SUBZERO

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Abstract

SubZero: A Restaurant at the End of the World

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This thesis explores the design and implementation of an underground restaurant and integrated greenhouse, situated in the remote and ecologically sensitive environment of Svalbard. The project exemplifies a holistic approach to sustainable architecture, incorporating advanced strategies in energy efficiency, resource management, and community engagement. The decision to build the main restaurant space underground is central to the project's sustainability goals. Subterranean construction leverages the Earth's natural insulation, ensuring a stable internal temperature that significantly reduces the need for artificial heating and cooling. This passive energy strategy is complemented by the use of light wells, which channel natural light into the dining area, creating a unique and aesthetically pleasing environment while minimizing electrical lighting requirements.

Overall, this thesis demonstrates that through thoughtful design and innovative resource management, it is possible to create a sustainable, resilient, and inclusive environment that serves both people and nature. The underground restaurant and greenhouse in Svalbard serve as a model for future sustainable development, illustrating the potential for architecture to harmoniously integrate with and enhance its natural and community context.

CONTENTS

GLOSSARY

Svalbard

A remote Arctic archipelago between Norway and the North Pole. Known for its stark beauty, towering mountains, and abundant wildlife including polar bears and Arctic foxes. Despite its harsh environment, it is home to human settlements like Longyearbyen, showcasing resilience in the face of climate change.

Longyearbyen

The largest settlement in Svalbard, situated in the Arctic wilderness. Characterized by colorful houses, it serves as a hub for scientific research and Arctic exploration. Despite its remote location and harsh climate, it boasts modern amenities and a resilient community.

Midnight Sun

Phenomenon occurring in polar regions during summer when the sun remains visible for 24 hours.

Polar Night

A period of continuous darkness during winter in polar regions. Where the sun does not rise for 24 hours from the months of November to January.

Fermentation

Natural process converting sugars into alcohol or acids using microorganisms like yeast or bacteria. Essential in food preservation, beverage production, and creating unique flavors.

Master Plan

Comprehensive blueprint outlining development goals and land use for a specific area. Guides urban growth, infrastructure, and community development over the long term.

Design Tool

Instrument or technique aiding in the creation or visualization of architectural concepts. Includes software, physical models, and sketches used by architects and designers.

Climate Change

Global phenomenon characterized by alterations in temperature, weather patterns, and ecosystems due to human activity. Poses significant environmental, social, and economic challenges worldwide.

LCA (Life Cycle Assessment)

Methodology evaluating the environmental impact of a product or service throughout its entire life cycle. Considers resource use, emissions, and waste generation to inform sustainable decision-making.

Trias Energetica

The Trias Energetica is a method in connection with energy optimization of a specific urban and building design after clarifying the user's requirements for the program.
The method consists of 3 steps:
1. Reduce the demand for energy through the rational use of energy
2. Use sustainable sources of energy like renewable energy to fulfill demands 3. Use fossil

fuels, if necessary, as efficiently and cleanly as possible.

Program

Set of requirements and functions defining the intended use and activities within a building or space. Influences architectural design and spatial organization to meet user needs.

Massing

Arrangement and form of architectural elements within a building or urban context. Determines the overall shape, scale, and silhouette of a structure or development.

Section

Architectural drawing depicting a vertical slice through a building or space revealing interior details and spatial relationships, and structural elements for design.

Detail

Specific element or component within a building or design, often depicted in drawings or specifications. Includes joinery, materials, and finishes, contributing to the overall aesthetic and functionality.

Plan

Architectural drawing representing a horizontal view of a building or space. Shows layout, circulation, and spatial relationships.

Service

The period during which meals are prepared, cooked, and served to customers in the restaurant.

Expediter

A crucial role responsible for coordinating and ensuring the smooth flow of orders between the kitchen and the dining area. The expediter acts as a liaison between the kitchen staff and the serving staff, helping to maintain communication and organization during busy service times.

Caravaggio

An Italian Baroque painter who lived from 1571 to 1610 renowned for his dramatic use of light and shadow.

Ruskin

John Ruskin was an English writer, critic, and artist who lived from 1819 to 1900 best known for his influential writings on art, architecture, and society during the Victorian era focusing on the connections between art, nature, and morality.

Doughnut Economics

A holistic framework for re imagining economic systems in ways that prioritize human well-being and planetary health in a mutually beneficial way coined by economist Kate Raworth.

CHAPTER ONE

WHERE ARE WE?

RESTAURANT IN THE ARCTIC

This thesis proposes the design of a restaurant called “Refuge” in Longyearbyen, Norway. With a restaurant, Longyearbyen has a truly unique development opportunity in the middle of the city. This presents the opportunity to create a neighborhood that invites the entire city out to the water and into nature, while also developing an area that creates value for the entire city. If we simultaneously use the area as a showcase project and laboratory for future urban development, the new neighborhood could potentially create exemplary value that extends far beyond the site’s borders.

The vision for the area builds directly on the city’s history by combining livability and innovation through food production and consumption thereby ensuring the three main principles: climate-resilient and sustainable, diverse and vibrant, with The Refuge as a living laboratory for experiments and innovation.

To realize this vision, I am proposing combining the master plan with a Process Plan. This creates a broader framework for development that includes the physical main structure but also encompasses the communication of common objectives as well as involvement, innovation, and ongoing experiments on-site.

To symbolize the goal of this site and restaurant in this extreme climate, the name Refuge will be the signifier.

Master Plan
The master plan delineates the physical main principles that ensure connectivity to Longyearbyen and to the water. The master plan outlines the area’s social infrastructure as a cohesive landscape, which forms the basis for social synergy and cohesion, as well as for the development of nature and The Refuge program within the neighborhood.

Process Plan
The process plan illustrates how the neighborhood, from day one and beyond, can cultivate a new way of eating, new activities, new nature, new participation and anchoring, as well as new experiences, which will ultimately create unique synergy and cohesion anchored in the city.

Photo of buildings in Pyramiden, Svalbard

LONGYEARBYEN, SVALBARD

INDUSTRIAL DISTRICT

SKOSKRENTEN

UNIVERSITY CENTRE IN SVALBARD (UNIS)

LIA

MAIN STREET

SITE

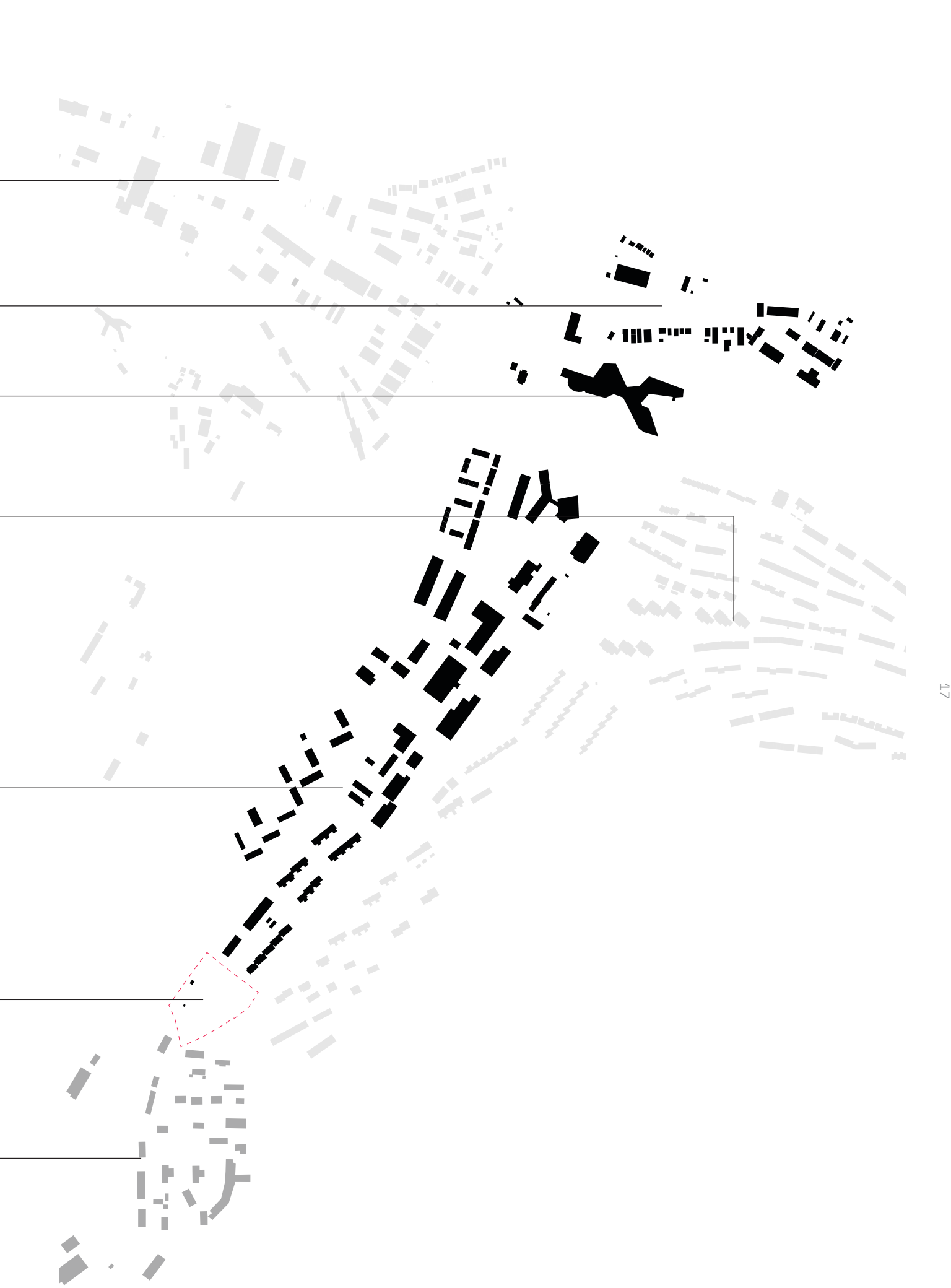


Figure 1: Foreground Diagram of Longyearbyen neighborhoods

AN OLD/NEW WAY OF DINING

This thesis delves into the conceptualization and design of a sustainable restaurant in the Arctic archipelago of Svalbard. With a focus on architectural innovation, the research navigates the challenges posed by the extreme climate and unique cultural context of the region. Svalbard, known for its pristine landscapes and distinct Arctic identity, offers an unprecedented opportunity to explore the intersection of culinary excellence and environmental responsibility.

The study begins by analyzing the climatic conditions, cultural nuances, and ecological considerations specific to Svalbard. It identifies key architectural strategies to address challenges such as extreme cold, limited daylight, and the delicate Arctic ecosystem.

Sustainability takes center stage in the architectural narrative, emphasizing the use of regional building techniques, energy-efficient systems, and waste reduction strategies. The restaurant becomes a model for responsible dining, celebrating Arctic gastronomy .

As a culmination, this thesis envisions the establishment of a restaurant that not only caters to the gastronomic desires of visitors but also contributes to the preservation of Svalbard’s delicate ecosystem and long term residents.

Images of various dishes from Noma

CONNECTION TO THE CITY AND LANDSCAPE

Refuge is a proposed restaurant located in the city of Longyearbyen at the intersection between Lia, Haugen, and Nybyen. Lia is the main residential district for the city, Haugen is the location of the only kindergarten, and Nybyen is the southern most district that act as a mixed commercial zone with hotels, a gallery, and restaurants.

Back in the 1940s Nybyen was to become the ”New Town” by becoming the new cultural center of Longyearbyen. The central commercial district has since moved forward up the Longyear Valley.

The location of the site provides the opportunity to create a new focal point for the city by extending the surrounding context into the site and providing a way point for the larger context of Longyearbyen.

Refuge is an experiment in and a self circular economy that aims to grow and provide food for its operation as a local eatery and diner while also allowing for moments of fine dining to explore the creativity of the region.

The master plan is based on significant greening to provide the restaurant and site with the vegetation for consumption while also testing the limits of agriculture in the arctic. The permeable edges provide grounding the site that expands its use throughout the season to create an environment to enjoy the polar nights while the sun is gone as the permafrost sets in.

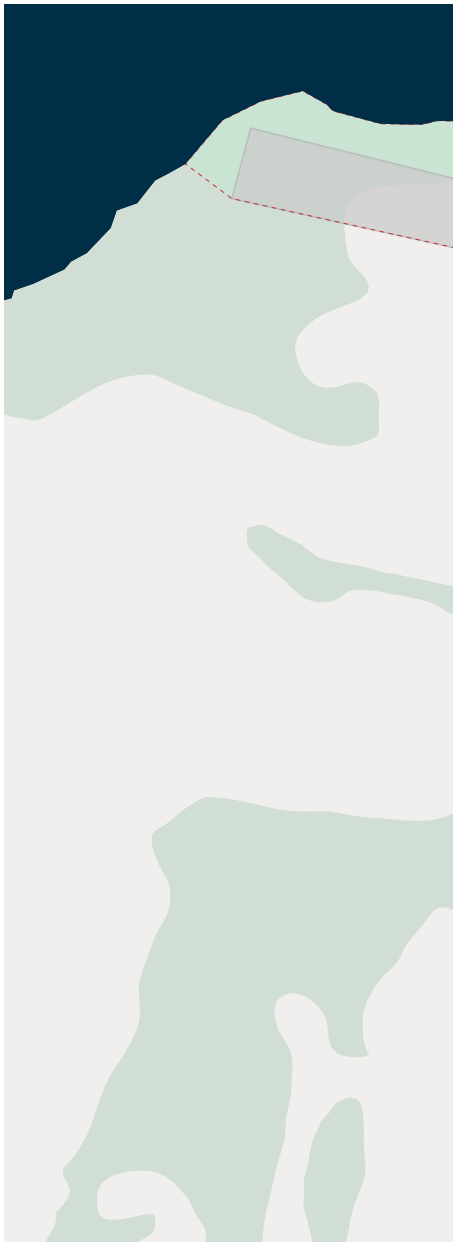
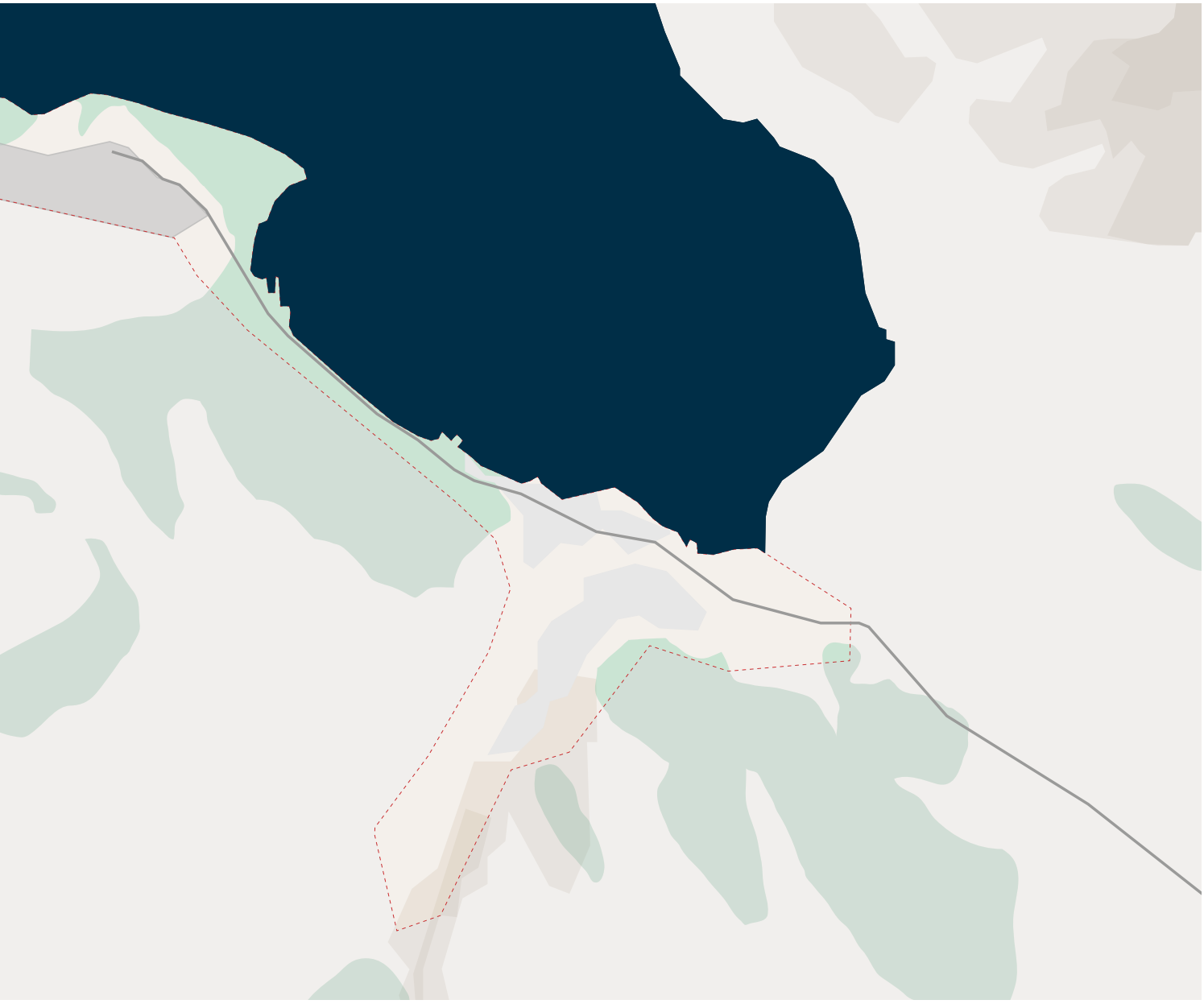
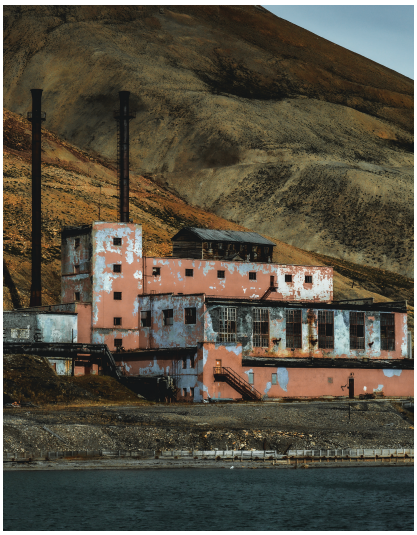


Figure 2: Overall map o

Series of Photographs of the surrounding areas of Longyearbyen



f Longyearbyen, Svalbard



CLIMATE

Average temperatures in Svalbard vary significantly between seasons. In winter, which extends from November to April, temperatures plummet well below freezing, with average lows ranging from -15°C to -20°C (5°F to -4°F) and occasional dips to even colder extremes. During this time, the region is shrouded in darkness for much of the day, with polar night lasting from late November to mid-February.

In contrast, summer in Svalbard, spanning from May to September, brings a brief but dramatic thaw. Average temperatures rise to around 3°C to 7°C (37°F to 45°F) during the day, though they can occasionally reach higher. The summer months also mark the arrival of the midnight sun, with 24 hours of daylight experienced from late April to late August. This extended period of sunlight fuels a burst of growth and activity in the Arctic ecosystem, as flora and fauna make the most of the short-lived warmth.

Precipitation in Svalbard is relatively low throughout the year, with most of it falling as snow. Snow cover is present for the majority of the year, persisting well into the summer months at higher elevations. Annual snowfall averages around 200 to 300 millimeters (8 to 12 inches), with slightly higher amounts in the coastal regions.

Overall, Svalbard’s climate is characterized by its extreme conditions, with long, harsh winters and brief, cool summers. Despite its challenging environment, the region supports a diverse array of wildlife and serves as a unique and captivating destination for tourists and scientists alike.

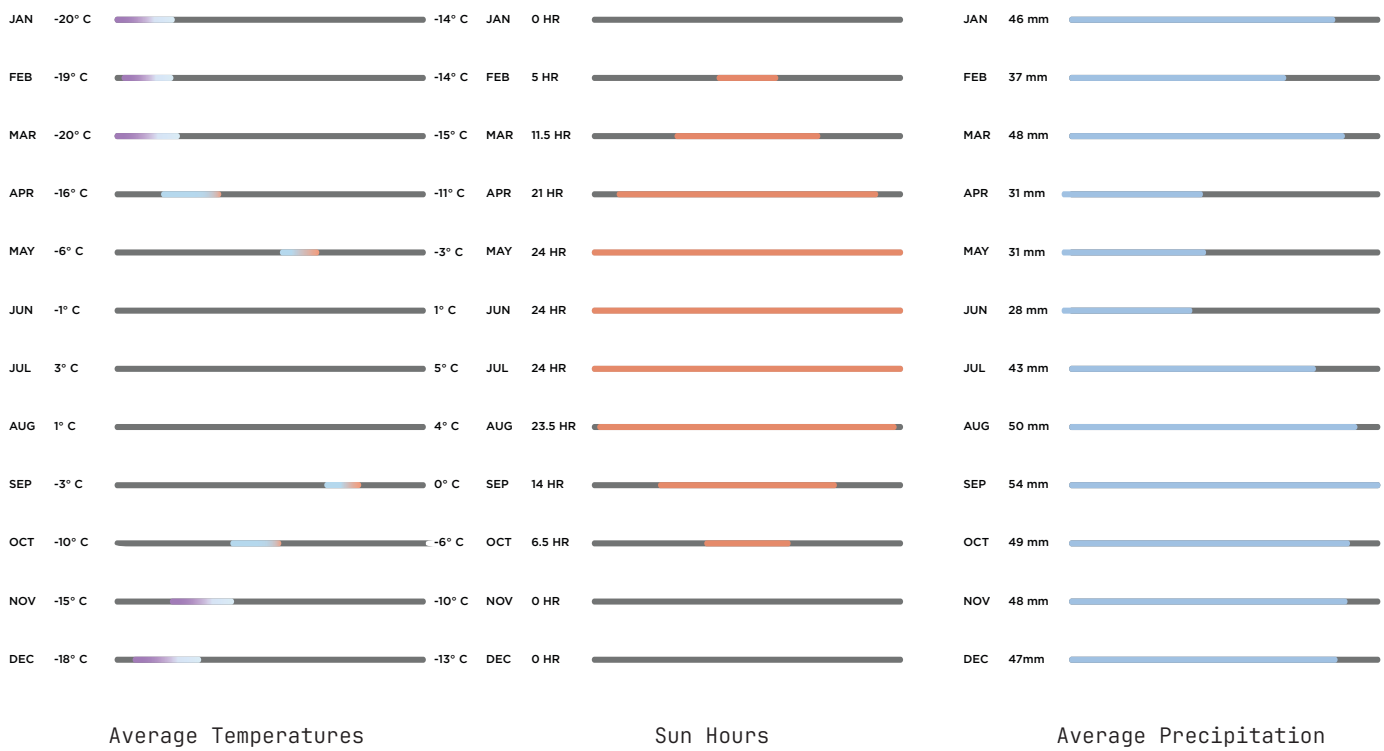


Figure 3: Charts of climate data on Longyearbyen Climate Data retrieved Apple Weather [Mobile App]

Photographs of Adventfjorden

Figure 4: Contextual Summer Site Plan

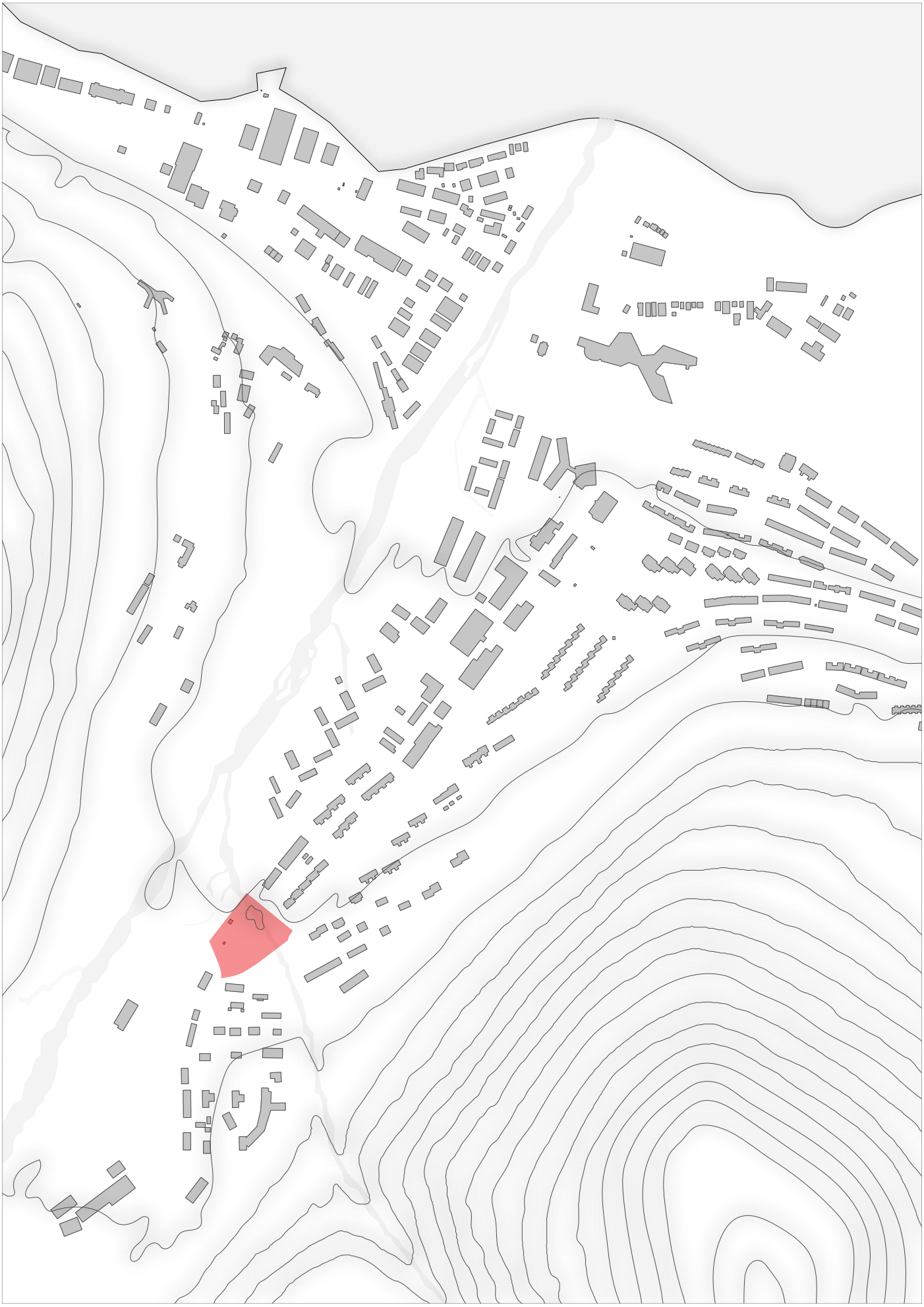


Figure 5: Contextual Winter Site Plan

LANDSCAPE

Longyearbyen, nestled in the Arctic, offers an unprecedented landscape. Located on the island of Spitsbergen, the largest in the Svalbard archipelago, Longyearbyen serves a its administrative center. Its backdrop of ice-capped summits, expansive glaciers, and fjords creates a setting that is both striking and unique to this location.

What sets Longyearbyen apart is not just the diverse landscape but also the unique journey that visitors undertake to reach it. Accessible yet remote, the voyage is marked by anticipation as the view from the plane reveals the isolation and rugged terrain.

Perched at the southern edge of town before Nybyen, the site commands panoramic views of the ice-capped mountains, and views of the city of Longyearbyen and the Adventfjorden. Its location on the outskirts of Longyearbyen offers a sense of seclusion and immersion in the Arctic wilderness while still being accessible to visitors and locals.

The surrounding terrain is characterized by rugged terrain, with rocky outcrops and sparse vegetation spread around the landscape. The Arctic climate exerts its influence with temperatures fluctuating seasonally and occasional gusts of wind sweeping across the site.

Despite its remote location, “Refuge” offers an experiment and celebration of the Arctic. The site blends seamlessly with the natural surroundings and is large enough to support he experimental production of vegetation for the restaurant. As visitors approach the site, they are greeted by a sense of awe and wonder at the beauty and harshness of the Arctic environment, setting the state for an immersive experience.

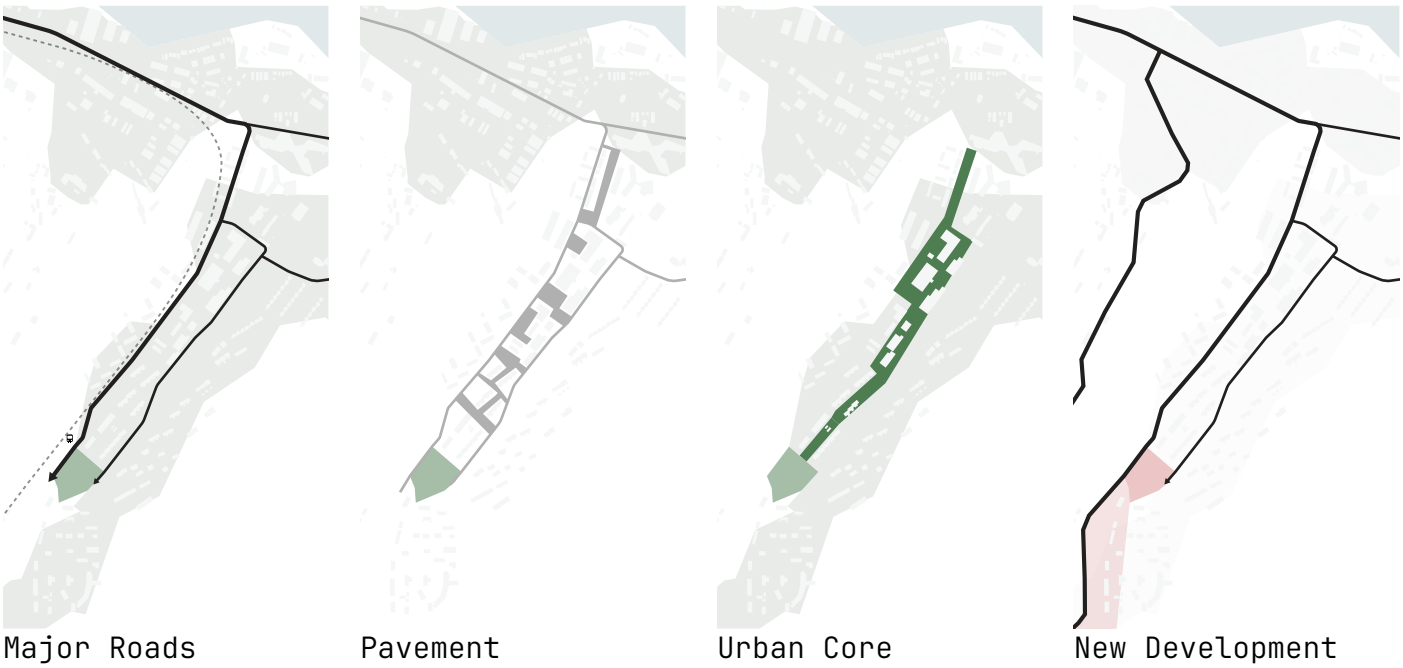


Figure 6: Urban Diagrams of Longyearbyen

Figure 7: Zoomed in Site Plan

FOLIAGE

The site has a potential to test new ideas for what it means to grow in the arctic. There is a lack of biodiversity on Svalbard due to its extreme climate, but even so, there are many native plants that are found throughout Svalbard that require the permafrost in the winter to grow during the summer months. These variety of plants represent a microcosm of what is growing across the archipelago and showcases some edible plants that are used in the restaurant. The desire is to promote and educate people about the native species that are reflective of the great struggle in this climate.

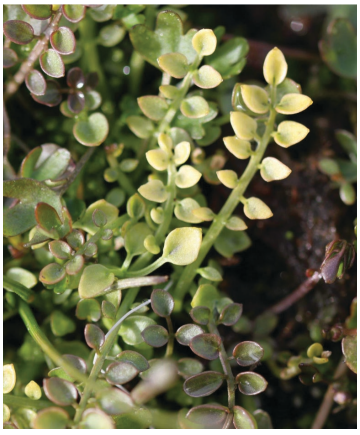
Diverse habitats

The site as an intersection between residential, commercial, and former industrial areas of Longyearbyen offers a great opportunity to pull in material palettes from the surrounding context in an effort to keep the language of the site similar.

A number of edible plants will be planted in the area, showcased here as cloud berries and crow berries alongside the greenhouses to show the potential for local growth. Edge zones will be permeable with these local plants to further blur the borders of the site and establish itself as an extension of the surrounding context

Community gardens

Vegetation Palette



Polarkarse

Arctic butterbur

Arctic wood-rush

Moss campion

Photographs of native plants found on Svalbard Image Credit: Geir Arnsen, Simen S. Hjelle, SvalbardFlora.no, Johannes B. U. Tomasson, Bjørn Erik Sandbakk

Local species

Seasonality

Edible Fruits

Permeable surfaces

Up-cycled & Recycled materials

Low LCA materials

Figure 8: Diagrams highlighting landscape strategies for the site
Image Credit: Created at EFFEKT Architects

Alpine hair-grass

Cloudberry

Mountain sorrel

Crowberry

SUSTAINABILITY AS DESIGN DRIVER

Focusing on innovation and sustainability.

Restricting its ecological footprint to a minimum is an ongoing commitment. The building continually seeks sustainable, energy-efficient, and environmentally friendly solutions without adopting extreme attitudes, choosing the right solutions that add value to the environment.

Building methods and materials

Adhering to the principles of Trias Energetica, the building focuses on limiting global energy consumption by constructing compact volumes that minimize energy losses. ”The greenest energy is the energy that is not used.” The building strives for architectural quality that is distinctive and cost-effective, achieving high standards within economic and rational building principles. Standard construction methods that have proven their efficiency and guarantee strict budget adherence through structural efficiency are chosen. The site is fully exposed to the extreme climate of Svalbard. Due to this specific climate, materials with high durability that also relate to the local history of storage and adaptability are selected.

Water management

The building focuses on rainwater harvesting by collecting and storing rain from sloped roofs for reuse in private toilets. Green roofs will be applied on flat roofs to ensure a slow outflow after rainy days.

Energy production

The building contributes to reducing energy needs by harnessing free resources from the sun and the earth. It is committed to supporting energy production through photo-voltaic panels and/or geothermal collectors. Longyearbyen presents the unique challenge of 3.5 months of constant sunlight followed by 3 months with no solar energy. Therefore, designing for solar energy is essential. Solar panels will be integrated into south-facing vertical walls from the preliminary design phase to achieve aesthetic architectural integration. The electricity generated by solar panels is the main power source for any current technical installation. The extension of the ’Nybyen’ towards the North offers the opportunity to connect. Additionally, a geothermal installation on this large site is a viable option, pending further study and consideration. The most suitable energy production source will be chosen based on in-depth contextual studies.

Heat Reclamation

By reclaiming heat from cooking and exhaust, the building can create a sustainable cycle of energy use, reducing waste, lowering costs, and supporting greenhouse production for fresh ingredients. This approach benefits the environment and enhances operational efficiency and appeal. Heat Recovery Ventilation (HRV) systems capture heat from kitchen exhaust before it is expelled outside, transferring it to incoming fresh air and preheating it before it enters the greenhouse.

Geothermal Energy

With extreme temperature swings throughout the seasons, the building aims to utilize the stable temperatures from within the Earth. Ground-source heat pumps transfer heat between the ground and the building, using the constant temperature a few feet below the surface to provide heating in winter and cooling in summer. Geothermal systems can also supply hot water for the restaurant's needs, reducing reliance on gas or electric water heaters.

DESIGN DRIVERS

What if building a new restaurant didn't just mean trying to cause less harm, but actually doing more good? What if new developments could restore the health of both people and the environment? Today, unprecedented challenges affect human habitats. The building and the built environment can and must play a fundamental role in addressing these challenges. This belief acts as the main design driver, permeating every aspect of the project. Inspired by the unique potential of the site, four themes were benchmarked to contextualize the requirements and create tailored design approaches for the site's specific needs.

Building Healthy Habitats: Using new developments to restore the health of people and the environment.

Building Communities: Creating inclusive and thriving communities where food is central to communal space.

Refuge as Material Community: Focusing on the mindful use of materials, building systems, and development processes.

The Resourceful Neighborhood: Emphasizing the importance of water and energy as fundamental resources for the new development.

BUILDING HEALTHY HABITATS

The project of reclaiming heat from restaurant operations to support adjacent greenhouse heating epitomizes the integration of sustainable practices with the creation of healthy habitats for both people and plants. By leveraging the natural warmth generated from cooking and exhaust, we enhance thermal comfort within the restaurant and greenhouse environments, providing a stable and pleasant climate year-round.

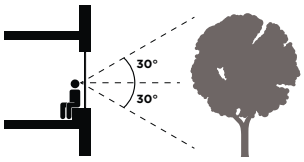
Our approach ensures that diners and staff experience optimal thermal comfort, significantly reducing reliance on traditional heating methods and promoting energy efficiency.

Furthermore, this project prioritizes direct view of nature and access to nature on approach and for more casual experiences. The greenhouse, heated by reclaimed energy, supports a variety of plants, visible through strategically placed windows and open spaces. This seamless connection to greenery not only beautifies the restaurant environment but also offers psychological benefits, reducing stress and fostering a sense of well-being among patrons and staff alike.

Access to light is another critical component of our design philosophy. The greenhouse structure is designed to maximize sunlight exposure, supporting robust plant growth and providing a vibrant, sunlit area that patrons can enjoy.

Thermal comfort

A space with good thermal properties and natural airflow improves physical and psychological health of its users.

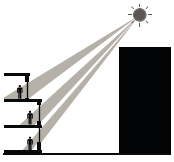


Direct view of nature

Direct view of nature has proven to have a beneficial effect on users' experience of psychological well-being.

Access to nature

Direct access to nature improves personal well-being and health. This can be achieved through simple solutions, such as semi-private open spaces.

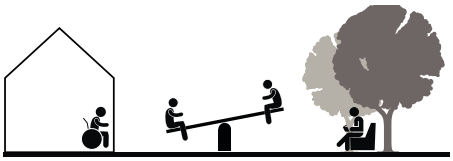


Light

We believe in the benefits of offering bright living environments to ensure visual comfort and support circadian rhythm of the residents.

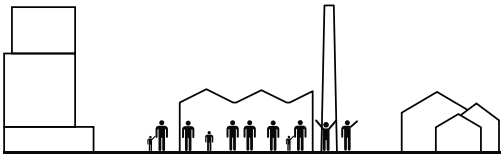
Figure 9: Diagrams graphically showcasing healthy building habits for inhabitants
Image Credit: Created at EFFEKT Architects

BUILDING COMMUNITIES



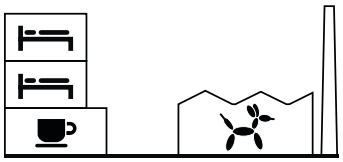
Inclusive design

We are committed to designing homes and urban spaces for the majority of people to have access to good living conditions.



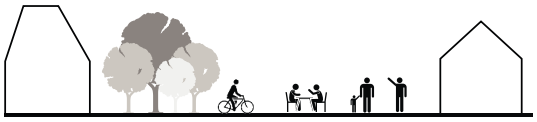
Streets designed for life

According to the STOP principles, we imagine streets owned by pedestrians and cyclists, where cars are just guests.



Program mix

To ensure a vibrant life, a neighborhood should accommodate mixed-use program, fostering informal encounters and strengthening the sense of community.



Community participation

A stronger sense of place and community arise when people proactively engage in shaping the spaces they inhabit.

Figure 10: Diagrams graphically showcasing community building strategies Image Credit: Created at EFFEKT Architects

Our approach extends beyond the building itself. The pathways and outdoor areas around our facility are pedestrian-friendly, promoting safety and accessibility during the summer months. We have incorporated landscaped walkways that connect the restaurant to the surrounding community, encouraging walking and cycling. These spaces are not just thoroughfares but are designed to be lively, interactive areas where guests can enjoy a direct view of nature and engage with their environment meaningfully.

A diverse program mix is essential to our vision, ensuring that our facility meets various needs and interests. The restaurant offers multiple dining options, including private dining rooms, a bar area, an outdoor patio, and spaces for educational workshops and community events. The greenhouse supports agricultural production with areas dedicated to plant propagation, hydroponics, and sustainable farming practices. This variety ensures that our facility serves as a hub of activity, education, and relaxation, catering to the diverse preferences of our guests and community members.

Community participation is a cornerstone of our project. We actively engage local residents, schools, and organizations in the planning and operation of our facility. Through workshops, tours, and hands-on activities, we invite the community to learn about sustainable practices, participate in urban farming, and contribute to our composting and recycling efforts. By involving the community, we foster a sense of ownership and shared responsibility for the health of our environment.

REFUGE AS A MATERIAL COMMUNITY

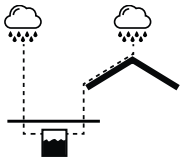
Integrating a sustainable restaurant with a greenhouse, is envisioned as a model of a material community, employing advanced strategies in water management, energy production, smart power grid technology, and fostering an energy community.

Water management is a cornerstone of our sustainable design. We implement comprehensive rainwater harvesting systems to collect and store rainwater, which is then used for irrigation in the greenhouse and for non-potable water needs within the facility.

The facility harnesses renewable energy sources, including solar panels and geothermal systems, to meet its energy needs. Solar panels installed on the walls capture 24 hours of sunlight, converting it into clean electricity. Geothermal systems tap into the Earth's stable temperatures to provide efficient heating and cooling. These renewable energy sources not only reduce our reliance on fossil fuels but also set a precedent for sustainable energy practices.

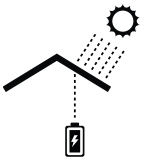
The integration of a smart power grid enhances the efficiency and reliability of our energy use. The smart grid facilitates the seamless integration of renewable energy sources, ensuring that the facility operates at peak efficiency.

Our project also embodies the principles of an energy community, fostering collaboration and shared benefits among local residents and businesses. By producing more energy than we consume, we can share surplus renewable energy with neighboring buildings, contributing to a resilient local energy network.



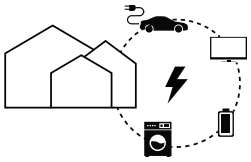
Water management

Rainwater management should be carried out on site. This will be achieved by creating green roofs and infiltration beds and maximizing permeable surfaces.



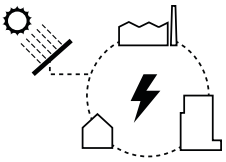
Energy production

We are committed to ensure that every building in the neighborhood contributes to the production of energy in the most efficient way.



Smart power grid

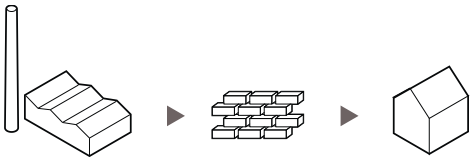
Smart grids allow to integrate multiple appliances within the same system, resulting in an efficient management of electricity.



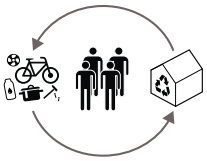
Energy community

An energy community centered around the production of geothermal and solar energy would minimize costs and optimize the energy management.

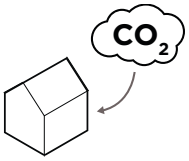
Figure 11: Diagrams graphically showcasing resource management strategies Image Credit: Created at EFFEKT Architects



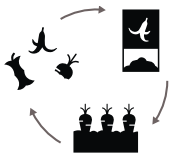
Recycling Restaurant
Buildings set for demolitions should contribute to the materialization of the new neighborhood and the preservation of its identity.



Up-cycling communities
A hot spot for recycled materials can allow residents to give away items they don't use anymore and make them available to the community.



Carbon sequestration
Building systems such as hybrid structures can contribute to restoring the environment by reducing CO2.



Composting
Composting hot spots, connected to community gardens allow to turn food scraps into nutrition for the users.

Figure 12: Diagrams graphically showcasing sustainable practices
Image Credit: Created at EFFEKT Architects

Building out of recycled or low LCA materials is a fundamental aspect of our construction and design philosophy. We select materials that have minimal environmental impact throughout their life cycle, from production to disposal. Recycled materials, such as reclaimed wood and re-purposed metals are prominently featured in the construction of our facility. These choices not only reduce the demand for virgin resources but also divert waste from landfills, embodying the principles of sustainability and circular economy.

Carbon sequestration is integrated into our project to mitigate the impact of greenhouse gas emissions. We incorporate carbon-sequestering materials, such as bio-char and carbon-storing concrete, into our building structure. The greenhouse itself plays a critical role in this process, utilizing plants that capture carbon dioxide and contribute to cleaner air.

Up-cycling is a creative and practical strategy we employ to transform waste materials into valuable resources. Within our facility, discarded items are re-imagined and re-purposed, giving them new life and functionality.

Composting is an essential practice in our commitment to waste reduction and soil enrichment. Organic waste from the restaurant is collected and processed into nutrient-rich compost. This compost is then used to fertilize the plants in our greenhouse, creating a closed-loop system that supports sustainable food production.

CHAPTER TWO

24 HOURS

WHAT MAKES A GOOD SITE?

A Manifesto on Place

In an era where rapid urbanization and technological advancements are reshaping our built environment, it is crucial to reaffirm the fundamental importance of ”place” in architecture. Place is not merely a backdrop for human activity; it is a profound, multifaceted entity that embodies our collective identity, history, and aspirations. As architects, urban planners, and designers, we hold the responsibility to create places that resonate with people, foster community, and nurture the human spirit.

Place refers to the physical, geographical, and environmental qualities of a location. It includes the natural landscape, such as topography, climate, vegetation, and water, but also the built environment, which includes the architectural styles derived from the context and culture, materials, and the urban planning of the region. These physical characteristics of place profoundly influence human behavior, emotions, and social communities. As we progress into the 21st century, the evolving complexities of our built environment suggest that Ruskin’s principles would benefit from an additional guiding light: The Lamp of Place.

Place is the bedrock of cultural and personal identity. It is through place that we connect with our history, traditions, and collective memory. Every place tells a story, and it is our duty to ensure that these stories are preserved and celebrated. Architecture must respect and reflect the unique cultural narratives and historical contexts of each location, creating spaces that anchor us to our roots and provide a sense of belonging.

Place fosters social cohesion and community building. Public spaces, parks, squares, and communal areas are the living rooms of our cities, where people gather, interact, and form bonds. These places should be designed to encourage social interaction, inclusivity, and accessibility. By creating welcoming and vibrant public spaces, we can strengthen the social fabric and promote a sense of unity and shared purpose.

In architecture, “place” encompasses more than just the physical location of a building; it embodies the unique characteristics, history, and cultural context of the environment. A sense of place elevates a building from just a series of structures into a cohesive, meaningful part of its surrounding. This holistic integration of buildings with the environment enhances the identity of the locale, fostering a sense of belonging for the inhabitants. Incorporating “Place” as the 8th lamp acknowledges the critical role that context and physical locale play in shaping architectural experiences. It argues for a design approach that is sensitive to the geographical, cultural, and social influences of a site. The Lamp of Place encourages architects to create buildings that make sense within their setting and contribute to the well-being and identity of those who interact with them.

Architecture has the power to inspire and evoke imagination. Places

should stimulate creativity and provide spaces for exploration and expression. By incorporating elements of beauty, surprise, and innovation, we can create environments that uplift the human spirit and encourage a sense of wonder and possibility.

It can be easy to think of “place” as the phenomenon of individual experiences reflected in an emotional capsule, but it can be so much more than that. On an emotional level, “place” engages all our senses, “The body knows and remembers. Architectural meaning derives from archaic responses and reactions remembered by the body and the senses.” (Pallasmaa 1996). It is because of these sensations that allow us to have individual experiences in a shared space, allowing “space” into “place.” What if there was more to “place” though? In our efforts to create “place,” we draw from our own experiences and hope that others will have the same feeling when they inhabit the space we’ve made. “Buildings and cities are instruments and museums of time. They enable us to see and understand the passing of history” (Pallasmaa 1966). In this time stopped world, we engage all our senses to take us back to the holistic experience that goes beyond the aesthetics. Spaces that evoke all those memories and stimulate the imagination are spaces that we deem successful “place.” What if there is more than just the individual experience though? How can we critically evaluate that temporal idea of “place” and bring it back to the physical realm?

When we look at successful places, here we can see so many examples. There is the Piazzas of Italy that are surrounded by the grand basilicas that frame the cultural and social hub of the cities. We have religious buildings like churches, mosques, temples, shrines, etc. that bring history to the present by preserving generations of tradition and culture. In more modern examples of place, we can look to Fallingwater by Frank Lloyd Wright as an example of physical integration with nature that presents a harmonious relationship between architecture and landscape, and in a contemporary example, we have the High Line in New York City that takes a relic of an older New York and re-imagines it into a new space that reflects the city in a futurist presentation. In all these examples, there is context, there is history, and there is most importantly, use that contributes to the creation of meaningful “place” that has resonated.

“…when we build, let us think that we build forever. Let it not be for present delight, nor for present use alone; let it be such work as our descendants will thank us for, and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and that men will say as they look upon the labour and wrought substance of them, ” See! This our fathers did for us.” (Ruskin, 1849). When architects and builders approach their work with the mindset that we are creating something enduring, we need to inherently consider the broader context and physical characteristics of the location. This involves a deep understanding of the landscape, climate, and cultural heritage of the site. By doing so, we ensure that the architecture is not only functional and aesthetically pleasing

for the present but also remains relevant for future generations. Here Ruskin gives the directive to “think that we build forever,” and encourages architects to design structures that harmonize with the natural landscape. At a high level this involves using materials and construction techniques that respond to the local climate and geography, that can later down the line be defined as “regionalism,” but it can be so much more than that. The idea that those who come after us will hold stones “sacred because our hands have touched them,” speaks to the cultural and historical continuity that a well-design architecture that understands place can provide.

We can look at place defined as a specific, identifiable location that is designed to support functions and activities but shaped by its physical features, spatial organization, and relationship to its surroundings. This just sounds like our job as architects though, so what makes it different? What makes that different from the individual ideals of “place” that evokes so much emotion? I believe that it now requires a combination of cultural identity, community building, a collective memory, public sentiment, and functional integration into public life.

The creation of meaningful places is not a luxury; it is a necessity. As we navigate the complexities of the modern world, the importance of place in architecture becomes ever more critical. Places shape our experiences, influence our behaviors, and mold our identities. They are the stage upon which the human drama unfolds. Let us, therefore, commit to designing and nurturing places that are rich in meaning, vibrant in life, and profound in their impact on individuals and communities alike.

We, the architects, urban planners, and designers of today and tomorrow, pledge to uphold the significance of place in our work, striving always to create environments that resonate with the human spirit and contribute to a more connected, inclusive, and sustainable world.

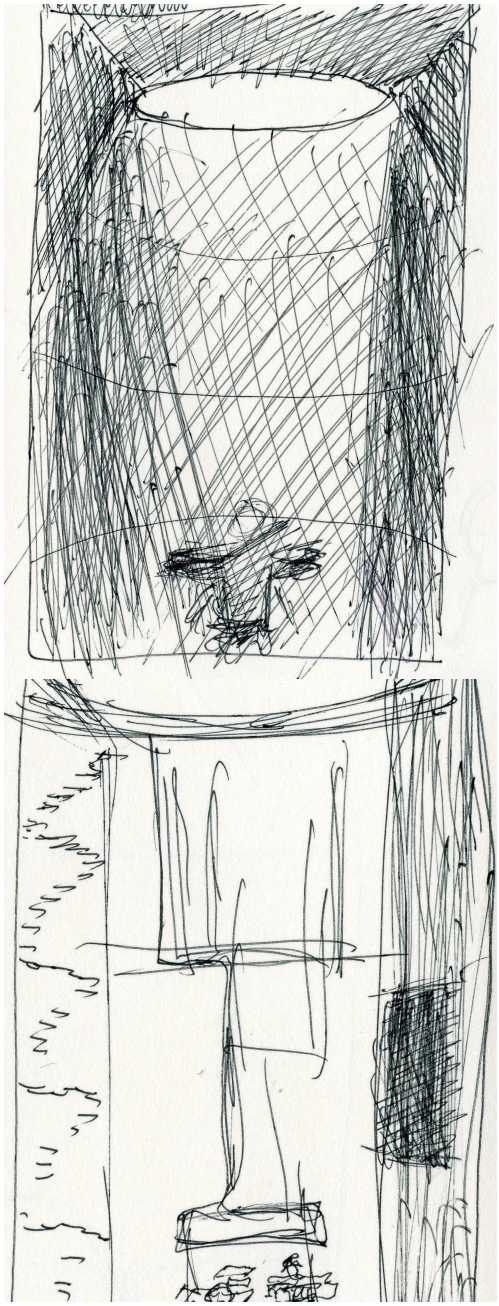
Photo of Rialto Beach, WA

WHERE THERE IS LIGHT

In the design of an underground restaurant, a light well serves as a vital architectural feature. Located at the center of the space, it acts as a conduit for natural light, channeling it from aboveground sources into the sub grade space.

The purpose of the light well is twofold: to provide essential illumination to the interior of the restaurant and to create a connection to the world above. Without access to external windows, the underground space would risk feeling dark and claustrophobic. However, the light well mitigates this by introducing a soft, diffused glow that permeates the surroundings, creating a welcoming and inviting atmosphere for diners.

In addition to its functional benefits, the light well also serves as a focal point within the restaurant, drawing the eye upward and adding visual interest to the interior. Whether bathed in sunlight during the midnight sun or just providing a connection to the sky during the polar night, the light well becomes a defining feature of the restaurant’s design.



Conceptual Sketches of Landscape and Interiors

Conceptual Sketch of Interior

Conceptual Sketch of Greenhouse during Midnight Summer

MIDNIGHT SUN

The midnight sun, where the sun remains visible for 24 hours, creates an otherworldly effect for those within it. As the earth tilts on its axis, for those living in the Arctic or Antarctic Circle, a sun that refuses to set, bathing the landscape in an eternal light that defies the boundaries of time.

For those who call these regions home, the midnight sun is more than just a celestial event; it is a symbol of resilience, adaptation, and celebration. In the depths of winter, when darkness reigns supreme and the cold seems unrelenting, the promise of the midnight sun serves as a beacon of hope, a reminder that light and warmth will return once more.

As the days lengthen and the sun climbs higher in the sky, life in these regions undergoes a profound transformation. The natural world bursts into bloom, as plants awaken from their slumber and wildlife emerges from hibernation. Rivers and streams, once frozen solid, flow freely once more. In this midnight sun, the brief summer becomes a time of growth and social activity, as the proposed greenhouse will reach peak production for the season and invite those who journey here to come together with those who live here to see what is possible this far north.

But the midnight sun is not without its challenges. For those unaccustomed to its relentless glow, sleep can become elusive, as the boundary between day and night blurs and the rhythms of life are thrown into disarray. Yet, for many, the excitement of experiencing the midnight sun outweighs any discomfort, as they seize the opportunity to embrace the energy and possibilities that accompany the sun’s presence.

POLAR NIGHT

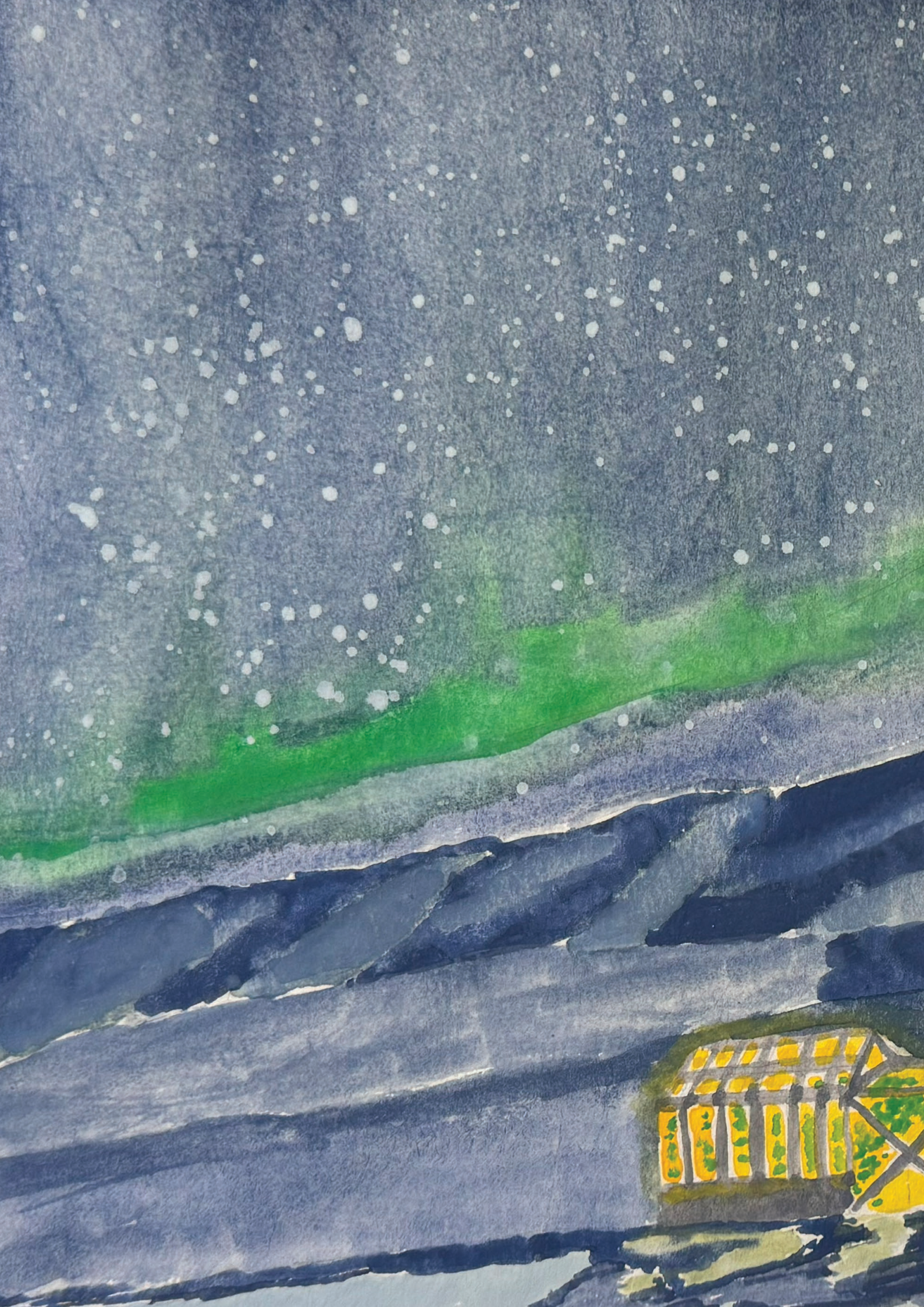
The polar night descends over the icy realms of the Arctic Circle, shrouding the landscape in an expanse of darkness. As the earth tilts away from the sun, those who inhabit these remote regions are plunged into a world devoid of light—a world where night reigns supreme for months on end.

For the people of the polar night, life takes on a rhythm all its own. In the absence of daylight, time becomes fluid, its passage marked not by the rising and setting of the sun, but by the ebb and flow of daily routines and rituals. In the depths of winter, when the sun remains hidden below the horizon, communities huddle together for warmth and companionship, drawing strength from one another as they weather the long, cold nights.

Yet, far from being a time of despair, the polar night is also a time of wonder and beauty. In the absence of light pollution, the night sky comes alive with a dazzling display of stars and incredible otherworldly sights, as the aurora Borealis dances across the heavens in color and motion. For those who brave the cold to venture outside, the polar night offers a glimpse into a world rarely seen—a world where the boundaries between earth and sky blur into one, and the wonders of the cosmos stretch out before them.

But perhaps the most profound impact of the polar night lies not in its physical manifestations, but in its effect on the human spirit. In the face of seemingly endless darkness, the people of the polar night find strength in their resilience, courage in their perseverance, and hope in their unwavering belief that light will once again return to their world. And when, at long last, the first faint rays of dawn pierce the horizon, heralding the arrival of a new day, they emerge from the shadows stronger, wiser, and more alive than ever before.

Conceptual Sketch of Greenhouse during Polar Night



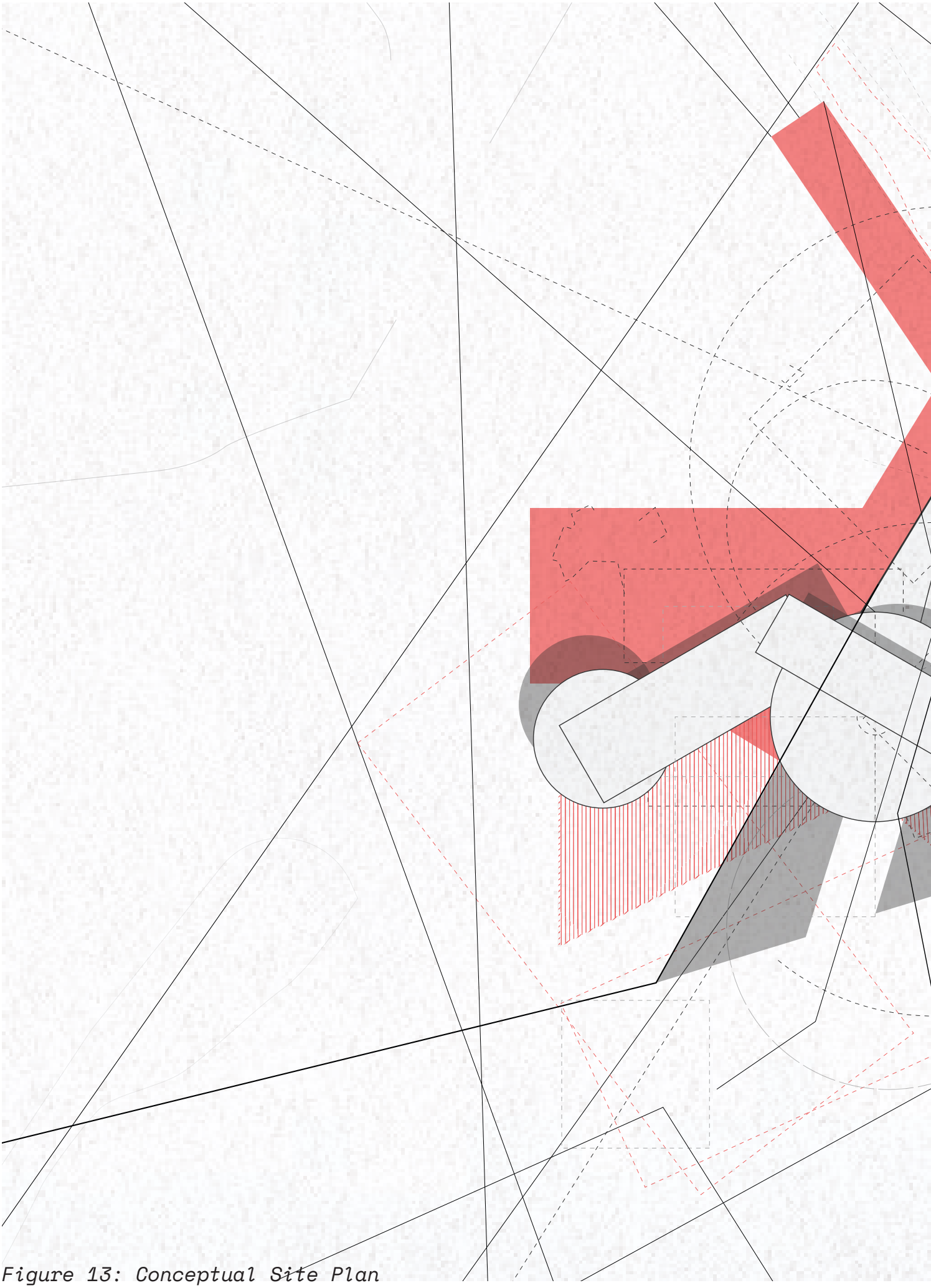
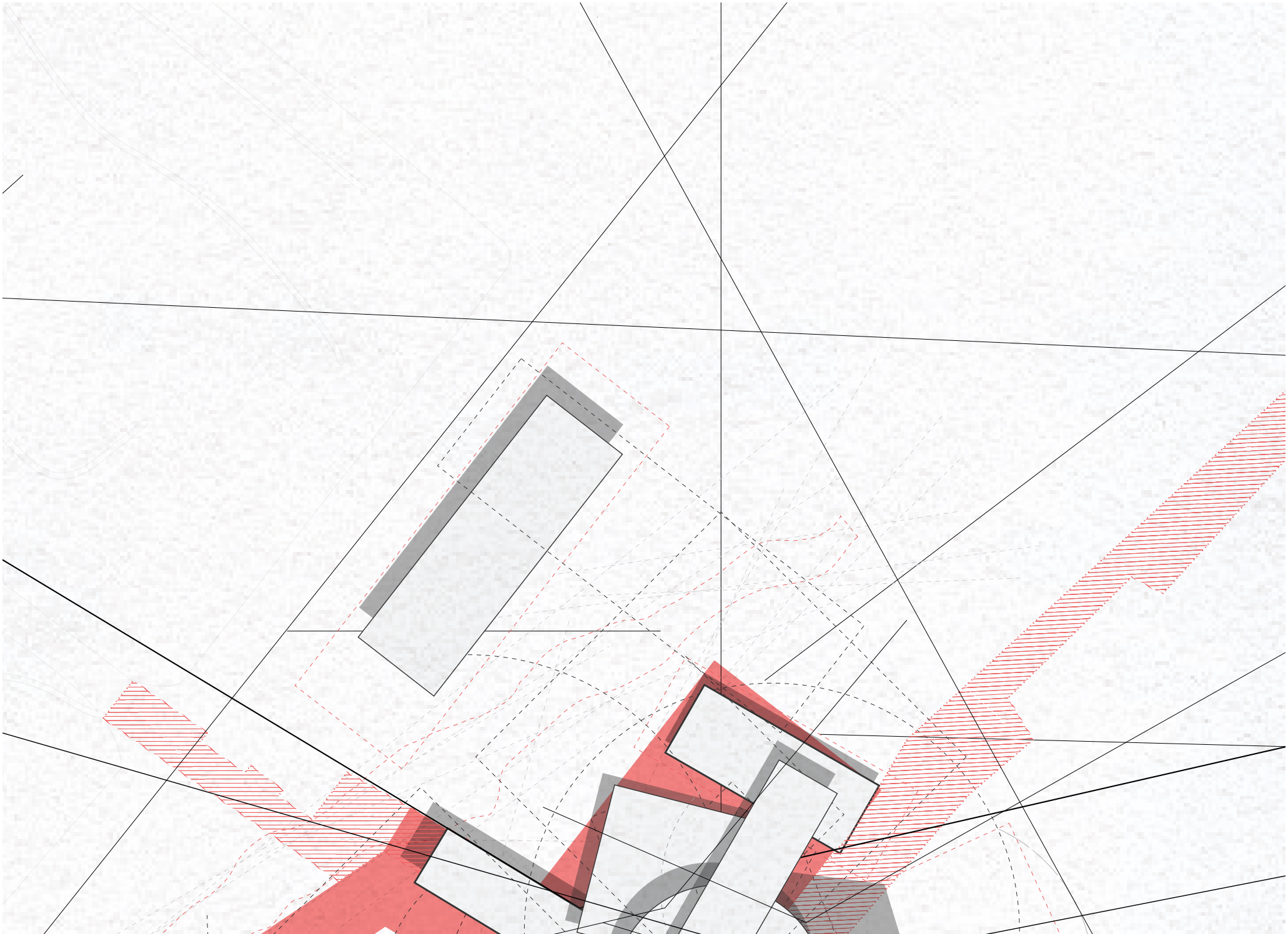


Figure 13: Conceptual Site Plan



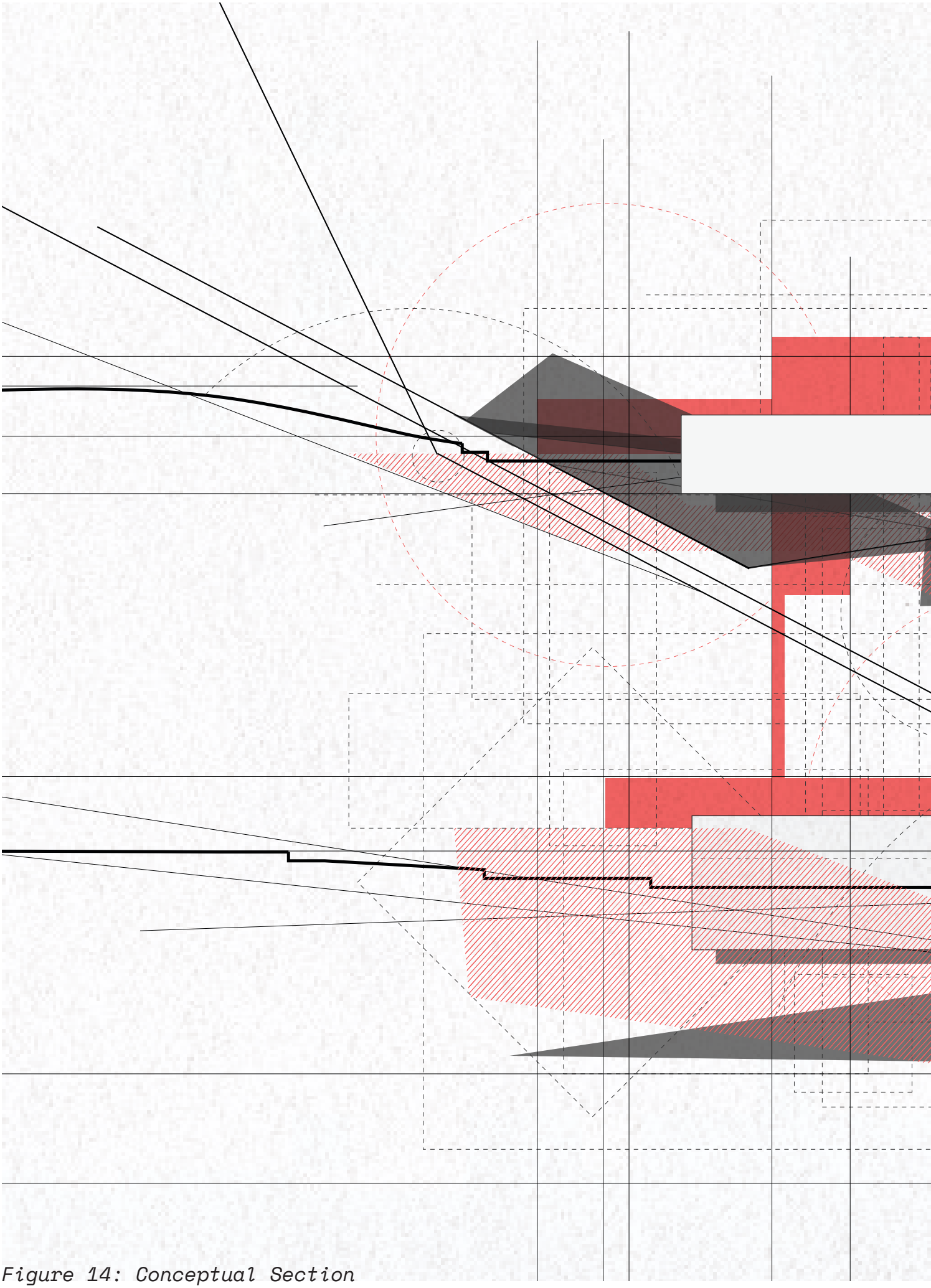
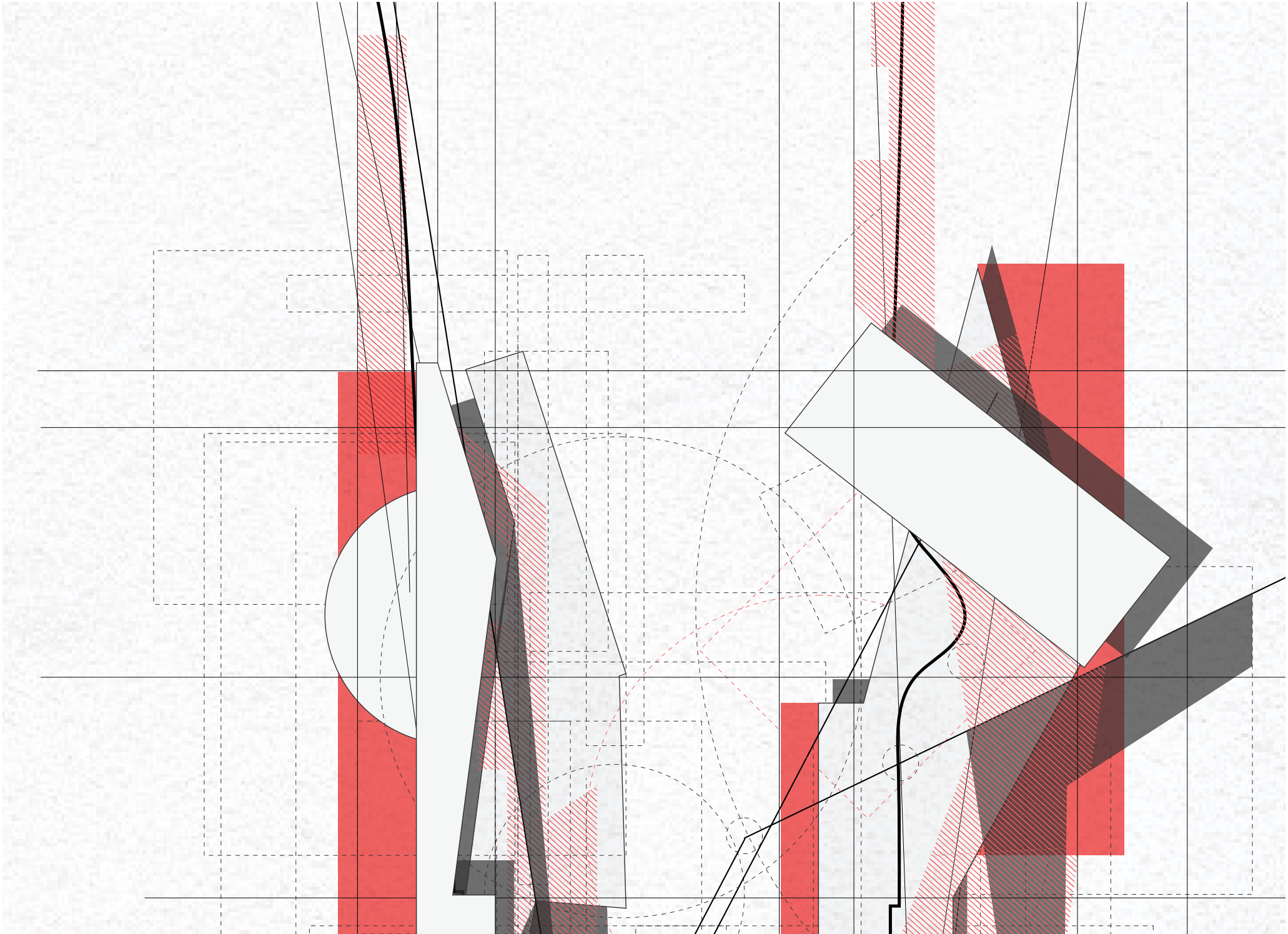


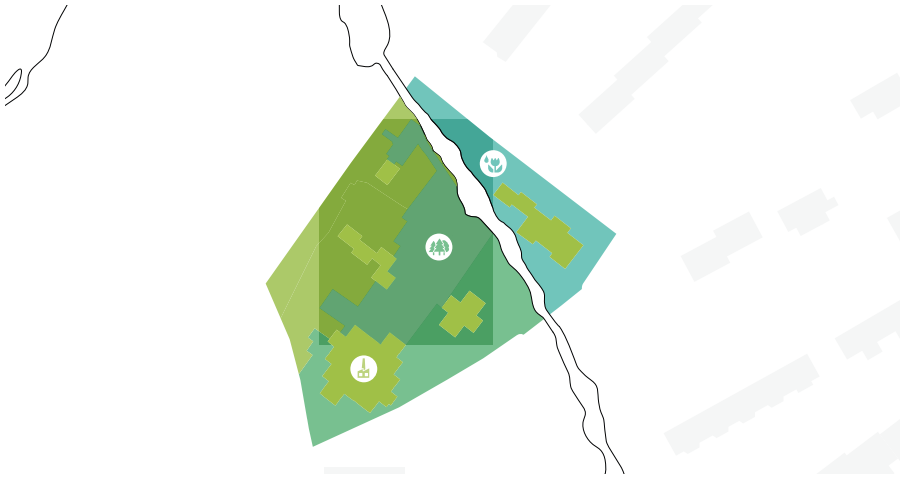
Figure 14: Conceptual Section



CHAPTER THREE

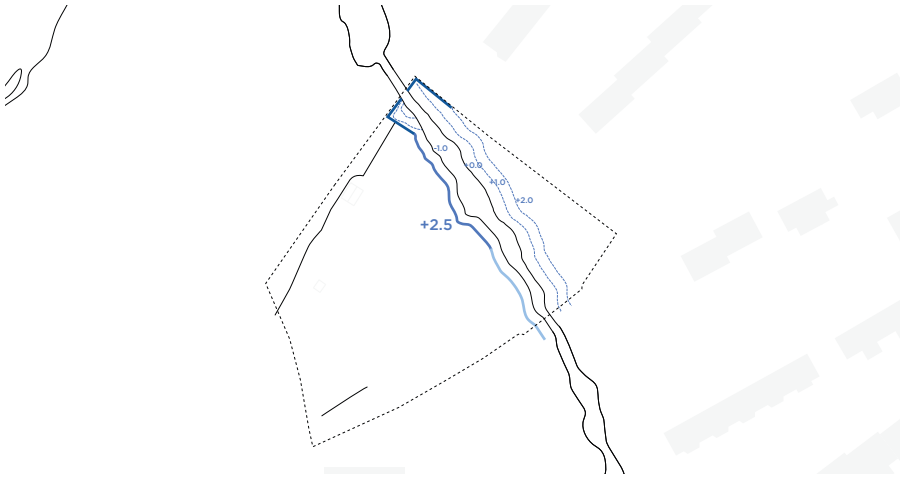
WHERE DO WE GO?

SITE STUDIES

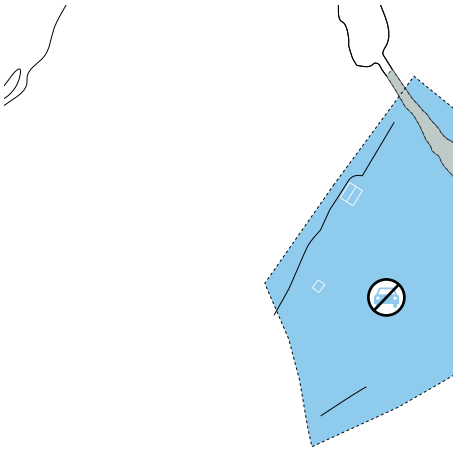


Zoning

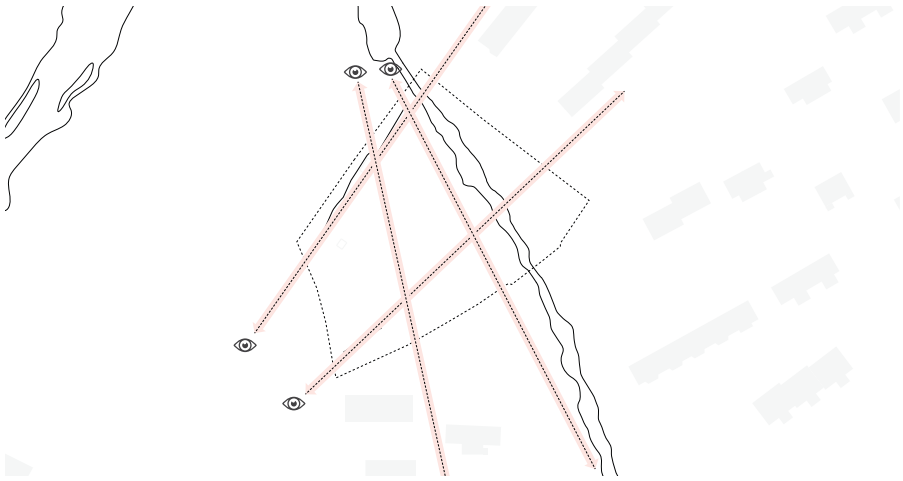
Impact Zones



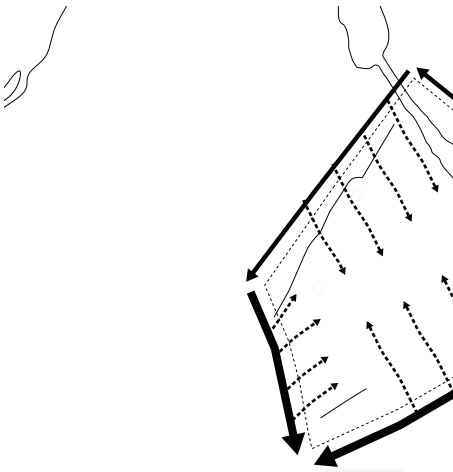
Climate Protection



No Vehicles



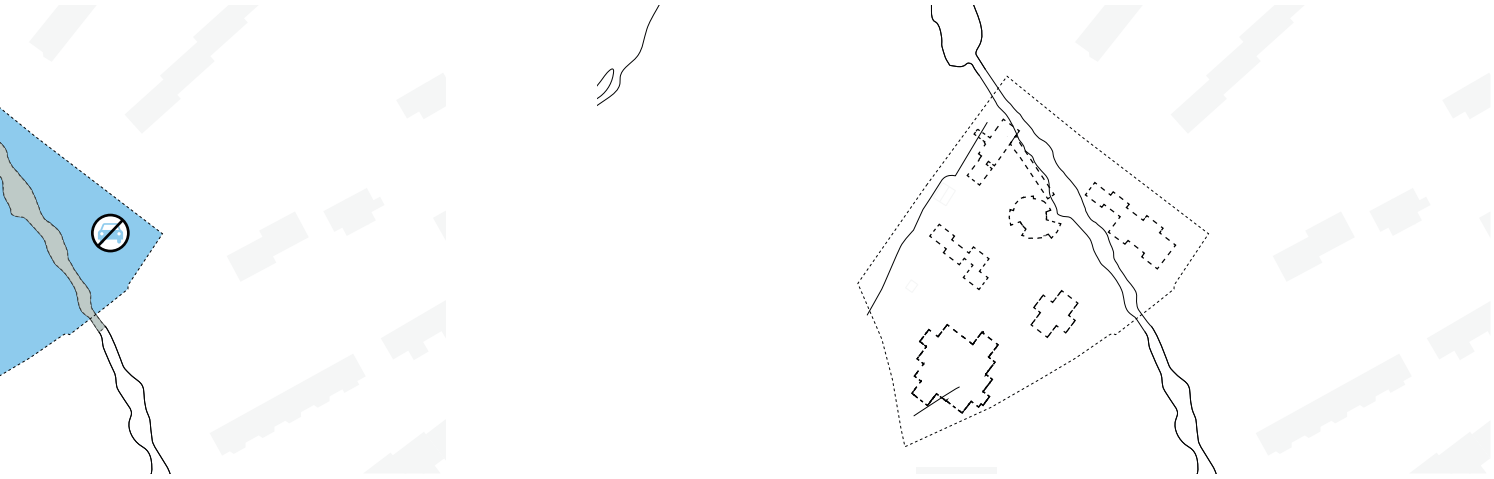
Sight Lines



Access to Site

Figure 15: Series of Site Diagrams

Water Management



Massing

Landscaping

SITE SECTIONS

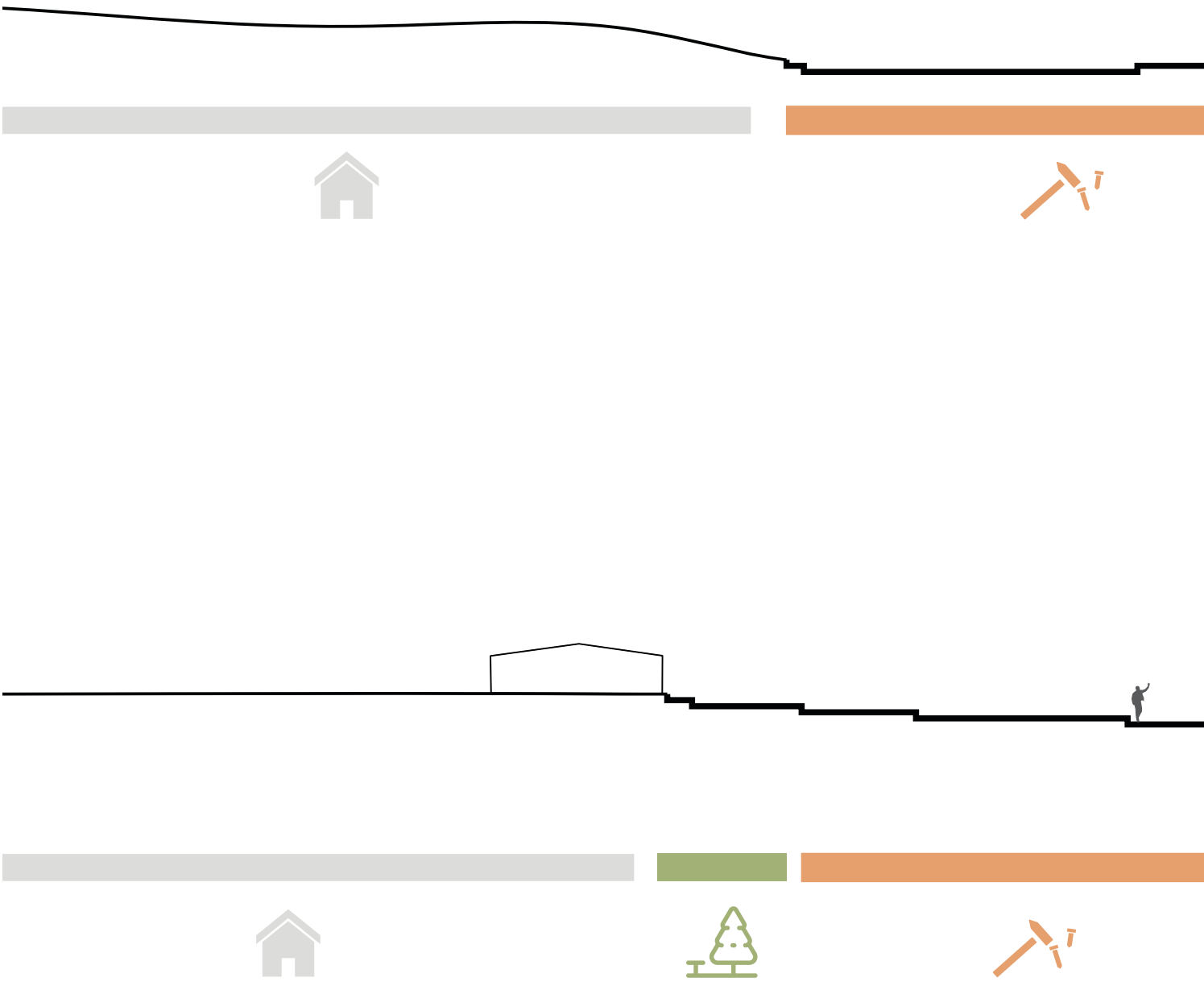
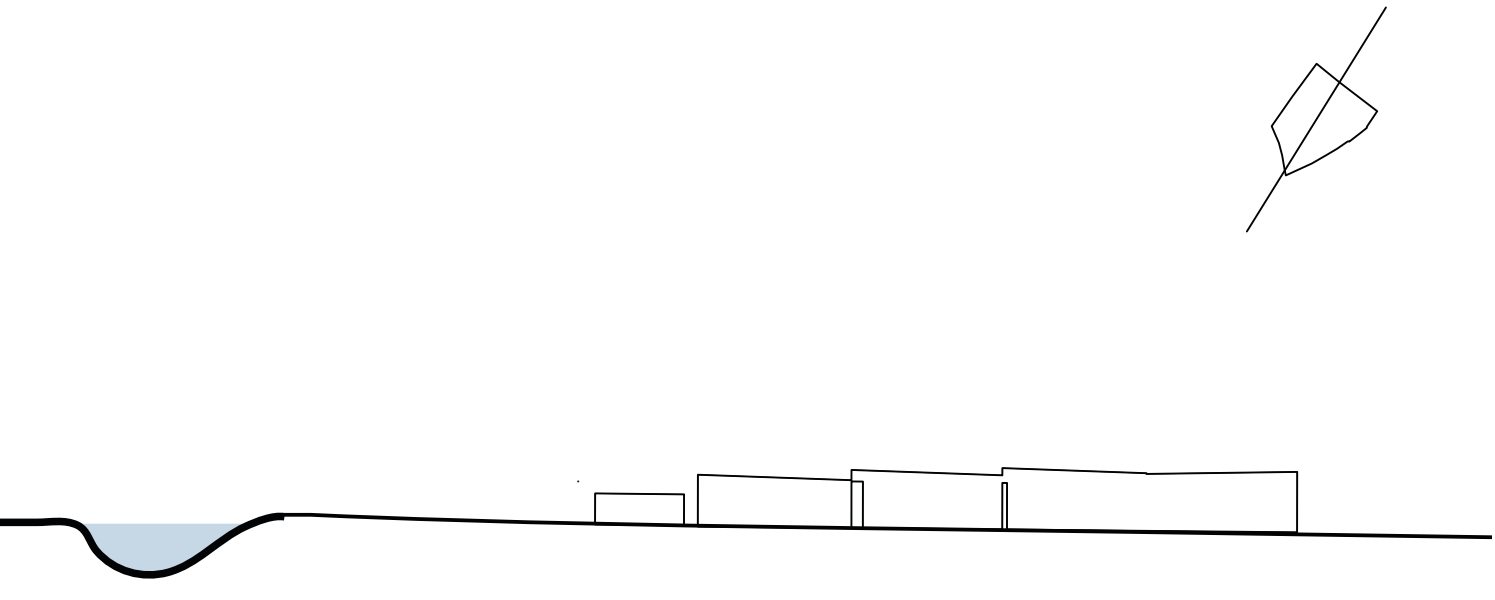
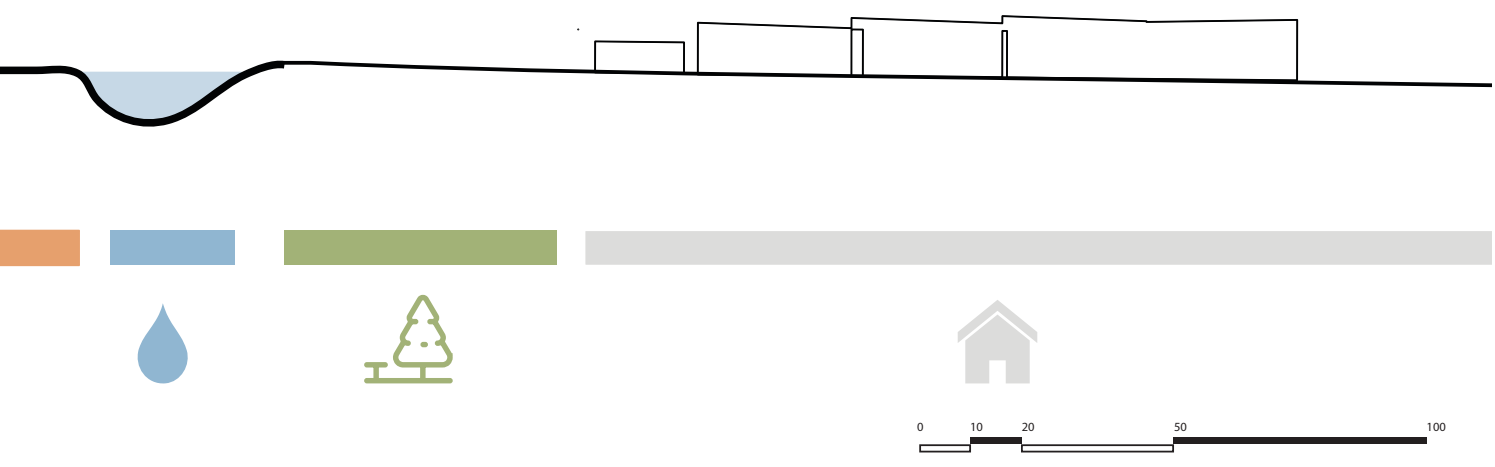


Figure 16: Site Section

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PROGRAM ELEMENTS

RESTAURANT AND DINING

Main Dining Room: Comfortable seating with views of the greenhouse and natural surroundings.

Private Dining Rooms: Smaller, secluded areas for private parties and events.

Bar Area: Space for serving drinks, including seating and standing room.

KITCHEN AND FOOD

Main Kitchen: Central area for food preparation and cooking, equipped with commercial-grade appliances.

Cold Kitchen: Dedicated space for preparing salads, desserts, and other cold dishes.

Baking Area: Specialized area with ovens and equipment for baking bread and pastries.

Butchery: Space for meat processing and preparation.

Fermentation Room: Controlled environment for fermenting foods, such as pickles, kimchi, and sauces.

Cheese Aging Room: Temperature and humidity-controlled space for aging and storing cheeses.

Wine Cellar: Climate-controlled room for wine storage, including racks and space for tasting.

Pantry: Storage for dry goods, spices, and non-perishable items.

GREENHOUSE

Greenhouse: Large space for growing fruits, vegetables, and herbs, integrated with heat recovery systems.

Hydroponics Room: Specialized area for soil-less growing systems.

Plant Propagation Area: Space for seed starting, cuttings, and plant propagation activities.

Harvest Processing Area: Space for cleaning, sorting, and packing harvested produce.

STORAGE AND UTILITY ROOMS

Walk-In Refrigerators and Freezers: Large, temperature-controlled spaces for storing perishable items.

Dry Storage: Room for storing non-perishable food items, paper goods, and supplies.

Equipment Storage: Space for storing kitchen and greenhouse tools and equipment.

Utility Room: Housing for HVAC, electrical, and plumbing systems.

Maintenance Room: Workshop for equipment repairs and maintenance.

Staff and Support Areas

Office: Administrative space for management and staff.

Staff Lounge: Comfortable area for staff breaks and meals.

Changing Rooms: Locker rooms for staff to change into uniforms.

Restrooms: Facilities for staff and patrons.

GUEST SERVICES

Reception Area: Welcoming space for greeting and seating guests.

Restrooms: Guest restrooms equipped with amenities.

Gift Shop: Area for selling products such as house-made preserves, plants, and other items.

Tasting Room: Dedicated space for wine, cheese, or product tastings.

SUSTAINABILITY ROOMS

Environmental Control Room: Monitors and controls climate, lighting, and irrigation systems for the greenhouse.

Education Room: Space for hosting workshops, cooking classes, and educational events.

Composting Area: Space for composting organic waste from the kitchen and greenhouse.

Recycling Center: Area for sorting and storing recyclables.

SPECIAL FEATURES

Heat Recovery System Room: Housing for equipment used in reclaiming and distributing heat from the kitchen.

Rainwater Harvesting System: Storage and treatment for collected rainwater used in irrigation.

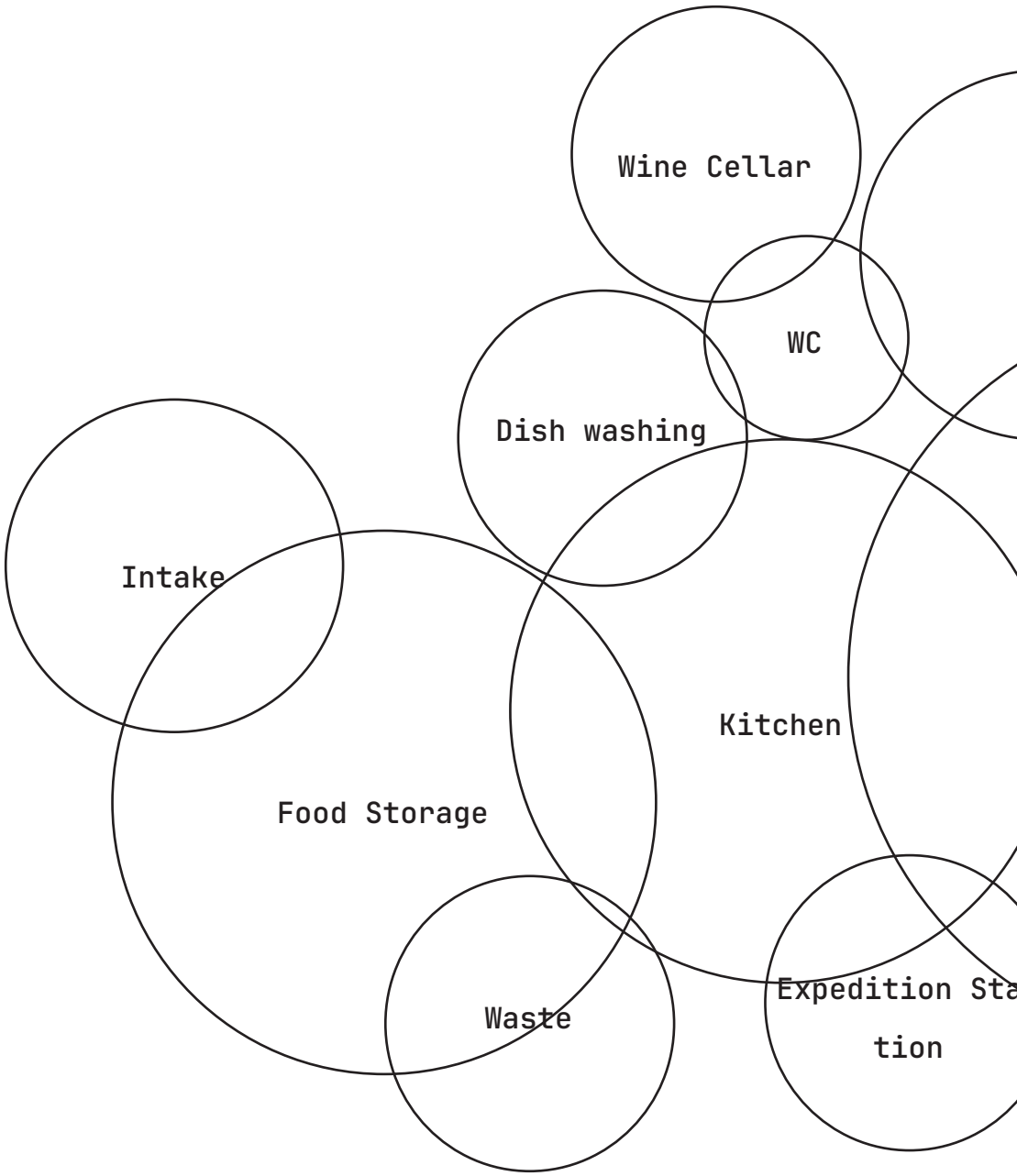
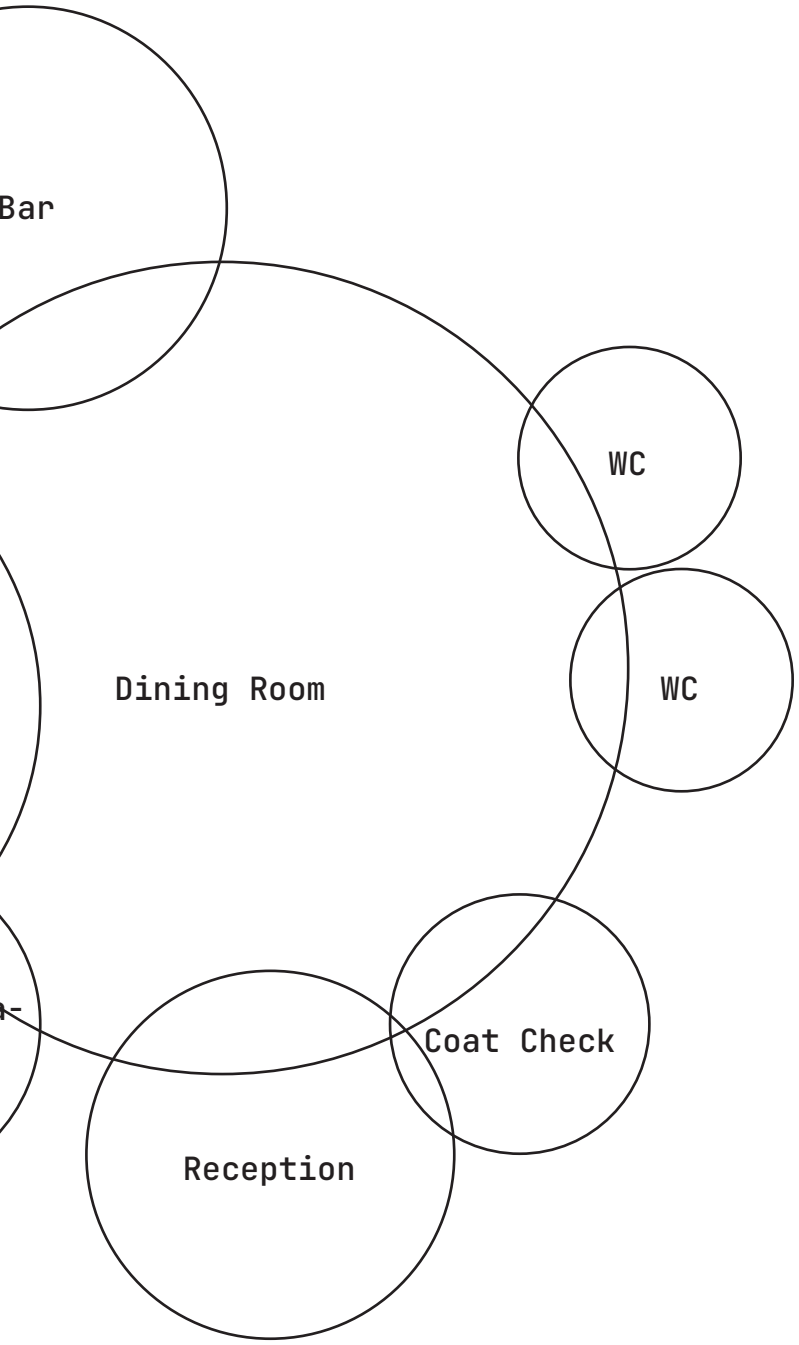


Figure 17: Bubble Diagram of Program of the restaurant


Bar
WC
Dining Room
WC
Coat Check
Reception

SITE PLAN

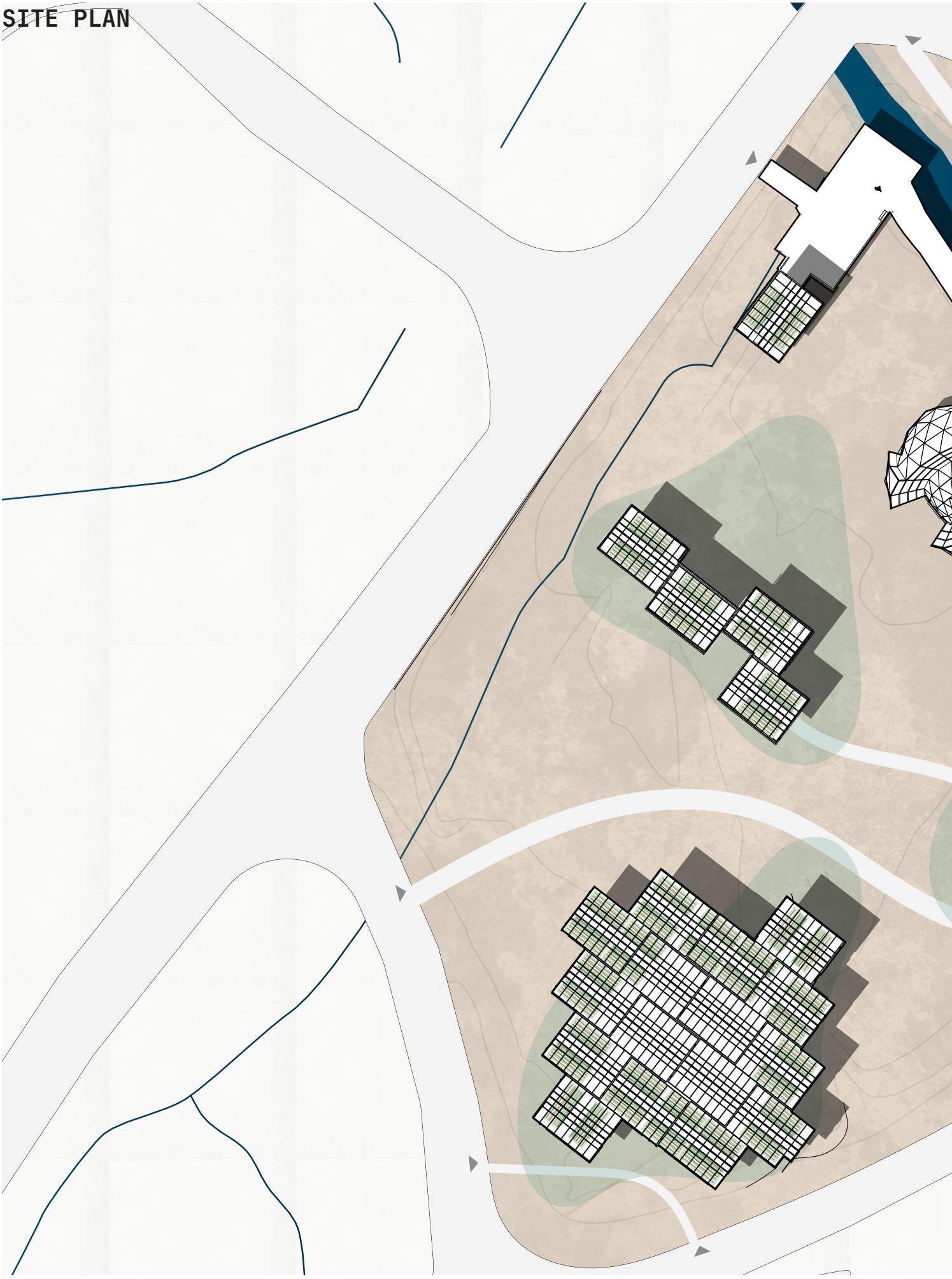


Figure 18: Illustrated Master Plan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CHAPTER FOUR

WHERE DO WE EAT?

THE DOME

The geodesic dome is a highly suitable and iconic representation of Arctic architecture due to its exceptional structural efficiency, energy efficiency, and environmental adaptability. This architectural form embodies several key principles that are essential for sustainable and resilient living in the harsh Arctic environment.

Structural Efficiency: The geodesic dome's design, consisting of a network of triangles, distributes stress evenly across the structure, making it incredibly strong and capable of withstanding extreme weather conditions, such as heavy snow loads and high winds. This inherent strength reduces the need for internal supports, maximizing usable interior space while minimizing material usage, an essential consideration in remote areas where building materials may be scarce.

Energy Efficiency: The geodesic dome's shape promotes excellent energy efficiency. Its spherical form minimizes surface area relative to volume, reducing heat loss. The structure can be easily insulated, and its aerodynamic shape helps to prevent the buildup of snow and ice, reducing maintenance and heating costs. This energy efficiency is critical in the Arctic, where heating is a significant concern due to prolonged periods of extreme cold.

Environmental Adaptability: Geodesic domes are highly adaptable to various environmental conditions. They can be constructed from locally available or sustainable materials, reducing the environmental footprint of building in the Arctic. Their modular nature allows for quick assembly and disassembly, which is beneficial for temporary or seasonal research stations, emergency shelters, and other flexible uses. This adaptability also means that domes can be tailored to specific site conditions, further enhancing their suitability for diverse Arctic landscapes.

Symbolic and Aesthetic Qualities: Beyond their practical advantages, geodesic domes have become symbolic of forward-thinking and innovative design. Their futuristic appearance reflects our desire and ability to adapt and thrive in extreme environments. As icons, they inspire a vision of sustainable and harmonious living with nature, resonating with the goals of modern Arctic communities striving for resilience and self-sufficiency.

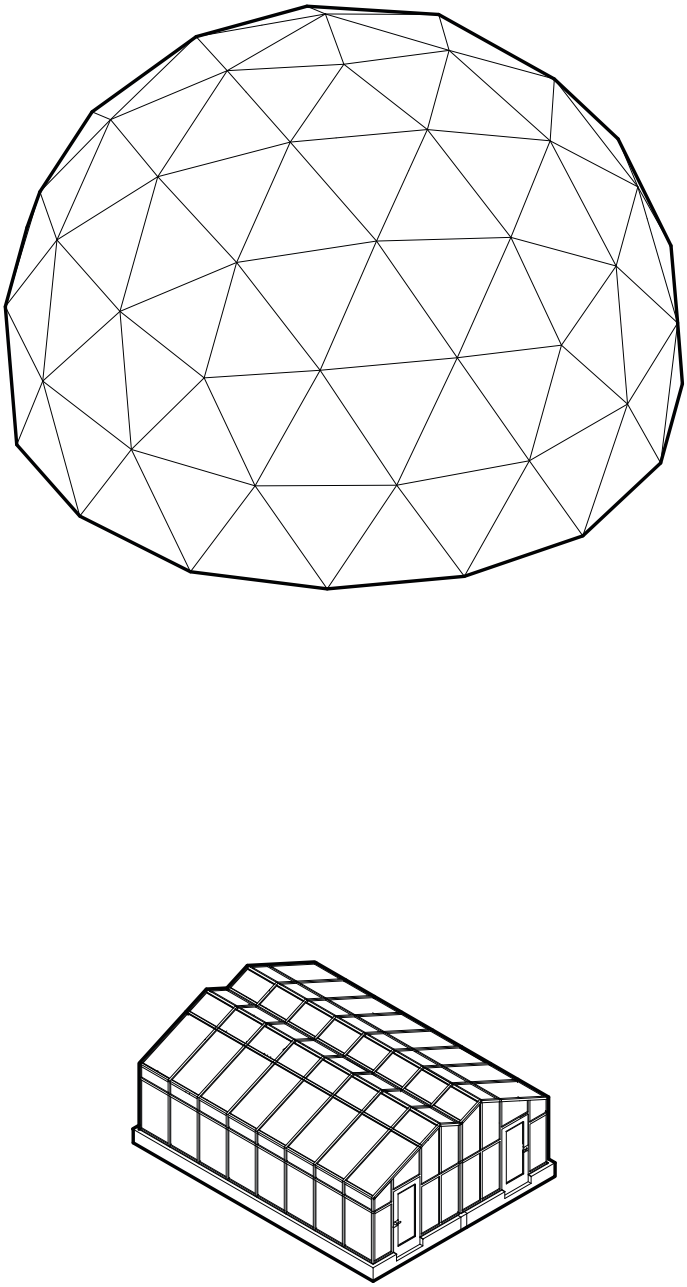


Figure 19: Diagram of Dome in comparison to greenhouse and person

PUSH / PULL

The deconstructed geodesic dome, strategically manipulated to optimize exposure to dawn and twilight, represents a groundbreaking approach to Arctic architecture, particularly suited for the unique conditions of Svalbard. This innovative design not only retains the core benefits of traditional geodesic domes but also enhances functionality and livability through its geometric modifications.

Maximizing Natural Light: Svalbard experiences prolonged periods of darkness in winter and continuous daylight in summer, with dawn and twilight offering precious natural light during the transitional seasons of fall and spring. By pushing and pulling segments of the dome geometrically, the structure can be oriented and shaped to capture and maximize this limited natural light. This optimization improves the quality of life for inhabitants, supporting both psychological well-being and energy efficiency by reducing the need for artificial lighting.

Enhanced Solar Gain and Thermal Efficiency: The geometric manipulation of the dome allows for precise angling of surfaces to maximize solar gain during periods when the sun is low on the horizon. By designing the structure to capture the maximum amount of sunlight during dawn and twilight, the interior spaces can maintain warmth more effectively, reducing the reliance on external heating sources. This is particularly beneficial in Svalbard's harsh climate, where energy efficiency is paramount.

Adaptive and Resilient Design: The deconstructed geodesic dome retains the structural integrity and strength of traditional geodesic designs, capable of withstanding heavy snow loads and strong winds. The geometric alterations do not compromise the dome's resilience but rather enhance its adaptability to local environmental conditions. This adaptive design ensures the dome remains robust and functional throughout seasonal changes, providing a reliable and comfortable shelter year-round.

Harmonizing with the Environment: The unique and dynamic form of the deconstructed dome harmonizes with the natural landscape of Svalbard, embodying a symbiotic relationship between human habitation and the Arctic environment. This design approach not only respects the natural beauty of the region but also promotes sustainable living practices, emphasizing the importance of environmental stewardship in the Arctic.

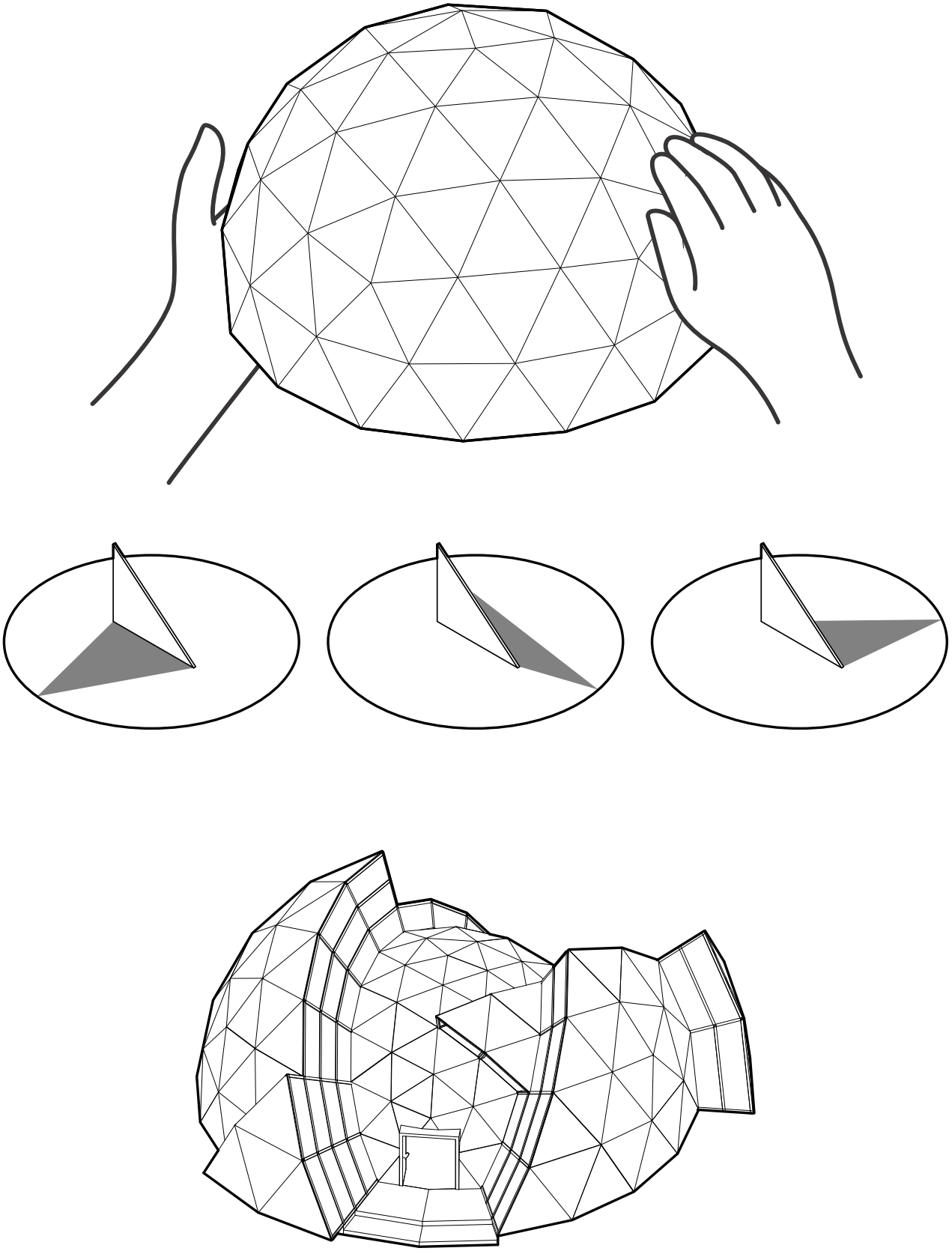


Figure 20: Diagram of shadows deconstructing the geodesic dome

THE DESCENT

The decision to build the main restaurant space underground is rooted in a combination of environmental sustainability, energy efficiency, and the creation of a unique dining experience. This approach leverages the natural benefits of subterranean construction while providing a distinctive ambiance for guests.

One of the primary advantages of situating the restaurant underground is the stable temperature. The Earth's insulation naturally regulates temperature, maintaining a consistent range that is cooler in summer and warmer in winter compared to surface conditions. This inherent stability reduces the need for extensive heating and cooling systems, significantly lowering energy consumption and operational costs. The consistent underground temperature aligns with the commitment to sustainability, minimizing our carbon footprint and reliance on non-renewable energy sources.

By utilizing the earth's natural insulation, the underground restaurant benefits from enhanced energy efficiency. The reduced need for artificial climate control means less energy is expended on maintaining a comfortable dining environment. This efficiency extends to other areas of the facility, as stable temperatures contribute to the optimal functioning of storage areas for wine, cheese, and fermented goods, which often require controlled conditions.

Dining in an underground restaurant offers a unique and memorable experience. The space can be designed to evoke the atmosphere of a cavern, creating an intimate and cozy setting that contrasts with conventional dining environments. This subterranean ambiance can be enhanced with thoughtful architectural elements such as vaulted ceilings, natural stone walls, and organic textures that mimic the natural underground landscape.

Building the main restaurant space underground not only aligns with our sustainability goals but also creates a distinctive and appealing environment for guests. The stable temperature provided by the earth's natural insulation enhances energy efficiency, while light wells introduce natural light and maintain a connection to the surface. This innovative design approach promises a memorable dining experience that harmoniously blends comfort, sustainability, and aesthetic charm.

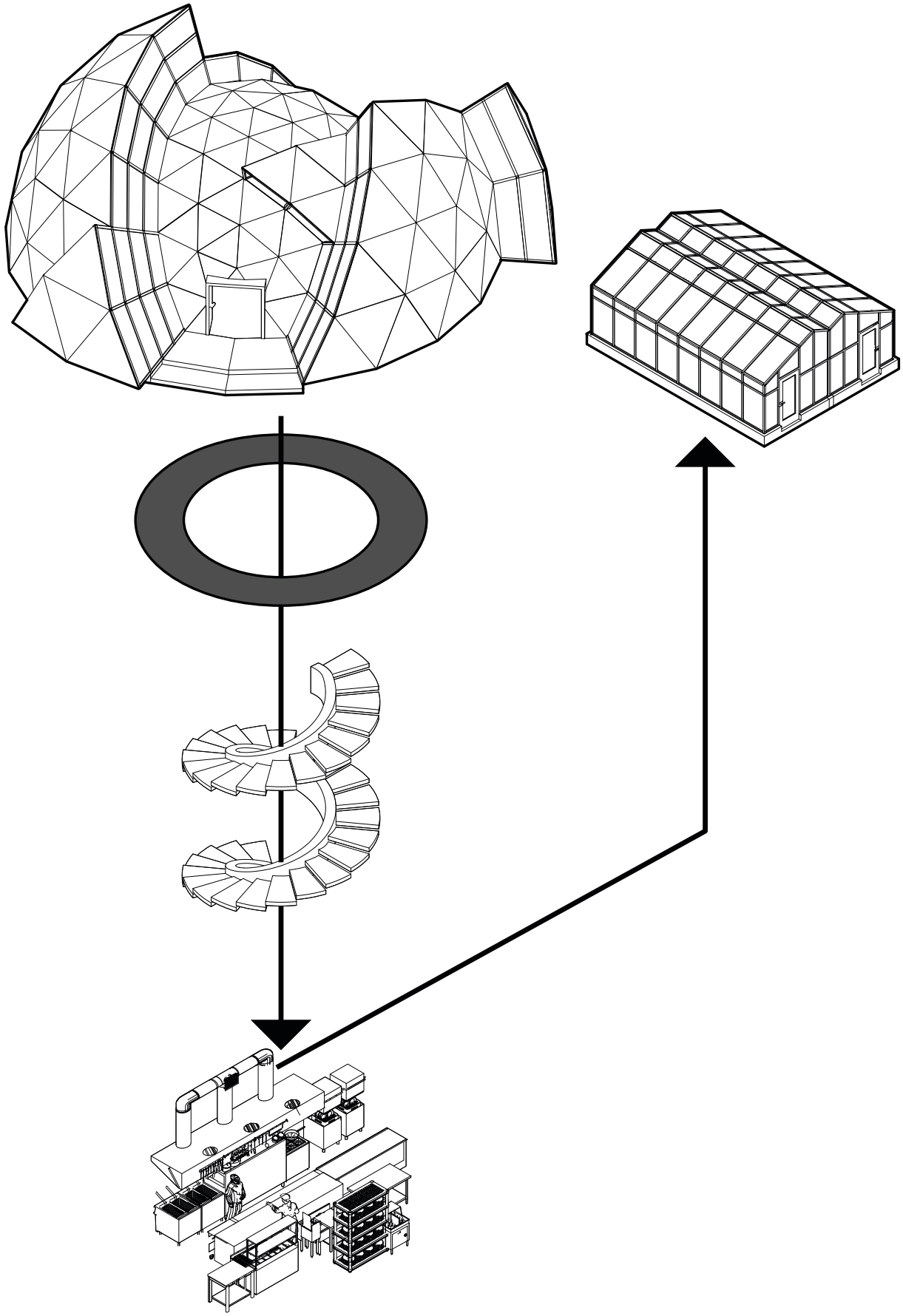


Figure 21: Diagram of relationship of ground to underground and systems recapture for the grenhouse

GROUND PLAN

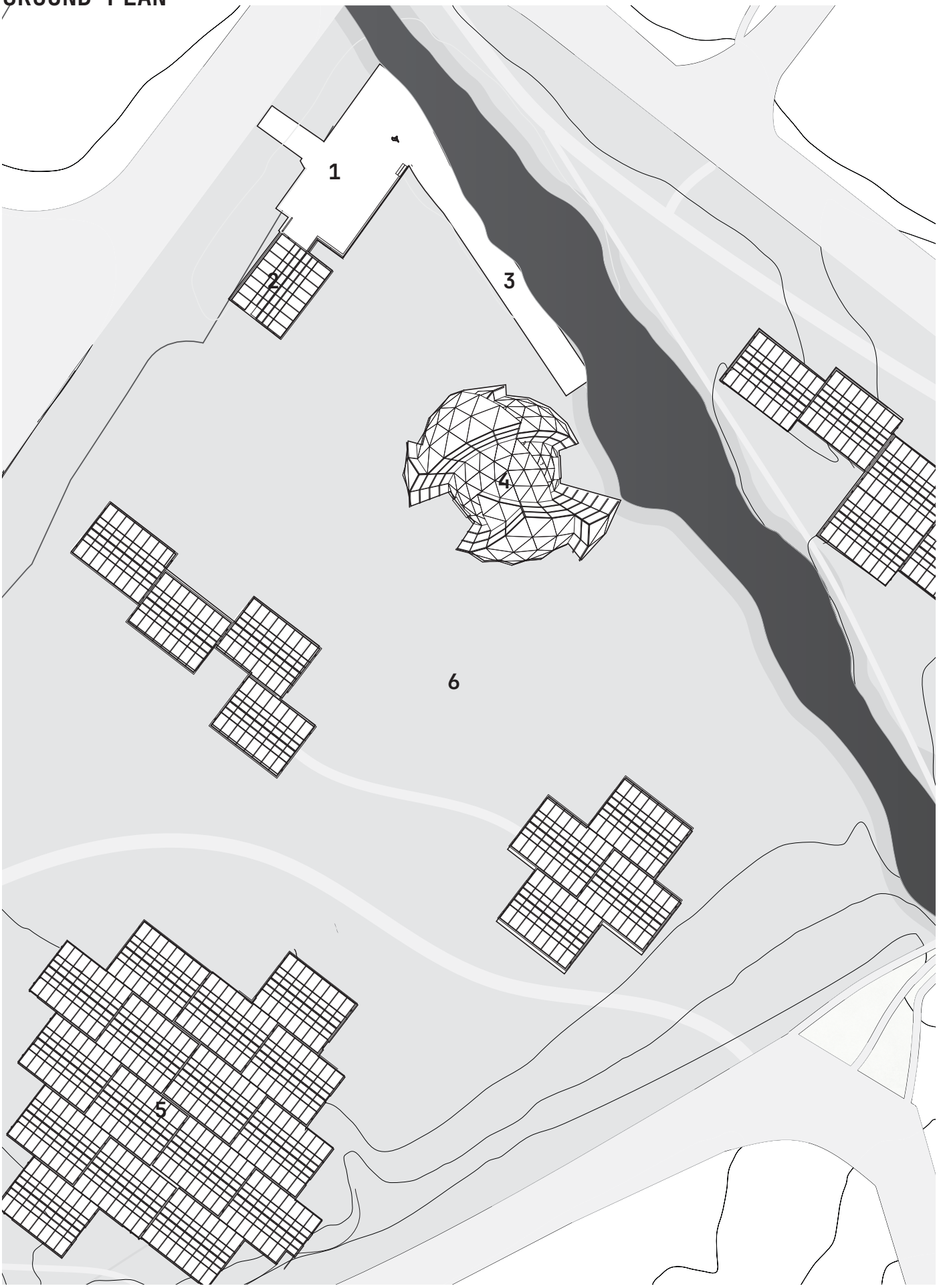


Figure 22: Ground Floor Plan

1. Entrance Pavilion
2. Demonstration Greenhouse
3. Ramp Underground
4. Refuge
5. Main Greenhouse
6. Open Area

The ground floor plan is designed to seamlessly guide guests from the surface to the underground dining space.

Upon arrival, visitors are greeted with a vantage point view of the greenhouses, showcasing our commitment to local, sustainable food production. From this elevated perspective, guests catch a glimpse of the submerged restaurant.

A descending ramp leads guests from the ground level to the underground space. The ramp is designed for accessibility and features natural materials. This transition culminates at the entrance to the underground restaurant, where stable temperatures provide comfort. Light wells ensure natural light illuminates the interior, maintaining a connection to the surface.

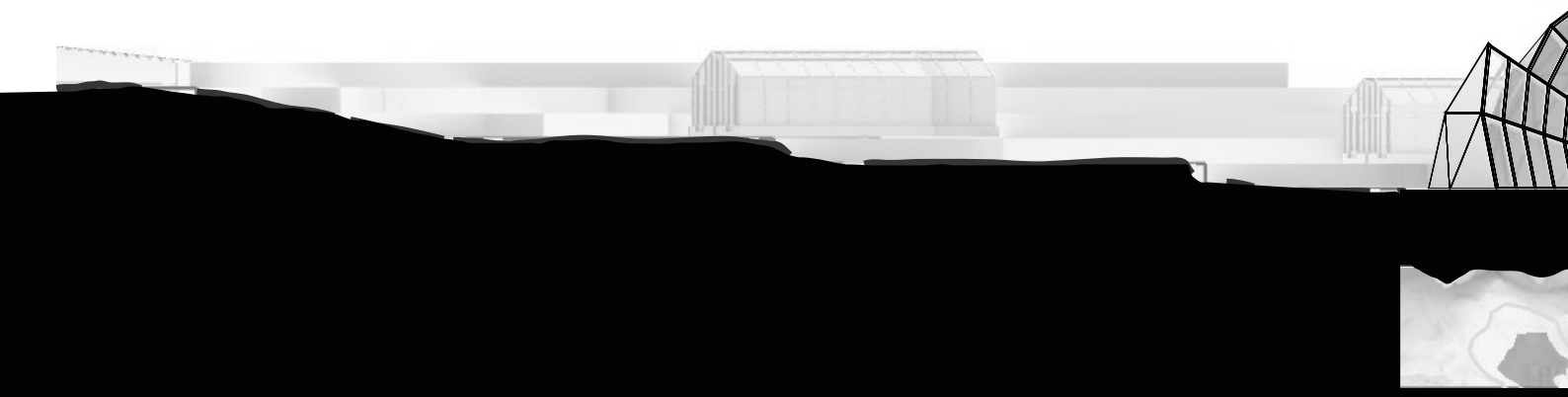
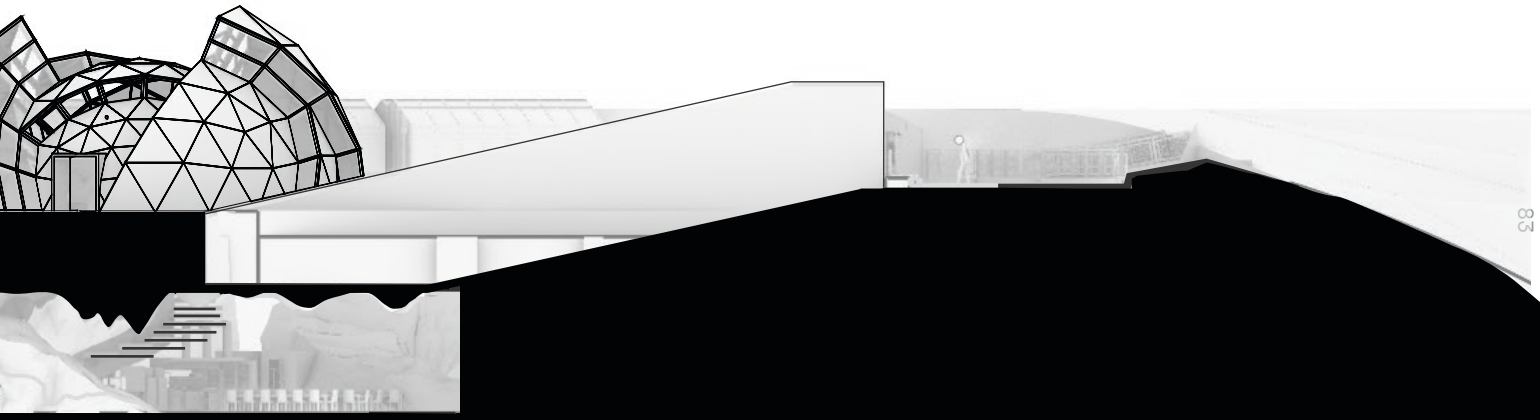


Figure 23: Section Drawing of Entrance



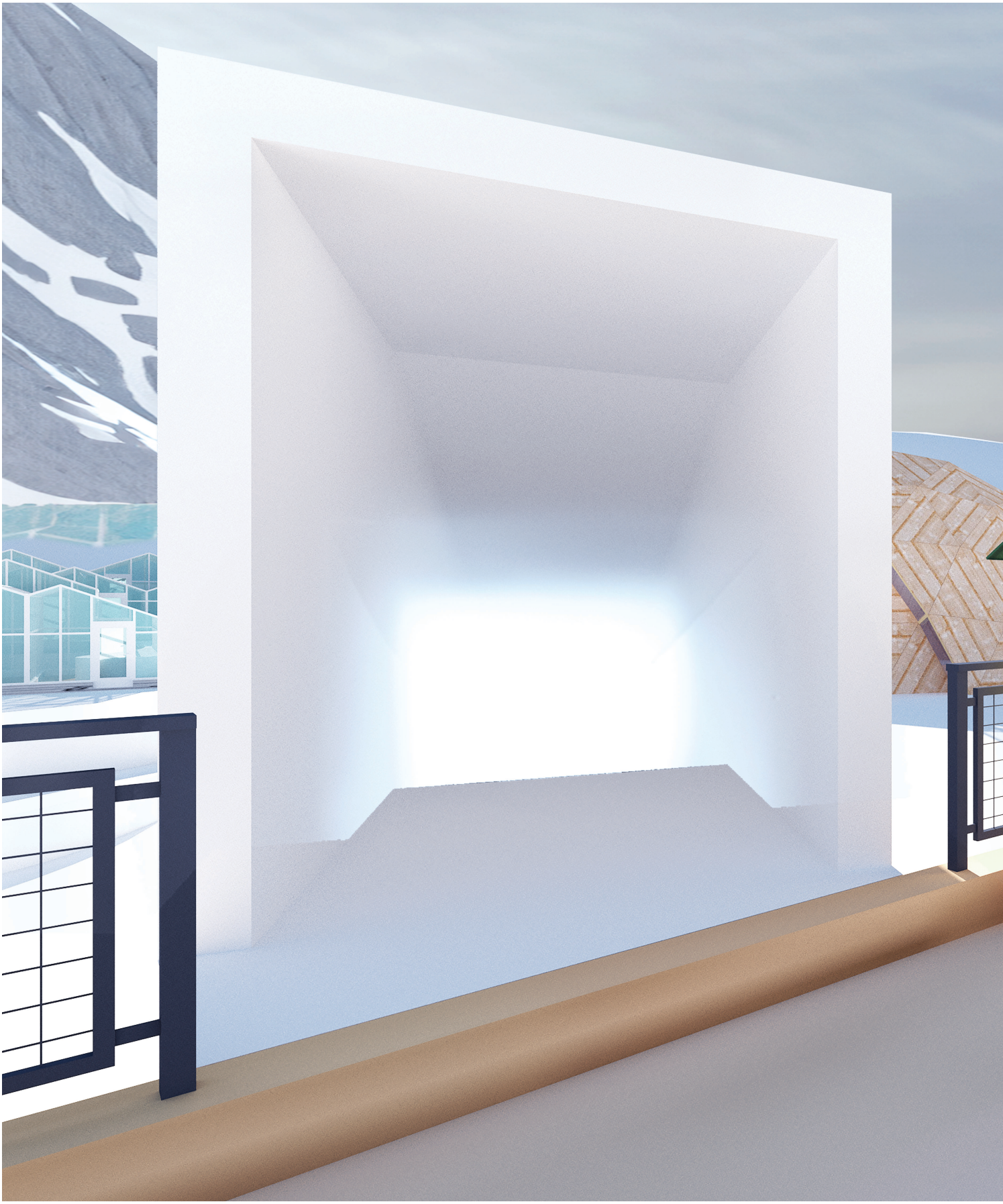


Figure 24: Rendering of Entrance

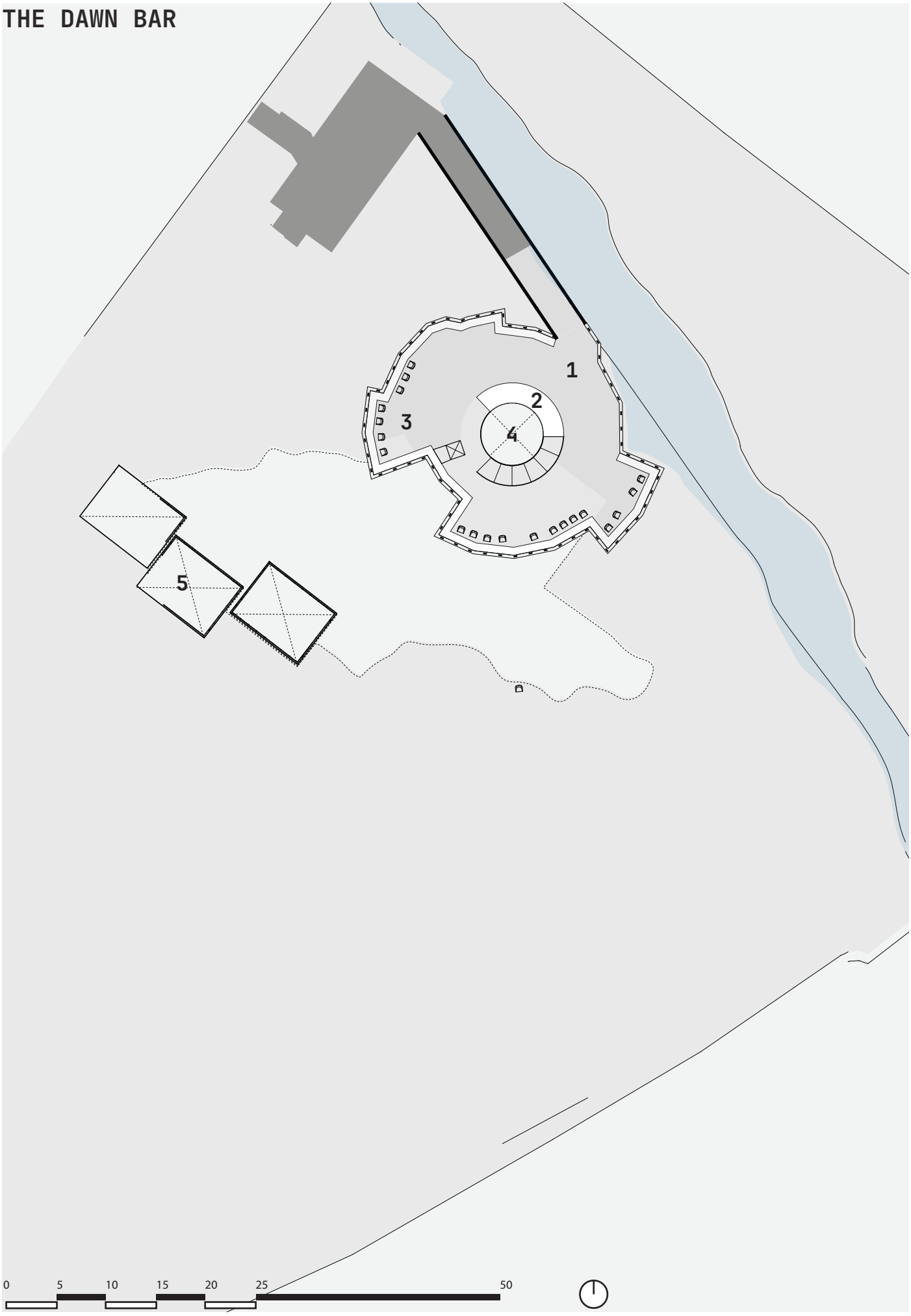


Figure 25: Sub Floor 1 Plan

1. Dome Entrance
2. Bar
3. Bar Seating
4. Spiral Staircase
5. Greenhouse Lightwell

Upon entering the restaurant, guests are initially enveloped in a dimly lit entryway that heightens the anticipation of what lies ahead. As they proceed, the space gradually opens up, revealing an expansive interior dome where the bar is centrally located.

This transition from darkness to light guides guests to a stunning overview shot of the dome’s interior. The bar is strategically positioned around a large central hole in the ground, with seating arranged along the perimeter. This design allows guests to fully experience the natural phenomena of the midnight sun or polar night, offering views that connect them to Svalbard’s unique environment.

The bar itself wraps around the central light well, creating a dynamic focal point. A spiral staircase descends from this point, teasing a further descent into the main dining area of the restaurant below. This staircase not only serves a functional purpose but also adds an element of intrigue and exploration, inviting guests to continue their journey deeper into the heart of the establishment.

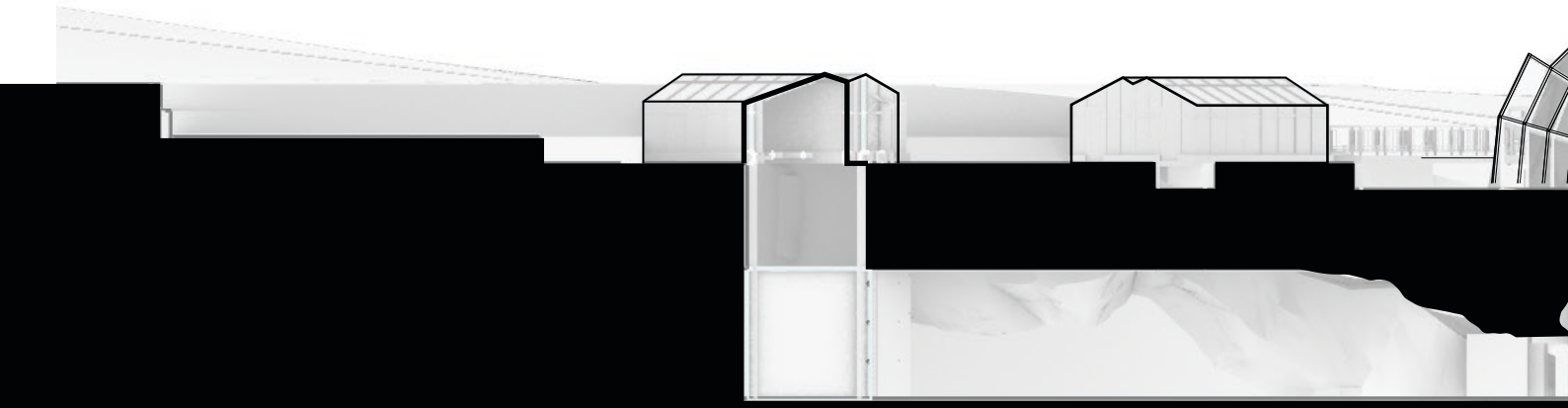
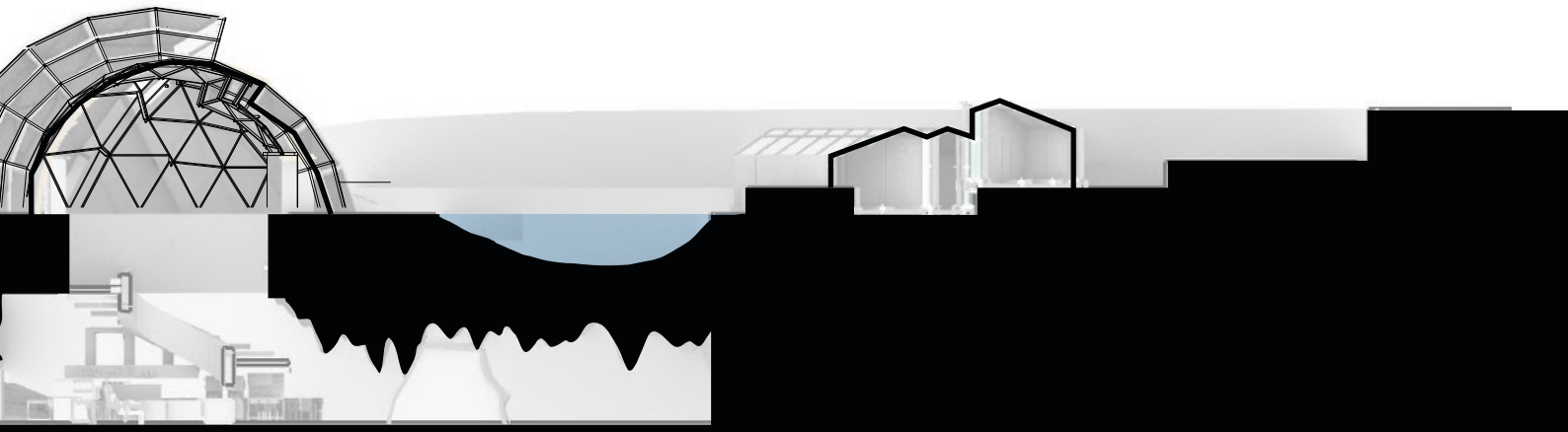


Figure 26: Section Drawing of Greenhouse Relationship



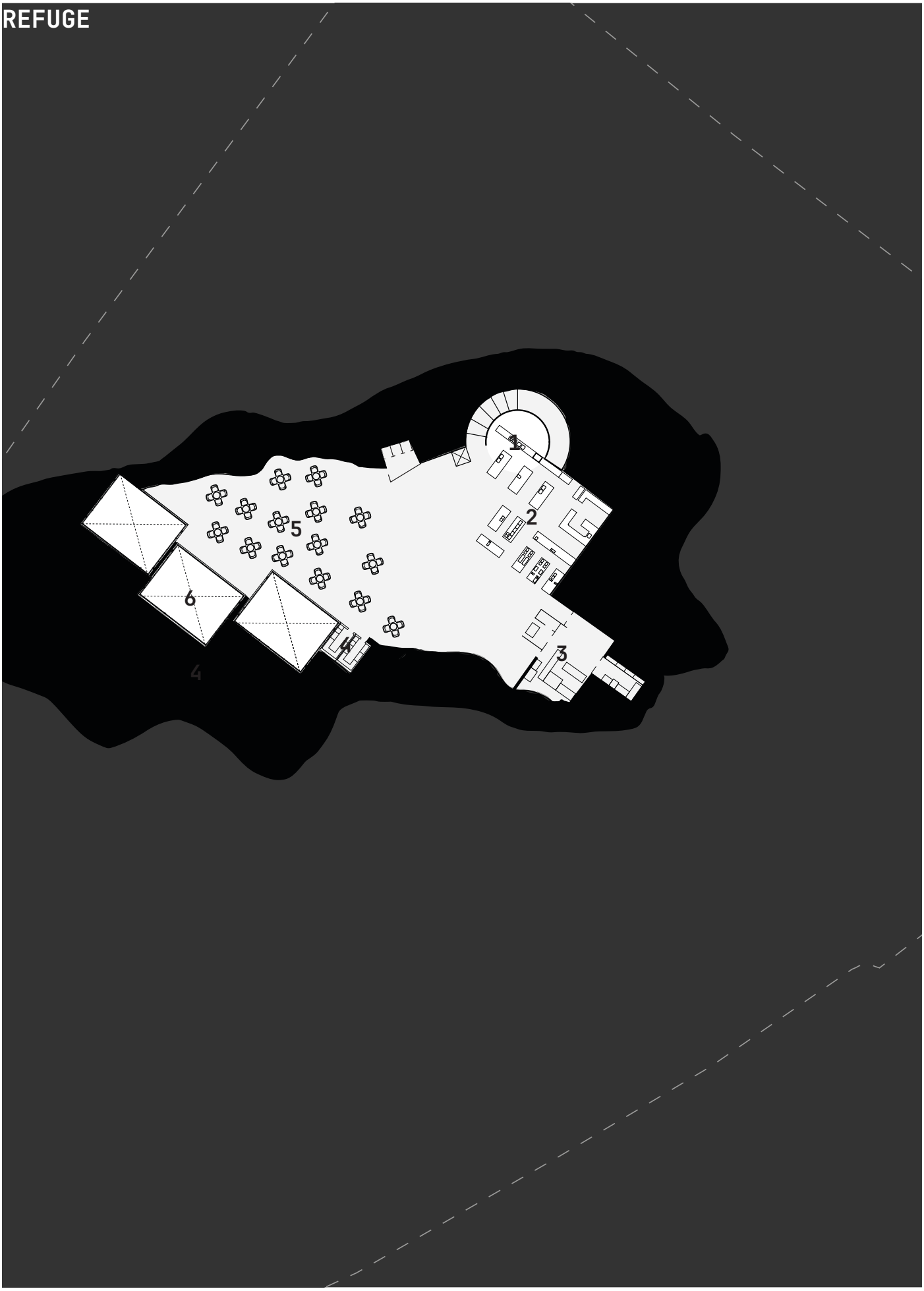


Figure 27: Underground Restaurant Floor Plan

Descending the spiral staircase, guests are gradually enveloped by the captivating ambiance of the main dining area. The staircase elegantly wraps around the kitchen, where massive light wells above cast a striking illumination, highlighting the culinary hub at the heart of the space.

The dining area itself is cavernous and dark, creating an intimate and immersive atmosphere. Individual spotlights over each table provide focused lighting, making each dining experience personal and distinct. The effect is a series of intimate islands of light within a vast ocean of darkness.

1. Spiral Staircase
2. Kitchen
3. Fermentaiton Station
4. Wine Storage
5. Dining Area
6. Underground Greenhouse

On this underground level, the unique subterranean environment provides ideal conditions for specialized culinary explorations, including fermentation and wine storage. The stable, naturally cool temperatures and controlled humidity underground are perfect for fermentation processes. Dedicated fermentation rooms take advantage of these conditions, allowing for the precise control required to create high-quality fermented products such as pickles, kimchi, and cheeses.

Similarly, the underground setting is ideal for wine storage and aging. The consistent temperature and low light levels mimic the traditional cellars used by vintners, creating the perfect environment for preserving and maturing wines. The wine cellar is thoughtfully integrated into the underground space.

Figure 28: Section Drawing of Greenhouse Relationship

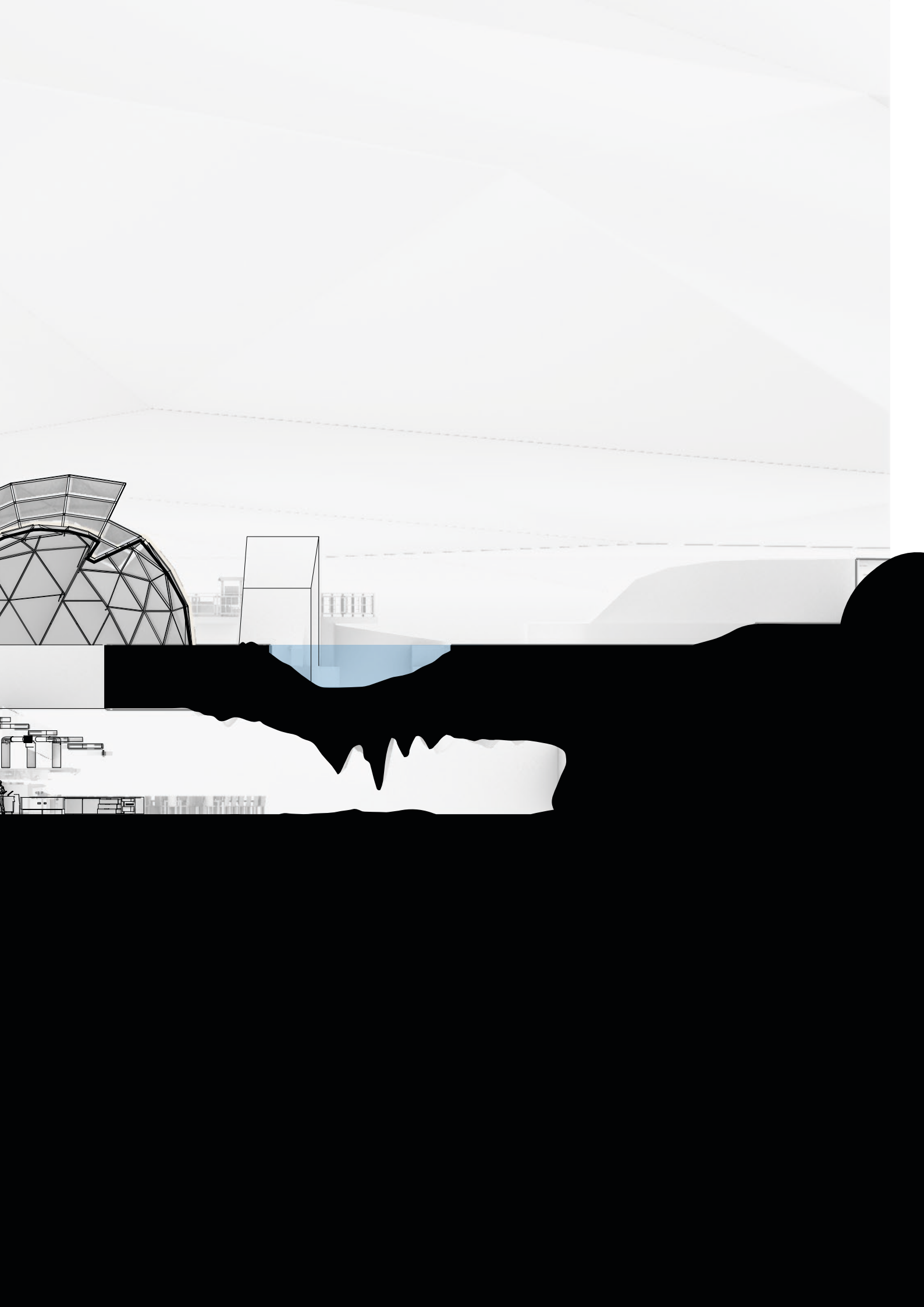


Figure 29: Rendering of Dining Room

MENU

Scallop
Scallop with herb oil and cured beetroot, with crab fat sauce and beetroot and quince paste

Moss and Lichen Salad
Dehydrated Moss, lichen gelee, golden beets, scallop

Grill
Reindeer Loin, root vegetables, juniper infused wine

Seal
Seal with cloudberry espuma and herb oil

Figure 30: Series of watercolor drawings of conceptual dishes

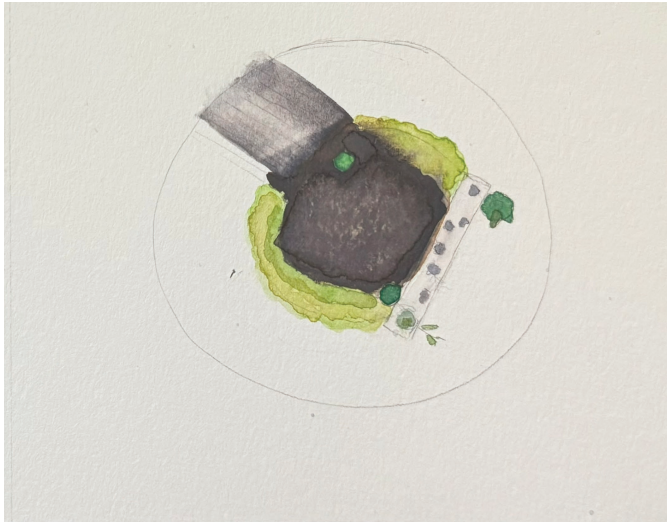
DINNER

Starters
Arctic Char Tartare
Scallop Ceviche
Mussel Bisque
Reindeer Carpaccio

Entree
Arctic Char Burger
Lingonberry-Glazed Fowl Breast
Seal Loin with Cloudberry Sauce
Mushroom Risotto

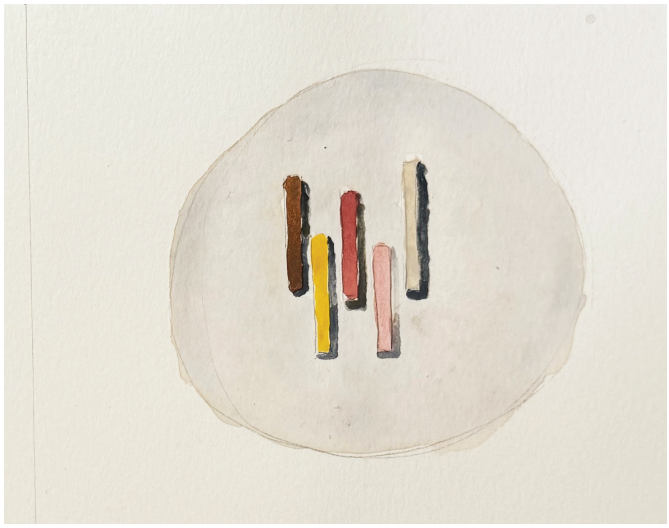
Dessert
Berry Parfait
Olive Oil Cake
Pine Mousse

Arctic Char
Artic Char with moss and herbs



Tempura Seaweed
Fried rolled seaweed, matcha broth, peas, cliantro ash

Sea Lettuce
Cured egg yolk, fried shimp ball, sea lettuce rolled over tofu



Preserved Berries
Casted bars of chocolate ganache, cloudberry sorbet, raspberry coulis, strawberry ice cream, pine panna cotta

Figure 30: cont

Amuse-Bouche
Seaweed | Dill | Yogurt

Frozen Salad
Kale | Spinich | Beets | Chervil

Scallop
Scallop | Crab Fat | Quince

Moss and Lichen Salad
King Crab | Moss | Lichen| Miso

Arctic Char Chawanmushi
Egg Custard | Char Dashi | Black Garlic | Caviar

Tempura Seaweed
Seaweed | Honey | Berries

Grill
Reindeer | Root Vegetables | Juniper

Seal
Seal | Cloudberry | Herbs

Sea Lettuce
Shrimp | Sea Lettuce | Cured Egg Yolk

Preserved Berries
Berries | Pine | Sheep Milk

Figure 31: Rendering of Site as seen from Platåfjellet

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AT THE NORTHERN EDGE OF
THE WORLD LIES
SVALBARD A REMOTE
ARCHIPELAGO THAT DEALS
WITH CHALLENGES IN CLIMATE
AND SOURCING.
CAN A RESTAURANT AND SITE
WORK TOGETHER
TO CHALLENGE THE IDEA THAT
FINE DINING
IS UNSUSTAINABLE? WHILE
OPERATING IN
THIS EXTREME ENVIRONMENT?