



OUT OF THE ASH:

Exploring New Material Agendas in Architecture and Landscape



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Fig. 1 Drainage outlet from the ash mound to the adjacent drainage canal, showing the existing water management system (Source: Pelin Yalçın, 2026).

PART I

Introduction: From Waste Disappearance to Material Ground

*What leaves the hand does not leave the world,
it sinks into systems, grounds and hidden hills,
waiting for a new agenda to make it visible again.*

1.1 Produce, Consume, Disappear

Produce, consume and throw out.

Plastic packages, furniture, clothes, food leftovers, papers, cartons, drink containers, takeaway wrappers, broken electronics, cheap household goods, single-use bags and disposable cups move quickly through everyday life. What is produced today often becomes tomorrow's residue, waiting to disappear. Modern urban life does not simply generate waste. It produces continuous flows of discarded materials that move through systems of collection, sorting, burning, burying and long-term aftercare.

Global municipal solid waste generation is projected to reach 3.4 billion tonnes by 2050, outpacing both population growth and urbanization (World Bank 2018). This acceleration is driven by consumption-oriented lifestyles, short product lifespans and changing daily practices. Once discarded, waste enters infrastructural systems that process it out of view, managing its flows while distancing it from everyday perception. Waste disappears socially before it disappears materially.

1.2 Waste Landscapes and Hidden Material Stocks

Waste systems are often organized around disappearance. They remove unwanted materials from daily life but they do not erase their spatial consequences. As Caniglia notes, waste landscapes are not inert and neutral objects, but rather politically charged terrains that materialise systems and histories of extraction, inequality, segregation, and exclusion (Caniglia 2025). These terrains, often described as *wastescares*, extend beyond isolated facilities to form spatial, ecological and cultural byproducts of modern urban metabolism.

Globally, most waste still ends up in landfills: 37 percent is landfilled, of which only 8 percent reaches sanitary landfills with gas collection systems; 33 percent is openly dumped, 19 percent is recycled or composted and 11 percent is incinerated (World Bank 2018). Each procedure leaves material and territorial traces, reshaping soils, hydrology and ground conditions. However, citizens rarely perceive these shifts because waste systems are designed to remain invisible and waste facilities are often placed at the urban periphery, outside everyday urban experience.

In the Netherlands, this invisibility takes a particular spatial form. The country's flat topography makes accumulated waste landscapes unusually visible. Landfills and bottom ash mounds become some of the few artificial elevations in the landscape, introducing vertical forms that would not naturally exist. These mounds are shaped not by geological processes, but by material flows, policy regimes, compaction, containment and aftercare. They are artificial grounds produced by the metabolism of cities.



Fig. 2 Bottom ash mountain in Afvalzorg Nauerna (Source: Pelin Yalçın, 2026).



Fig. 3 Bottom ash mountain in Afvalzorg Nauerna (Source: Pelin Yalçın, 2026).

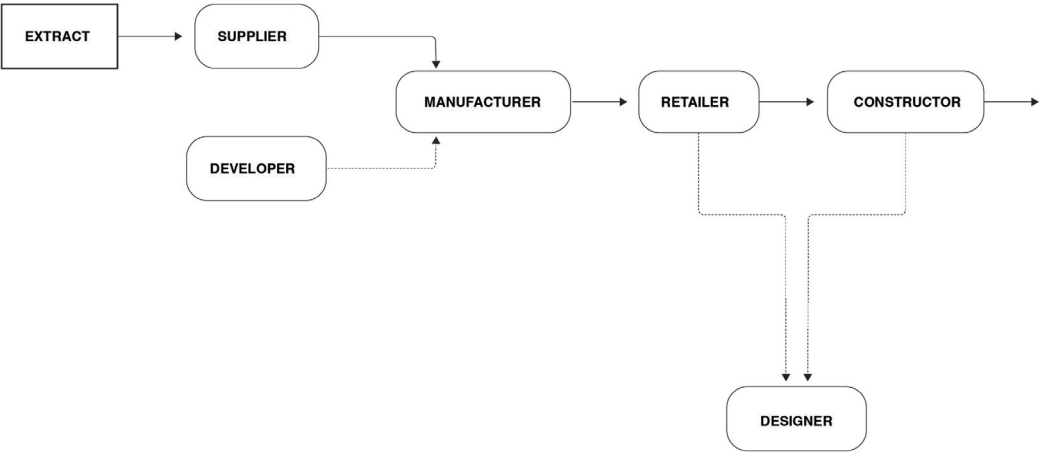
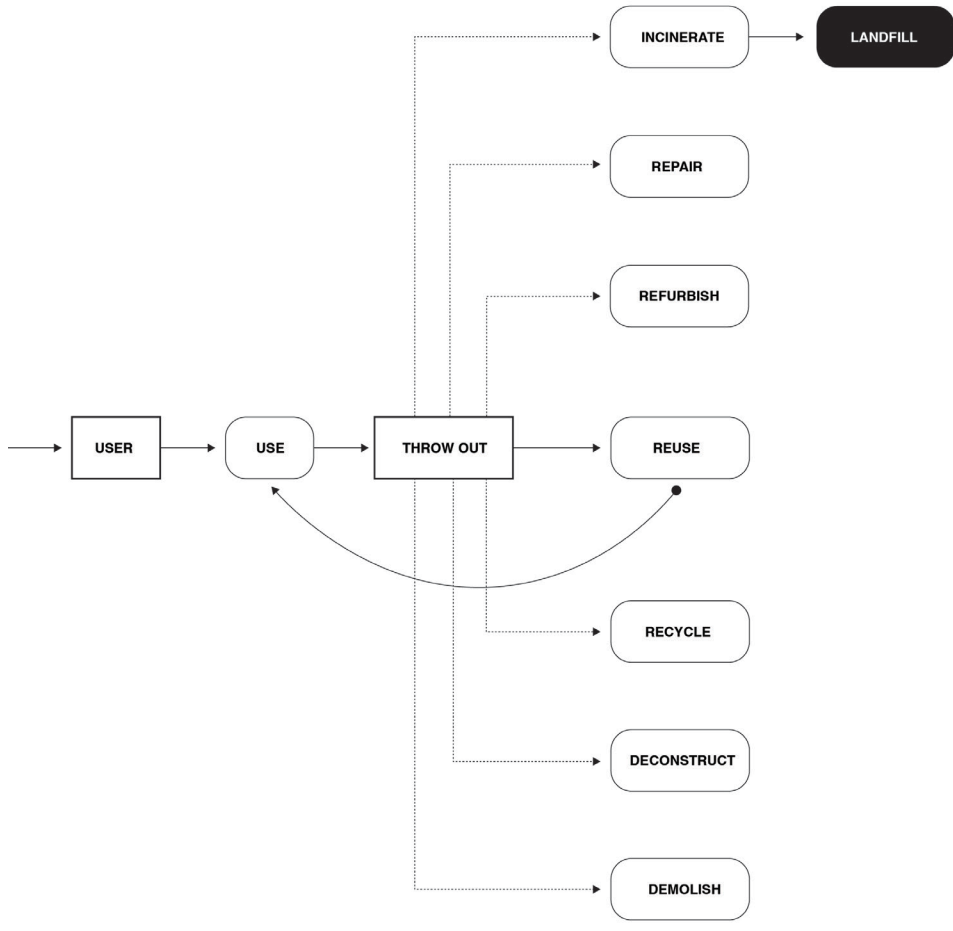


Fig. 4 Linear and circular material pathways in the built environment, showing the shift from extraction, consumption and disposal toward repair, reuse, recycling and deconstruction (Source: Pelin Yalçın, 2026).



Designed to be sealed and forgotten, these *wastescares* generate new and often unintended spatial conditions. Their presence raises questions about visibility, public memory and the cultural narratives that shape the understanding of waste. Although their external forms with green coverings may appear similar, the internal sections of landfill landscapes are distinct. They are shaped by specific material compositions, temporal layers and changing regulatory frameworks. Before 1996, Dutch landfills operated under relatively loose standards, with permeable bases and highly heterogeneous waste bodies. Since the 1996 policy reforms, Dutch landfills have been required to include engineered base liners, leachate systems and structured aftercare, whereas landfills closed before 1996 show heterogeneous waste composition and variable construction quality (Tussenevaluatie Duurzaam Stortbeheer 2023).

However, in both eras, landfills and bottom ash mounds produced by WtE (waste to energy) plants remain largely absent from the spatial imagination of planners, designers and policymakers. They are approached primarily as technical and environmental problems rather than as territorial or architectural conditions. By tracing material flows, policy regimes, actors, networks and infrastructural practices, this research seeks to reposition these bottom ash mounds within the broader discourse of urban networks, architecture and constructed ground. Consequently, the architect's role in such circumstances becomes increasingly prominent, echoing the stronger need for a design-based solution that extends beyond technology and socio-political agendas (Kara, Asensio Villoria and Georgoulas 2017).

This need becomes more urgent when bottom ash is understood not just as an exceptional residue, also as a recurring material stream produced by the continuing operation of WtE plants. The magnitude of bottom ash production makes this issue more than a local site condition. Based on AVR Rotterdam's 2022 processing volume, an AVR-scale plant could produce roughly 350,000 m³ of bottom ash in one year. If thirteen Dutch WtE plants produced bottom ash at a comparable scale, this would amount to approximately 4.6 million m³ annually, or more than 91 million m³ over twenty years. Spread across the municipality of Delft, this volume would form a layer of about 3.5 metres. This calculation is not an exact national statistic, but a spatial illustration of the amount of material generated by incineration.



Fig. 5 What if Delft's new ground is covered with 20 years of nationwide ash? (Source: Pelin Yalçın, 2026).

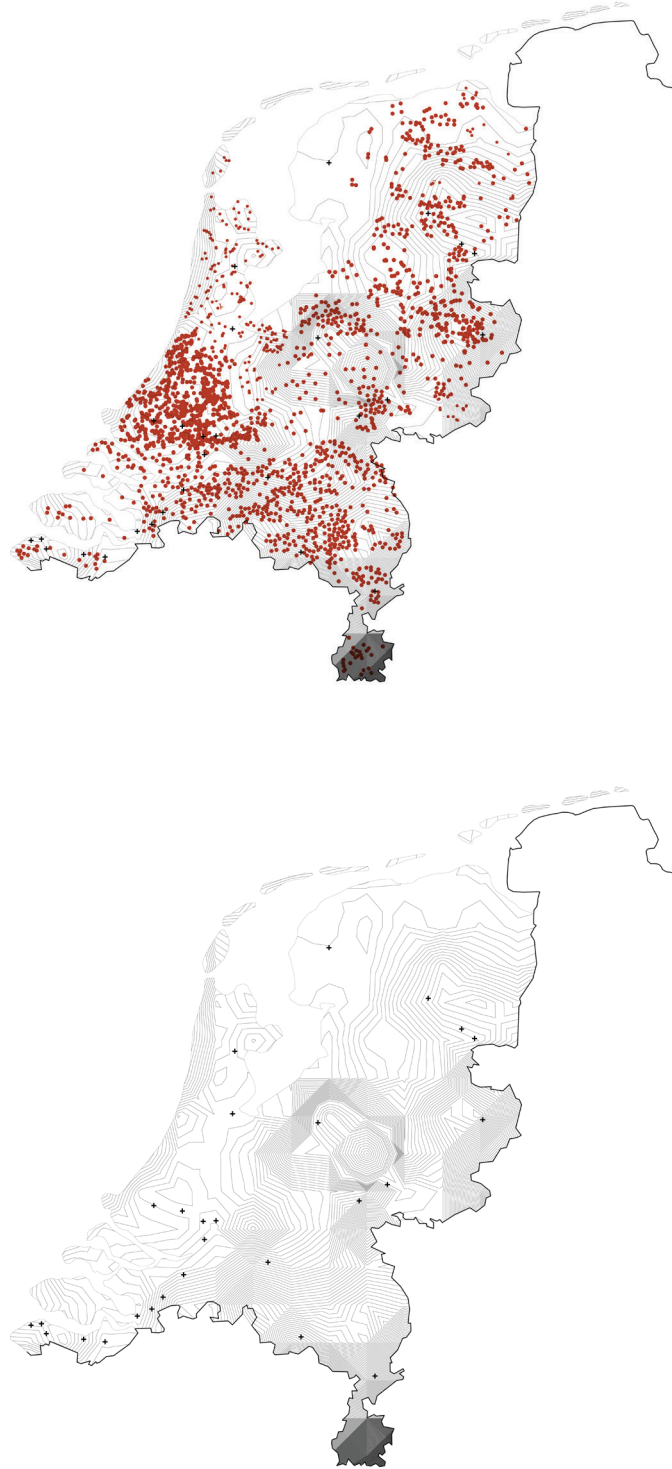


Fig. 6 Landfill locations in the Netherlands (top); waste processing plants in the Netherlands (bottom) (Source: Pelin Yalçın, 2026 via municipal archives).



Fig. 7 Waste sorting conveyors inside a waste processing facility, still image from *Artefacts of Accumulation* (Source: Carolien Schippers and Locument, 2025; cinematography by Francisco Lobo).



Fig. 8 Waste incinerator (Source: Antoine Taveneaux, 2006. CC-BY-SA 3.0 via Wikimedia Commons).



Fig. 9 Bottom ash as a residual material after waste incineration, still image from *Artefacts of Accumulation* (Source: Carolien Schippers and Locument, 2025; cinematography by Francisco Lobo).

1.3 Problem statement

Despite their physical presence and territorial impact, *wastescares* and bottom ash mounds remain primarily framed through technical and regulatory approaches concerned with risk, environmental control and long-term aftercare. Policies may describe how these sites must be engineered, sealed, monitored or managed but they remain less specific about what these terrains could become spatially, culturally or architecturally. As a result, waste-derived grounds are often treated as closed infrastructures rather than as constructed territories with future spatial potential.

Bottom ash production makes this gap especially urgent because it is both a managed residue and a recurring material stream. AVR describes bottom ash as the residue “left after incineration of residual waste” and emphasizes that it contains “valuable metals and minerals suitable for high-grade recycling” (AVR 2024). Its mineral fractions already enter construction chains, being used “before or after cleaning” in groundwork, road-building, waterways and as raw material for construction materials (AVR 2024). However, this potential is not straightforward. The reuse of bottom ash is constrained by regulation, quality requirements and public acceptance. AVR notes that requirements for these minerals are becoming stricter, while its 2023 report describes the search for high-grade applications as “increasingly complex” (AVR 2023). Bottom ash is therefore a technical residue and spatial & architectural problem: a material with potential value, but dependent on careful processing, controlled use and public trust.

Het Groene Schip in Amsterdam Westpoort makes this urgent problem tangible. It appears as a green public landform but it also contains a hidden bottom ash stock connected to incineration, sorting and possible future reuse. The problem addressed by this research is therefore not only how bottom ash can be reused as a material, but how architecture and landscape can make this hidden material condition visible, accessible and productive without denying its operational and environmental constraints.

1.4 Relevance, Objective and Motivation

Landfill areas and bottom ash mounds are not isolated sites. They are nodes within wider networks of material flows, infrastructures, ecological processes and public territories. Understanding them through interconnected systems allows the research to move beyond the building scale and beyond landscape as surface treatment.

The relevance of this research is architectural, landscape-based and societal. Architecturally, it investigates how a hidden material stock can generate program, structure, public routes and material production. From a landscape perspective, it examines how artificial topographies can become evolving grounds. Socially, it aims to make visible the material consequences of consumption, disposal and forgetting.

The objective of the project is to transform the bottom ash mound from a passive stock into an active spatial and material framework. By connecting material processing, public routes, research spaces and landscape interventions, the project explores how a waste-derived ground can become a site of operation, awareness and future reuse.

1.5 Research and Design Questions

These questions examine bottom ash as a spatial condition, the mound as an artificial ground and architecture as a means to connect material cycles, landscape transformation and public awareness.

Main question: How can architecture transform a hidden bottom ash stock into a material ground that connects public awareness, landscape transformation and future reuse?

Sub Q1: How can bottom ash be understood not only as residue, but as a material condition with spatial, ecological and architectural potential?

Sub Q2: How can artificial waste-derived topographies be transformed into evolving grounds that support new landscape, ecological and public uses?

Sub Q3: How can material cycles of excavation, processing, production and reuse become part of the spatial organization of the site?

1.6 Scope

This research focuses on bottom ash mounds in the Netherlands, with Het Groene Schip in Amsterdam Westpoort as the main design site. While the broader research begins with landfill formation, waste flows and artificial topographies, the design proposal focuses specifically on a bottom ash mound understood as a hidden material stock with architectural and landscape potential.

The project examines how bottom ash can be read spatially, processed, transformed into construction products and reintroduced into the site through architecture, public routes, pavilions and landscape interventions. It also investigates how public, research and operational programs can coexist around this material process while remaining safe and spatially distinct.

The research does not provide a full engineering assessment, environmental risk calculation, material certification process or detailed permit procedure. Issues such as contamination, leaching, dust, structural performance and public safety are treated as design constraints and responsibilities.

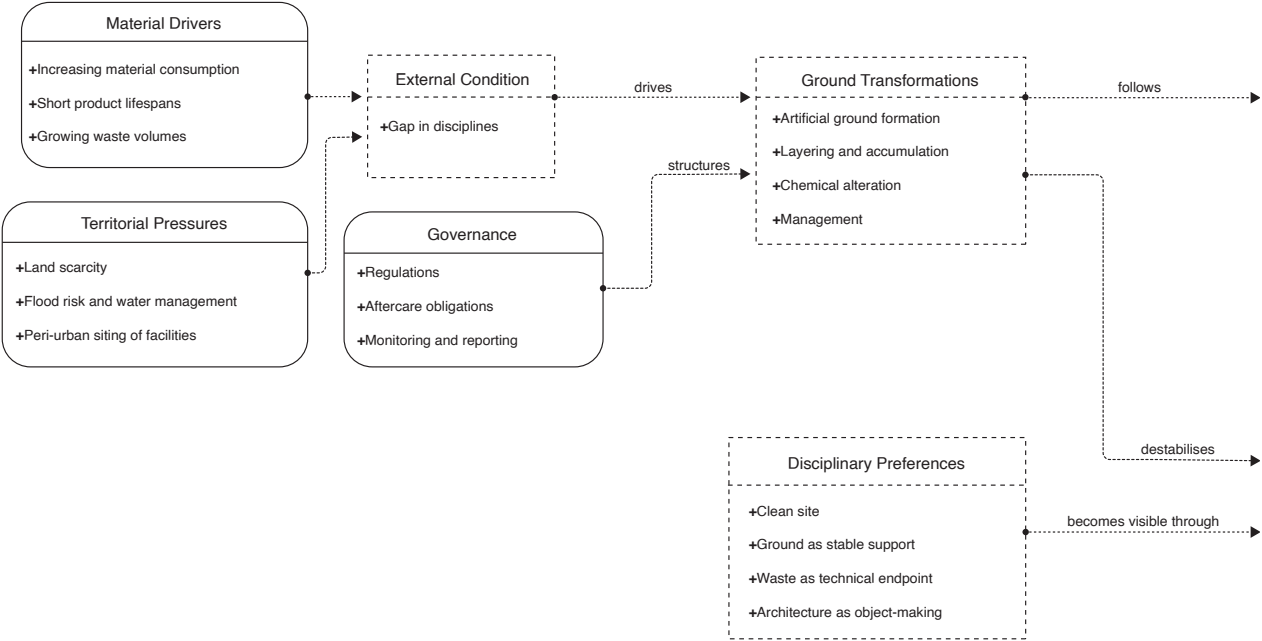
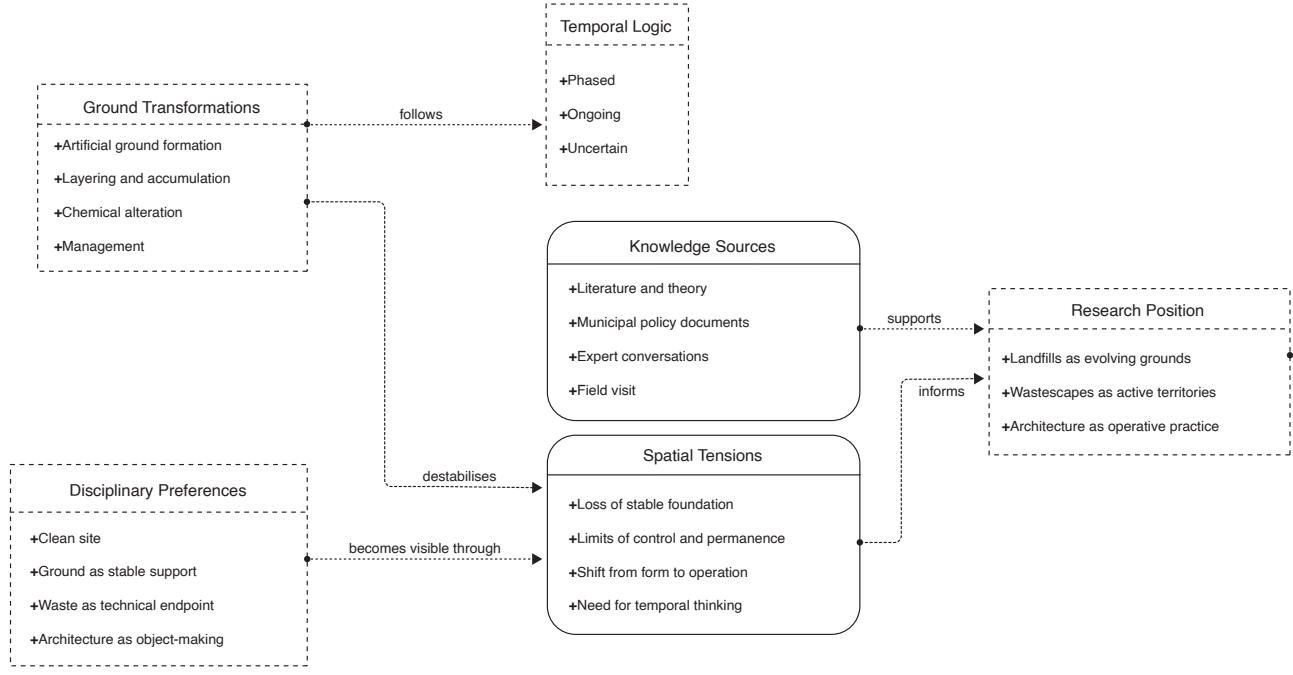
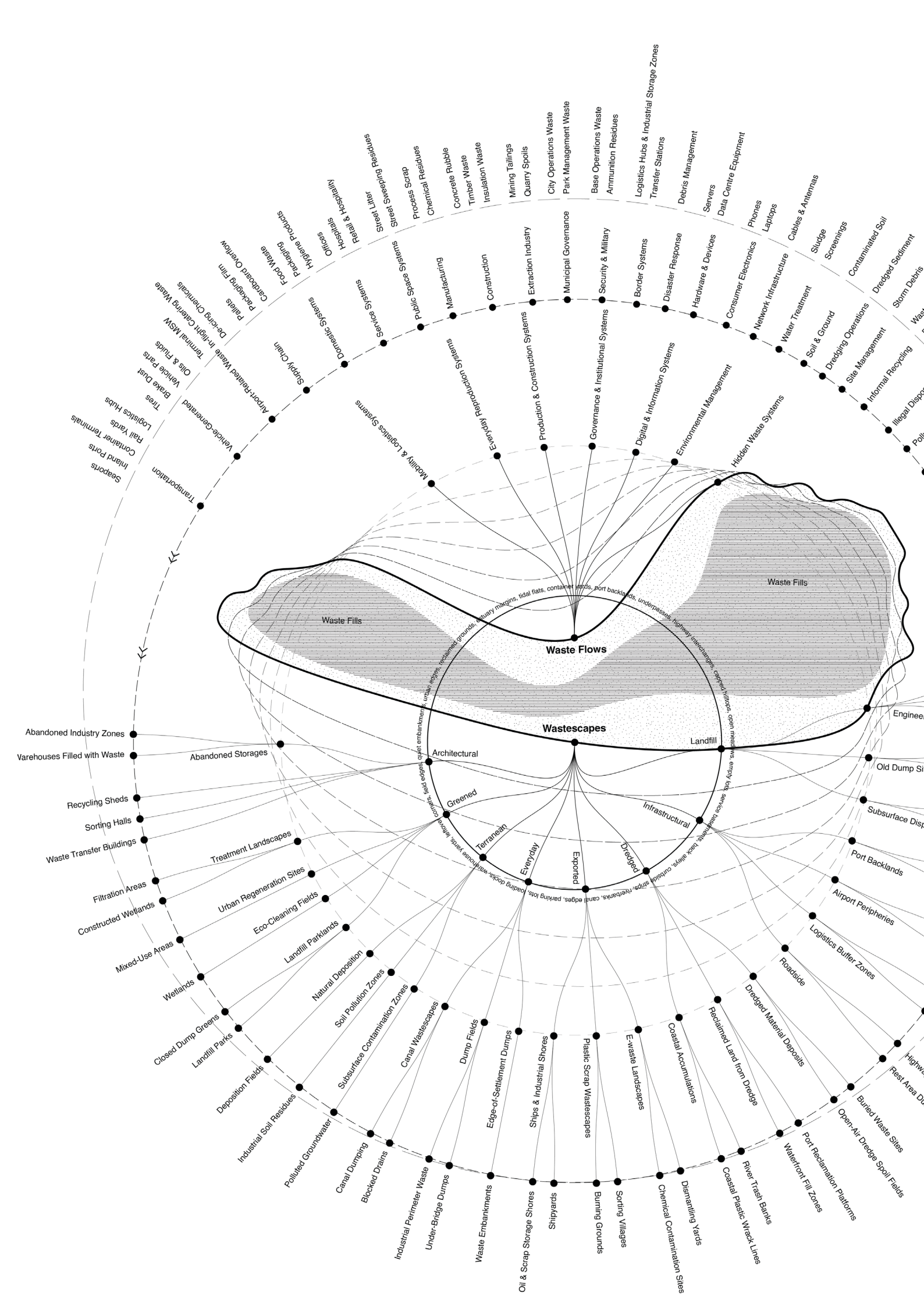


Fig. 10 Relevance and motivation diagram (Source: Pelin Yalçın, 2026).



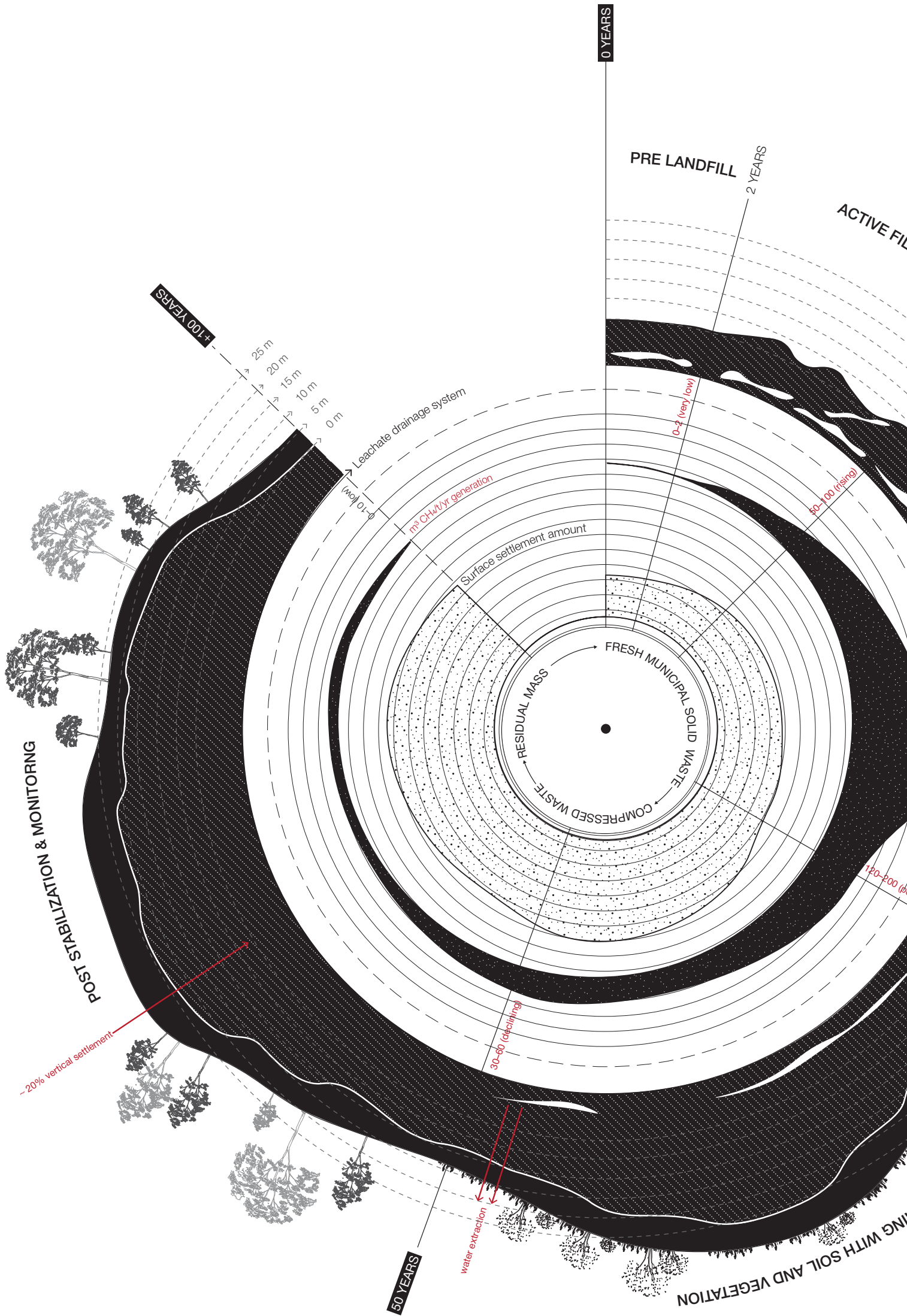
The Lexicon of Material Flows & *Wastescapes*

As materials move through cycles of extraction, production, consumption and disposal, they leave behind a scattered geography of sites: landfills, transfer stations, incinerators, abandoned storage zones, polluted grounds and emerging reuse landscapes. These *wastescapes* are not peripheral but structurally embedded in the metabolism of cities, showing how every stage of a material's life produces spatial consequences.



Forming Landfills: (re)Construction of the Landscape

Landfill formation is not a single act of disposal but a layered process shaped by policy, engineering, metabolism and time. Understanding this formation logic becomes the methodological entry point for tracing how waste transitions into terrain.



PART II

Approach: Reading Bottom Ash as System and Material

*Between waste and building, ash waits in transition,
sorted, washed, aged and renamed,
until matter begins to ask for form.*



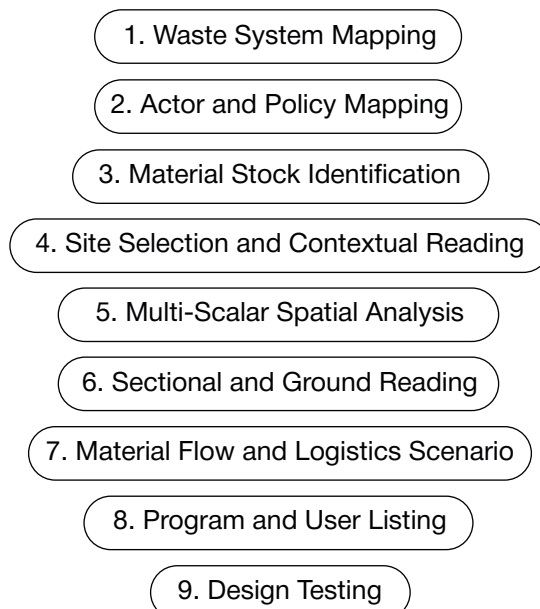
Fig. 13 Unprocessed bottom ash (Source: Pelin Yalçın, 2026; bottom ash sample provided by AEB Amsterdam).

2.1 Methodological Position

The research follows a multi-scalar and research-by-design methodology. It begins at the scale of waste systems, material flows and regulatory frameworks, then narrows toward bottom ash as a material stock and Het Groene Schip as a specific architectural and landscape condition. This movement between scales is necessary because a bottom ash mound can't be understood only as a local landform. It is produced by a larger network of consumption, incineration, sorting, transport, regulation and possible reuse.

The methodology combines analytical and projective tools. System mapping is used to understand the movement of waste, bottom ash, actors and infrastructures. Theoretical research frames waste landscapes as spatial, cultural and infrastructural conditions rather than isolated technical problems. Material research focuses on the composition, sorting, processing and environmental constraints of bottom ash. Expert input is used to test design assumptions against operational realities, especially in relation to safety, contamination, monitoring and long-term management.

This approach positions design not as a final illustration of the research, but as a way of testing the spatial consequences of the research itself. The project asks what happens when bottom ash is treated not only as a technical residue, but as a material ground capable of producing architecture, public routes and evolving landscape structures.



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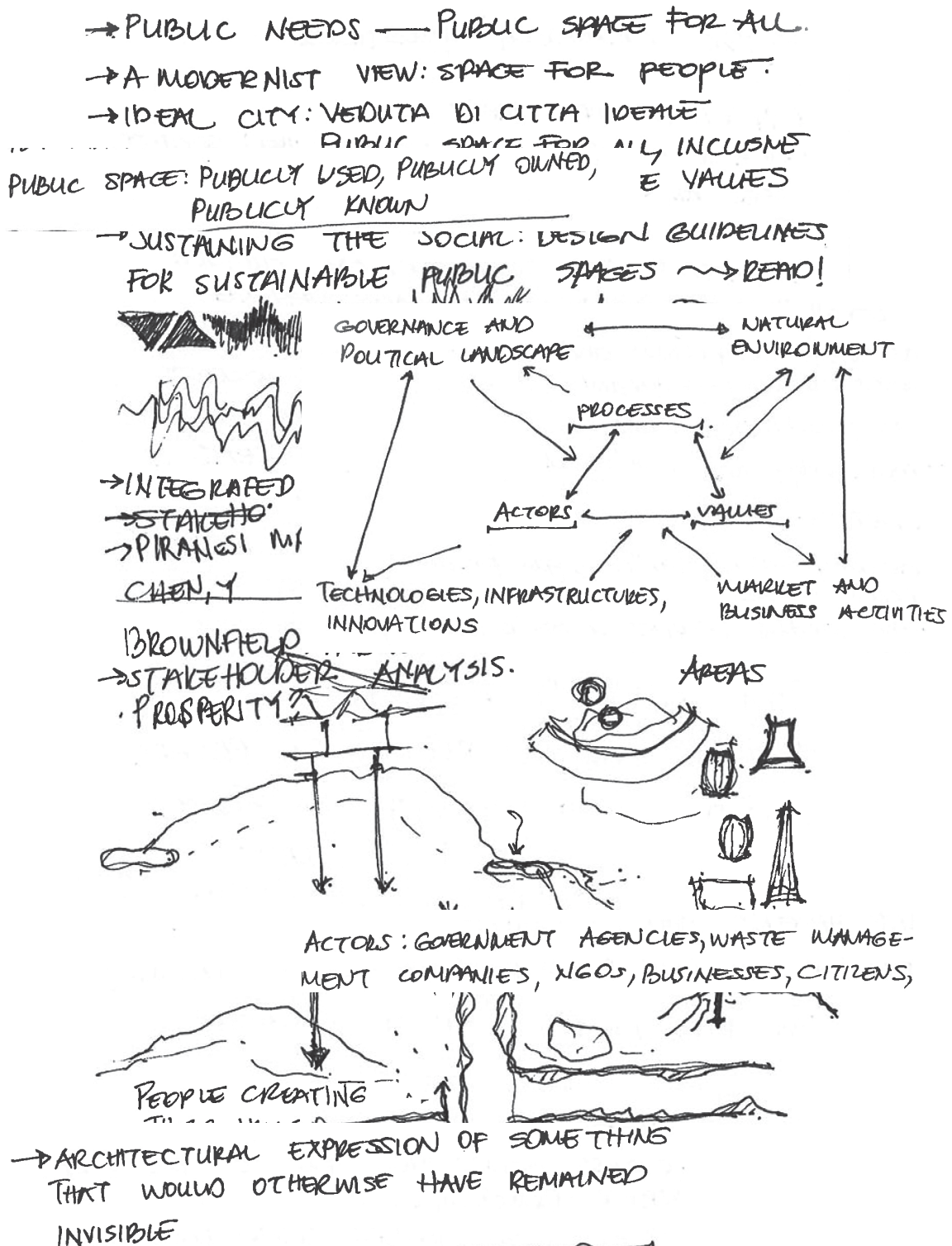


Fig. 14 Design process notes and sketches, documenting early ideas about material reuse and the relationship between people, mound, building and landscape (Source: Pelin Yalçın, 2026).

2.2 Theoretical Framework

disposability, material flows, wastescapes, accumulation, artificial grounds

Studies on waste show that discarded materials are not just byproducts of urban life but active forces that structure space, culture and infrastructure. As cities generate and manage large, continuous streams of waste, distinct landscapes of disposal emerge at their edges, forming some scholars describe as *wastescapes*, territories shaped by circulation, storage, remediation and long-term ecological aftereffects. These are not static leftovers but dynamic environments embedded in wider urban, metabolic and political networks.

Within this broader discourse, several thinkers offer frameworks that help reinterpret landfills as spatial and cultural terrains rather than residual infrastructures. Greg Kennedy examines the logic of disposability, arguing that modern societies are structured around objects designed to appear briefly and then be removed from meaning in *An Ontology of Trash*. This cultural detachment shapes how waste sites are conceptually sidelined. James Corner extends this in *The Landscape Imagination: Collected Essays of James Corner 1990-2010* into the realm of landscape theory by emphasizing process, layering and the temporal life of materials. His work suggests that landscapes must be read as dynamic constructions shaped by flows and accumulations, a perspective that is in parallel with how landfills evolve over time.

In *Drosscape*, Alan Berger situates dross within the larger field of urbanization and shows how they continue to reorganize territory long after their initial function has ended. He identifies these areas as neglected but influential parts of the metropolitan landscape. Pierre Bélanger expands this thinking in *Landscape As Infrastructure* by proposing that contemporary landscapes function as infrastructures, shaped by ecological, operational and material systems. This approach positions landfills within broader networks of energy, remediation and maintenance. Richard Rogers adds a civic dimension in *Cities for a Small Planet* by arguing that cities often externalize their waste into remote or invisible zones, limiting opportunities for public engagement and long-term regenerative planning.

Building on theories that question idealised notions of clean and stable ground, *Dirty Theory: Troubling Architecture* by Hélène Frichot offers a critical lens through which contamination, residue and maintenance can be understood as part of architectural practice rather than external problems to be solved. Instead of treating dirt and waste as anomalies to be removed or concealed, the book frames them as conditions that reveal the limits of architectural control and permanence. This perspective supports reading landfills and ash not as exceptions, but as intensified expressions of broader processes through which ground is continuously produced, managed and negotiated.

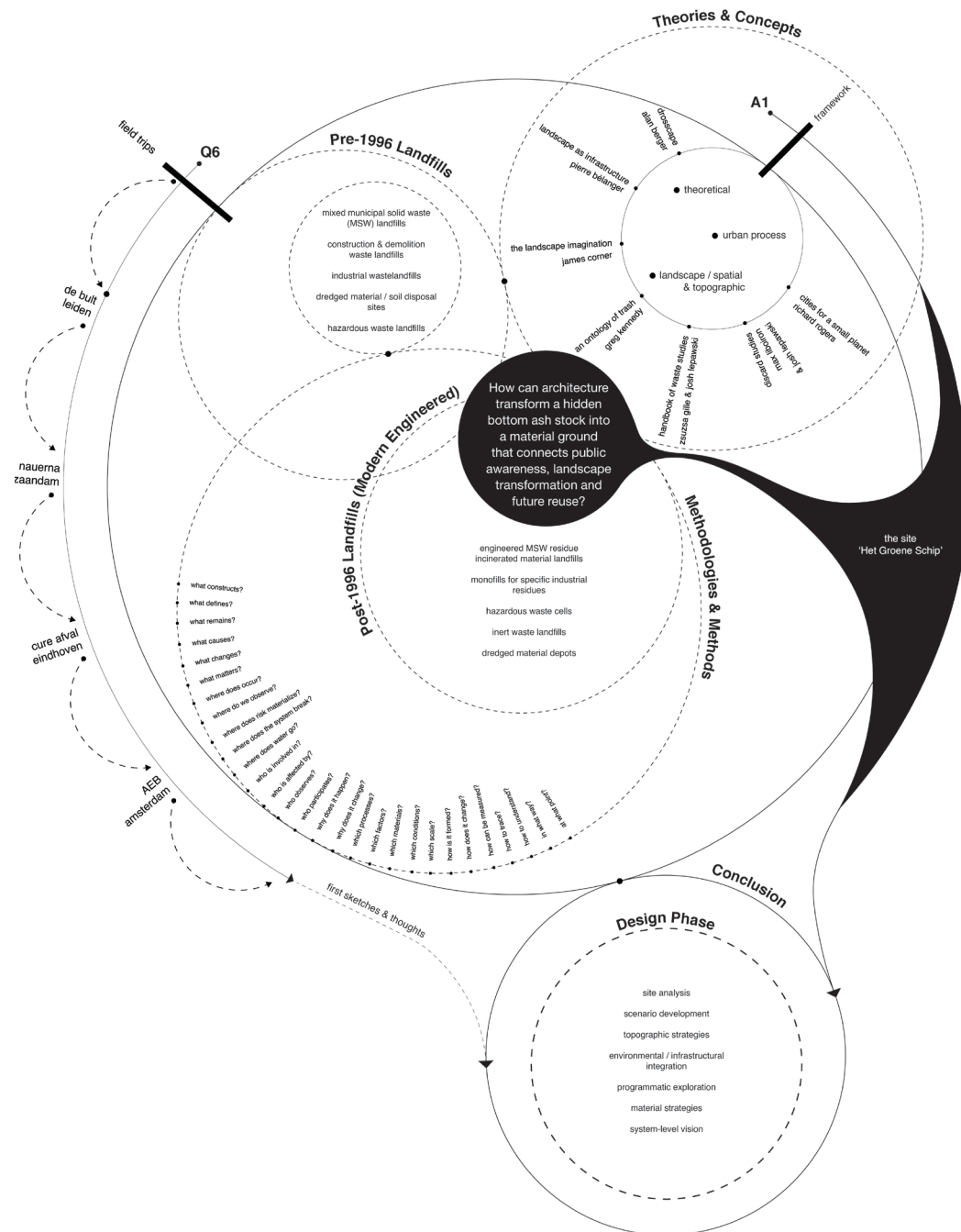
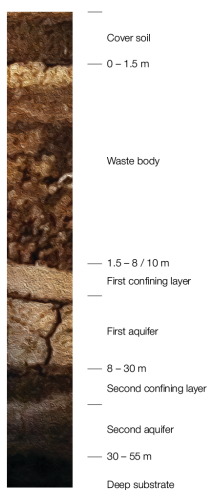
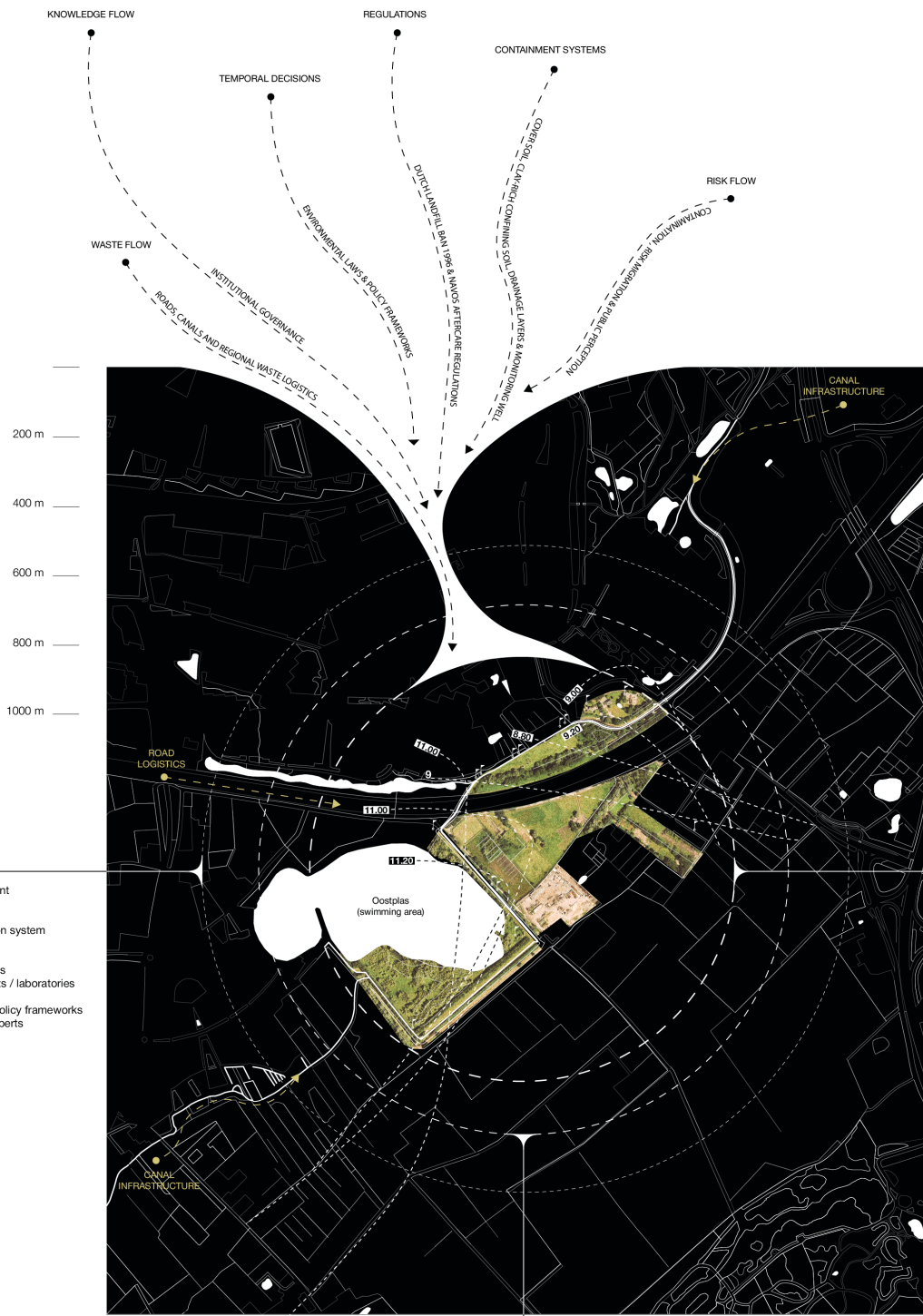


Fig. 15 Research diagram (Source: Pelin Yalçın, 2025).

2.3 Material Flows, Actors and Infrastructure

Former landfills can be read as time-based systems rather than fixed objects. Their spatial meaning changes from disposal to closure, aftercare and possible redevelopment, depending on regulation, ownership, monitoring and material condition. This temporal reading provides a background framework for understanding bottom ash mounds as waste-derived grounds shaped by accumulation, control and future reuse.



MONITORING 1986-ONGOING

Sampling strategies
Monitoring infrastructure

Province of Noord-Brabant
Municipality of Tilburg
Rijkswaterstaat
Municipal waste collection system
Municipal labour force
NAVOS
Engineering consultancies
Environmental consultants / laboratories
Monitoring infrastructure
National environmental policy frameworks
Hydrogeologists / soil experts
Monitoring wells

Municipal solid waste
Ash from combustion
Construction and demolition debris

Province of Noord-Brabant
Municipality of Tilburg
Rijkswaterstaat
Municipal waste collection system
Municipal labour force

ACTIVE LANDFILL 1910-1978



Agriculture

Safari Park

Decomposed waste
Leachate
Groundwater & surface water systems
Settlement and subsidence
Vegetation colonisation
Seasonal cycles

Province of Noord-Brabant
Municipality of Tilburg
Rijkswaterstaat
Municipal labour force
Municipal planning apparatus

CLOSURE 1978-1986

Waste landscapes are not only endpoints of disposal, but time-based material systems. While former landfills move from deposition to closure, monitoring and possible redevelopment, bottom ash follows a more active trajectory: residual waste is incinerated, transformed into energy and mineral residue, and redirected toward construction chains such as groundwork and land formation.



0 1 2 3 4 5 10 km

2.4 Bottom Ash: Composition, Sorting and Processing

Bottom ash is an incombustible residual material that remains after the incineration of municipal solid waste. In this research, it is understood as a mixed material stock produced through urban consumption and post-treatment processes. Its composition reflects the heterogeneous character of the waste stream itself. It typically contains mineral residues, glass, ceramics, stones, ferrous and non-ferrous metals, salts, unburned residues, and other inorganic compounds (van Meerwijk 2021).

The largest part of bottom ash consists of a mineral or inert fraction, generally around 80–85 per cent. Metals account for approximately 10–12 per cent, including both steel and non-ferrous metals, while non-ferrous metals usually form around 2–5 per cent of the total composition. Aluminum represents a significant share of this non-ferrous fraction (CEWEP n.d.). This composition makes bottom ash both problematic and valuable. On the one hand, it may contain heavy metals, salts and other substances that require environmental control. On the other hand, it contains recoverable metals and mineral fractions that can potentially re-enter construction and infrastructure systems as secondary resources.

Before bottom ash can be reused, it must go through a sequence of sorting and processing steps. The first stage usually focuses on the recovery of valuable metals. Ferrous metals are commonly extracted through magnetic separation. After this, the remaining bottom ash is screened and divided into different size fractions, allowing more precise treatment of the material. Non-ferrous metals, such as aluminum, copper, and zinc, can then be separated using eddy current separation, in which a conveyor system separates metals according to their reaction to changing magnetic fields (CEWEP n.d.). Through these operations, bottom ash is gradually transformed from a mixed residue into a set of differentiated material streams.

After metal recovery and sorting, the remaining mineral fraction requires further stabilization before it can be considered suitable for reuse. Aging is an important part of this process. During a period of approximately 6 to 20 weeks, the material becomes more stable and can then be used in applications such as road construction or as aggregate for concrete, where it may substitute virgin gravel and sand (CEWEP n.d.). Depending on the required application and regulatory context, additional treatments such as crushing, washing, milling or further classification may also be used to improve its physical properties and reduce environmental risks (van Meerwijk 2021). Its application remains conditional on leaching behavior, particle size, metal content, contamination levels and the environmental standards of the context in which it is used (van Meerwijk 2021). For this reason, bottom ash can't simply be treated as a clean replacement for conventional aggregates. It must be understood as a processed and regulated material that architectural value appears only through careful treatment and contextual application.

For this research, bottom ash is important because of this uncertain and conditional status. It is neither simply waste nor immediately architecture. It is a material in transition: extracted from the hidden afterlife of urban consumption, processed through technical systems and potentially redirected into spatial and architectural use. Therefore, understanding its composition and processing chain is necessary for translating bottom ash from an invisible residue of waste-to-energy infrastructure into a possible material for landscape and architectural design.

2.5 Expert Interview / Afvalzorg

13.01.2026

What happens to municipal waste after it is discarded in Amsterdam?

The bottom ash received by ACCN arrives from active waste processing plants, including Attero Moerdijk and Attero Wijster. The bottom ash is not kept on Nauerna. It is processed and washed by ACCN and then forwarded for application as a secondary building material elsewhere. The contaminants washed out by ACCN are sent back to Attero, where they are disposed of. These contaminants used to be disposed of at Nauerna, which made sense because ACCN is located at the Nauerna site. However, since Nauerna is now closed, the contaminants are sent back to Attero.

What type of landfill is Nauerna?

Nauerna is not a single-type landfill. Older layers of household waste and mixed waste remain present beneath the surface. As a result, biological processes such as landfill gas production continue to occur.

Does the landfill still produce gas and how is it used?

Yes. Due to the presence of older organic waste layers, landfill gas continues to be produced. Gas is collected through an extensive underground pipe network and transported to an adjacent facility. Depending on its quality, the gas is either reused for heating Afvalzorg's own headquarters and a nearby greenhouse, or combusted to generate electricity. Gas production varies spatially and temporally across the site.

How are water and leachate managed?

Groundwater is forced upwards and pushes against the bottom foil liner that forms the underside of the landfill. Only if there is a hole in the bottom liner would groundwater interact with leachate. Even then, this would not cause contamination of the surrounding groundwater. Because of the pressure difference, groundwater would be pushed into the landfill rather than leachate being pushed out.



Fig. 18 Gas monitoring and processing in Afvalzorg Nauerna (Source: Pelin Yalçın, 2026).

When is a landfill considered “closed”?

It is not necessarily closure that is constrained; it is expansion that gets constrained. Once everything is sorted, the remaining capacity is known, and there is no desire or possibility to further expand the landfill, the landfill can be considered closed. This is the case for Nauerna.

How does the landfill ground behave over time?

Settlement occurs rapidly in the first years after waste deposition. However, settlement does not stop after this phase. Slow subsidence continues for decades, depending on the composition of the waste. Landfills never fully stabilize and remain long-term evolving ground conditions. Two factors contribute to this process. First, pressure on the ground caused by the added weight causes the ground to lower. Second, organic material decomposes in the landfill, causing the landfill body to compress and shrink.

How does ground movement affect buildings on the landfill?

Buildings on the site, including the Afvalzorg headquarters, are designed to accommodate movement rather than resist it. The structure rests on a slab without piles and is periodically adjusted using hydraulic jacks to correct differential settlement. Beyond the structure itself, building services such as ventilation ducts and pipes also move over time, occasionally leading to minor leakages that are anticipated and managed.

Concluding Note

This interview and field trip emphasize that landfills function as long-term infrastructural landscapes embedded in regional systems of waste, energy, water and regulation. Nauerna may be considered closed in terms of further expansion, but it continues to operate through aftercare, gas extraction, water management and settlement.



Fig. 19 Afvalzorg Nauerna waste management site (Source: Pelin Yalçın, 2026).



Fig. 20 View from Het Groene Schip toward the sorting station and port infrastructure, where barges, cranes and conveyor systems move bottom ash from waste-to-energy plants. The image shows how ash mountains are directly connected to a larger industrial landscape of storage, handling and processing (Source: Pelin Yalçın, 2026).





Fig. 21 The construction of Het Groene Schip (Source: Haarlem's Dagblad, 2019)





Fig. 22 View of Het Groene Schip as a covered ash mound, where grass and stairs create the appearance of a public landscape. Beneath this green surface, years of accumulated bottom ash remain stored as a hidden material stock, turning the hill into both landscape and archive (Source: Pein Yalcin, 2020).



PART III

Results: Design Proposal

*A green hill hides a stock below,
water, paths, trees and machines trace its edge.
Ash moves out, returns changed,
and the closed mound begins to act as ground.*

3.1 Site Selection: Het Groene Schip as Material Stock

Het Groene Schip becomes relevant to this research because it brings together waste infrastructure, artificial topography, public landscape and future material potential in one site. It is a bottom ash mound in Amsterdam Westpoort, situated within a larger territory shaped by port logistics, waste processing, energy production and landscape transformation. This makes the site important not only as a landform, but as part of an operational material system.

The mound appears to be already resolved. Its green surface presents it as a finished landscape, accessible and visually integrated into its surroundings. However, beneath this surface is a stored bottom ash stock produced through Waste-to-Energy processes. This contrast between visible landscape and hidden material condition makes this mound an appropriate site for questioning how waste-derived grounds are perceived, managed and potentially transformed.

Its location also enhances the project's relevance. Amsterdam Westpoort is a territory where industrial infrastructure, water logistics, energy systems, ecological edges and future urban pressures overlap. The site is close to waste-processing networks and sorting infrastructures, while also being connected to larger landscape systems and public routes. This position allows the project to address bottom ash not as an isolated material, but as something connected to flows of waste, transport, regulation, construction and public awareness.

For this reason, Het Groene Schip becomes more than a case study. It becomes a testing ground for the project's central question: how a hidden bottom ash stock can become a productive ground for architecture, landscape transformation and future reuse. It is a landscape and infrastructure, public image and hidden stock, finished form and possible beginning.



Fig. 23 Aerial view of Het Groene Schip, showing the sorting station and the surrounding port, energy and industrial landscape
(Source: Afvalzorg, date unknown).





Fig. 24 Het Groene Schip and Westpoort area aerial view (Source: Google Earth, 2026).



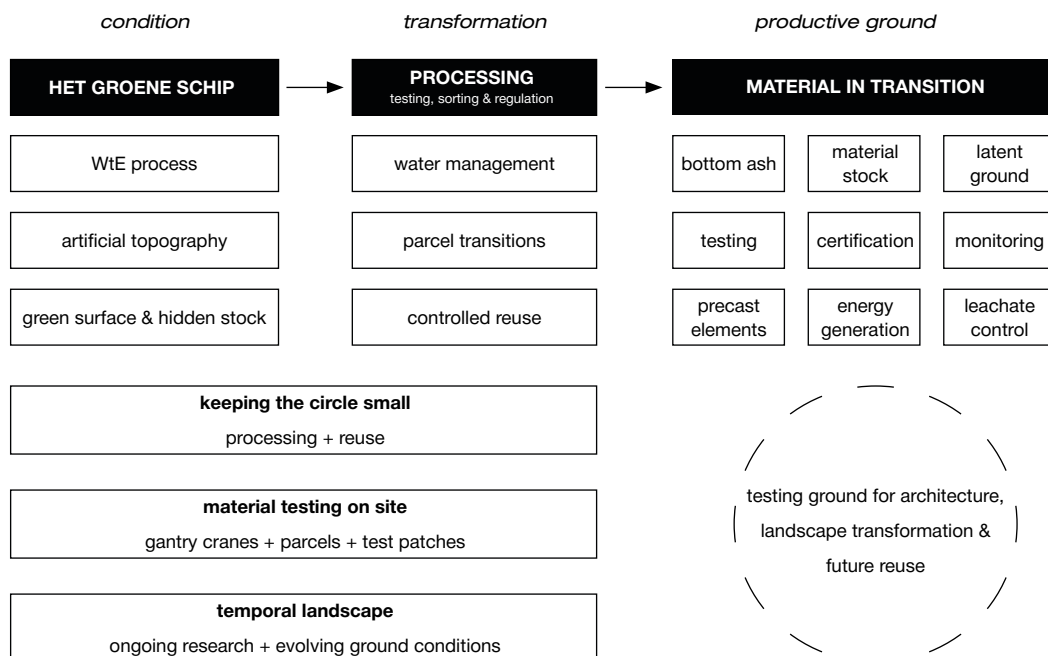
3.2 Design Thesis: From Hidden Stock to Productive Ground

The design thesis begins by understanding Het Groene Schip as a constructed ground formed through incineration, sorting, deposition and long-term management. Although the mound appears complete on the surface, its interior remains part of an ongoing material cycle.

The site is important because of its position in Amsterdam Westpoort, close to port logistics, waste processing, water infrastructure and energy systems. This proximity supports the project's aim to keep the circle small: bringing processing, testing, reuse and public understanding closer together.

This becomes more urgent with the future development of Haven-Stad. The development strategy describes 40,000 to 70,000 dwellings and 45,000 to 58,000 jobs, while also emphasizing sustainable energy, circular construction, waste separation and material reuse (Gemeente Amsterdam 2017). As more people live and work near this territory, consumption will increase, along with its material consequences.

Bottom ash is therefore treated as a material in transition. It is no longer only waste, but it is not yet a ready-made resource. Its value depends on processing, testing and careful application. From this position, the mound is transformed into a productive ground where material cycles, public awareness, environmental responsibility and landscape transformation can be connected.



3.3 Landscape Strategy: Productive and Evolving Grounds

The existing landscape around Het Groene Schip already has a public character. The mound and its surroundings function as a park-like landscape with walking paths, drainage channels, open green areas and poplar trees. People can walk across parts of the site, but the mound and the surrounding landscape remain only loosely connected. Although the mound has a strong geometric presence, it does not fully invite occupation, interpretation or interaction. It is experienced mainly as a green landform, while its hidden material condition remains unread.

The atmosphere of the site is also shaped by infrastructure. Sounds from the nearby sorting station and low-flying aircraft make the park feel connected to a larger operational territory. These sounds are important because they reveal that Het Groene Schip is part of a landscape shaped by waste processing, logistics and port activity.

The landscape strategy works with these existing conditions instead of replacing them. Paths become clearer public routes, drainage channels become visible landscape structures and open parcels become grounds for ecological growth, material testing, productive planting, energy generation and future reuse. The poplar trees are treated as part of this temporal strategy. As fast-growing trees with a limited productive lifespan, approximately 30-50 years depending on species and site conditions, they introduce a cycle of growth, harvesting, reuse and replacement into the landscape.

Processed bottom ash is introduced carefully through controlled applications such as paving units, gabion edges, drainage aggregates, precast landscape elements and experimental test patches. It is not used as raw ground cover. These applications allow the site to test how treated ash can return to the landscape while maintaining environmental responsibility.

Water management is treated as a key part of the landscape strategy. The existing drainage channels are not hidden as purely technical infrastructure; they are used to structure the site and define different landscape parcels. Because the project works with processed bottom ash, runoff, infiltration and possible leaching must be carefully controlled. For this reason, experimental ash applications are placed within monitored areas, while drainage lines guide water movement and help separate public, ecological and testing zones. Water therefore becomes a design tool for organizing safety, visibility and environmental responsibility.

Together, these strategies reposition Het Groene Schip from a green but distant landform into an evolving landscape system. Material cycles, water management, public movement, planting cycles and operational atmosphere become part of the same productive ground.

3.4 Logistics Strategy: The Ash Loop

The logistics strategy is based on a controlled ash loop. This loop begins with the selective excavation of the mound and continues through transport, sorting, washing, classification, production and deployment. The excavated bottom ash is not spread directly across the site. It is treated as an uncertain material that first needs to be contained, processed and tested before it can return to the landscape or become part of architectural production.

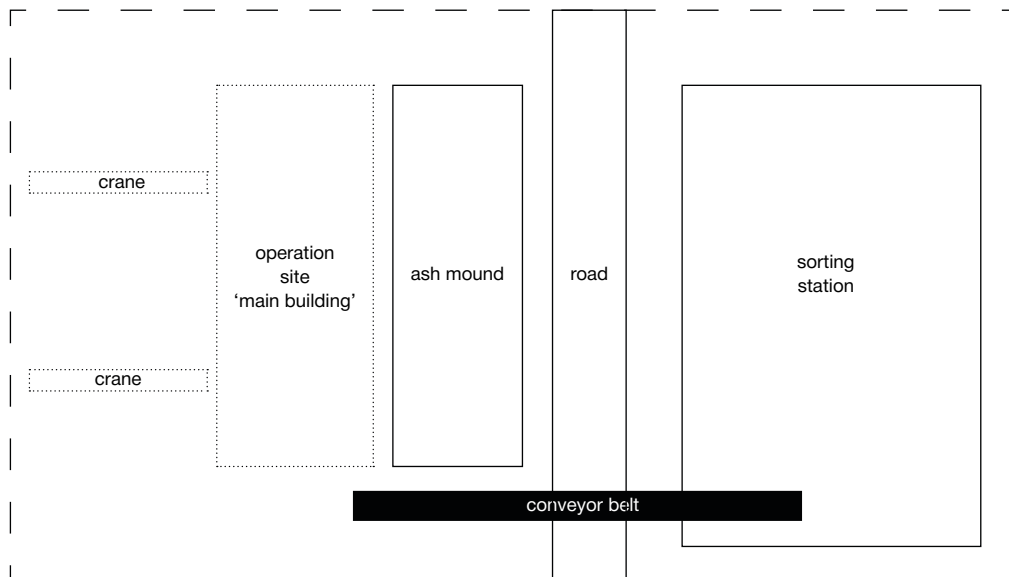
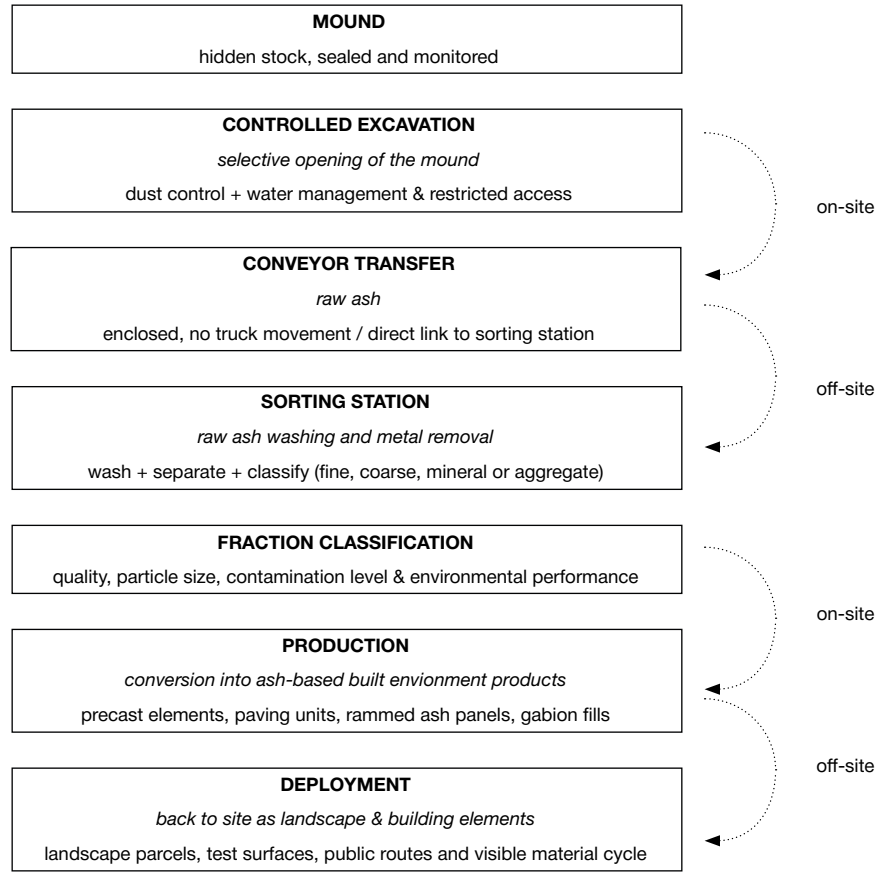
The first stage is controlled excavation. The cut into the mound is organized as a precise operation, with dust control, water management and restricted access. This allows the hidden material stock to be opened without turning the surrounding landscape into an uncontrolled working zone. Excavation is therefore both a spatial act and an environmental responsibility.

After excavation, the material is moved through an enclosed conveyor connection toward the sorting and processing infrastructure. This avoids unnecessary truck movement across the site and reduces the risk of dust spreading. Since the sorting station is located across the road, the conveyor becomes a direct link between the mound and the existing material-processing system. It keeps raw or uncertain ash within a controlled route.

At the sorting station, the material is washed, separated and classified into usable fractions. This stage defines what the material can become. Fine, coarse, mineral and aggregate fractions can be evaluated for different applications, while unsuitable material can remain within controlled treatment or storage. The project does not assume that all excavated ash has the same value. Its future use depends on quality, particle size, contamination level and environmental performance.

Once processed, selected fractions return to the project site as controlled material streams. They can become precast elements, paving units, rammed ash panels, gabion fill, drainage aggregates or test surfaces. The return of the material completes the ash loop, but it also changes the meaning of the site. The mound is no longer a sealed stock at the edge of public awareness; it becomes part of a visible cycle of extraction, treatment, production and reuse.

The ash loop acts as the operational backbone of the proposal. It organizes the relation between mound, sorting station, production spaces, landscape parcels and public routes. Logistics is not treated as a hidden technical necessity. It becomes part of the spatial structure of the project, showing how a waste-derived material can move from concealed stock to tested architectural and landscape application.



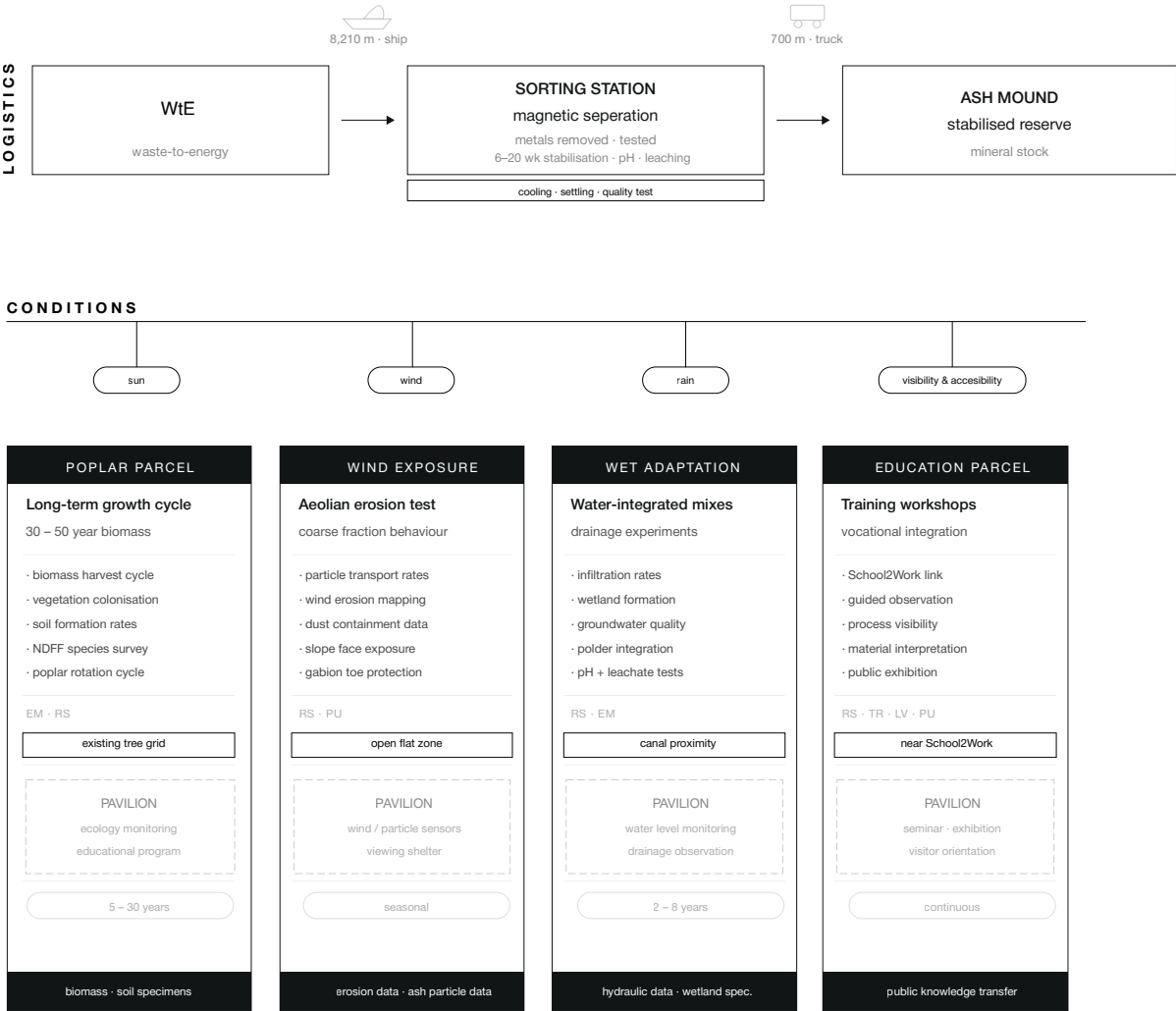
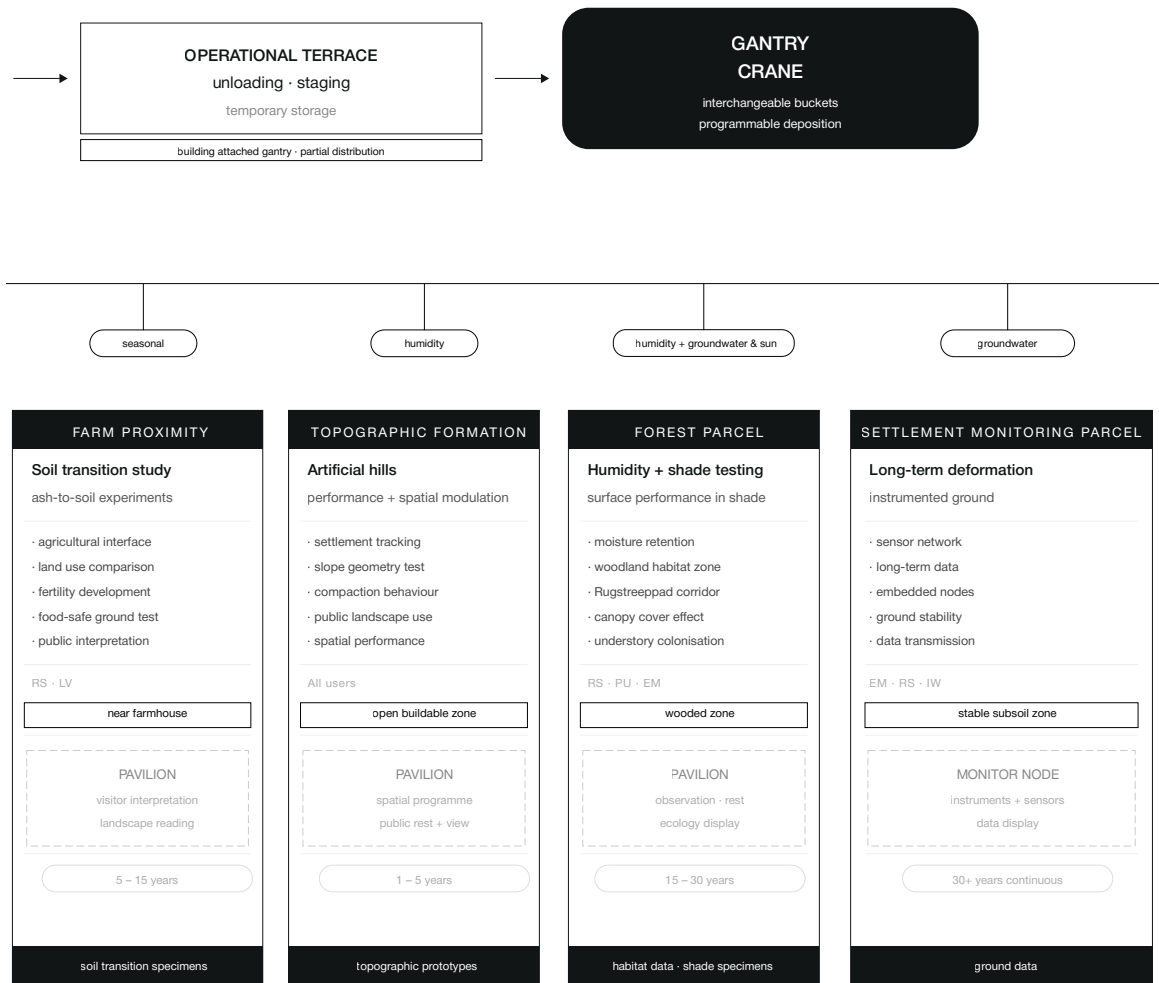


Fig. 25 Proposed operations and logistics diagram (Source: Pelin Yalçın, 2026).



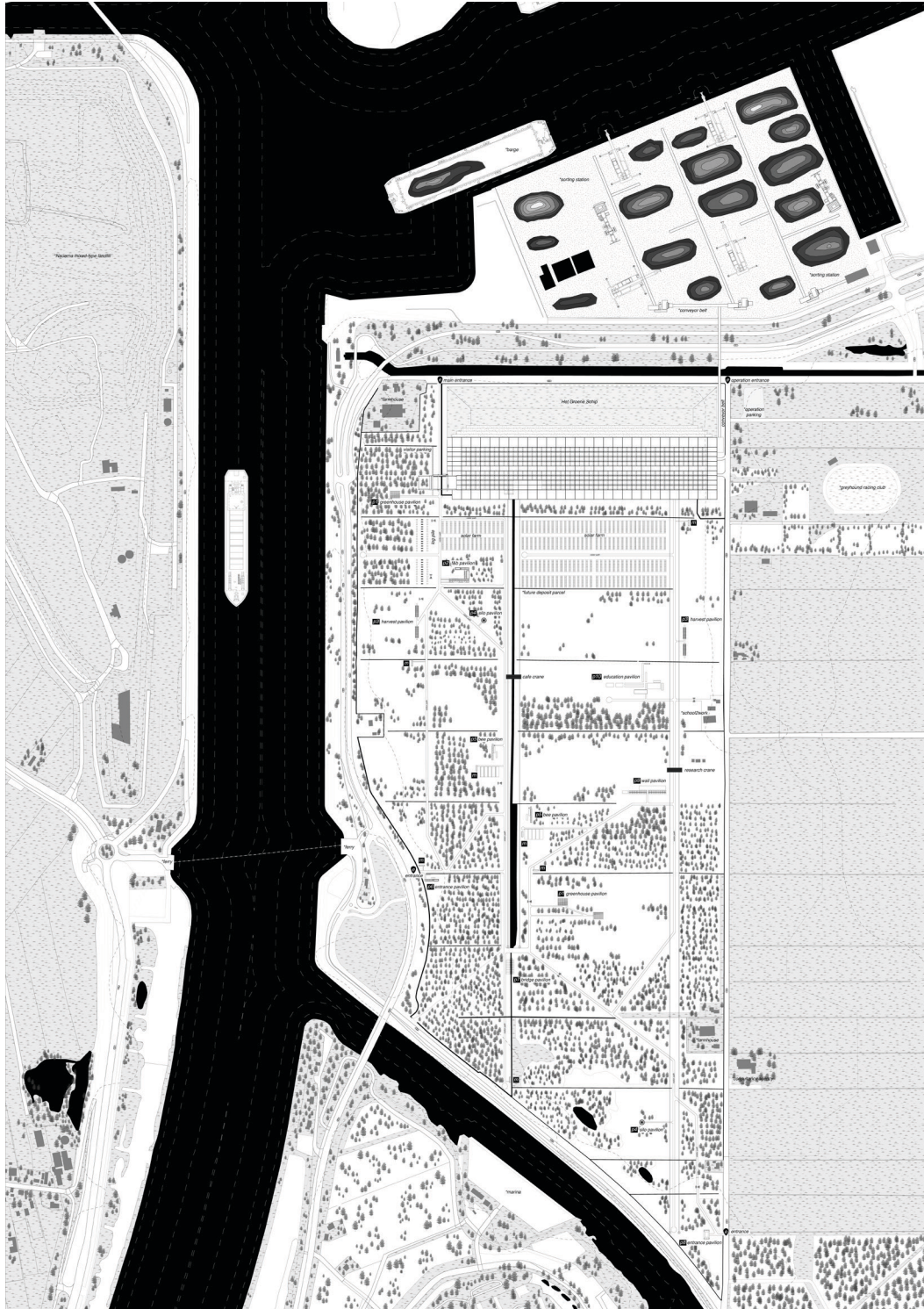


Fig. 26 Site plan showing the proposed pavilions, parcels, main building, sorting station, conveyor connections and visitor and gantry routes (Source: Pelin Yalçın, 2026).

3.5 Architectural Strategy: The Main Building as Interface

The main building is positioned as the interface between the mound, the ash loop and the surrounding landscape. Its role is to organize the transformation of bottom ash spatially: material is excavated, processed, tested, produced and observed through a controlled architectural framework. The building does not stand apart from the mound. It becomes part of the system that connects hidden stock, operational process and public understanding.

The building is organized around three main programmatic zones: operation, research and public access. The operational zone supports material handling, production, storage, maintenance and crane-based movement. The research zone provides spaces for testing processed ash fractions, evaluating material performance and developing possible construction applications. The public zone allows visitors to understand the process from a safe distance through controlled routes, viewing points and enclosed spaces.

Separation is a central principle of the architectural strategy. The project deals with a material that requires dust control, environmental care and restricted access. For this reason, public, research and operational areas are not freely mixed. They are separated through levels, thresholds, controlled circulation and visual distance. Visitors can see the material process without entering unsafe zones. Researchers can work close to the material while remaining protected from heavy operational movement. Operators can move ash, components and equipment without crossing uncontrolled public areas.

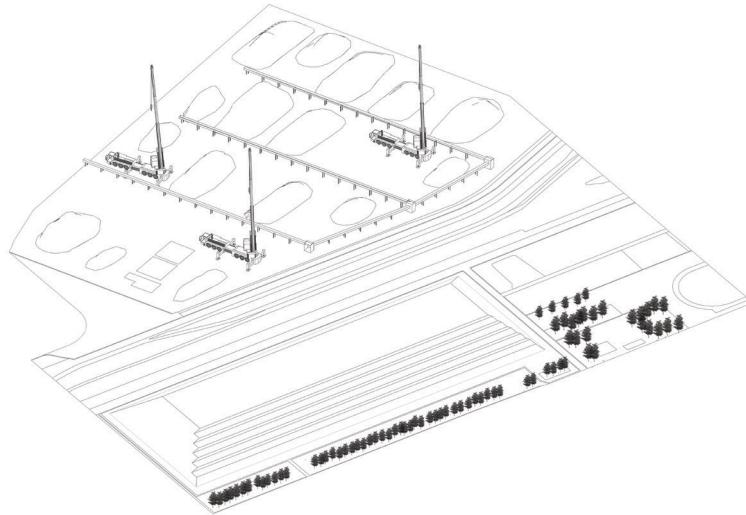
The building also works vertically. The ground level remains primarily operational, allowing material movement, crane access, storage and production. Public access is lifted above the operational ground, creating a clear separation between visitors and material handling. Elevated routes and platforms allow the process to be observed from above, turning the building into a spatial section through the ash loop. This vertical organization makes the hidden material cycle visible without compromising safety.

Structurally and technically, the building follows the logic of an industrial framework. Large spans, exposed structural systems, visible services, cranes, platforms and modular enclosed rooms express the building's role as a working infrastructure. The architecture does not try to hide its technical systems. Instead, structure, circulation and services help explain how the building functions. This supports the wider design thesis: architecture becomes a mediator between material stock, operation, research and public awareness.

In this way, the main building becomes more than a container for program. It is the architectural device through which the mound is opened, the ash loop is organized and the public can understand the transformation of bottom ash. The building gives spatial form to a process that would otherwise remain hidden within waste infrastructure.

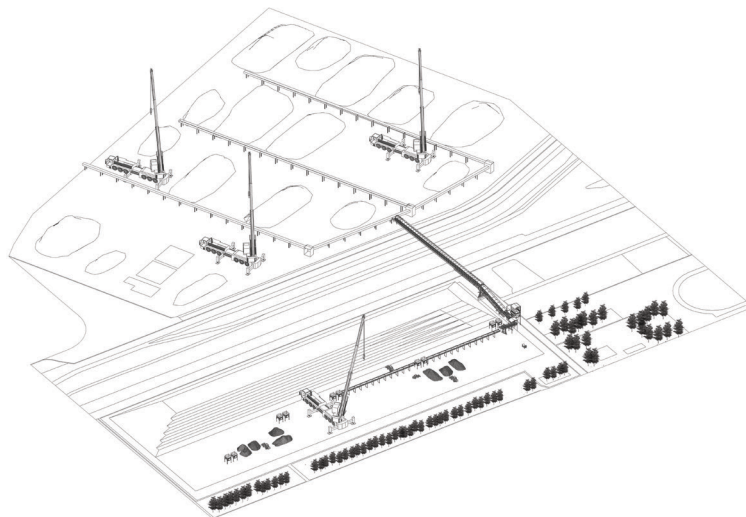
Phase 1: Controlled Excavation

The selected part of the mound is carefully excavated. Dust, runoff and water movement are controlled during the process.



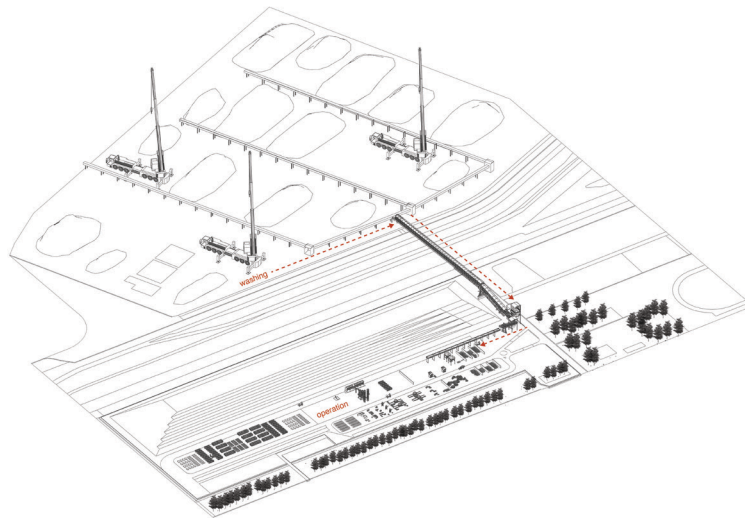
Phase 2: Closed Conveyor to the Sorting Station

The excavated ash is not spread across the site. It is transported through a closed conveyor system to the existing sorting station across the road for washing and sorting.



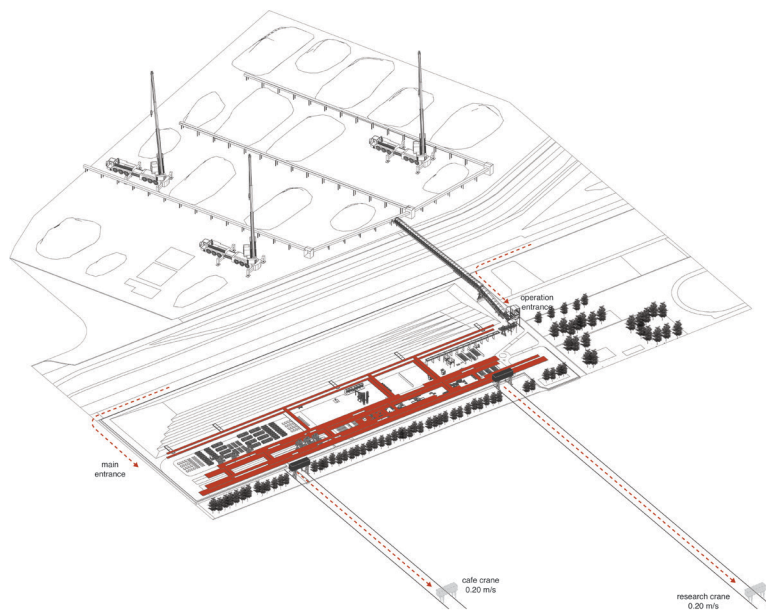
Phase 3: Return as Classified Fractions

Only the suitable and tested ash fractions return to the main building.



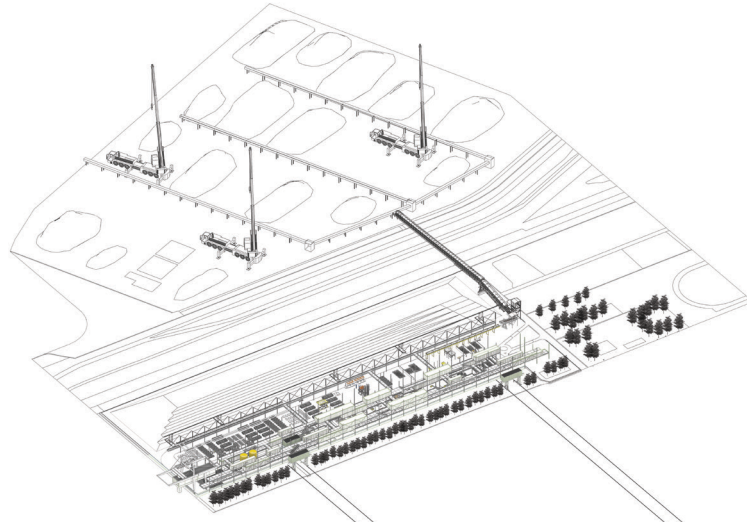
Phase 4: Construction of the Main Building Program Layers: Public, Research and Operation

A large industrial frame is built as the main interface between the mound, the sorting station, production and public observation.



Phase 5: Material Production

After research and production, processed ash products return to the site as controlled material streams. These elements are placed by cranes and used for architectural and landscape applications, including paths, platforms, test fields and pavilion structures.



Phase 6: Activated Material Landscape

The site becomes an active material landscape where the main building, crane systems, pavilions, paths and testing parcels operate together. Processed ash becomes part of a visible cycle of production, observation, learning and reuse.

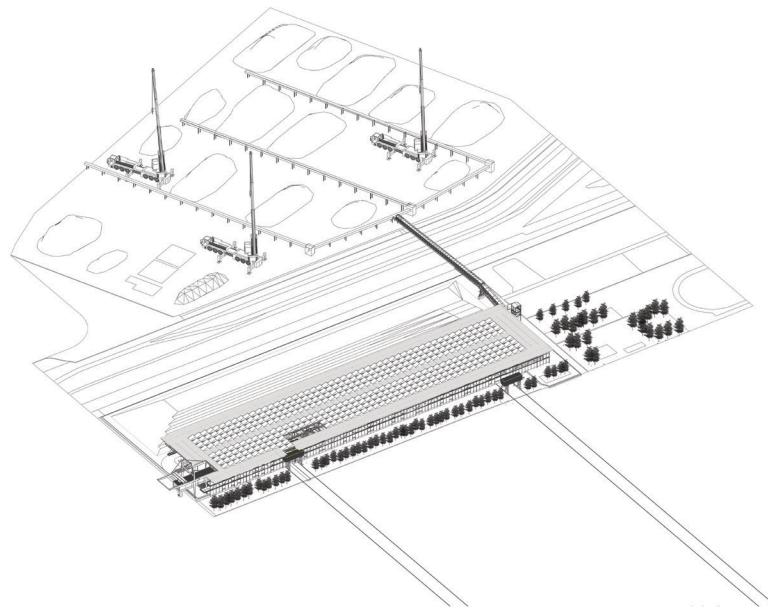


Fig. 27 Architectural strategy diagrams across pages 60–62 (Source: Pelin Yalçın, 2026).

3.6 Users and Spatial Requirements

Inspired by Listing as a Design Methodology¹, this research uses listing as a method to derive spatial requirements from users, activities, needs and relations. This method helps the future bottom ash stock transform a spatial program based on how different groups interact with the site, what they come to do and what kinds of environments these actions require. In this way, the project is structured through patterns of use, movement, visibility and exchange.

1. Users

- * Visitors
- * School groups / trainees / students
- * Researchers / operational staff

2. What they come for

General public

- * to understand what the mound is
- * to see the consequences of waste and consumption
- * to observe operations from a safe distance
- * to experience the section / mound / route
- * to rest, sit, eat, pause

Local visitors

- * to visit
- * to walk / view / rest
- * to use the site as part of a larger route
- * to follow a curated narrative
- * to access specific overlooks and explanations
- * to understand archive + production + mound together

School groups / trainees

- * to learn how bottom ash is processed, tested and stored
- * to move through a guided sequence
- * to gather, listen, discuss
- * to connect landscape, material and industry

Researchers and operational staff

- * to explain findings
- * to display samples
- * to manufacture built environment materials
- * to arrange the mound

¹ Bruno Zevi, *The Modern Language of Architecture* (Vancouver: Douglas & McIntyre, 1978), 7-15.

Ground Floor Plan // Operational Ground

The ground floor is organized around the full material journey of bottom ash. The process begins at the receiving area, where incoming ash is brought into the building from the mound and temporarily collected before further handling. From there, the material moves into unprocessed ash storage and pre-processing areas, where it is sorted, prepared and made ready for reuse.

After this first stage, the ash continues into the production sequence. It is mixed with binders and aggregates, cast or formed into new elements, checked through concrete testing and finally moved to the drying yard. In this way, the ground floor works as the active base of the project, where ash is received, processed, transformed and prepared to return to the landscape.

1 bottom ash receiving

2 unprocessed ash storage

3 pre-processing

4 mixing, casting & forming

5 concrete lab

6 drying yard

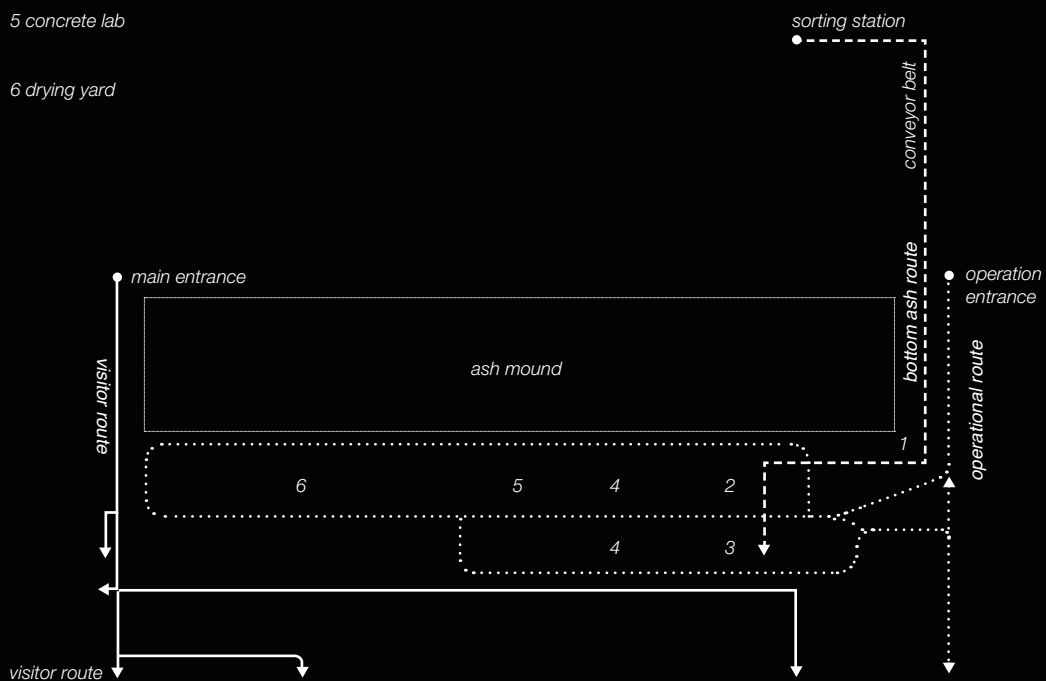




Fig. 28 View of the visitor-operation threshold, showing the water barrier, building platforms, visitor spaces and the harvested silo reused as a library (Source: Pelin Yalçın, 2026).

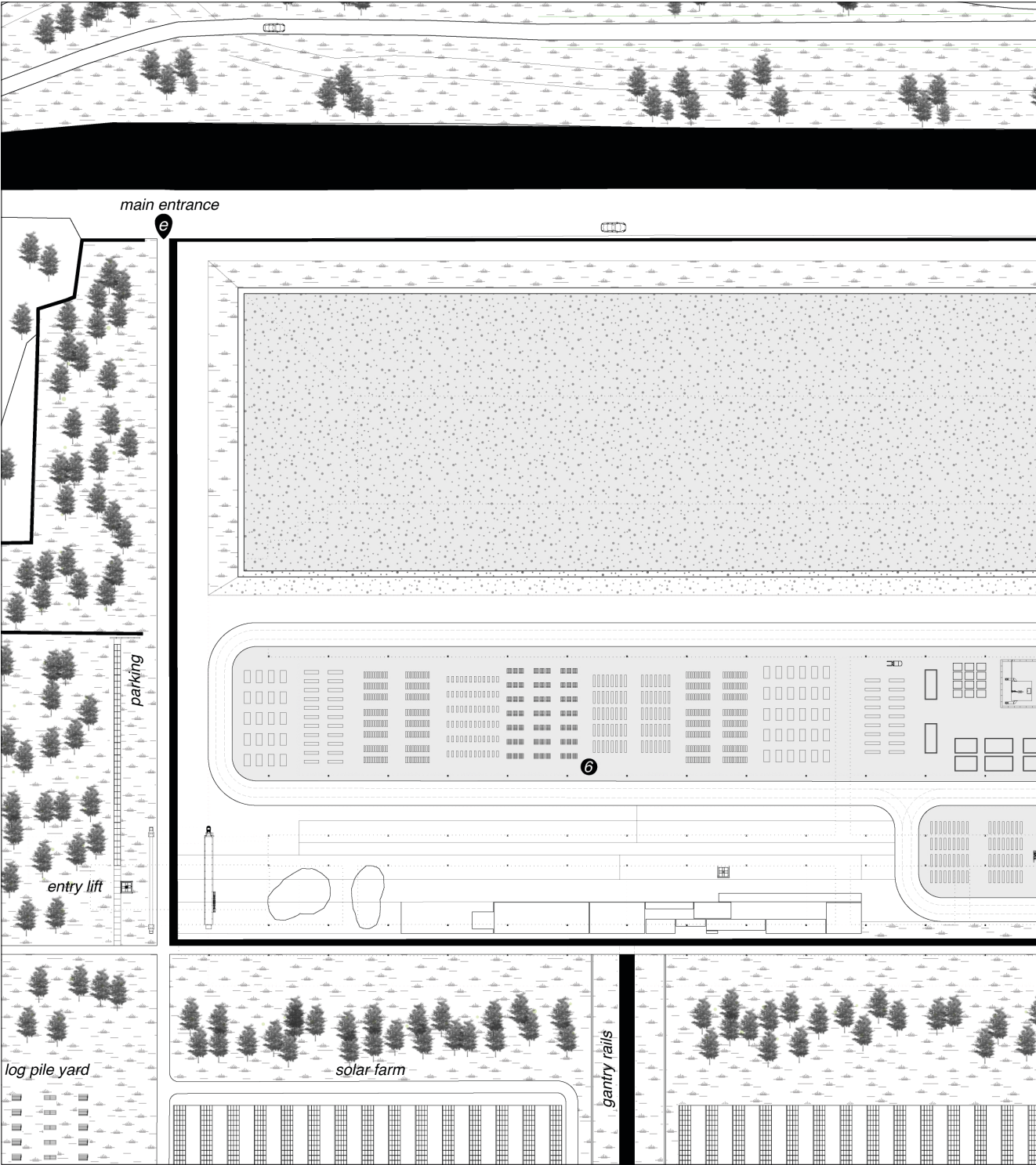
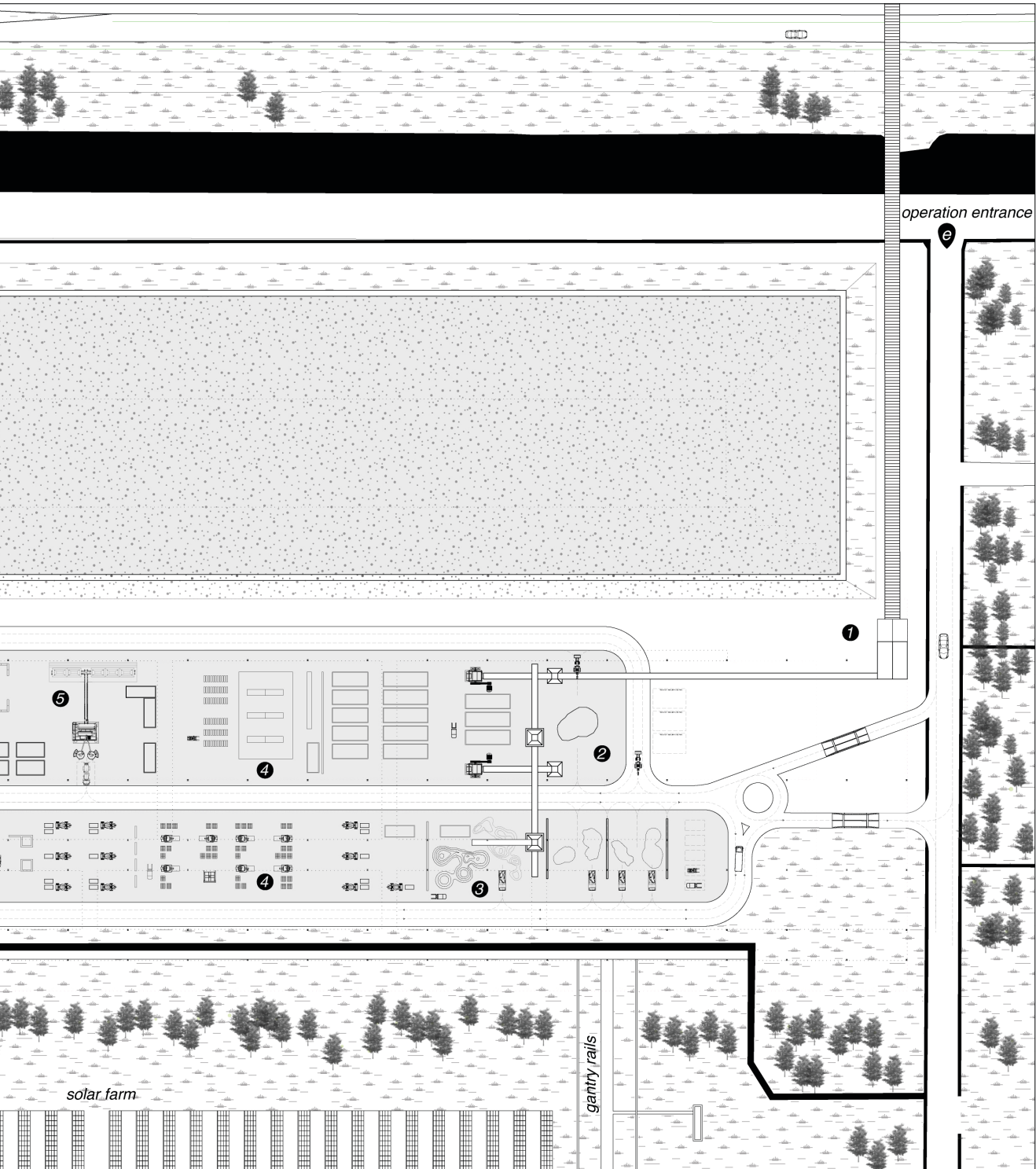


Fig. 29 Ground-floor plan of the operational area, showing the bottom ash processing sequence from receiving, unprocessed ash storage, and pre-processing to mixing, casting and forming, concrete testing, and the drying yard (Source: Pelin Yalçın, 2026).



First Floor Plan

The +10 level acts as a controlled interface between production, research and the ash mound. It includes laboratories, sample rooms, material archives, meeting spaces and technical support areas that remain closely connected to the working floor below. This level also relates to the bridge elements that extend toward the mound. These pieces are assembled and moved by the crane system along the roof structure, creating a physical connection between the building and the landscape route. While researchers work with material samples and documentation, the floor also supports this wider movement of elements from the production hall back into the ash landscape.

Public access is limited and guided through threshold spaces, so the research areas can remain controlled while still being visually connected to the larger material process.

- | | |
|----------------------|-------------------------|
| 1 exhibition space | 8 research data gallery |
| 2 exhibition space | 9 sample preparation |
| 3 library | 10 research labs |
| 4 material archives | 11 storage |
| 5 workshop area | 12 storage |
| 6 library | 13 technical room |
| 7 small seminar room | 14 operation room |

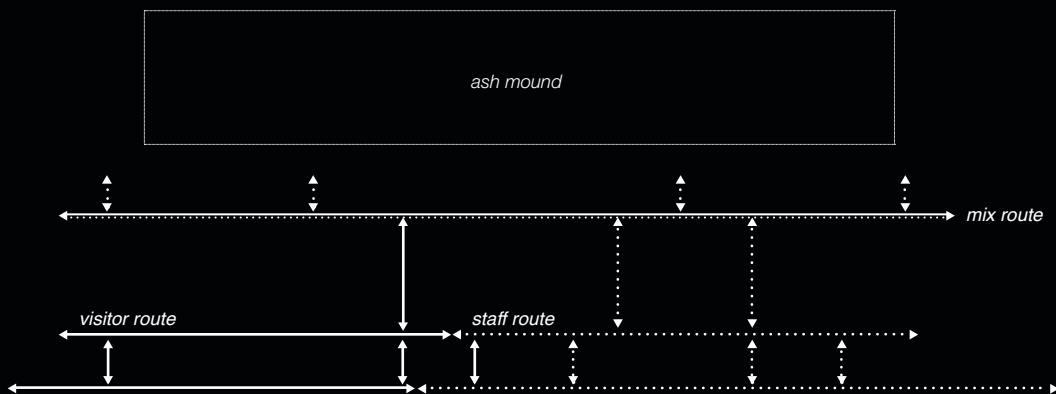




Fig. 30 View along the visitor promenade, positioned between the opened ash mound and the production hall. The elevated route allows visitors to observe both the exposed material stock and the ash-based production process, while remaining separated from the operational ground below (Source: Pelin Yalçın, 2026).

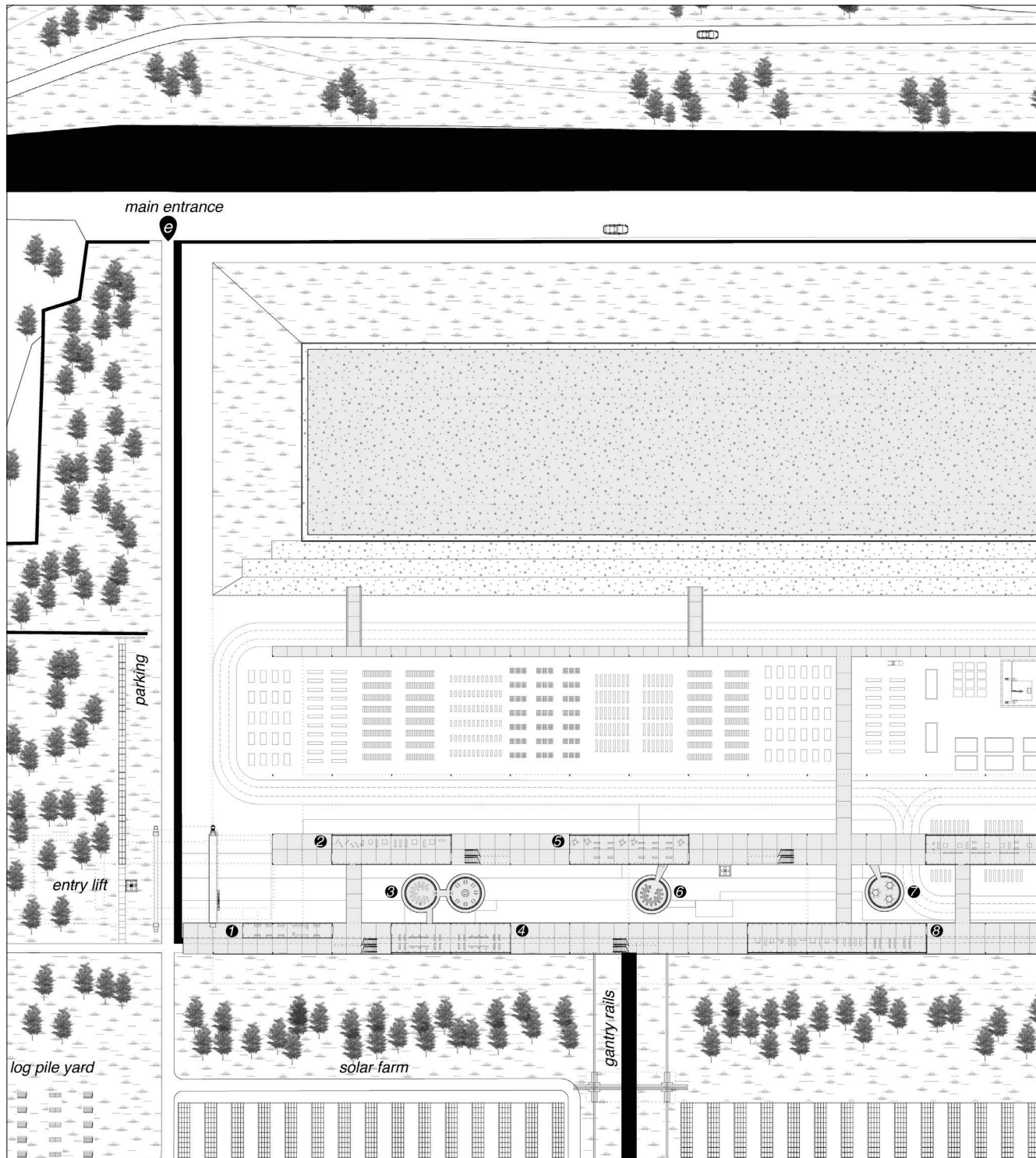
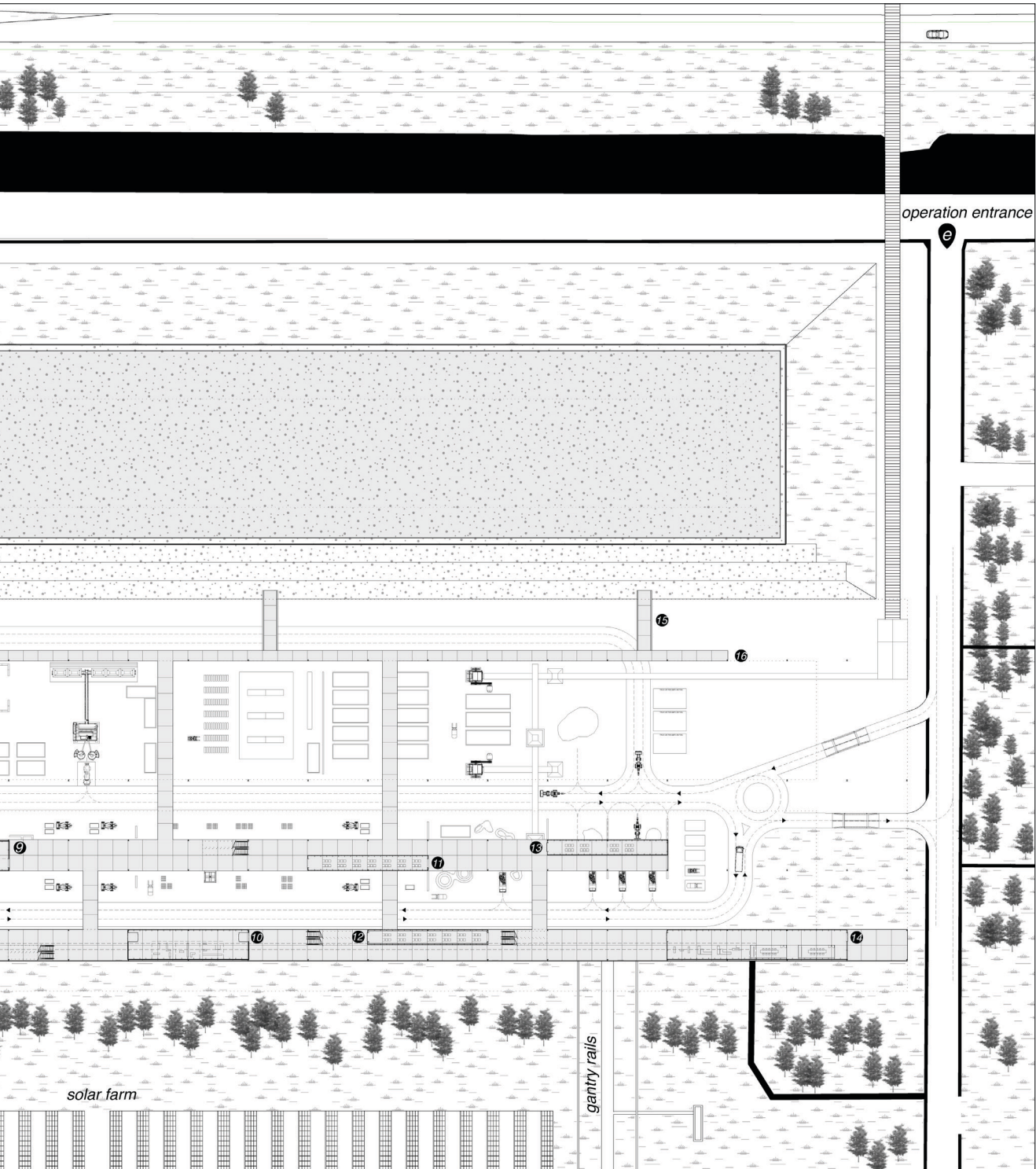


Fig. 31 First floor plan (+10,00) of the main building, showing the elevated visitor route, research spaces and controlled threshold areas between public circulation and the operational zone. The plan organizes observation, learning and material research within the same structural frame while maintaining restricted access to the ash-handling areas (Source: Pelin Yalçın, 2026).



Second Floor Plan

The +17 level is the main entrance and interface floor of the building. Visitors arrive here by the freight elevator through the visitor center, then continue toward the ash process gallery, material sample room and data gallery. From this elevated level, they can observe the production hall, the opened ash mound and the wider material landscape without entering the operational floor directly.

At the same time, this level also includes research and operational support spaces, such as research labs, common rooms, the operation center and technical areas. These programs are separated through buffer zones, but remain visually and spatially connected to the public route. The gantry café also connects to this level, turning the entrance floor into a point of arrival, observation, work and slow movement through the landscape.

- 1 visitor center

2 orientation room

3 ash process gallery

4 material sample room

5 data gallery

6 research collection

7 buffer zone
- 8 research labs

9 researcher common room

10 operation center

11 operation common room

12 technical room

13 gantry cafe

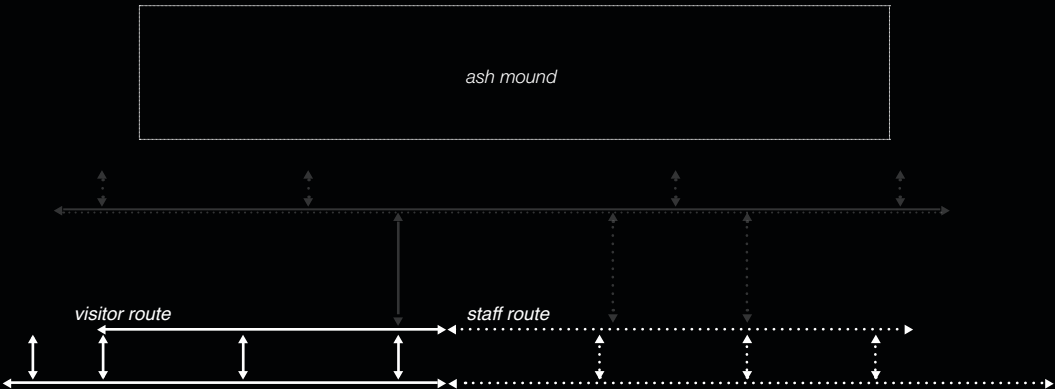




Fig. 32 View from the second-floor visitor promenade, showing the elevated public route between the operational hall, the reused silo and ash-mixed soil test beds. The planting areas act as small substrate experiments, while visitors observe the ash-processing activities from above within a sheltered structure of daylight, steel and material display (Source: Pelin Yalçın, 2026).

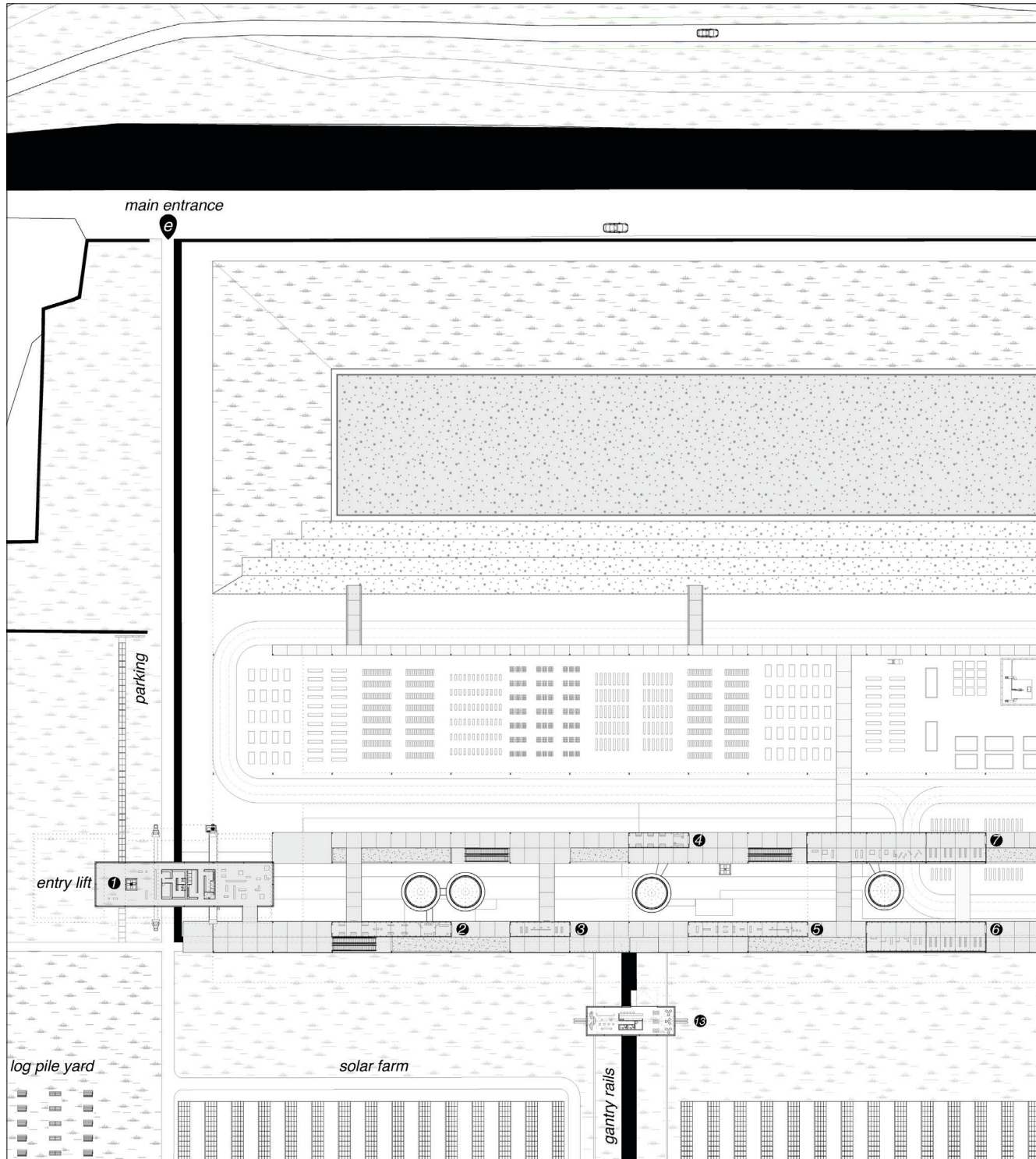
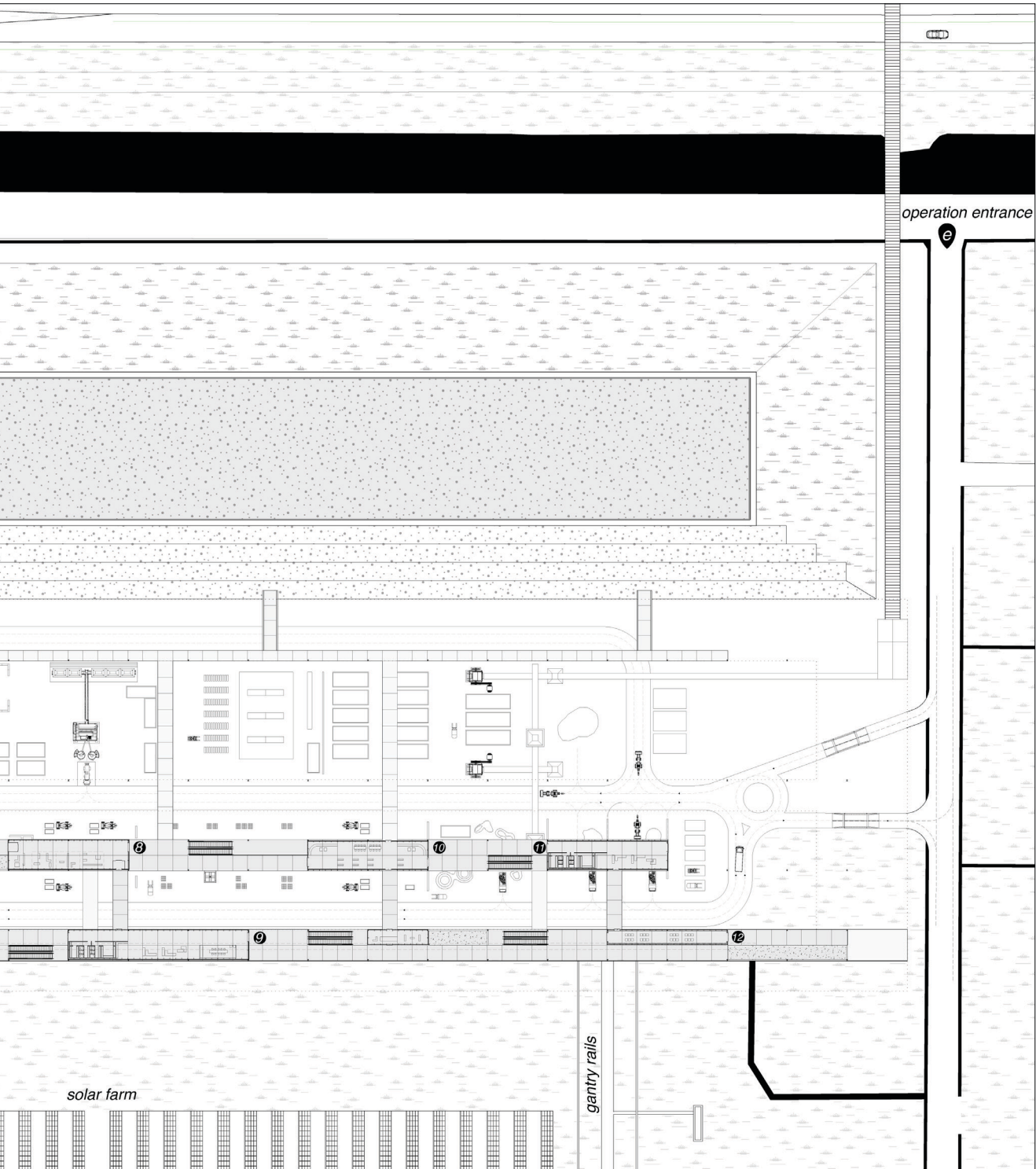


Fig. 33 Second floor plan of the main building, showing the main public promenade and visitor-oriented program. The plan organizes orientation spaces, exhibition galleries, material displays and observation points along an elevated route, allowing visitors to read the ash-processing system from above while remaining separated from the controlled research and operational areas (Source: Pelin Yalçın, 2026).



Section 01

This section explains how the building brings the material process, public route and landscape together under one roof. The building is mostly semi-open, because bottom ash should not be enclosed in a fully sealed interior. The material needs ventilation, dust control, moisture management and enough open air for safe handling. For this reason, the roof works more like a large protective cover than a closed building envelope.

Only specific functions are fully enclosed and conditioned, such as research labs, offices, common rooms, technical rooms and visitor spaces. These rooms are placed as glass and perforated-metal volumes within the larger open structure. This creates controlled indoor environments where they are needed, while the production and material areas remain more open and adaptable.

The main structure is steel, the floors are concrete-ash elements and the envelope uses metal sheet panels. These materials support a practical industrial logic: parts can be replaced, maintained or adapted over time. Inside the building, soil-ash mix areas and trees are included as part of the material landscape, showing how ash-based ground can relate to planting and monitoring.

Several moving systems are visible in the section: an overhead crane above the drying yard, a maintenance crane along the roof edge and research bridges extending toward the cut side of the mound. Together, they connect the opened mound, production areas, enclosed rooms and landscape route into one active material system.



Fig. 34 Section through the ash mound and main building, showing the project as a connection between ash mound, processing infrastructure and public observation. The cut opens the mound, while the building organizes extraction, research, production and visitor routes above the operational ground (Source: Pelin Yalçın, 2026).

Section 02

This section shows the opened ash mound, main building, production areas and the harvested silo from the port within the same spatial sequence. Together, they make visible a cycle that is usually hidden after the moment of disposal. We produce, consume and throw things out, but what happens after that often disappears from public view. In this project, that forgotten part of the cycle becomes visible again.

From the elevated route, visitors can see where the bottom ash is stored, how it is moved and how it is transformed into new architectural and landscape elements. The harvested silo adds another layer to this idea. It shows that not only materials, but also industrial structures from the port can be reused and given a new role.

Through this spatial arrangement, the building creates awareness of the material consequences of everyday life. The aim is to make visitors aware of the systems behind the materials around them. The ash in this project is not anonymous; it is produced by people, cities and everyday consumption. By seeing the mound, the machines, the material samples and the reused port elements together, visitors understand that they are also actors within this cycle of production, waste and reuse.

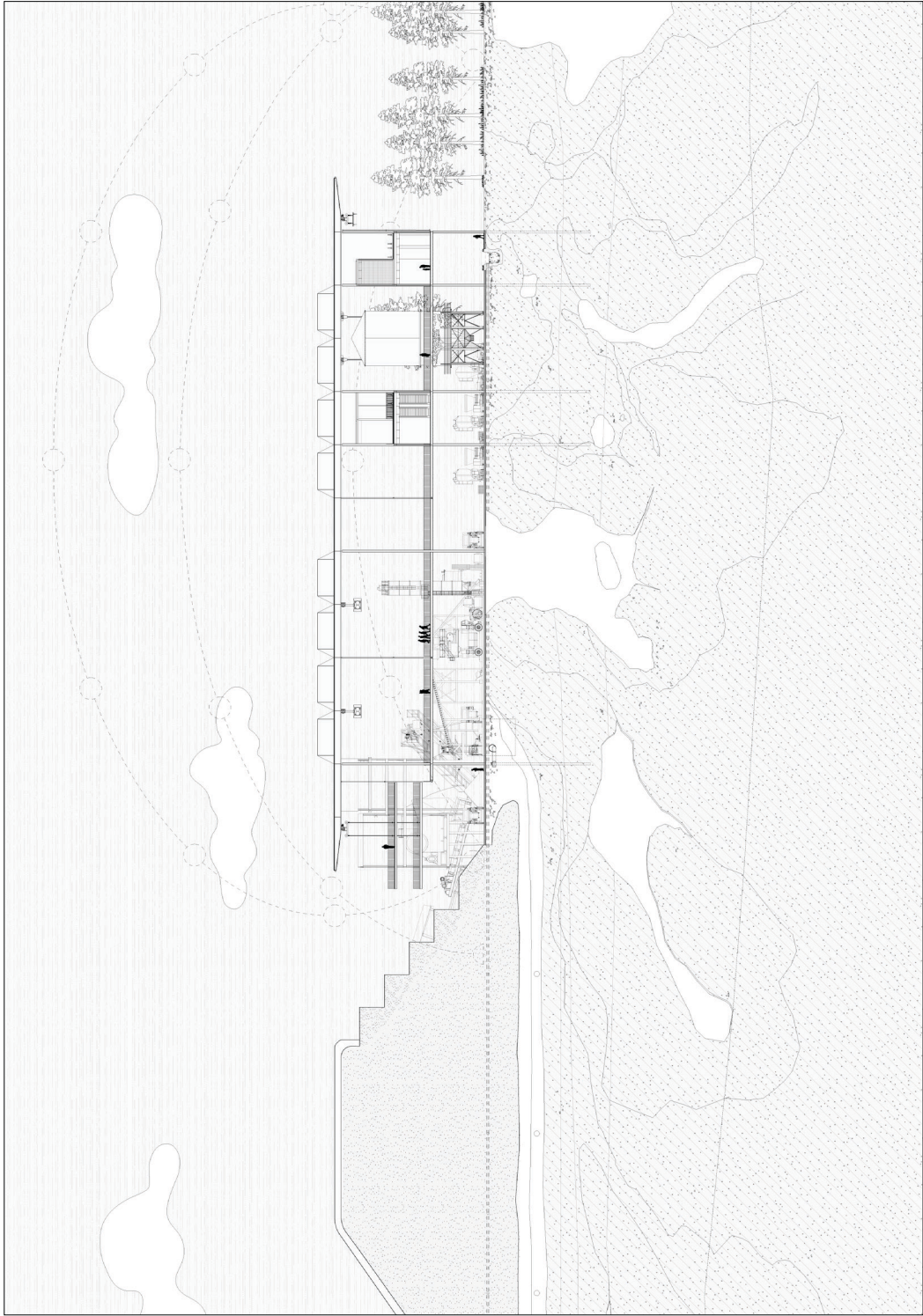


Fig. 35 Section through the ash mound and main building, showing the relationship between the opened mound, production hall, visitor route and reused silo. The silo becomes a vertical marker within the building, connecting material reuse, exhibition and monitoring to the wider ash-processing landscape (Source: Pelin Yalçın, 2026).

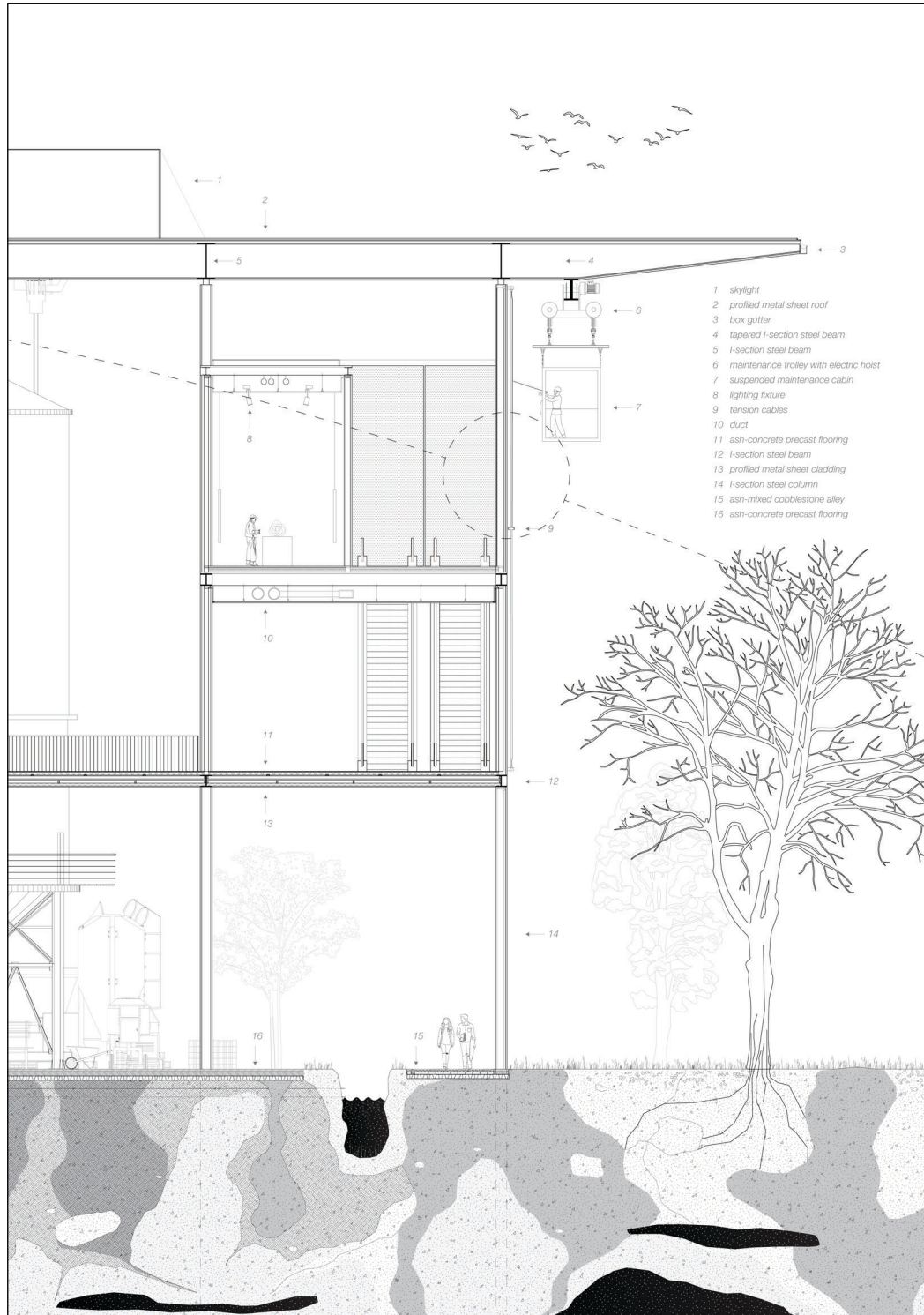
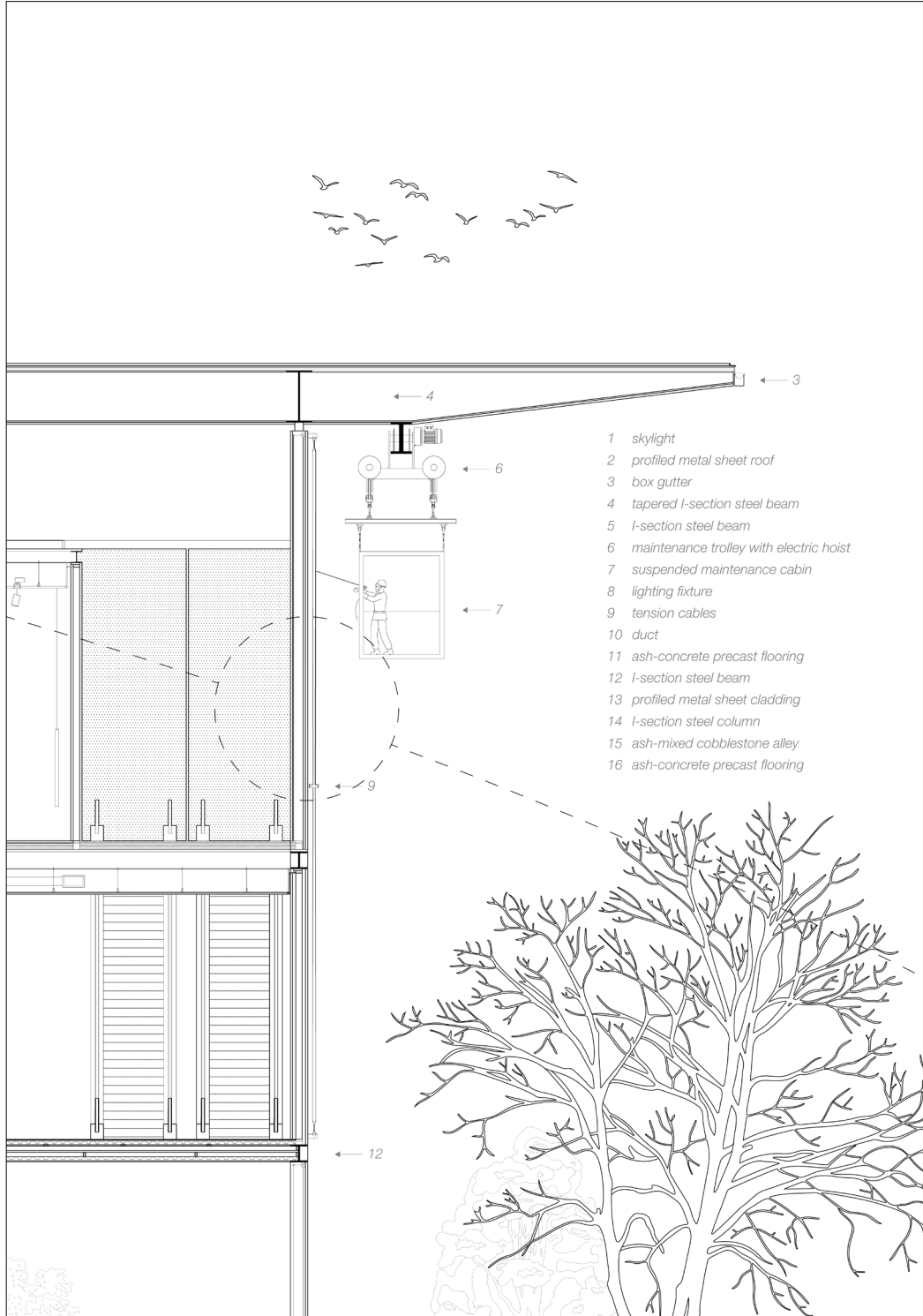


Fig. 36 System section showing the coexistence of different materials, structures and technical elements under one roof. The steel frame, profiled metal roof, skylights, suspended rooms, ash-concrete floors, maintenance crane cabin and landscape come together as part of the same operational architectural system (Source: Pelin Yalçın, 2026).



3.7 Material Strategy: Constructing with Processed Ash

The material strategy focuses on the products that can be produced in the operational center after bottom ash has been excavated, sorted, washed, classified and tested. Raw bottom ash is not treated as directly usable. Its architectural application depends on particle size, mineral composition, metal content, leaching behavior, contamination level and the environmental requirements of each use (van Meerwijk 2021). For this reason, the project works with processed ash fractions and controlled production methods.

The operational center becomes a material workshop where different ash-based products are developed for architectural and landscape use. These products include precast ash concrete blocks, paving blocks, precast ash slabs, concrete ash bricks, rammed ash panels, gabion walls, loose landscape material and bio-ash blocks. Together, they form a material palette rather than a single material solution. Each product responds to a different scale, exposure level and degree of public contact.

Precast ash concrete blocks, concrete ash bricks and precast ash slabs are used where the material needs to become modular, transportable and structurally clear. These elements can support paths, edges, platforms, small retaining structures or pavilion components. Paving blocks are used for public routes and landscape surfaces where the material is stabilized and contained. Gabion walls allow coarser ash fractions or aggregate-like materials to be displayed while remaining physically enclosed. Rammed ash panels make the layered character of the material visible and can be used as walls, screens or sample surfaces. Other products are more experimental. Loose landscape material can be tested in controlled patches where drainage, vegetation and surface behavior can be monitored. Bio-ash blocks explore the possibility of combining processed mineral material with biological growth, such as moss, algae or low vegetation. These applications are not presented as finished construction standards. They operate as prototypes that test how processed ash can perform under different landscape and environmental conditions.

The strategy separates material uses according to risk, contact and performance. Public areas require more stable and controlled applications, such as paving units, slabs, bricks or sealed precast elements. Experimental zones can allow more visible testing, especially where researchers can monitor weathering, water movement, vegetation growth and material behavior over time. This distinction allows the project to use bottom ash responsibly without reducing its architectural potential. Through these products, the transformation of the mound becomes visible. Bottom ash moves from hidden stock to sorted fraction, from processed material to constructed element, and from waste residue to part of a new ground condition. The material strategy therefore connects the mound, the main building, the landscape parcels and the public route. It shows that the value of bottom ash does not exist automatically; it is produced through treatment, testing, design and careful application.

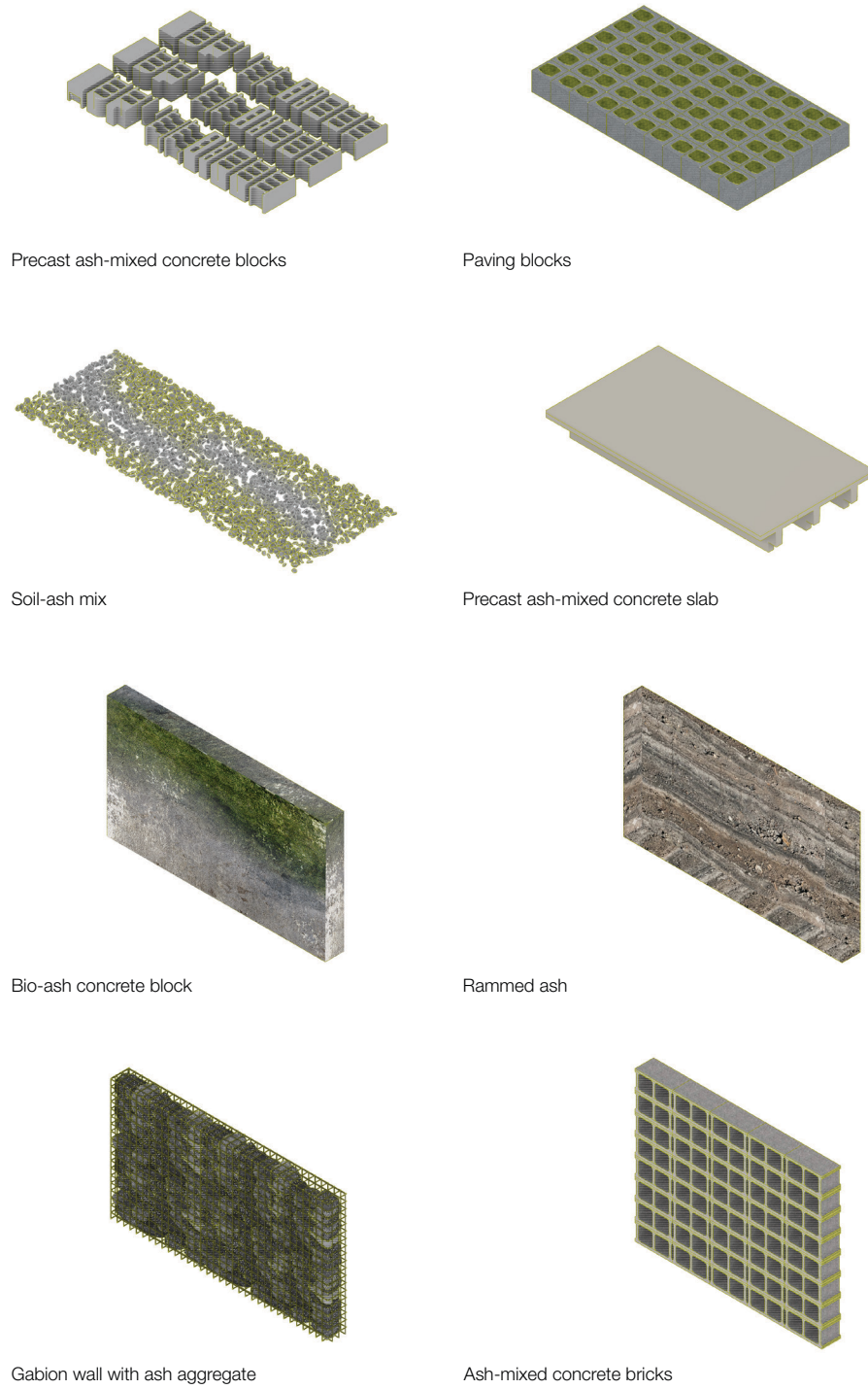


Fig. 37 Ash-based material prototypes developed from processed bottom ash fractions, showing possible applications in blocks, paving, slabs, soil mixtures, rammed panels, bio-integrated elements, gabion walls and brick systems (Source: Pelin Yalçın, 2026).

3.8 Public Route, Awareness and Visitor Experience

The visitor experience is organized through two connected sequences: the experience inside the main building and the experience across the landscape. In both sequences, public movement is separated from operational ground, while remaining visually connected to the material process. Visitors do not enter the working zones directly. Instead, they encounter the project through controlled proximity, elevated views, moving equipment, exposed logistics and landscape-scale material applications.

The building experience begins before visitors enter the main structure. After parking, they approach the site through an entrance pavilion and are directed toward a freight elevator. This choice is intentional. Visitors cannot access the main building from the operational ground level, where trucks, cranes, conveyors and material handling take place. The first architectural image is therefore industrial: the main building appears as a bridge-like structure, connected to an old crane from the port, the freight elevator and the elevated visitor center. This arrival makes the infrastructural character of the project visible from the beginning.

Once inside the visitor center, the public enters a sequence of platforms, corridors and observation points. From these elevated spaces, visitors can look down toward the operational ground and observe the constant movement of trucks, cranes and conveyors. The conveyor connection between the sorting station and the building can be seen from the platform facing the mound, allowing visitors to understand how bottom ash moves through the ash loop. The building itself also contains moving elements. A large overhead crane connected to the roof operates the drying area, while another crane near the mound-side platform controls movable bridges and makes it possible to approach the cut section of the mound. These movements turn the building into an active spatial device rather than a static viewing platform.

The route then extends from the building toward the landscape. After descending back to ground level, visitors can follow a walking route parallel to the main building, where the operational process can be read step by step from a safe distance. If they continue toward the landscape side, the experience changes. The view opens toward poplar parcels, pavilions, test grounds and productive fields. Here, the project becomes less about observing heavy operation from above and more about encountering the afterlife of bottom ash through landscape, material prototypes and mobile structures.

Movement remains important in the landscape sequence. A mobile crane café and a research crane introduce changing points of activity across the site. The café can leave its station, move through the landscape and return to the building within a one-hour cycle, allowing visitors to experience the site as a working field rather than a fixed park. Between the poplar trees, visitors encounter pavilions made from harvested port materials, such as silos, scaffolding and other reused industrial components. These pavilions

mark different functions and moments within the route, while their specific stories are developed further in the pavilion and parcel prototypes.

The landscape also introduces future scenarios. Poplar parcels are understood as temporary productive landscapes with a limited growth cycle. When some of these trees reach the end of their lifespan, selected parcels can be transformed into solar energy fields. Inspired by historic fruit walls, these future energy parcels use sloped ash-based topographies to optimize exposure and production. In this way, the landscape is not presented as a finished park, but as a changing ground where planting, harvesting, energy production and material reuse can follow one another over time.

Through this route, visitors gradually read the site as a material cycle. The experience begins with the industrial image of the building, continues through elevated observation of the ash loop and expands into a landscape of pavilions and productive parcels. Public awareness is created through movement, distance, sound, machinery and changing views. Waste is no longer understood as something that disappears, but as a material condition that continues to move, transform and shape the ground.

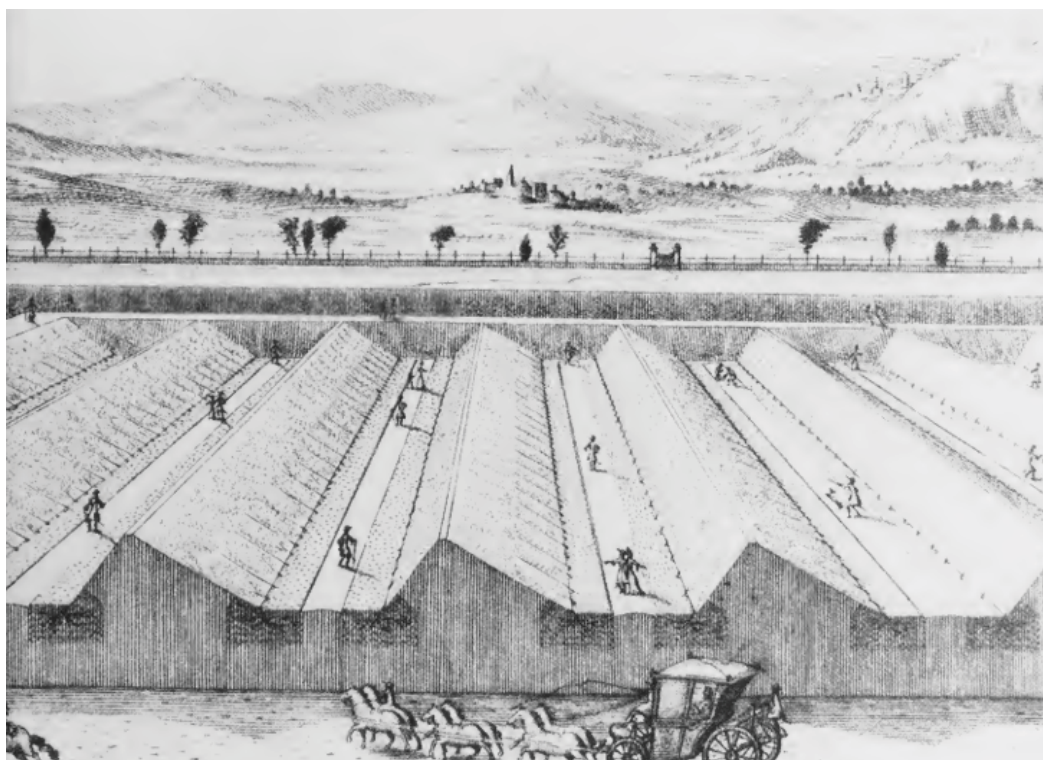
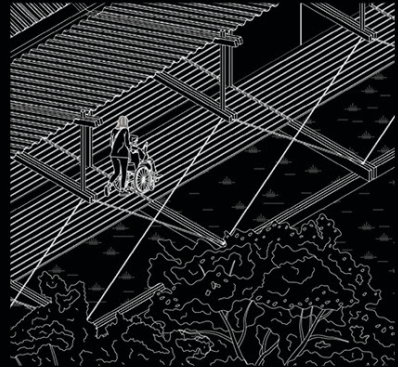
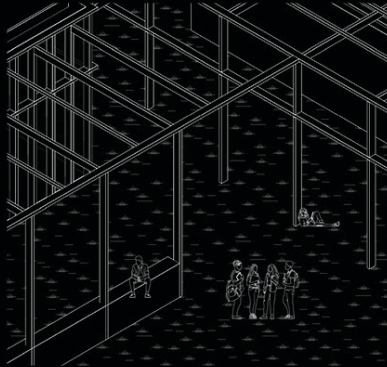
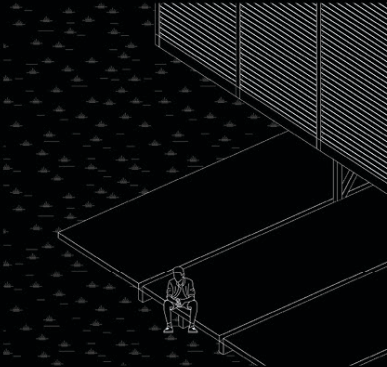
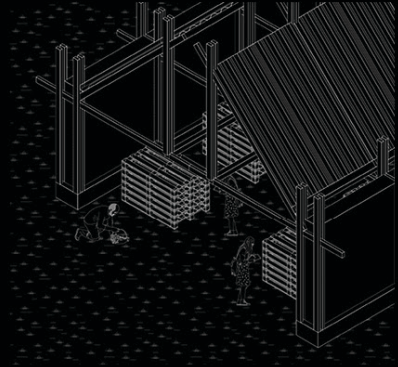
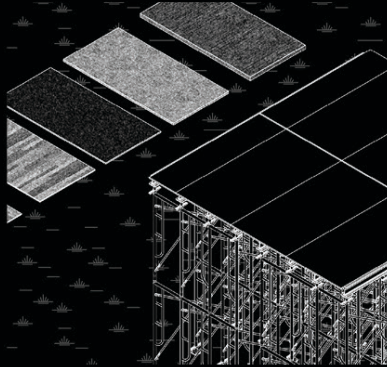
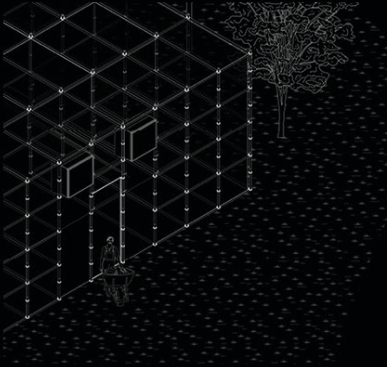


Fig. 38 Engraving of sloping fruit walls in seventeenth-century France, from (Source: Nicolas Fatio de Duillier from *Fruit Walls Improved*, 1983).



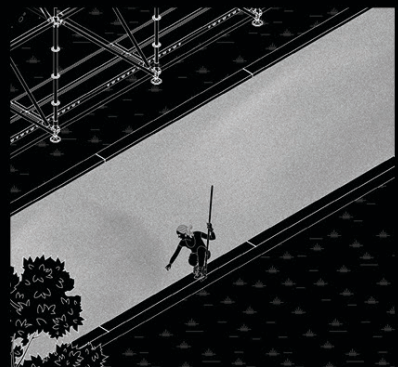
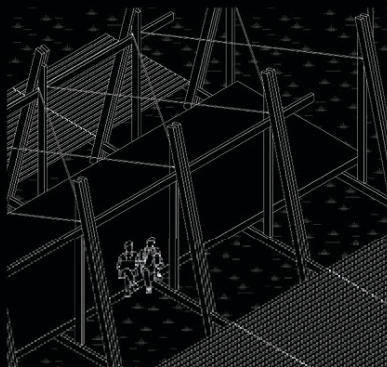
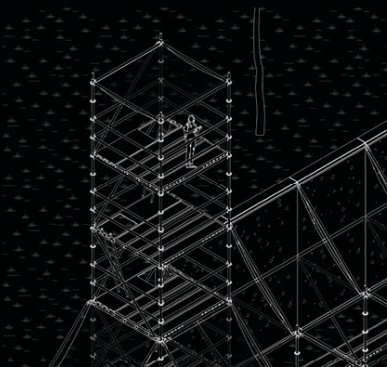
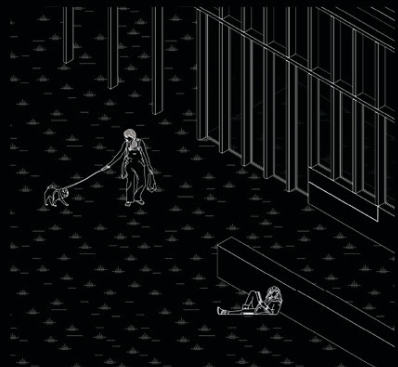
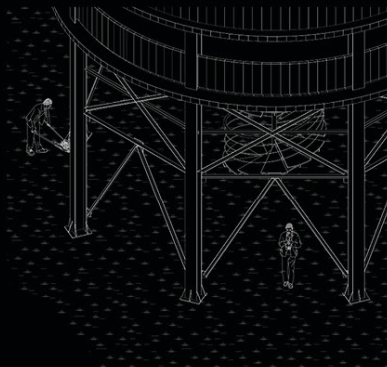
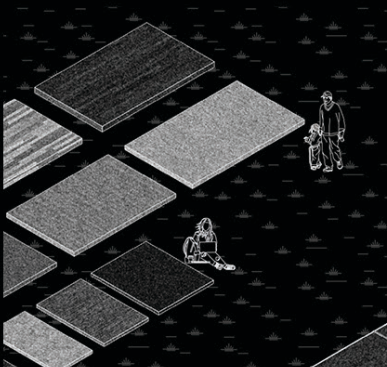
Fig. 39 View of the main building from the solar farm, where ash-based ground is used as a testing surface for future productive landscapes. The building combines steel structure, transparent façades, elevated visitor routes and production spaces under one large roof (Source: Pelin Yalçın, 2026).



OUT OF THE ASH:

Exploring New Material Agendas in Architecture and Landscape

PAVILIONS



3.9 Pavilion and Parcel Prototypes

The visitor experience is organized through two connected sequences: the experience inside the main building and the experience across the landscape. In both sequences, public movement is separated from operational ground, while remaining visually connected to the material process. Visitors do not enter the working zones directly. Instead, they encounter the project through controlled proximity, elevated views, moving equipment, exposed logistics and landscape-scale material applications.

The building experience begins before visitors enter the main structure. After parking, they approach the site through an entrance pavilion and are directed toward a freight elevator. This choice is intentional. Visitors cannot access the main building from the operational ground level, where trucks, cranes, conveyors and material handling take place. The first architectural image is therefore industrial: the main building appears as a bridge-like structure, connected to an old crane from the port, the freight elevator and the elevated visitor center. This arrival makes the infrastructural character of the project visible from the beginning.

Once inside the visitor center, the public enters a sequence of platforms, corridors and observation points. From these elevated spaces, visitors can look down toward the operational ground and observe the constant movement of trucks, cranes and conveyors. The conveyor connection between the sorting station and the building can be seen from the platform facing the mound, allowing visitors to understand how bottom ash moves through the ash loop. The building itself also contains moving elements. A large overhead crane connected to the roof operates the drying area, while another crane near the mound-side platform controls movable bridges and makes it possible to approach the cut section of the mound. These movements turn the building into an active spatial device rather than a static viewing platform.

The route then extends from the building toward the landscape. After descending back to ground level, visitors can follow a walking route parallel to the main building, where the operational process can be read step by step from a safe distance. If they continue toward the landscape side, the experience changes. The view opens toward poplar parcels, pavilions, test grounds and productive fields. Here, the project becomes less about observing heavy operation from above and more about encountering the afterlife of bottom ash through landscape, material prototypes and mobile structures.

Movement remains important in the landscape sequence. A mobile crane café and a research crane introduce changing points of activity across the site. The café can leave its station, move through the landscape and return to the building within a one-hour cycle, allowing visitors to experience the site as a working field rather than a fixed park. Between the poplar trees, visitors encounter pavilions made from harvested port materials, such as silos, scaffolding and other reused industrial components.

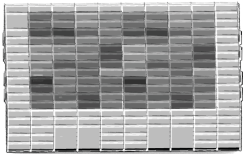
These pavilions mark different functions and moments within the route, while their specific stories are developed further in the pavilion and parcel prototypes.

The landscape also introduces future scenarios. Poplar parcels are understood as temporary productive landscapes with a limited growth cycle. When some of these trees reach the end of their lifespan, selected parcels can be transformed into solar energy fields. Inspired by historic fruit walls, these future energy parcels use sloped ash-based topographies to optimize exposure and production. In this way, the landscape is not presented as a finished park, but as a changing ground where planting, harvesting, energy production and material reuse can follow one another over time.

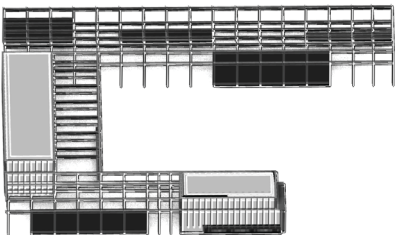
Through this route, visitors gradually read the site as a material cycle. The experience begins with the industrial image of the building, continues through elevated observation of the ash loop and expands into a landscape of pavilions, productive parcels and future transformations. Public awareness is created through movement, distance, sound, machinery and changing views. Waste is no longer understood as something that disappears, but as a material condition that continues to move, transform and shape the ground.

The pavilion series extends the project beyond the main building and distributes its material and spatial logic across the landscape. Each pavilion is developed in relation to a specific parcel condition, such as proximity to water, exposure to wind, agricultural adjacency, settlement monitoring, or public use. Together, they form a dispersed architectural system that tests how processed bottom ash and harvested port materials can be applied in different environmental and programmatic situations. Rather than repeating a single building type, the pavilions respond to local conditions and make the evolving landscape legible through use, construction, and occupation.

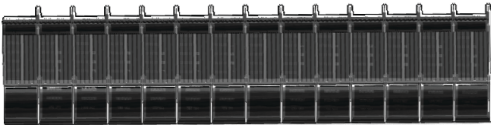
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P2



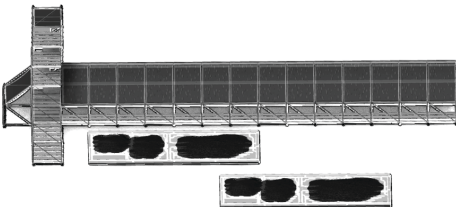
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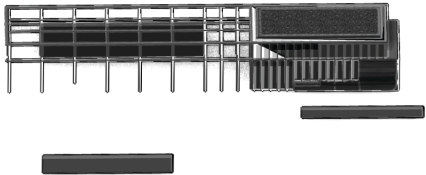
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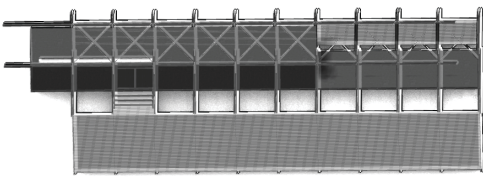
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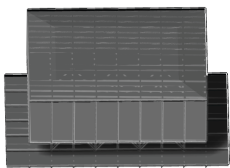
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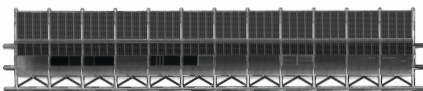
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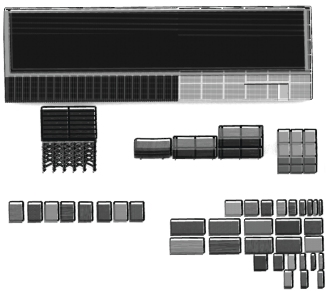
P8



P9



P10



P1 Greenhouse Pavilion / Farm Proximity Parcel

The Greenhouse Pavilion is located in the farm proximity parcel and supports cultivation experiments using soils mixed with bottom ash. Constructed from harvested scaffolding and polycarbonate panels, it provides a lightweight enclosure for testing plant growth, cultivation performance, and environmental conditions. Its program connects agricultural production with material research, turning the parcel into a testing ground for future planting strategies.

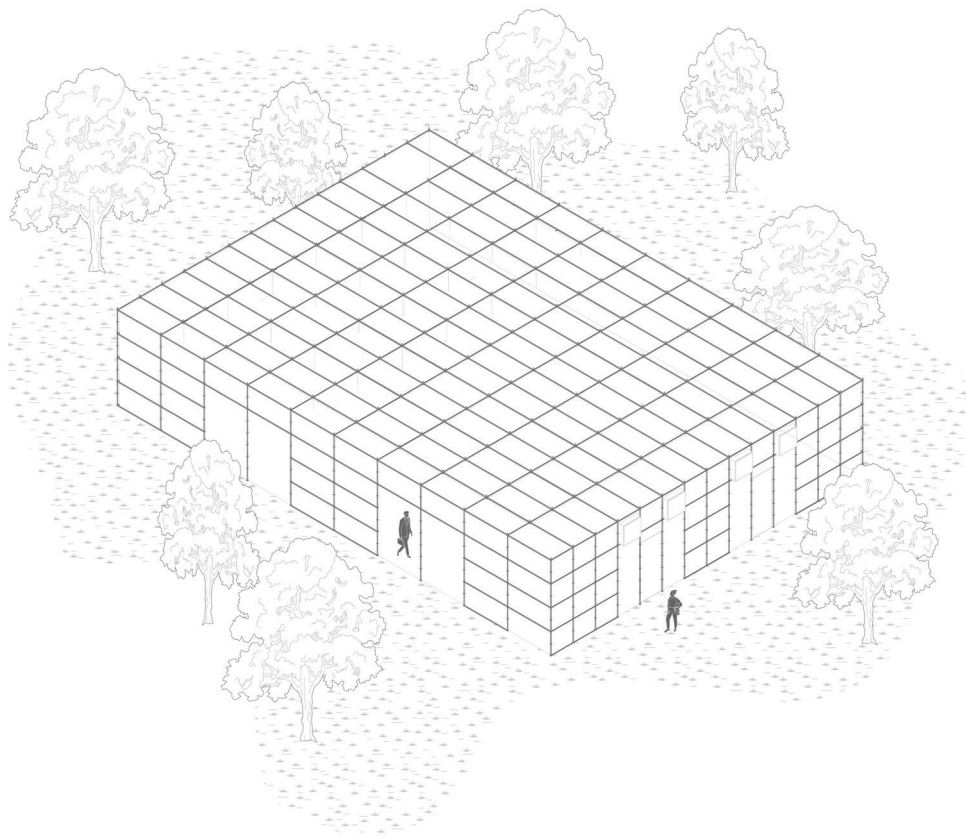




Fig. 40 Interior view of the Greenhouse Pavilion, showing soil-ash test beds and fiber-producing plants growing within a lightweight scaffolding and polycarbonate structure. The pavilion functions as a controlled cultivation space where processed ash mixtures, plant growth and future biomass applications for rammed ash prototypes can be tested (Source: Pelin Yalçın, 2026).

P2 Food and Beverage Pavilion / Poplar Parcel

Positioned close to the main building, the Food and Beverage Pavilion serves as a resting and gathering point for visitors. It is constructed from rammed ash walls and timber profiles, combining a heavy mineral expression with a lighter structural system. Its location near the visitor route makes it an important social point within the landscape, where the industrial and environmental narratives of the site are experienced through pause, observation, and everyday use.

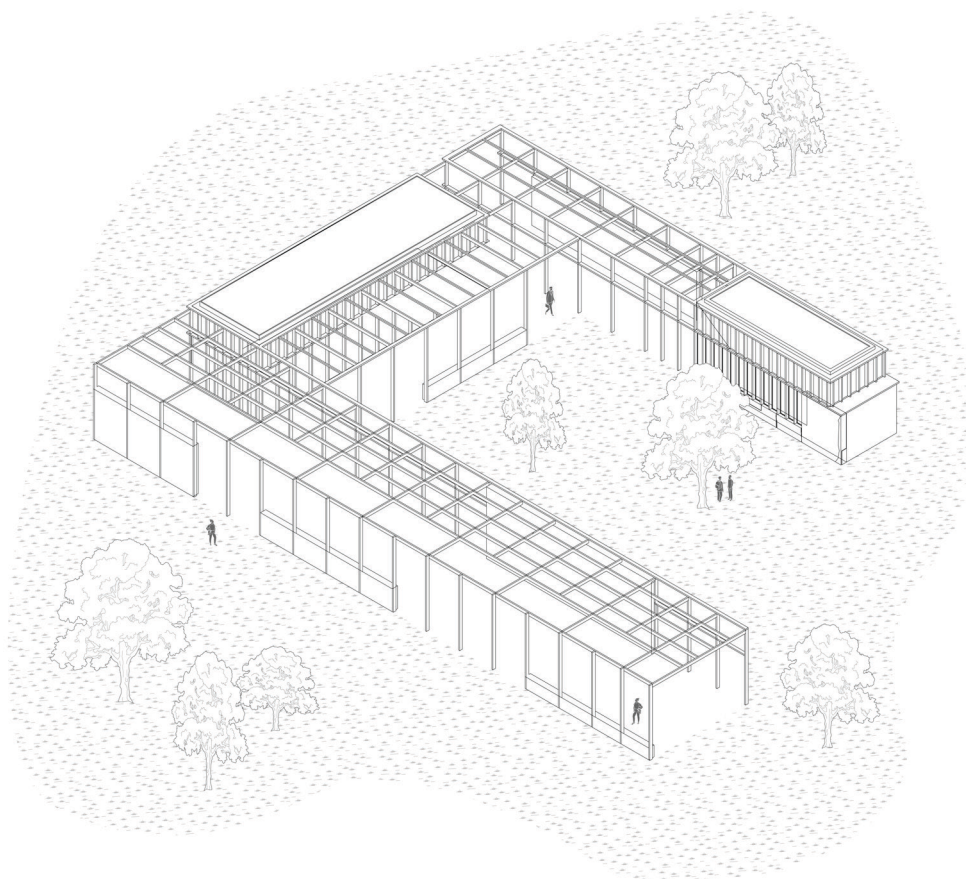




Fig. 41 View of the Food and Beverage Pavilion, showing a resting point along the visitor route where rammed ash walls, timber frames and vegetation define a softer public space. The pavilion allows visitors to pause, gather and experience the material landscape through everyday use (Source: Pelin Yalçın, 2026).

P3 Harvest Market Pavilion / Education Parcel

The Harvest Market Pavilion is conceived as a place where harvested materials from the port are displayed, discussed, exchanged and redistributed. Visitors can learn about the reuse potential of these elements and in some cases, take materials freely as part of an upcycling culture. The pavilion is built from a timber structure with rammed ash walls, and its roof is formed from harvested metal sheets. In this way, the building itself demonstrates the reuse logic it promotes.

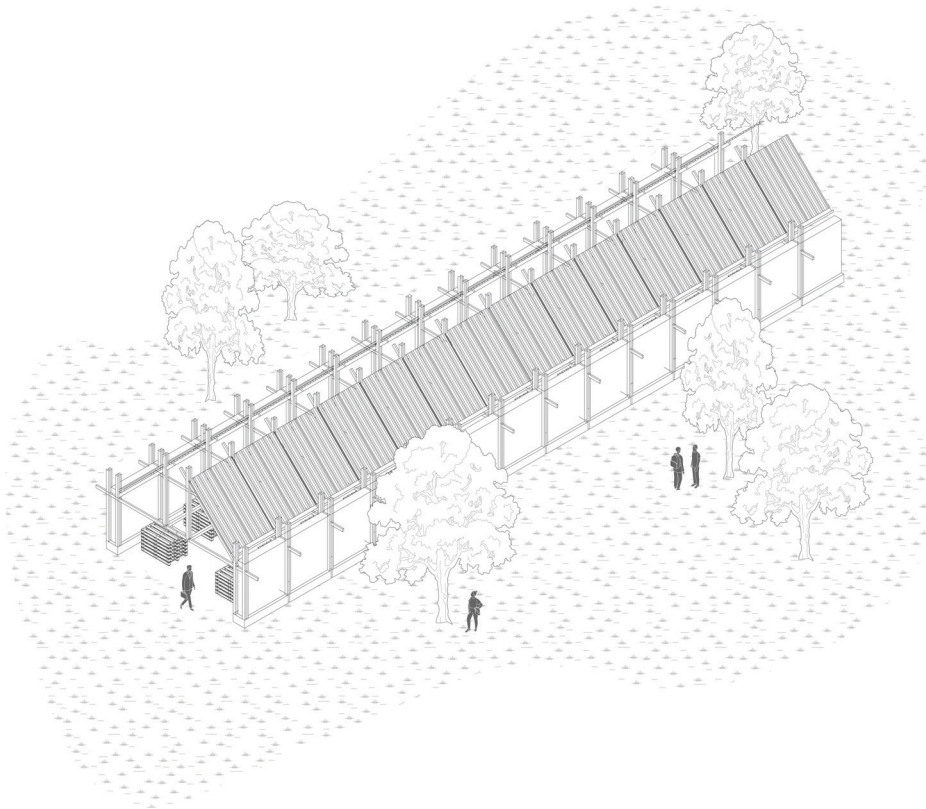




Fig. 42 Interior view of the Harvest Market Pavilion, where harvested port materials are displayed, exchanged and reused. Rammed ash walls, timber structure and reused wooden pallets from the port turn the pavilion into a public space for learning, upcycling and material redistribution (Source: Pelin Yalçın, 2026).

P4 Silo Pavilion / Settlement Monitoring Parcel

The Silo Pavilion reuses a decommissioned harbor silo relocated to the site. Raised on metal supports, it becomes both a monitoring instrument and an exhibition space. The ground movement of the ash landscape is measured through monitoring devices installed below and around the structure, while the interior hosts displays related to settlement, time, and material transformation. It acts as a marker of long-term change within the site.

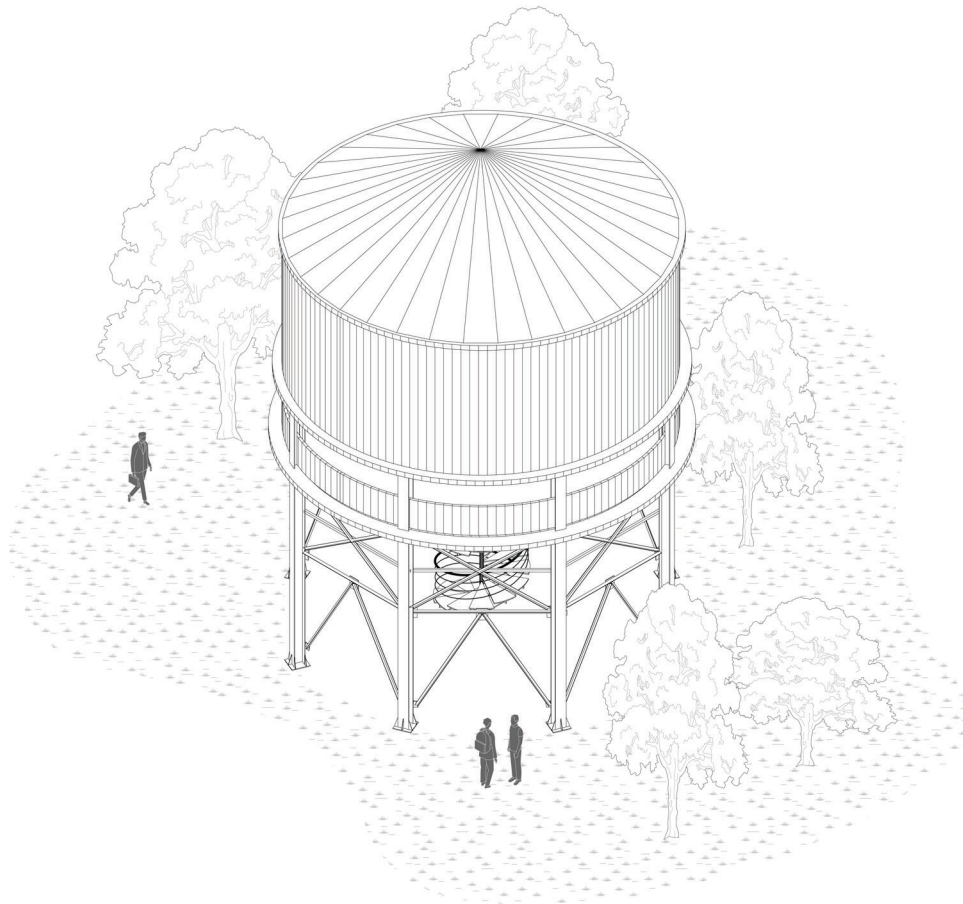




Fig. 43 View of the Silo Pavilion, showing a decommissioned harbor silo reused as an exhibition space and monitoring structure within the landscape. Raised on metal supports, the pavilion acts as a marker of material reuse, settlement and observation (Source: Pelin Yalçın, 2026).

P5 Bee Pavilion / Education Parcel

Located near the water, the Bee Pavilion responds to the presence of pollinators on the site. It is constructed from scaffolding and concrete ash blocks, with perforations in the blocks that allow bees to inhabit them. An observation tower is attached to the pavilion, giving visitors a raised point from which to observe the landscape and the ecological role of the parcel. The pavilion works as both habitat and public learning device.

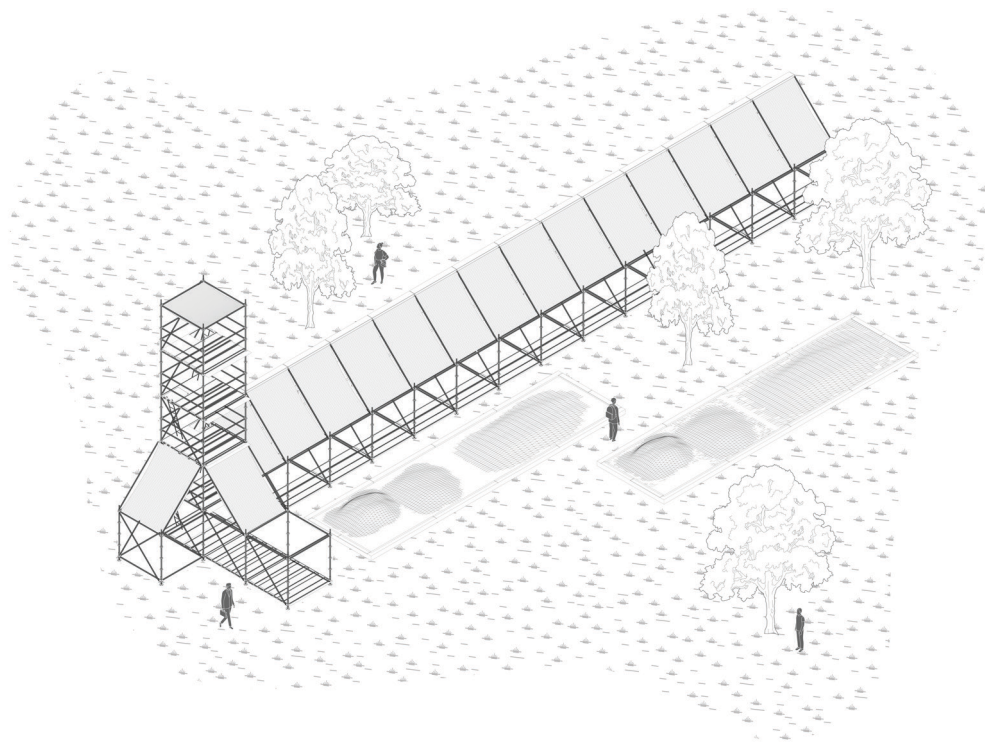




Fig. 44 View of the Bee Pavilion, showing perforated ash-concrete blocks and a scaffolding observation tower placed within the landscape. The pavilion works as both habitat and public learning structure, allowing pollinators to inhabit the wall while visitors observe the ecological role of the parcel (Source: Pelin Yalçın, 2026).

P6 Entrance Pavilion, Poplar Parcel

The Entrance Pavilion is located near the ferry station as a secondary point of arrival to the site. It acts as an orientation threshold where visitors are introduced to the landscape, its material history and the transformation of the bottom ash mound. Built from timber and rammed ash, the pavilion combines a light structural frame with layered mineral walls that refer to the stratified ground of the site.

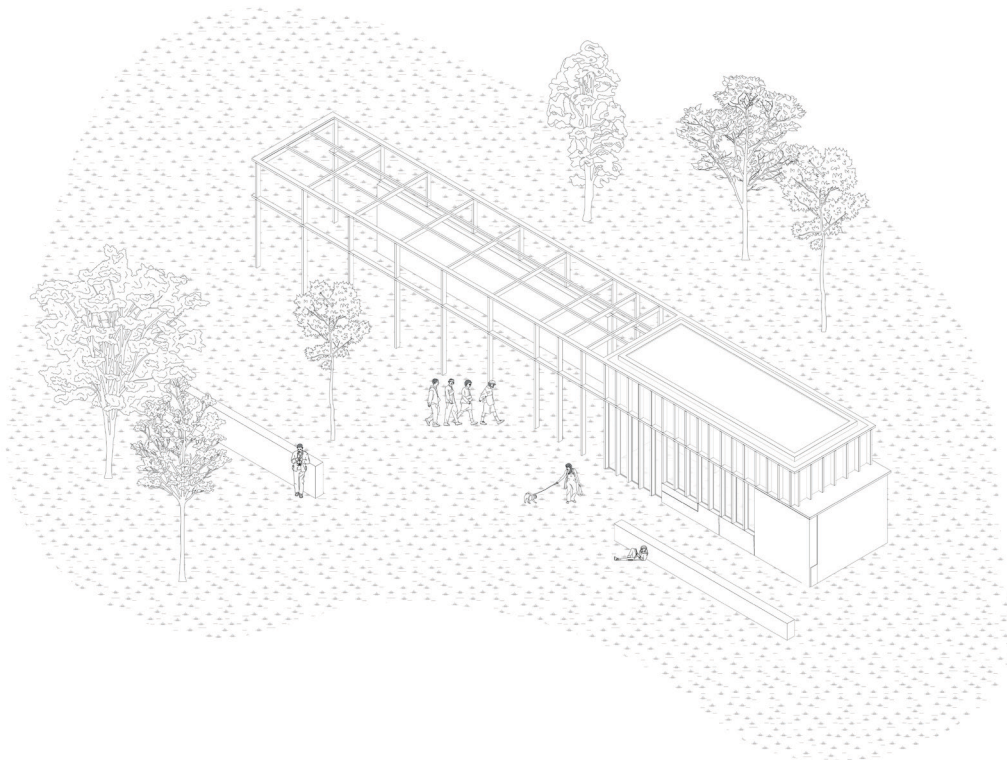




Fig. 45 View of the secondary Entrance Pavilion near the ferry station, where timber frames and rammed ash walls create a threshold into the site. The pavilion introduces visitors to the landscape through temporary exhibitions, material displays and information about the ash mound before they continue along the route (Source: Pelin Yalçın, 2026).

P7 Bridge Pavilion / Wet Adaptation Parcel

The Bridge Pavilion is located within the wet adaptation parcel and functions as a small café and stopping point along the landscape route. Built from concrete ash blocks and supported by a timber structure, it stretches across the water like a narrow bridge. Its position emphasizes the relation between architecture, hydrology, and occupation, allowing visitors to inhabit a threshold condition between land and water.

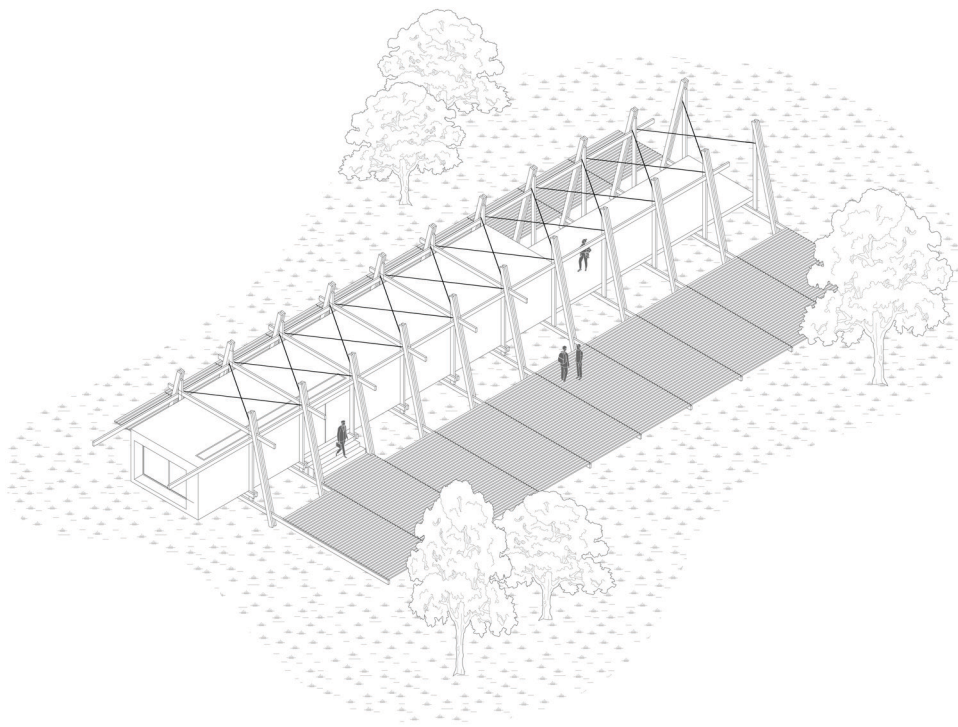
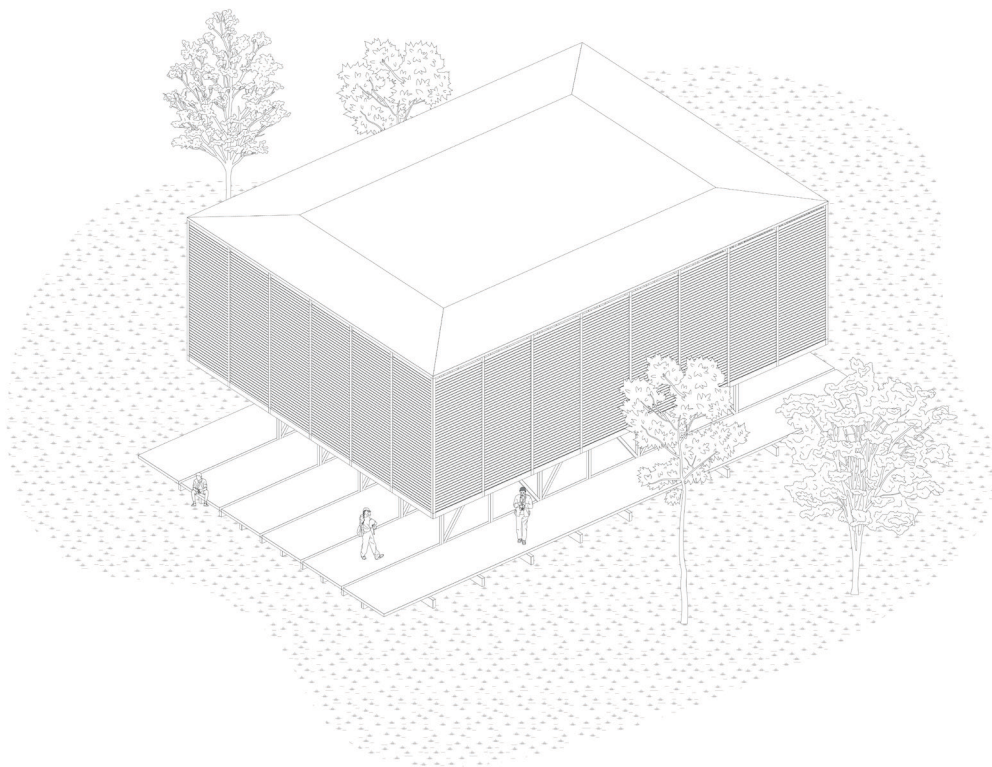




Fig. 46 View of the Bridge Pavilion in the wet adaptation parcel, where ash-concrete blocks and a timber structure form a small café over the water. The pavilion creates a pause along the landscape route and lets visitors inhabit the threshold between drainage, planting and public movement (Source: Pelin Yalçın, 2026).

P8 Entrance Pavilion, Poplar Parcel

The Entrance Pavilion is located near the cycling club as a secondary, more secluded point of arrival. Positioned at the beginning of the route, it introduces the site through movement, learning and material reuse. Built entirely from timber, including elements harvested from trees on and around the site, the pavilion was constructed by students in the education parcel.



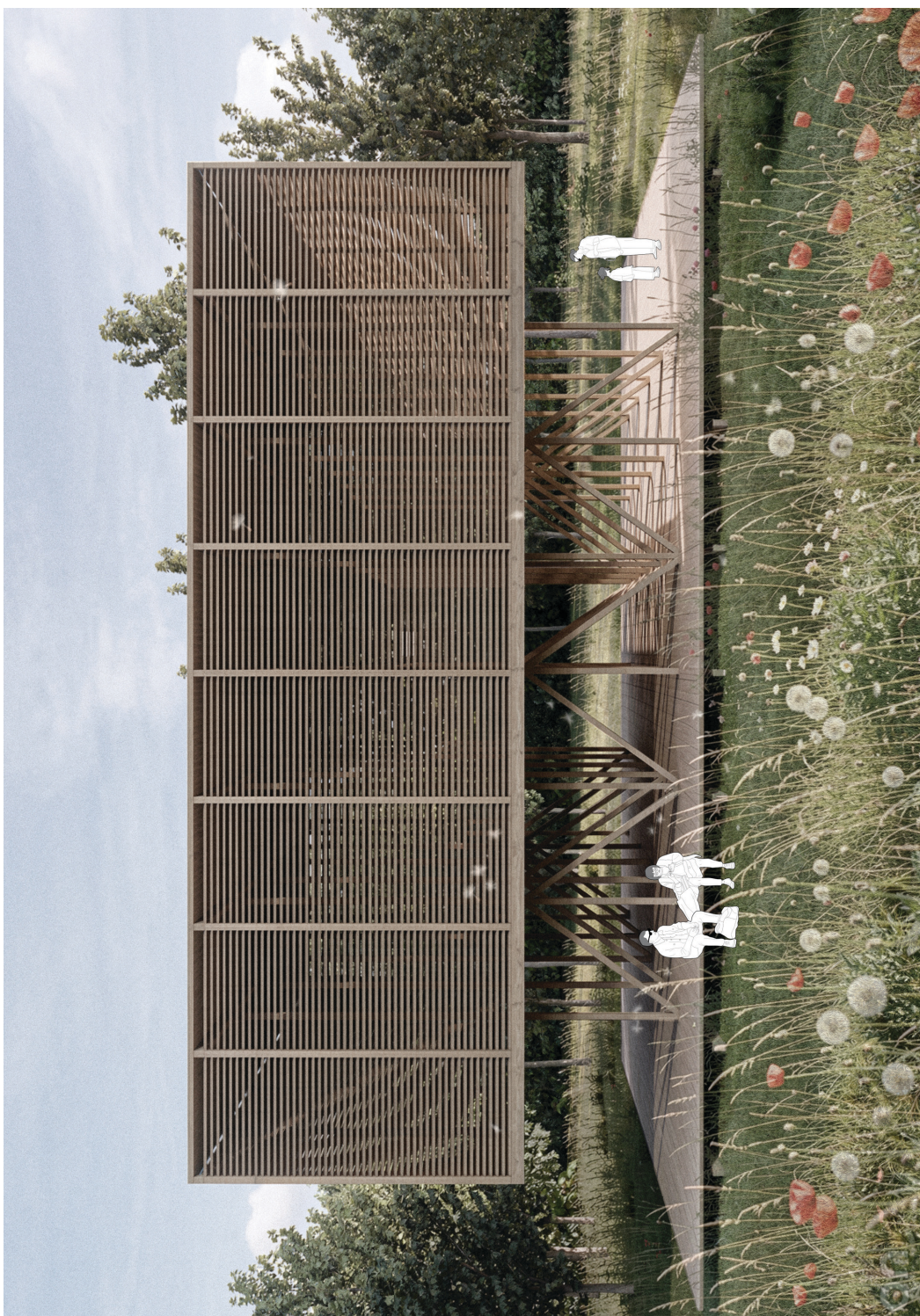


Fig. 47 View of the Entrance Pavilion near the cycling club, marking a quieter secondary entrance to the site. Built entirely from timber, including elements harvested from nearby trees, the pavilion introduces the cycling route as a place of arrival, rest and collective learning (Source: Pelin Yalçın, 2026).

P9 Wall Pavilion / Wind Exposure Parcel

The Wall Pavilion is placed in a parcel where wind conditions are strongly felt. It consists of a timber structure supporting a series of wall prototypes made from different ash-based materials. Each wall segment tests a specific construction system and its performance under exposure. The pavilion operates as a full-scale testing environment where structural behavior, weathering and durability can be observed over time.

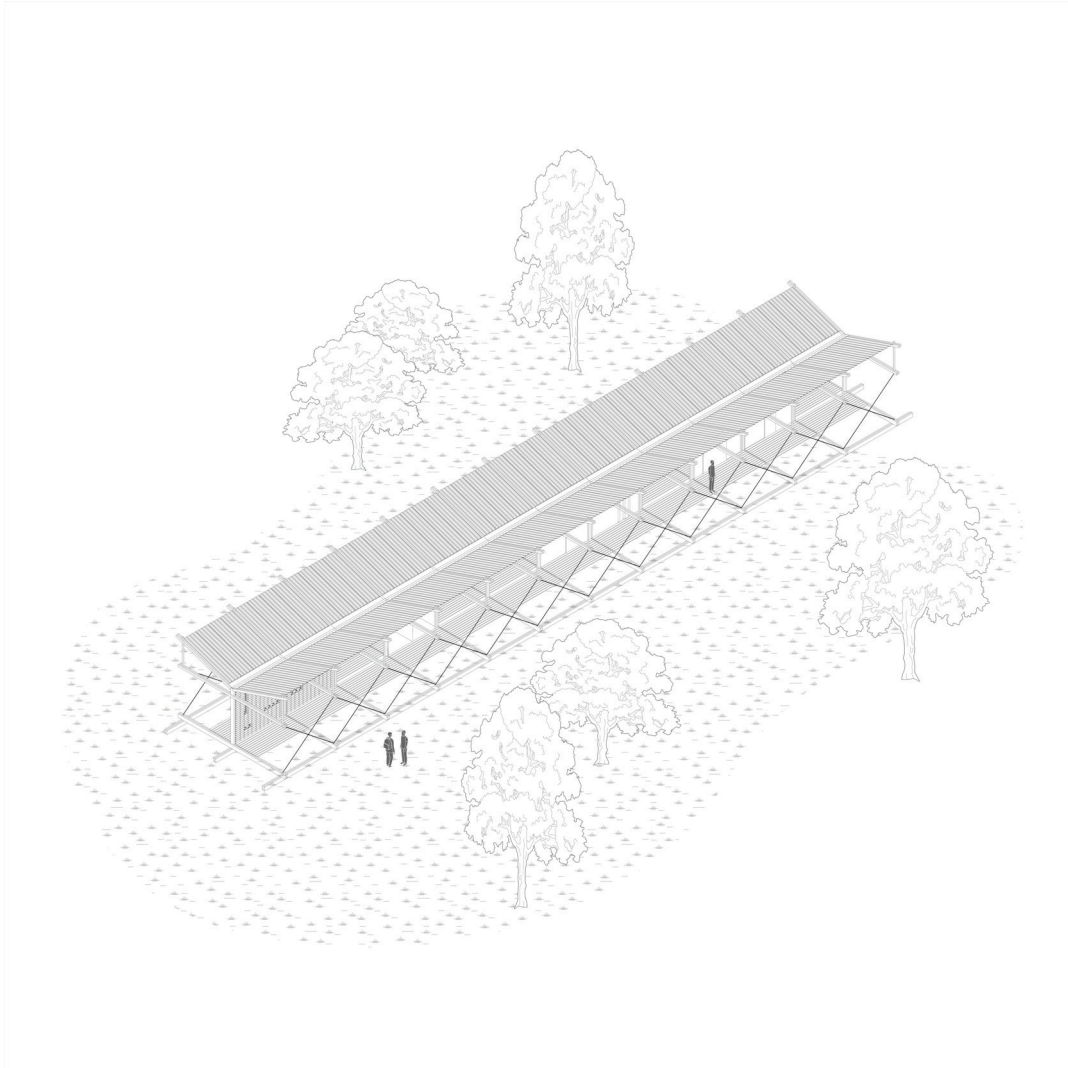




Fig. 48 View of the Wall Pavilion, where different ash-based wall prototypes are tested under exposed landscape conditions. A timber structure holds the wall segments in place, allowing visitors to observe how material systems respond to weather, wind and time (Source: Pelin Yalçın, 2026).

P10 Education Pavilion, Education Parcel

Education Pavilion is a fieldwork and learning ground where School2Work students, researchers and visitors can test materials through making. Outdoor work areas, sample fields and temporary storage spaces support experiments with ash-based surfaces, timber elements, scaffolding structures and reused construction materials.

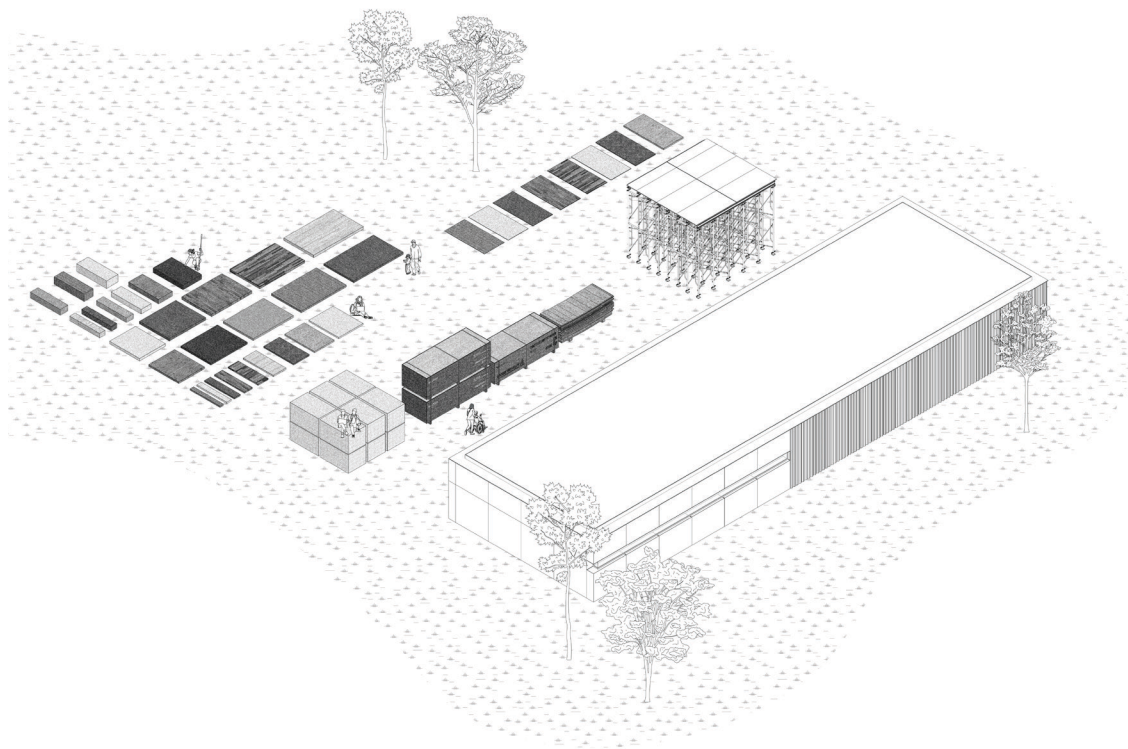
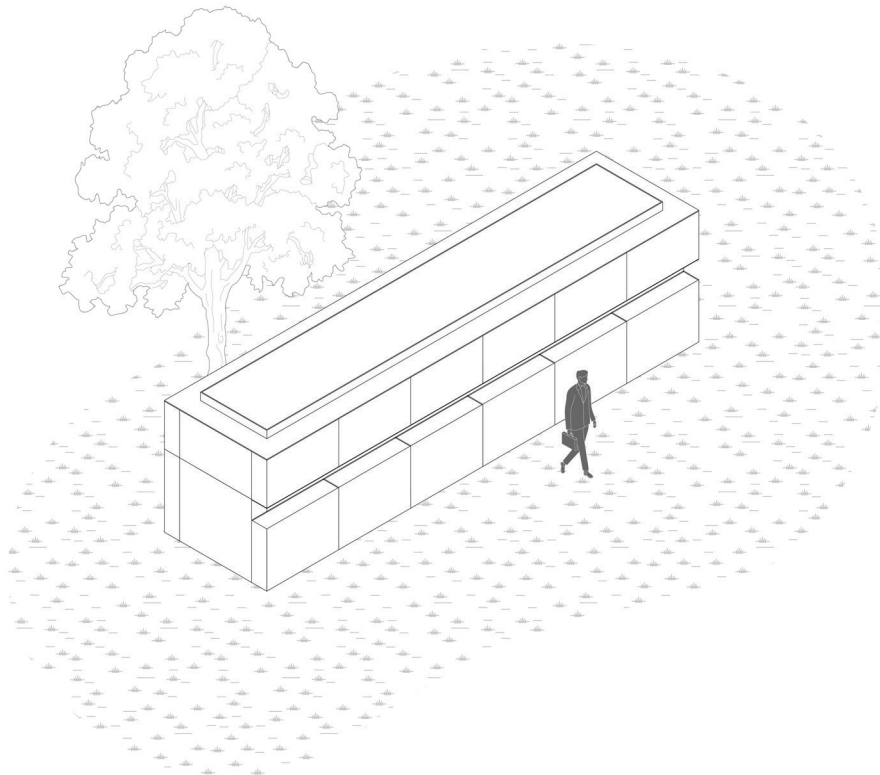


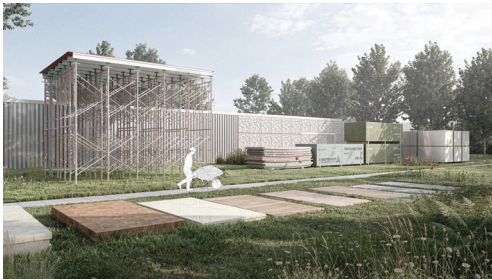


Fig. 49 View of the Education Parcel, showing outdoor work areas, material samples and reused construction elements used for fieldwork and learning. The parcel supports hands-on experiments with ash-based surfaces, timber, scaffolding and harvested materials, turning circular construction into a practical learning process (Source: Pelin Yalçın, 2026).

Monitoring Pavilion / Distributed Across All Parcels

The Monitoring Pavilion is repeated across the site as a small but important architectural type. Constructed from gabion walls, it houses monitoring wells and other instruments used to observe groundwater conditions. These pavilions are open to visitors and can also host temporary exhibitions, making environmental monitoring visible as part of the public experience. They connect technical observation with spatial presence.





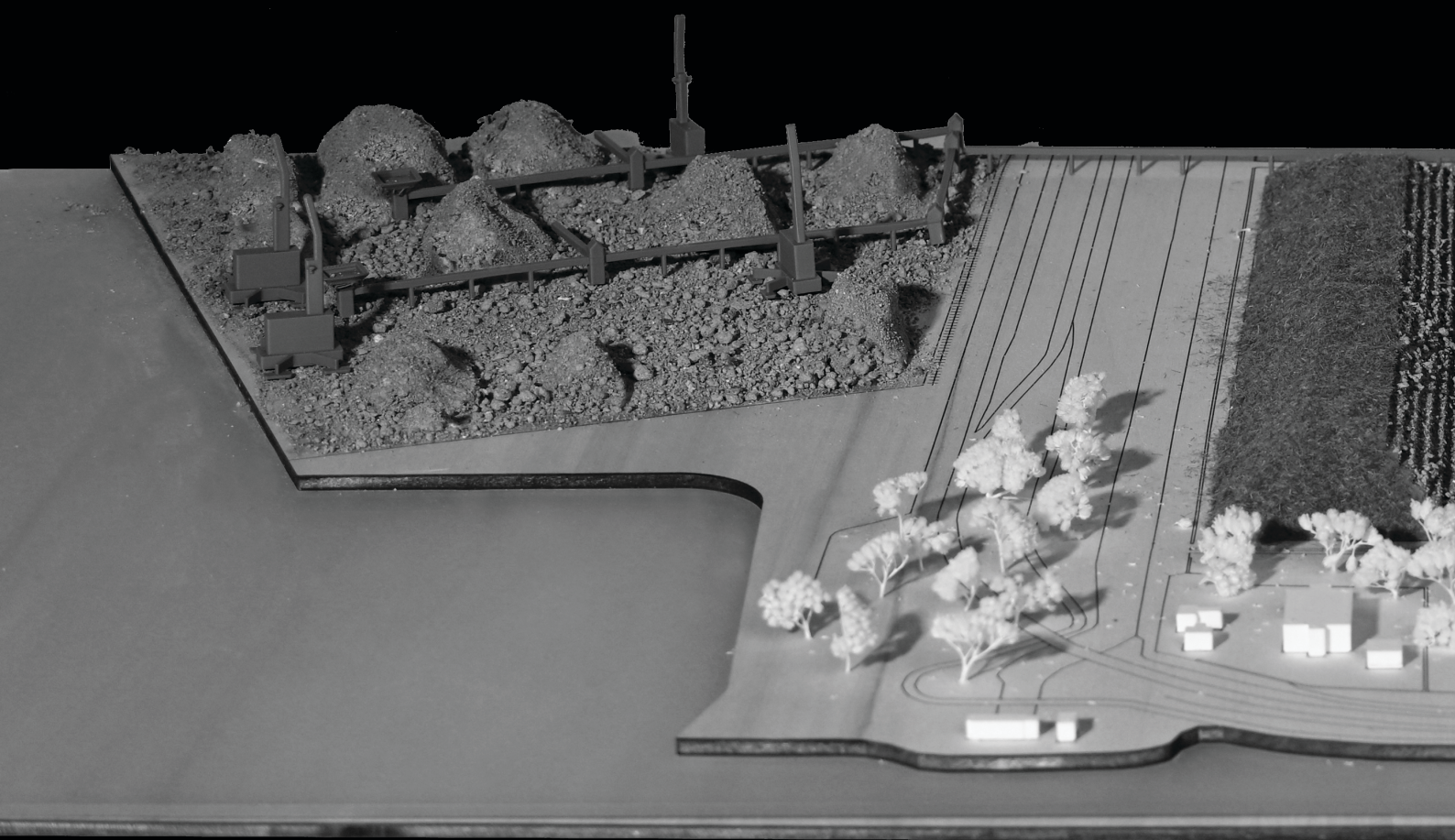


Fig. 50 Physical model showing the relationship between the sorting station, main building and landscape pavilions. The model presents the project as a connected material system, where ash movement, production, public routes and pavilions operate together across the site (Source: Pelin Yalçın, 2026).

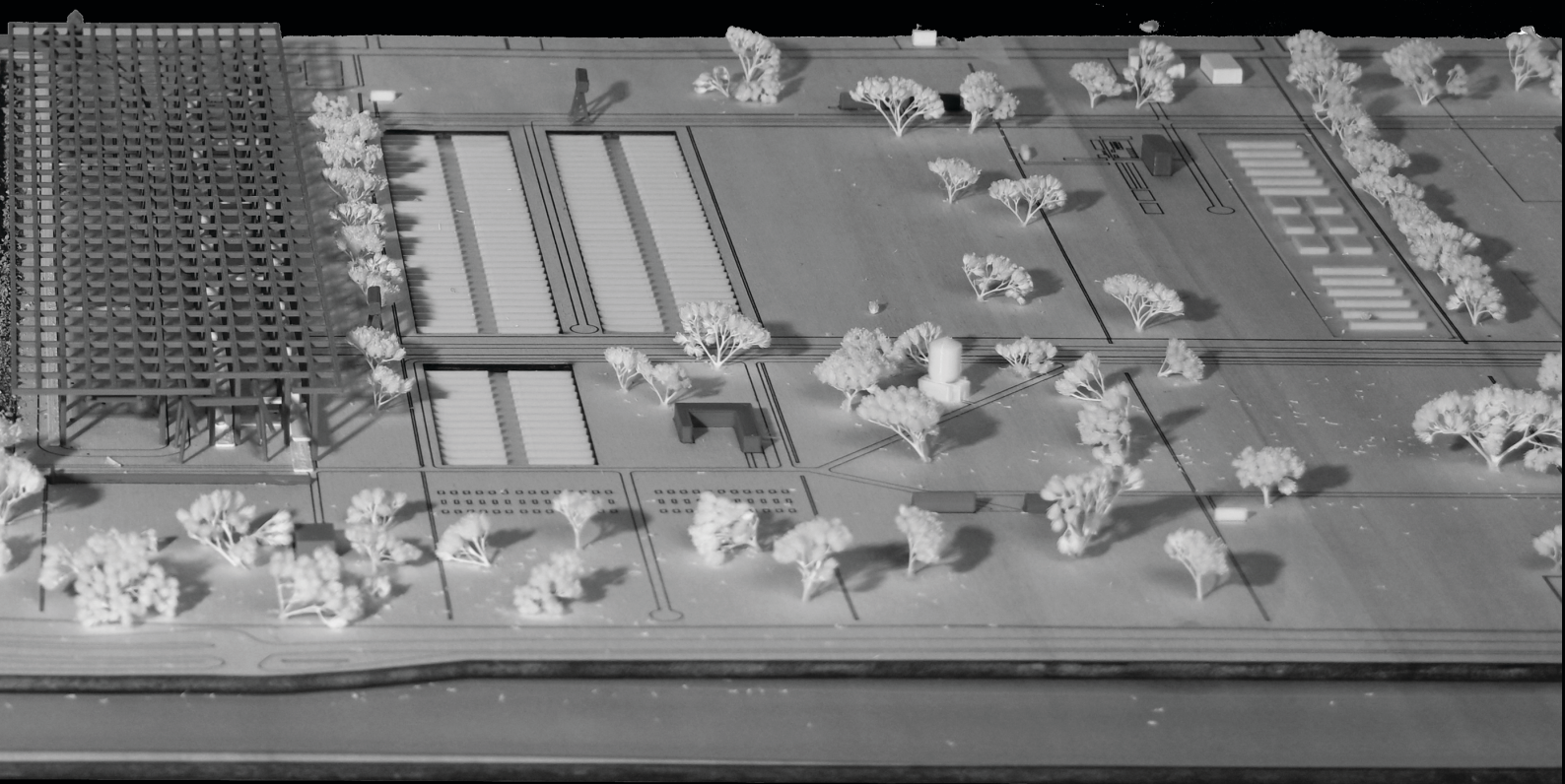




Fig. 51 Physical model view of the sorting station, showing the ash piles, cranes and conveyor route as part of the industrial material-handling system. This area represents the first operational step before ash is transferred toward the main building (Source: Pelin Yalçın, 2026).

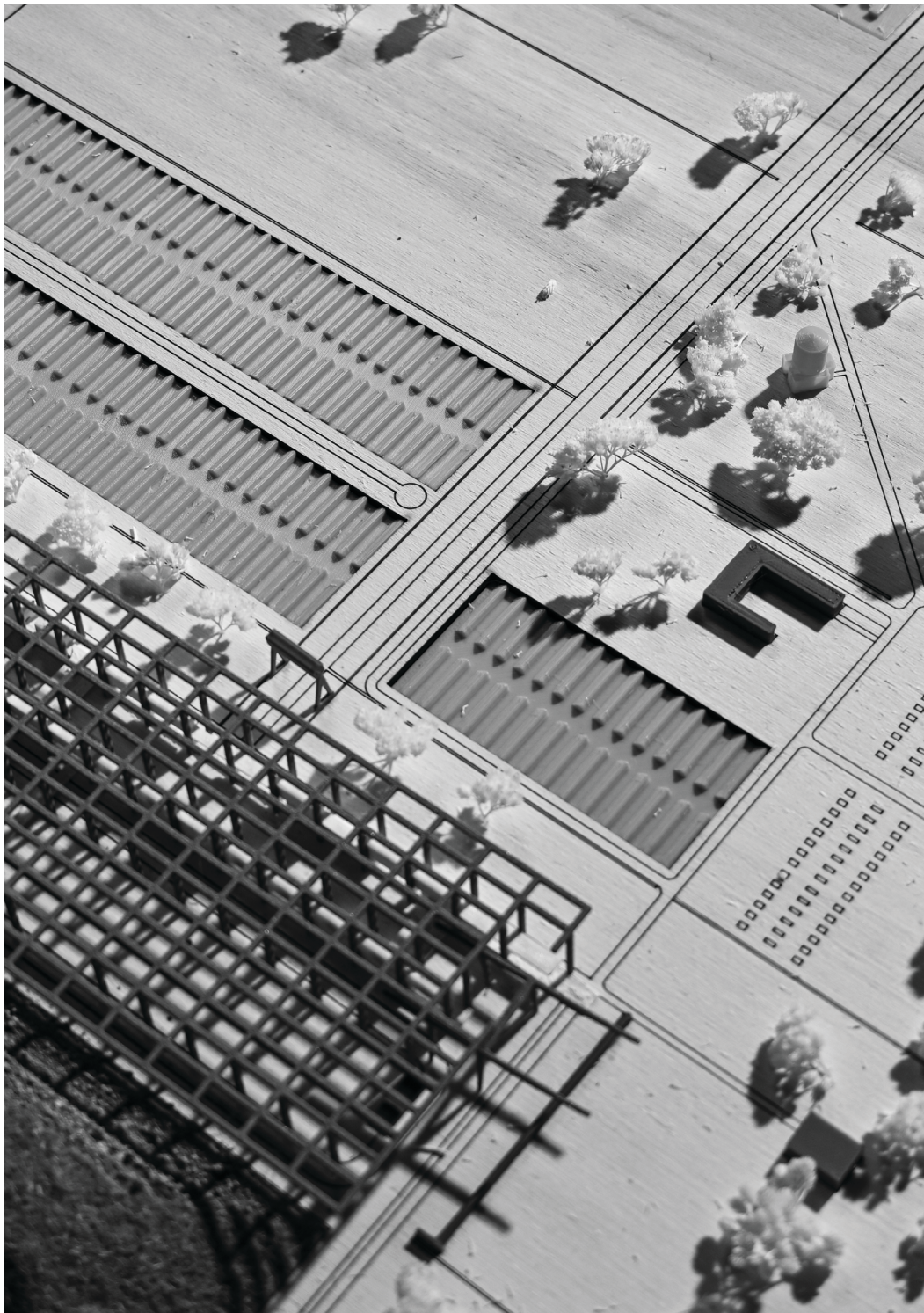


Fig. 52 Physical model view of the main building, solar farm, pavilions and the landscape. The image shows how energy production, public routes and pavilions are organized around the central ash-processing structure (Source: Pelin Yalçın, 2026).

dark ash wall



bio-integrated ash wall



gabion wall

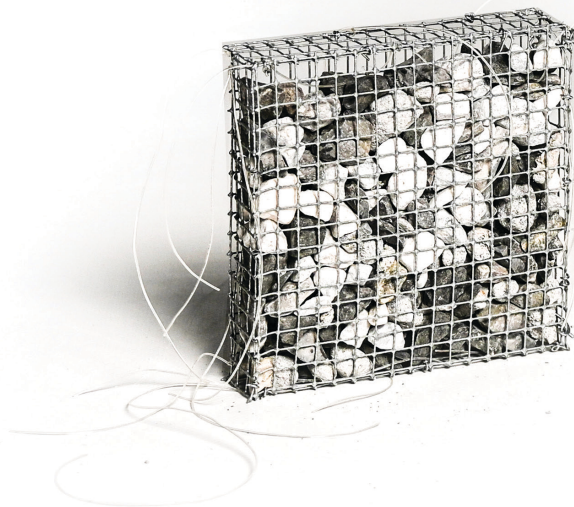


Fig. 53 Material models showing different ash-based construction possibilities. The samples include bottom ash used as aggregate, ash-filled gabion, fine and coarse ash-concrete cubes, darker ash wall material and surface-finished wall models. Together, they translate the material research into physical fragments that can be understood through texture, weight, color and surface quality (Source: Pelin Yalçın, 2026).

fine ash-concrete



coarse ash-concrete



unprocessed bottom ash



PART IV

Conclusion and Discussion

*The mound is opened to reveal what the city has stored,
ash is processed, measured and returned with care.
A hidden residue becomes a visible ground,
asking the city to take responsibility for what it leaves behind.*

4.1 Conclusion

This research began with the question of how architecture can transform a hidden bottom ash stock into a material ground that connects public awareness, landscape transformation and future reuse. The project answers this question by reading Het Groene Schip as a constructed ground: a landscape that appears green and complete on the surface, while containing a stored body of bottom ash shaped by waste-to-energy processes, deposition, regulation and long-term management.

The design works with the tension between surface and section, visibility and concealment, public landscape and operational infrastructure. Through a selective cut into the mound, the project opens the hidden material stock and turns it into a readable spatial condition. The cut is not only an excavation, but a way to connect the material history of the mound to architectural, logistical and public systems.

The ash loop forms the operational backbone of the proposal. Excavated bottom ash moves through a controlled sequence of transport, sorting, washing, classification, production and deployment. This prevents the material from being treated as an immediately usable resource. Instead, bottom ash is understood as a conditional material whose value depends on treatment, testing and careful application.

Architecture works with this process through the main building. The building organizes operation, research and public access through separation, visibility and controlled circulation. Visitors don't enter the operational core but they can observe the movement of ash, trucks, cranes, conveyors and material production from safe positions. In this way, technical processes become part of the spatial experience without ignoring environmental and safety constraints.

The landscape extends this transformation beyond the building. Existing paths, drainage channels, poplar parcels and open fields are reorganized as productive and evolving grounds. Processed ash is tested through controlled applications such as paving blocks, precast elements, gabion walls, rammed ash panels, drainage aggregates, bio-ash blocks and experimental landscape patches. The pavilions distribute these tests across the site, linking harvested port materials, ecological processes, public use and environmental monitoring.

The project proposes an architectural and landscape system, not a single object. Its main contribution is the repositioning of bottom ash from hidden residue to spatial material condition. It shows that waste-derived grounds can become sites of awareness, testing and reuse. Also the risks, uncertainties and operational requirements remain part of the design.

4.2 Implications

The project has implications beyond Het Groene Schip. Many waste landscapes are covered, monitored and managed after their technical function has ended. However, they are rarely approached as spatial resources with architectural and landscape potential. This research suggests that such sites can be read as constructed grounds with material histories, operational dependencies and future transformation capacities.

The proposal is not a universal model for every landfill or bottom ash mound. Its strategies depend on material composition, regulation, environmental risks, ownership, processing infrastructure, public access and monitoring capacity. However, the method is transferable. Understanding waste landscapes through material flows, section, logistics, users, environmental control and public experience can reveal design opportunities in other waste-derived territories.

For architecture, the project positions the building as an interface between material stock, processing infrastructure, research and public awareness. For landscape, it challenges remediation as visual recovery alone, using parcels, drainage, planting cycles, monitoring and material tests to create an evolving system. For circular construction, it argues for an approach: bottom ash gains value only through processing, testing, regulation and appropriate application.

4.3 Reflections

The project moved between waste systems, material research and the specific conditions of Het Groene Schip. This was necessary because bottom ash could not be treated as an abstract symbol of waste; it had to be understood through production, processing, risk and possible reuse. The main lesson was visibility alone is not enough. Exposing the mound without control would ignore dust, water, leaching and safety issues. For this reason, the design works through controlled proximity: visitors can understand the process without entering unsafe zones. The field visit and expert conversation made the project more precise. They showed that waste landscapes are managed territories shaped by regulation, monitoring and long-term responsibility. This shifted the design from a simple act of revealing the mound toward a more careful system of testing, separation and gradual transformation.

So, the final design accepts Het Groene Schip as both landscape and stock, resource and risk. Its value lies in keeping this ambiguity visible, instead of resolving it too quickly through either concealment or beautification.

What is next?

To become truly circular, cities need to keep the circle small. When consumption is separated from its material consequences, the loop expands: waste travels far, processing becomes less visible and residues return to the landscape as hidden stocks. This project responds to that condition by designing an operative ground for today, while suggesting how such a ground could evolve into a more local and accountable infrastructure.

Het Groene Schip becomes a first step in this direction. It brings waste, material reuse, testing, production and public life closer together without ignoring the need for control, regulation and environmental care. The project does not claim that all waste processes can be localized. Some operations still require regional infrastructure, advanced technology and strict monitoring. However, it suggests that parts of the waste cycle can become more visible and spatially present.

In the future, neighborhood-based circular systems could include repair spaces, sorting points, material recovery hubs, bio-waste treatment, small-scale energy systems and carefully regulated forms of thermal processing. These infrastructures would not be hidden at the edge of the city, but integrated into daily urban life through architecture, public space and monitoring. The next step is not just building smaller waste facilities, but to rethink how cities can take responsibility for the materials they consume, transform and leave behind.

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