Fusion Fields

From Nuclear to Culture

THE CAORSO TRANSFORMATION

cover

image

CAORSO NUCLEAR POWER PLANT

TEACHING STAFF

SUPERVISOR: prof. Michele Roda

AUTHOR: Zhifen Deng, Shulei Li

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ABSTRACT

This project aims to transform the abandoned Caorso Nuclear Power Plant in Piacenza, Italy, into a multifunctional cultural and artistic center that attracts visitors and enhances public awareness of this unique site. Through this redevelopment, the project seeks to create a vibrant space that integrates cultural, artistic, and educational functions, breathing new life into this piece of industrial heritage.

The Caorso Nuclear Power Plant is a representative building with distinct nuclear power characteristics, historical and cultural value, and is set within a natural landscape of forests, wetlands, and rivers. Currently abandoned, the plant's potential remains untapped, while its beautiful surroundings lack interaction with the public.

The design concept, "Fusion," focuses on seamlessly blending industrial and natural elements. Interactive installations scattered throughout the site connect the plant's industrial identity with the surrounding landscape. Sustainable design principles—such as rainwater collection, solar power generation, and eco-friendly materials—enhance this connection, offering visitors an immersive and environmentally friendly experience. The site is also reimagined with a range of functional areas, including a museum, art exhibition spaces, educational workshops, dining options, and sports zones, providing diverse experiences for visitors and making this a lively destination for culture and art.

FUSION FIELDS


ZHIFEN DENG


SHULEI LI

1

Industrial Heritage

4/2024 - 12/2024

Caorso Nuclear Power Plant

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Industrial Heritage

Brief

The Caorso nuclear power plant, once central to Italy's nuclear ambitions, is now an important part of the nation's industrial heritage. Despite its closure in the 1980s, its architectural and technological significance remains, offering potential for transformation into a cultural or environmental space that preserves its legacy while serving contemporary needs.

Abstract

The Caorso nuclear power plant, one of Italy's largest, represents a key aspect of the nation's industrial heritage. Constructed in the 1970s during Italy's pursuit of nuclear energy, the plant stands as an example of the technical advancements of the era. Despite its early shutdown following the 1987 referendum that led to Italy abandoning nuclear power, the plant's architectural and engineering design offers insight into the industrial capabilities of the time. As a now decommissioned facility, it presents a valuable opportunity for adaptive reuse. The plant could serve as a site for cultural, environmental, or educational purposes, demonstrating how post-industrial spaces can be repurposed for modern needs while preserving their historical significance.

From Energy Past to Heritage Future 01

According to data from mid-2020, 440 reactors operate worldwide, spread across 30 countries. With the exception of the latest generation of power plants, nuclear plants originally were designed for a service life lasting around 30 years. Therefore, what should be the fate of decommissioned nuclear power plants?

It spans past, present and future, linking the technology's development in the military maelstrom of the mid-twentieth century with the current challenges of decommissioning. Technologically, the process of decommissioning is as ground-breaking as nuclear power's inception, with new procedures being developed as attention shifts from operating to dismantling facilities: something that was not necessarily planned for when they were built. Socially, communities are subject to significant change as decommissioning alters the structure of employment around which many "atomic" societies matured. Environmentally, decommissioning requires us to look forward and safeguard nuclear waste; not only determining the most appropriate way of storing it, but addressing how we transmit warnings thousands of years into the future to a society which may be fundamentally different from ours.

The methods for handling decommissioned nuclear power plants vary based on geographical location, historical context, environmental requirements, and economic conditions. Examples of decommissioned nuclear power plants worldwide indicate that the main approaches include **complete dismantling**, **transformation into industrial heritage sites or museums**, and **land reuse**.

4/2024 - 12/2024

Caorso Nuclear Power Plant

Examples of Nuclear Plant

Redevelopment 02

▲ Image above

https://www.reddit.com/r/BalticStates/comments/goqkjq/ignalina_nuclear_power_plant_built_in_1983_once/?rdt=47424

Ignalina Nuclear Power Plant, Lietuva

Ignalina Nuclear Power Plant. Built in 1983. Once the most powerful nuclear power plant in the world, fulfilling most of Lithuania's electric demand. The last reactor was shut down in 2009.

The Ignalina Nuclear Power Plant has been repurposed into a unique site showcasing the history, technology, and decommissioning of nuclear energy. It also serves as a notable filming location for the Chernobyl series, attracting visitors interested in both science and culture. Nearby, Lake Drūkšiai and local nature reserves offer outdoor activities like fishing, boating, and wildlife exploration. This combination of industrial heritage and natural beauty makes it a diverse and engaging tourist destination.

Fessenheim Nuclear Power Plant, France

Image above ▲

https://techxplore.com/news/2020-02-france-oldest-reactors-nuclear-power.html

The Fessenheim Nuclear Power Plant is France's oldest nuclear facility, with construction beginning in 1970 and operations starting in 1977. In 2020, reactor n ° 1 was shut down, followed by reactor n ° 2, marking the full decommissioning of the plant.

The French government, in collaboration with local authorities, has developed a plan to transition the region into a renewable energy hub. This project includes hydroelectric and solar power plants, aiming to repurpose the existing nuclear infrastructure and fill the energy gap with sustainable solutions, promoting long-term regional energy sustainability.

Development History of

Caorso NPP 03

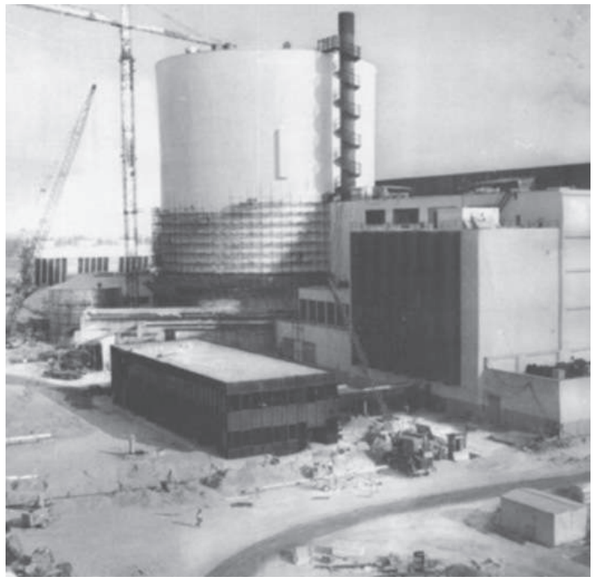
3.1 Sogin's Responsibility

Sogin is a state-owned company in Italy, entirely owned by the Ministry of Economy and Finance. Its mission is to ensure the safety, decommissioning, and environmental remediation of nuclear power plants (referred to as "decommissioning"). It aims to eliminate radiological risks, safeguard the environment, and protect current and future generations.

▲ Image above
Il progetto di disattivazione della Centrale di Caorso e lo stato di avanzamento delle attività

3.2 Construction and Technology

Caorso Nuclear Power Plant is the largest in Italy, with a capacity of 860 MWe. It was constructed in the 1970s by a consortium of Enel, Ansaldo Meccanica Nucleare, and GETSCO. The plant utilizes Boiling Water Reactor (BWR) technology, classified as a second-generation nuclear facility.



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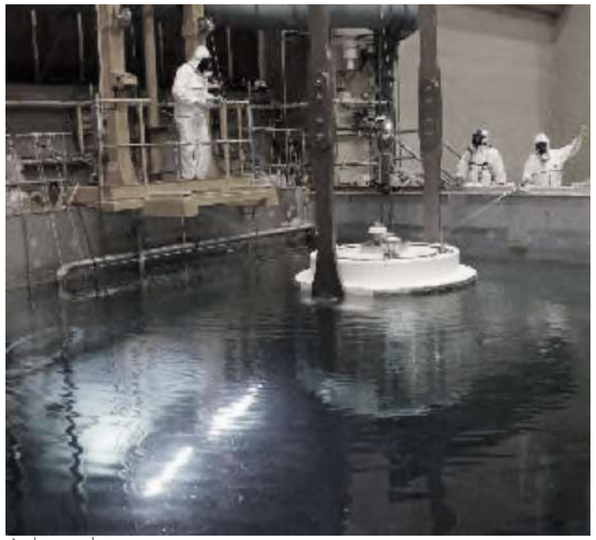
https://associazioneitaliananuclea-re.it/il-punto-sulla-centrale-di-ca-orso/



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Il progetto di disattivazione della Centrale di Caorso e lo stato di avanzamento delle attività

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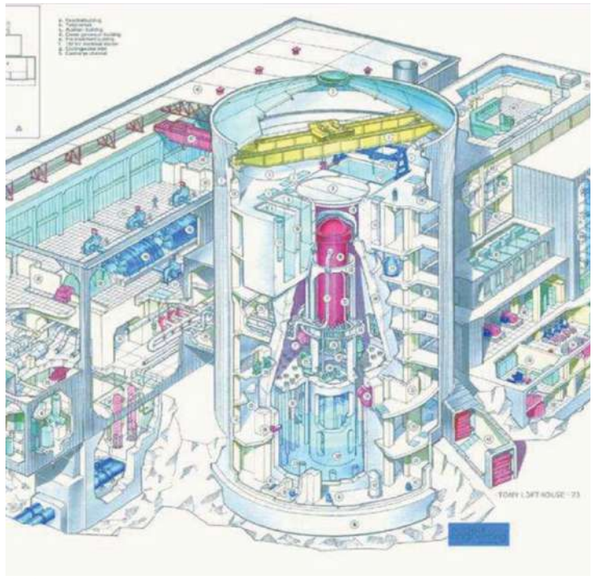

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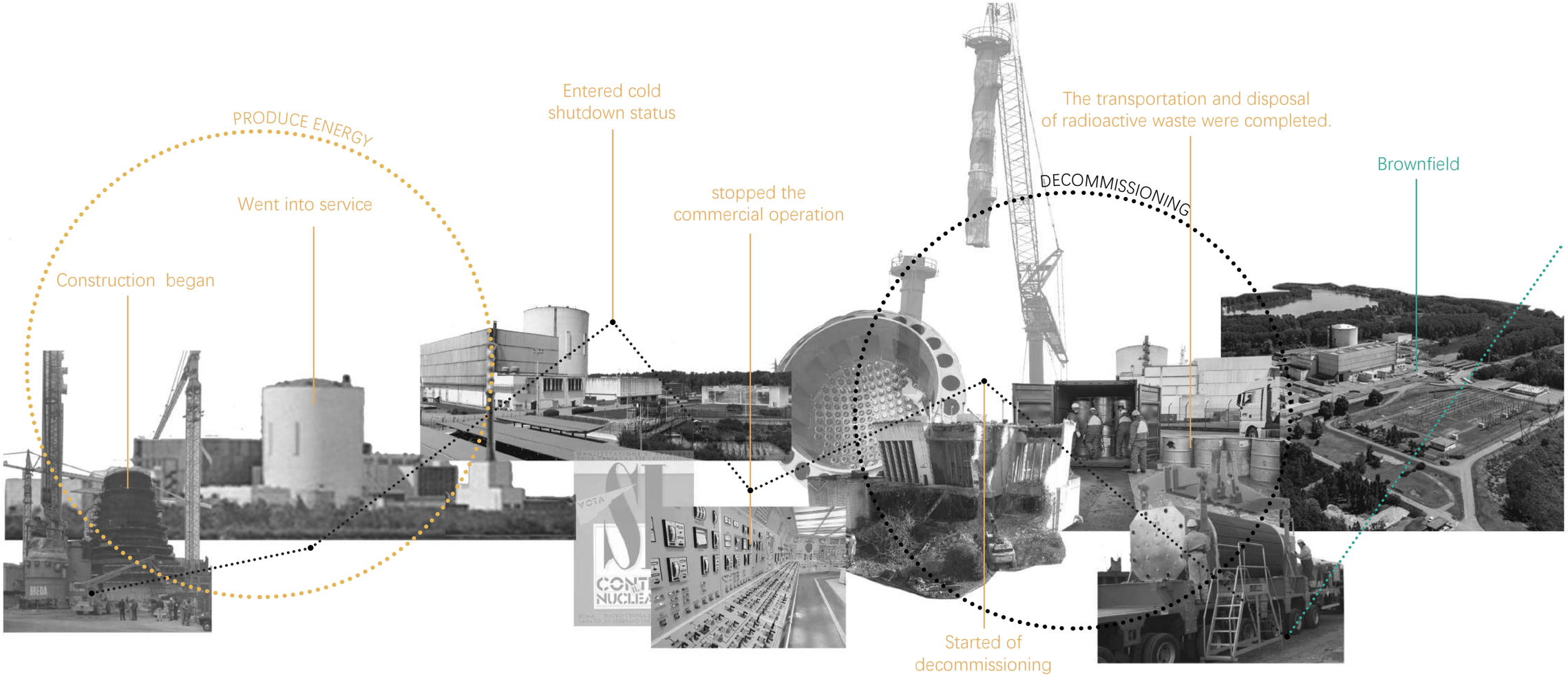
Il progetto di disattivazione della Centrale di Caorso e lo stato di avanzamento delle attività

3.3 Operation, Shutdown, and De-commissioning

The Caorso plant connected to the national grid in May 1978 and began operation in December 1981.
After a brief operational period, it was shut down in October 1986 for fuel replacement. Following a 1987 referendum, Italy decided to abandon nuclear power, and the plant never resumed operations, having produced 29 billion kWh of electricity.
In 2000, the government initiated decommissioning activities, and in 2014, the Ministry of Economic Development approved the plan to dismantle the facility step by step.

3.4 Structure and Safety

The plant's structural design includes a Reactor Pressure Vessel (RPV) made primarily of carbon steel, which houses the nuclear reactor. The reactor building consists of a Secondary Containment (SC) made of reinforced concrete, topped by a hemispherical metal dome, designed to prevent the release of radioactive material under normal or emergency conditions.



1970 · 1981 · 1986 · 1990 · 1999 · 2024 · 2031

Construction began

The Caorso nuclear power plant, the largest in Italy, was built in 1970 by the Enel – Ansaldo Meccanica Nucleare – GETSCO pool of companies.

Went into service

The plant, of the BWR (Boiling Water Reactor) type, belongs to the second generation of nuclear plants. Connection to the national grid took place in May 1978. and it went into service in December 1981.

Entered cold shutdown status

In October 1986, the plant was stopped for periodic fuel charging and was never restarted, also as a result of the outcome of the 1987 referendum on nuclear power.

stopped the commercial operation

In October 1986, the plant was stopped for periodic fuel charging and was never restarted, also as a result of the outcome of the 1987 referendum on nuclear power.

Started of decommissioning

In 1999, Sogin became the owner of the plant with the objective of decommissioning it. In 2000, an accelerated decommissioning plan was initiated.

The transportation and disposal of radioactive waste were completed.

From 2015 to 2024, the first phase involved the pretreatment of resins and radioactive sludge, the second phase focused on the transfer and treatment of radioactive drums and the return of the conditioned manufactured items.

Brownfield

After the dismantling of auxiliary buildings, the site will be decontaminated and cleared of hazardous materials, allowing for redevelopment or repurposing.

Principles of Caorso NPP

Operation 04

Image caption

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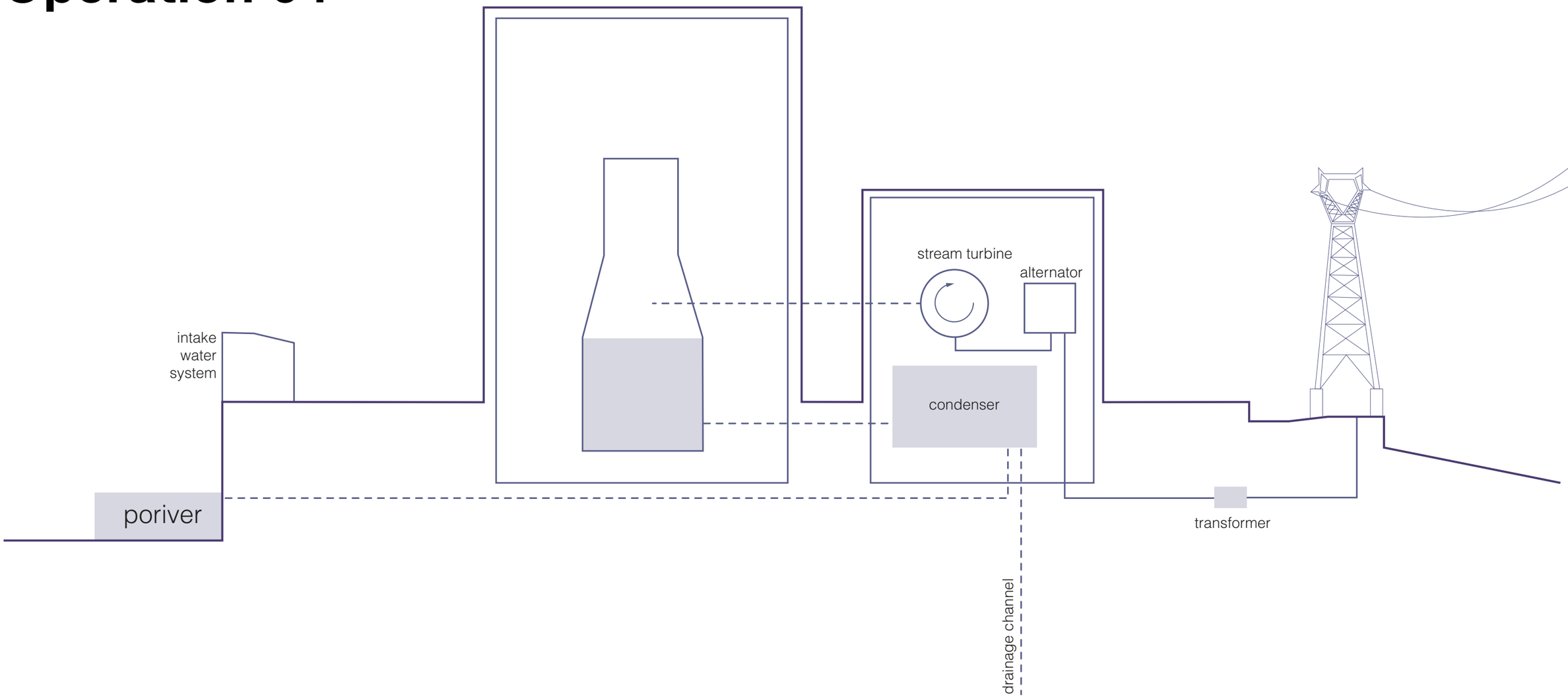

PHASE 1

The water is taten from the Po River through the intake structure,passing through underground channels to the platform.

PHASE 2

The extracted water s brought into the condenser, which through a system of hydraulic pumps,is able to deliver the water into the thermonuclear cycke.

PHASE 3

With the thermonuclear cycle, the water is transformed into stream, which reaches the turbine. The movement of the turbine rotates the alternator.

PHASE 4

The alternator, directly connected to the transformer, converts the motion into electrcal energy. And it is distributed to the national electrical system.

Ecological and Landscape

Features 05

5.1 Decommissioning and Landscape Transformation

The initial strategy for decommissioning the Caorso plant aimed at completely demolishing all buildings to return the site to a “green field” state. However, this approach has evolved due to a cultural shift towards repurposing industrial structures and landscapes. The plant, once a symbol of nuclear energy, can now be transformed into a space for new creative and cultural uses, blending its industrial past with future aspirations. This process not only respects the historical significance of the site but also fosters new potential for its future use.

▲ Image above
Il progetto di disattivazione della Centrale di Caorso e lo stato di avanzamento delle attività

5.2 Ecological Evolution and Biodiversity

The restricted access around the plant during its operational years allowed the surrounding environment to develop unique ecological characteristics. Over the decades, the area has evolved into a biodiversity reserve, with the growth of the riparian forest and the formation of wetlands due to the excavation works done for the plant’s safety measures. This unexpected ecological development has turned the area into a rare and valuable natural habitat in the Po Valley, contributing to local biodiversity.

Image above ▶
Google Earth Pro

▲ Image above
Google Map

5.3 ndustrial-Natural Integration

The Caorso plant, once considered a blight on the landscape due to its large geometric structures, has now become part of a dialogue about the integration of industrial and natural elements. Its towering structures are juxtaposed against the natural environment, creating a new perspective where industrial remnants and natural growth coexist. The site's marginality, where agriculture meets the Po River, enhances its uniqueness, turning it into a transitional zone ripe for creative ecological and cultural regeneration.

5.4 Landmark and Socio-Cultural Identity

The Caorso nuclear power plant has become a regional landmark, visible from over 10 kilometers away, breaking the otherwise flat horizon of the Po Valley. Its massive structure, particularly the white dome enclosing the reactor, has shaped both the landscape and the local cultural identity. The site’s strong visual presence continues to influence how people perceive and interact with the environment, providing an opportunity for the plant to play a role in future landscape and cultural regeneration efforts.

◀ Image above
Google Map

cover image

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Macro Site Analysis

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Macro Site Analysis

Brief

This section provides a comprehensive overview of the large-scale context surrounding the Caorso Nuclear Power Plant redevelopment project. It evaluates the site's current status and ecological aspects, emphasizing its potential integration with the surrounding infrastructure and natural environment.

Abstract

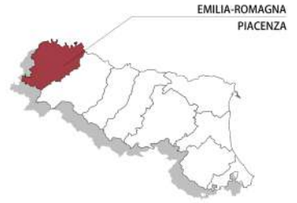
The Macro Site Analysis of the Caorso Nuclear Power Plant examines the site's context and redevelopment potential. It includes an infrastructure analysis that notes the lack of direct access to the plant, limiting cycling opportunities. The analysis briefly mentions surrounding facilities, showcasing the area's multifunctionality. A flood risk assessment highlights the site's vulnerability due to its location in the Po River plain, emphasizing the need for flood management strategies. Additionally, bird migration routes indicate the site as part of an important ecological corridor. The surrounding vegetation features diverse terrestrial, aquatic, and wetland plants that support local wildlife and provide opportunities for environmental education. This analysis underscores the importance of integrating infrastructure improvements, ecological considerations, and flood management in the redevelopment of the site.

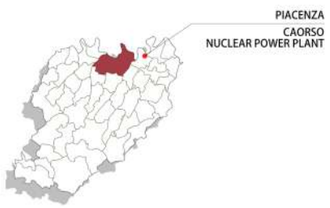
Site Status 01

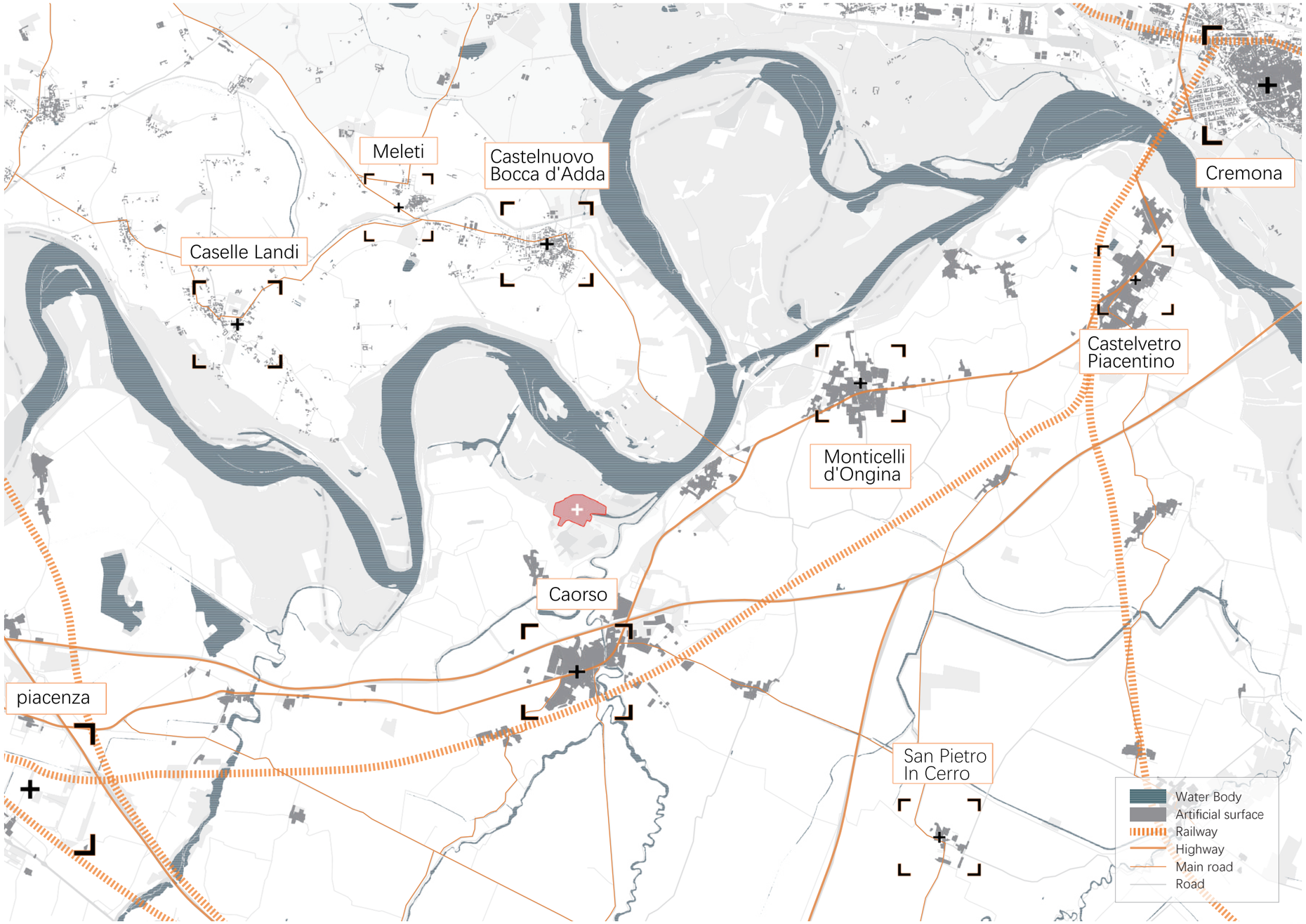
1.1 INFRASTRUCTURE ANALYSIS

The Caorso Nuclear Power Plant is located in the Emilia-Romagna region of Italy, within the province of Piacenza, near the town of Caorso. It lies approximately 20 kilometers from the city of Piacenza, in the northern part of Italy's Po River plain.

The analysis marks key cities and transportation systems around the site, revealing that while regional connectivity between cities is well-established, there is a significant lack of direct access to the nuclear power plant. This highlights the need for improved infrastructure leading to the site.







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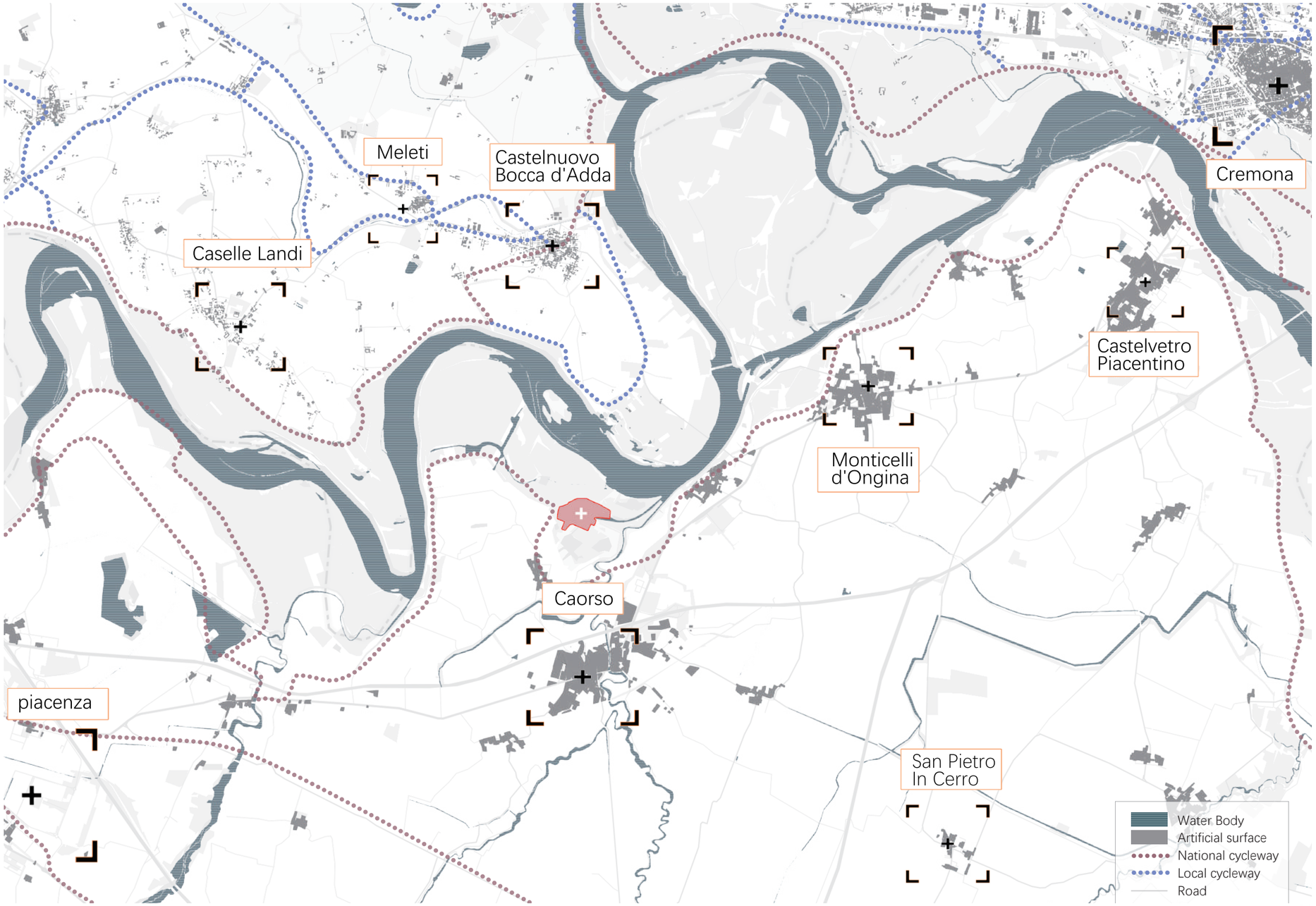
Caorso Nuclear Power Plant

1.2 BICYCLE ROAD ANALYSIS

In our analysis of bicycle routes, we have identified and marked significant cycling paths in the vicinity of the Caorso Nuclear Power Plant, including both National and Local Cycleways. However, our findings indicate that there are no dedicated bicycle routes that connect to or pass through the nuclear power plant area. This lack of access not only limits the riding experience for cycling enthusiasts but also represents a missed opportunity to enhance cycling tourism and recreational activities in the region. By establishing a direct cycling route to the plant, we could promote sustainable transport, increase visitor engagement, and foster a connection between the site and the surrounding landscape.



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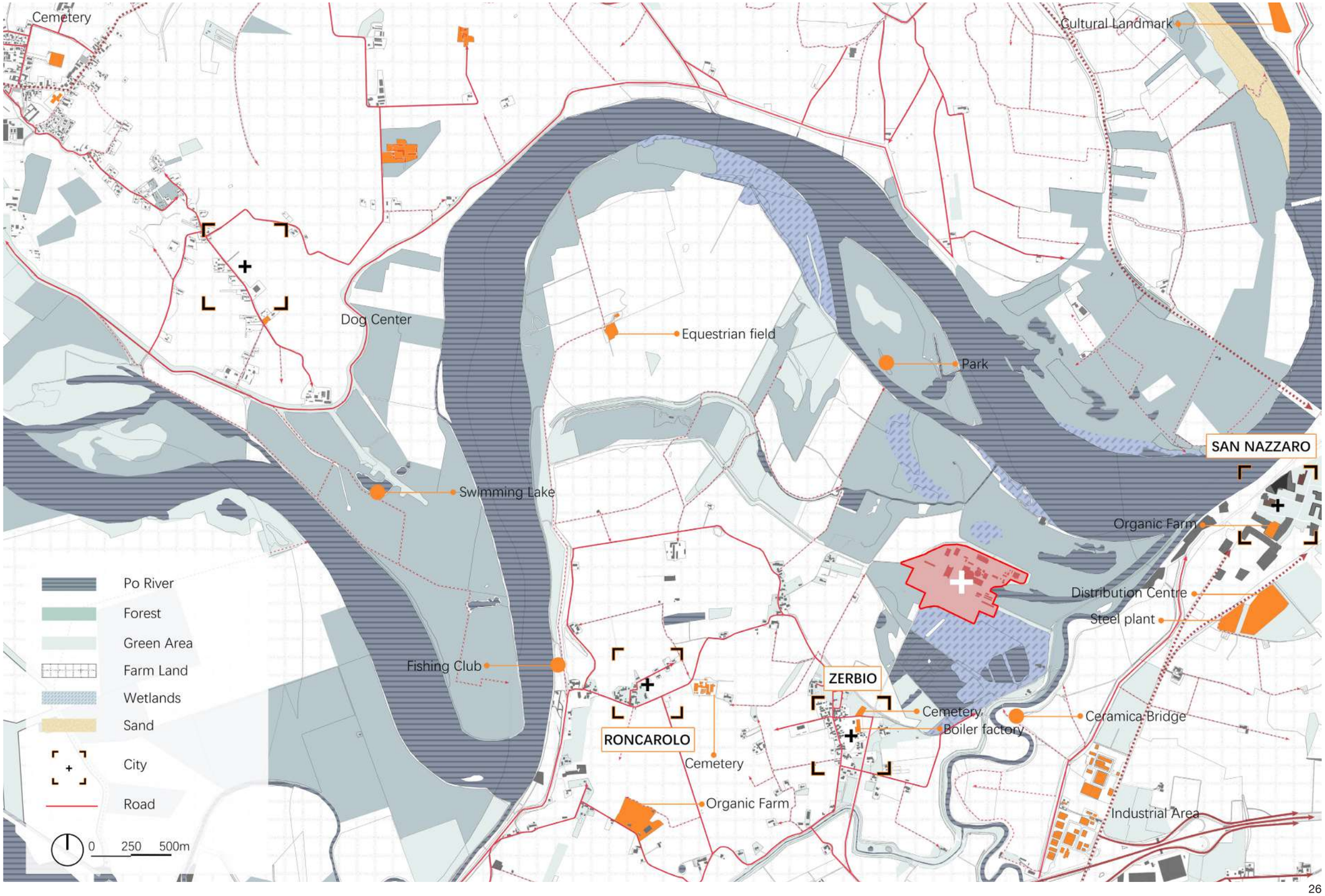
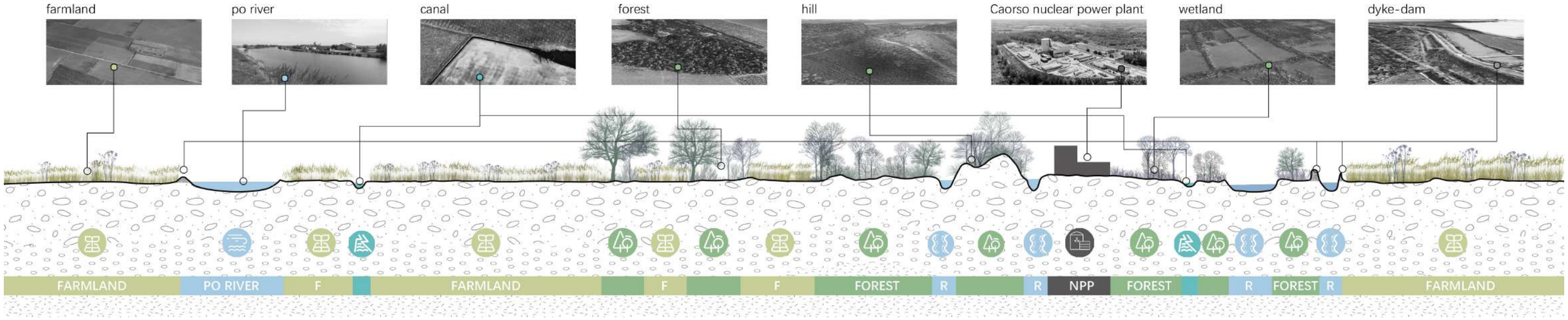
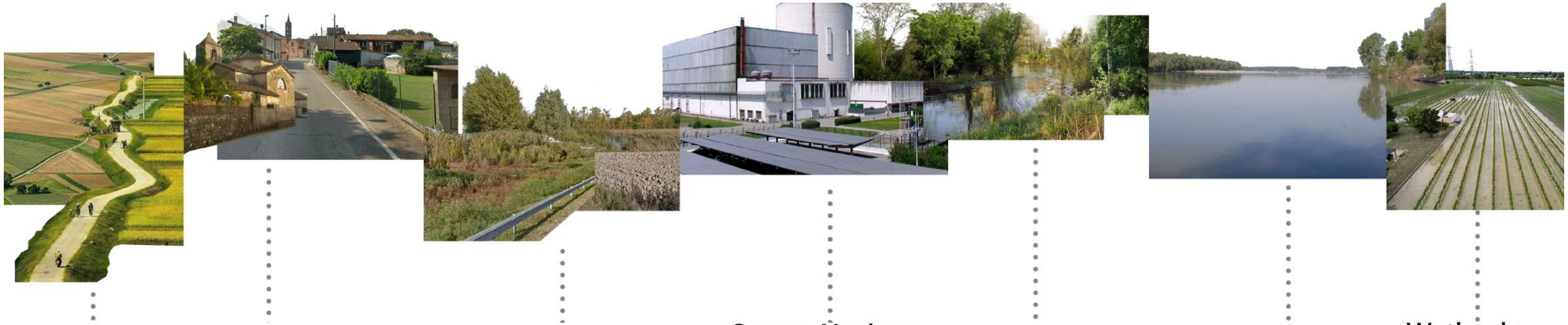
Caorso Nuclear Power Plant

1.3 SURROUNDING EXISTING

In our analysis of the surrounding existing facilities, we have highlighted key functions in the vicinity of the Caorso Nuclear Power Plant, including a cemetery, dog center, swimming lake, fishing club, organic farm, factory, industrial sites, Ceramica Bridge, distribution center, steel plant, and park. This diverse range of facilities underscores the area's multifunctional character and potential for synergies in the redevelopment project. By integrating these existing amenities, we can enhance the overall appeal of the site and create a vibrant community hub that serves both residents and visitors.







Cultivated Land | Village Zerbio | Water Body+Forest | Caorso Nuclear Power Plant | Forest | PO RIVER | Wetland+ Cultivated Land

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Caorso Nuclear Power Plant

Ecological Analysis 02

2.1 CLIMATE ANALYSIS

This analysis provides a comprehensive assessment of the climate characteristics in the Piacenza region, focusing on four key factors: sunlight, precipitation, humidity, and temperature, along with their impact on the Po River.

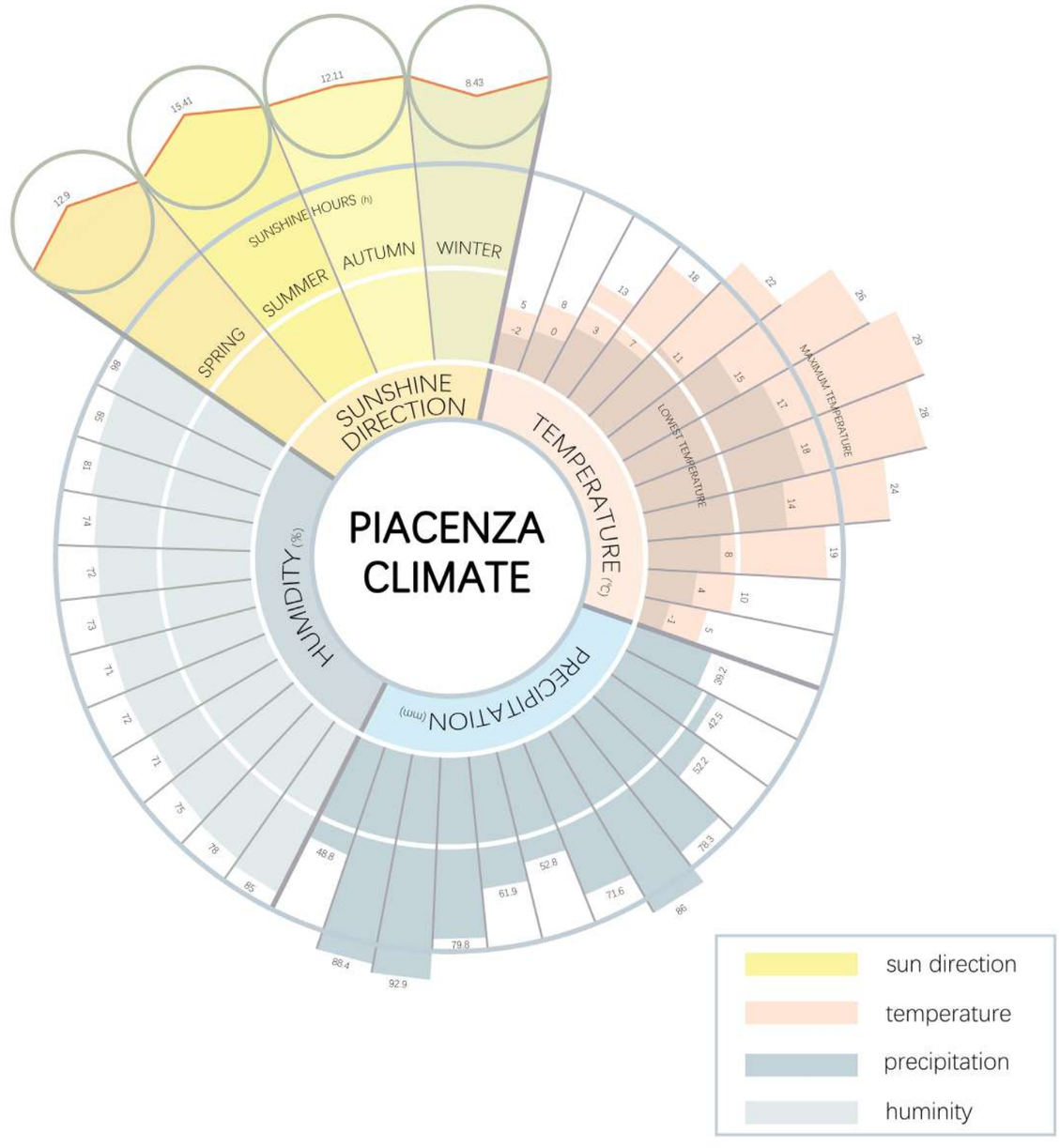
Sunlight: The sunlight hours in Piacenza indicate that the region enjoys ample sunlight during the summer, providing favorable conditions for plant growth and agricultural production. However, intense sunlight can also lead to high temperatures in summer, putting pressure on the ecosystem.

Precipitation: There is a clear seasonal variation in precipitation, with concentrated rainfall during autumn and winter, while summer tends to be relatively dry. This characteristic significantly impacts regional water resource management, agricultural irrigation, and biodiversity.

Impact on the Po River: Increased precipitation raises the water level of the Po River during the autumn and winter months, helping to sustain the surrounding ecosystems. In contrast, reduced water levels during the dry summer can negatively affect water quality and ecological balance.

Humidity: Humidity levels are higher in winter and relatively lower in summer. High humidity conditions in winter help retain soil moisture and support vegetation growth, but low humidity during the dry summer may pose challenges for water resources.

Temperature: Temperature fluctuations in Piacenza are significant, with hot summers and mild winters. These temperature changes directly influence the growth cycles of ecosystems and the distribution of species, particularly during migration seasons.



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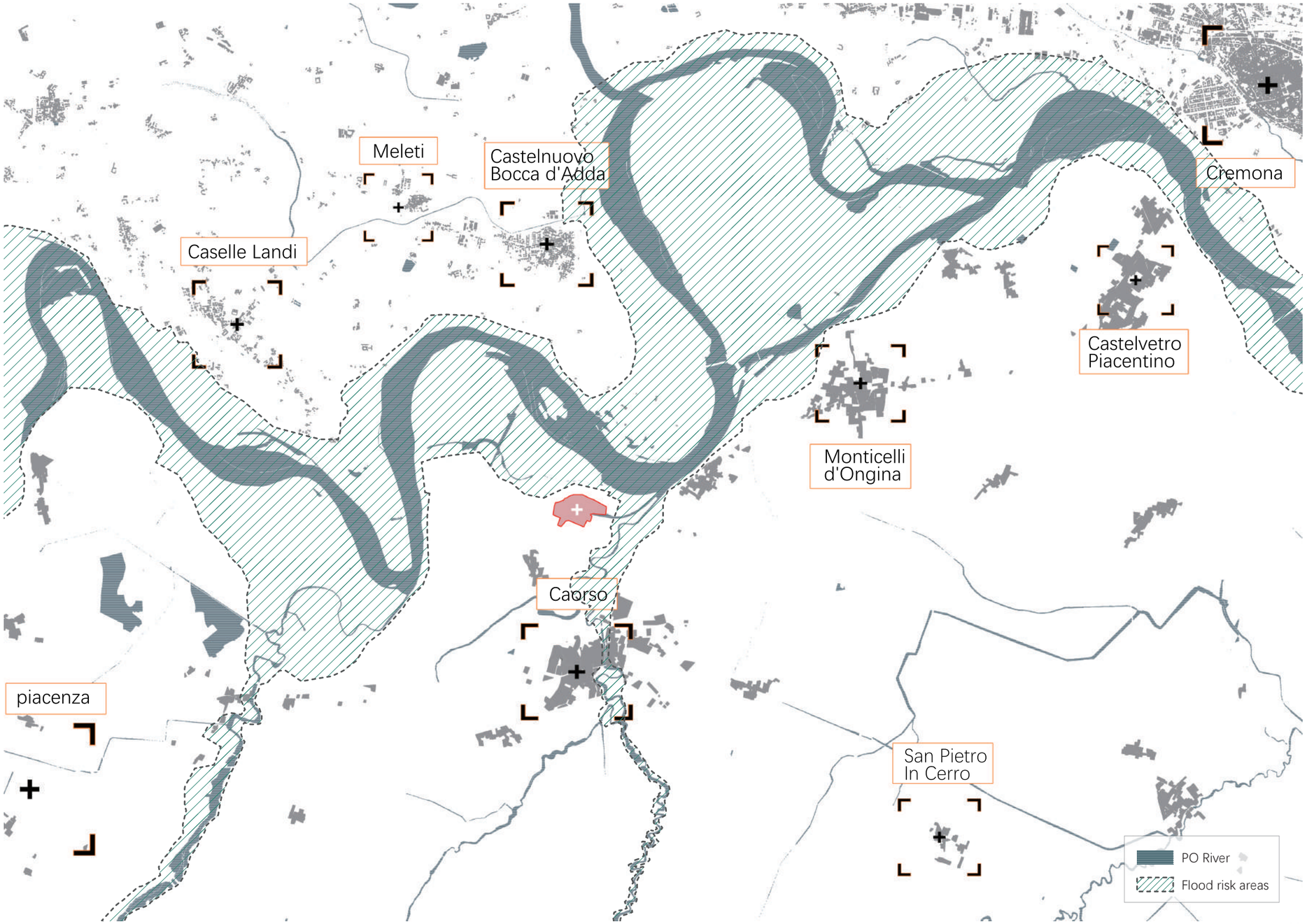
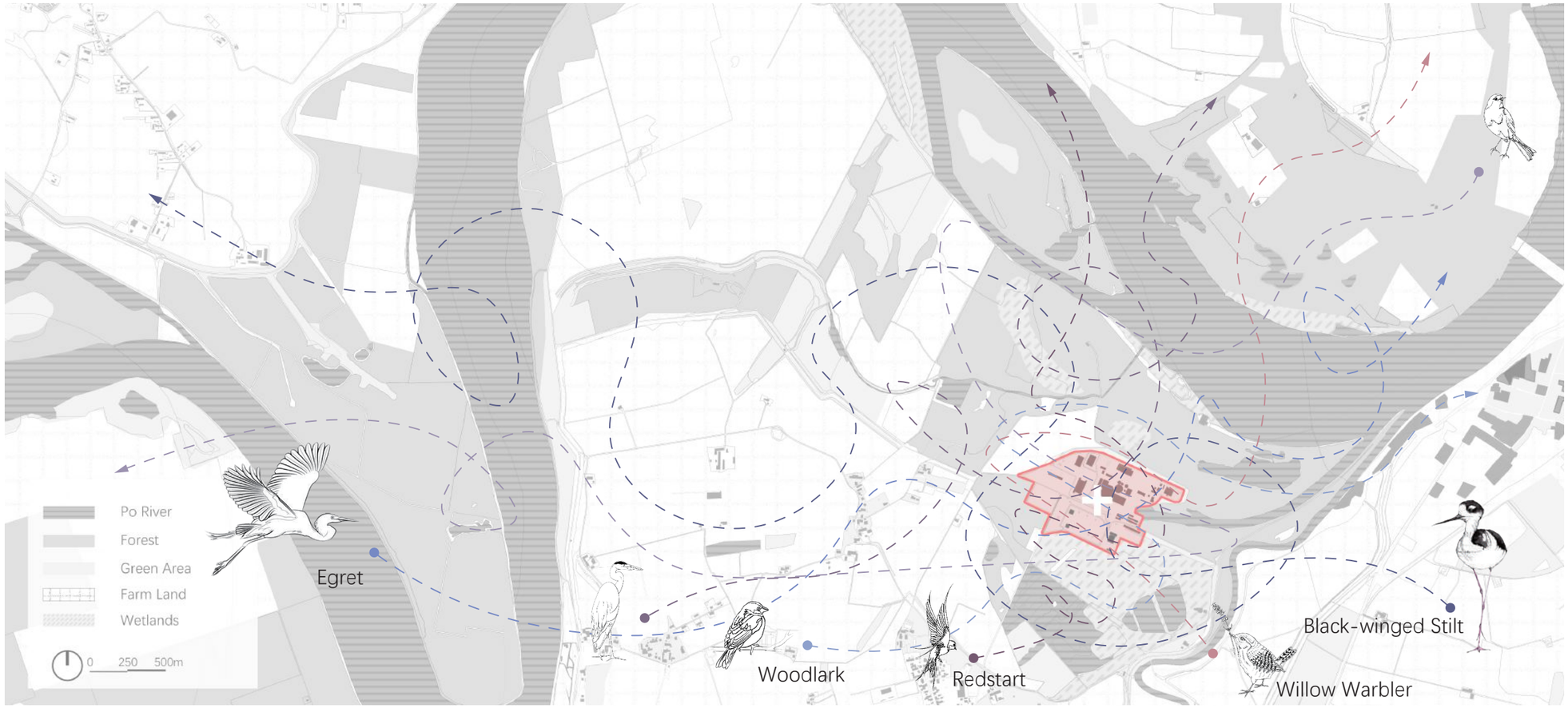
Caorso Nuclear Power Plant

2.2 FLOOD RISK

The flooding risk characteristics surrounding the Caorso Nuclear Power Plant are influenced by its location in the Po River plain, an area that is prone to seasonal flooding. Historical data indicates that heavy rainfall and river overflow can lead to water accumulation in low-lying areas nearby. The site's elevation and drainage systems play a critical role in managing this risk. However, the absence of effective flood mitigation measures could pose significant challenges for future redevelopment efforts, necessitating careful planning to ensure the safety and sustainability of the site.



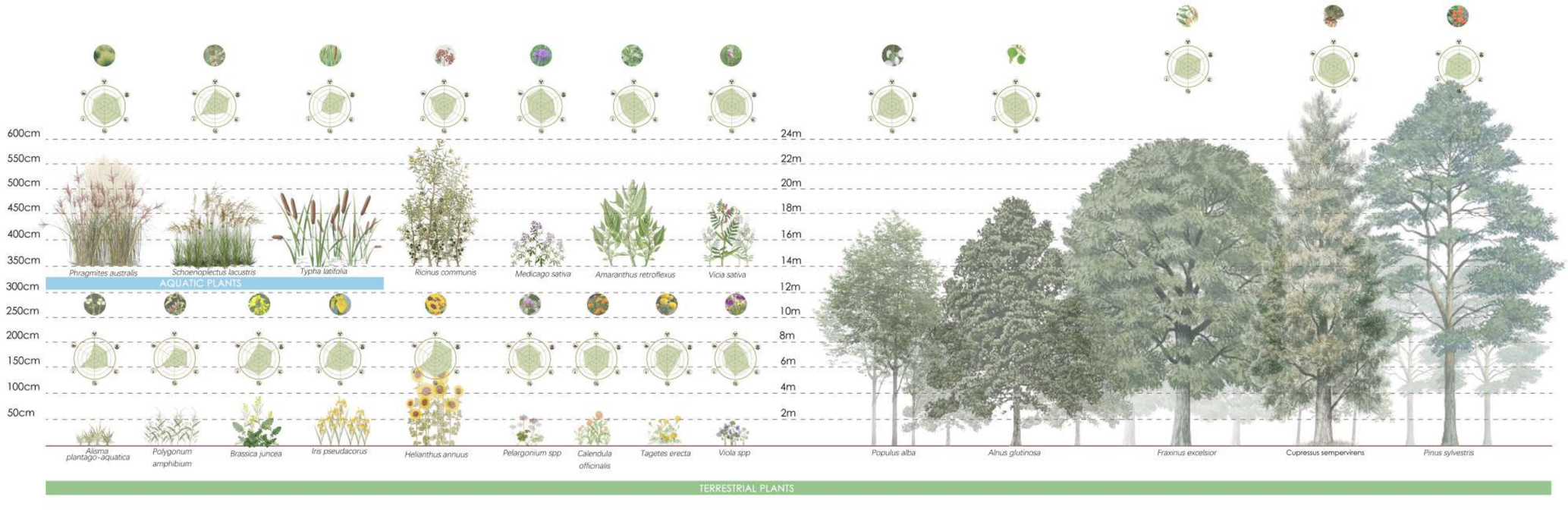


2.3 BIRDS IMMIGRATION LINES

The primary migration routes of several bird species around the Caorso nuclear power plant include Black-winged Stilt, Egrets, European Robin, Grey Heron, Redstart, Willow Warbler, and Woodlark. These birds mainly migrate from Africa and Southern Europe to the north, passing through or stopping in the region. This highlights the ecological significance of the Caorso area in bird migration patterns, offering valuable insights for conservation and design.

2.4 VEGETATION ANALYSIS

The vegetation around the Caorso Nuclear Power Plant includes terrestrial, aquatic, and wetland plants. Native shrubs and trees provide wildlife habitat, while aquatic plants enhance local ecosystems. Wetland vegetation, like reeds and sedges, aids in water filtration and flood management. This diverse plant life contributes to ecological health and environmental education.



3

Micro Condition Analysis

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Micro Condition Analysis

Brief

The Micro Condition Analysis of the Caorso Nuclear Power Plant reviews infrastructure, flood risks, and demolition progress. It notes key personnel pathways, the lack of cycling routes, and ecological benefits from nearby water bodies. Ongoing decommissioning includes significant demolitions, with a SWOT analysis highlighting eco-tourism potential and public perception challenges, emphasizing the site's ecological and cultural significance.

Abstract

This analysis of the Caorso Nuclear Power Plant provides insights into the site's infrastructure, flood risks, and landscape features. It assesses access routes and highlights the plant's role in flood management. The diverse landscape benefits from limited human activity, fostering biodiversity. The ongoing decommissioning includes careful management of radioactive materials, with a phased demolition approach. A SWOT analysis identifies eco-tourism potential and challenges related to funding and public acceptance, positioning the site as a valuable ecological and cultural asset.

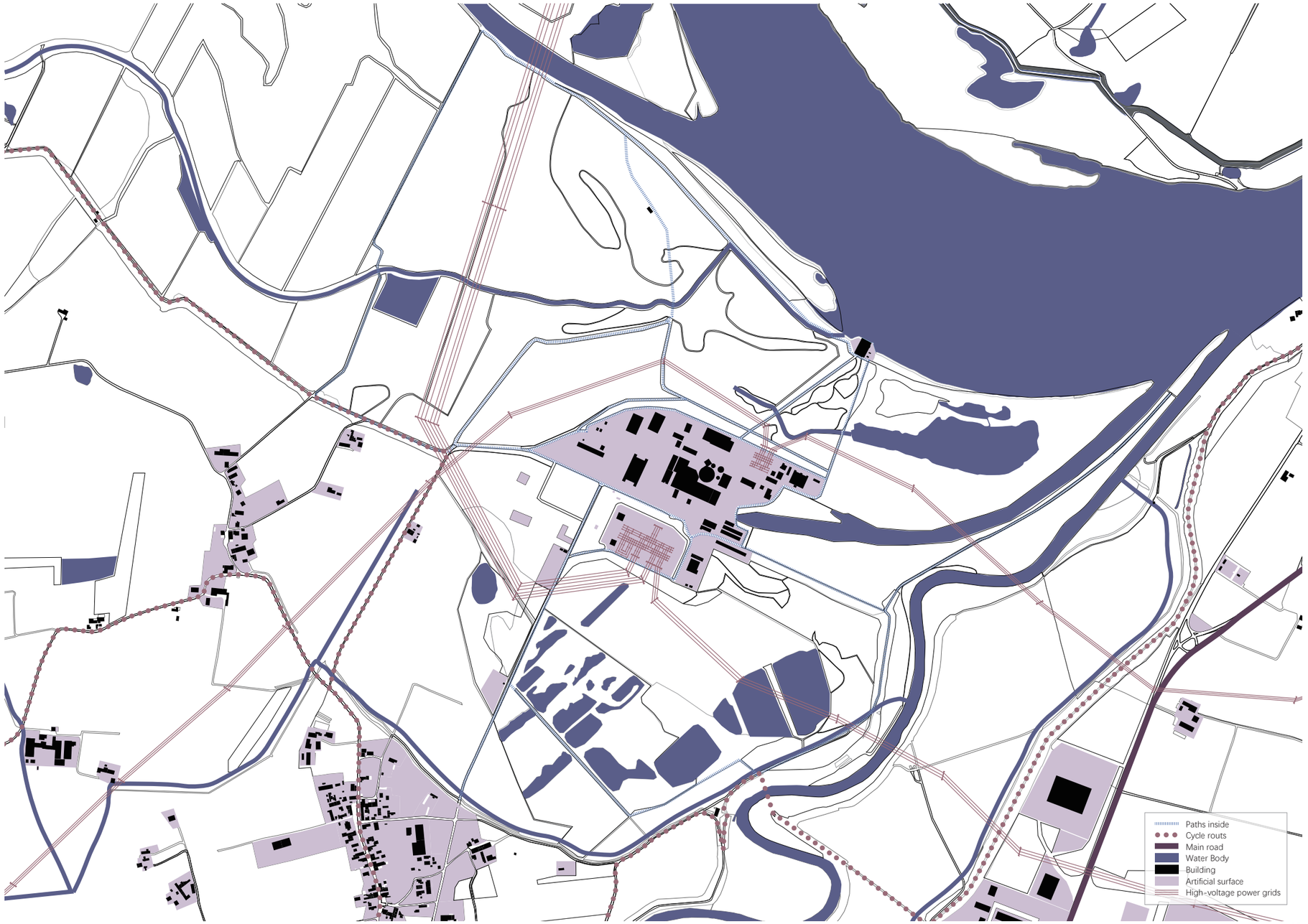
Site Status 01

1.1 CONSTRUCTED ANALYSIS

This constructed analysis provides an overview of the current infrastructure surrounding the Caorso Nuclear Power Plant, focusing on critical pathways and facilities that define its operational environment.

The paths inside the plant support the movement of personnel and equipment, ensuring efficient operations even as the site undergoes decommissioning. Cycle routes are notably absent, indicating a lack of accessible cycling infrastructure, which could discourage eco-friendly transportation options. The presence of main roads facilitates access to and from the site, playing an essential role in logistics and transportation.

Nearby water bodies contribute to local biodiversity and play a role in flood management strategies. Various buildings are essential for ongoing operations and maintenance, while artificial surfaces highlight the impact of human activity on the landscape. The high-voltage power grids in the area signify the continuing importance of energy infrastructure, underscoring the nuclear plant's legacy in energy production, even as it transitions into a post-decommissioning phase.



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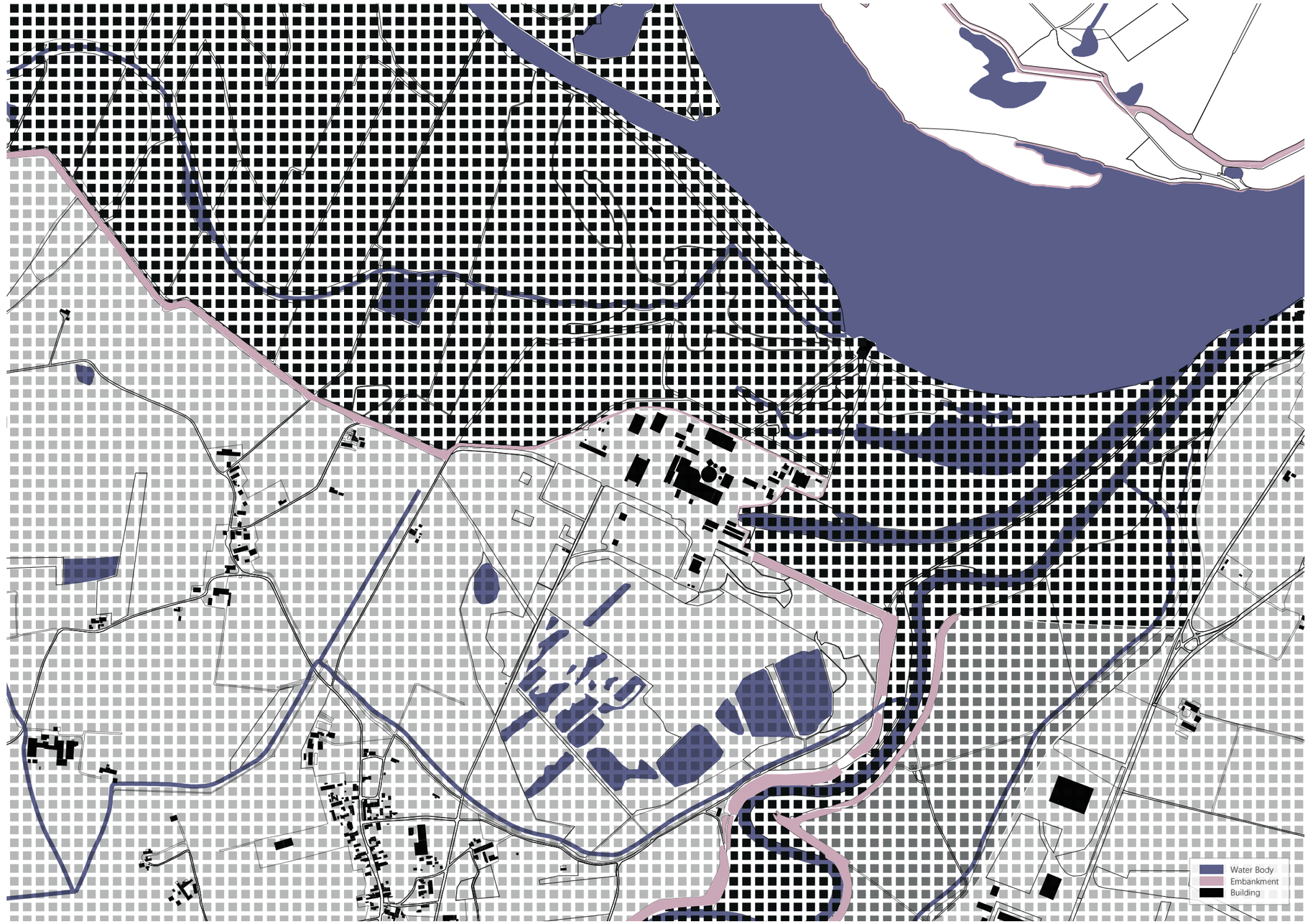
Caorso Nuclear Power Plant

1.2 FLOODING ANALYSIS

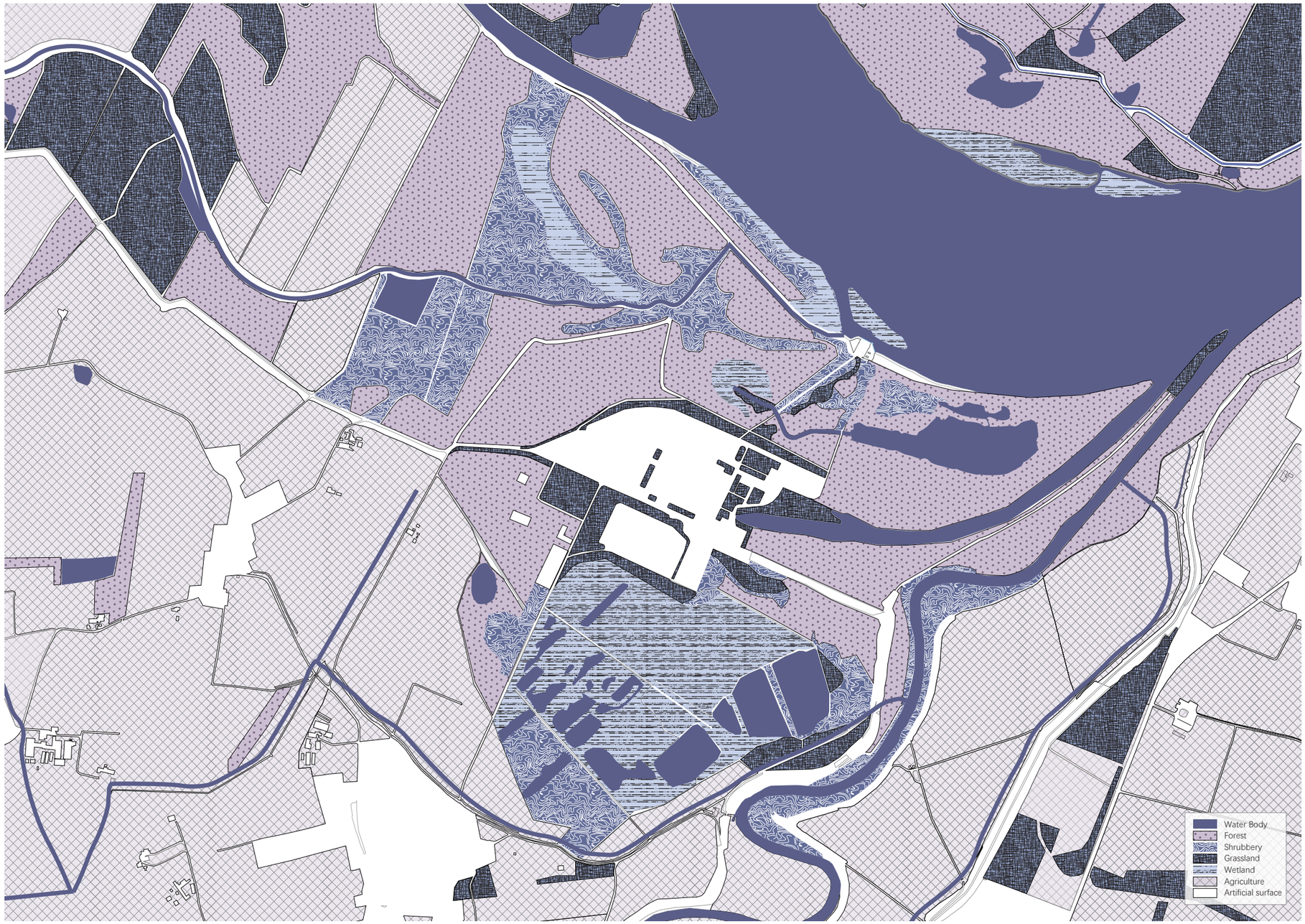
The hydrogeological structure plays a crucial role in this area, particularly in relation to flood-prone zones. It assesses the frequency and likelihood of flooding, which is vital for determining the boundaries of the Natura 2000 network. This network considers areas exposed to frequent and high-probability floods, with the presence of the nuclear power plant adding complexity to the flood risk assessment. The plant's platform functions as an effective levee, and when combined with the main levee, it helps to define the boundary of the Natura 2000 protected area.



Frequent floods (TR: 20-50 years)
Less frequent floods (TR: 100-200 years)
Rare floods (TR: up to 500 years)

1.3 LANDSCAPE ANALYSIS

We have marked various types of land cover surrounding the Caorso Nuclear Power Plant, including water bodies, forests, shrubbery, grasslands, wetlands, agricultural areas, and artificial surfaces. This diverse landscape has benefited from the limited human activity in the area due to the presence of the nuclear power plant, resulting in a remarkably well-preserved ecological environment. The lack of disturbance has allowed local flora and fauna to thrive, creating a rich and diverse ecosystem. Water bodies serve as important resources for local wildlife, while forests and shrubbery provide shelter and food. Grasslands and wetlands play crucial roles in water management and biodiversity, and agricultural areas reflect the area's rural character. Artificial surfaces indicate human development, which can create opportunities for integrating natural spaces in future redevelopment efforts.



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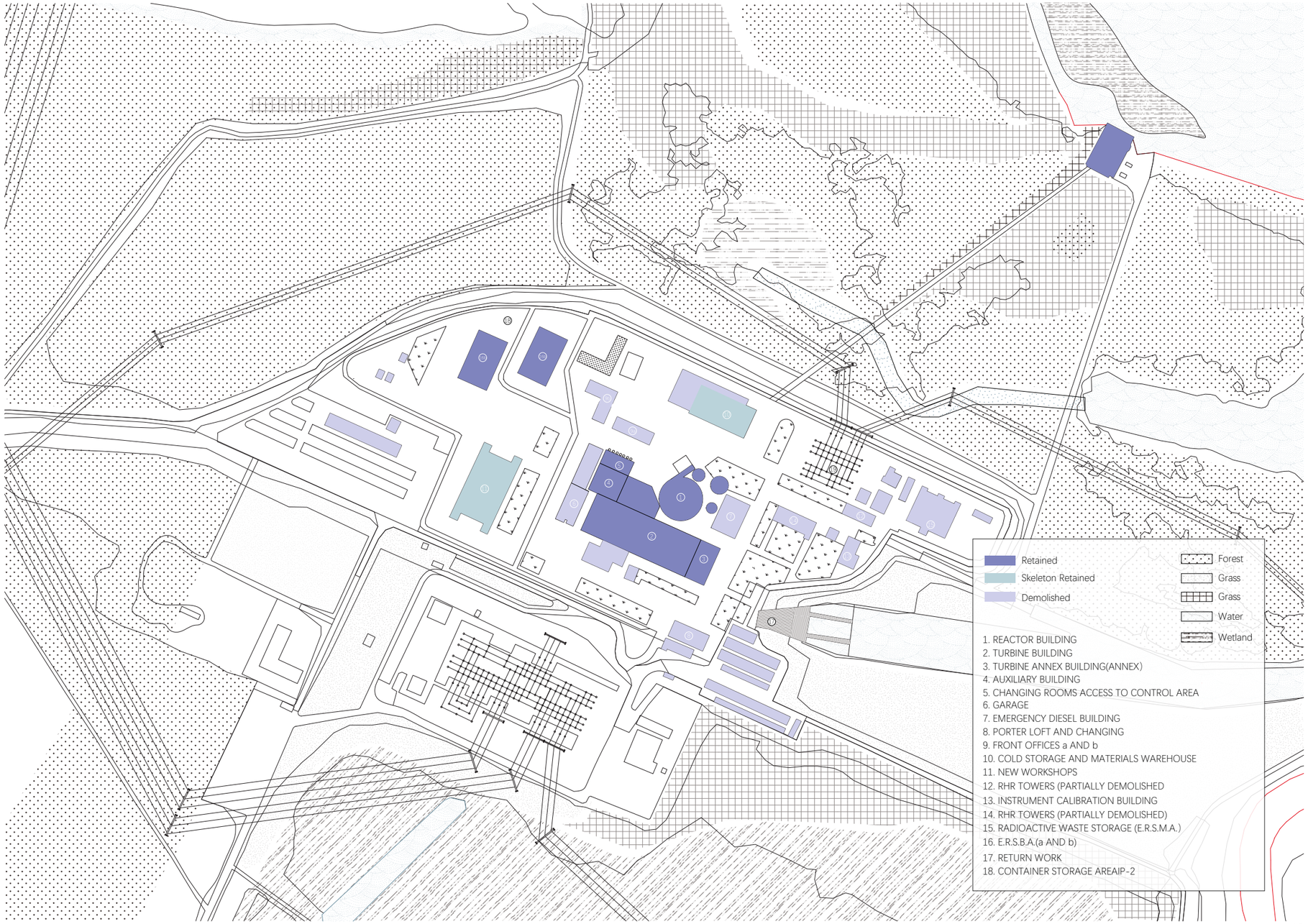
Caorso Nuclear Power Plant

Current Status of Buildings 02

This diagram outlines the decommissioning status of the Caorso (Piacenza) Nuclear Power Plant. Key buildings, such as the Reactor Building, RHR Tower, and Turbine Building, are identified based on their current or planned demolition stages. The Turbine Building has already been demolished and repurposed into a material management section, while the Reactor Building and auxiliary structures are scheduled for demolition from 2021 to 2030.

Additionally, the Temporary Storage Facilities are undergoing upgrades and renovations, with completion expected by 2028. Specific areas containing radioactive substances are marked, showing the meticulous approach required to ensure safety during the dismantling process. This phased approach reflects the delicate balance between infrastructure removal, material management, and the safe handling of radioactive materials.



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Caorso Nuclear Power Plant

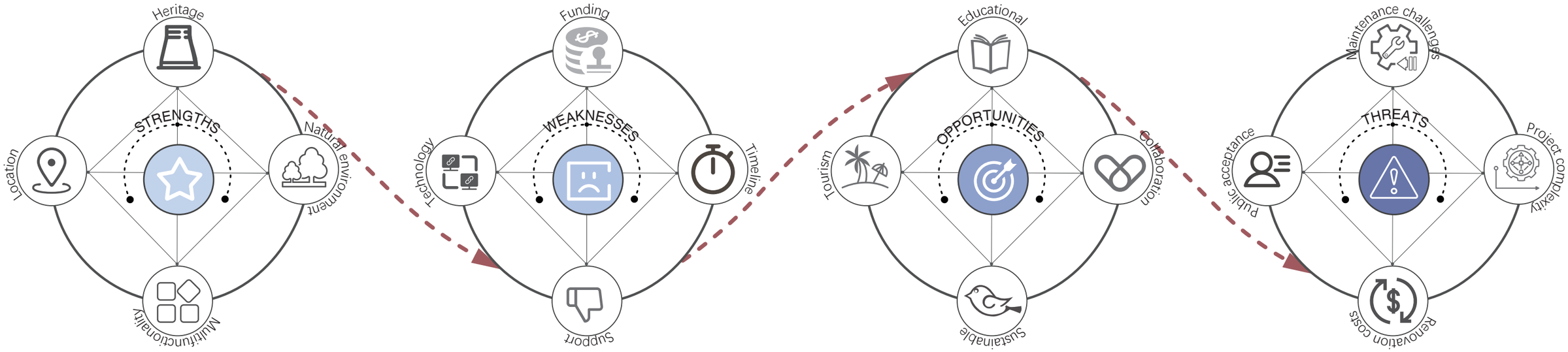
SWOT 03

The nuclear power plant's unique architectural heritage, prime location near the Po River, multifunctionality for diverse events, and well-restored natural environment make it an attractive destination for tourists and researchers.

The project faces weaknesses such as funding shortages affecting quality, technological challenges requiring advanced expertise, and a lack of local support that could hinder success.

Transforming the Caorso site leverages its history and nature to boost sustainable tourism and the local economy. As an educational hub, it supports renewable energy and heritage research, showcasing green practices in energy and ecology while enriching community life.

The project encounters threats such as public safety concerns regarding the nuclear background, high renovation costs that may exceed budget, complex regulations and approval processes causing delays, and increased long-term maintenance costs for green facilities.



STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS

- The project's unique architectural heritage and excellent natural environment can attract eco-tourism and collaborations with cultural institutions, enhancing its appeal and funding potential.
- High renovation costs and maintenance challenges may make it vulnerable to economic uncertainty and competition, necessitating effective public engagement to improve acceptance.

cover
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4

case study

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Caorso Nuclear Power Plant

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CASE STUDY

Brief

This case study examines five significant projects: Tate Modern, GES-2 House of Culture, Power Station of Art, Zeche Zollverein, and Parco Dora. Each project is analyzed in terms of its historical background and renovation strategies, highlighting the architectural and landscape interventions that contribute to their transformation into multifunctional cultural spaces.

Abstract

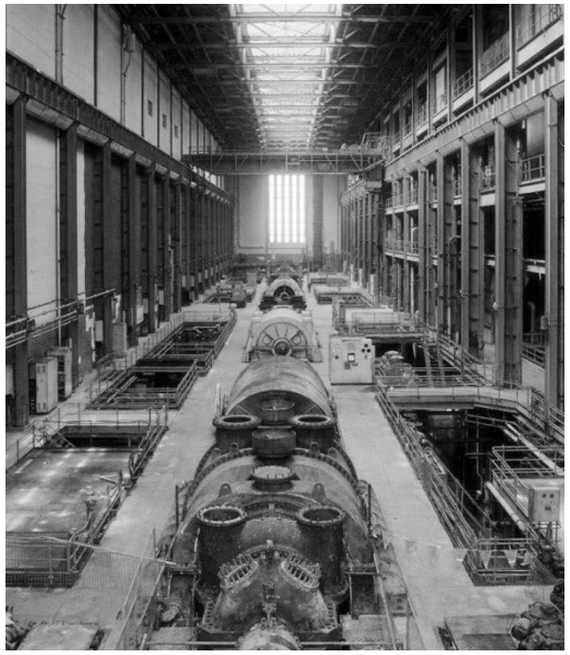
This case study explores the adaptive reuse of five notable projects—Tate Modern, GES-2 House of Culture, Power Station of Art, Zeche Zollverein, and Parco Dora. Through an examination of their historical contexts and renovation plans, the study illustrates how these sites have been transformed into vibrant cultural hubs. The analysis emphasizes the importance of integrating architectural and landscape design to enhance functionality and community engagement while preserving historical significance.

Tate Modern 1

1 HISTORY AND BACKGROUND

Tate Modern was originally the Bankside Power Station, designed by renowned architect Giles Gilbert Scott, and completed in 1952 to provide electricity to central London. However, due to advancements in technology and changes in energy needs, the power station gradually became obsolete and was eventually decommissioned in 1981.

The massive industrial structure stood unused for years before the London government decided to transform it into a modern art museum. The power station's iconic chimney, monumental scale, and robust brick structure would become key elements in its future redesign.



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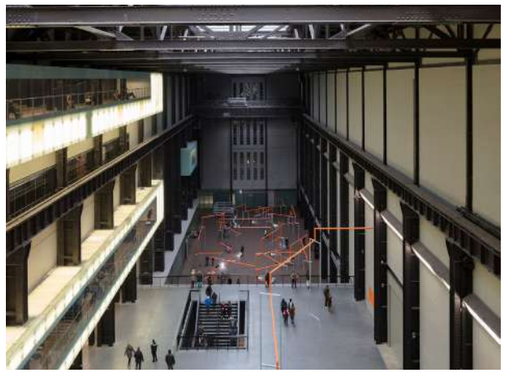
Caorso Nuclear Power Plant

2.1 DESIGN PHILOSOPHY AND SPATIAL LAYOUT

The transformation of Tate Modern, led by the Swiss architectural firm Herzog & de Meuron, successfully retains the rugged beauty of the original industrial building while incorporating modern design elements. The designers utilized the existing red brick structure alongside new materials like glass and steel to create a fresh visual aesthetic.

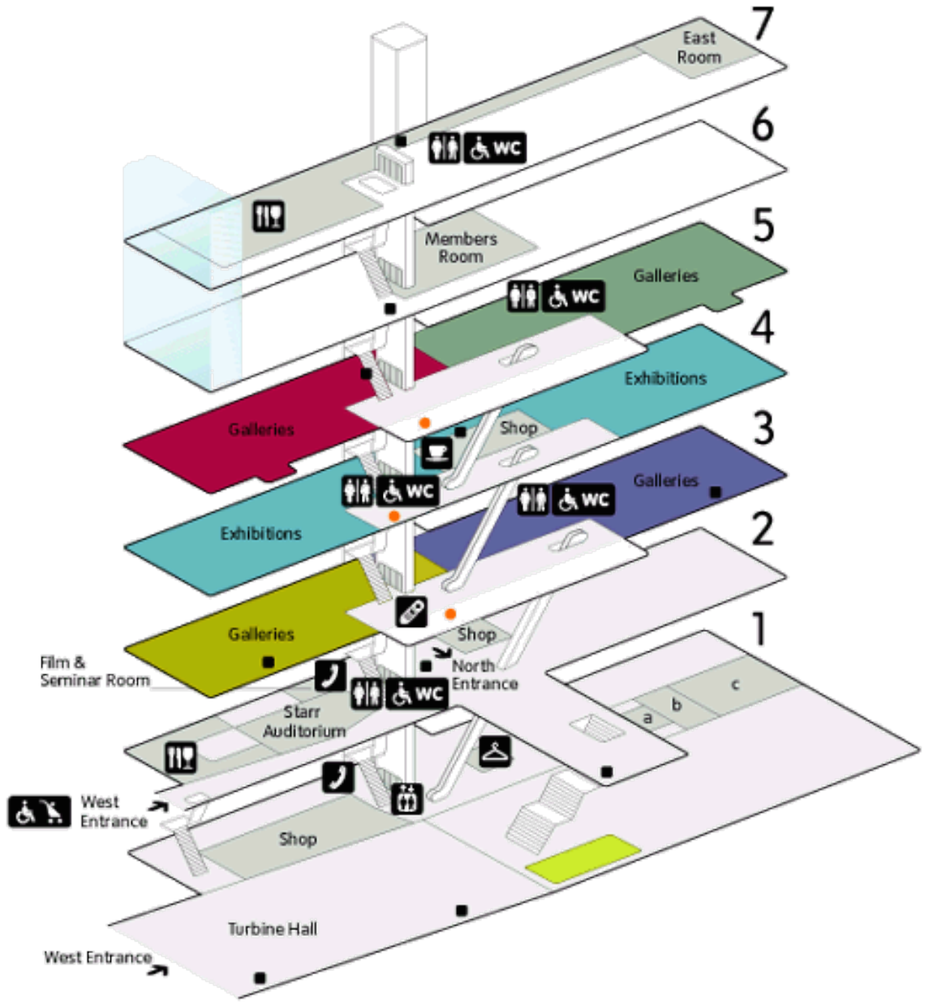
The internal spatial organization and circulation design are particularly important, with the Turbine Hall serving as a core space. Its vast open design accommodates temporary exhibitions and public events, showcasing the flexibility and adaptability of the space.



2.2 Functional Transition and Multipurpose Use

Tate Modern's successful transformation from a power station to an art museum aligns the functional change with the architectural form, meeting new cultural demands.

The museum features flexible exhibition spaces, public areas, cafes, and bookstores, creating a diverse functional experience that attracts a wide range of audiences, highlighting the building's significance as a modern cultural space.

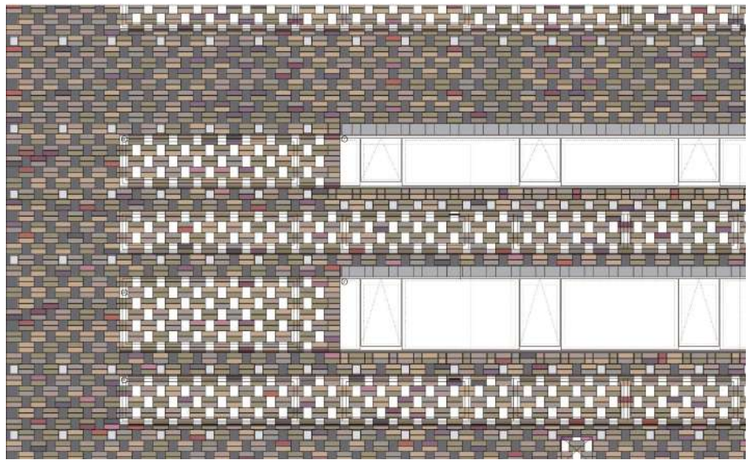


3.1 SUSTAINABLE DESIGN PRINCIPLES

The transformation of Tate Modern is not only an update of architectural form but also a demonstration of modern sustainable design principles.

The designers aimed to minimize waste of existing materials during the selection and use of building materials, while enhancing energy efficiency through natural lighting and ventilation. The repurposing of the power station reduced the demand for new construction materials, embodying the sustainable principle of "waste reuse."

Furthermore, Tate Modern's location harmonizes with the surrounding urban environment, connecting to public spaces like the Thames riverside walkway and the Millennium Bridge, thereby enhancing urban accessibility and public experience.

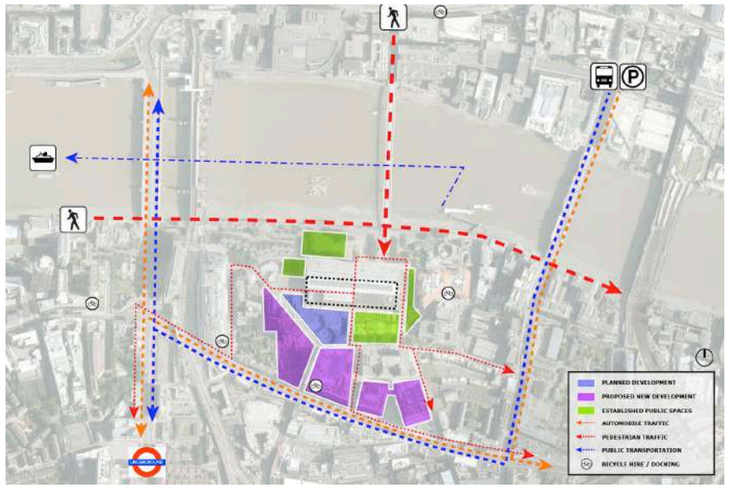


3.2 URBAN RENEWAL AND ENVIRONMENTAL RELATIONSHIPS

The transformation of Tate Modern symbolizes the cultural revival of the Bankside area in London, significantly boosting economic and cultural development. By converting an industrial site into a modern art museum, it attracts millions of visitors, stimulating local businesses and tourism.

Situated along the River Thames and connected to the Millennium Bridge, the museum creates new public spaces that enhance the walking experience. This waterfront integration not only provides beautiful views but also fosters social interaction between visitors and residents, enriching the community's cultural atmosphere.

Moreover, the relationship between the building and its surrounding environment is crucial. Its accessibility through various transportation options, including public transit and bike paths, impacts foot traffic and urban life. As a catalyst for urban regeneration, Tate Modern promotes the development of vibrant public spaces.

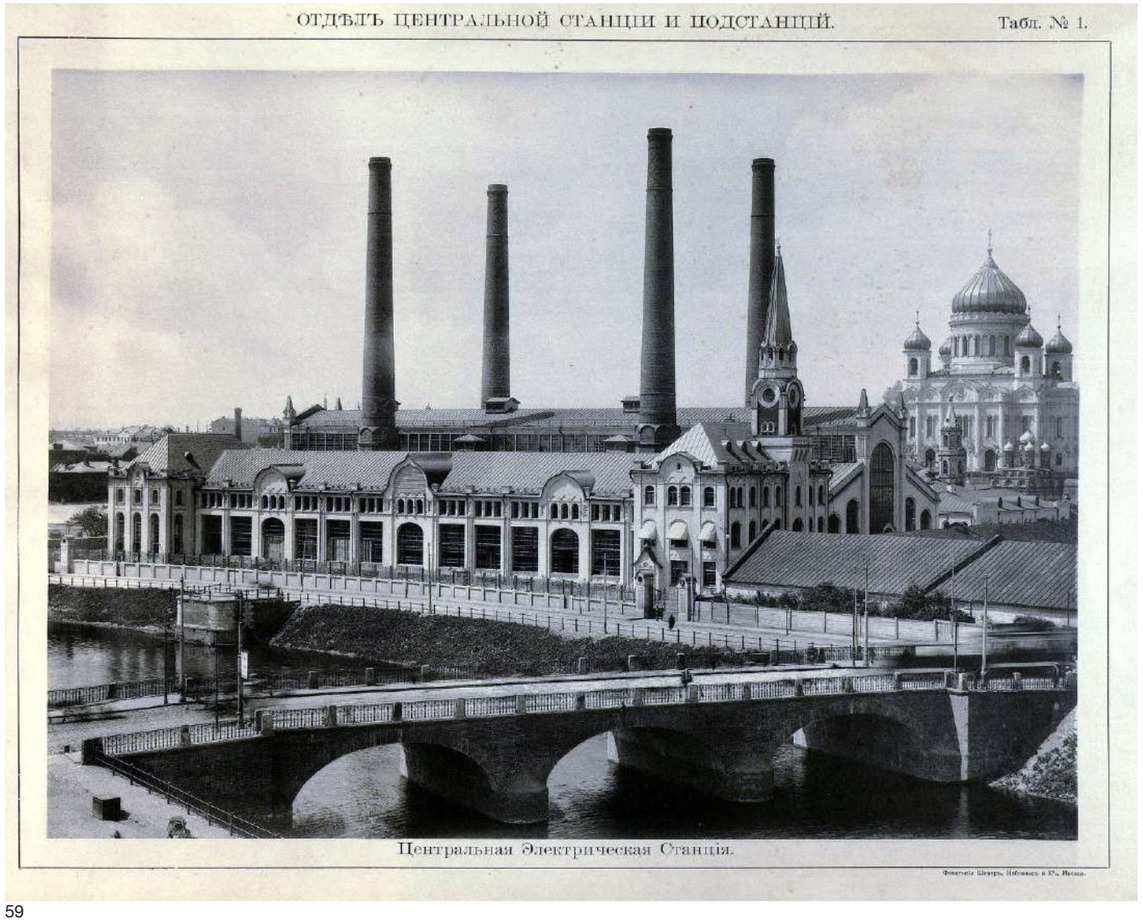


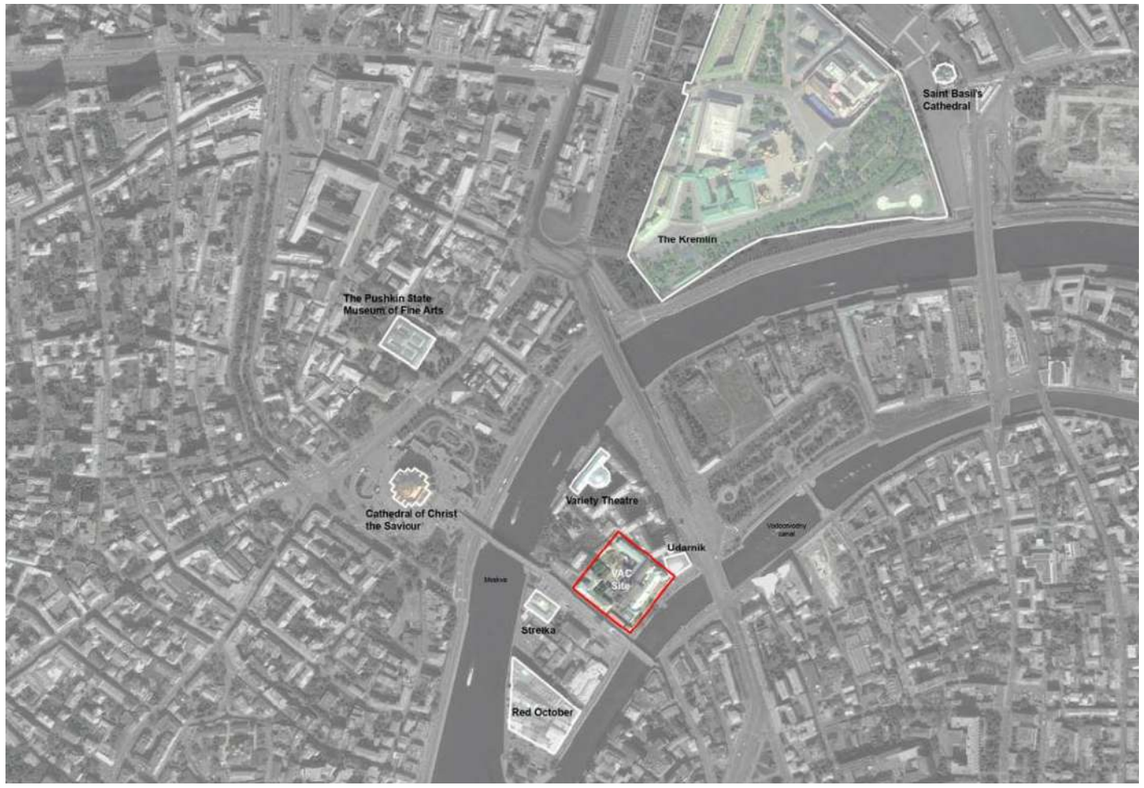
GES-2 House of Culture 2

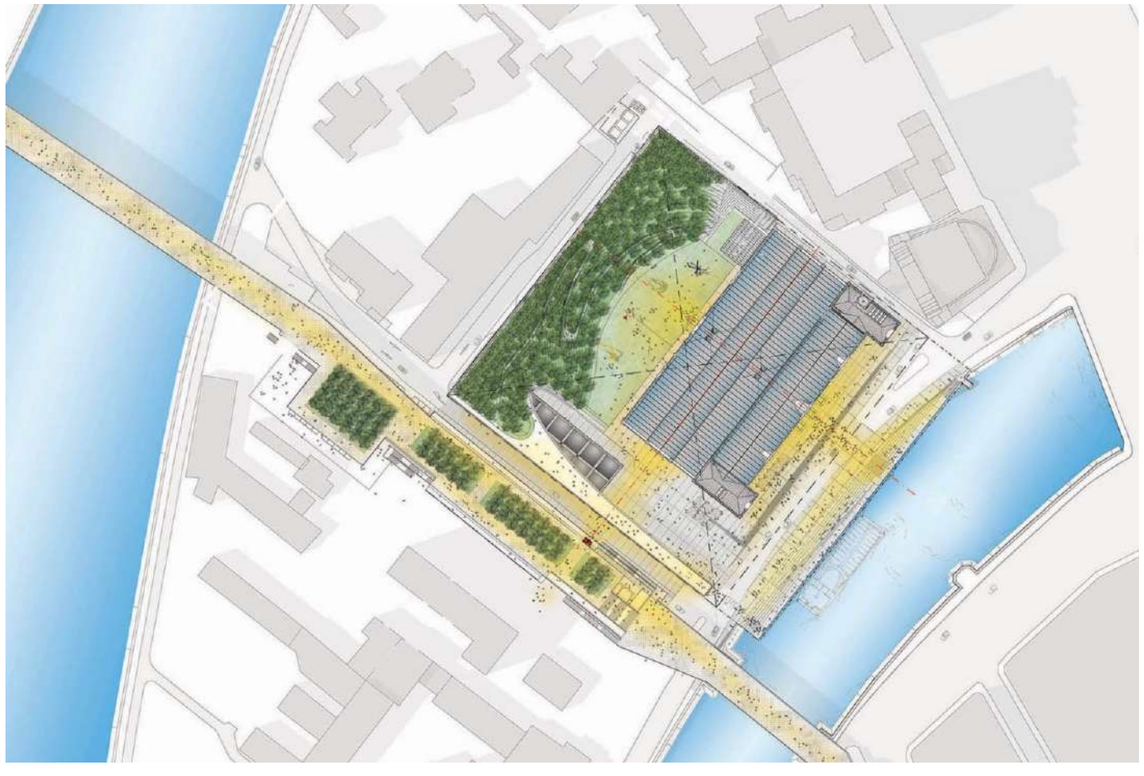
1 HISTORY AND BACKGROUND

The GES-2 House of Culture is located in Moscow and was originally built as a power station in the early 20th century, marking an important milestone in Russia's early industrialization. This building not only showcased technical innovation but also represented the era's pursuit of energy development and urbanization. Over time, GES-2's original function diminished, yet its unique historical and architectural significance remains an essential part of understanding Moscow's industrial development.

The decision to transform GES-2 into a cultural center stemmed from the desire to repurpose historical heritage and foster urban cultural development. Through this renovation, the industrial site was given new life, evolving into a multifunctional space for art and culture. This transformation not only enriched the cultural atmosphere of the area but also stimulated economic growth, attracting tourists and local residents and enhancing the overall vitality and social interaction within the city.







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Caorso Nuclear Power Plant

2 ARCHITECTURAL DESIGN AND FUNCTIONAL LAYOUT

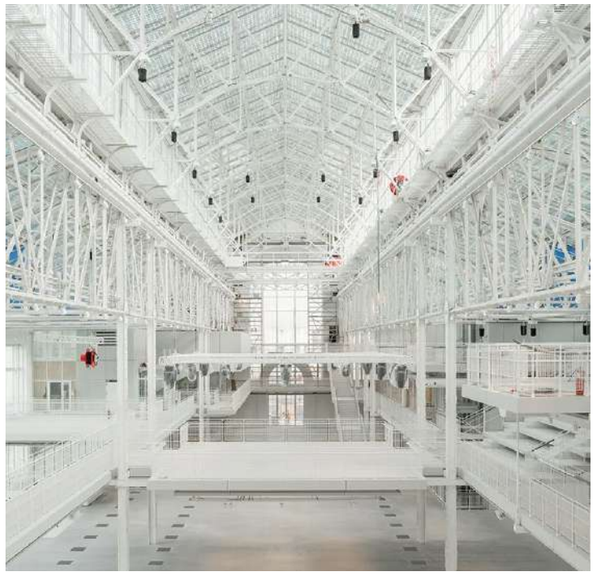
2.1 Design Philosophy and Historical Integration

The renovation of GES-2, led by Renzo Piano Building Workshop, combines the historical industrial building with modern design. The design team preserved historical elements to enhance its cultural heritage identity and give the building new life. The façade features extensive glass and concrete; glass creates bright, transparent interiors, integrating better with the surroundings, while concrete retains the building's solidity and industrial beauty. This material combination enhances visual appeal, emphasizing natural light and spatial fluidity.

2.2 Spatial Layout

The interior design of GES-2 emphasizes flexibility and diversity to accommodate various cultural activities. Its open layout and movable partitions allow for rapid adjustments to the space, making it suitable for exhibitions, performances, and community events, thereby promoting public participation and interaction.

A key highlight of the design is the adaptable exhibition space, which can host both large art installations and smaller exhibits, providing artists with multiple display options. Additionally, the specially designed acoustic performance venue enhances the audience experience, ensuring optimal outcomes for events.



2.3 Spatial Layout and Multifunctionality

The internal layout of GES-2 is thoughtfully designed to accommodate a variety of cultural activities. The building includes exhibition spaces, performance venues, cafes, and social areas, ensuring flexibility to host diverse events. This multifunctionality attracts various audiences, from art enthusiasts to local community members, providing opportunities for everyone to engage in activities that suit their interests.

2.4 Cultural Activities and Community Interaction

As a cultural center, GES-2 actively hosts various exhibitions, performances, and community events, fostering interaction between the arts and the public. Through its diverse cultural programming, GES-2 not only enhances the public's appreciation for art but also provides a platform for communication and engagement within the local community. This project has not only transformed the building's function but also promoted cultural development in the area, making it an important cultural landmark in Moscow.

3.1 SUSTAINABLE DESIGN PRINCIPLES

During the renovation of the GES-2 project, various sustainable design strategies and technological innovations were implemented to enhance the building's energy efficiency and sustainability.

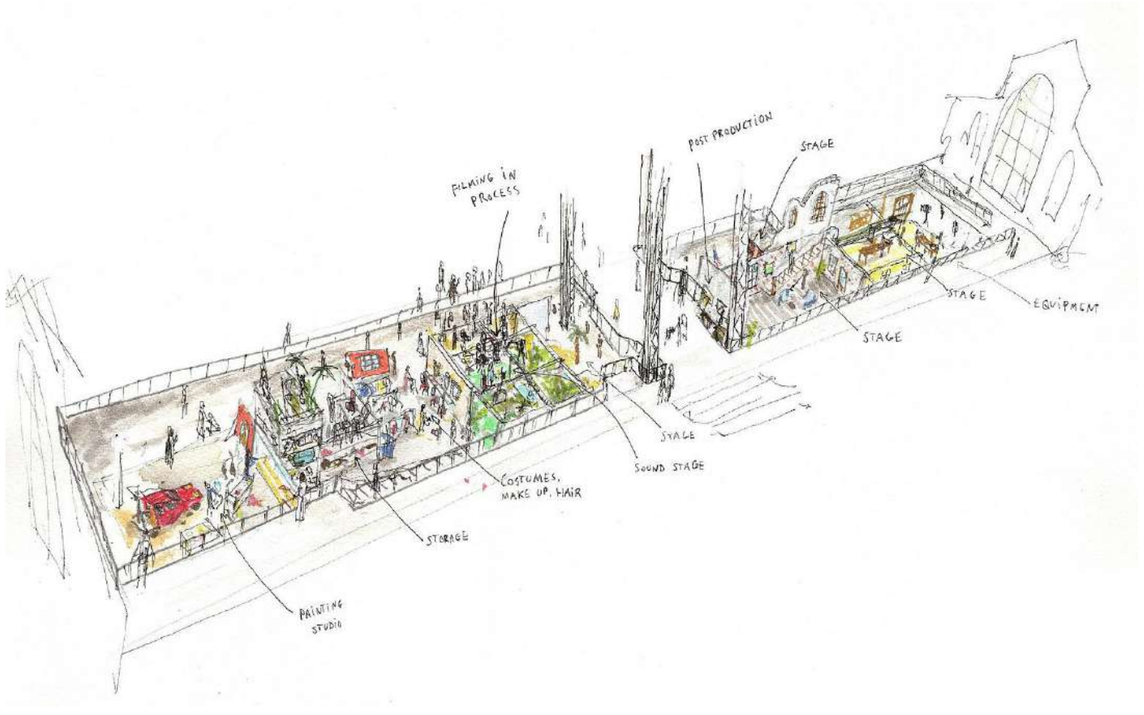
The design features extensive use of glass facades and skylights to maximize natural lighting, green roofs to promote ecological benefits, and rainwater harvesting systems to reduce water consumption. Additionally, high-efficiency heating, ventilation, and air conditioning (HVAC) systems, along with energy-saving equipment, were integrated.

The project also incorporates acoustic design and flexible space configurations to accommodate diverse cultural activities, while exploring the potential for renewable energy integration, such as solar panels, to increase the building's self-sufficiency.

3.2 SOCIAL AND CULTURAL IMPACT

GES-2's social and cultural impact is evident in its deep engagement with the community and promotion of cultural exchange. Through a variety of arts education programs and public activities, GES-2 encourages local residents to interact and participate, strengthening connections and a sense of belonging among community members. As a cultural center, it provides a platform for showcasing diverse art forms, fostering the convergence and dialogue of different cultures, and promoting cultural diversity.

Additionally, GES-2 addresses social issues and encourages the public to reflect on relevant topics, making art a driving force for social change. It attracts visitors, stimulates economic development in the surrounding area, and creates new public spaces for the community, enhancing residents' quality of life. By making cultural activities a social connector, GES-2 contributes to the vibrancy and dynamism of the community.



Power Station of Art 3

1.1 HISTORY AND BACKGROUND

Nanshi Power Plant, established in 1897, was one of Shanghai's earliest power facilities, supplying electricity to the city's industrial and municipal needs. It played a crucial role in Shanghai's transformation from a traditional port city into a modern industrial hub during the early to mid-20th century. However, with advancements in power generation technology and the rise of more efficient plants, the power station gradually lost its importance and was eventually shut down in 2007 due to outdated equipment, pollution concerns, and the city's urban renewal plans.

As a key part of Shanghai's industrial history, the Nanshi Power Plant not only provided essential energy for over a century but also embodied the city's industrial heritage. Its closure reflected the changing dynamics of Shanghai's urban landscape and stricter environmental standards, yet its unique industrial architecture and historical significance made it an ideal candidate for preservation and adaptive reuse.

1.2 REDEVELOPMENT MOTIVATION

The motivation behind transforming Nanshi Power Plant into the Power Station of Art was aligned with global trends in repurposing industrial heritage. The creation of the museum addressed Shanghai's need for contemporary art spaces, turning the disused industrial facility into a platform for art exhibitions and cultural exchange. This adaptive reuse project preserved the plant's historical value while elevating Shanghai's position on the international art stage.

Additionally, the redevelopment was closely tied to Shanghai's urban renewal strategy, revitalizing the plant's prime location along the Huangpu River. The project balanced the preservation of the building's industrial characteristics with modern design, ensuring the museum served as both a cultural landmark and a driver of community vitality and economic growth.

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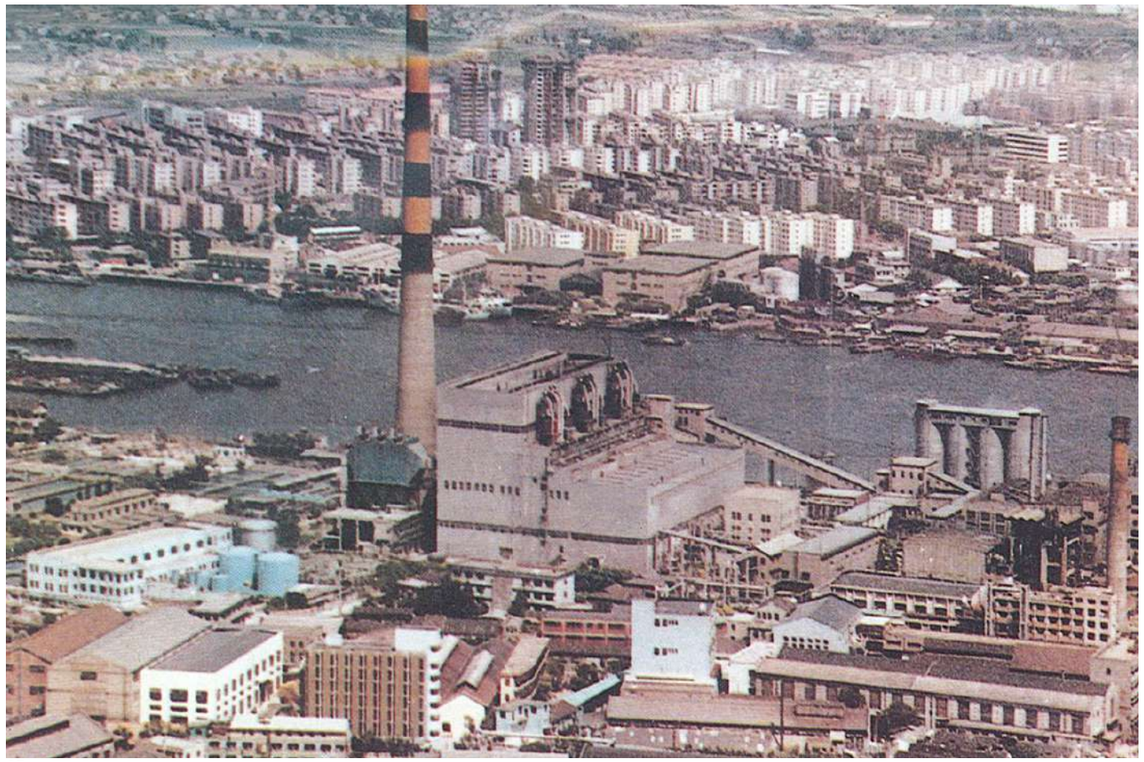


From 2012 to present

4/2024 - 12/2024

Caorso Nuclear Power Plant

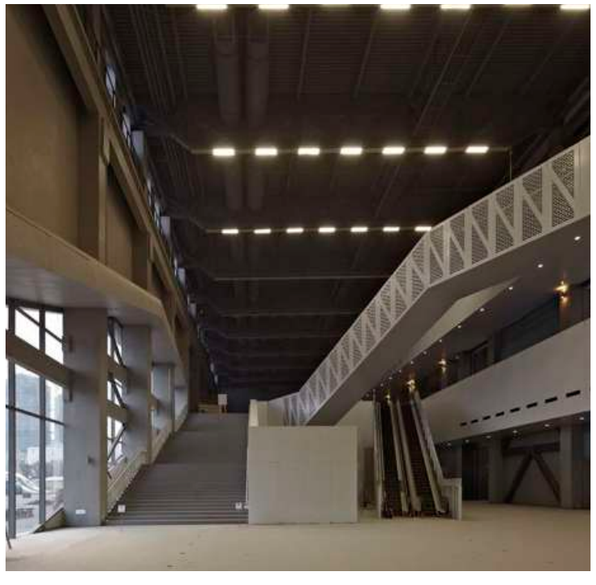
2 ARCHITECTURAL DESIGN AND RENOVATION

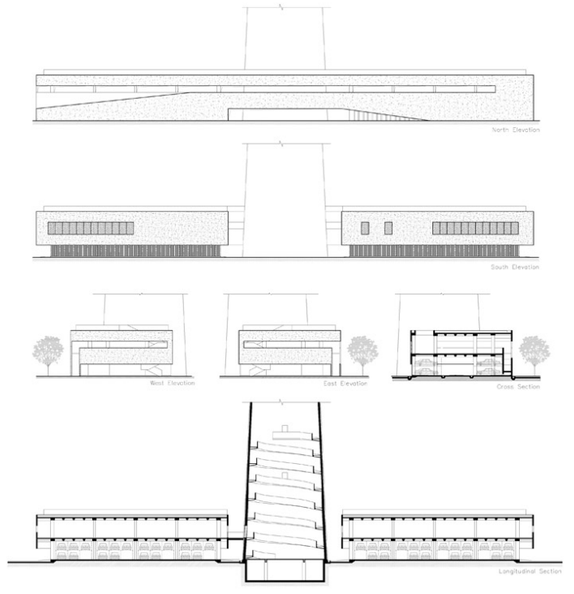
2.1 Original Architectural Features

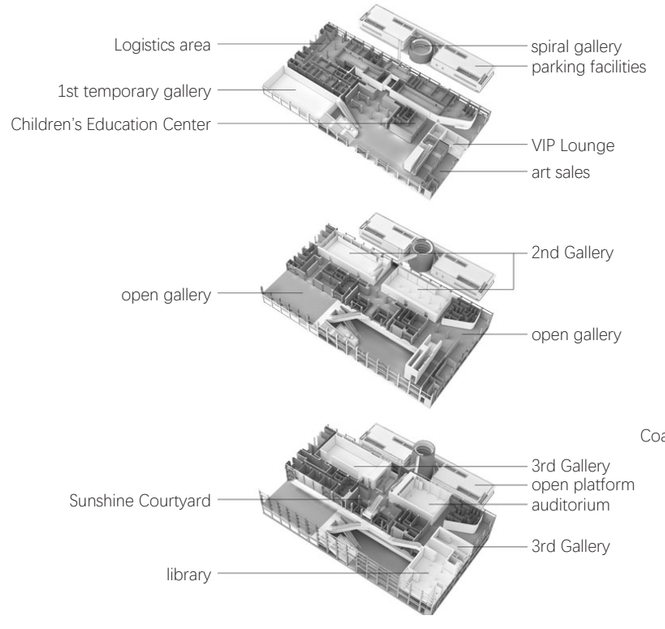
Nanshi Power Plant, as a typical industrial building, features a robust reinforced concrete structure, red brick façade, large windows, and a tall chimney, emphasizing functionality and durability in its design. During the renovation, these iconic industrial elements were preserved, particularly the towering chimney and the expansive factory structure, which became core components of the transformed museum, highlighting the building's historical significance and the continuity of its industrial heritage.

2.2 Design Concept

The design concept of the project aims to achieve a fusion of historical elements and contemporary functions by preserving the original industrial characteristics of the power plant. The design team focused on maintaining the building's primary framework while incorporating modern materials and technologies, ensuring that the structure retains its industrial memory while also serving modern cultural functions. The design emphasizes spatial regeneration, balancing historical preservation with the needs of a contemporary art museum, facilitating a dialogue between old and new architectural elements.

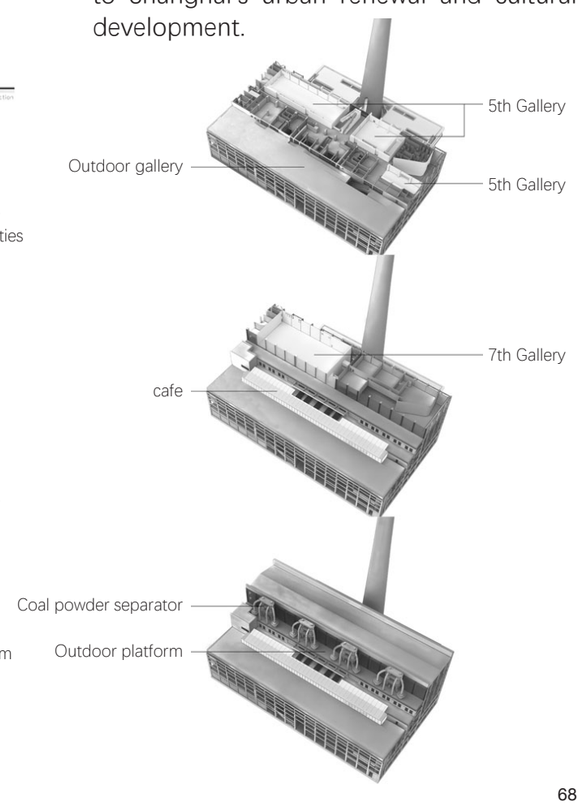






2.3 Spatial Transformation

Spatial transformation is key to the renovation of Nanshi Power Plant, as the design team skillfully converted the spacious factory areas into suitable exhibition spaces while adding interactive areas, a library, a café, and other public facilities. Through thoughtful circulation design and optimization of outdoor spaces, the building successfully achieved a balance between functionality and aesthetics, becoming a comprehensive space that integrates culture, art, and public engagement, thereby contributing to Shanghai's urban renewal and cultural development.



3.1 SUSTAINABLE DESIGN

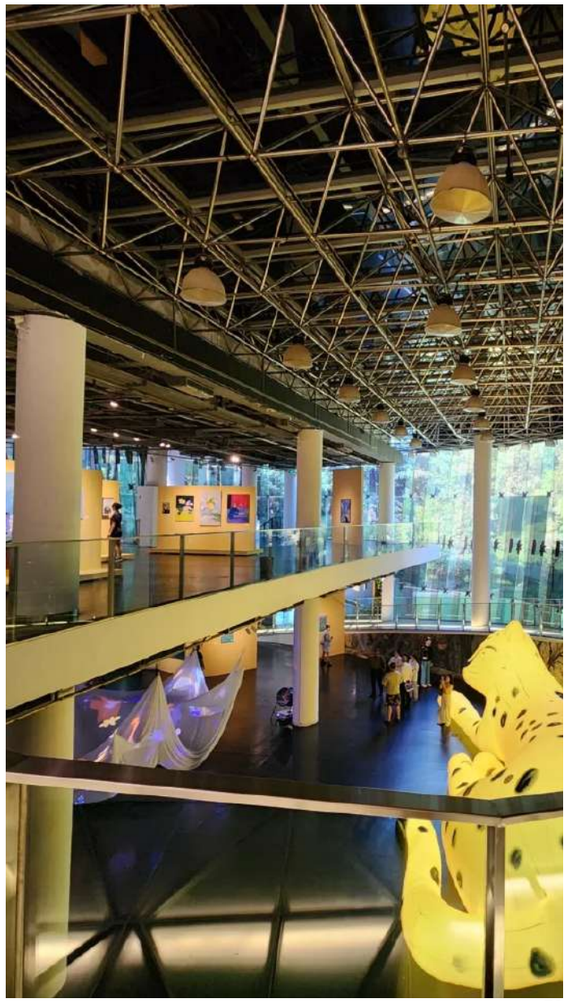
The renovation of the Nanshi Power Plant into the Shanghai Power Station of Art prioritized sustainability through the reuse of original materials like red bricks and steel. Energy-efficient measures, including optimized natural lighting, ventilation systems, and green technologies such as efficient HVAC systems, were implemented to enhance energy performance and reduce consumption.

The project minimized ecological impact through sustainable strategies like rainwater harvesting and biodiversity-promoting green spaces. Effective waste management encouraged recycling and reduced landfill reliance. Overall, the sustainable features enhanced both the environmental performance of the museum and the quality of the Huangpu River waterfront.

3.2 SOCIAL AND CULTURAL IMPACT

The Shanghai Power Station of Art (PSA) has significantly contributed to social and urban regeneration by transforming the Nanshi Power Plant into a public cultural space. It offers a rich platform for artistic and cultural experiences, enhancing public education and art appreciation. As a key cultural landmark, PSA attracts visitors and art enthusiasts, boosting the local economy and revitalizing the Huangpu River waterfront.

Culturally, PSA promotes the dissemination of contemporary art and serves as an important platform for international art exchange. By preserving and repurposing industrial heritage, PSA exemplifies the fusion of history and modern culture, raising public awareness of heritage conservation and showcasing cultural diversity, further solidifying Shanghai's status as a global cultural hub.



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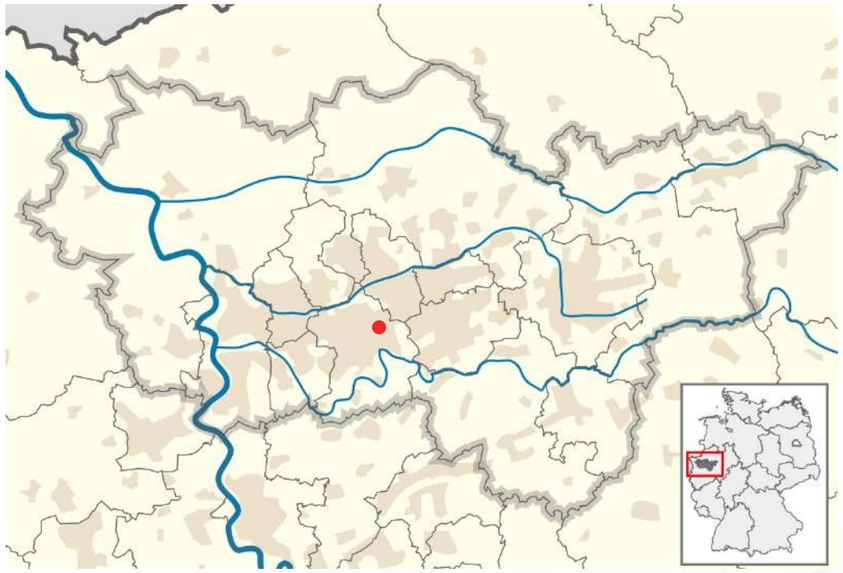
Caorso Nuclear Power Plant

Zeche Zollverein 04

1.1 HISTORICAL CONTEXT AND CULTURAL SIGNIFICANCE

Zeche Zollverein is one of Germany's most important coal mines, located in Essen, founded in 1847. It played a crucial role in Germany's industrialization, becoming a vital pillar of the national economy and social structure. As coal mining and the coal industry developed, Zollverein not only propelled local economic prosperity but also attracted a significant workforce and their families to the area. By the mid-20th century, Zeche Zollverein had become one of Germany's largest coal mines, closing in 1978. Its closure marked the end of an era and sparked discussions on how to preserve and transform industrial heritage.

During its transformation, Zeche Zollverein has been redefined as a cultural space that retains the core characteristics of its industrial heritage. In 2001, it was designated a UNESCO World Heritage Site, bringing greater attention to the area and encouraging deeper exploration of its historical and cultural value. By converting the coal mine into museums, art galleries, design centers, and conference venues, Zollverein not only provides space for educational and cultural activities but also attracts visitors from around the world, making it a vibrant cultural hub. Through this transformation, Zollverein not only reestablishes the importance of industrial history but also becomes a crucial force in promoting local economic and cultural development.



Zeche Zollverein is located in the northeastern Essen, Germany, within the Stoppenberg district, adjacent to Katernberg and Schonnebeck. It lies between Gelsenkirchener Straße, Fritz-Schupp-Allee, Arendahls Wiese, and Haldenstraße, featuring a prominent double-bock headframe at its main entrance. The Zollverein coke plant is also part of this UNESCO World Heritage site.

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Caorso Nuclear Power Plant

1.2 ARCHITECTURAL DESIGN AND SPACE UTILIZATION

Preservation of Industrial Features

The transformation emphasized the preservation of original industrial elements, such as the large brick chimneys and historic mining equipment. These components are integral to the site's identity and highlight its industrial heritage. The design team integrated these features into the overall space, allowing visitors to experience the grandeur of the site while maintaining a connection to its historical significance.

▲ Image above
https://de.wikipedia.org/wiki/Zeche_Zollverein

Adaptive Reuse of Spaces

Various areas were repurposed for different functions, including museums and exhibition spaces that showcase the history and cultural heritage of the coal mine. For instance, former miner's housing was converted into exhibition areas and event venues. This adaptive reuse not only preserved the industrial aesthetic but also catered to contemporary societal needs.

Image above ▶
https://visitworldheritage.com/en/eu/zollverein-coal-mine-industrial-complex-germany/b0b631c5-ea55-4717-9141-dcf745ee052d

Integration with Surrounding Environment

The project included the introduction of pathways, green spaces, and recreational areas, allowing Zeche Zollverein to blend seamlessly with its surroundings. The design emphasized landscape architecture, enhancing the site with green belts and open areas that improve accessibility and comfort for visitors. These spaces encourage relaxation and enjoyment of the natural beauty alongside the industrial heritage.

◀ Image above
Google imagine

Sustainable Design Practices

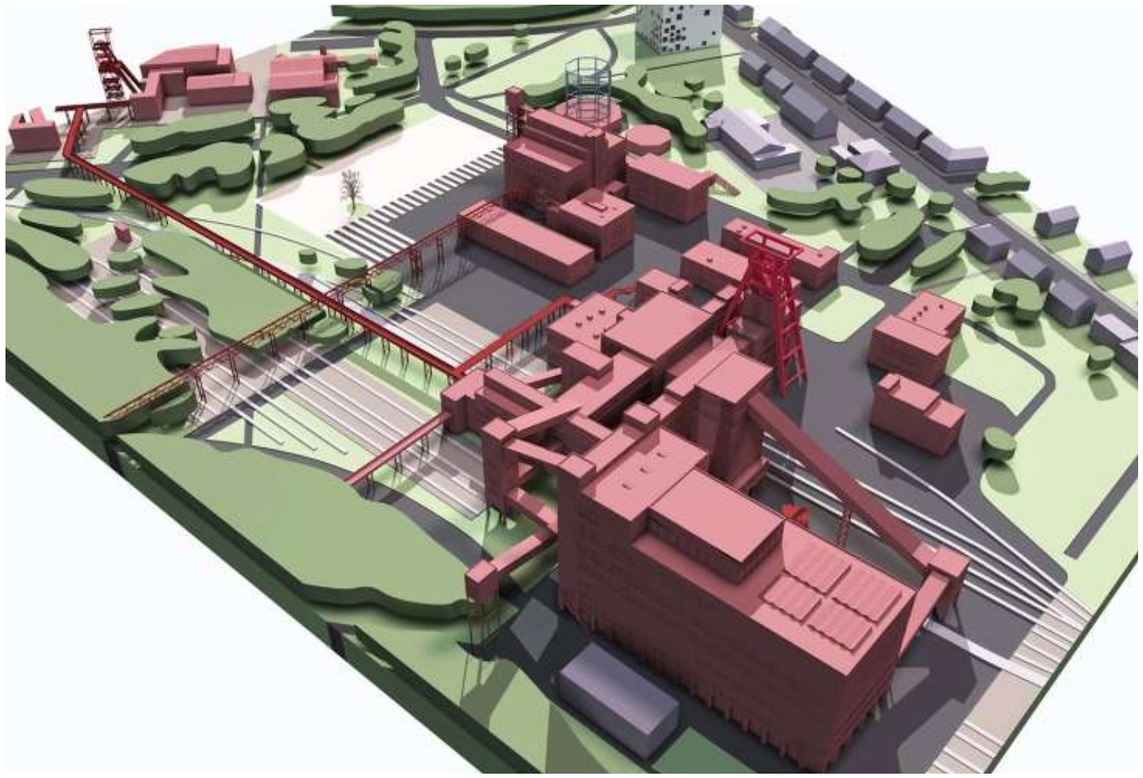
The project actively incorporated sustainable design principles, such as the installation of solar panels and rainwater harvesting systems. These measures reduce the energy footprint of the buildings and demonstrate a commitment to environmental stewardship. Additionally, the renovation prioritized the use of renewable materials, ensuring that the preservation of historical heritage aligned with modern sustainability goals.

1.3 COMMUNITY ENGAGEMENT AND CULTURAL IMPACT

Zeche Zollverein has transformed into a vibrant cultural hub that significantly impacts its surrounding community. By hosting diverse cultural activities such as concerts, exhibitions, and markets, the site fosters social interaction and engagement among local residents. These events create vital platforms for community connection, enhancing social ties and cohesion.

Additionally, the cultural activities at Zeche Zollverein have spurred local economic development by attracting visitors, which benefits surrounding businesses such as restaurants and shops. This influx of tourism generates job opportunities and improves the overall quality of life for residents. As a UNESCO World Heritage site, Zeche Zollverein also enhances the image of Essen, drawing both national and international attention, which further stimulates cultural and tourism development.

Furthermore, this transformation supports local artists and the creative economy by providing a venue for exhibitions and performances. The site not only celebrates its industrial past but also nurtures a thriving artistic community, making it a model for other cities aiming to revitalize their cultural heritage.

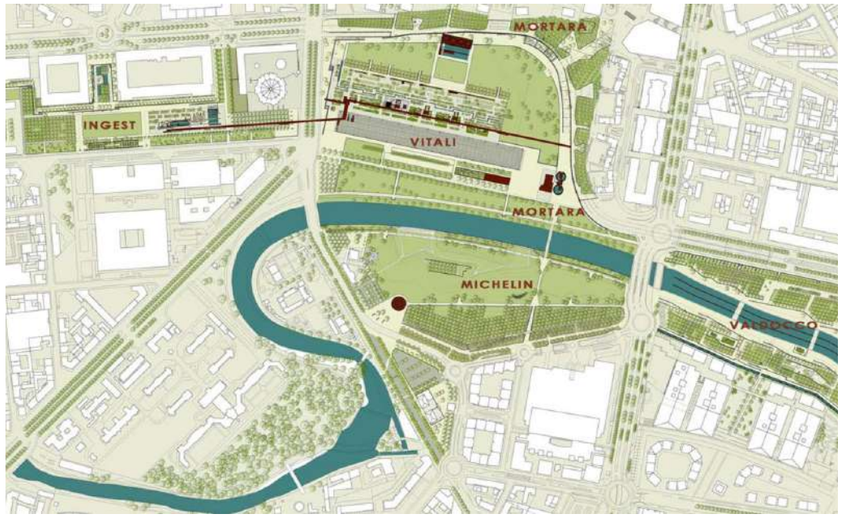


Parco Dora 05

1 HISTORICAL CONTEXT AND CULTURAL SIGNIFICANCE

Parco Dora in Turin, Italy, was originally an industrial hub, primarily home to the Fiat factory and other manufacturing facilities that contributed significantly to the local economy in the 20th century. However, by the 1990s, these industrial sites were abandoned, leaving vast spaces unused. Urban planners and architects then initiated a transformation to repurpose this land into public spaces while respecting and celebrating its industrial history.

The design of Parco Dora preserved key industrial elements such as factory remnants and bridges, integrating them into a green landscape. These elements now serve as art installations and gathering spaces, blending the site's industrial past with its new function as a public park. Today, Parco Dora is a thriving urban space, hosting events, concerts, and markets, and serving as a model for sustainable post-industrial site transformations.



Parco Dora is a post-industrial park in Turin, Italy, spanning 456,000 square meters. Previously occupied by Fiat and Michelin factories until the 1990s, it is named after the Dora Riparia river that flows through it. The park is situated in the Spina 3 area and is surrounded by various streets, marking its location between the 4th and 5th administrative districts of the city.

Former Teksid factory, former Fiat Vitali Ferriere

Fiat's automobile manufacturing factory

4/2024 - 12/2024

Caorso Nuclear Power Plant

2 ECOLOGICAL RESTORATION AND SUSTAINABILITY

2.1 Biodiversity Restoration

Parco Dora's redevelopment focused heavily on reintroducing native plant species to promote biodiversity. By carefully selecting local flora, the project aimed to create a resilient ecosystem that not only thrives within the local environment but also provides a habitat for various animal species, such as birds, butterflies, and insects. This approach contributes to a more stable and sustainable ecosystem, encouraging natural regeneration and enhancing the park's ecological function. These native plants also help in mitigating soil erosion and improving air quality, contributing to a healthier urban environment.

2.2 Rainwater Management

The park features an advanced rainwater collection and management system that captures and stores rainwater for irrigation and water features within the park. This closed-loop water system reduces the reliance on external water resources and eases the burden on the city's drainage system. The integration of ponds, wetlands, and other water bodies not only enhances the aesthetic appeal but also supports aquatic biodiversity and offers a natural filtration system for the collected water. The presence of water elements further contributes to a cooler microclimate, particularly during hot summer months, making the park more enjoyable for visitors.

2.3 Use of Recycled and Reclaimed Materials

One of the standout features of Parco Dora's sustainable design is the reuse of industrial materials from the original site. Instead of discarding the remnants of the former factories, the designers repurposed steel beams, concrete fragments, and other industrial waste into the park's structures and installations. This practice minimized the need for new construction materials, reducing both waste and carbon emissions associated with producing and transporting new building supplies. These reclaimed materials also serve as a tribute to the site's industrial past, maintaining a connection to its history while promoting sustainability.

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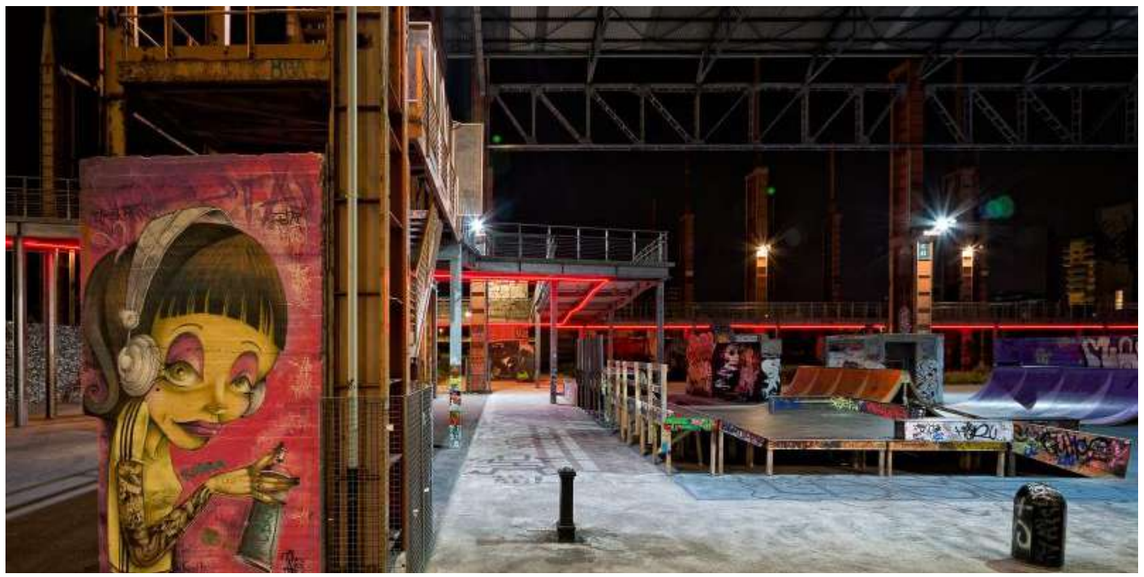
Caorso Nuclear Power Plant

3 COMMUNITY ENGAGEMENT AND CULTURAL INTEGRATION

The transformation of Parco Dora goes beyond providing a green space; it skillfully integrates rich community engagement and cultural elements throughout its design. Extensive community consultations allowed local residents to participate in the planning process, ensuring that the park met their needs while fostering a sense of ownership. Today, the park not only serves as a key social hub but also strengthens community bonds through markets, cultural festivals, and outdoor performances, offering a diverse public experience for both locals and visitors.

In addition, Parco Dora has seamlessly incorporated art and culture into the park's design. Various sculptures, installations, and murals are scattered across the park, adding aesthetic appeal and enriching the cultural experience for visitors. The integration of art not only enhances the visual beauty of the park but also inspires creativity, making it a vibrant space for cultural expression and community interaction. As a result, Parco Dora has become a cultural center that attracts artists and events, contributing to the city's cultural development and vitality.



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Caorso Nuclear Power Plant

Industrial Site Transforma-

tions in Italy 06

Italy's urban revitalization projects emphasize the rejuvenation of old industrial areas by repurposing many outdated or abandoned factories. This approach not only preserves local historical and cultural heritage but also enhances community identity. The renovated spaces are transformed into public facilities, art venues, or commercial centers, enriching community life and improving residents' quality of life. Furthermore, these projects attract new businesses and creative industries, creating job opportunities and driving local economic growth.

Typical examples include:
Milan
Fondazione Prada
Ex Macello
Fabbrica del Vapore
Base Milano

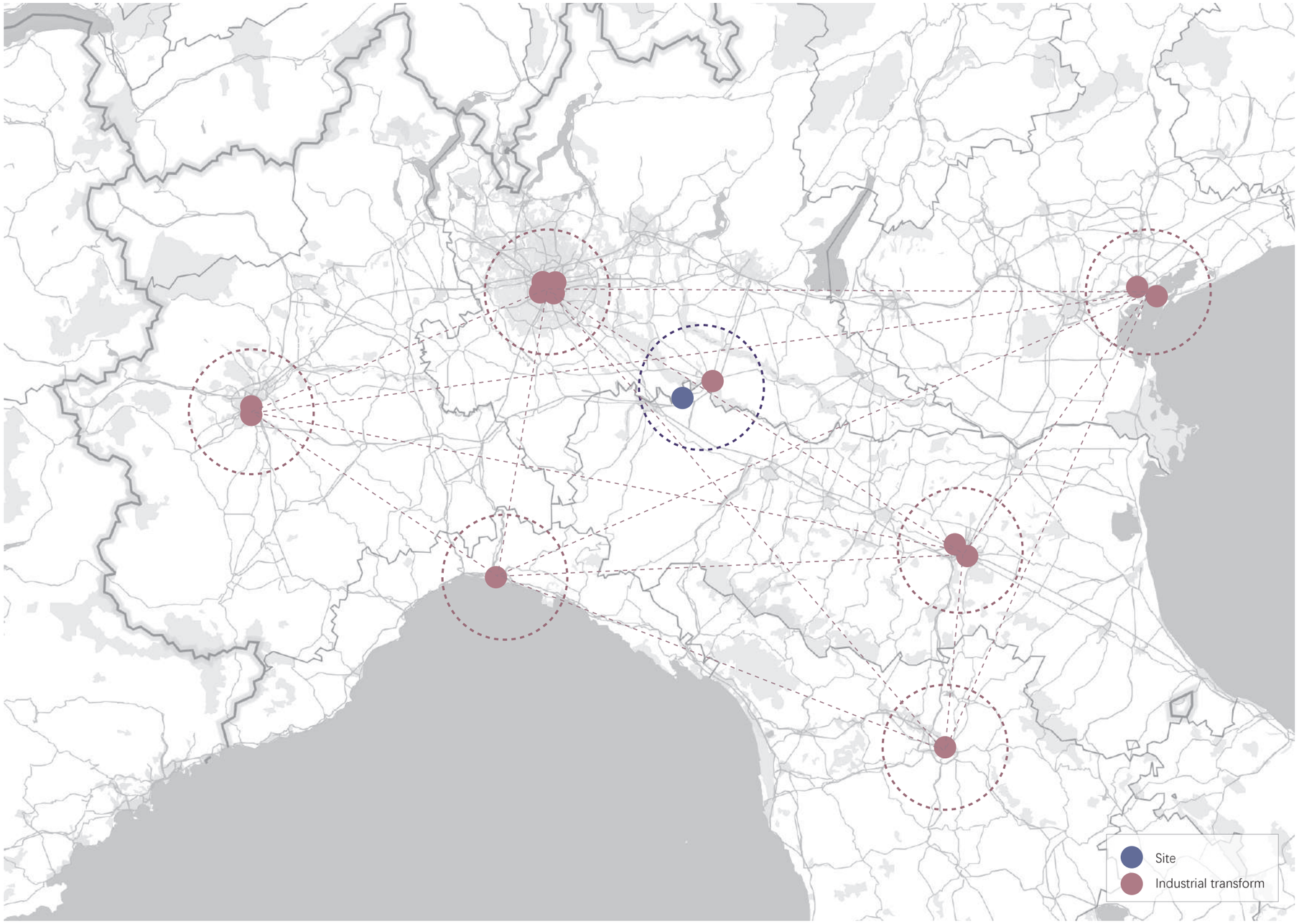
Torino
OGR -Officine Grandi Riparazioni
Parco Dora

Bologna
DumBO
Manifattura delle Arti

Firenze
Manifattura Tabacchi Firenze

Genova
Porto Antico

Venezia
Centro Sociale Rivolta
Arsenale di Venezia



4/2024 - 12/2024

Caorso Nuclear Power Plant

cover
image

5

THE PROJECT

4/2024 - 12/2024

Caorso Nuclear Power Plant

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THE PROJECT

Brief

This project transforms an abandoned nuclear power plant into a multifunctional cultural and art center. The design integrates the site's history, landscape features, and sustainability principles, using interactive installations to connect spaces and create a venue that blends art, education, recreation, and nature.

Abstract

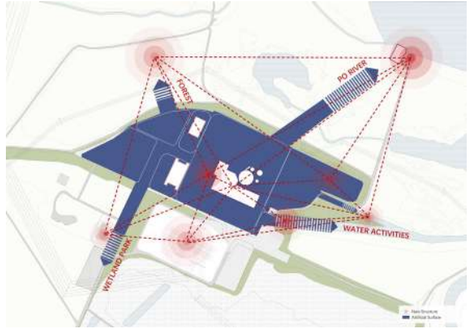
This project aims to repurpose the abandoned nuclear power plant in Piacenza, Italy, into a versatile center for cultural, artistic, and educational functions. The design preserves the original concrete structures, introduces sustainable materials to improve water permeability, and incorporates interactive installations that guide visitors and seamlessly link the site with its surrounding landscape. Facilities include a museum, art exhibitions, educational workshops, dining, and sports areas, utilizing the unique features of the site to foster community engagement and create a space where culture and nature coexist.

Strategy 01

Step 1. Building Selection

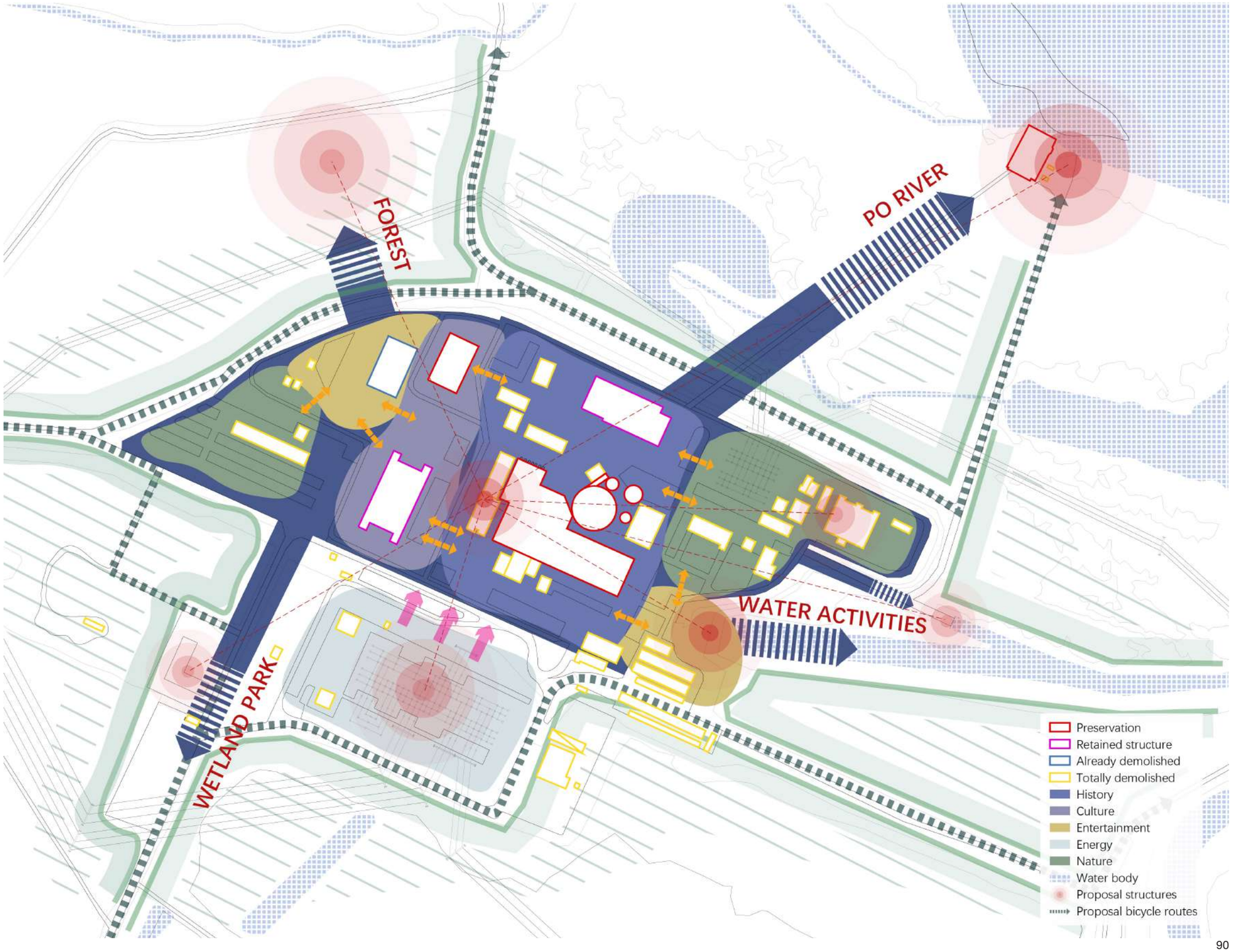
Step 2. Redefine the functions

Step 3. New structure- Integration with the surrounding



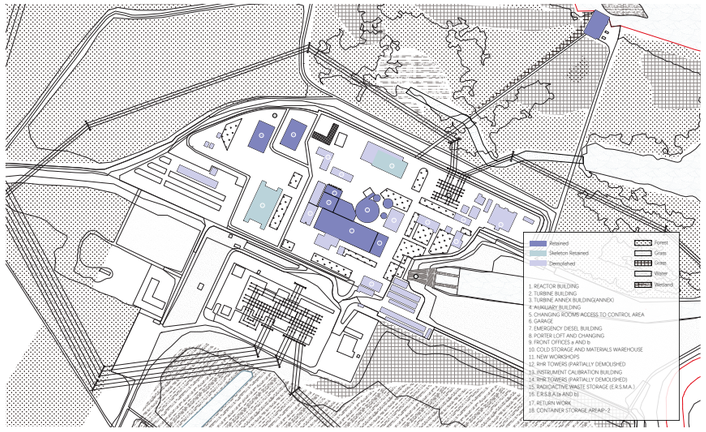
Step 4. Energy Continuity and Ecological Integration

1.1 Site Strategy



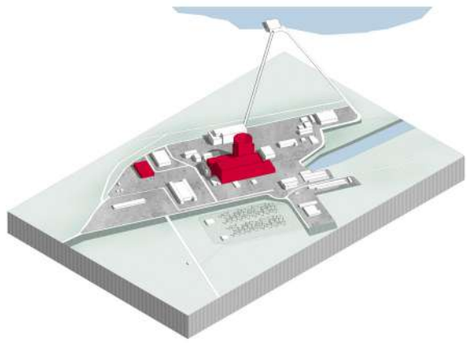
Strategy 01

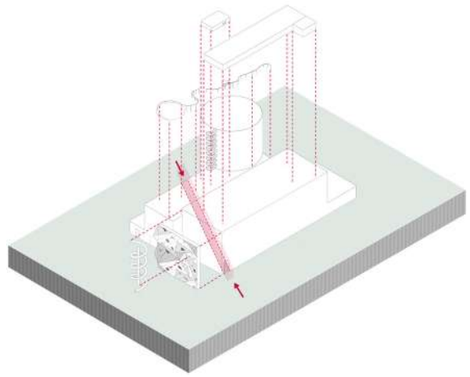
1.2 Building Transformation Strategies

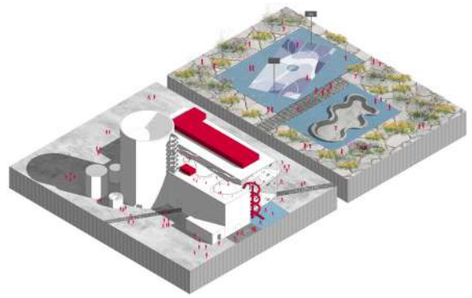


Retained

The Reactor and Turbine Buildings are central to the power plant's iconic identity and are the focal points of our redesign. Other retained buildings are repurposed as event spaces, providing venues for various activities and celebrations.

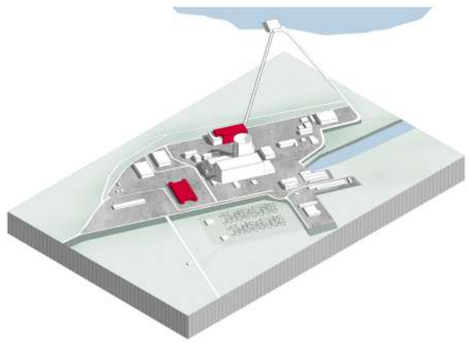


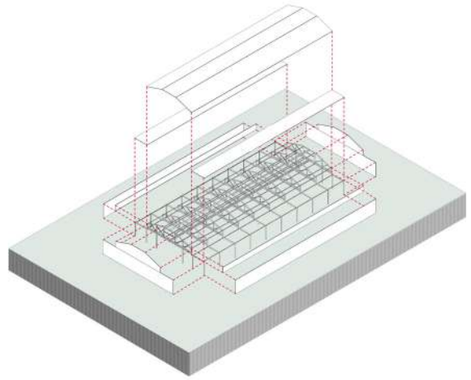


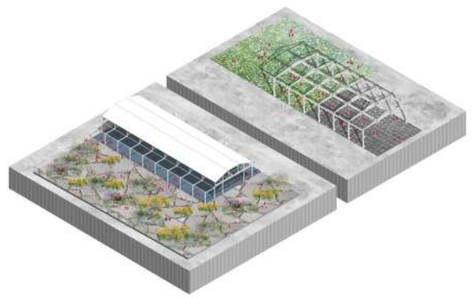


Skeleton Retained

Although some structures with industrial features obstruct views of the main buildings, we have preserved their frameworks. This choice connects with the site's history and offers visitors a new perspective.

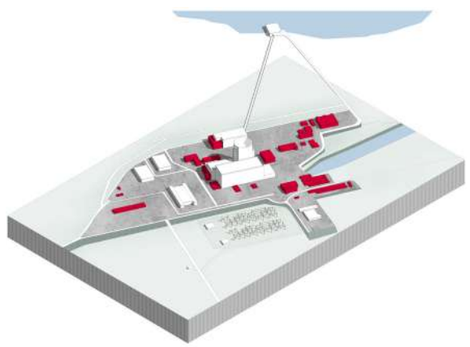


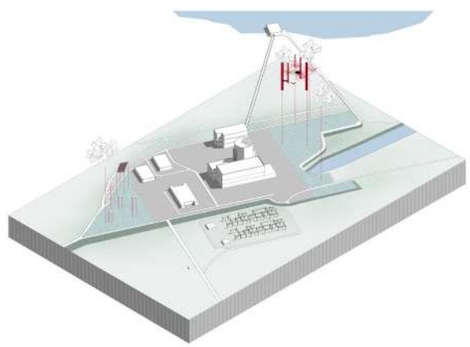




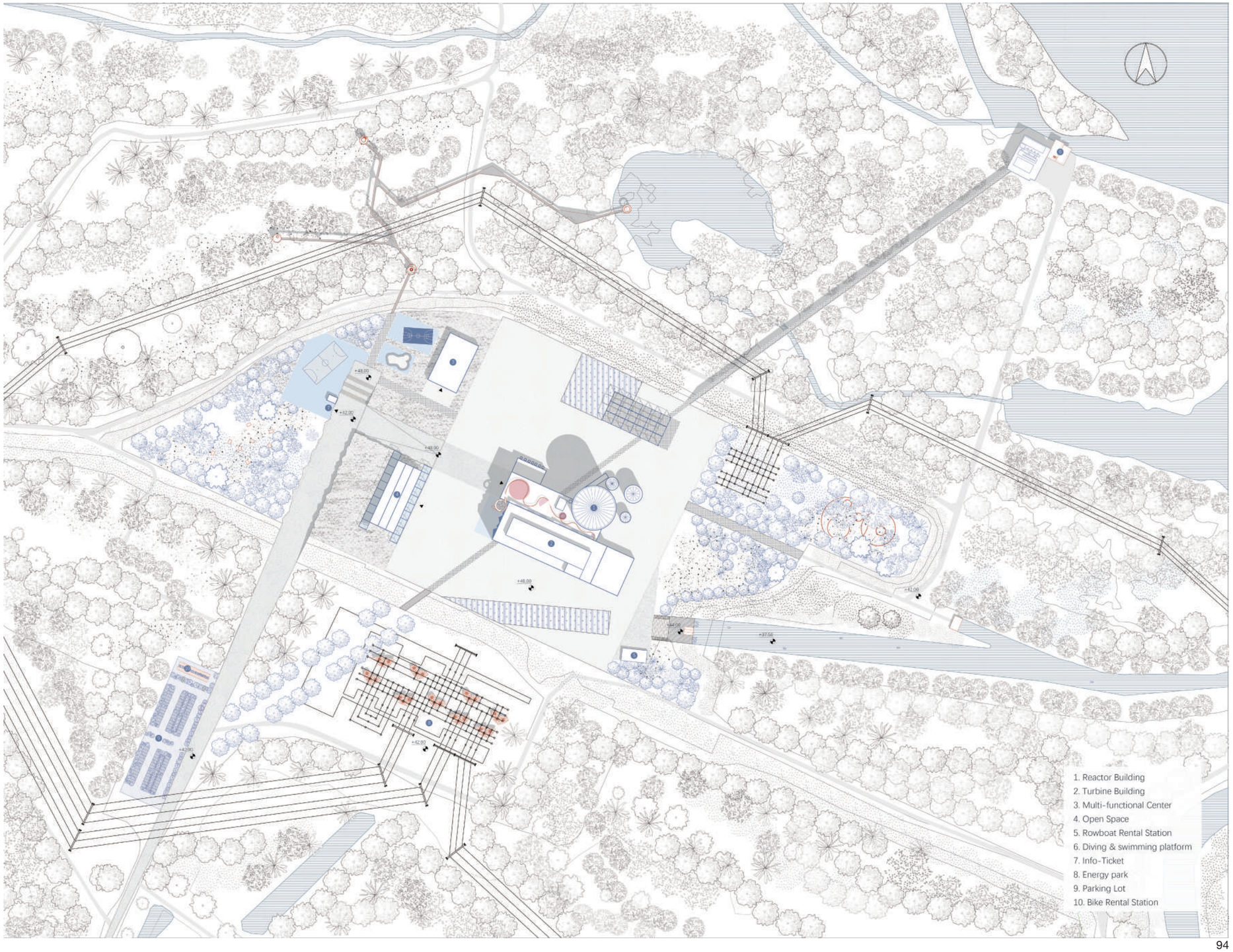
Demolished

To highlight these main structures, smaller, visually unremarkable buildings have been removed to open up the space, making the primary buildings more visually dominant. This clearer spatial arrangement enhances the site's architectural identity, resulting in a more cohesive and aesthetically pleasing composition.



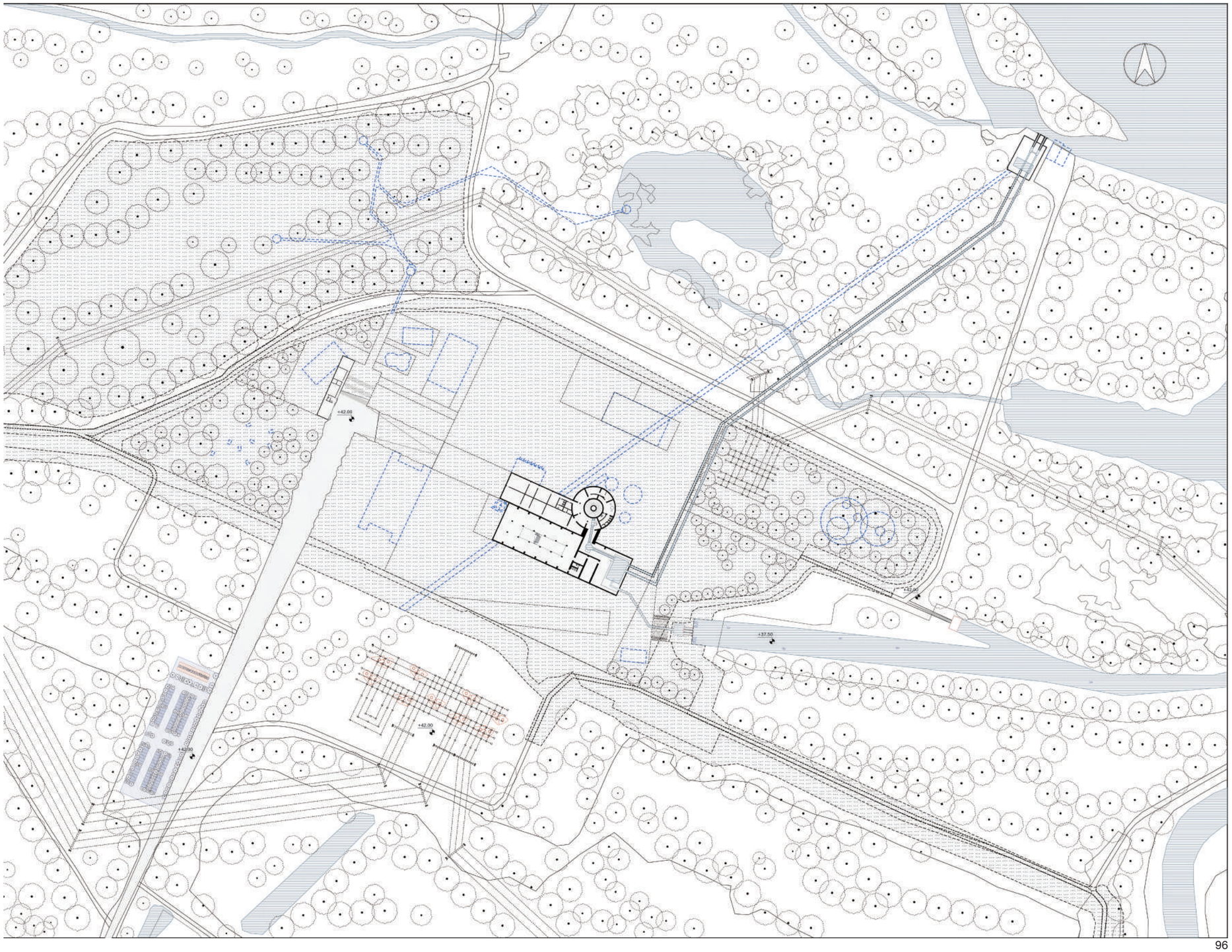


Site Master Plan 02

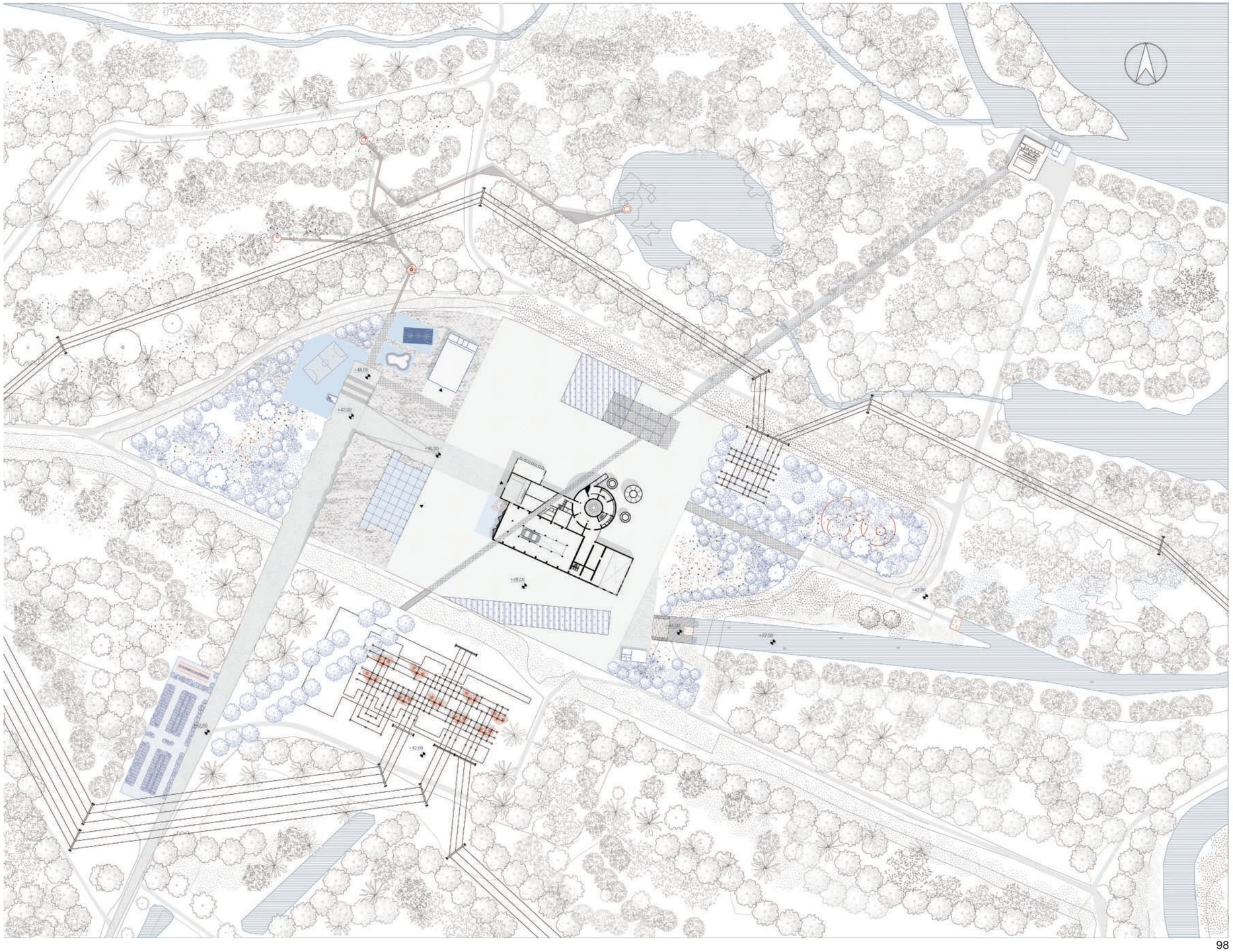


floor plans 03

3.1 Underground floor plan

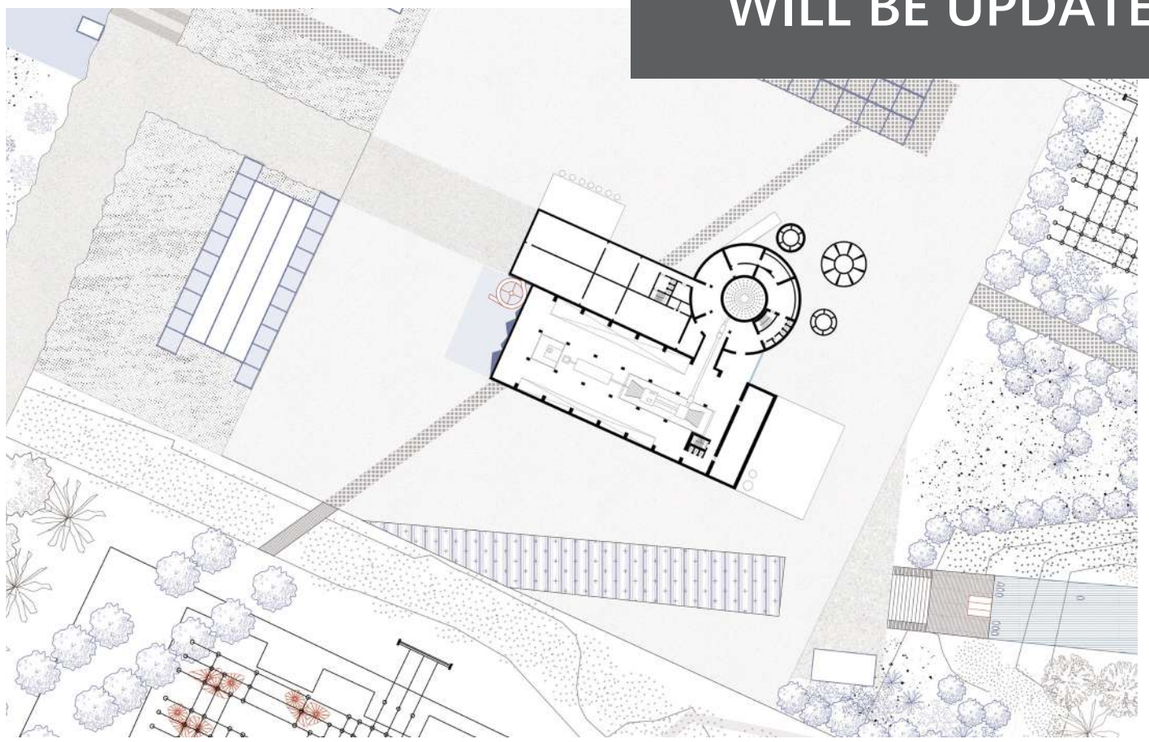


3.2 Ground floor plan

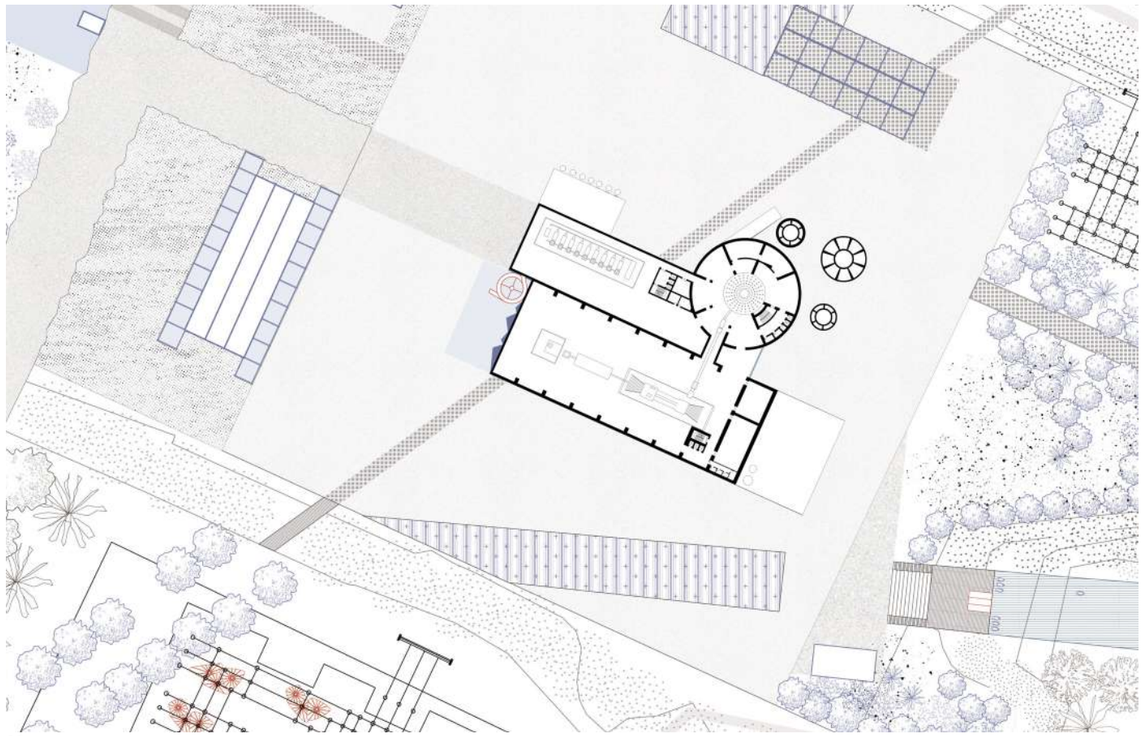


WILL BE UPDATED

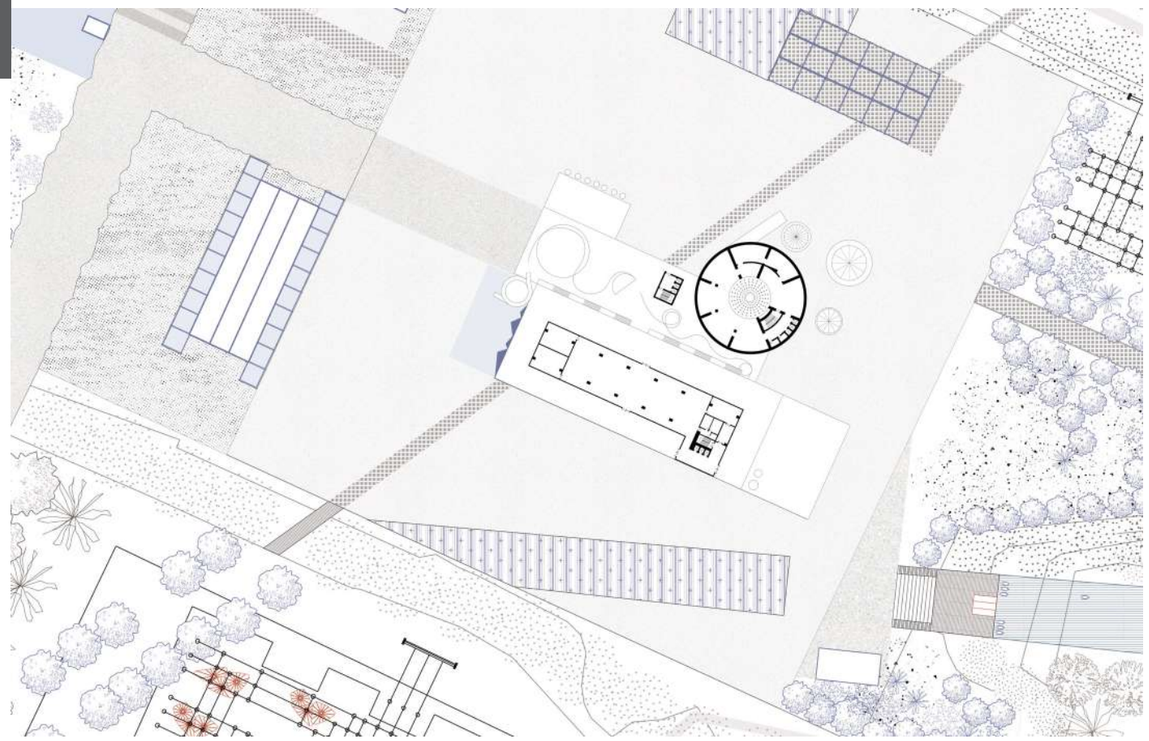
3.3 Second Floor



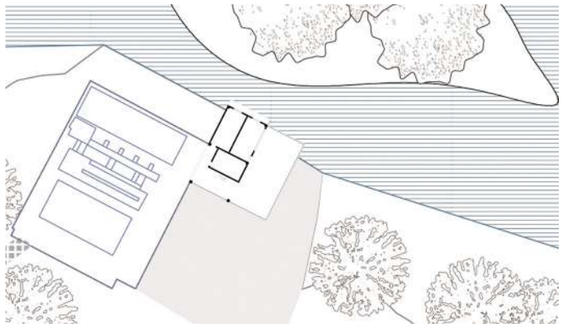
3.4 Third Floor



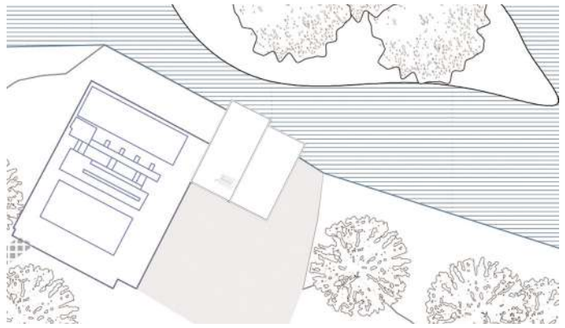
3.5 Top Floor



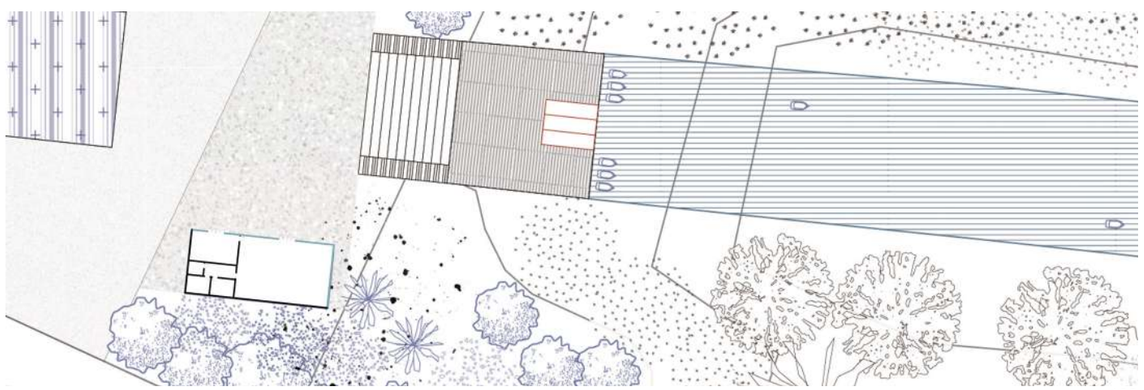
3.6 Diving & swimming platform ground floor



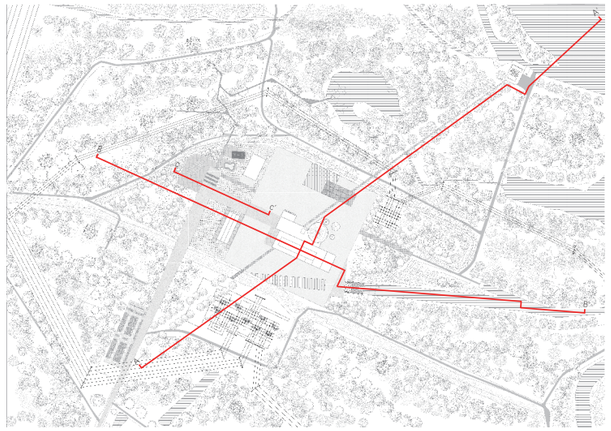
3.7 Diving & swimming platform first floor



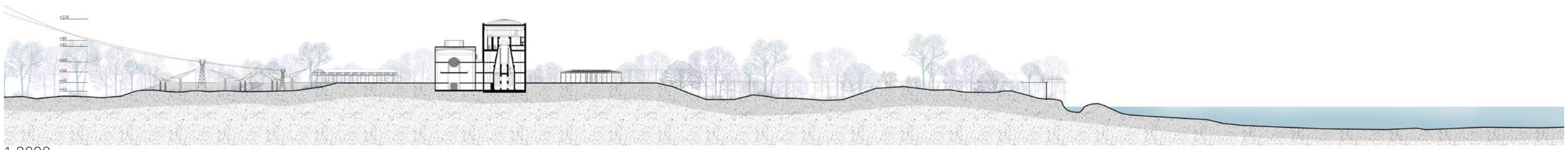
3.4 Rowboat Rental Station



section 04



A-A’



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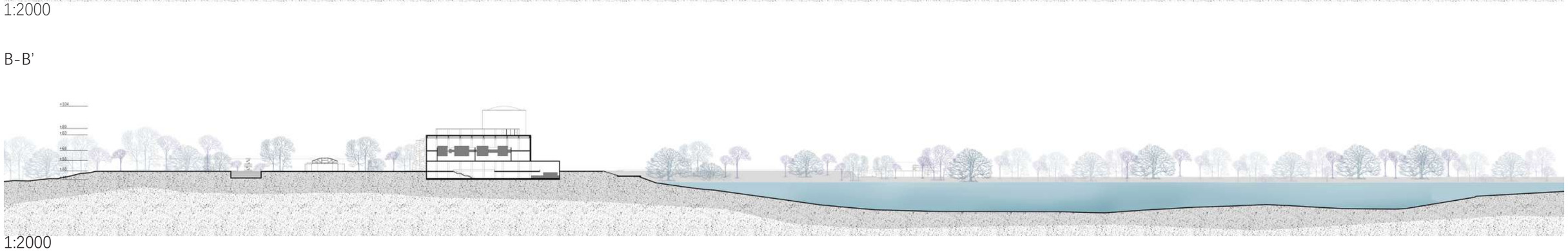
B-B’



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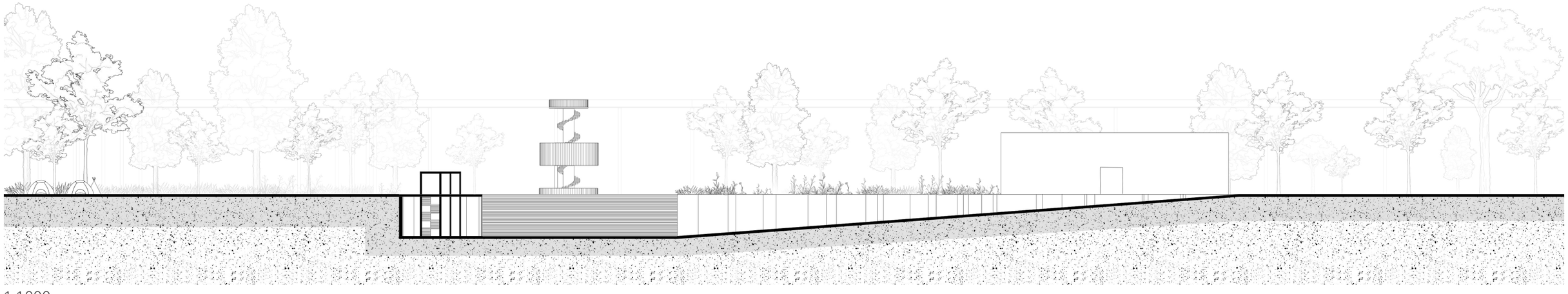
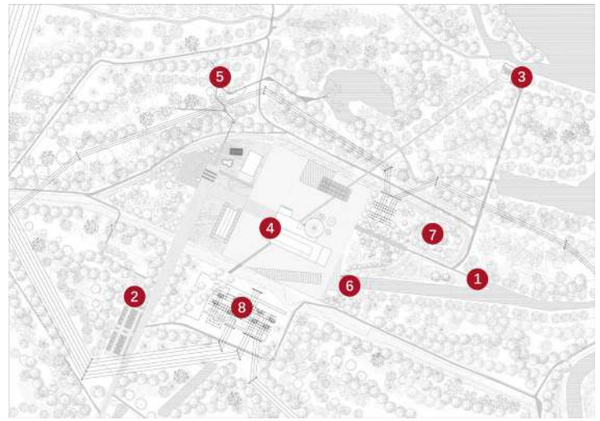
C-C’



1:1000

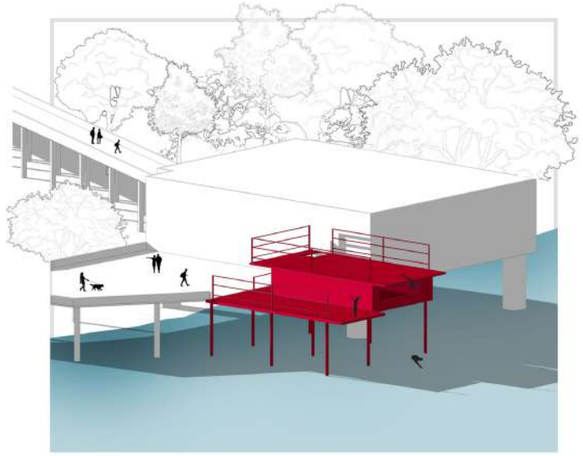
Interactive Connecting

Installations 05

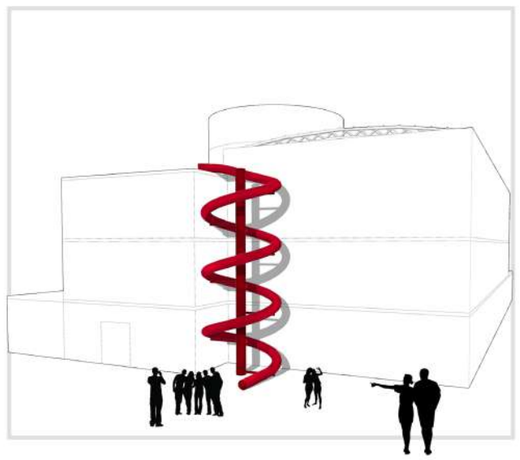


1. Riverside Viewing Platform

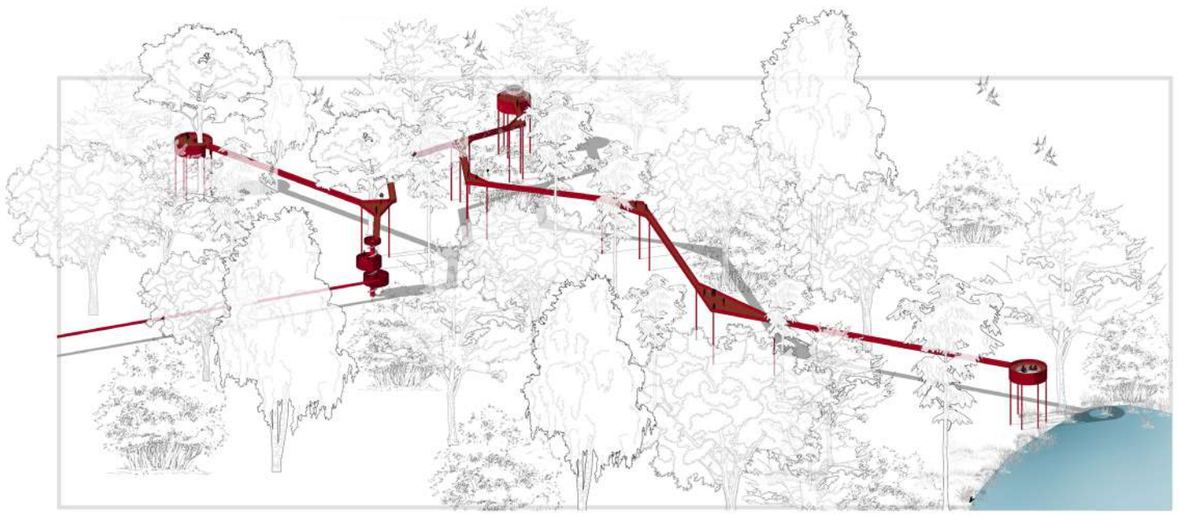
2. Bicycle Rental & Parking Area



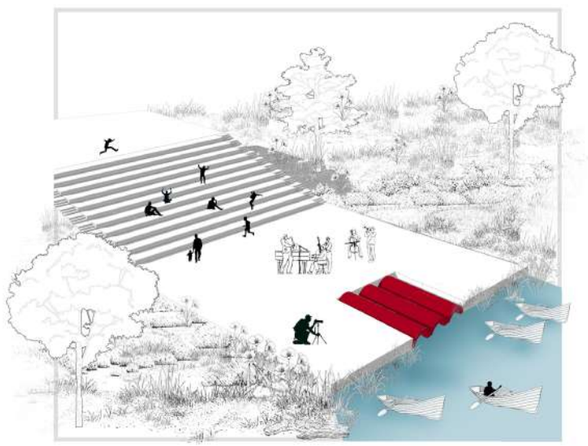
3. Diving Platform



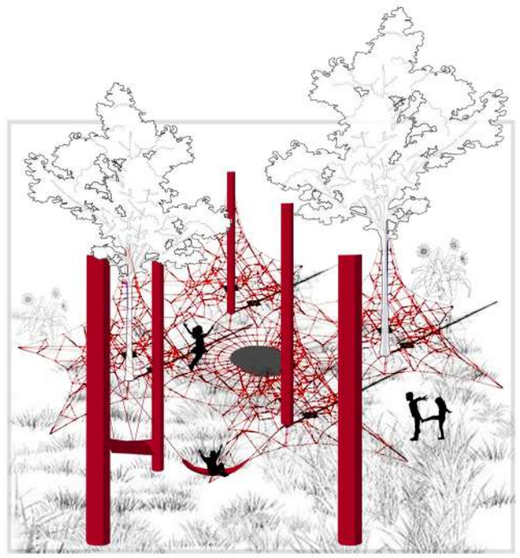
4. Spiral Slide



5. Forest Top Walk



6. Outdoor Auditorium

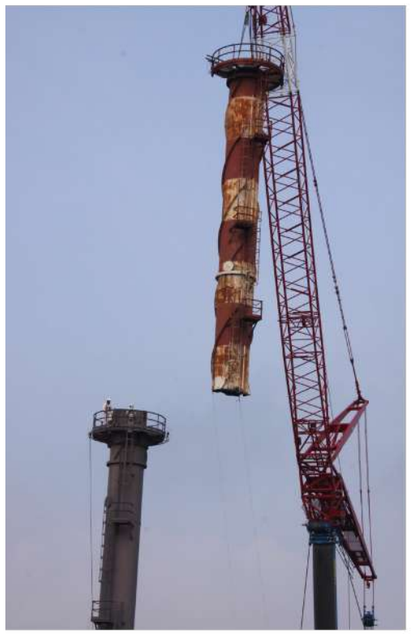


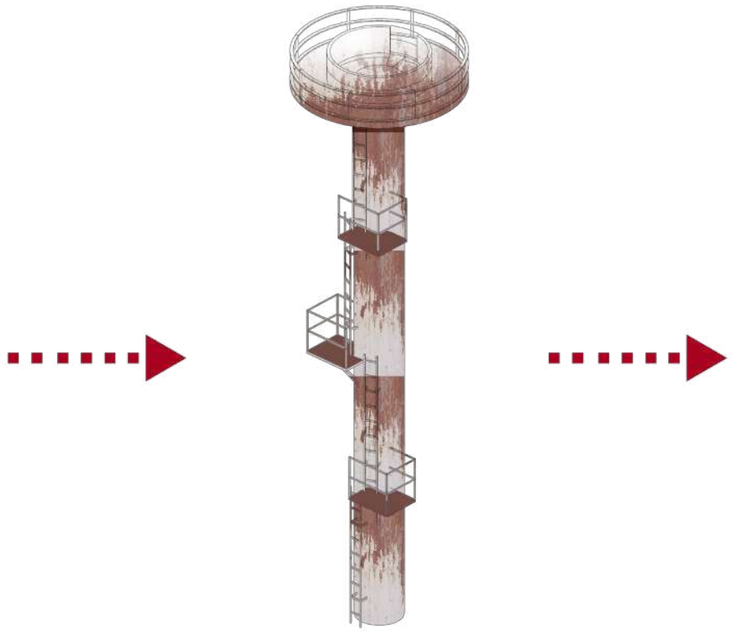
7. Adventure Climbing Zone

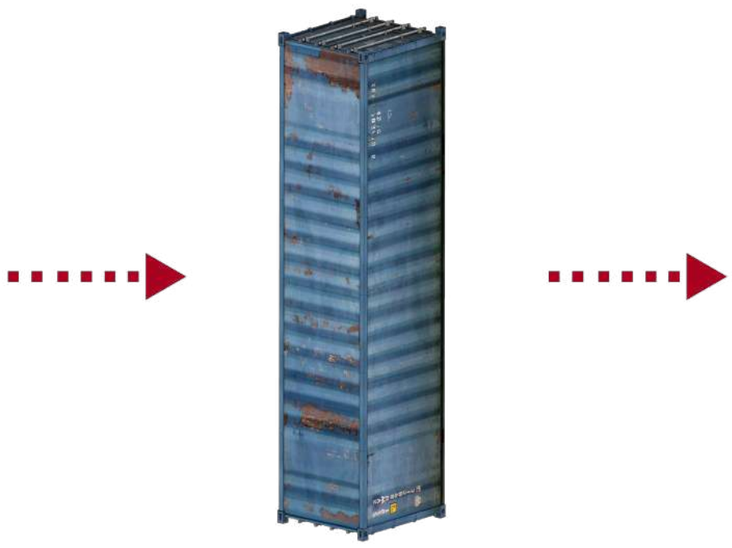
Sustainable Design 06

6.1 Waste Recycling

This project creatively repurposes existing site materials, giving new life to abandoned elements. The dismantled smokestack has been transformed into a focal point along the forest canopy walk, while the site's containers have been adapted into functional modules, serving as visitor amenities such as bars, elevators, and more.

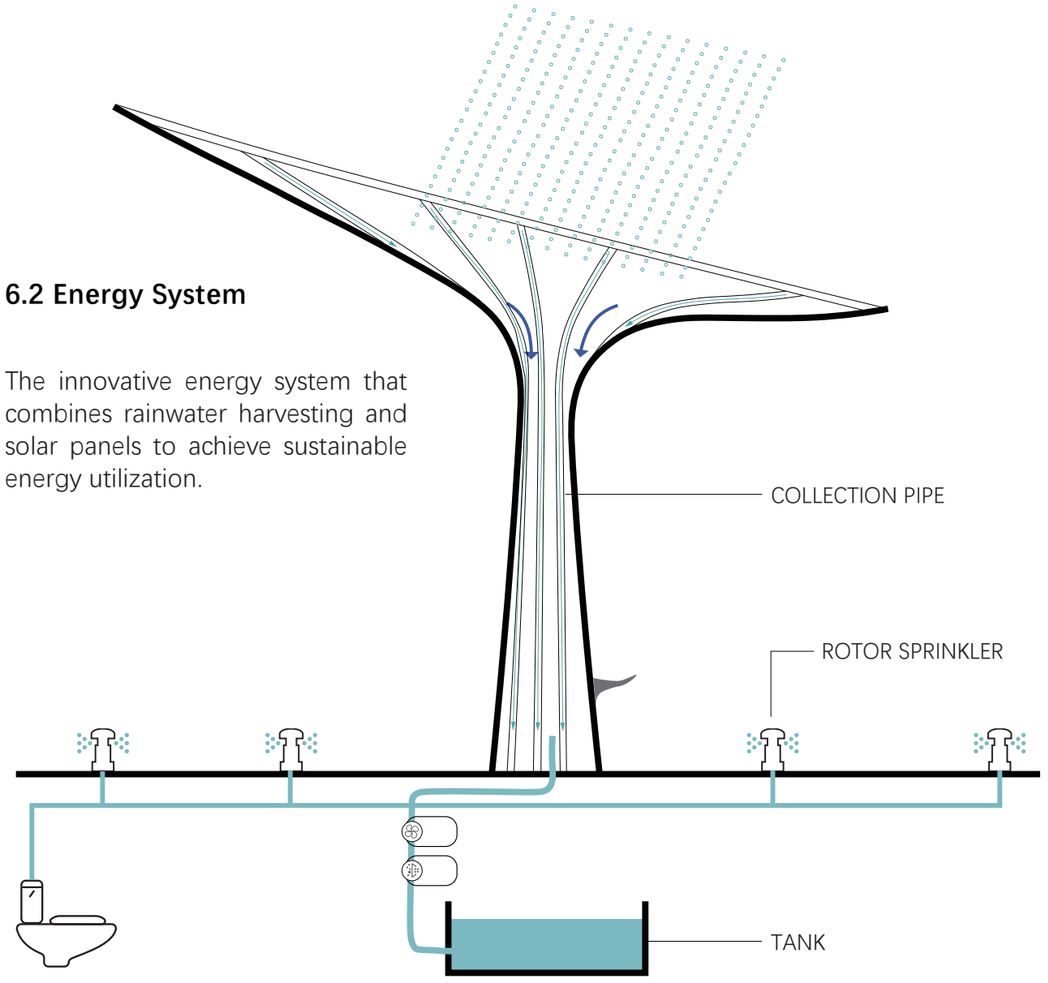


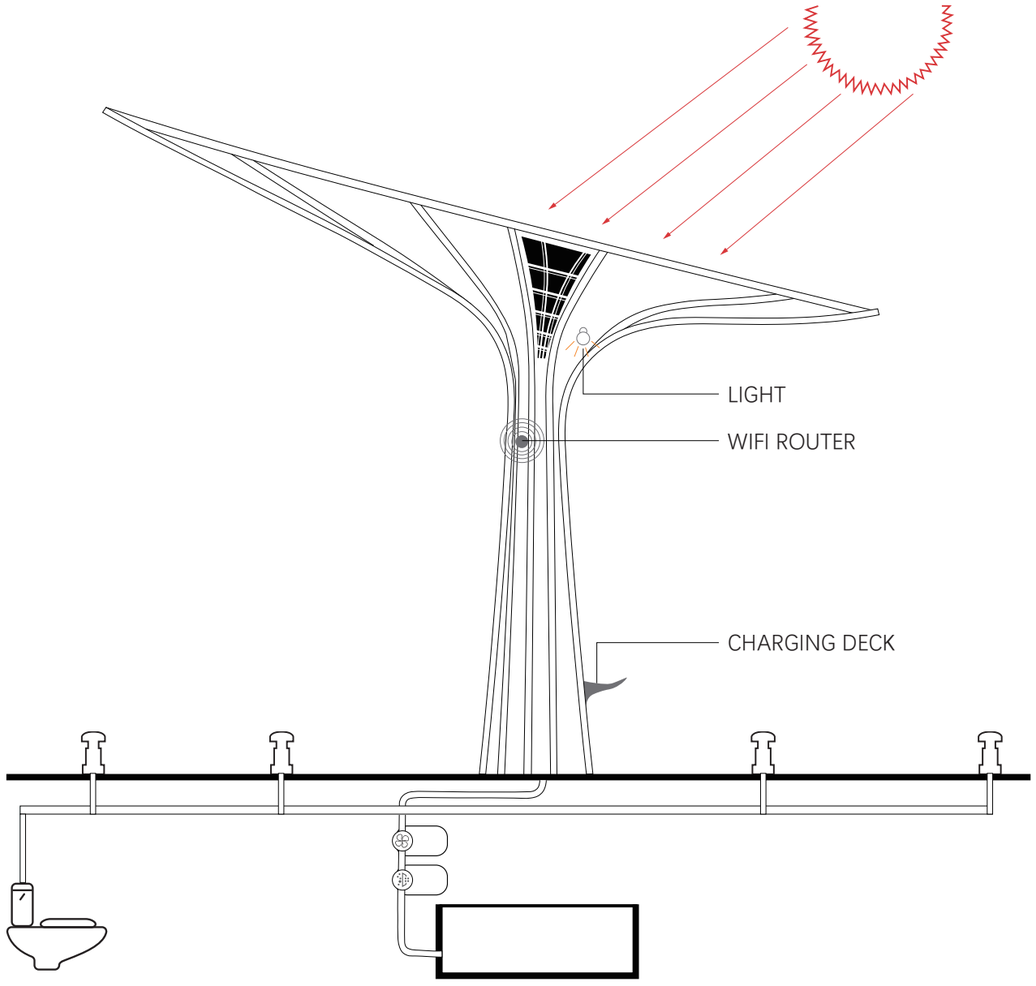


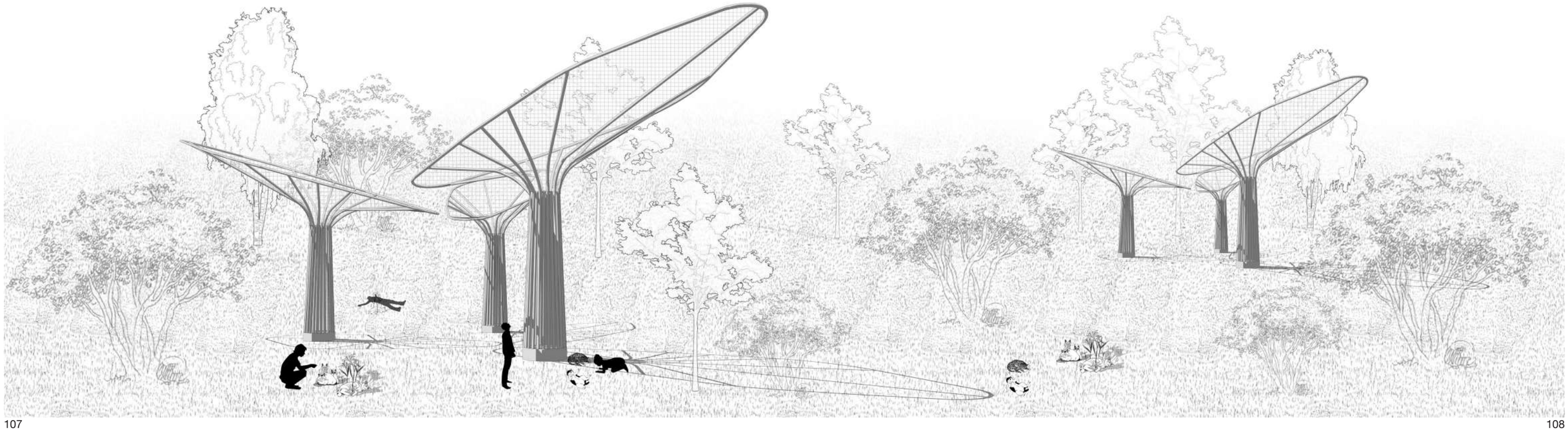


6.2 Energy System

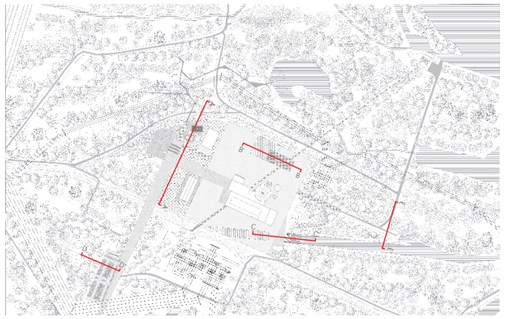
The innovative energy system that combines rainwater harvesting and solar panels to achieve sustainable energy utilization.







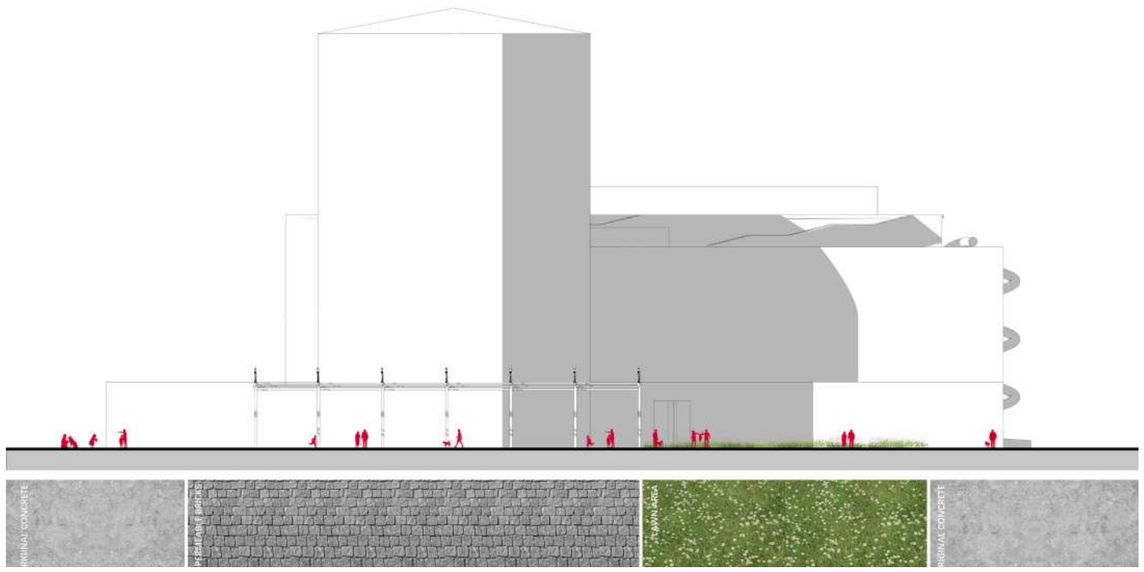
Surface and Material Details 07



7.1 Adventure Climbing Zone

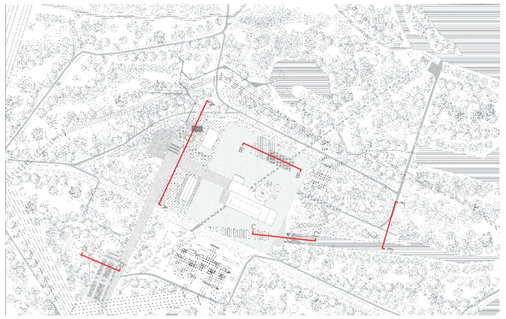
A-A’

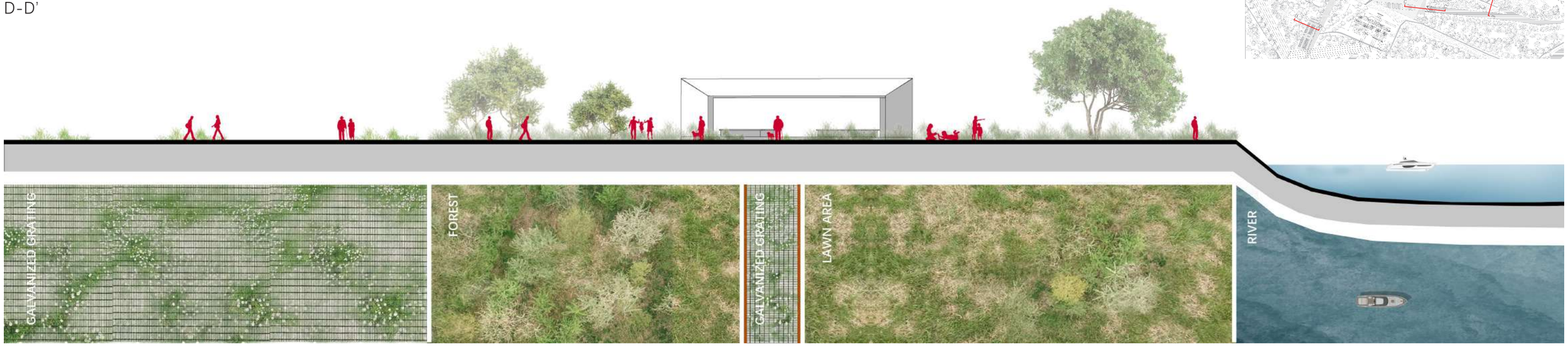
B-B’



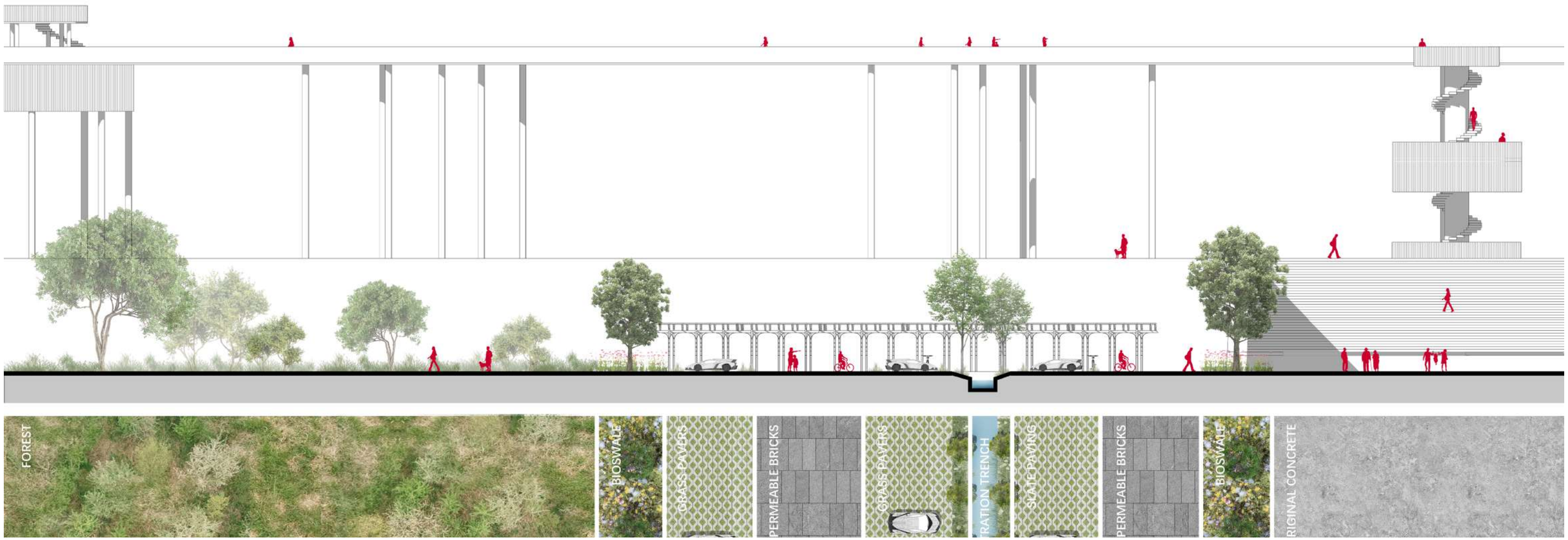
C-C’

D-D’



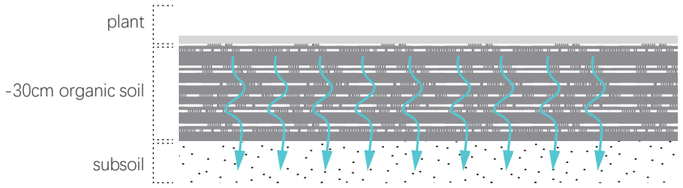

GALVANIZED GRATING
FOREST
GALVANIZED GRATING
LAWN AREA
RIVER

E-E’

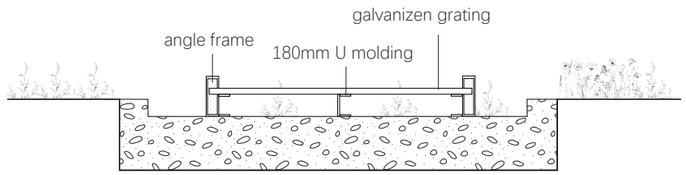

FOREST
BIOSWALE
GRASS PAVERS
PERMEABLE BRICKS
GRASS PAVERS
TRATION TRENCH
SLATE PAVING
PERMEABLE BRICKS
BIOSWALE
RIGINAL CONCRETE

7.2 PERMEABLE SURFACES

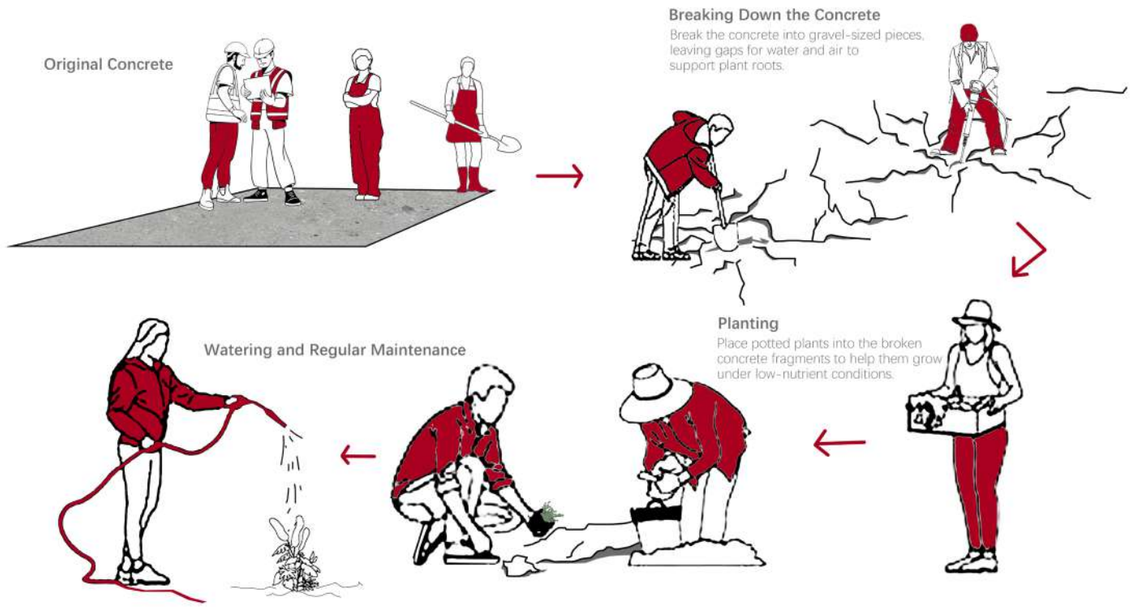
For the material selection, we chose seven different materials. Given that the original concrete paving at the nuclear power plant site poses drainage issues, particularly during the rainy season when surface water accumulation can occur, we focused on the permeability of the materials. We selected materials based on the specific functions of different areas, ensuring they not only enhance the aesthetic appeal but also provide visual guidance for visitors, enriching the overall experience.

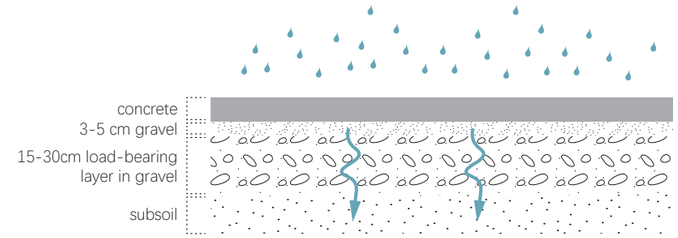


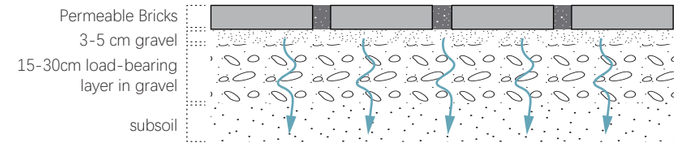
Galvanized Grating Walkway Section

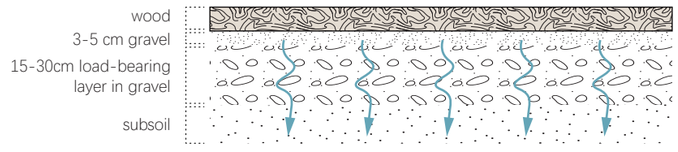


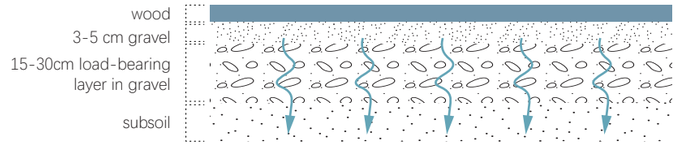
Crushed Process of Concrete

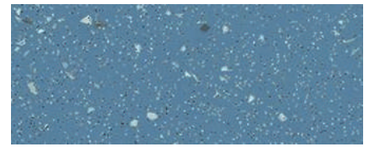


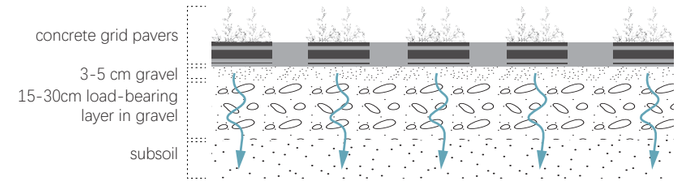


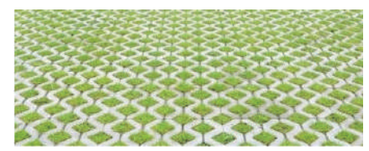


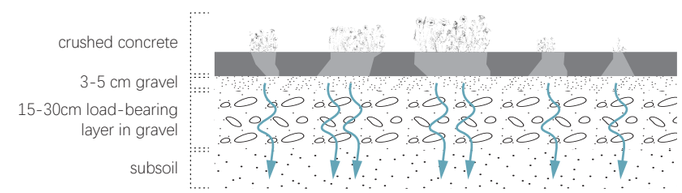












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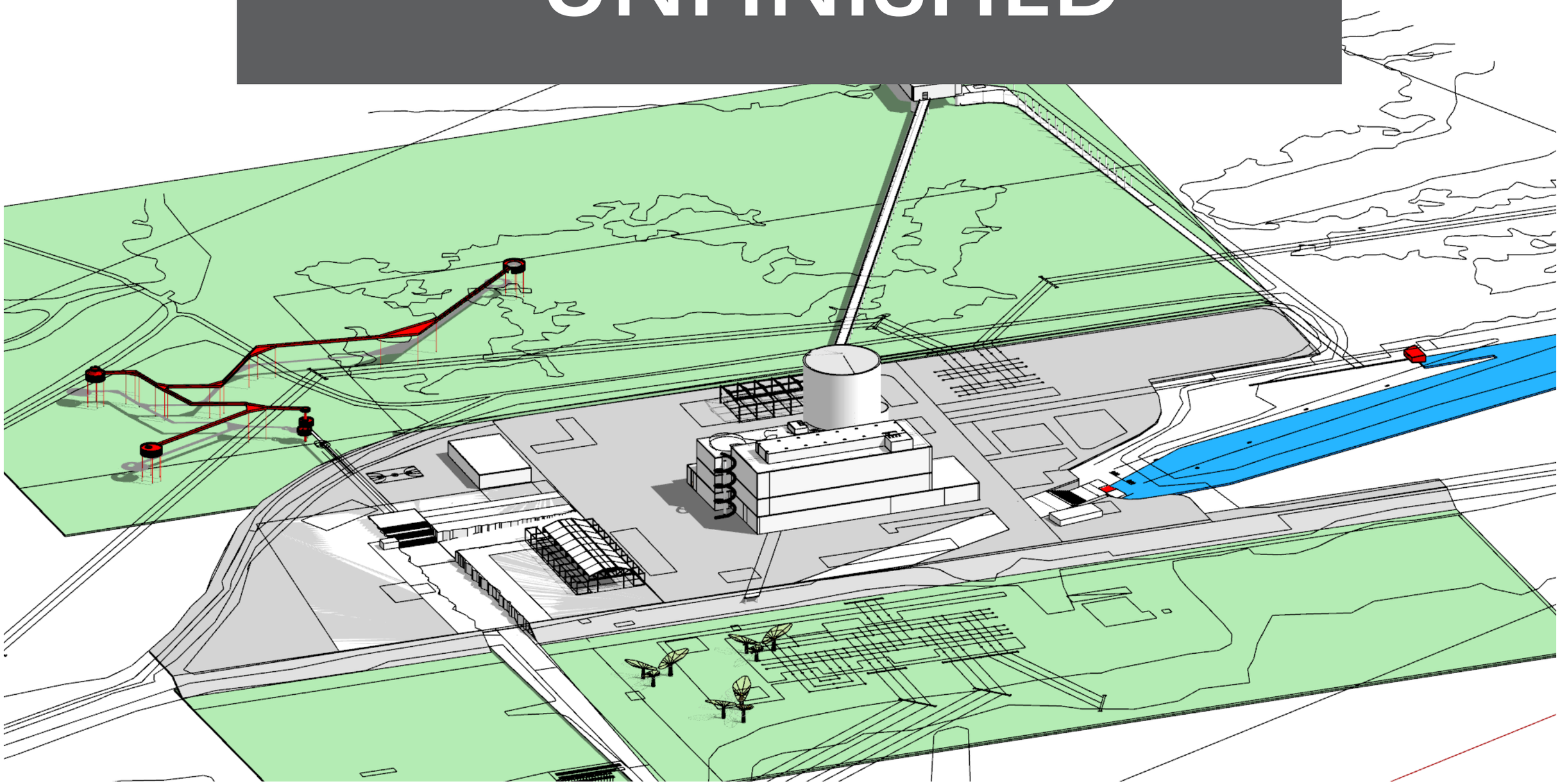

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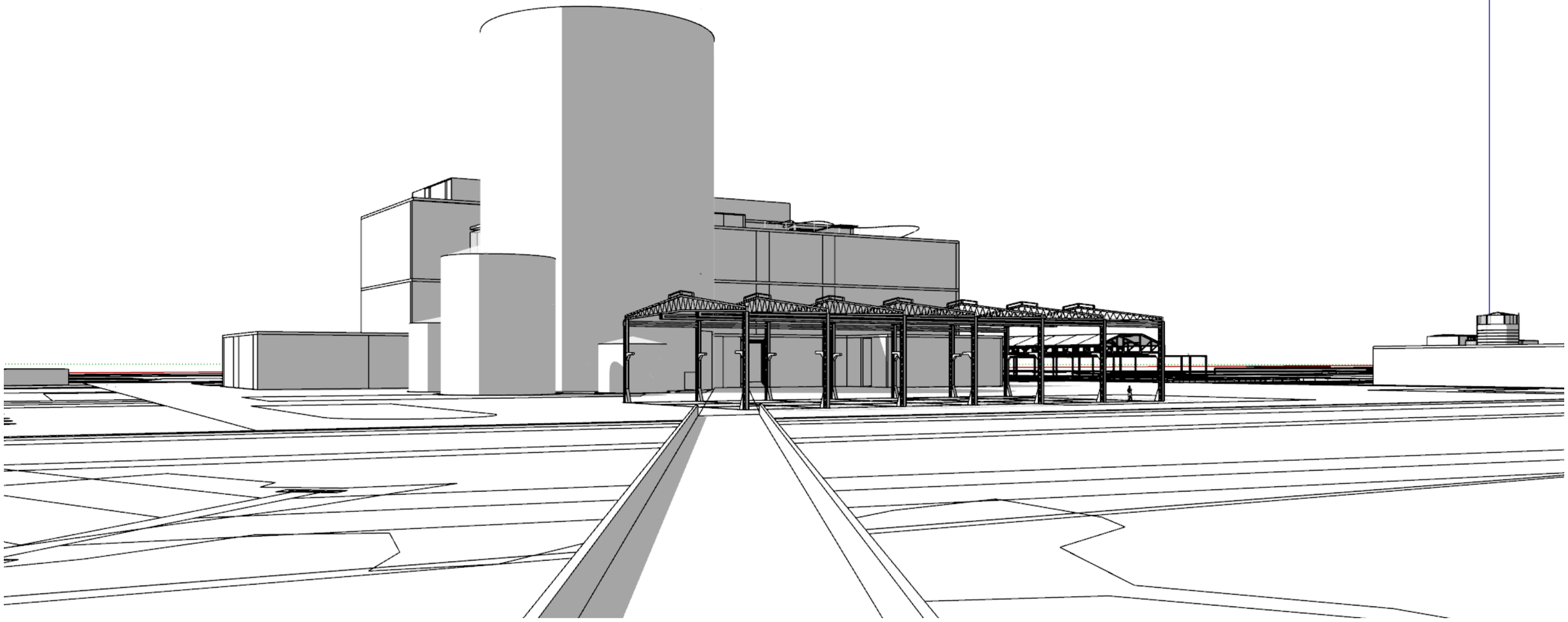

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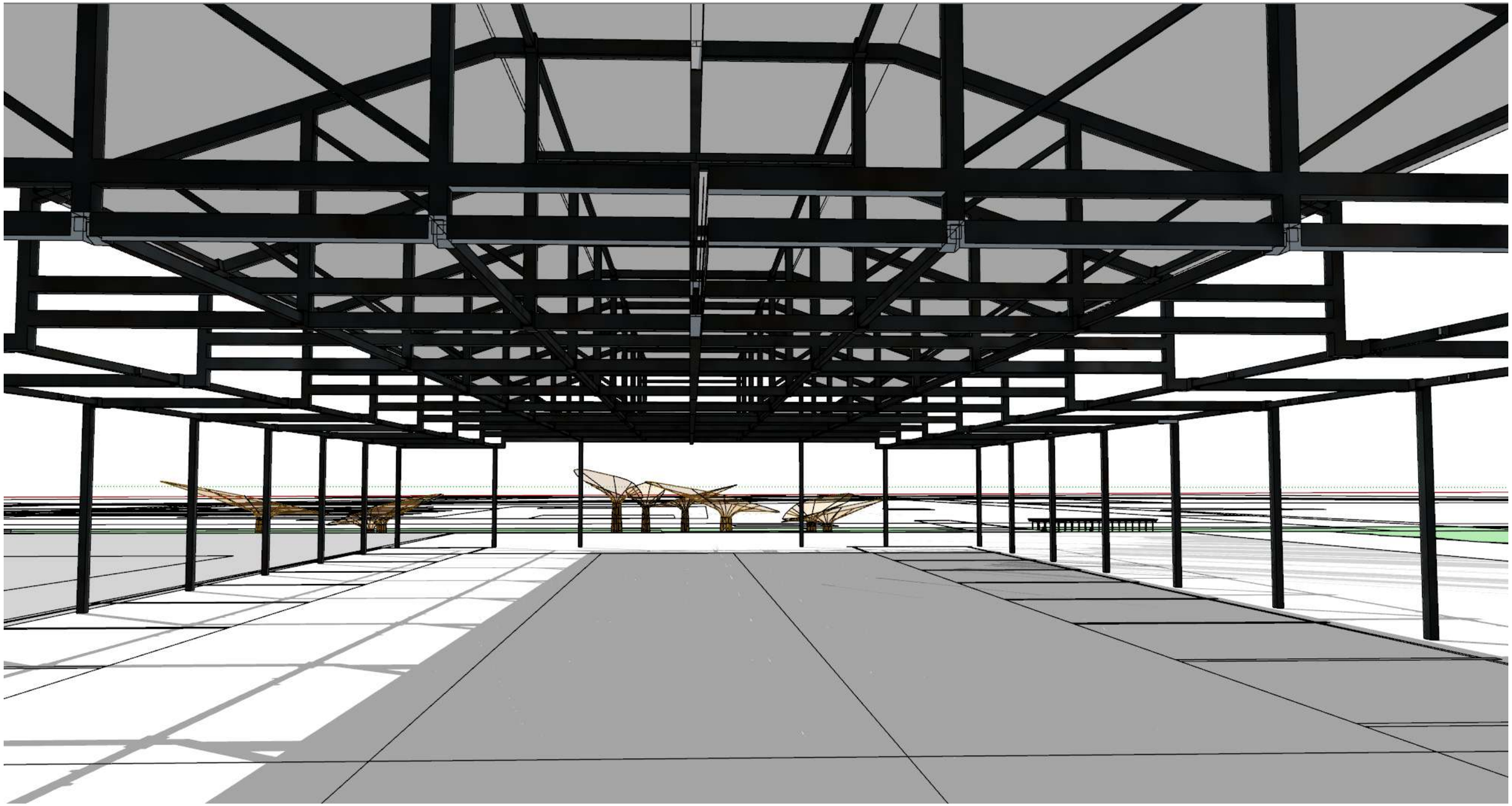

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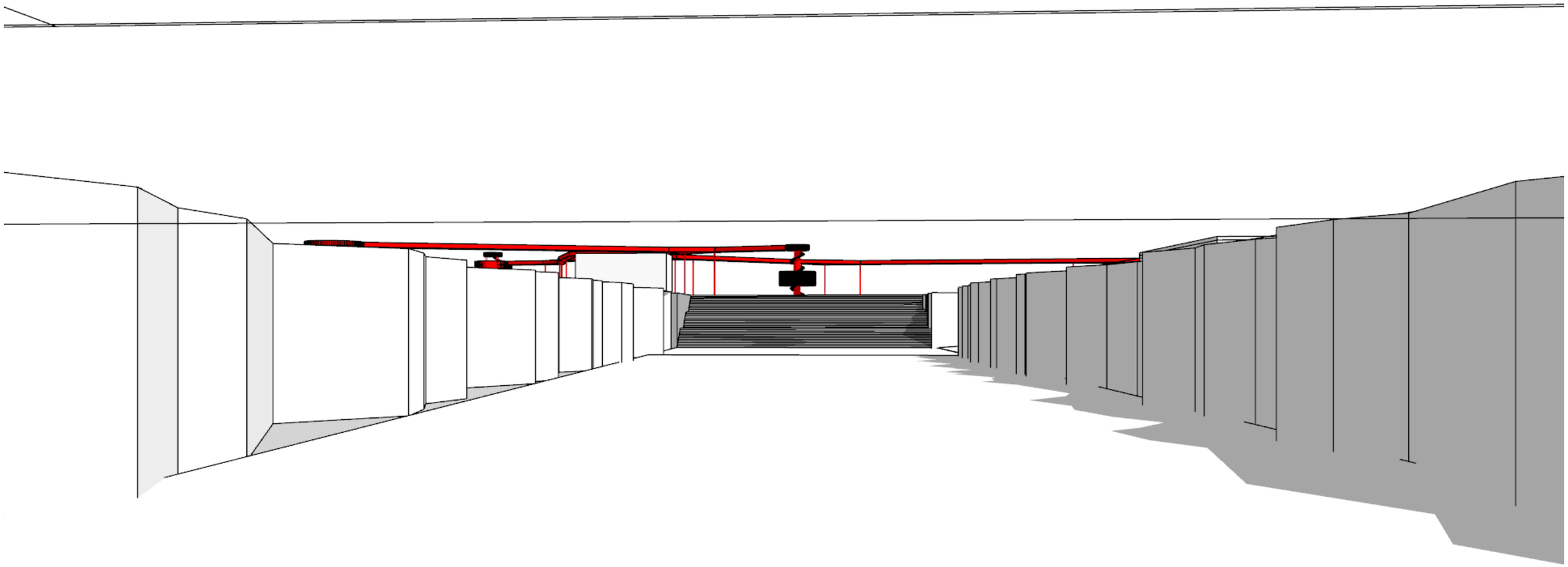

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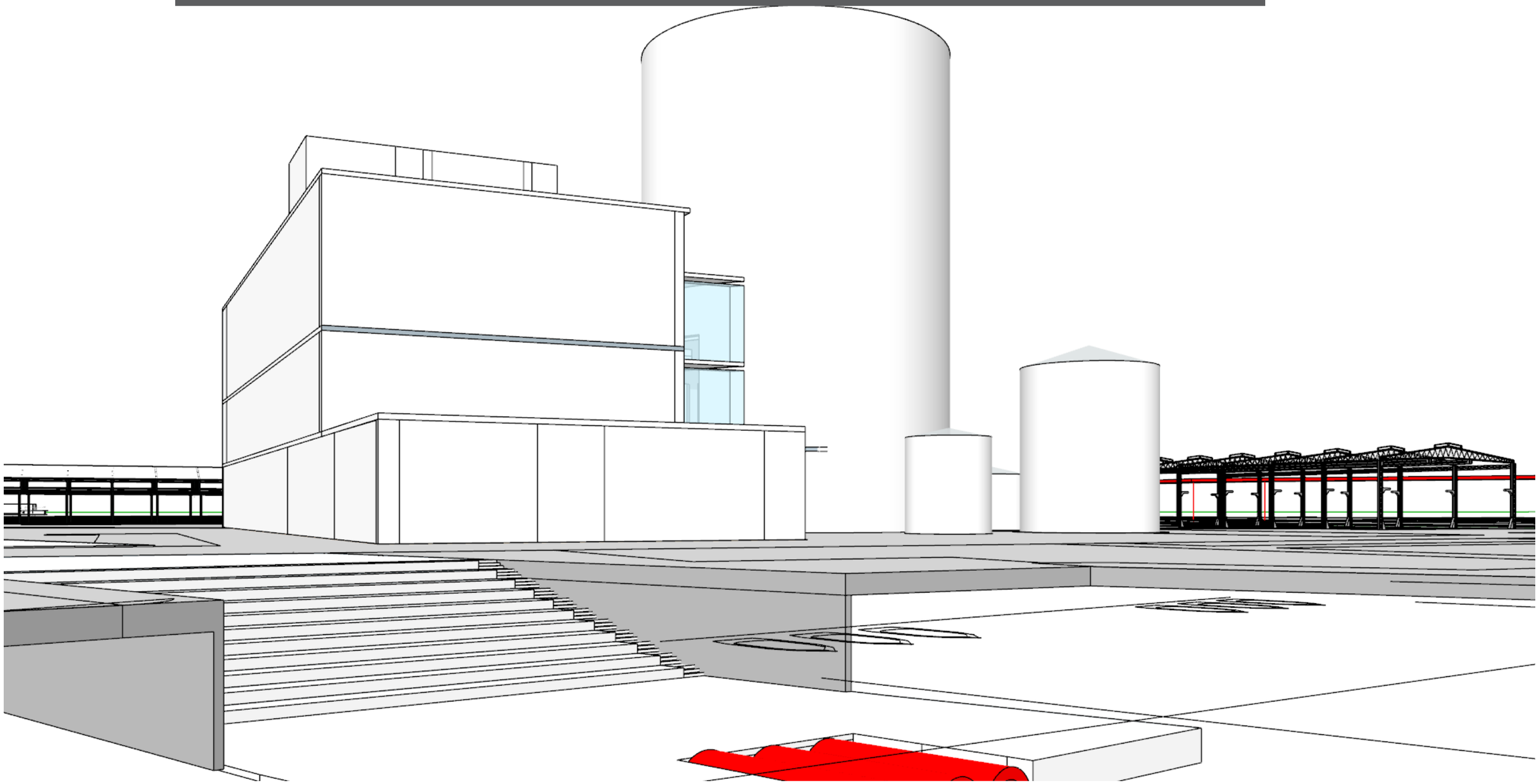

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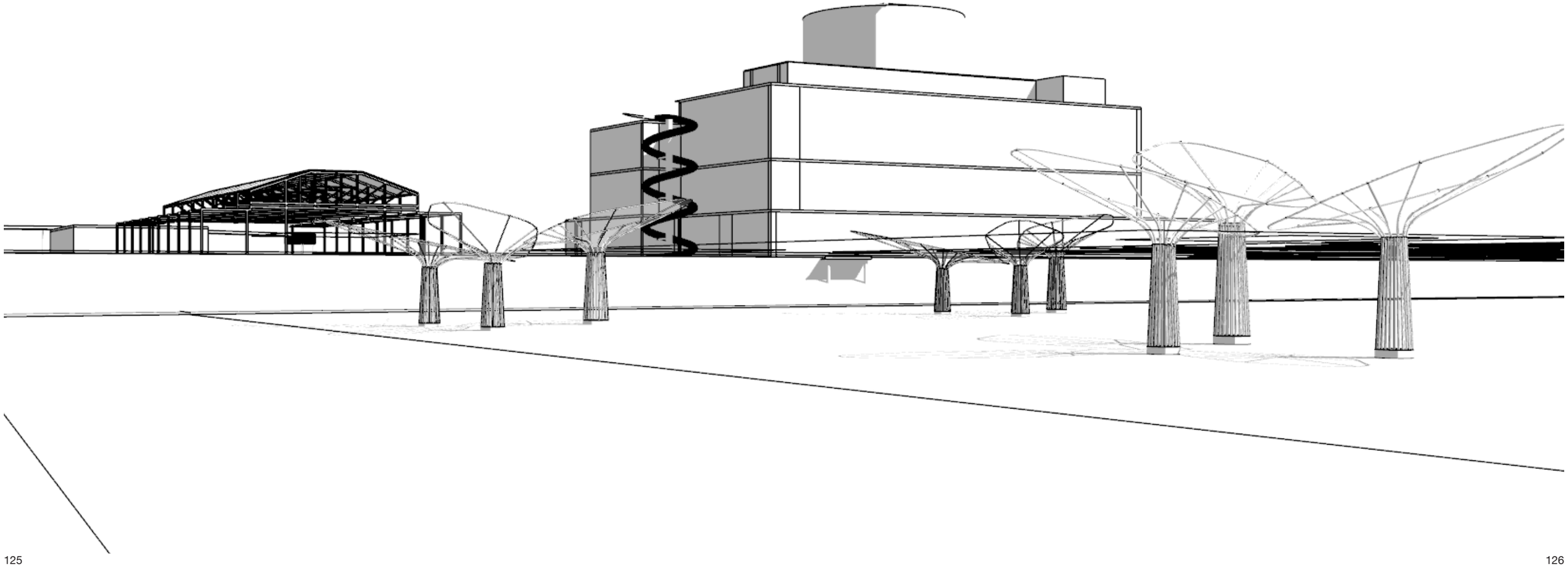

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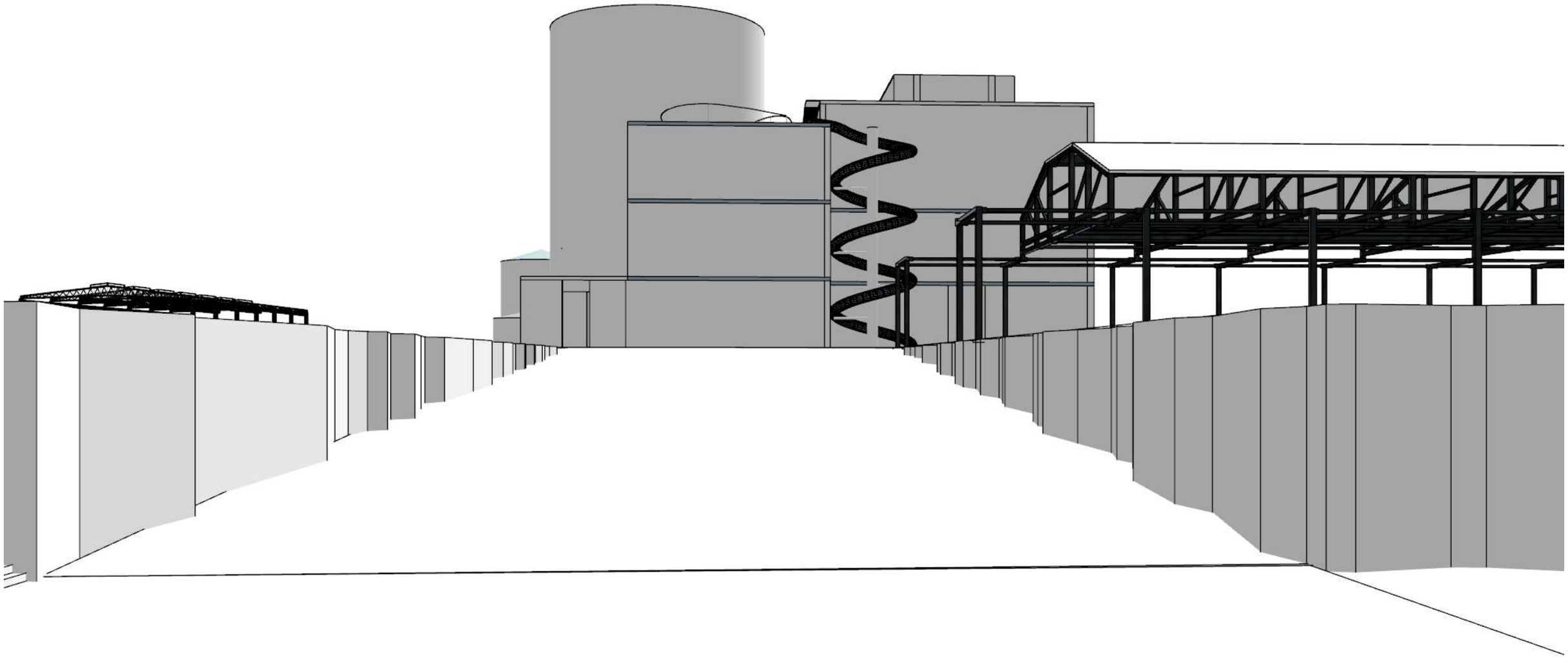

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