However, as I discovered through studying a selected mine site (the former Hober-21 mine), things are a lot more nuanced.

Recommended during the tutoring sessions, I started to zoom in to understand the natural and cultural processes related to mining and the reclaiming of mine sites. By mapping this location, I found out that, every mine site has very specific topological, vegetational and hydrological conditions that require a more site-specific approach. However, I found mines can be roughly categorized based on bonding, reclamation, or revegetation status and therefore my results could apply to other locations as well.

This notice was strongly confirmed by my field trip. The reclamation experts I have talked with all work on site-specific solutions. Each location could be suitable for a wide range of post-mine uses but can be restricted by different conditions such as soil and water issues, permits and bonding, accessibility, available workforce, etc. However, certain connecting factors make it possible to develop a framework that addresses most places. For example, the 'Forest Reclamation Approach' (FRA) was mentioned by most people I spoke with. It was developed to ensure proper technical reforestation throughout all mine sites. There I noticed that there was room for an addition to this method in the sense of spatial quality and zoning. The approach does not specify, what type of function or aesthetics these forests should have. And perhaps sometimes forest is not the most desirable land-use or can be combined with other functions.

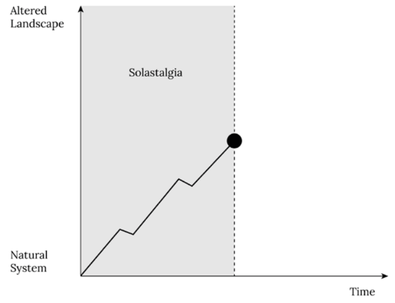
I believe many of what we consider 'ecological restoration' projects need a form of leverage to bring along the public. While I could try to make a certain scenario, for example solar energy combined with soil improvement, more tangible and feasible, I realised that on this scale there is no perfect answer to the vastness of the problem. Therefore, by changing methods to a narrative approach, I was able to focus on questioning what I believe to be a problem overlooked on this scale, and that is resolving the conflicts between current narratives around loss and restoration. This than became my leverage.

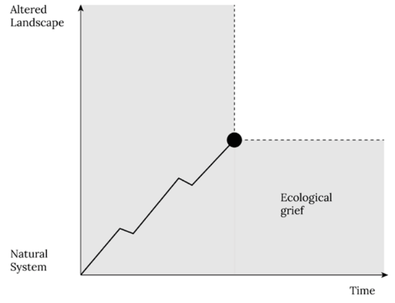
Furthermore, all methods of repurposing mine sites that I researched or visited lack storytelling or a way of experiencing its former coal heritage. Especially in this region, coal is central in society and therefore reluctant to change. This led me to my latest design proposal which is threefold: (1) an addition to the FRA exploring the spatial quality and value of mine land reforestation to maximize the potential of post-mine land use, (2) while maintaining, or creating, place for memorizing and recognizing the coal heritage. (3) making the mines accessible and open to the public to witness the landscape transformation. The result is a framework to define the next mine 'space', together with 'places' of memorization and interpretative routing.



Relevance
-How do you assess the academic and societal value, scope, and implication of your graduation project, including ethical aspects?
As described in the problem statement, the environmental, social, and emotional impact of coal mining in Appalachia is enormous. This project aims to offer relevant new perspectives on mitigating these problems. During the site visit, I discovered the complexity of Appalachia's history and future. Yes, there a many negative stereotypes and all of them can be found. They are proud, independent people, resistant to change at first. Tired of other people deciding about their land and lives. Yet that is exactly what I am doing. But I believe that there is, like some of the incredible people I have had the honour to meet there, a large group of people that is working very hard for a better future despite all setbacks. They are not open to suggestions but to a discussion. Throughout history, others have always decided over Appalachia. The dominant narratives in Appalachia understate the importance of addressing these feelings of solastalgia. The independent, folklore mountain culture is rapidly disappearing so working on finding the Appalachian identity in relation to the physical damage of the landscape is crucial in my opinion.

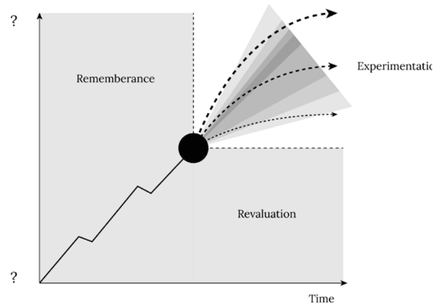
Social Relevance
This research addresses the significant social impact of mountaintop removal, by focusing on the ecological grief experienced by local communities and the loss of cultural identity tied to the landscape. By developing landscape architectural interventions that reveal and celebrate the historical and ecological narratives of these mined areas, the research aims to foster a deeper public appreciation and emotional connection. This can lead to enhanced community pride, engagement, and a sense of responsibility for the reclaimed lands, contributing to social cohesion and collective healing. The proposal of a landscape memorial is so far I can tell unique in Appalachia and could have great potential. The central location and iconic status the mine has could form a critical role in leading the debate about future reclamation of other mines.





Professional Relevance
For landscape architects and urban planners, this research provides valuable insights and guidelines for addressing the complex, large-scale, challenges of mine reclamation. By exploring the concept of scale continuum and its application to the Appalachian context, the research offers design principles and interventions that can be applied in similar contexts globally. I can position this research in the ongoing search for our new relation to the natural world in the age of the Anthropocene. Even though I can still not answer how we should define this new relation, I found that it can help to take this moment in time to remember and evaluate how we created this situation. Within the rapidly evolving body of knowledge around human and non-human relation, for landscape architects the main task, I believe, is to experiment with alternative, and hopeful answers to our ecological crisis as an answer to the conflicting narratives that paralyse us at the moment. I therefore hope that these findings will help professionals in the field to develop more effective, context-sensitive, and sustainable reclamation strategies, enhancing their ability to address both environmental and socio-cultural issues in degraded landscapes. The research also emphasizes the importance of interdisciplinary collaboration, integrating ecological, historical, and community perspectives into landscape design.

Scientific Relevance
Scientifically, this research contributes to the body of knowledge on landscape architecture and environmental aesthetics, particularly in the context of post-industrial and extraction landscapes. It advances the theoretical understanding of scale continuum as a landscape architectural principle and its practical implications for mine reclamation. The study also provides empirical data on the landscape characteristics of mountaintop removal sites and the ecological and cultural narratives that define them. By documenting and proposing various design interventions, the research offers recommendations for future studies of alternative management strategies for reclamation. Furthermore, it highlights the importance of addressing ecological grief and cultural identity in environmental restoration, expanding the scope of research in both landscape architecture and mine reclamation.



Ethical
Ethically, this project has been very hard for me. I have had the privilege to visit my location for three weeks, but I knew this would never be enough to paint a just image. I want to avoid coming across as patronizing, but certain improvements are easily made and necessary. There is a lack of most public functions like shops, schools, hospitals, jobs, etc. The region is known for the largest incarceration of the states, together with the highest amount of obesity and opioid addiction. These are not direct problems in my power to change. However, there is also a need of ecosystem restoration and even coal miners hate the view of strip and surface mining. So, through my academic interest in large-scale landscape design, I can attempt to bring new insights into mine reclamation that can indirectly improve living conditions for a lot of people. Ethically, it would be a sensitive issue how the memorial is perceived by the public. While the intent is to be open-minded to new types of reclamation and acknowledge important landscape features from the past, it is unsure how this would be received by a conservative target group. When it would only attract visitors from outside, it misses the point of offering a place of healing to the locals and therefore their support would be crucial.

-*How do you assess the value of the transferability of your project results?*
The central Appalachian coal region is perhaps one of the most famous and largest historical coal areas in the world. I chose this location for its scale and its rich cultural history and identity. I belief the minimal, experimental and flexible character of the design proposal can be easily carried out in smaller trial projects, starting with a main memorial location close to the Rock Creek Lake where ongoing development have currently stopped but can be repurposed easily.

Even though we are transitioning away from coal energy, we are still heavily dependent on coal, coal mining, and therefore the destruction of natural ecosystems. In some regions coal is in decline, in others, it is still growing rapidly. Additionally, the demand for rare earth minerals is rapidly growing. In short, surface mining will continue to happen globally and will require some form of reclamation. I believe that the results of this thesis can therefore be of interest to most of these locations.

Furthermore, the theoretical study of scale continuum as a landscape architectural principle can be of interest to the landscape section at TU Delft. Together with the other results of this and the upcoming year's graduation labs, a comparison can be made and used to sharpen the four principles. This can be in turn useful to students, landscape architects, and academics elsewhere

Personal Reflection
During the last year, I have challenged myself with a big topic and a location I was not familiar with. I am quite proud that I decided to take this opportunity to explore a topic I will not soon encounter in the professional field and I am particularly happy with the amount of knowledge and great connections I made during my visit to the United States.
While I am happy with this adventure, I would have liked to continue this in my design. Where intended to work on a very big scale that I think could only work in America, I needed to adjust my expectations a lot and I scaled down to one single mine. Even though I tried, and this has cost me lots of time, I needed to limit myself to be able to reduce all the knowledge on such a big scale into a workable design concept. This search for a workable design concept took me much longer than I would have liked and is mainly due to my insecurities and doubt leading to postponing major decisions to the final stage of the thesis. If I had more time, I could spend more time focusing on the experiential level and elaborate on most products to achieve a higher level of detail. I wished I could turn back time and have the ability to be more decisive, follow my heart and not create temporary products for in-between meetings and presentations that I did not use in the final report. Ultimately, this is part of the design process and I wish to be judged on the work I can create within the given time. I can see the potential for the concept to grow further but still, I am very happy with the fact that I could explore my own interests, discover a whole new type of landscape and turn it into an interesting concept that I believe could be a really interesting proposition for this location.



Fig. 69| Montani Semper Liberi
Made by Author, 2024



Fig. 70| Pittsburgh &Monongahela River
Made by Author, 2024

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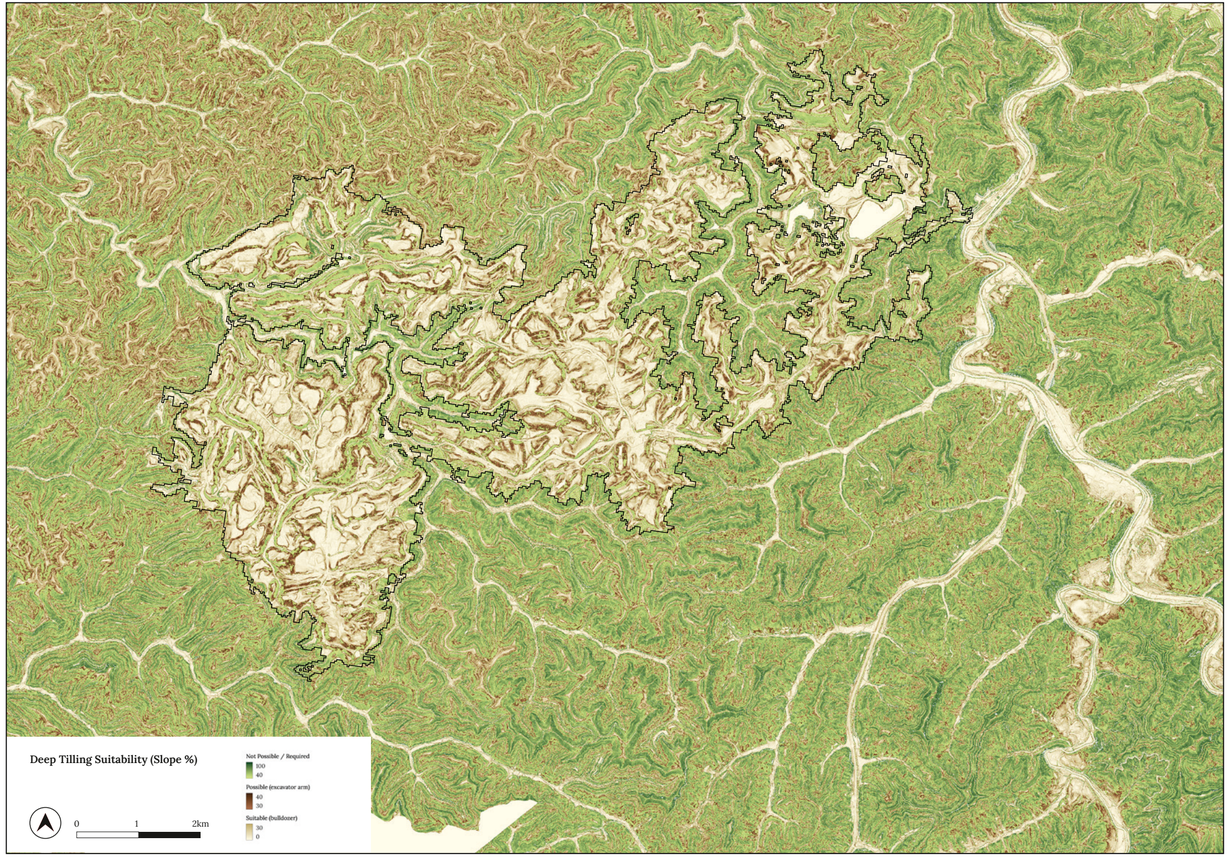


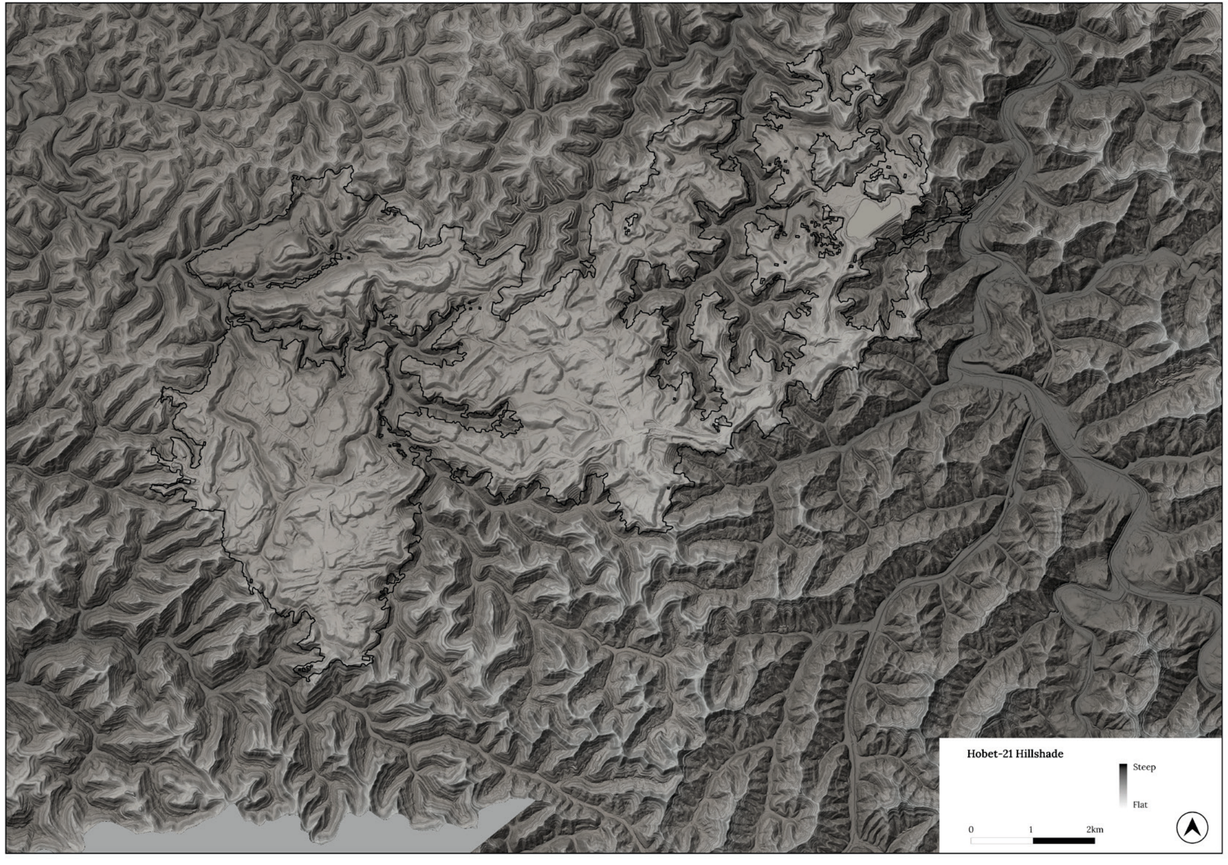
Fig. 71| Log Hollow Overlook, Blue Ridge Parkway
Made by Author, 2024

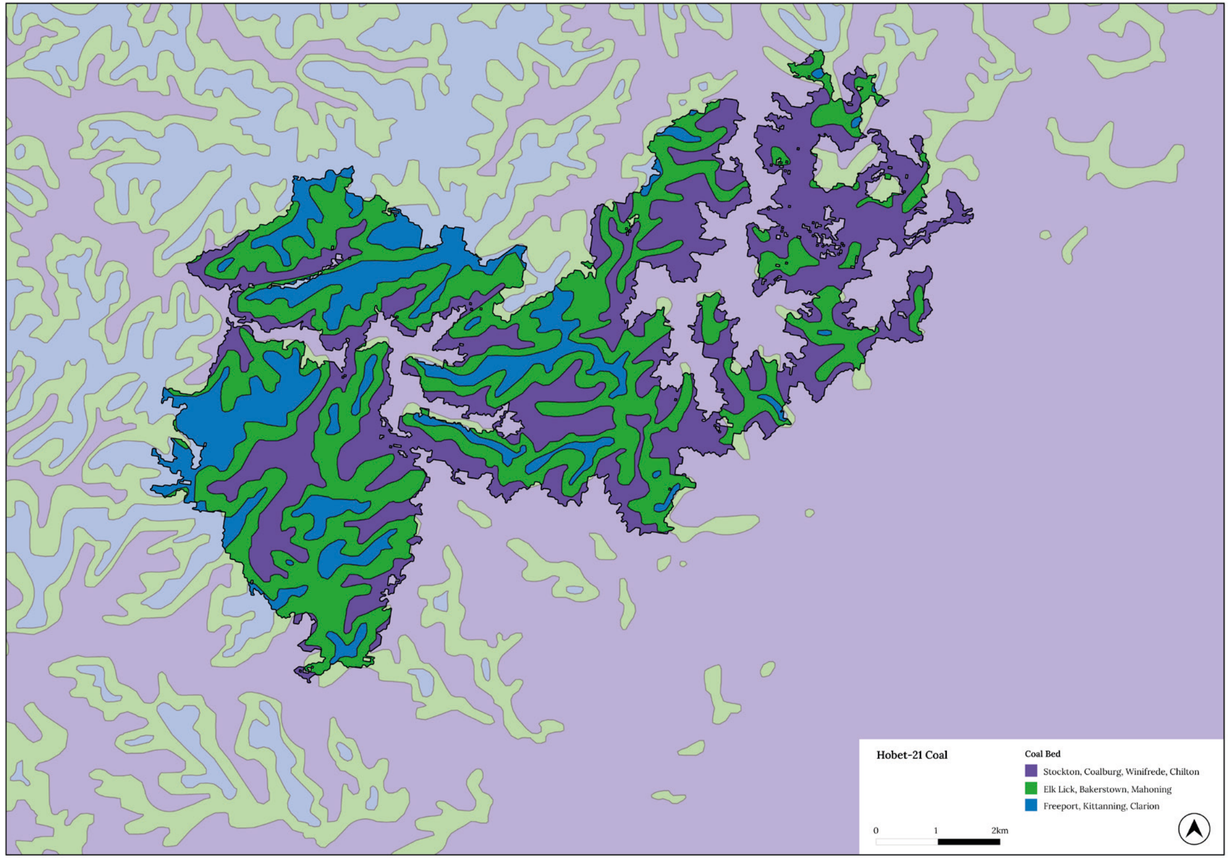
Appendix

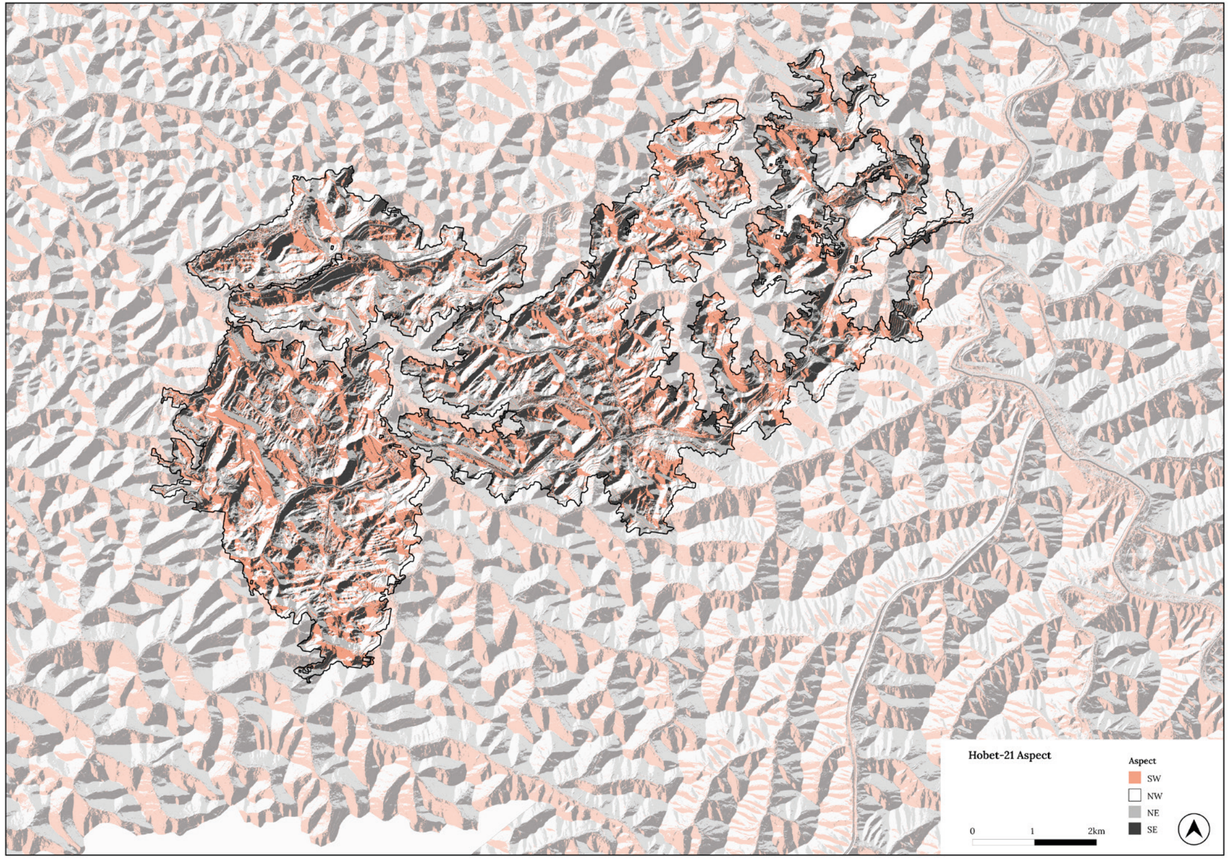
GIS Data used is retrieved from:

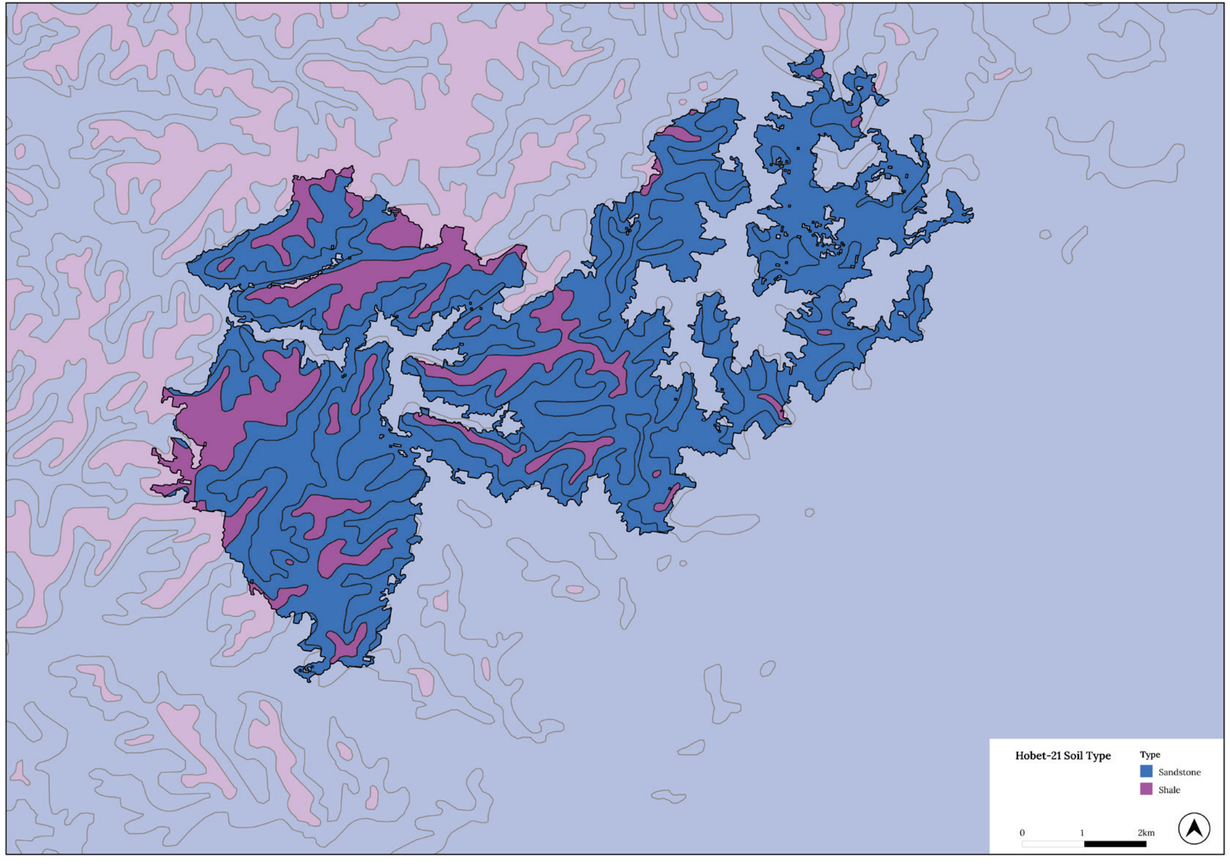
West Virginia GIS Technical Center
WVDEP, TAGIS
WVDEP, OPEN DATA HUB
WV Geological and Economic Server
Hydrorivers
Skytruth
Open Street Map
Bing Maps
Google Earth

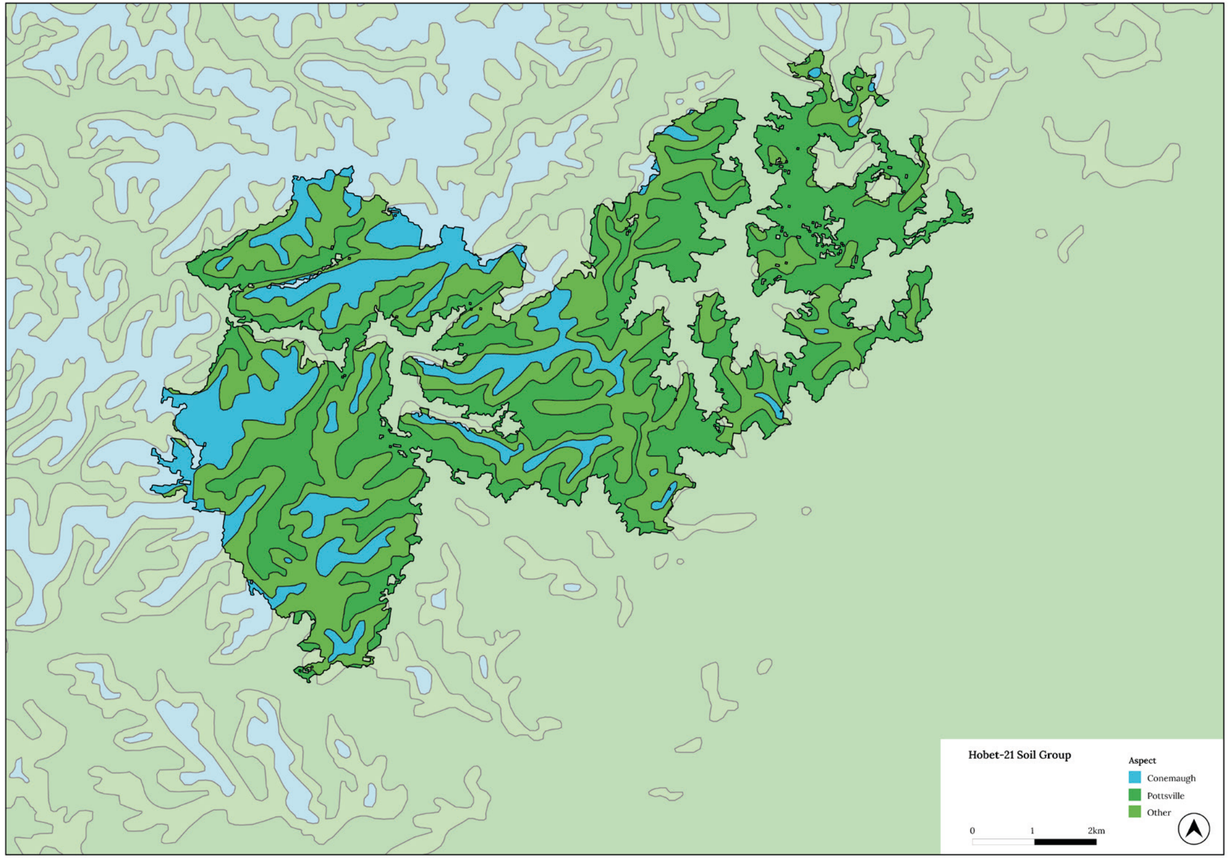

Deep Tilling Suitability (Slope %)
Not Possible / Required
100
40
Possible (excavator arm)
40
30
Suitable (bulldozer)
30
0
0
1
2km

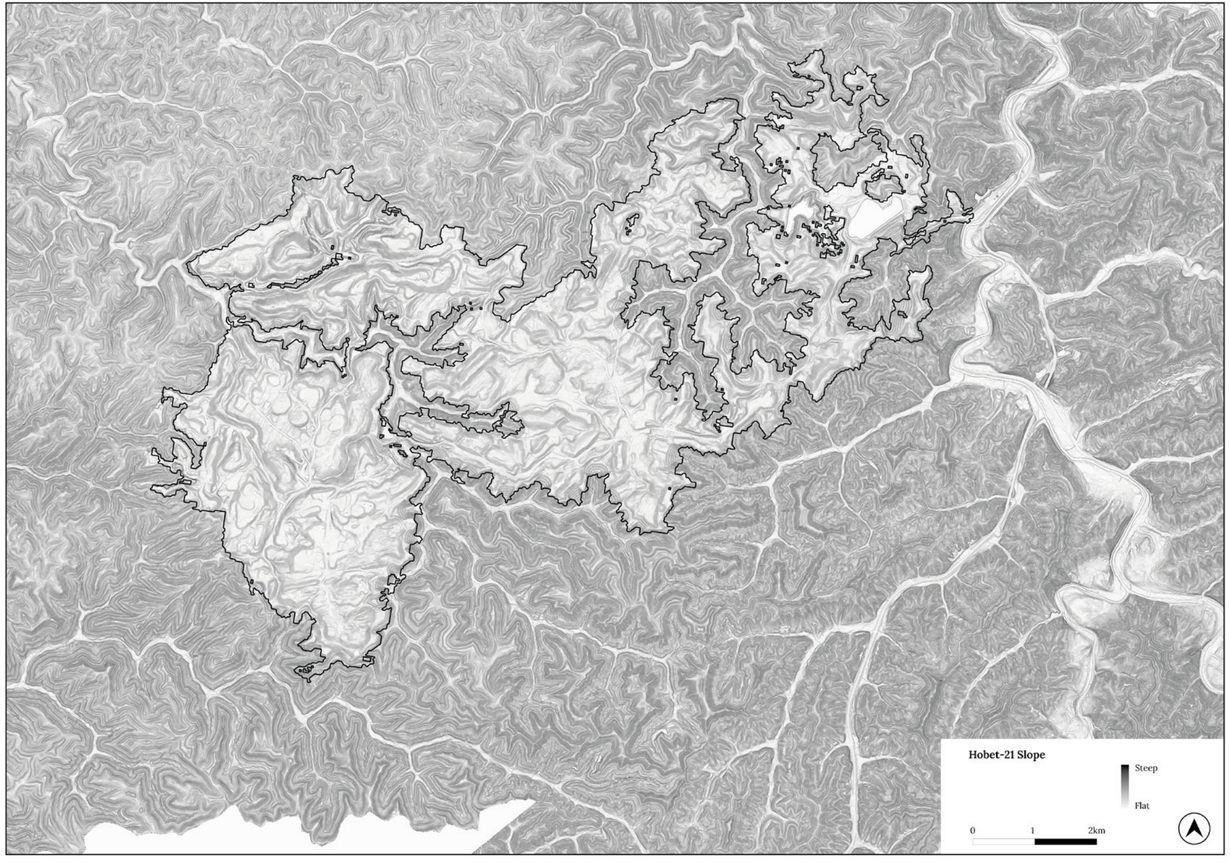

Hobet-21 Hillshade
Steep
Flat
0
1
2km

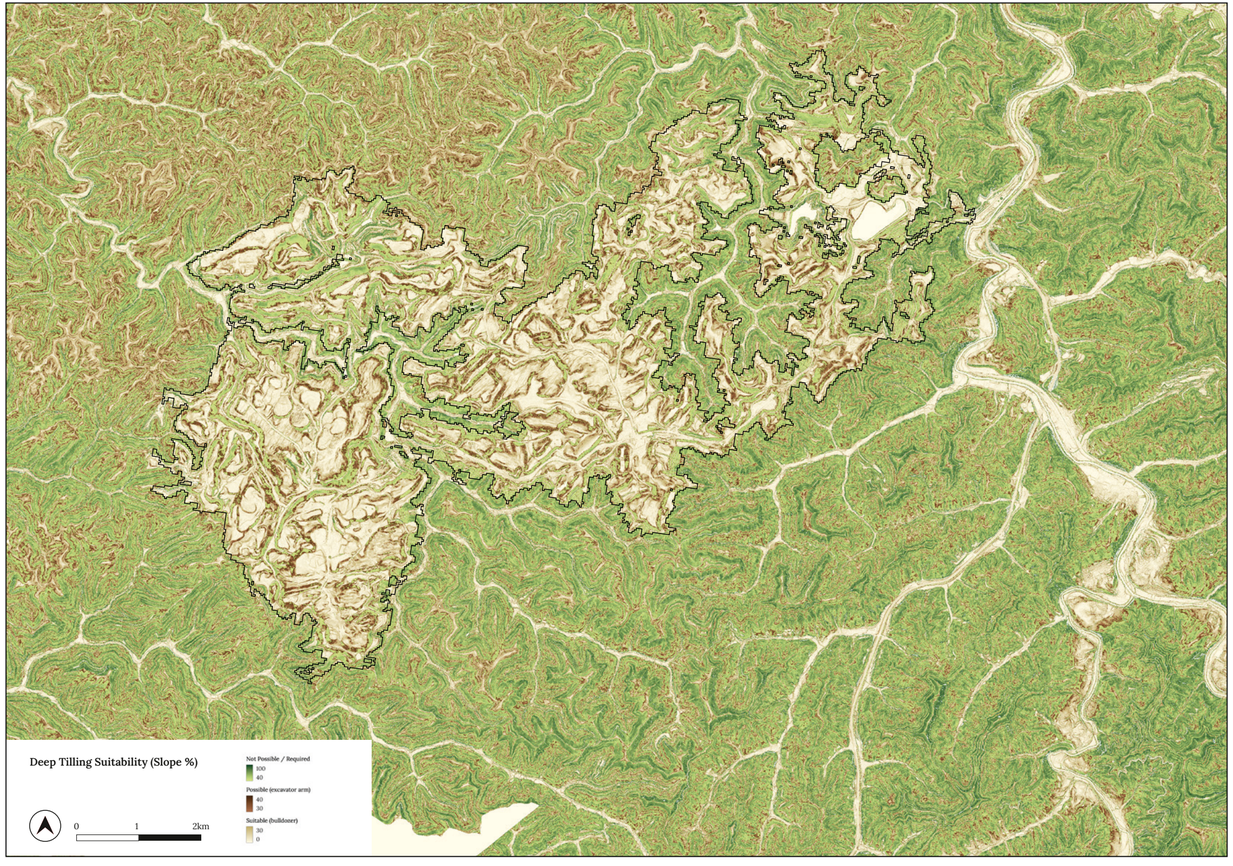

Hobet-21 Coal
Coal Bed
Stockton, Coalburg, Winifrede, Chilton
Elk Lick, Bakerstown, Mahoning
Freeport, Kittanning, Clarion
0
1
2km


Hobet-21 Aspect
Aspect
SW
NW
NE
SE
0
1
2km


Hobet-21 Soil Type
Type
Sandstone
Shale
0
1
2km


Hobet-21 Soil Group
Aspect
Conemaugh
Pottsville
Other
0
1
2km


Hobet-21 Slope
Steep
Flat
0
1
2km


Deep Tilling Suitability (Slope %)
Not Possible / Required
100
40
Possible (excavator arm)
40
30
Suitable (bulldozer)
30
0
0
1
2km



Delft University of Technology

Master Thesis Landscape Architecture

Martijn Bisschops