Mining Memory : Three Land-Stories from Cerro de Pasco

by
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Author’s Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis including any required final revisions as accepted by my examiners. I understand that my thesis may be made electronically avaliable to the public.

Abstract

High in the Peruvian Andes, the four hundred year old city of Cerro de Pasco is being swallowed by an open pit mine. For its entire history the city has depended on mining to fuel its growth, but the industry has displaced its urban fabric and poisoned its population. The city's parasitic relationship to extraction has challenged its very existence and it's been forced to decide whether it will preserve its history or protect its future. This thesis will explore how architecture, operating at the intersection of the industrial landscape and the city, might serve as the medium for local histories and collective memory to survive.

The industrial landscapes surrounding Cerro de Pasco, on the Bombon plateau are aliens, constructions of a global industry occupying revered and symbolic places. Their proposed remediation strategies are a new form of pseudo landscape which threaten further perversion of local stories. Mountains made of mine tailings, a historic city with a pit growing at its center, and a lake used as storage for ancient mine waste are all operating within the symbolic landscapes of the Andes. These inevitably affect local traditions and identities which are rooted in a pre-extraction, land-based agrarian lifestyle. Using on-site documentation and site mapping to understand the technical, political and material processes of these industrial sites will inform three design projects that graft onto remediation strategies to connect people to the collective memory of a site's history.

The research presents methods for designers working in the context of extraction landscapes which begin with story-telling. It posits that amidst the tension of global industries and cultural sustainability, architecture may emerge as a conduit for preserving local histories, ensuring their resilience in the face of transformative site forces. Through this exploration, the thesis offers insights to empower designers in honoring stories while shaping healthier futures for Cerro de Pasco and similar contexts.

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Finally to Caesar, without your kindness this research would not have been possible. Thank you for being our guide into the mountains.

Dedication

This thesis is dedicated to the residents of Cerro de Pasco who have done their part to keep the memories of the city alive for future generations.

Dedicado a los de *la tierra de machos y no de muchos.*

Dedicated to the people from the land of the tough and of the few.

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Statement of Positionality

In the year of my birth, my grandfather wrote a letter to me. A sort of message to a future me that I was only to read on my 20th birthday. Returning home to Canada from the Andes to have his cancer treated, my grandfather was seemingly forced to write the letter. A lifetime of searching for gold in the mountains of Peru as a prospector rendered his tone defeated and somewhat sorrowful. If his health allowed it, he surely at this point in his life, as a 74 year old, would have still been searching. In the letter, he spoke of his journeys, his faults, and his successes. But of all his words, one of his lessons stuck with me, he wrote, “and finally please do not follow in my wandering footsteps, it has brought me no joy and no fortune.” My grandfather was no poet, he’s been described to me as a matter of fact man, but here I believe he revealed a deep truth through contradiction. He found no fortune, some joy, but died a storied man. So this thesis is inspired by my late grandfather as I do exactly what he told me not to and trace his footsteps into the mountains, to the high altitude mining capital of Cerro de Pasco.

~

Also relevant is my upbringing in the mining city of Sudbury, Ontario. We used to go to a pond called Meatbird to swim, a man-made swimming hole on the edge of town. The pond was a gathering place of the entire town, and a place of exploration in my youth. Next to the pond, was a dominating hill. As children we never understood why it towered over the perimeter of the water body. Only from a satellite image can you see the massive infrastructure project that exists directly next to meatbird : a tailings pond around ten times the size of the swimming hole. To children these industrial sites were invisible, designed by the mine to disappear. Many of us bonded over memories of eventually discovering the traces of mining that inevitability permeated the landscapes of our youth. This thesis sets out to understand the ghosts of the anthropocene that hide in plain sight.

As I research the storied landscapes of Cerro de Pasco I acknowledge first the earthly matter of the city that perpetually carries with it the complex histories of the place. This material made the thesis possible and as an outsider accessing it, I hope this research honors the stories embodied by the vibrant materials from the land.

I acknowledge the indigenous lands, the ancestral home of the Quechua people, upon which the city of Cerro de Pasco was founded. The dispossession of land by the Spanish crown in the 16th century shaped the city as it is known today, and I continue to reflect on this legacy as I listen to stories of the place. The ripples of this history are still felt today, as extractive industries, born from colonial control, are inherently at odds with andean land-based traditions. This thesis acknowledges this tension.

Amongst the tension, this research sets out to first listen. As an outsider writing on landscapes of extraction it is important to acknowledge my identity, as a white Canadian settler, with inherent privileges. As I work in a context that is foreign to me, it is my continued goal to research and design with care and empathy by first learning and listening before speaking. Three land-stories from Cerro de Pasco therefore asks how we might navigate the tension of our times by first recognizing the stories that surround us.

part one

finding cerro de pasco

Prologue

“In the Anthropocene, humanity has become a geophysical force on par with the earth-shattering asteroids and planet-cloaking volcanoes that defined past eras. Earth is now a human planet.”[1]

Recent discourse surrounding the Anthropocene has signaled a profound shift in the relationship between earth and humanity. The vast expanse of geological time that has sculpted the physical forms of the earth is challenged in this new epoch. Humanity is now capable of reshaping the planet at an unprecedented pace, blurring the delineations between human history and geological phenomena.[2]

Mining epitomizes the reshaping of the earth at vast scales. The industry brings with it a clear burden on the environment as waste, in both solid and liquid form, is dumped and stored on the earth’s surface. This waste seeps into the strata of landscapes – into soils, rivers and ecosystems beyond, deeply changing our world. The vastness of these human actions are born from the endless removing and processing of materials from the earth.[3] So, it is here that the thesis lies; grappling with how we will live among the industrial bodies and extraction infrastructure of the Anthropocene, and the strange, often unpredictable ways that humans interface with them.

There is no greater evidence that earth has entered this new geological era than in the nation of Peru. A country that mines its globally renowned cultural landscapes behind the scenes to fuel one of its largest industries. “Latin America over the past decade has seen its mining sector triple in value to $300 billion. Peru’s economy, among the fastest growing, derives one-sixth of its gross domestic product from minerals.”[4] This growth is fueled by global mining operations across the country which have brought about a slew of environmental injustice cases. Experts have said mining adversely effects over half of rural peasant communities in Peru.[5] In Cerro de Pasco, a city in the central Andes, the entire history of the industry is visible, and its consequences are clear to see.



Fig 1.1 An open pit mine in the town of Morococha, Peru.

Stories from Cerro de Pasco

“Haricapcha dates from 1630 in the Christian era. The story goes that one sunny morning Santiago Haricapcha went out to graze his cattle, he had about 30 head of cattle, and suddenly the sky filled with jaguars as Manuel Scorza would say. The storm began, then the hail and the snow and Haricapcha had to look for shelter. He found a cave but the storm persisted all day and Haricapcha had to stay in the cave. That night he lit a fire and they say that the heat of the fire drew down threads of silver and gold. Huaricapcha didn’t know he had discovered the minerals in Cerro de Pasco. He took two or three threads to Huariaca where the land-owner lived. The land-owner congratulated him and that’s when they think mining began in the area. This legend is very similar to one they tell in Bolivia. Maybe our miners, our people took a few ideas, made-up others and joined the Bolivian character up with the Cerro.”

From an interview with Victor, a cultural researcher from Cerro de Pasco, 1995, conducted by the Panos Institute.[6]



Fig 1.3 Santiago Haricapcha, the folkloric founder of Cerro de Pasco, carries a bag full of ore and a head lamp.

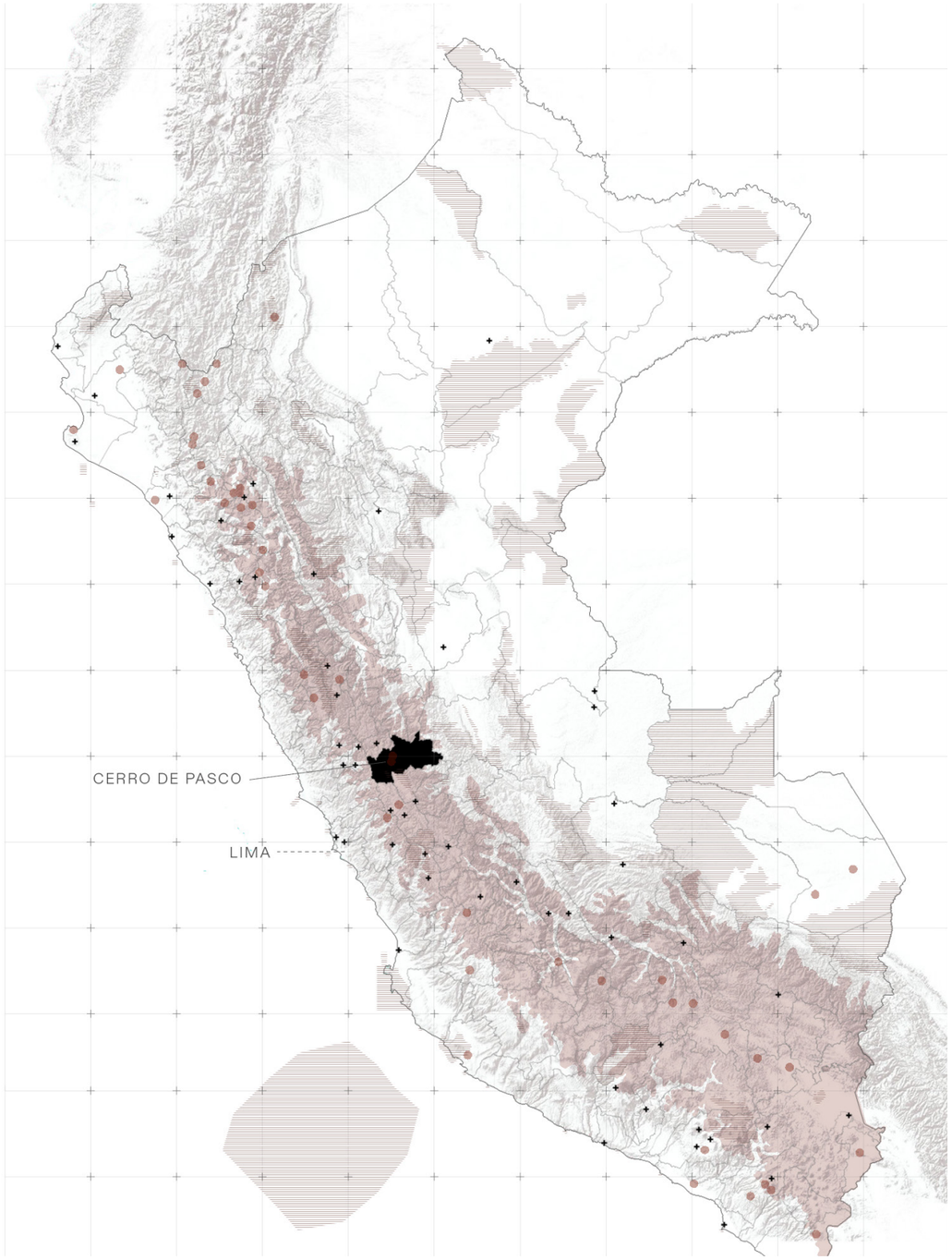


Fig 1.2 Extraction + Environmental Injustice in Peru

- pasco province
- protected areas
- puna eco-zone
- environmental injustice cases
- extraction sites

This colonial narrative, told by settlers and fortune seekers who have come to the Andes for generations, is just one origin story of the city Cerro de Pasco. At 4300 meters above sea level the city in central Peru is being consumed by an open pit mine. The entire history of the city is rooted in its mining industry, and all who live there depend on mineral extraction, directly or indirectly, for their livelihoods. The city has been mined since colonial times. This deep history of mining activity has had disastrous consequences on the city, as it is now regarded as one of the most polluted places on earth and is permanently marked by waste materials in solid and liquid form that have rendered the soil, air and water toxic.[7] As a result the landscape around the city is nearly uninhabitable, and the traditions of agricultural and land-based practices that historically co-existed with the mine are no longer possible.[8] In 2008, the complete relocation of the city's 60, 000 peoples to a site a few kilometers south of the open pit mine was proposed. This has not been carried out, but begs the question: why should the mine remain, while the people who have on the land before it, be displaced?[9] By carefully telling stories rooted in landscape and local knowledge a new future in Cerro de Pasco may emerge, one rooted in an acknowledgment of its complicated histories.

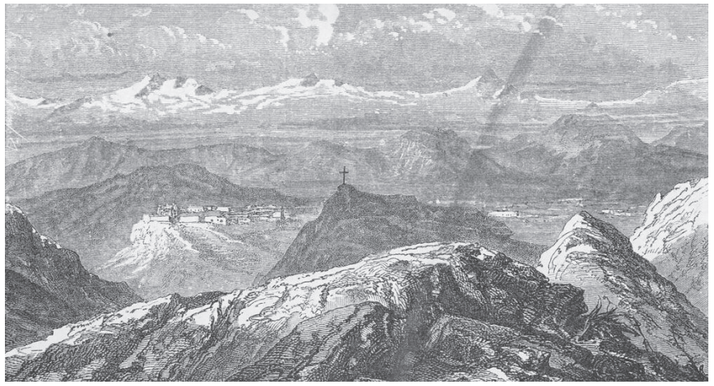


Fig 1.4 General view of the Cerro de pasco mining sector in Peru. Simonin, Louis Laurent, 1869.



Fig 1.5 The Raul Rojas open pit mine grows at the centre of the city of Cerro de Pasco.

The mining city is situated in the central Peruvian high Puna, the highest habitable eco-zone of the Andes, typically categorized as being 4000 - 4800 meters above sea level. It is one of eight natural regions of Peru classified by geographer Javier Pulgar Vidal based on climate, altitude, and indigenous land use[10] . Known as the royal city of mines, Cerro de Pasco is a seven-hour trip by car from Lima. The highway connecting the city to the coastal capital weaves through all Andean ecozones. It burrows itself into a valley on the windswept Bombon Plateau. Symbolic mountain peaks, lakes, and rolling hills with fields of grass surround the city and are strongly associated with many stories of the Andean people who have lived on the plateau for thousands of years. The mountains, for example, are associated with the most powerful deities in Andean mythology. In Quechua, the spirit of the mountain is called the apus, whose power is determined by the size of its mountain's peak or by the water it delivers to its base.[11] From the apus, many Andean stories are derived, which often personify or give human qualities to the mountain and other landscape elements. This thesis will begin to place a new importance on stories and their connection to landscape as critical to a healthier future in the mining capital of Pasco.



Fig 1.7 Typical Landscape of the Bombon Plateau of the Central Andean High Puna.

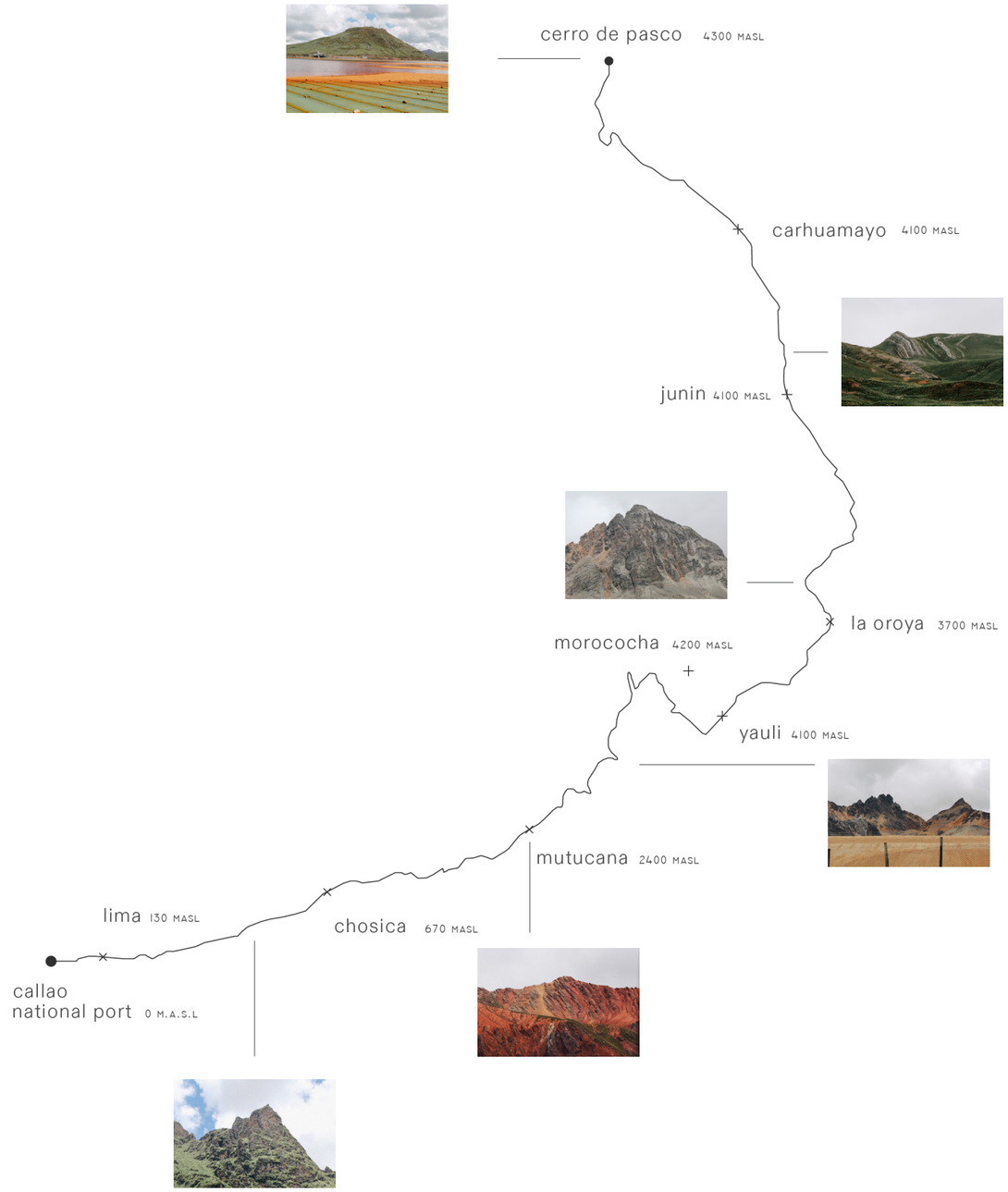


Fig 1.6 Road to the Royal City of Mines.

11

12

Fig 1.8 (previous spread) The windswept Bombon Plateau, representative of the Puna Ecozone located at 4000 - 4800 masl.

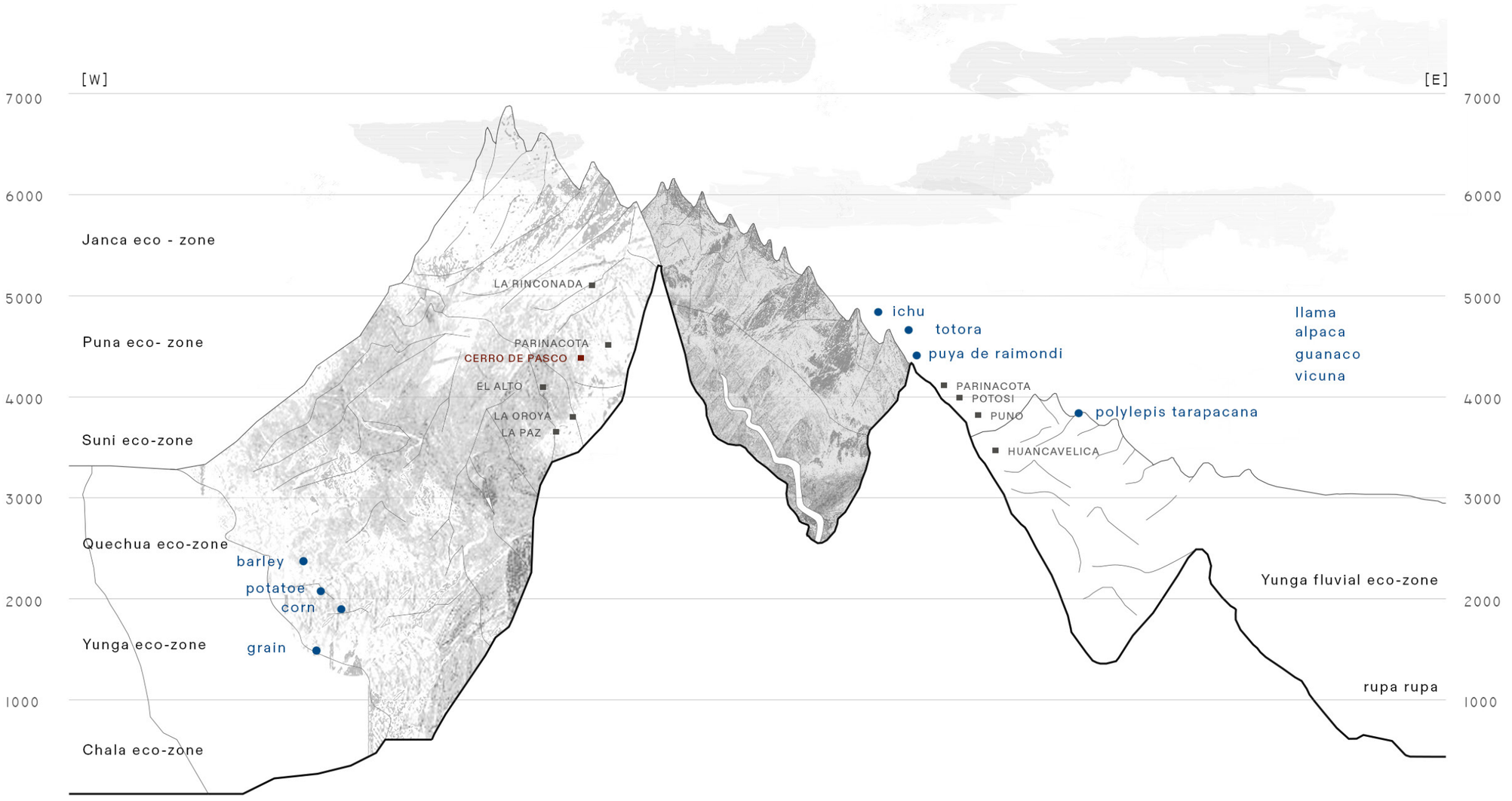


Fig 1.9 Eight Eco-zones of the Peruvian Andes Classified by Elevation. Section of the Andes.

Framing the Land-story

Landscape and its modifications are interwoven with stories and should be understood as a process, continually made and unmade by both human and non-human forces. In his essay the land as palimpsest, Swiss author, architect, and philosopher Andre Corboz uses the metaphor of a palimpsest to describe the cultural landscape; a written manuscript whose content has been eroded, but the original can be detected through remaining traces.[12] This presupposes that a landscape is constructed of the beliefs and traditions of those who inhabit it and that it is not purely a space made of natural processes. Thus, the local stories rooted in landscape, told in Cerro de Pasco may allow us to learn about the industrial and pre-industrial histories of the city. Land and story, in this way, are fundamentally interconnected. The matter that makes up landscapes and ecology, whether conceived as spiritual by locals or as resource by capitalists, are interwoven with histories. So, the concept of the “land-story” will be used, throughout the thesis, to describe the processes that have shaped Cerro de Pasco.

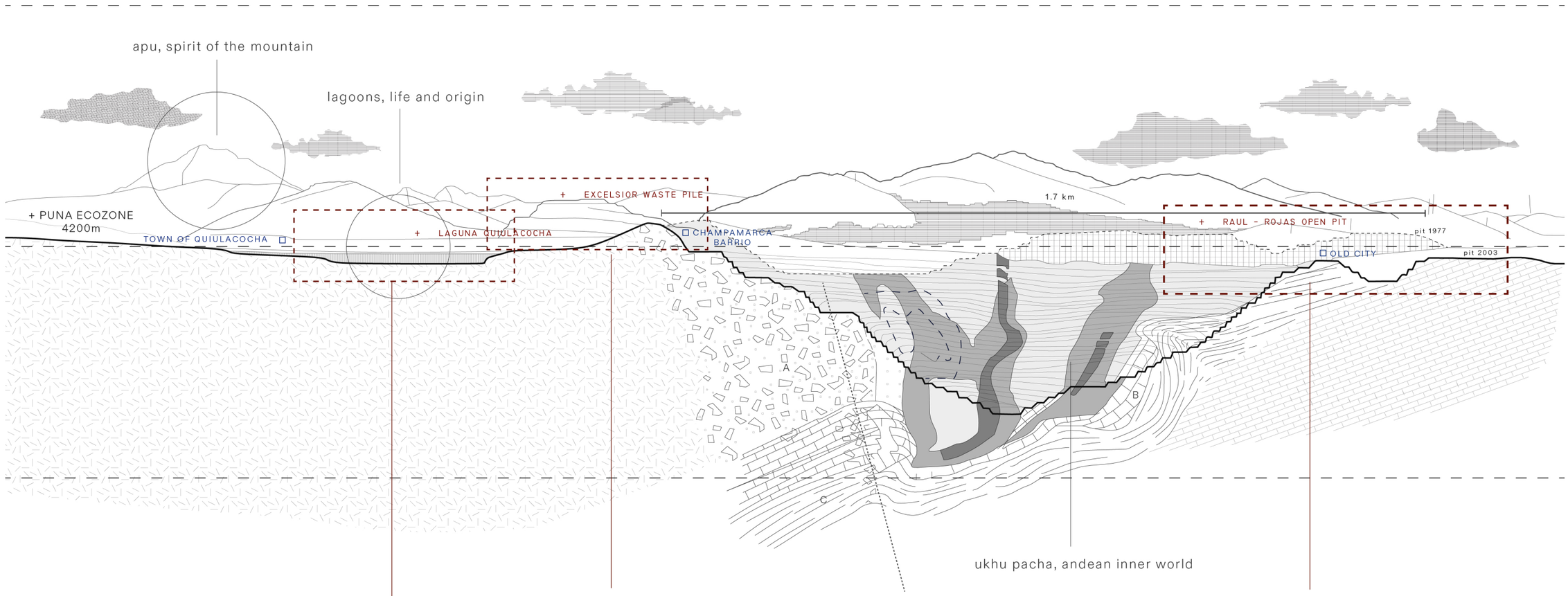
“It matters which stories tell stories, which concepts think concepts. Mathematically, visually, and narratively, it matters which figures figure figures, which systems systematize systems.”[13]

Donna Haraway, Staying with the Trouble : Making Kin in the Chthulucene, 2016.

Academic, activist and philosopher Donna Haraway suggests that the stories we tell are not neutral, they represent the biases and values of their creators. In the case of Cerro de Pasco, the colonial stories that let us read site (and beyond site) matter, because they can continue to perpetuate exploitative practices and systemic racism that have built the city. It could be possible then, that careful storytelling could establish deeper connections with cultural landscapes.

In the context of the Andes, mythology becomes an important pillar of the land-story. The concept of animism is prevalent, which conceives of a landscape as having consciousness and being full of life. Andean stories operate upon the blending of spiritual and physical worlds, into one reality.[14] If these realities are intertwined, then there is an immediate need to revisit the stories of places in damaged and deeply engineered landscapes. How can the land-story be used to re-find Cerro de Pasco ?

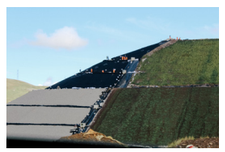
In the film by director Cristian Edwin Ricaldi Condor, called “Donde está Cerro de Pasco?”, (where is Cerro de Pasco?),[15] images of a vibrant old city fade. The film fuses old and new images of the historic center of the city to reveal extreme differences and complexity. Over half of the historic center of Cerro de Pasco has been displaced by the growth of the open pit mine, throughout the 20th century. On the edge of the old city, the void is obtrusive; prominent historic public spaces open towards the mine, and past vibrant urban blocks stand abandoned. The film deals with themes of collective memory and loss in a place which so poignantly captures the mine’s parasitic relationship with the city; a generator of wealth, that has built and simultaneously destroyed the urban fabric. So, in this context of a damaged landscape, where the earth has been hollowed out, excavated, how can the land-story re-conceptualize the industrial body slowly, palpably, and silently disturbs. Anthropologist Anna Tsing has declared that the question of our time is: ‘how do we tell terrible stories beautifully.”[16] Thus the thesis asks what happens to the Land-story, when a landscape is tortured by the effects of mineral extraction.





+ LAGUNA QUIULACOCHA

TAILINGS POND USED TO STORE MINE WASTE



+ EXCELSIOR WASTE PILE

HUMAN CONSTRUCTED WASTE PILES SURROUND TOWNS



+ RAUL - ROJAS OPEN PIT

OPEN PIT DISTURBS 3 SYMBOLIC LEVELS OF THE ANDES

Fig 1.10 Disturbed Mythologies
Landscape Section Cerro de Pasco.
Lake, Mountain and Pit

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To Move A City ?

In 2008, Volcan, the company that managed the mine, sought to address concerns of urbanism and toxicity by proposing the complete relocation of the cities' residents to a new company town.[1] It was one of many attempts to move the city's residents but failed due to the massive costs associated. Plan L, the latest project to move the city's residents, was motivated mostly by further expansion of the open pit into the old city.[2] The proposal raises an interesting question of priorities among the mine management: why the mine should remain, while the residents of Cerro de Pasco become again displaced. The city now faces the challenge of co-existing with a mine that continually threatens its existence by removing the earth beneath its foundations. Through understanding the ways other architects have worked around mine sites, both existing and former, a series of examples will underscore architecture's important place between the industry and the cultural built form it threatens.

Mining cities are characterized by their instability. Cities are founded, built haphazardly and have and have indeterminate life spans based on their dependence on single industries.[3] One mining town, connected by highway to Cerro de Pasco is Morococha. The town was purchased by the Chinese mining company, Chinalco, and was recently moved about six kilometers east of the original site of the village. The site of the town is to become an open pit mine, a land action to claim the copper that has long existed beneath the centuries old town.[4] The newly constructed town is, "strangely silent and sterile, with the artificial feel of a movie set."[5] The case is a pattern destined to repeat itself, when company towns rely on single industries, towns become forced to choose between preserving their past or protecting their future.[6]



Fig 2.1 Mine on the former site of the town of Morococha, visible foundations of demolished town buildings.



Fig 2.2 Tailings pond in the basin of Morococha.

The tension between the extractive processes of mining and the urban processes is an issue that persists globally. If the demolition of an old city implies the construction of a new one, the prospect has drawn the attention of architects. In the mining city of Kiruna, in northern Sweden, much of the historic city has been relocated because excavations beneath it were so extensive the ground was nearing collapse.[7] Architects of the 20th century were drawn to this case of urbanism and proposed speculative architectural projects for the new city, including Ralph Erskine.[8] Many of Kiruna's historic buildings and icons have been moved to newer districts of the city, but the physical places they occupied are lost, swallowed by an industry whose presence looms. Kiruna therefore, like Cerro de Pasco, operates in a strange temporal condition, in constant shift, endlessly attempting to escape the very mine that fuels its economy but consumes its physical space.

Kiruna and Morococha, like Cerro de Pasco, are fading cities. They face problems of memory as their local histories are sacrificed by the global industries that fuel them. Agrarian and land-based traditions that are linked to identity in the city are directly challenged by the adverse effects of mining.[9] Physical spaces linked to identity are abandoned, or moved, perpetuating generational disconnect to place. This design research will situate itself within the far future, envisioning the city's persistence on its current site despite the looming possibility of relocation. By maintaining this stance, it seeks to safeguard the existing narratives interwoven with place – an act of defiance against the relentless expansion of extraction practices.



Fig 2.3 Historic home being moved, displaced by the mine's expansion in Kiruna.

Remediating the Fading City

A future for Cerro de Pasco that remains in its current location must heal its landscapes made toxic by generations of mining. An Italian NGO that has researched the city for over a decade, Source International, has called Cerro de Pasco one of the most polluted places on earth[10], its air, waters and soil have all been poisoned by heavy metals. In June 2017, the area was deemed to be in a state of emergency due to the deep health crises the local population faced from legacies of toxic accumulation.[11] It eventually brought about remediation plans and increased healthcare, but the situation remains dire. By understanding environmental restoration efforts in a similar context, a proper strategy can be selected and understood as the system upon which a site will change.

In the city of Cajamarca, in the Peruvian Andes, scholar Margarita Macera has proposed a remediation framework for the watershed connected to the city's gold mines.[12] She argues that a complete reading of a landscape's complex histories should be understood to properly undertake an environmental repair project. This is critical to the context of Peru where Andeans have historically relied on a symbiotic relation to landscape which has enabled agrarian lifestyles. It is also stated that remediation efforts can establish "pseudo-natural environments", and that returning landscapes to their pre-industrial states can contribute to the further erasure of histories.[13] It is thus important that the implementation of ecological restoration is connected to locals and rooted in a multitude of site histories. By introducing stories into the process of remediation from the outset, restoration projects can become more embedded in place .[14]

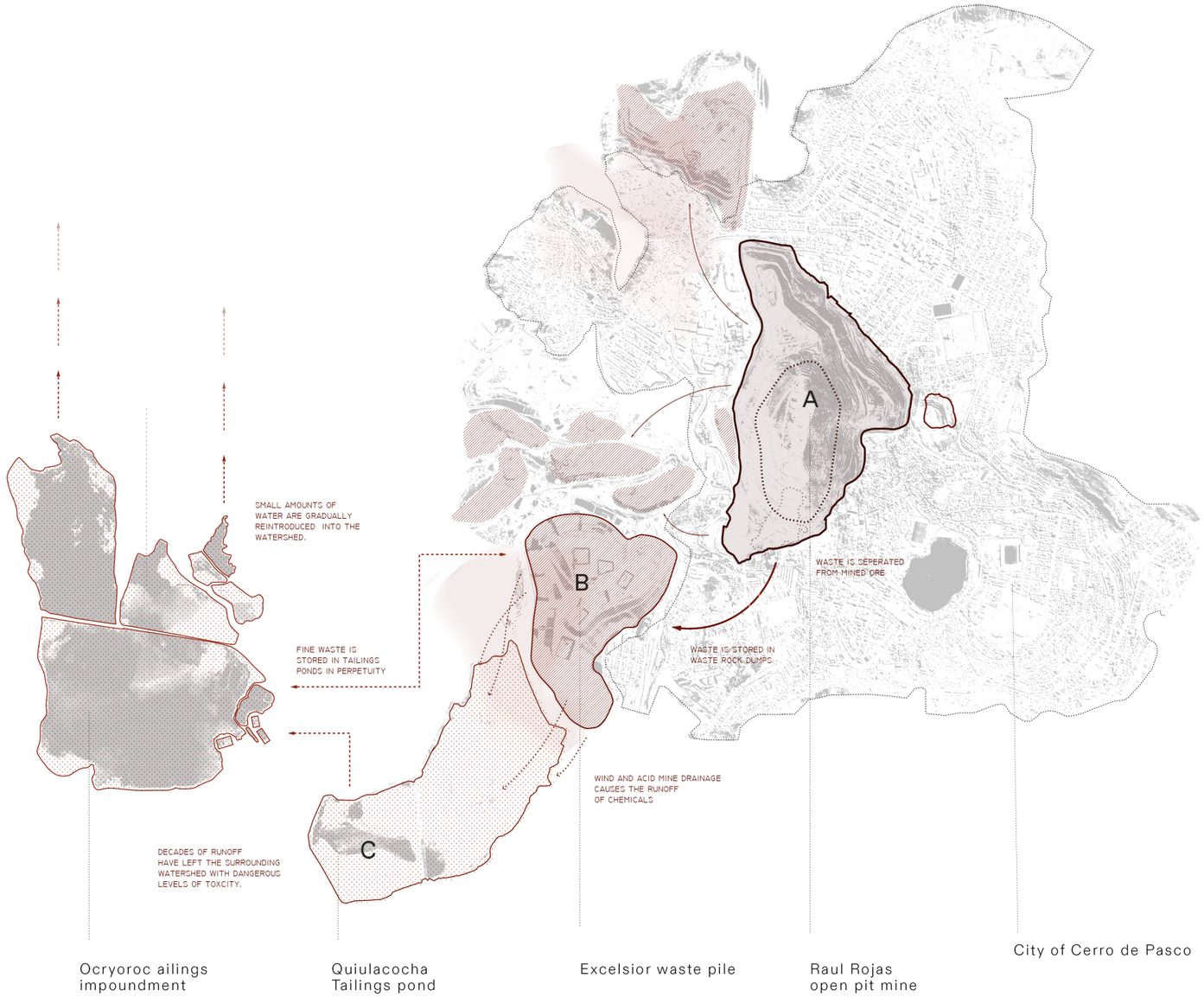


Fig 2.4 Toxicity map of Cerro de Pasco's soil, water and air. Including location of historic pollutants.

This thesis will operate in the context of a pre-existing remediation plan and integrate itself into the evolving physical form of the terrain as it is restored. An action that understands the site as dynamic and of continual change. The Cerro de Pasco Corporation, currently the owner of the major polluted industrial landscapes of the city has vowed to remediate them. But their remediation plan is motivated by the economic value that lies within the waste left behind from generations of mining. Tailings piles and ponds can be re-exploited with new technology. A new face extraction that if conducted alongside remediation may become a new mode of forgetting. This thesis therefore will interrogate this remediation project by operating at the scalar intersection of land and human action.



Fig 2.5 Sign demarcating Private Property on the edge of an abandoned town purchased by the mining company Volcan.



Fig 2.6 View of the Quiulacocha Lagoon, a tailings pond edge yet to be remediated on the outskirts of the city of Cerro de Pasco.

On Methodology

In Cerro de Pasco, landscapes connected to mythologies have been unsettled. The plateau around the city has been so deeply altered, if the sun set and a mountain had disappeared in the night it would not seem a surprise. Architecture and the city's urban fabric feel even more temporary, as most of its old neighborhoods on the perimeter of the open pit lay abandoned. Cerro de Pasco's industrial land actions feel more deeply ingrained in the city than the symbolic landscapes which surround it. As the ore beneath it is mined, so too are the mythologies that made the city.

"As humans reshape the landscape, we forget what was there before. Ecologists call this forgetting the "shifting baseline syndrome." Our newly shaped and ruined landscapes become the new reality. Admiring one landscape and its biological entanglements often entails forgetting many others. Forgetting, in itself, remakes landscapes, as we privilege some assemblages over others. Yet ghosts remind us. Ghosts point to our forgetting, showing us how living landscapes are imbued with earlier tracks and traces."[15]

Anna Lowenhaupt Tsing. "Arts of Living on a Damaged Planet," 2017.

As the landscapes of Cerro de Pasco are deeply modified by extraction they are forgotten. This quote from Anna Tsing poignantly describes the traces that memorialize the landscapes of the past. Her ghosts may provide a way to navigate the deeply human landscapes of the mining city. In the city, Mountains are lined with textiles that cover, pits are fenced, and lakes are dammed. Industrial landscapes are deeply human, pseudo natural constructions. The proposed remediation of these landscapes are necessary projects due to their current toxicity. But mine environmental restoration could bring about further alienation by establishing a new breed of artificial land-form. The processes that have shaped landscapes, whether natural or unnatural, are worth memorializing. Without their memory, there is a risk that patterns of damaging landscapes to this scale and

extent will continue. This research will therefore use drawing at the scale of territory to understand the industrial landscapes as; in progress, complex engineering projects, emitters of toxicity, part of landscape systems, associated with cultural memory, and inextricably human. To draw these dynamics, this thesis will borrow landscape architect and theorist James Corner's plots, fields and extracts to map interrelationships and shaping forces, rather than purely physical geography.[16] In this method of drawing, extracts will map the technical and material qualities of industrial landscapes, (like chemical composition, age or trajectories) an act of revealing traces of the mine, like unearthing ghosts of the past.

Among the matter of industrial landscapes are components of global construction which have potential to be appropriated into the bones of a future architecture. The design, in this way, takes possession of found global materials, which are attempting to double as landscapes, and render them more local. Introducing a system that enables storytelling on sites of pollution that have historically unwoven places from symbolism. It is a process of understanding a site as in progress, one that will be remediated in the deep future. In this way the architecture grafts on to remediation strategies and effectively re-stories the foreign bodies of the Anthropocene. It will encourage a framework for reappropriating alien infrastructures in a symbolic landscape, while referring to found architectural icons of a specific place.

If mining is at odds with cultural memory and remediation processes lack a critical cultural component, then the use of the land-story from the outset can address these issues simultaneously. Architecture which exists at the intersection between built infrastructure and culture serves as the medium through which stories and the collective memory can survive. Each proposed architecture acts as a historic capsule, permitting deep histories to live on past physical site transformation and allowing new stories and identities to persist- An action of freezing matter in time, so that its memory will endure.

The following chapters, each associated with a symbolic landscape of Cerro de Pasco, will explore how assembled mythologies and plotted matter can be used to memorialize the spirits of a land-story's past.

3 land-stories :

1 **mountain + human hills**
2 **lake + toxic waters**
3 **city + open pit**

each composed of :

A **mythologies**
B **matter**
C **memory**

Fig 2.7 (opposite) Three land-stories key map.



Endnotes

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part two

mountains + human hills

Legend of Taita Buerán

“The mountain named Buerán is located two kilometers from the canton of Cañar and is at the crossroads between two mountain ranges: the eastern and the western. It is the clock of time and the home of the gods for the campesinos [country people] living in the communities of our canton.

This mountain is full of fantastic stories and legends that are told by many old people. When they describe this mystical character—Taita Buerán—they describe him as a person short in stature, dressed with indigenous clothing from the Cañar, with a woolen hat and blond hair.

They say that by chance some people have come across him, which is a sign of good fortune. There are some who describe him as an expert curandero [healer or medicine man], and as a Juan Tenorio since he likes single women.

Many people believe that “el Buerán” is an enchanted mountain; that in its interior there is an orchard with all kinds of fruits, from the highlands as well as from the coast.

They say that Taita Buerán is divorced from the mountain that is in front of him, whose name is Mama Zhinzhona, and that it’s been some time since their divorce. Taita Buerán lives with his sons, and Mama Zhinzhona with her daughters. They’re in the habit of living in constant discord, because Mama Zhinzhona keeps a close eye on Taita Buerán with the [female] mountain Mama Charón Ventanas.

They say that on desolate nights they insult one another. And that is why there is a belief that when it’s cloudy over Taita Buerán, that’s because he is angry and the day [weather] will turn out badly. Many people from our region tell this story.”

From *Decoding Andean Mythology*, Marín-Dale, 2016[1]
High in the Andes, landscapes are defined by their mountains. Peaks dominate the skyline and direct the flows of all life.

Mountains give; they direct water, animals, and people. The legend of Taita Buerán, a story told by the Canari people, whose ancestral land is within the borders of present-day Ecuador, can help us understand how mountain peaks are venerated and conceptualized in the Andes.

Buerán has human qualities and is described as short, clothed and even with emotions. This is emblematic of the Andean “Huaca”, a spirit that exists in animate or inanimate things, found in nature.[2] Huacas interface with humans interestingly, sometimes acting as portals between the natural and supernatural world. In this way, the sacred mountain is fundamentally intertwined with Andean people, who do not see themselves as inseparable from the landforms. In fact, the Quechua word “Apus” means spirit of the mountain and is the most revered of the natural animas.[3] Andeans respect it, even fear it as they observe its influence on the cosmos akin to Taita Buerán’s storm bearing mood swings.

Man, in many cases, is mountain. In parts of the Andes, hills are assigned body parts or organs. These become the interface



Fig 3.1 Mountain peaks on the outskirts of Cerro de Pasco, looking towards Huagurucho.

Fig 3.2 (previous spread) Revered mountain peaks on the horizon of the Bombon Plateau.

between Andeans and sacred offering sites meant to propitiate the Apus. The interconnectedness of the mountain and man extends to the two-sharing fate. In one case “medicine men determined that a woman’s blood was weak because a landslide (on the mountain) had taken it and replaced it with water.”[4]

The andes were forged for over 15 million years through deep geological action. Born from a process involving the gradual sinking of the oceanic nazca plate below the south american plate. The mountain range, which is relatively young in geological time, experiences persistent uplift which is the source of great seismic activity.[5] This is the origin of the venerated mountain, and on the central cordilleras, current location of the city of cerro de pasco, a geological incident made mining earth minerals possible.

Sacred mountains are now a source of vast wealth in the andes and as a result are endlessly extracted. Their mass exploitation began with the discovery of the new world and the foundation of cities like potosi, which caused widespread legends of fortune in the new world. The Americas were now a place to find and strike riches and circulating representations of the city of silver perpetuated this idea across the world.[6] The mountains surrounding these cities became associated with this wealth, including Cerro Rico, a mountain dominating the horizon of Potosi, translating to “rich mountain.” The hill, mined for silver, has been nearly hollowed out after almost 500 years of mining its interior.[7]



Fig 3.3 Houses on the mountain side of Cerro de Pasco.

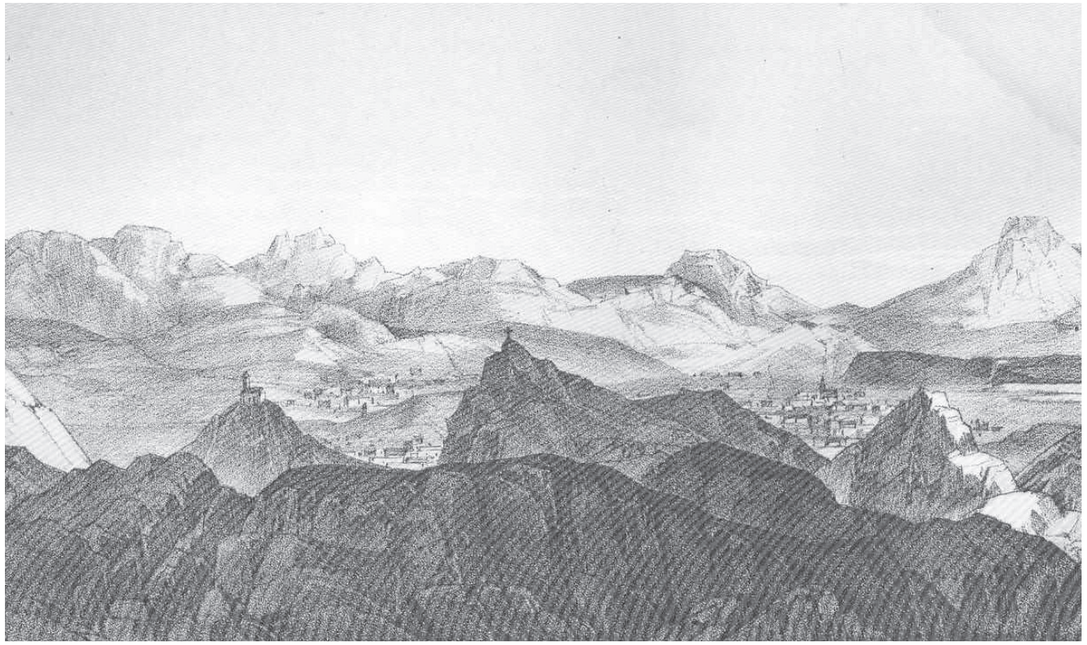


Fig 3.4 Old City of Cerro de Pasco, Herndon, W. M. Lewis, 1853.

Fig 3.5 (Opposite) Cerro Rico and Villa Imperial de Potosí, with reservoirs supplying water to mills, Francisco J. Mendizábal, 1755–75, courtesy of Museo del Ejército, Toledo, Spain.



A trip to the Huayllay rock forest around 40 km south of the mining city on the same plateau of the Puna ecozone begins to reveal the mountain's symbolic power and importance to the people who live around them. An area of weathered ignimbrite[8] juts out of the plains, west of Lake Junin, which creates a natural phenomenon that resembles the insides of the mountains reaching out to the sky. Now a park surrounding the town of Huayllay bringing in numerous tourists, the stone forest contains a complex network of trails connecting human visitors directly to stories of stone. A tradition of encountering the massive rock pillars is the reading of the forms of animals or other beings in the profiles as they naturally occur. One may observe rock formations resembling camelids, birds, humans or other species. It is here that all ancient actors in this landscape are one with the mountain, memorialized in stone, with the apus as their origin. The peaks of Huayllay reveal a deep symbolism and connection of stories to the landscape. In fact, there is evidence that even primitive hunter gatherer humans took shelter among the rock pillars, in the form of cave paintings and archaeological remains.[9] For the ancient people of the Andes stones were perceived as living beings and thousands of fables are rooted in humans turning to rock or becoming petrified.[10] Stone in this way represents culture, ancestors, past actions, and histories.[11] Today these same stones are a source of mineral wealth that draws corporations into the hills.

Generations of extraction around mountains have meant the extent to which humans shape the sacred hills has changed immensely. In the 21st century, in Cerro de Pasco, a series of industrial bodies like mountains flank the horizon. This has drastically altered the landscape surrounding the city and has fundamentally altered the image of the high Puna where the city is located.



Fig 3.6 *The Crown* and *the Alpaca* rock formations at the Huayllay Sanctuary.



Fig 3.7 Rocks grow out of the plains of the plateau, reaching into the sky.

Fig 3.8 (previous spread) The valley beween rock outcrops in the Huayllay Stone Forest is grazing lands for native camelid species.



Fig 3.9 Legends are assciocated with rock formations, pictured above *the Crown*.



Fig 3.10 Birds flying above the rock forest, in local Quechua mythology they have a strong link to the mountain.

The Excelsior Waste Pile

Growing over the town of Champamarca, the Excelsior waste pile inches nearer and nearer to the town's edge. Its boundary is now demarcated by industrial fences; the waste pile prominently encircles the small town. The hill is a strange topography, a mound of decades old mining waste, made up of the by-products of low-grade ore, not valuable enough to process, but still removed from the earth to make way for what lies further beneath it. The residue has accreted on the surface; the subsequent landform towers over all human and non-human neighbors, a sort of alien portrayal of the sacred mountains that surround it.

If the mountains and their deep geological formation represent both the spiritual and productive heart of the region, then the human engineered mountains of the 20th century provide a realistic image of the new age of extraction in the geological era of the Anthropocene. The Excelsior represents the systemic removal of material from the earth at an unimaginable scale.



Fig 3.11 The human hill looks like the mountains it neighbours, but beneath is ancient mine waste rock.



Fig 3.12 The excelsior waste pile grows over the town of Champamarca.

The Excelsior appears static, like a hill, due to its sheer scale but it is a dynamic construction. It's a complicated engineering project that grows, shrinks and bleeds into its surroundings, affected by the change of seasons and its chemical makeup.[12] The mountain bleeds in the rainy season of Cerro de Pasco, and toxic materials that rise to its surface are allowed to wash off it and eventually make their way into the surrounding landscape, after being directed into an acid mine drainage channel.[13] On satellite images, the human hill barely reads as topographically distinct or significant. In fact, representations of the Excelsior make it almost disappear, covered up like a sore on the land reminiscent of the massive textiles that have covered its surface for generations to keep toxic waste rock from blowing off its surface.

The Excelsior involves a great deal of study. It is a multidisciplinary project involving engineers interested in its safety, environmentalists in its toxicity, politicians in its ownership and corporations in its economic potential. The pile is divided down its center upon a concession line called "el Metallurgista", an area that the Canadian Cerro de Pasco Corporation owns the rights to re-exploit.[14] The waste rock from hundreds of years ago is now of immense value to mines as the concentration of ore in this material is valuable to exploit with new technology.[15] Recently a remediation strategy for the Excelsior has been proposed, involving its complete reprocessing, and moving. The pile's size will be vastly reduced, and a new resurfaced hill will exist in its place. The massive hills dominating the community of Champamarca will be removed, giving the town access to surrounding grazing lands once again.[16] This development has prompted efforts to understand the engineered mountain's chemical composition and history. A plethora of information about the history and material morphology of the waste rock dump is now known.



Fig 3.13 Children playing next to the formerly exposed tailings pile. Geo-textiles lined the top surface, to keep dust and debris from blowing onto the town.



Fig 3.14 The human engineered mountain looms over a playground in the town of Champamarca.



Fig 3.15 (previous spread) The south-side of the excelsior exposes its bones, a system of geo-textiles, gradually covered resurfaced with grasses.

Fig 3.16 Map of the Human Hill, the Excelsior in Context. The rock waste pile surrounds the town of Champamarca has polluted the towns soils and air. It is currently being resurfaced due to a recently declared state of emergency.



Fig 3.17 Revealing the technical qualities of the mountain. The hill has been sampled to understand it's geochemistry. Toxic material flows off of the mountain onto the Acid Mine Drainage channel to the west of the hill.

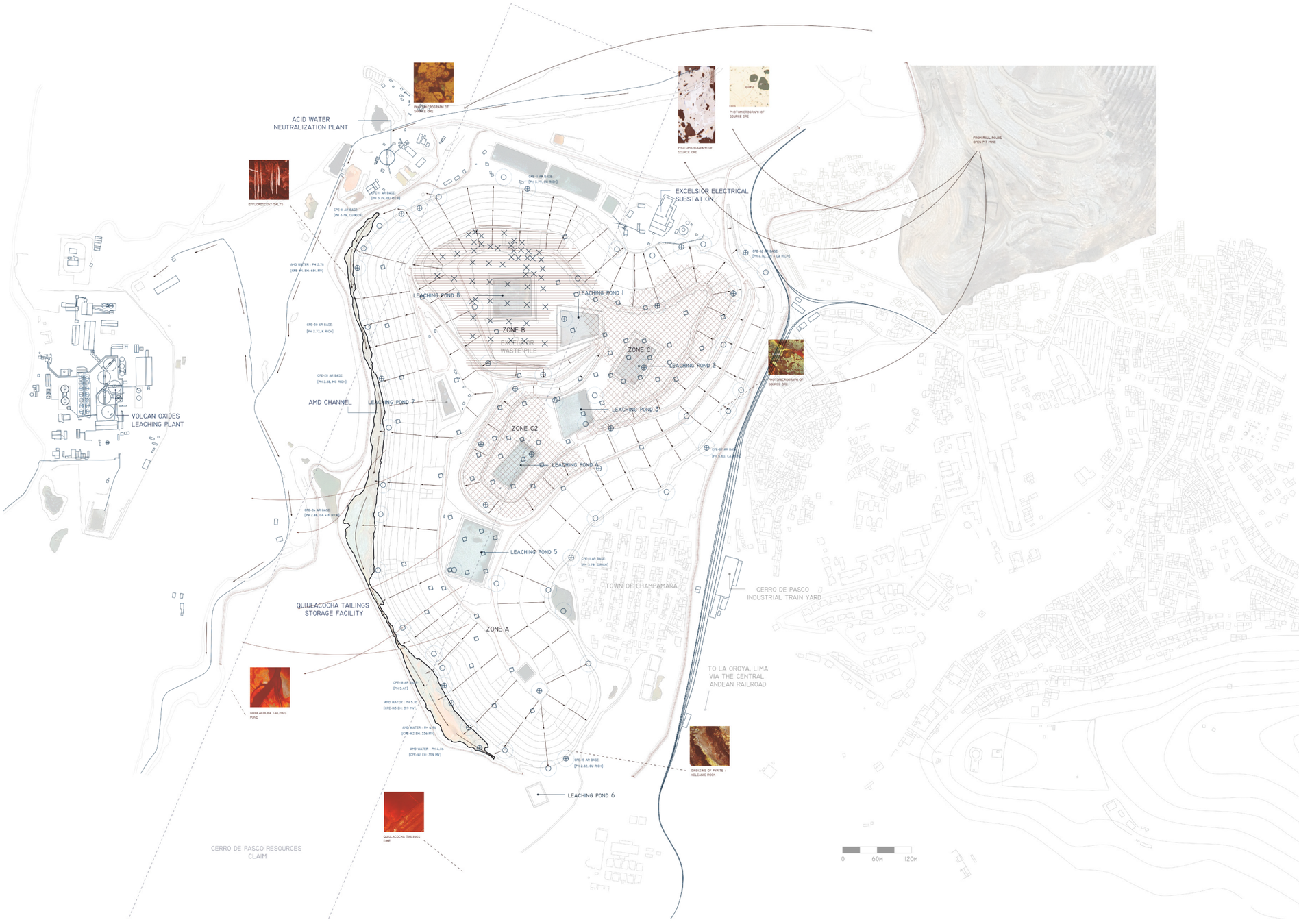


Fig 3.18 Matter movements + material history of the tailings pile. Three zones of mineralization reveal a history of mining through the stockpile.



Fig 3.19 Narrative plots on the Excelsior.



Fig 3.20 Typical exposed tailings pile on the outskirts of the neighbourhood of Paragsha.



Fig 3.21 Machines manage the tailings surrounding tailings piles on the horizon of the city. Its height rivaling the presence of the mountains over the horizon.



Fig 3.22 Excavator manages drainage channel at the base of the tailings pile, which has historically generated acid mine drainage.



exposed tailings material



concession owned by cerro de pasco corp



phase 1 : partially re-mediated Excelsior tailings pile



phase 2 : cerro de pasco corp. begins the exploitation and re-processing of waste material.



MOUNTAIN IS RESURFACED WITH LOCAL PLANTINGS.

TOWER IS ESTABLISHED TO CONNECT TOWN WITH MOUNTAIN.

phase 3 : re-processed waste is stored on the same location of the current site, and is built to correct remediation standards.

Fig 3.23 Remediation Strategy / re-expliotation plan for the Excelsior Stockpile.

The Tower Between Peaks

If Taita Buerán communicates with its neighboring peaks, what conversations would the natural mountain, forged through deep time, have with the human mountain made in an instant? To memorialize the human hill, a tower between the two peaks; one natural and one human, will be constructed using the re-appropriated materials of an existing headframe on the northside of the Excelsior. The headframe will reflect the form of the iconic Lourdes headframe that existed in the center of the historic city. (Now displaced by open pit growth) This tower will first be built into the waste pile and reveal itself as it is gradually excavated. An action of acknowledging the speed at which mountains are born and destroyed in the city. The hill's disappearance without a trace, even as it is remediated, is a pattern of continued erasure that may perpetuate the notion that topography, in Cerro de Pasco, is fleeting.

As the proposed tower is excavated from the face of the human hill it will become the grounds for a mitigation project that protects the town of Champamarca. From the tower, wind screens and textiles are deployed which shield existing houses and town infrastructure from dust and debris generated by the undertaking of razing a mountain.

After the human mountain is fully excavated and removed, the tower will stand adjacent to the town, denoting the mountain's former height. But the mountain of waste and the people who have endured its toxicity for generations should be memorialized. The design will therefore freeze matter in place. Critically mapping the excelsior has revealed its material history. Different zones of the waste pile contain waste rock from different eras of mining, a tower that reveals the matter from within the hill will therefore make accessible the history of mining through its byproducts. Waste rock, in this way, represents the conceptual antithesis to the ancient stone of Huayllay's rock forest. By putting on display the matter once contained within the ghost mountain, visitors to Champamarca can memorialize the prominent hill that once surrounded the town.



Fig 3.24 Collage, stage two of the of the tower's construction. As mountain is excavated, the tower is wrapped in the same geo-textiles that cover the earth.

In the far future the landscape surrounding the town will be resurfaced and planted with native vegetation. When surrounding landscapes are overgrown and the resurfaced hills are occupied with wildlife, the symbolic tower will find use as a bird observation deck, letting residents of Cerro de Pasco interact with the multi-species relatives of the mountains, strongly associated with the Apus.

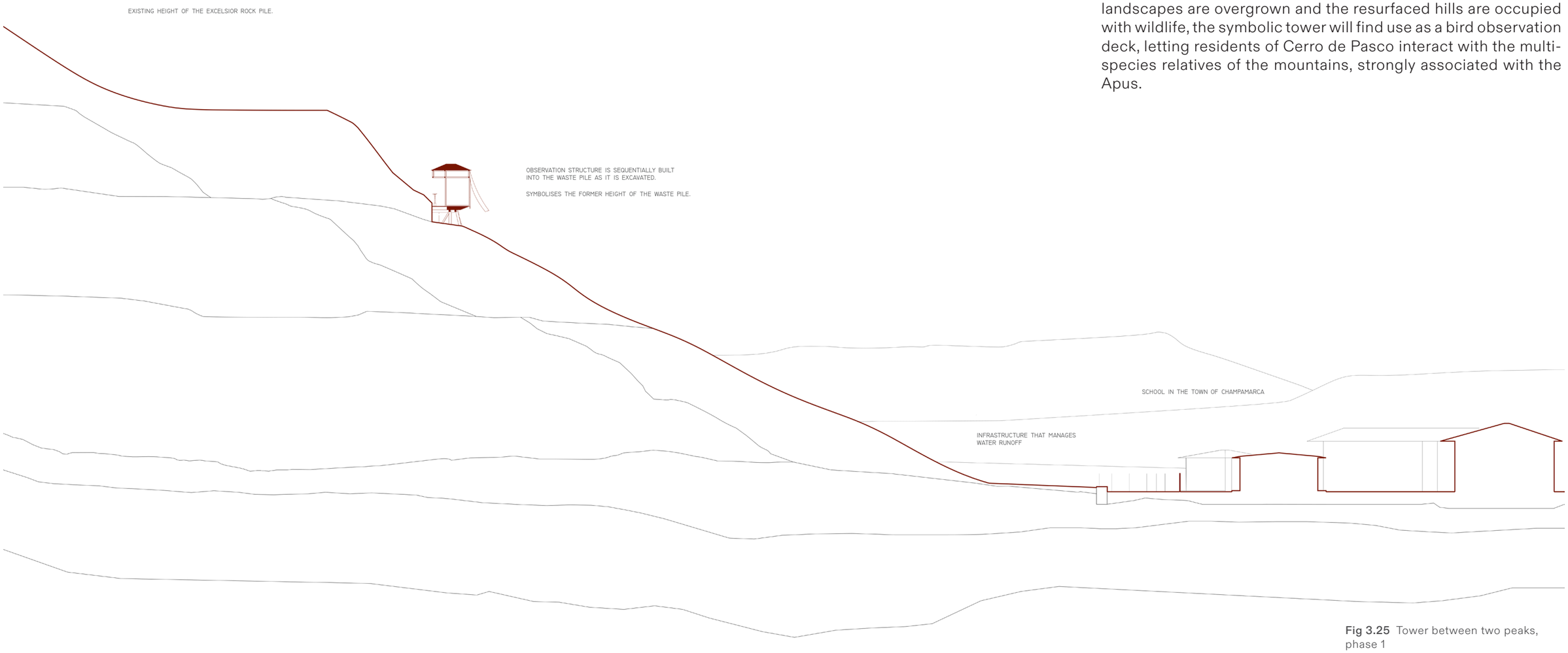


Fig 3.25 Tower between two peaks, phase 1

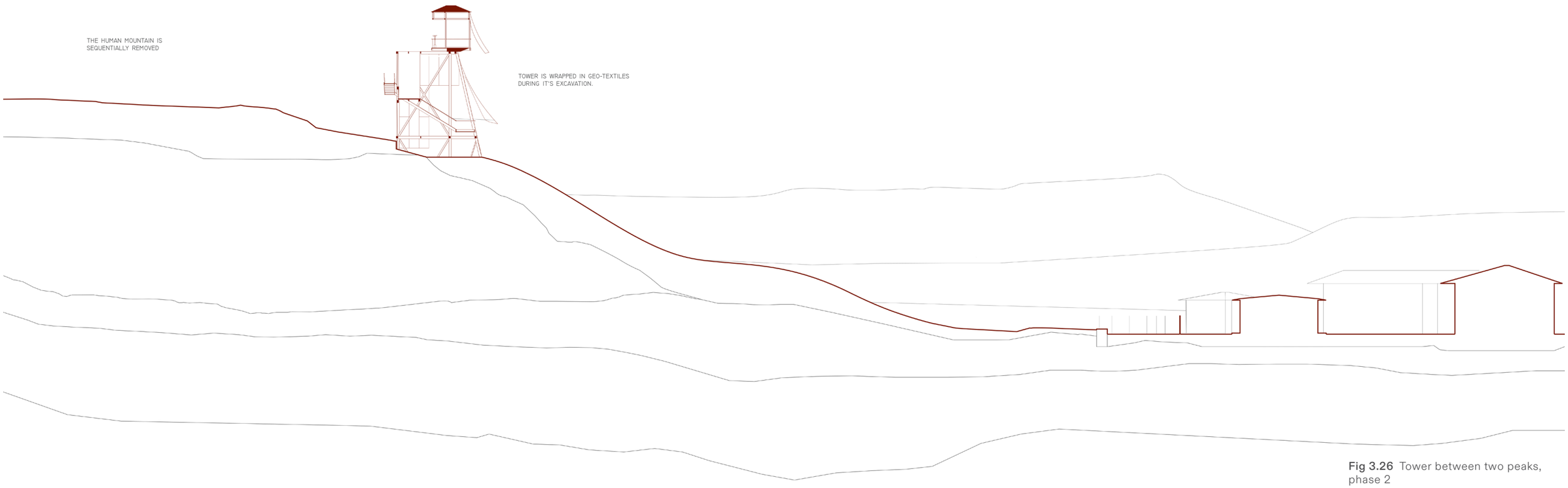
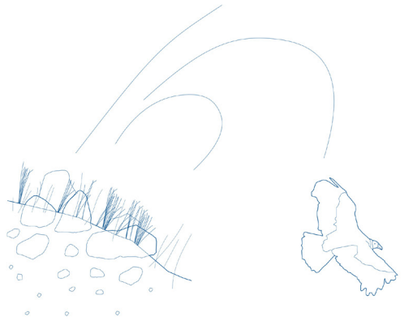
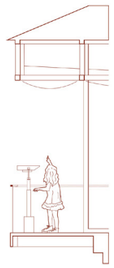


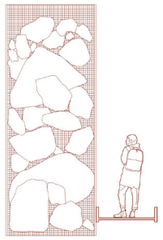
Fig 3.26 Tower between two peaks, phase 2



\+ BIRD HABITAT ESTABLISHED ON REMEDIATED TAILINGS PILE.



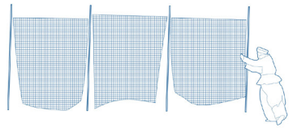
BIRD WATCHING LOOKOUT + OBSERVATION TOWER PERMITS VISITORS TO STAND AT THE FORMER PEAK OF THE EXCELSIOR WASTE PILE.



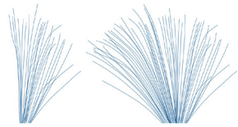
SUSPENDED STONE, PETRIFIED AS IT ONCE WAS INSIDE THE WASTE PILE.



STORIES OF STONE, FORMS FROM THE ROCK FOREST OF HUAYLLAY. MATTER IS MYTH.



CLOUD CATCHERS CONVERT FOG FROM MOUNTAIN TOP INTO WATER FOR IRRIGATION SYSTEMS AND REMEDIATION.



JARAVA ICHU GRASSES ARE NATIVE TO THE PLATEAU. TO BE USED FOR THE RESURFACING OF THE EXCELSIOR.

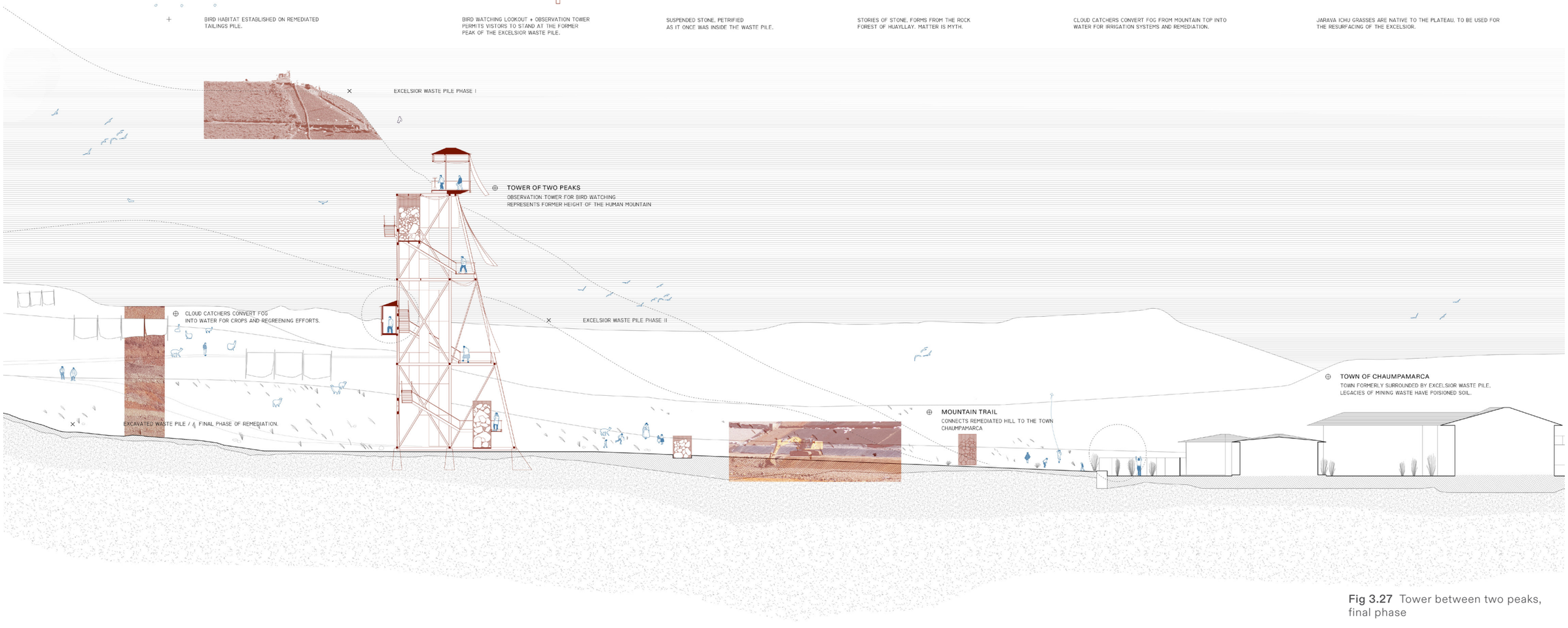


Fig 3.27 Tower between two peaks, final phase



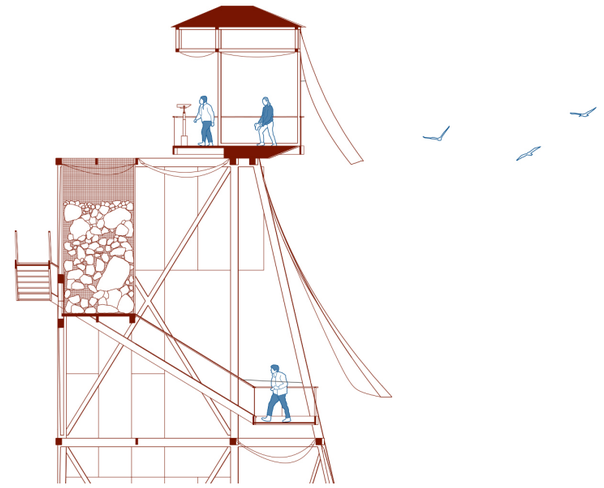
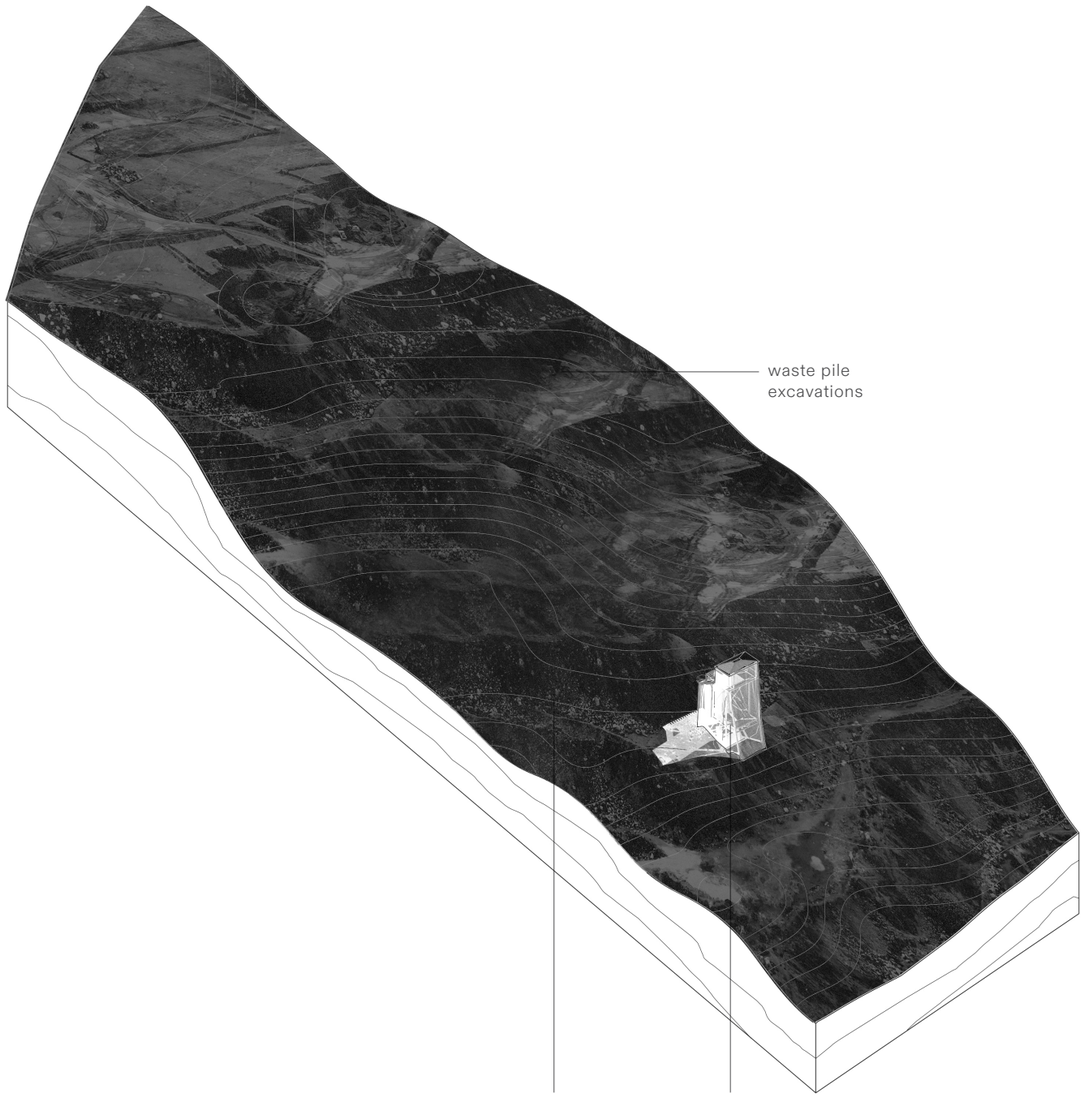


Fig 3.28 Tower Phase 1: Set into the Excelsior.

Fig 3.29 View of the Observation deck.



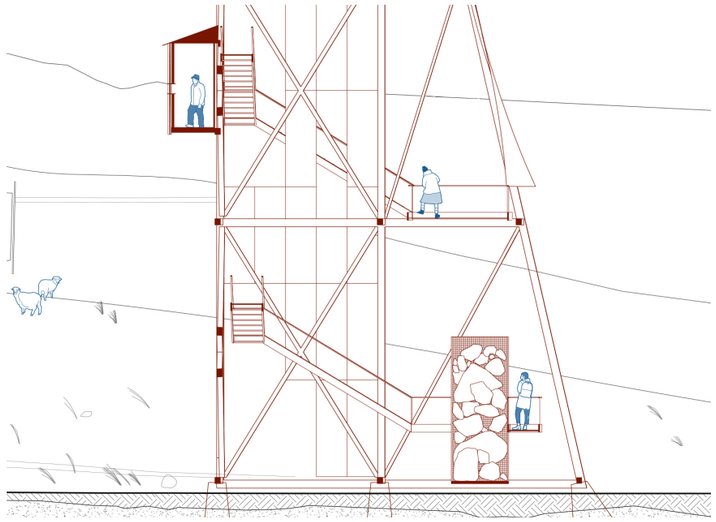
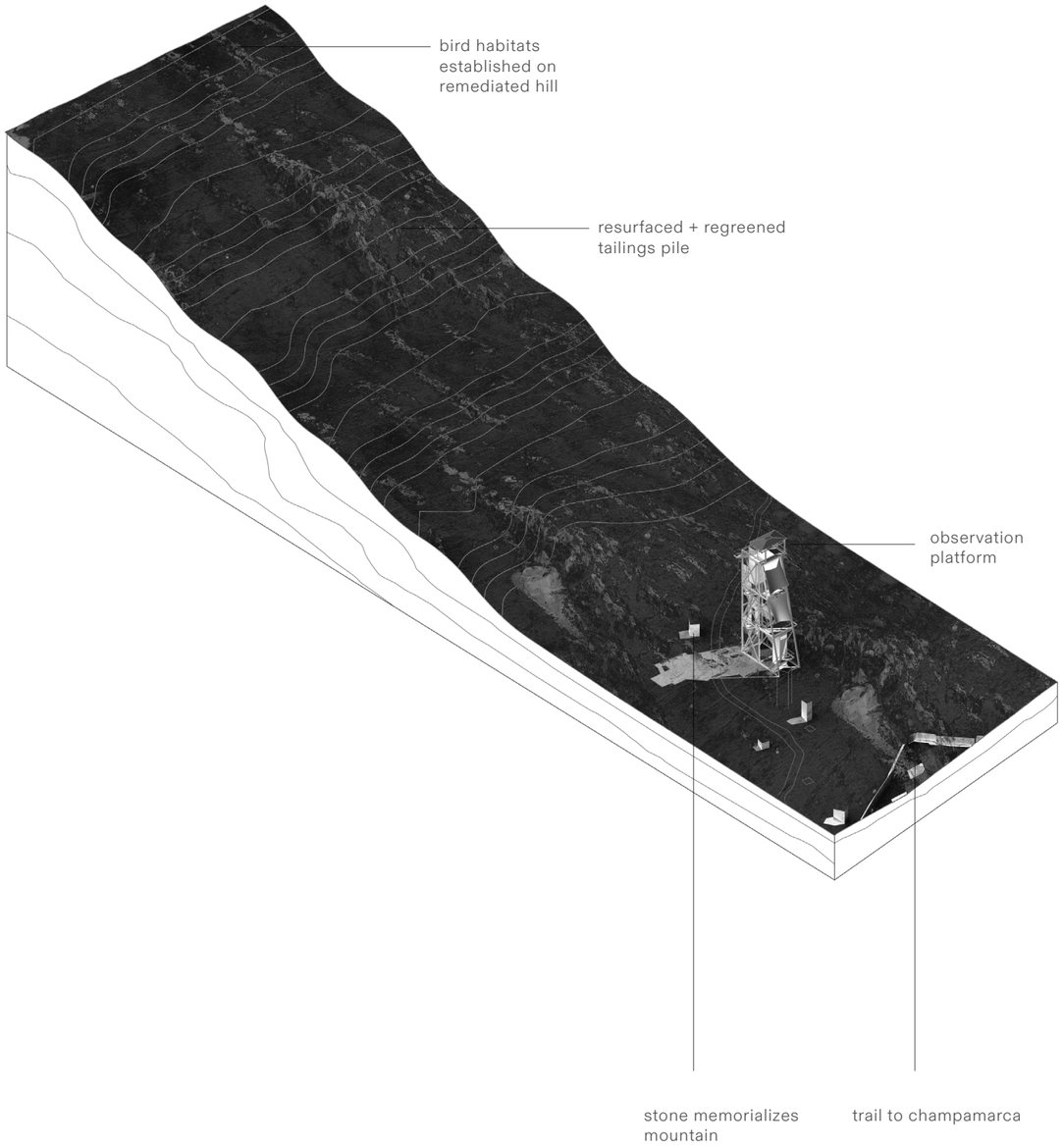


Fig 3.30 Tower phase 2: Partly Excavated from the Hillside.

Fig 3.31 View of the tower's core with geo-textiles that hang from its edges.



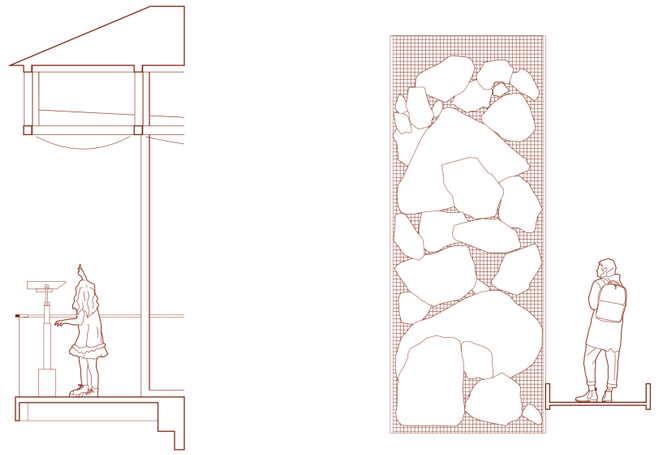


Fig 3.32 Tower Axo phase 3: Tower is Freed from Hillside denoting the height of the former hill and providing views of the adjacent remediated hill.

Fig 3.33 View of the matter suspended in the tower and observation platforms to percieve the site's history.

Endnotes

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lakes + toxic lagoons

The Legend of Lulicocha

On the side of the road that connects the town of Ninacaca with Huachón, there is a beautiful lagoon full of trout that has been given the name Lulicocha. The following legend is told about this place: Quite a long time ago, on the edge of this beautiful mountain lagoon, there lived a man whose livelihood depended on raising sheep. He lovingly went to graze over long distances. Every day he had to prepare his food after arriving tired at his house. One day he was surprised to find his humble hut very neat and tidy and, on the table, a hot and delicious lunch. Certain that he was the victim of a joke, he was contemplating the appetizing stews displayed there, which in the end were devoured by the extreme appetite that compelled him. Everything was very pleasant but no matter how hard he tried, he couldn't imagine who could have played that joke on him. When the same thing happened the following days, his curiosity increased. Tremendously intrigued, one day he pretended to go to work and stealthily returned, making a detour to the back of a hill from where he could clearly see his hut and, settling behind a rock, he lay in wait. Not much time had passed when he saw a beautiful woman enter his home and start cooking. With great stealth he came down from the hill and surprised the girl inside her house. - You're the one who prepares my food, right? -he asked. "Yes," the young woman responded weakly and completely disturbed. - why?! - Every day I saw that you came very tired to prepare your meals with great difficulty, that's why I decided to support you. - Who are you? -asked the shepherd. - I am the soul of this lagoon. I'm Luli Huarmi. - But you are a woman! - Clearly! - So, if you want to help me... Why don't you marry me? - Well. If you want it, I will be your wife, with the only condition that you never betray me, in which case I would be capable of revenge...

...Soon they were happy with the arrival of a baby. In this loving atmosphere they were very happy for some time until, pressed by necessity, he had to go to Cerro de Pasco to do business. Then his journeys became continuous, lasting six to seven days each. During these separations nothing abnormal happened until one day when her husband was absent...

...the woman, who little by little, sowed her distrust and lack of love towards her husband until she ended up hating him mortally. Poisoned with jealousy, the woman looked for a way to get revenge on her husband without knowing that he dedicated himself entirely to his task as a supplier of meat to the miners. Determined to punish what she supposed was the betrayal of her husband and convinced that their child was the supreme adoration of man, she decided to retaliate through the child.

One noon, when the man was returning from the Cerro mines, he saw that a foaming iron pot was boiling on the stove. He called out to his wife shouting loudly, but she did not respond, hidden as she was. The man then approached in order to find out what stew his wife had prepared for him. He lifted the lid of the pot and, horrified, saw the little boy inside it. - Delirious, he went out to ask his wife and only managed to observe that she submerged into the waters of the lagoon followed by all of her animals. The man went crazy and soon buried himself in the snow; The lagoon, for its part, became cursed. When a pregnant woman approaches it, it is certain that the child she is carrying will inevitably die.

A story from "Voices from the Sinkhole: Tales and Legends in the Cerro de Pasco", by César Pérez Arauco, translated by Author.[1]

The folk story of Lulicocha is of a cursed lake near the mining city of Cerro de Pasco. In the high puna lakes are connected to the mountains for their spiritual power.[2] In Andean belief water from still lakes represents femininity and is often the source of new life in stories.[3] But the story veers into the realm of horror, a narrative entwined with the legacy of mining and the desecration of scared waters. Here, the woman of Lulicocha personifies the fertility of the lake, while man represents the pollution of that fertility reminiscent of how modern humans have used headwaters as places to store mining waste. What was a source of life for the region has become, in the age of extraction, a source of pollution that poisons what it comes into contact with.

This tale is one of numerous stories of lakes based Huacas around the Andes. Bodies of water are said to contain mystical realms beneath their surfaces and often have supernatural protectors,[4] similar to the woman of Lulicocha. The story is of utmost relevance to this project as symbolic lakes surround the city of Cerro de Pasco. In fact, Cerro de Pasco's own origin story is based on an important lake at its center, Patarcocha, which still acts as the nucleus of the mining capital.



Fig 4.1 Lake Patarcocha sits at the centre of the city. It's associcated with origin myths of mining in the town.

Among the storied lakes of the Pasco province, none command greater reverence than Chinchaycocha, also called lake Junin. Sitting entirely within Peru's border, the expansive body of water is a source of immense biodiversity, acting historically as a habitat for numerous rare bird and plant species.[5] The massive surface of water reflects the panoramic sky like a mirror among the tall grasses of the wet Puna. Along its eastern shores, a dense wetland teems with aquatic life, punctuated by the occasional country house, and intersected by a national railway – The lifeline connecting the mining capital in the clouds to the distant coast some 160 kilometers away.[6]

The basin, only 40 kilometers south of Cerro de Pasco, is connected by watershed via two tributaries, the San Juan and Mantaro rivers.[7] Inevitably, the mining activity from Cerro de Pasco has contaminated the waters of Chinchaycocha, as high levels of iron oxide sediments have been observed in the water, affecting protected bird species.[8] The result is not uncommon for Peru at large, a nation that has granted hundreds of mining companies unlimited water rights, in regions of water scarcity which has resulted in conflicts.[9] With these rights, companies threaten access to water and outright eliminate sources, which to Andeans, comes from deities of the mountain.[10] Further, for indigenous populations in the Andes water is connected to traditions of reciprocity, which is inherently at odds with a western conception of water as resource.[11] There is a problem not only with rights and access to water in the Andes but also with its quickly changing conceptualization.[12] This is made obvious around mine sites, where places of vitality become landfills in the form of tailings ponds.

Fig 4.2 (previous spread) typical body of water on the plains of the Bombon Plateau.



Fig 4.3 Tall Peruvian Feathergrasses or *Jarava Ichu* on the perimeter of lake Chinchaycocha.



Fig 4.4 (previous spread) Marshlands on the west side of Lake Chinchaycocha towards the town of Ondorres.

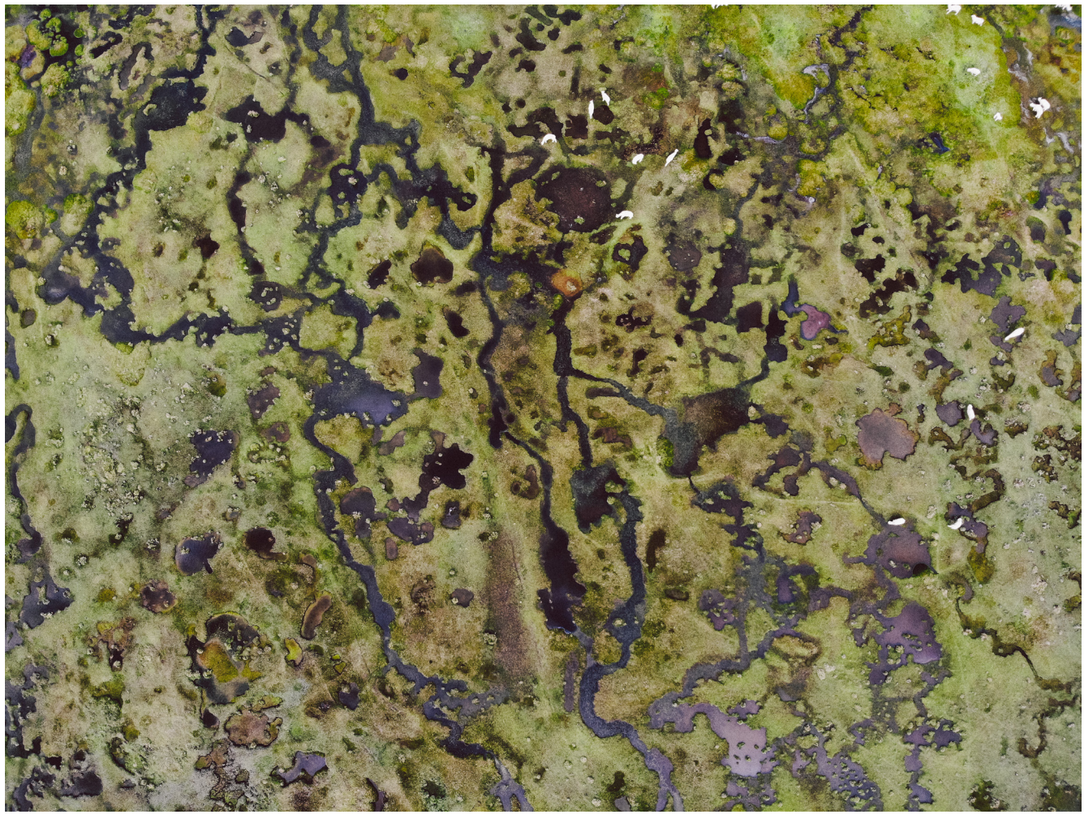


Fig 4.5 Northern Wetland of Lake Chinchaycocha, towards the Upamayo dam, Cerro de Pasco.

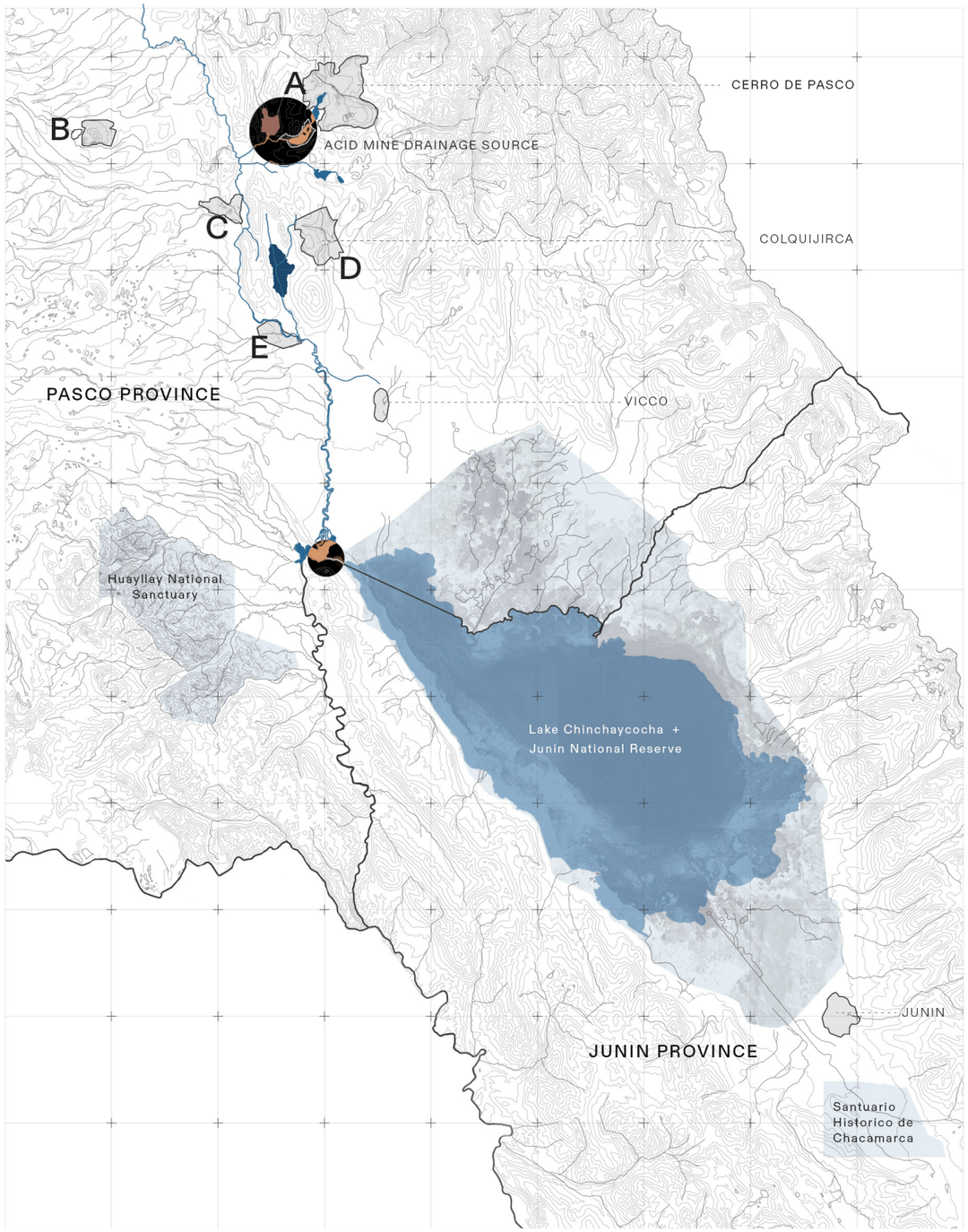


Fig 4.6 (opposite) Mapping Extraction Industries on the Junin watershed

A - E Extraction sites
Protected areas
Water
Major polluters

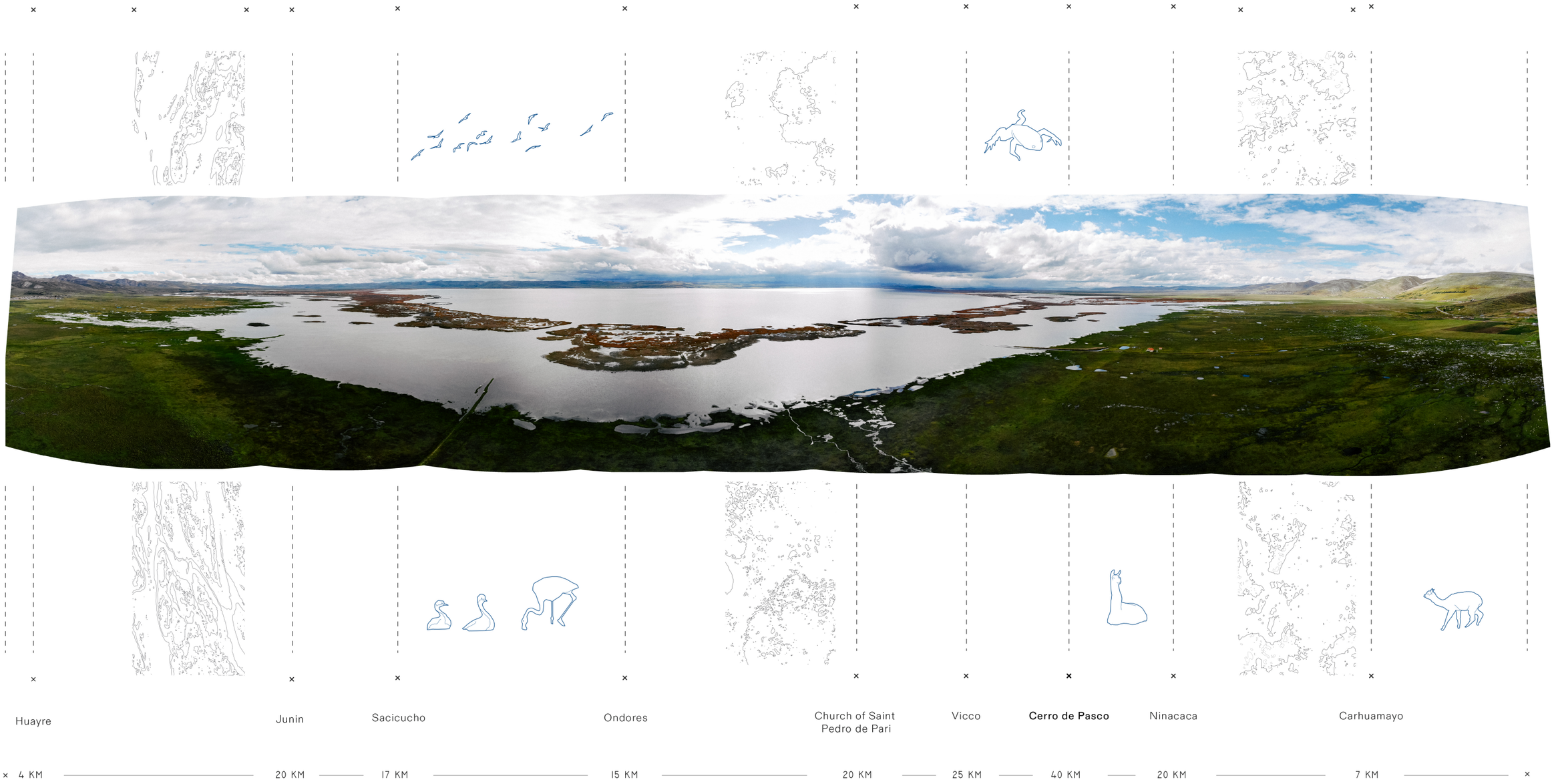


Fig 4.7 Panoramic view of Lake Chinchaycocha, iconic lagoon of the Bombon plateau.

Lake Quiulacocha

A peculiar body of water vaguely resembling a lake lies on the fringes of Cerro de Pasco. The alien volume seems to have implanted itself into the landscape, an imposter among lakes. The body of water, called Quiulacocha is only a ghost of its former self, a once historic lake, deriving its name from the Quechua word for seagull.[13] Now stained a red and orange hue, its waters are silent, bereft of biological life and avian inhabitants it once welcomed. Quiulacocha is part dry tailings, part pond, a storage for historic mining waste kept in its depths. Like its neighbor, the human mountain the excelsior, the tailings pond holds immense wealth in the form of ancient mine detritus. The byproducts of the processes from hundreds of years ago are now of higher grade than material pulled out of the earth today. With new technology Quiulacocha will be re-exploited through a process of intricate damming, water treatment, and finally, massive earthworks.



Fig 4.8 Edge of Quiulacocha tailings pond



Fig 4.9 View of Quiulacocha tailings pond.

Quiulacocha, like its neighboring waste store, the Excelsior, is a complex engineering project, including an assemblage of hydrological dynamics, environmental management infrastructures, and speculative possibilities. The water body interacts with surrounding sources of acid mine drainage, which contribute to its problems of toxicity.[14] Consequently, efforts are underway to dam and re-exploit the tailings storage, spearheaded by the Cerro de Pasco Corporation, with the ultimate goal of remediation.[15] The prospect has prompted the intense sampling of the lake's waters which has revealed a history of exploitation etched into the layers of its sediment. Copper sulfide tailings at the bottom of the naturally occurring lake represent the first zone of ancient tailings storage. The waste, a slurry that is the byproduct of separating ore from rock, can be traced to copper exploitation of the 20th century.[16] The stratigraphic layers of the dry tailings deposit contain zinc and lead sulfides, evidence of mining around 1947 and beyond.[17] This historic matter now contains inherent economic value[18] and the "el Metalurgista" concession, will be the site of future exploitation.

Quiulacocha is a site of dynamic spatial inquiry as its reprocessing plan is connected to remediation. A project of convergence between past and future, nature and artifice, its reclamation requires an intricate understanding of its material and technical processes. Currently, the lake's waters are neutralized by a treatment plant on its north shore. Gradually, clarified water runs through a system of geomembrane pools and is reintroduced into the surrounding watershed.[19] Of utmost concern is the seasonality of the tailings deposit. During the rainy seasons, the pond is at an increased risk of overflowing, which would be detrimental to the already ravaged surrounding landscape.[20] The remediation plan is the conceptual foundation of this exploration and will clean the waters of lake Quiulacocha, transforming the fields of tailings sludge into a wetland reminiscent of the edges of Junin.



Fig 4.10 View of drainage channel on the dry section tailings storage facility.

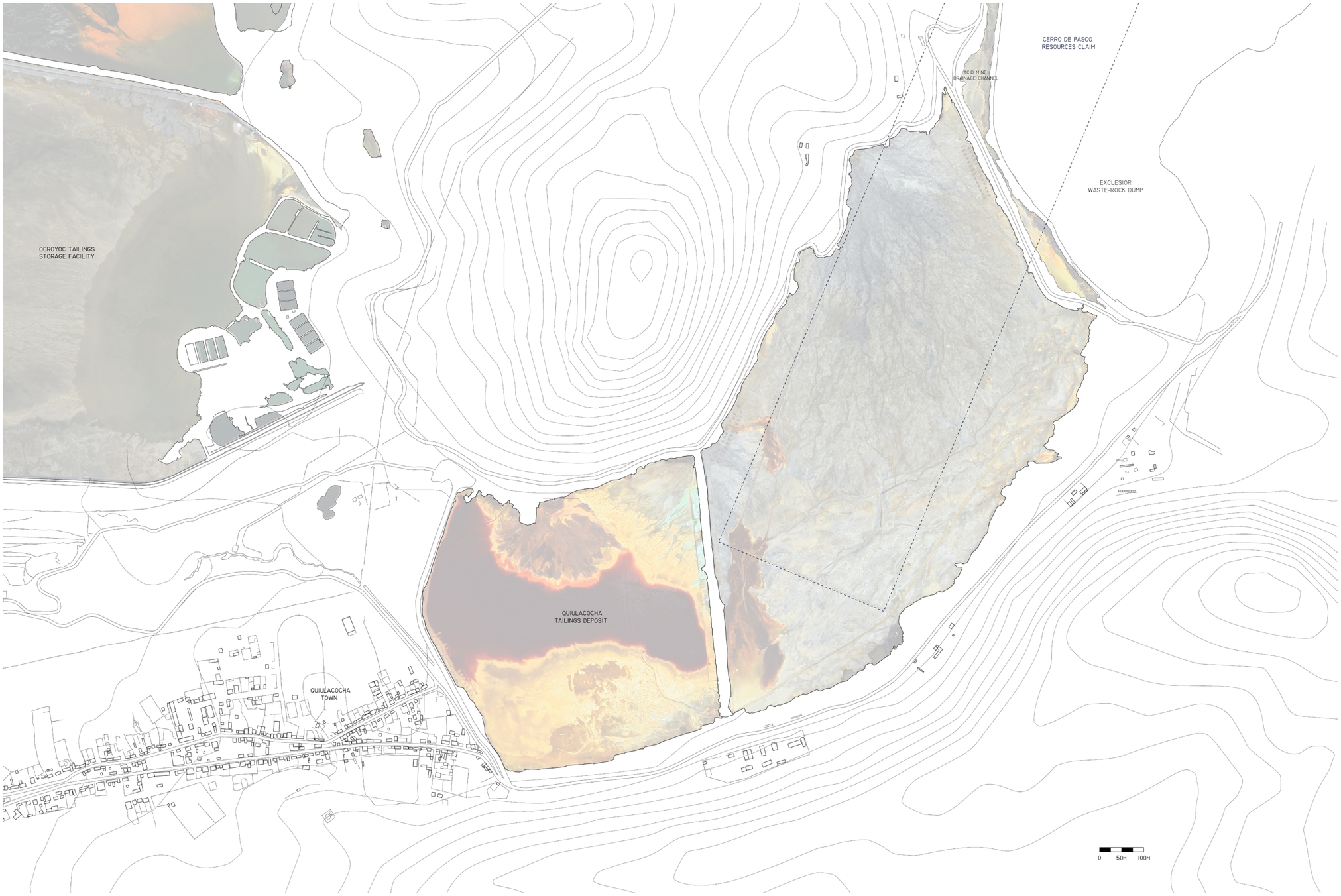


Fig 4.11 View over the center of the Quiulacocha tailings pond

Fig 4.12 Quiulacocha + Ocroyoc Tailings ponds on the southwestern edge of the city of Cerro de Pasco.

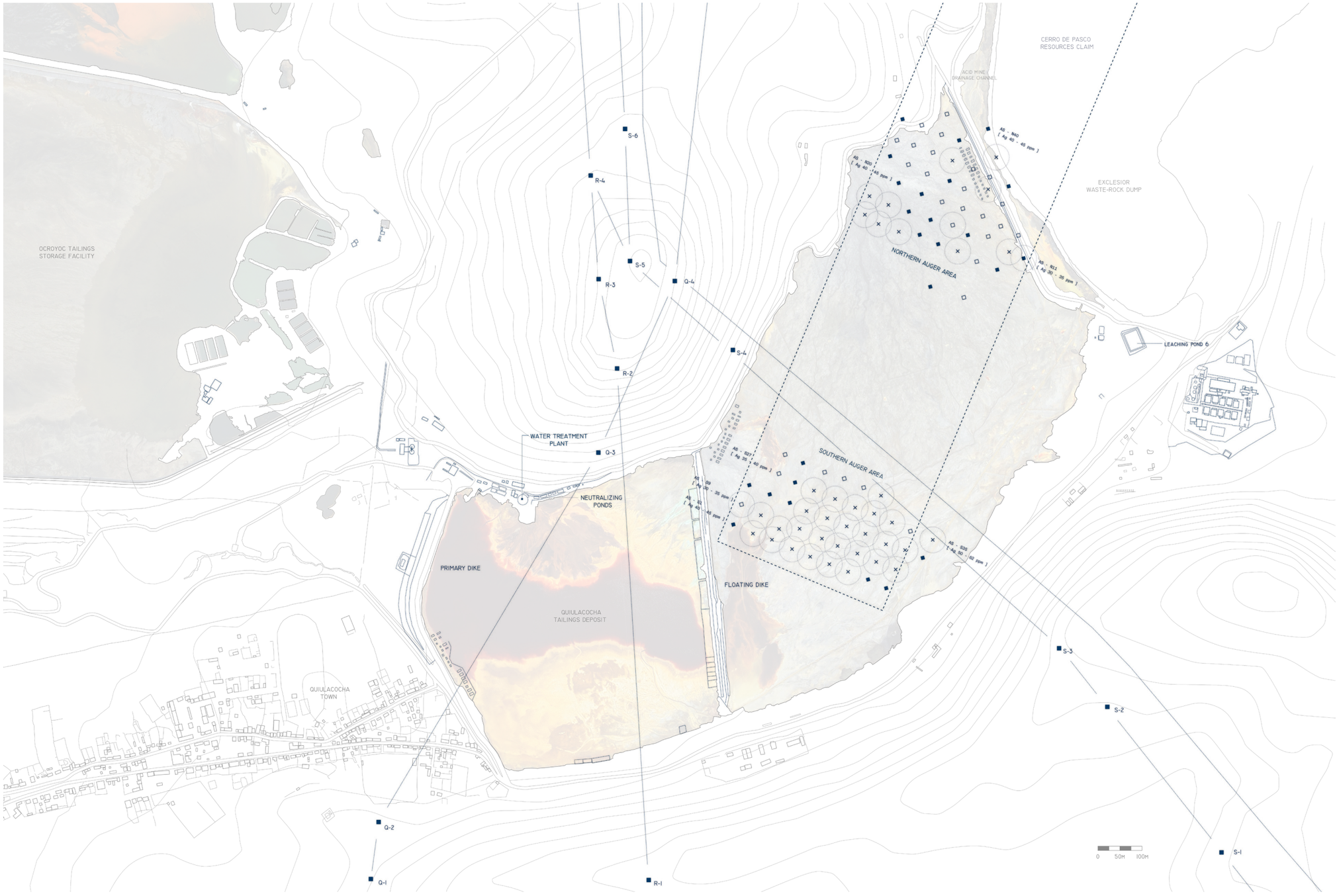


Fig 4.13 Revealing the technical. A collection of dams, plants and channels carefully control the project of Quiulacocha. Sampling points test the future viability of re-exploiting the historic tailings slurry.

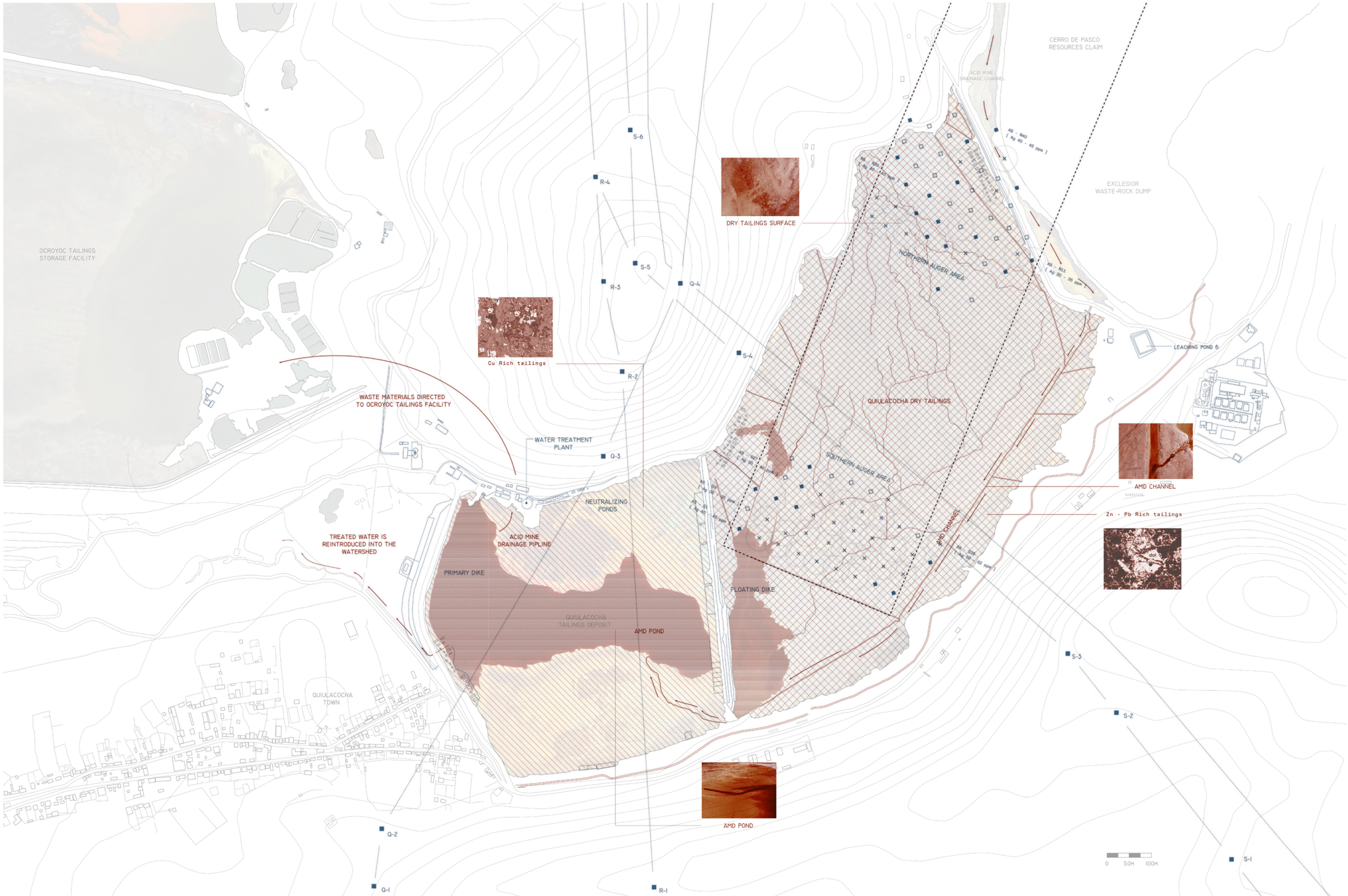


Fig 4.14 Mapping Material flows of Quiulacocha. Channels that direct the flow of water, points that the water body bleeds.

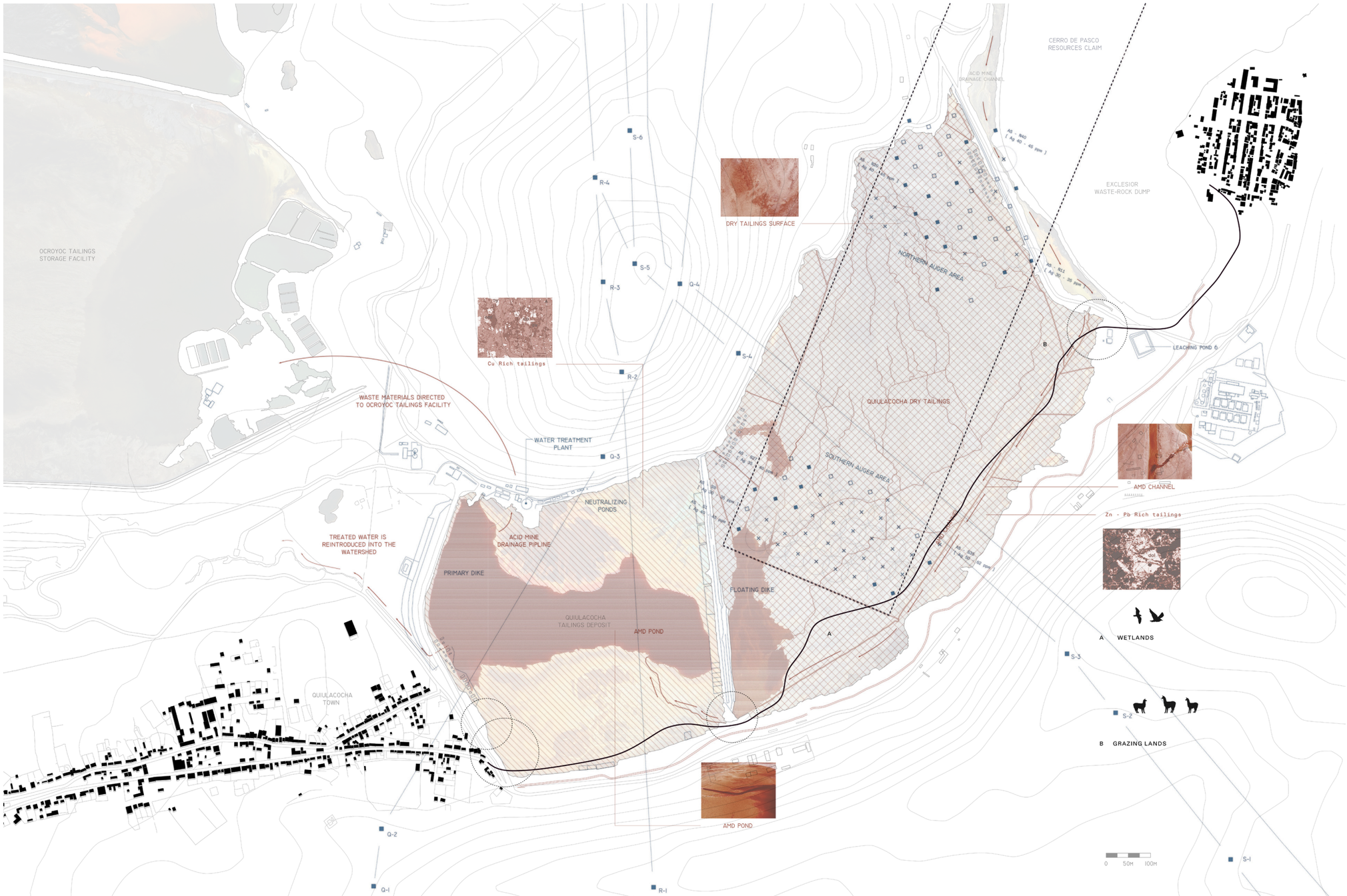


Fig 4.15 Narrative plots



Fig 4.16 Dyke separating the dry and pond portions of the tailings deposit.



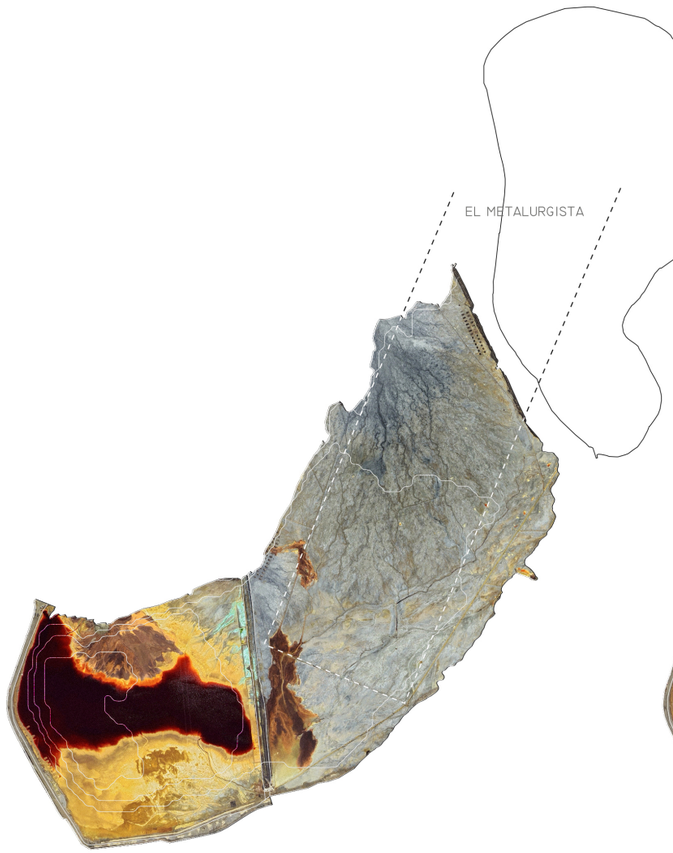
Fig 4.17 Water treatment facility on the north side of the tailings pond.



Fig 4.18 Drainage channels and water management on the perimeter of the storage facility.



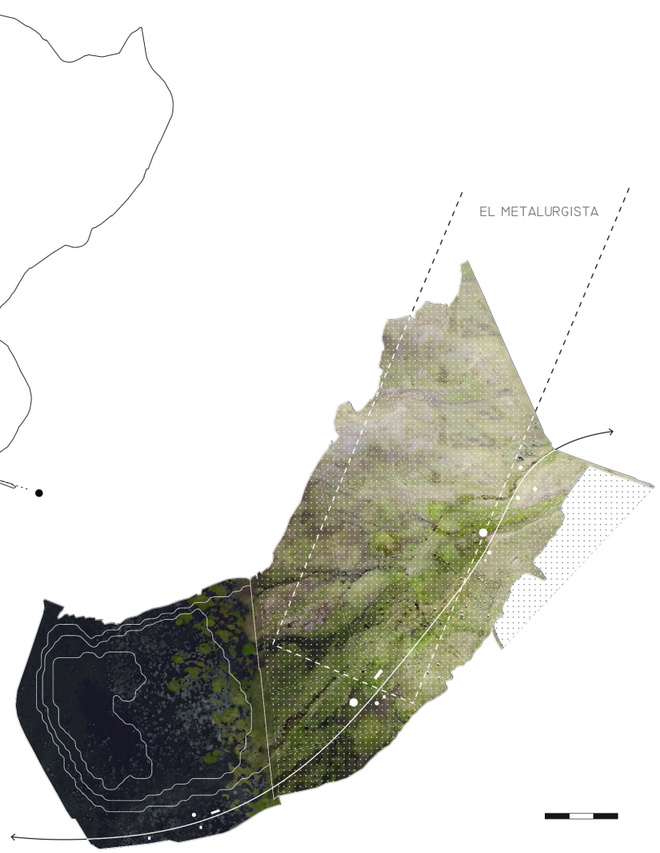




Phase 1: Existing Quiulacocha dry and wet tailings impoundment, Partly remediated by AMSAC



Phase 2: Installation of dams that permit the control and sequential remediation of quiulacocha.



Phase 3: Resurfacing and cleaning of pond to allow Quiulacocha to become a community asset.

Re-seeding of topsoil, establishment of community trails

Fig 4.19 Remediation framework for the Quiulacocha tailings facility.

A Trail Between Tailings

Lake Quiulacocha's current status as a tailings pond is similar to the lake of Lulicocha; a polluter that poisons what it touches. The historic water body is now a toxic twin of its former self. Only the memory of the biodiverse lake that provided sustenance to the surrounding town remains. As it is remediated, its stories should be remembered. Without a reference to it's pyrite orange water, generations to come may forget the tumultuous histories of Quiulacocha, and its legacies of pollution. The remediation of quiulacocha includes damming, exploitation and resurfacing. Water will be pumped out of pond to make way for the dry material beneath, a process that changes the state of mater on the water body.

The re-occupation of lake Quiulacocha begins with a proposed walkway which connects a series of pavilions sheltering tailings monitoring equipment. This equipment includes stationary monitors which measure ground pressure. drones, and field documentation instruments. The structures, built initially as shells are made of reclaimed steel, sourced from nearby demolished mine processing plants. They will first facilitate the resurfacing of the tailings and then pumping and cleaning of water.

In the far future when Quiulacocha has been mined, and the materials stored in its depths reprocessed, the former sludge storage will be resurfaced. The physical states of matter at this stage of the lake begin to change, and it is here that matter should be frozen, so that its memory persists. A series of salvaged industrial sized drums, (sometimes used in the tailings floatation processes), will be repurposed and set into the landscape at the water level. These drums act as time capsules, permitting visitors to peer down into the history of the tailings pond and therefore the history of the mine itself. At this point the re-surfacing of the dry tailings section of Quiulacocha begins to fill incrementally. This resurfacing will bury the elevated walkway above the tailings establishing a trail on the newly established grade level. This pathway will become a spine connecting all pavilions along quiulacocha's remediation. Covered portions of

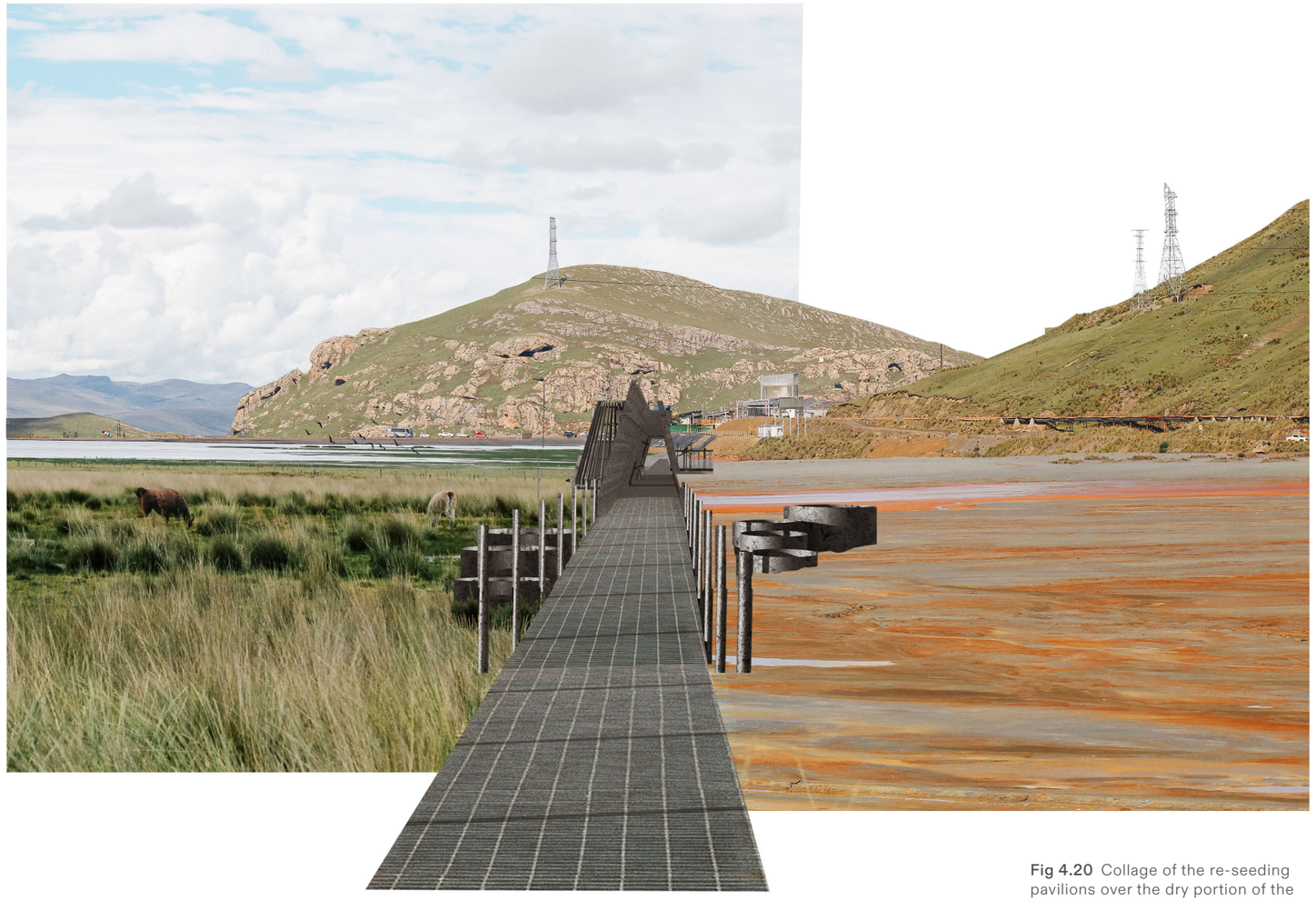
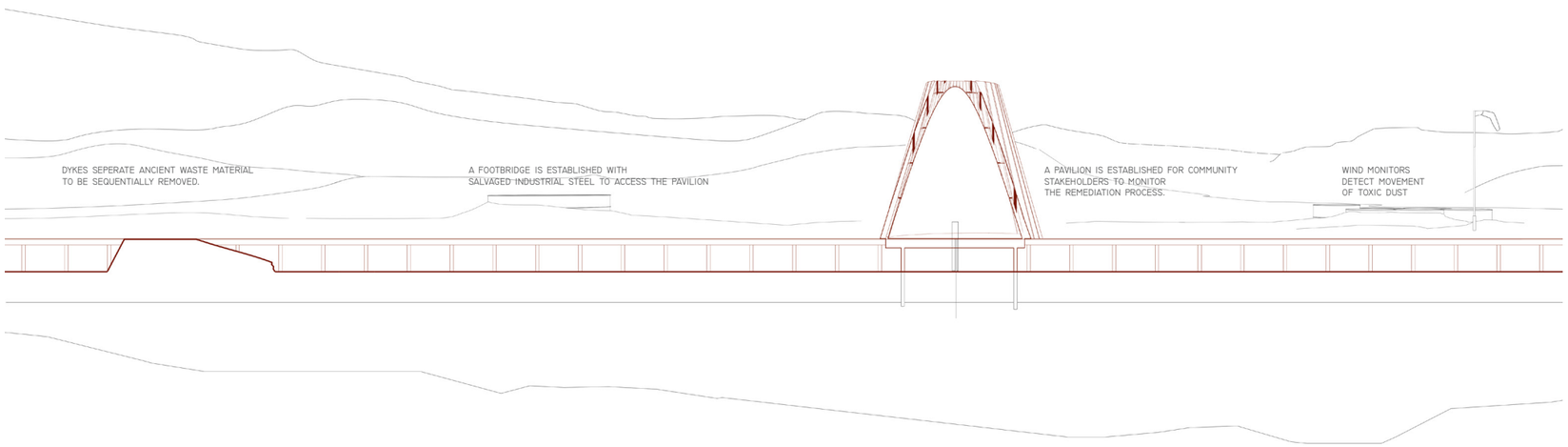


Fig 4.20 Collage of the re-seeding pavilions over the dry portion of the tailings storage. Half of the image is represented as remediated lands.



the pathway emerge, which connect enclosed sheltered spaces to the former tailings bed's great expanse.

The trails and remediated lands become overgrown in the far future. Reclaimed steel from the proposed tailings reprocessing plant (from Cerro de Pasco resources re-exploitation plan, which will be out of commission after waste is re-processed) is used to make a final series of structures along the pathway connecting the pond, wetland and grazing lands. These structures are overgrown and thatched with native grasses, Jarava Ichu or Peruvian feather grass, to fade into the surrounding landscape. A wetland seemingly grows around the pavilions as local planting begin overtaking former tailings storage. The pavilions along Quiulacocha will become intergenerational storytelling spaces and places to learn about the ecology of the Bombon Plateau and it's high-altitude lakes. It's surrounding wetlands will learn from the ecology of the edges of Lake Junin, establishing a deep connection to existing language of lakes found on the plateau. This wetland will gradually and seamlessly blend the landscapes of the marsh into lake Quiulacocha, which by this point has had the waste in its depths removed, and its waters cleaned.

Fig 4.21 First Phase of the re-seeding pavilion over the Quiulacocha tailings facility.

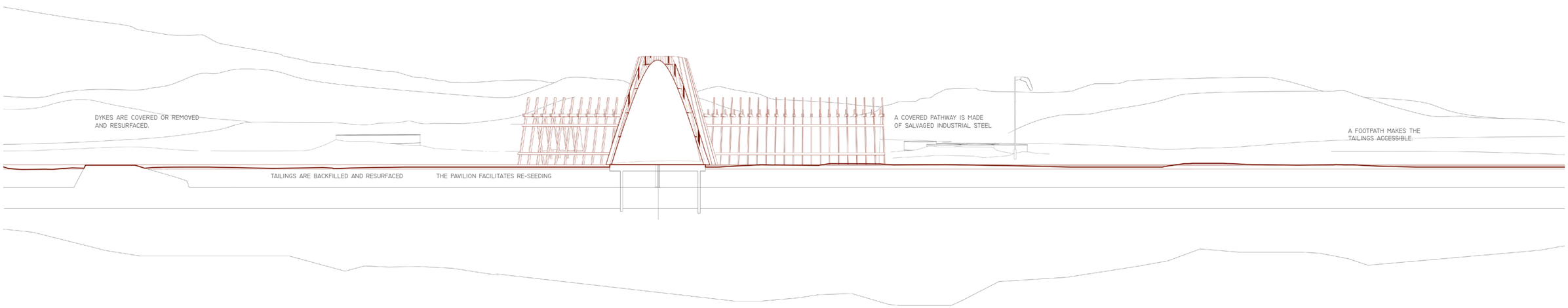


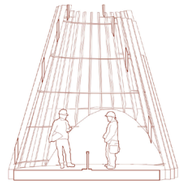
Fig 4.22 Second Phase of the re-seeding pavilion over the Quiulacocha tailings facility.



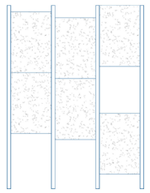
\+ WETLAND TRAIL ESTABLISHED BETWEEN TAILINGS POND + DRY TAILINGS.



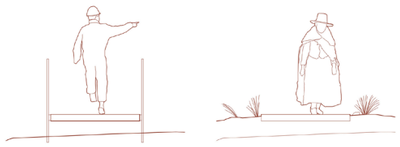
REMEDIATED SURFACE BECOMES A MULTI-SPECIES HABITAT, PROMOTING BIODIVERSITY OF LAGOONS FROM THE SURROUNDING PLATEAU.



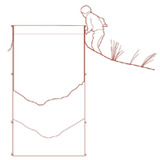
PHASE I OF THE STORY-TELLING PAVILLION IS REMEDATION MONITORING FACILITY. IT BECOMES REAPPROPRIATED INTO THE DEEP FUTURE.



PAVILLION IS CLAD WITH MATERIALS FROM THE EARTH. THATCHED JAVARA ICHU GRASSES THAT CAN RETURN TO THE LANDSCAPE IN THE DEEP FUTURE.



WALKING PATH IS RESURFACED AS TAILINGS ARE REMEDIATED AND SOIL IS MADE HEALTHY.



DRUMS AND INDUSTRIAL INFRASTRUCTURE ARE SUNK INTO THE EARTH, PERMITTING VISITORS TO PEER INTO THE SITE'S TUMULTUOUS HISTORY.



RESURFACED DRY-TAILINGS BECOMES FUTURE GRAZING LANDS FOR NATIVE CAMELID POPULATIONS.

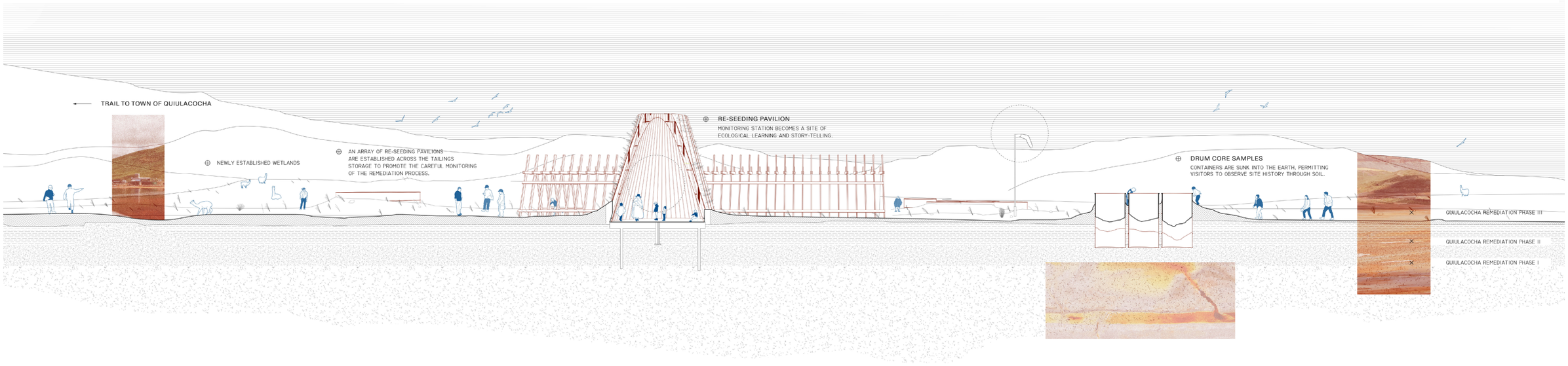
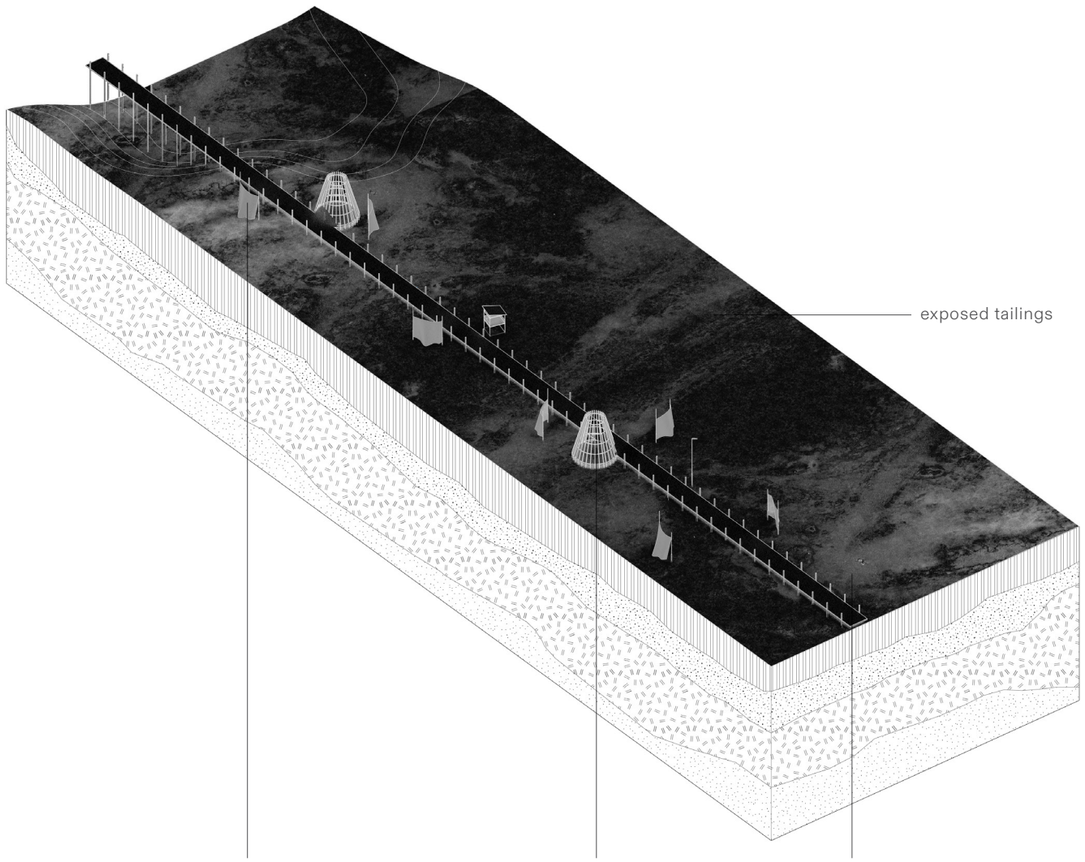


Fig 4.23 Final Phase of the re-seeding pavilion over the Quiulacocha tailings facility.



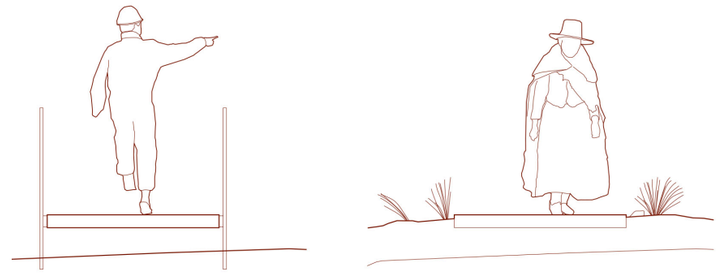
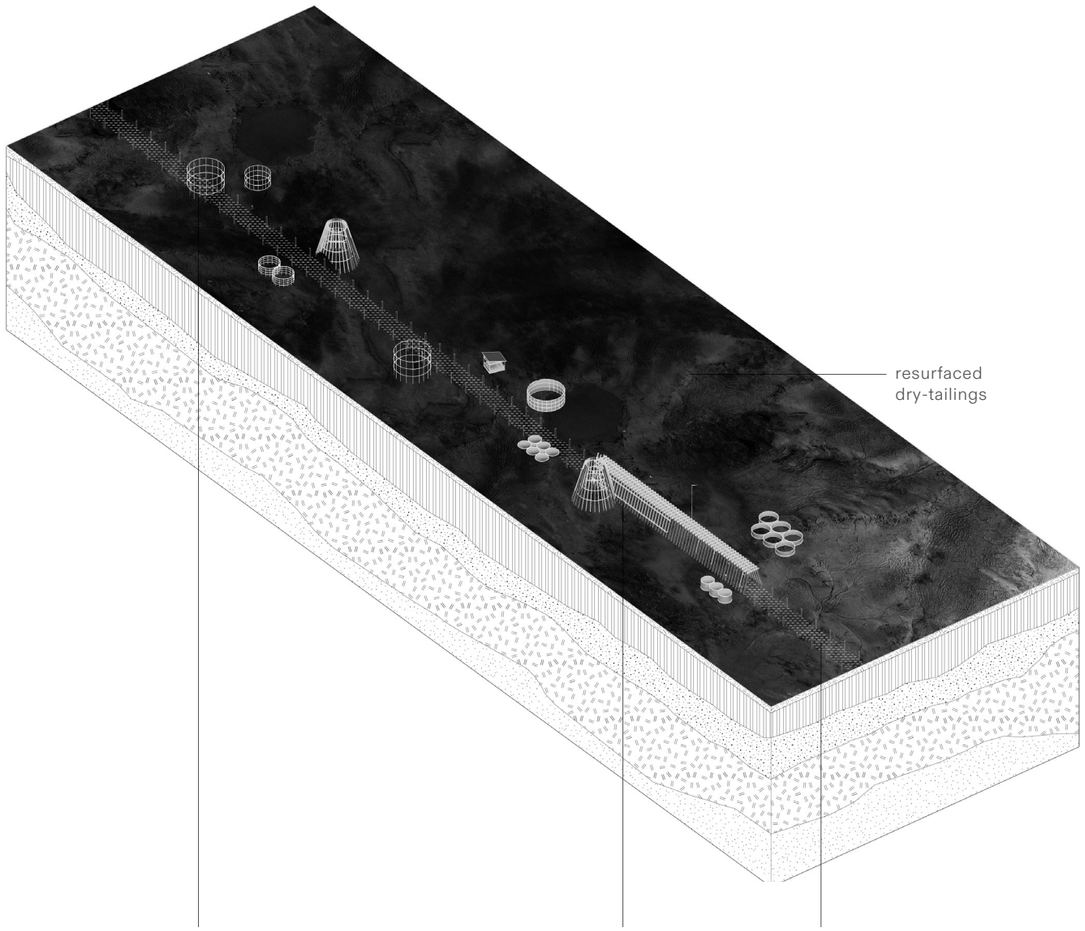


Fig 4.24 (opposite) Pavilion Axo Phase 1 : Walkway over toxic waters.

Fig 4.25 Pavilion as a mine monitoring station walkway.



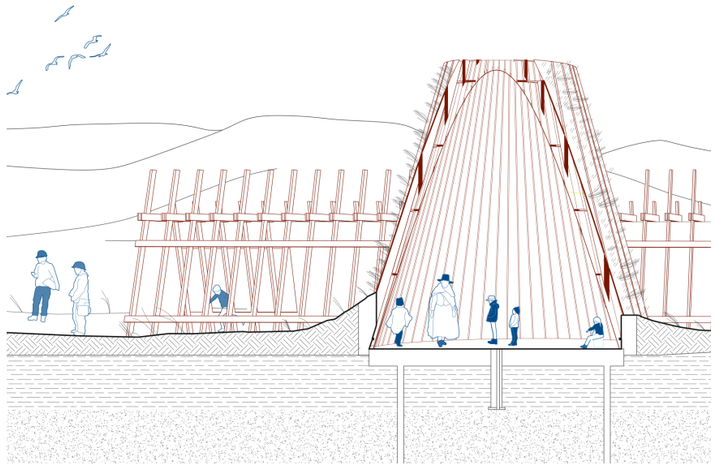
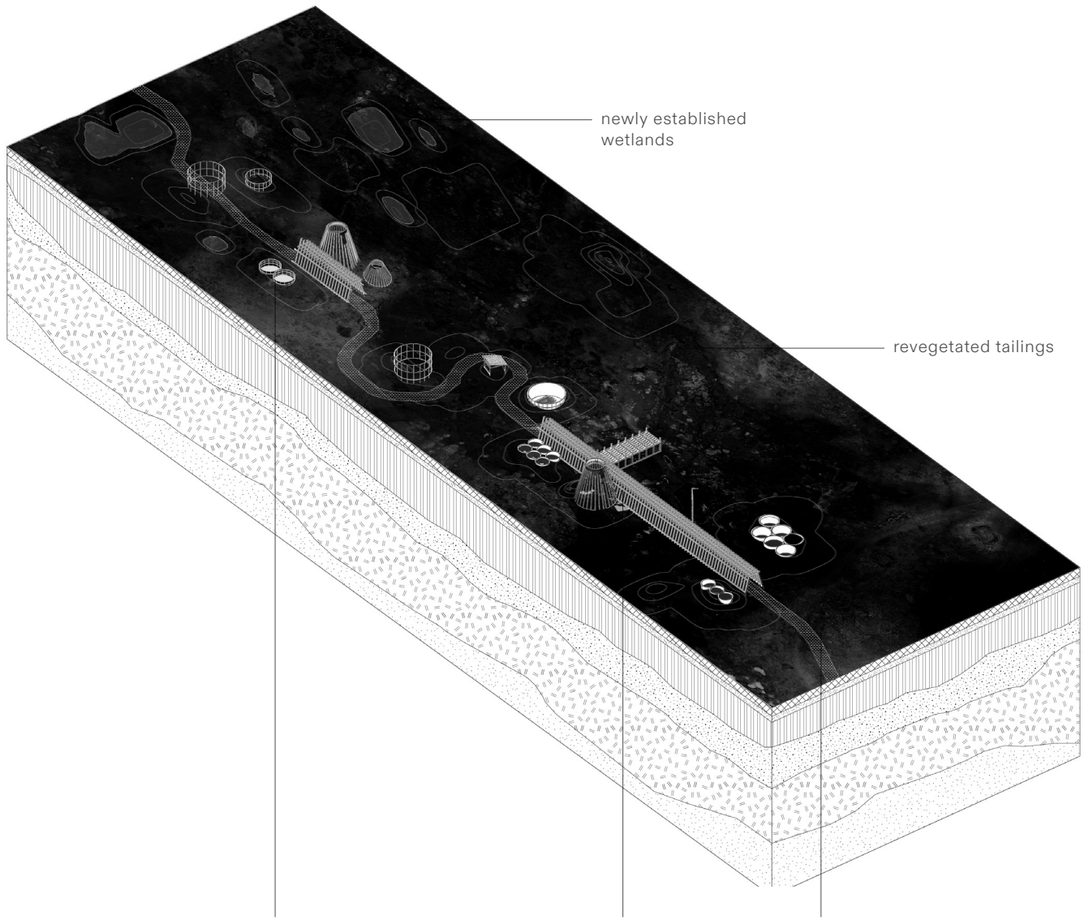


Fig 4.26 (opposite) Pavilion Axo Phase 2 : resurfacing and reclaimation of industrial waste.

Fig 4.27 View of the re-seeding pavilion re-purposed as an ecological story telling space.



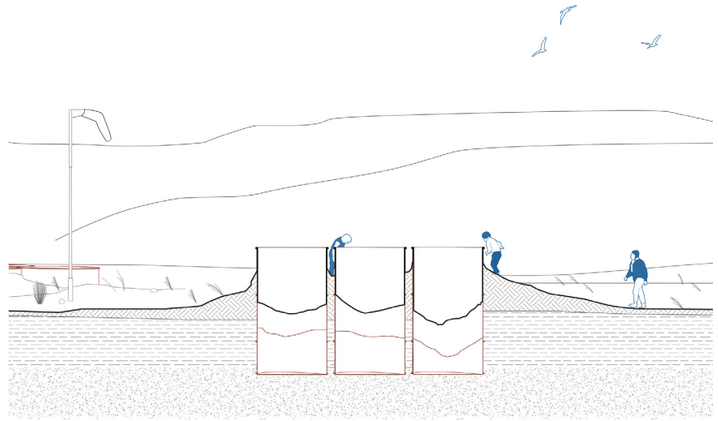


Fig 4.28 (opposite) Pavilion Axo Phase 3 : Establishment of an overgrown trail over Quiulacocha.

Fig 4.29 View of repurposed industrial drums, sunk into the earth to reveal the history quiulacocha like a core sample.

Endnotes

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old city + open pit

The Pact with Muqui

This was an old miner who, despite his forty years of work in the pits, had not been able to raise the necessary funds to endure an old age free of deprivation. He did not have his own house nor had he been able to expand his farm like his colleagues had done, who were always reminding him: "Youth is not eternal." That made him terribly uneasy. He had to find a way to improve his situation. As if everything were not enough, his chain of frustrations was joined by a series of mysterious events. To the acute rheumatic pain that gripped his hands, to the steely hardness of the galleries and to the savage treatment of his bosses, there was now added an event that had him intrigued. Every time he returned to work after having completed a task, he found his "huallqui" fluttering almost empty and without any cigarettes in it. He couldn't know who was causing this problem. When he asked his colleagues, they emphatically denied being the perpetrators of the robbery. At the height of desperation, he broke down with many of them. This increasingly repetitive fact made him an enemy of those who worked with him, completely isolating him in an enervating world of loneliness and silence. Only his harmonious and sentimental whistle like that of wild goldfinches made his isolation bearable. Thus, he decided to investigate the reason for his unrest: he would find the culprit of the thefts of his coca and cigarettes. Pretending to go on an errand, he would abandon his task in great strides with his high-pitched, playful whistle, and after advancing a long way, he would silence his whistle, turn off his lamp, and return stealthily in order to surprise the culprit. Many times he performed this maneuver without any result. One afternoon, when fatigue was about to overcome him, he managed to see, from his secret hiding place, a small light approaching. He waited with bated breath. Now he would have to deal with the culprit who had caused him a lot of problems. After a long time of waiting he was left with his eyes wide open. The light he had just seen came from a small toy-like lamp that hung from the helmet of a tiny, stocky being, with bright quartz eyes and a caper rose beard. It was the Muqui! Holding his breath as much as possible, he waited for it to be within reach of him and, when he had it close to him, he jumped like a cat and

with the "chicullo" he was carrying in his hands he caught the mysterious gnome, owner of the mines. - I got you, damn it! -the miner shouted. - Luckily, nothing more than luck - answered the apparition without doing anything to free itself from the powerful arms of its jailer -. Do you know who I am?... - Of course, damn it!... You're the Muqui!... You're the owner of the mines!... And there was the Muqui. Tiny, stocky, blonde gnome with his gesticulating chubby little hands. The big head attached to the trunk without traces of a neck imprisoned by its amber fiber protector so that the golden threads in his hair showed dazzlingly; the flints of her playful little eyes, bright and restless - fixed on him - seemed to want to jump out of his sockets; His tight, white caper beard gave him a century-old appearance. The Muqui is the conceit of the Jircas - eternal deities of the earth - who have granted him supernatural powers. He manages to increase or disappear the grade of minerals; He can help or sink the miners in the pits, which is why they always offer him coca and cigarettes and, when they drink, they sprinkle a few drops on the ground so that the Muqui along with the jircas share the drink.

A folktake from "Voices from the Sinkhole: Tales and Legends in the Cerro de Pasco", by César Pérez Arauco.[1]

The story of Muqui is one rooted in the Andean inner world, and landscape. The folkloric figure dwells in the depths of the mine, and has emerged from the convergence of Andean beliefs, traditions of mining towns, and Spanish colonial control.1 The legend, often shared by word of mouth, represents a resistance among miners working in the Andean world below or the Urin Pacha, a story born from a landscape transformed by colonial practices and exploitation, manifested as a symbol.[2] The context of the figure, which has relatives in other mining cities, (tio in Potosi, Bolivia) is based on a Christian system of good and evil imposed on an indigenous people, which finds itself in local stories.[3] Muquis are therefore spiteful, but their intentions can be changed through offerings which establish them as protectors. It is common to find underground shrines in tunnel systems for miners to bring offerings, these guarantee that Muqui will keep the underworld of the mine safe. Muqui has emerged as an important folklore figure in Cerro de Pasco, a symbol of carnival, that children frequently dress as.[4]

Muqui is a Supay, a deity of the Andean underworld, often associated with an image of Satan. Supays dwell at the point between this world, the world of humans, and the world below.[5] But Andean conceptions of the underworld are very different from western ones. Here the underworld exists in duality with the worlds above and is consequently connected to systems of reciprocity and interaction.[6] In the face of open pit mining the gradual processes shaping the city and identity are undone. Violent explosions transform solid earthly matter into liquid material in an instant. Mining is suddenly detached and absolved of its complicated histories.[7] The dwelling of Muqui, in the physical spaces between topsoil and subterrain, among the cracks, voids, caves and ravines,[8] is displaced. The result: an occupation of the fading city's plaza and squares by the symbols of the underworld, Muqui's final act of resistance.



Fig 5.1 Child dressed as Muqui for carnival, *El Muqui en el Tajo Raúl Rojas, 2013. Courtesy of Paccarik Orue.*

The plazas of Cerro de Pasco are constantly occupied. At their center, monuments of symbols or icons calling to bygone eras. In the old city's largest plaza, Daniel Carrion, a statue of the local medical hero towers at its center. Only two street blocks away, the open pit looms, slowly creeping towards the public spaces it sits next to. Despite this, its residents remain strongly connected to the urban area, using plazas for dancing, gathering and the pride of Cerro de Pasco, the Carnival Cerrenos. The Carnivale, one of the oldest traditions in the Peruvian Sierra, was brought to Cerro de Pasco by European immigrants in the middle of the 18th century.[9] It remains a powerful gathering directly next to the open pit mine that has displaced many of the former squares and streets that the carnival has historically occurred in.

The tradition has always included a parade of Cerrenos, exhibiting luxurious costumes, weaving through the public spaces of the old city.[10] Within public spaces of the city, the sounds of distant music play, while the traditional dance, the Muliza, is performed by many.[11] Troupes of Cerrenos parade through the streets of the old city with floats representing folktales and traditional legends of the city. Some constructed floats representing the collective memories of historic buildings now demolished due to the growth of the pit. One of which is the historic bell tower that has been reconstructed on the other side of the city. It lives in the collective memory of residents as a symbol of the mines' displacement of a historic urban fabric so ingrained in the traditions of carnival.[12]



Fig 5.2 View of the city's main plaza Daniel Carrion, the open pit mine sits two blocks away



Fig 5.3 View along Jiron San Cristobal in the old city.



Fig 5.4 Helmets of Park of the Miner. *Parque El Minero, 2019, courtesy of Paccarik Orue*



Fig 5.5 Old float from the Cerrenos Carnival. *Dragon Cerreño, 2013 courtesy of Paccarik Orue*



Fig 5.6 Carnival in the historic Chaupimarca Plaza, 1920



Fig 5.7 Traditional Dance. *Fiesta de la cruces de mayo, 2013, Courtesy of Paccarik Orue*

Fig 5.8 (previous spread) Raul Rojas open pit mine grows in the centre of the city of Cerro de Pasco.

The Raul Rojas Open Pit

On the edge of the old city, an open pit mine grows. The Raul Rojas Open pit mine is a silent void, some describing its presence like standing next to an ocean.[13] Concealed from eyesight, fences, barriers, facades, and topography separate the active open pit from the historic city. Only ghosts of the 400-year-old city remain; over half of its footprint has been consumed. The pit is a clear symbol of the extent to which the earth has been mined on the plateau, a kilometer deep depression, that broadcasts the sacrifice a city makes to fuel its economy. Its depth challenges even the drama of the surrounding symbolic mountains and hills. In this way, the pit is the symbolic and physical antithesis to the mountain, representing the formal excavation of both memory and physical matter. Its dominant presence calls into question the very future of the city.



Fig 5.9 View of concrete barriers along the open pit mine's edge.



Fig 5.10 Open pit edge looking towards Chaupimarca Plaza and the remaining old city.





Fig 5.11 Mapping pit expansion

1	Plaza Chaupimarca	A	Concrete barrier
2	Daniel Alcides Carrion plaza	B	light walls
		C	Facade
a	State government office	D	Chain-link fence
b	Huancapucro church		
c	Church of st. michael		
d	Central market		
e	Oratory of the lord of miracles		
f	Primary school		
g	Public school		
h	Transportation terminal		
i	Patarcocha lagoon		

Fig 5.12 Reconstruction of the historic bell tower, now located in the newest district of the city.

The Chaupimarca Plaza sits at the center of the historic city. One of its edges, facing the open pit mine, is lined with facades, false buildings that maintain the image of the city from within. A few blocks away, buildings marked for demolition are painted green and lay abandoned. They are shells of the city's past urban forms, maintaining the density of blocks, but are empty reminders of Cerro de Pasco's former glory. A quaint square now smaller compared to neighboring public spaces was part of a group of important public plazas in the old city. Prominent for its central position in the town, it now sits on the periphery of the fading city. Decaying matter from the buildings lining the plaza suggest that the pit has a strange gravitational force. It pulls structures and their associated memories in, as it consumes the valuable ore within the earth they sit atop.



Fig 5.13 Buildings on the edge of the open pit are purchased by the mine. Those marked for demolition are painted green.



Fig 5.14 Vacant historic structure separates the square from the open pit mine. A facade that maintains the image of a city from within the street block.



Former CRC headquarters
now vacant, acting as a barrier
between plaza and open pit.

Raul Rojas Open Pit

Recently restored
center of plaza

Historic House of
Vicente Vegas

Church of San Miguel
Arcangel of Chaupimarca

Fig 5.15 Panoramic view of the Historic Chaupimarca Plaza



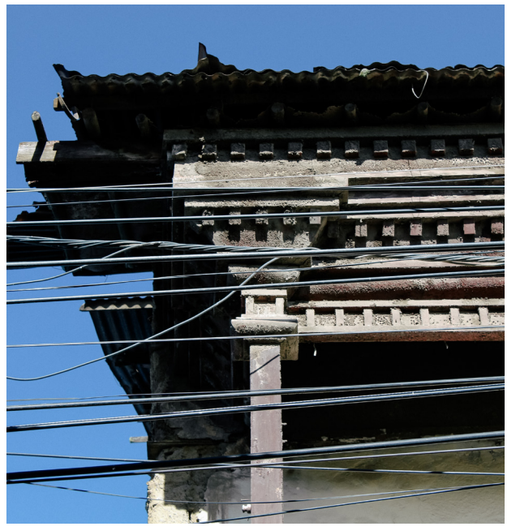


Fig 5.16 Bell tower of the church of San Miguel Arcangel of Chaupimarca
Fig 5.17 Wood detail of decaying colonial structure in the plaza.



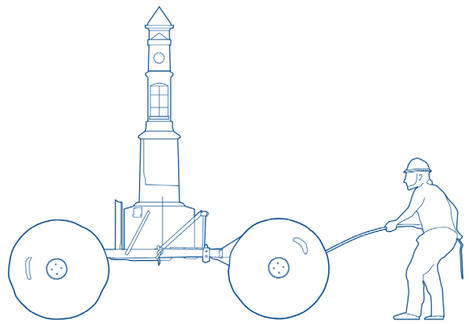


Fig 5.18 Historic Chaupimarca Plaza, with the historic church of San Miguel Arcangel of Chaupimarca, 1907

Fig 5.19 Allegorical float representing the demolished historic bell tower, once located in the old city


SR. DE SANTA CATALINA
1895
AYAPOTO
2016
BIENVENIDOS
BIENVENIDOS
LOS DIAS
4-5-6 - MAYO
2018

Fig 5.20 (previous spread) An abandoned church, in a neighbourhood on the edge of the open pit. The mine purchased the land and have left it vacant.

The development of the open pit began in the 1950s, a time of massive growth for the mine, with the first blasts beginning in 1957.[14] The purchasing of privately owned land on its periphery has further fueled the expansion of the pit into the future. The open pit operation began as a more efficient process of extracting low-grade ores, from a polymetallic vein containing zinc, lead, copper, and silver.[15] Since 2015, the pit has been suspended temporarily[16] although there are plans to continue expansion in the future. After pit operations cease, (an indeterminate amount of time, in the far future) it is assumed the pit will follow standard remediation practices[17] and be partially backfilled and eventually flooded, per a Cerro de Pasco Corporation Report.[18]



Fig 5.21 The origins of open pit mining, Overlooking an old Spanish silver mine, Cerro de Pasco, Peru, 1907



Fig 5.22 The Lourdes headframe, on the west edge of the open pit.



Fig 5.23 (previous spread) view over looking an access road in the raul-rojas open pit mine.

Fig 5.24 The Raul-Rojas open pit mine directly in the centre of the city.



Fig 5.25 Revealing the technical. Drawing mine infrasturcture, a pit phases and pathways.



Fig 5.26 Material flows and Historic Ore body drawing.

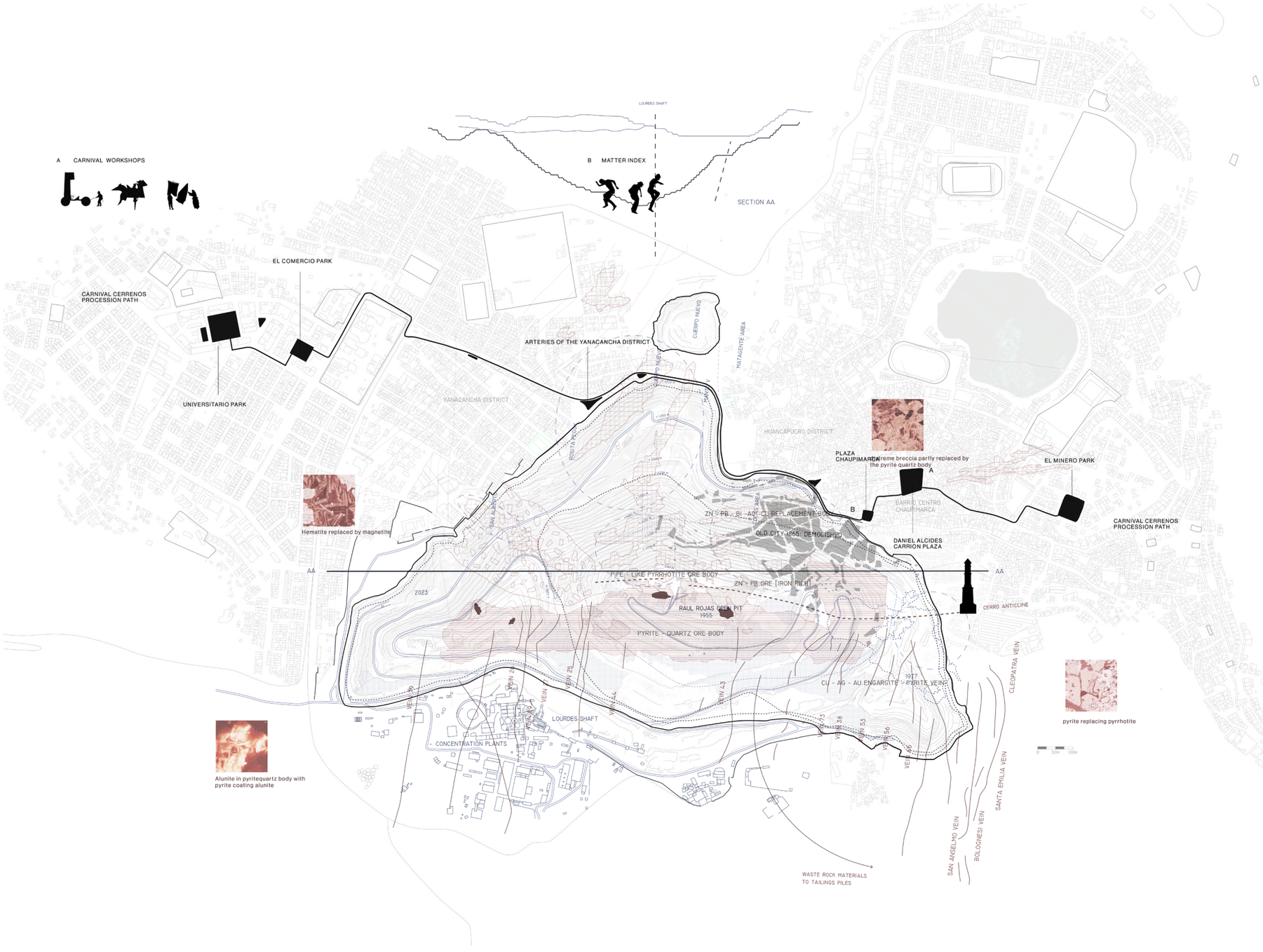
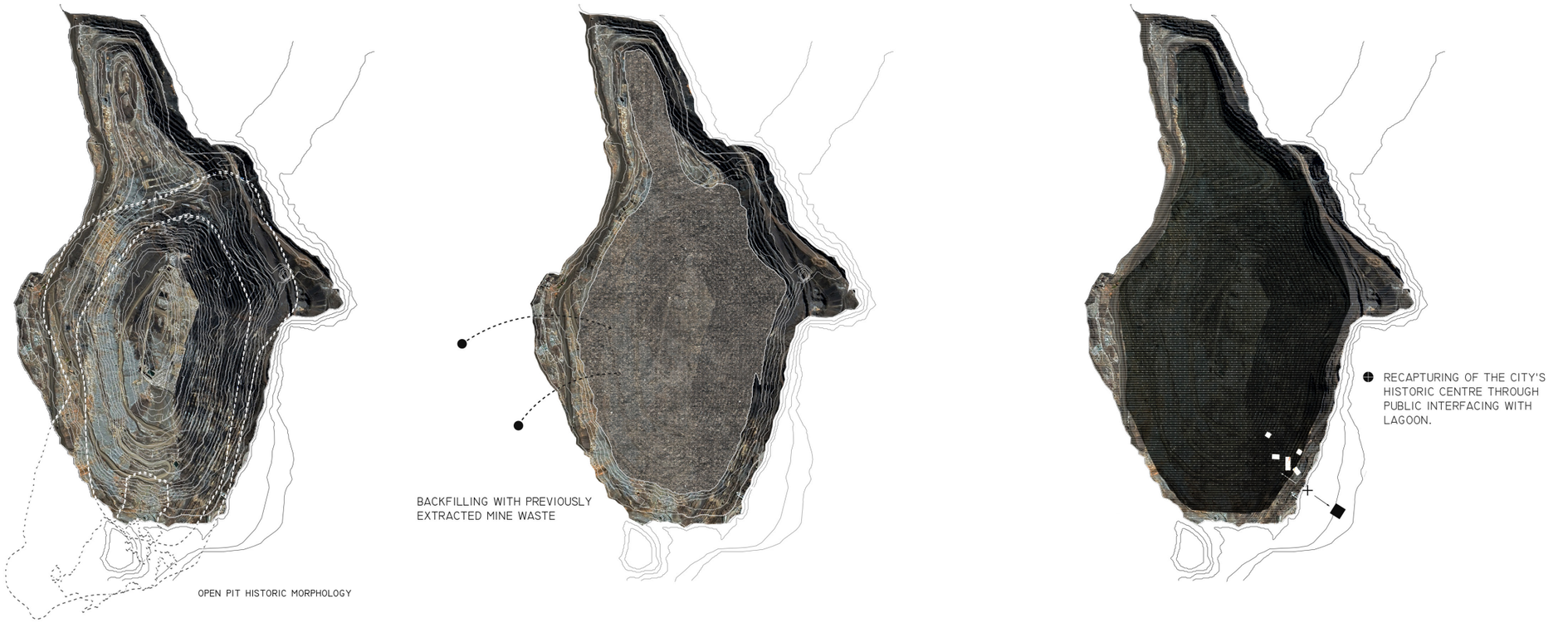


Fig 5.27 Carnival procession path and its adjacency to the open pit's edge.



Phase 1 : Cerro de Pasco Corp.
superpit expansion

Phase 2: Footprint of current open
pit is partially back-filled
Its top edge is re-surfaced

Phase 3 : Back-filledopen pit is
allowed to flood becoming a lake
that interfaces with the city.

Fig 5.28 Open-pit remediation framework.

The Floating City

The growth of the open pit has unleashed muqui and the occupants of the Andean world below into the old city. But in the face of mine expansion even the urban fabric fades. Stories and the physical spaces associated with them live on through acts of celebration during carnival. The stories of Muqui and the memory of the bell tower are memorialized through costume and float construction. But as traditions fade in the historic city[19], there is danger that the memory of lost physical spaces will disappear. It is here that the architecture of collective memory will play an important role, by recapturing the physical space of historic icons, now lost to the open pit.

The intervention will first break through the false facades that hide the open pit from view. The obvious, nearly kilometer deep hole, should be carefully revealed to visitors of the city as a first step to its long-term confrontation. An observation walkway will pierce through a historic structure on the west side of the historic Chuampimarca plaza, visually connecting the depths of destruction to the plaza under threat. Within the historic structure, lightweight scaffolding will be deployed to reinforce the building's deteriorating walls. This will facilitate the construction of an open air, covered plaza, complementing the use of the historic plaza for festivals and events year-round. The existing half-clad structure will be completed with semi-translucent, poly-carbonate material which will allow light to pass through it, inviting the city to participate in its events, by encouraging visual connections. The building temporarily acts as the embodied threshold between the city and pit.

In the far future as mining in the open pit ceases, more space along the open pit's edge will be captured. Established on a perpendicular axis to the open-air plaza, an old-city repository and carnival float workshop will cut into the earth. The subterranean structure will protrude out of the face of the open pit mine, permitting views into the depths of the industrial landscape. A ramp, mirroring the long circulating stopes of the open pit, gradually directs visitors down to the world below, the domain



Fig 5.29 Ghosts of the old city float over the flooded open pit in the far future.

of Muqui. It is here that a repository for ancient matter of the old city lies; a place for memories to persist next to the physical space of their demise.

In the deep future the Raul Rojas pit will be partially backfilled, resurfaced and flooded, a typical remediation technique for the open cast mines. Facilitated by the carnival construction workshop embedded in the topography, a whimsical society of floating carnival structures can occupy the flooded open pit mine, re-capturing the physical space of the old city. These ephemeral structures, designed and built by the residents of Cerro de Pasco may take the form of the historic architecture displaced by the growth of mining. The temporary structures illuminate the dark waters of the former open pit, their forms inspired by allegories of Cerro de Pasco's rich carnival and its traditions of float construction. Local stories and folktales occupy the pit as ghosts of their former selves.

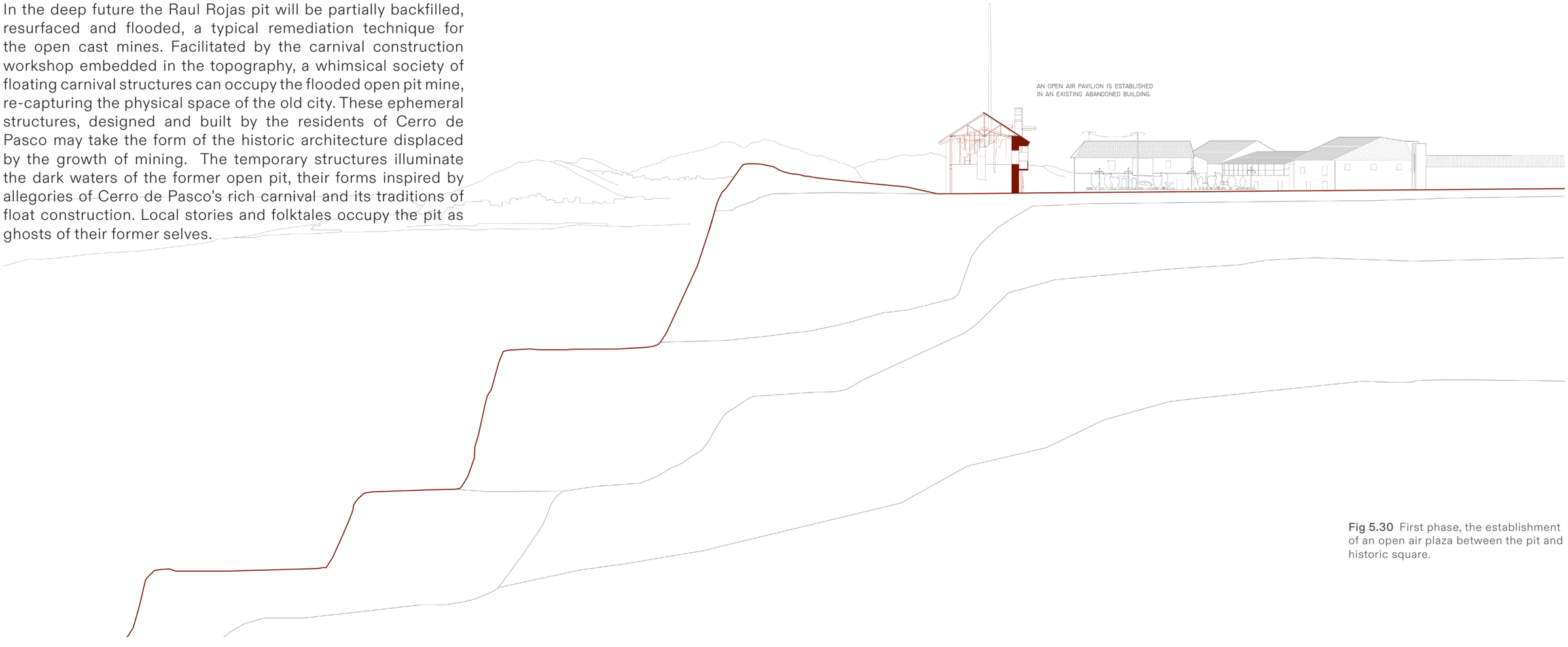


Fig 5.30 First phase, the establishment of an open air plaza between the pit and historic square.

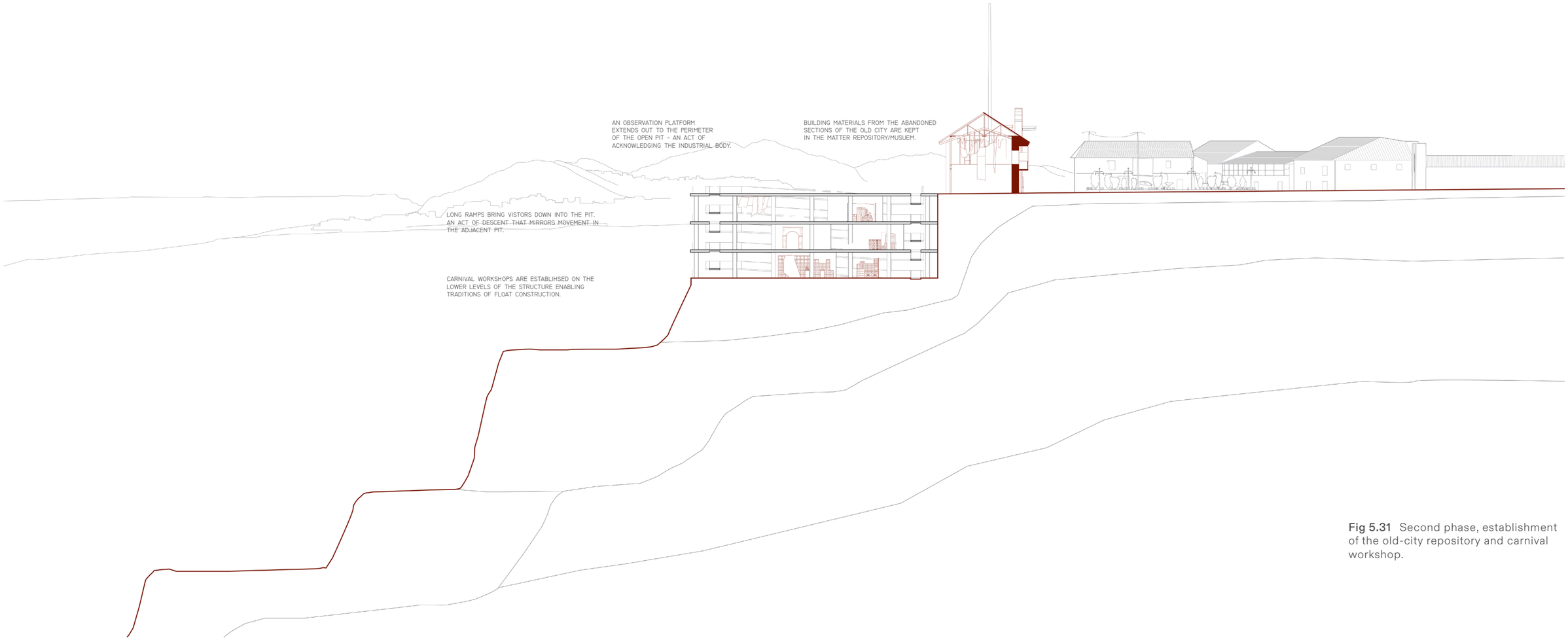
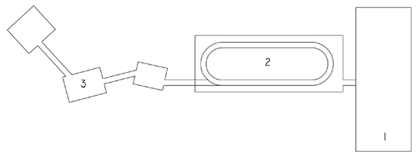
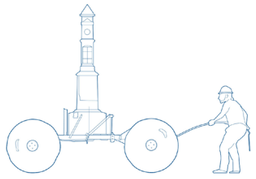


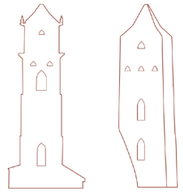
Fig 5.31 Second phase, establishment of the old-city repository and carnival workshop.



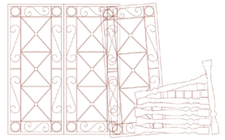
\+ CARNIVAL EXTENDS ONTO THE OPEN PIT TO RECAPTURE THE PHYSICAL SPACE OF THE OLD CITY.
1 COVERED PLAZA
2 OLD CITY MEMORIAL
3 FLOATING CARNIVAL



FLOATS REPRESENT COLLECTIVE MEMORY OF DISPLACED ARCHITECTURAL ICONS OF THE OLD CITY.



THE PROPOSED FLOATING TOWER MIRRORS THE FORM OF THE NOW DISPLACEDBELL TOWER PREVIOUSLY LOCATED IN THE CITY CENTRE.



MATERIALS + MATTER FROM ABONDONED PARTS OF THE CITY ARE KEPT AND DISPLAYED.



ACTS OF CARE AROUND THE OLD CITY. CARNIVAL BECOMES AN ACT RESISTANCE TO THE EXPANSION OF THE OPEN PIT.



MUQUI, DWELLER OF THE WORLD OF BELOW REPRESENTED IN THE CARNIVAL THROUGH COSTUME. THE MULIZA DANCE FILLS PLAZAS AND PUBLIC SPACES DURING CARNIVAL.

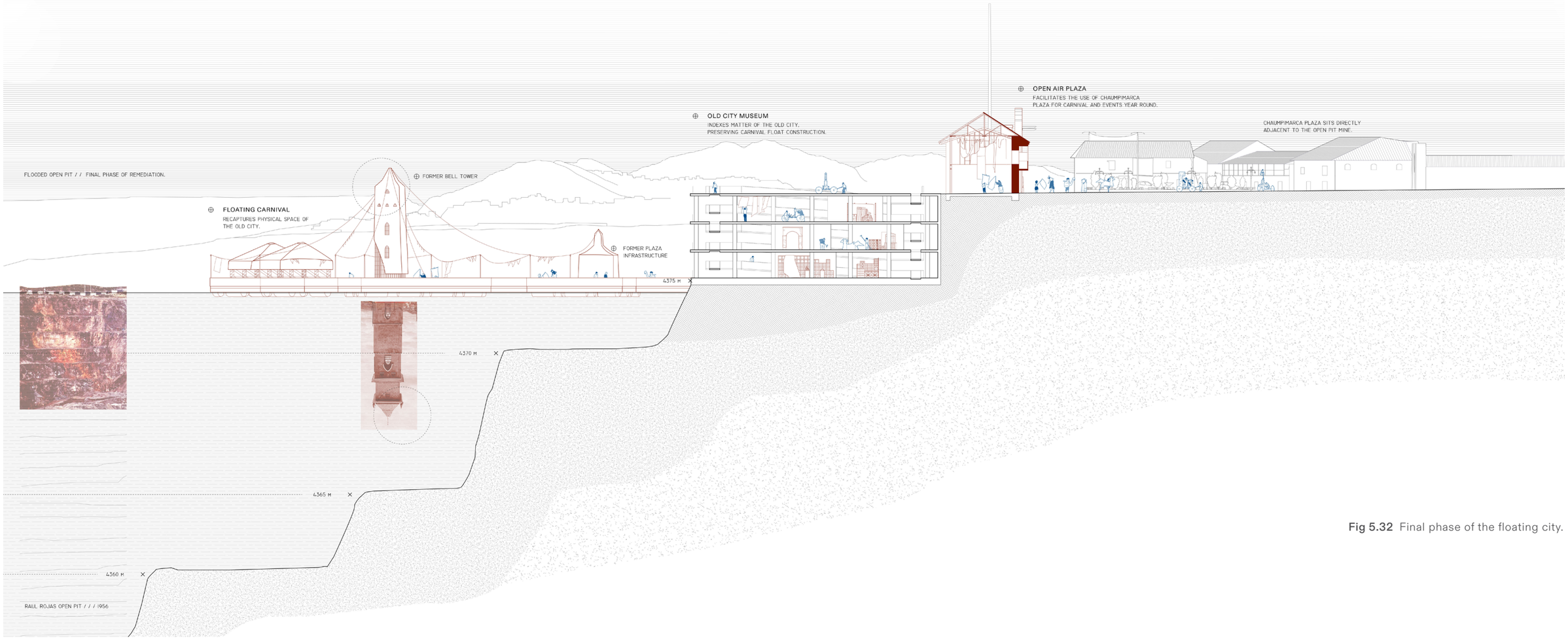


Fig 5.32 Final phase of the floating city.

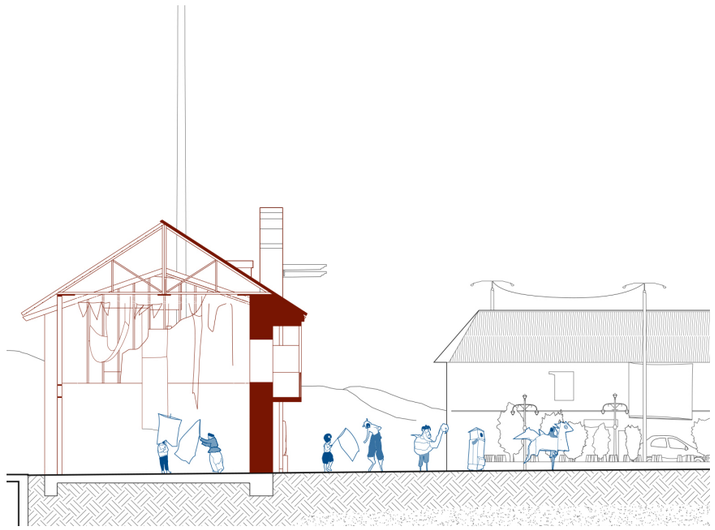


Fig 5.33 (opposite) Phase 1 : An open air plaza is established on the edge of the open pit.

Fig 5.34 view of the open air plaza during a celebration

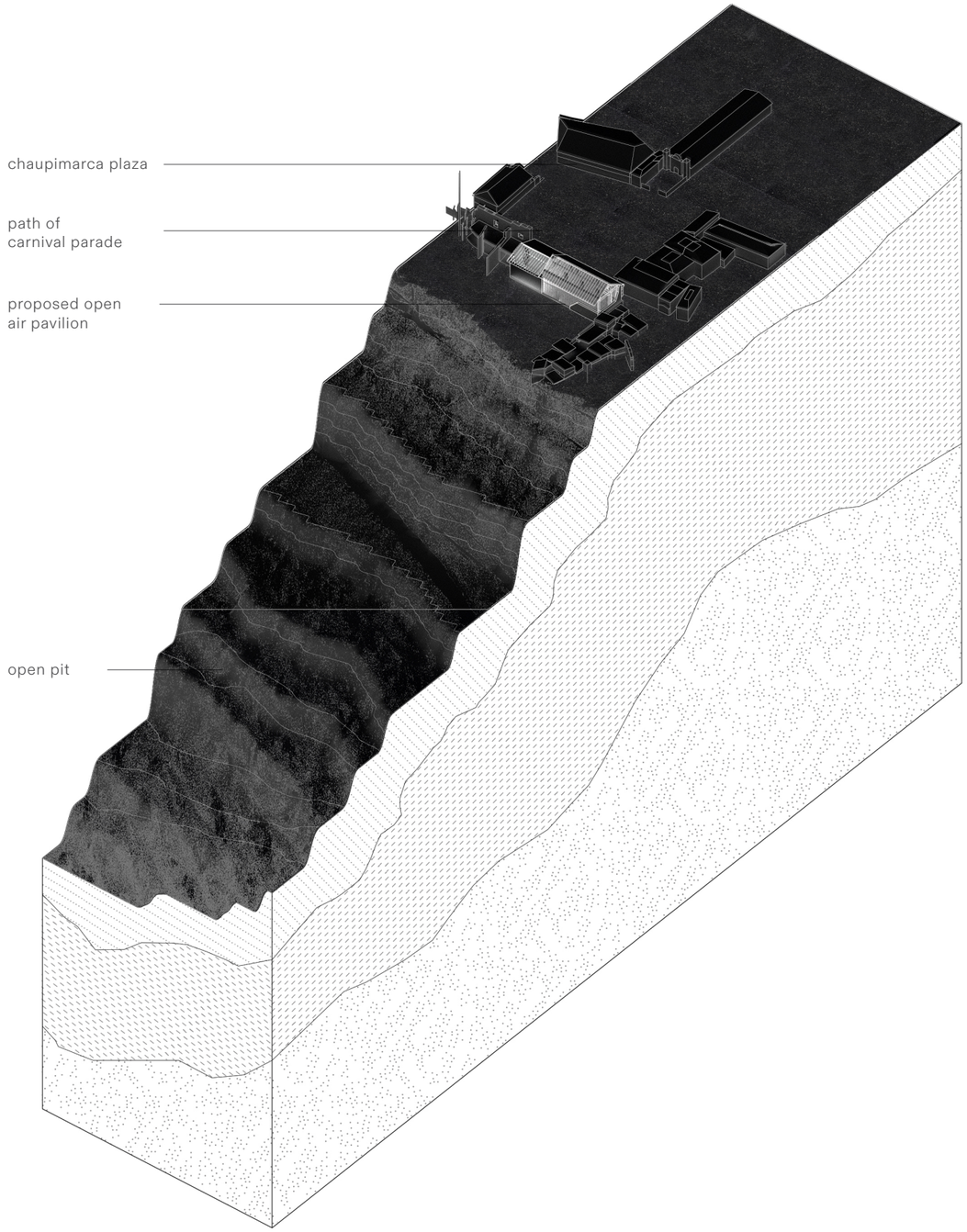
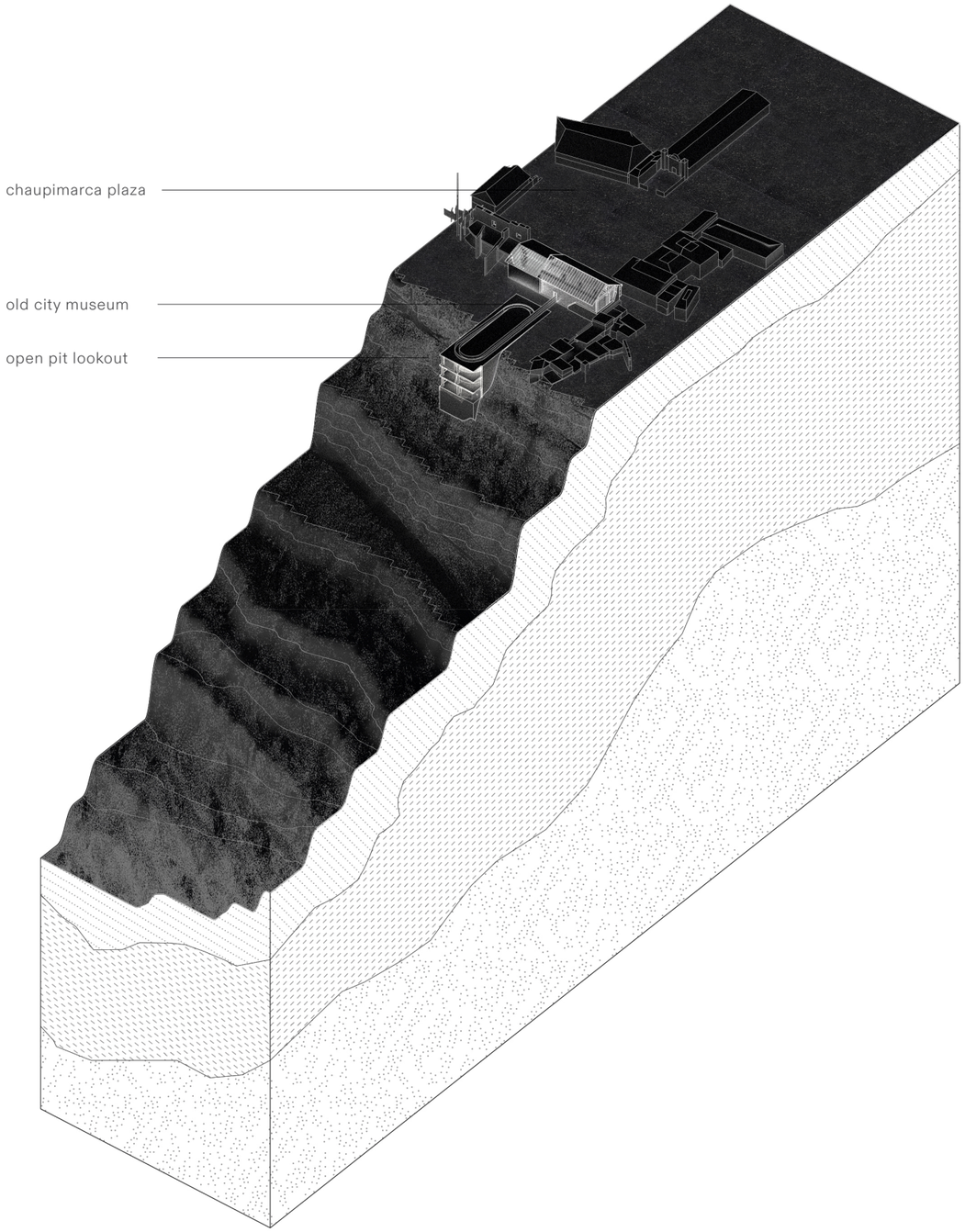




Fig 5.35 (opposite) Phase 2 : The old -city repository cuts into the edge of the open pit.

Fig 5.36 Acts of care around the old city which inspire the old city index/musuem.



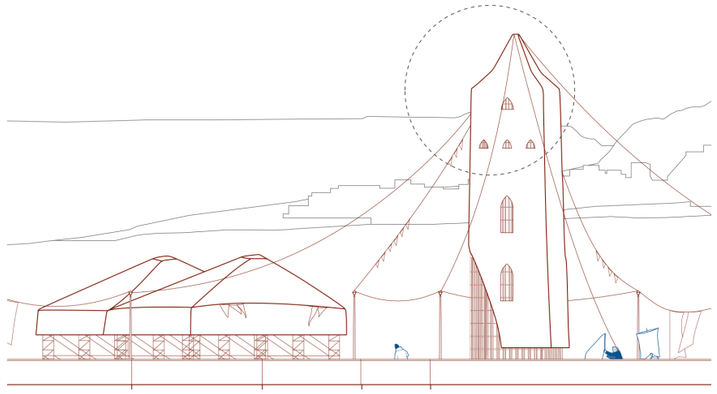


Fig 5.37 (opposite) Phase 3 : a carnival that learns from the collective memory of demolished architecture, floats atop the flooded open pit.

Fig 5.38 Views of a Float memorializing the historic tower that once lied at the centre of the city.

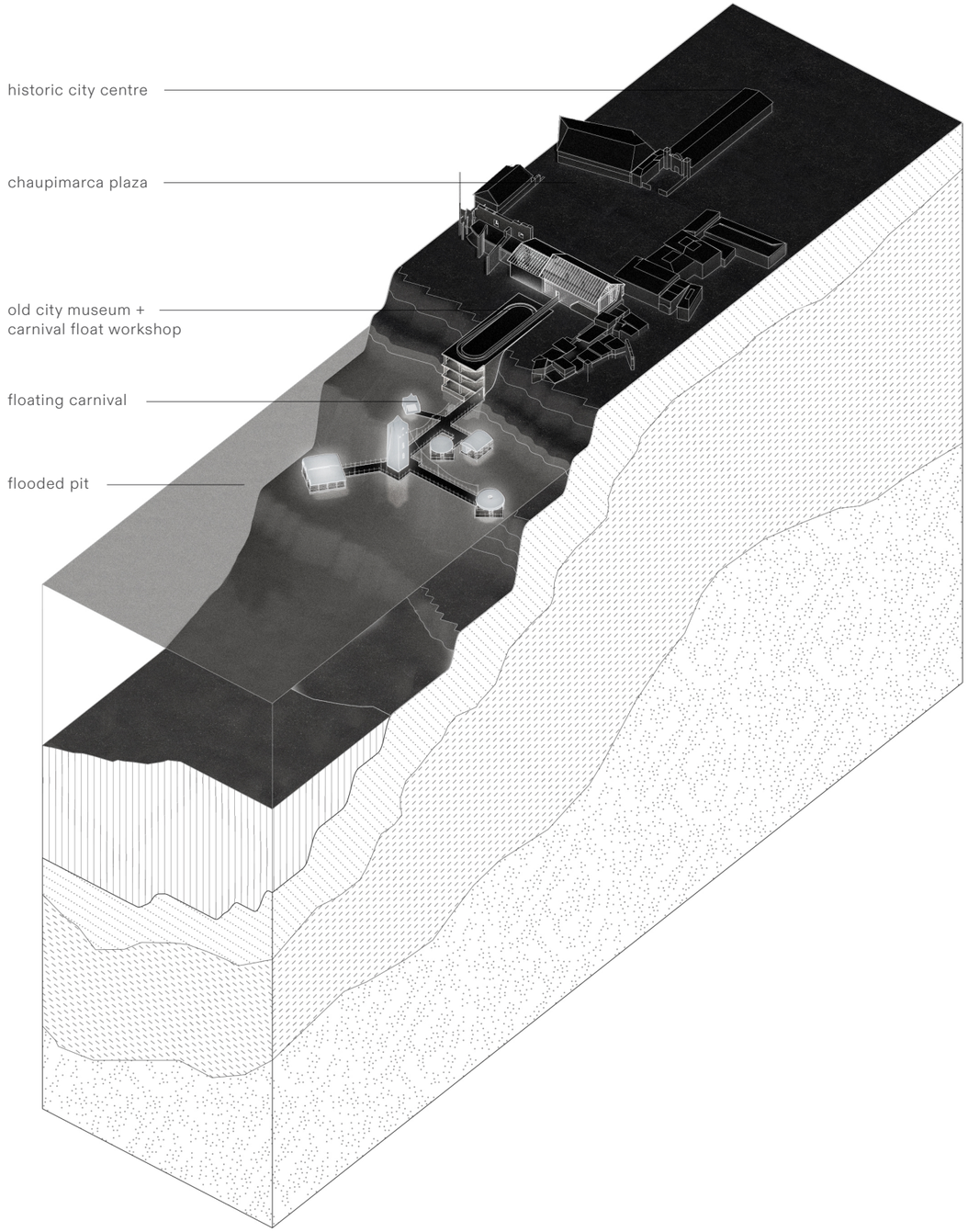




Fig 5.39 View of the old city and the two towers of collective memory at its center.



Fig 5.40 A ghost of the tower recapturing the physical space of its demise.

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part three

conclusion

Ghosts of the Plateau.

As the cultural landscapes of Cerro de Pasco are mined, so too are their associated stories. Symbolic mountains are excavated, lakes are polluted, and historic cities fall to ruin. Only ghosts of the former landscapes and cities exist, but their memories live on through stories. It is perhaps why ghost stories and legends are so enduring in Cerro de Pasco. On the Bombon Plateau and further, across the Andes, where mines move earth at unimaginable speeds, ghosts of the Anthropocene are everywhere. This thesis proposes using land-stories, the amalgamation of materiality and memory, to unearth the latent ghosts that hide in plain sight.

This thesis set out to honor the stories told at Cerro de Pasco through architectures that assemble matter and preserve memories on sites of rapid physical change. But as an outsider researching these landscapes, it is important to acknowledge that this thesis is not attempting to choose which histories are valid. The designs operate as frameworks upon which Cerrenos, through their own actions, will localize sites made foreign by global extraction industries. In this way, the architectures reconnect people to the material histories of the site, linking observed pre-industrial site conditions to the future physical form of remediated sites. The designs are therefore contributions to the many stories which make up the palimpsest of landscape. By linking temporalities through built form, a new identity rooted in place, forged by the people of Cerro de Pasco, may emerge which reverses trends towards generational divide.

Given the complex circumstances surrounding the design-research project, situated within a community grappling with environmental degradation and health concerns, its role serves as a catalyst for dialogue among designers and activists. While the project has primarily addressed challenging architectural inquiries, it is evident that other disciplines may be prompted to pose additional questions as a result of this research. Expanding upon the project's trajectory, critical examination of the proposed remediation plan and its efficacy becomes imperative. One could argue that humanitarian initiatives, encompassing healthcare,

education, or environmental monitoring, represent the most pressing needs in the city. However, their implementation hinges upon the resolution of a fundamental question central to this thesis: whether the city of Cerro de Pasco will persevere or relocate. If the city can endure and resolve its identity crisis—a paradox intrinsic to its existence— a path forward may emerge. It is crucial then to acknowledge that this prospective future must not be shaped by outsiders (myself, a foreign designer), but by the collective agency of the people of Cerro de Pasco.

By first listening and learning from the stories of mountains, lakes and the city, designers can learn how one might reframe the alien industrial landscapes left behind after generations of extraction. To understand these complex sites of extractive history, a method of analytical mapping is employed. This plots the technical, political, material and human dimensions of the mining landscape onto one plane; a palimpsest upon which the land-story is etched. Drawing these deep layers, overlaid like stratum hidden below the surface of the earth, reveals unseen forces and highlights important conceptual opportunities. The method of drawing acknowledges on-site tensions and may be applicable to other contexts where mining contributes to erasure.

Architects have long been interested in extraction and post-extraction sites as previously stated in the research. This thesis advances a design-research method that may be relevant for architects working on mining futures in architecture. Central to this approach is the concept of the land-story, a foundational element that has often been overlooked in existing remediation plans and speculative architectural endeavors. By prioritizing a close reading of local narratives from the outset, this methodology seeks to reintegrate the intrinsic stories of a place into the design process.

The work carves out a niche territory for architects to explore, between the technical and political, engaging a variety of disciplines. By transcending disciplinary boundaries and

engaging diverse fields of knowledge, the project posits that the role of the architect must adapt to suit increasingly complex contexts and questions. As extraction and exploitative industries persist across the world, and their impacts proliferate, the land-story may emerge as an important point of departure for designers working in those contexts. It suggests that a design process begins with listening and close readings of site. By employing this methodology, site-histories and their ghosts can be unearthed anywhere they are buried.

~

Before departing on the site visit for this research I met a woman in Lima who knew the city of Cerro de Pasco well. I met her by chance at a bar top in Barranco. She told me that she had a grandmother who spent time in the mining capital and was never the same afterwards. After spending time in the city, her grandmother, a matter-of-fact woman (not unlike my own grandfather), was transformed - she was now superstitious. She said that she had never believed in ghosts until she had been to Cerro de Pasco and that ghosts, in the city, were everywhere. I like to think she met the architectural ghosts of the old city, or the phantoms of the moving mountain peaks.

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Buenos Aires, March 22nd 2024

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JN

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Hello Reese,

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Have a great day!

Vänliga hälsningar / Kind regards,

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