# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## DIAGNOSIS - THE INVISIBLE SCAR

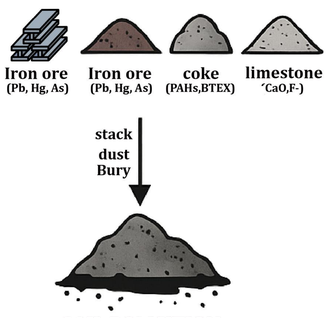
### Milan's Post-Industrial Dual Heritage

Area Falck, once the pinnacle of Italy's industrial prowess, stood for decades as a profound **urban scar** of the post-industrial age.
The site is defined by **a stark duality**: majestic **industrial monuments** preserved above ground, and a century of **heavy metal contamination** buried beneath.
Despite its **strategic location**—anchored by a major **transport interchange** and **the upstream of the Lambro River**—the sheer scale of remediation costs kept the site in a state of flux between various capital interests.
Today, as Italy's l**argest brownfield** redevelopment, it is finally transitioning from a silent void into a massive laboratory for urban rebirth.

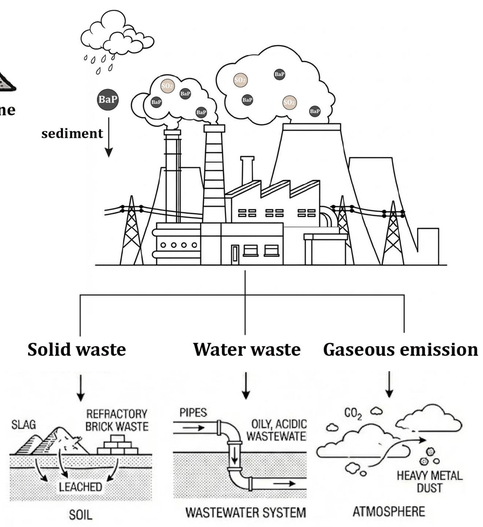
### Area falck pollution analysis

Area Falck was once a major steelmaking center. Long-term production led to the accumulation of large amounts of heavy metals and fluorides in the soil and groundwater, forming a typical industrial brownfield pollution that seriously threatens the surrounding ecology and subsequent urban renewal.

**RAW MATERIAL POLLUTION**




**PRODUCTION & SMELTING POLLUTION**

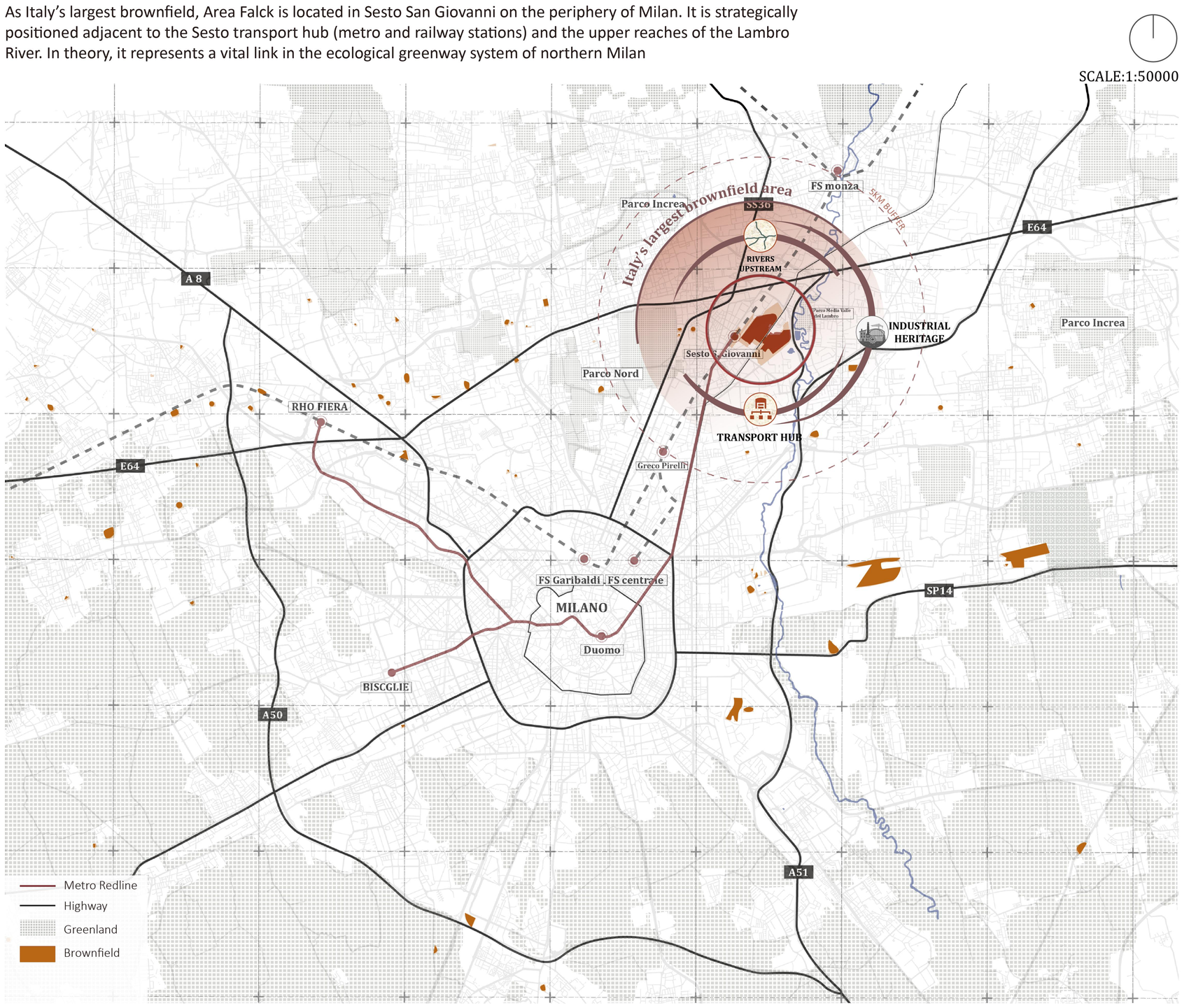



### Area falck core pollutants

| HEEAVY METAL | PAHs | Mineral Oils | Cyanides & Phenols |
|---|---|---|---|
| • Heavy metals cannot be degraded naturally and will accumulate in the soil over a long period of time. | • These substances are highly carcinogenic and teratogenic.<br>• Long-term adhesion to the surface of soil particles | • Altering the physical properties of the soil to make it hydrophobic and unable to support plant growth. | • If this wastewater leaks directly without treatment, it can cause highly toxic pollution to localized areas of land. |

## SITE ANALYSIS

As Italy's largest brownfield, Area Falck is located in Sesto San Giovanni on the periphery of Milan. It is strategically positioned adjacent to the Sesto transport hub (metro and railway stations) and the upper reaches of the Lambro River. In theory, it represents a vital link in the ecological greenway system of northern Milan




## TIMELINE OF AREA FALCK

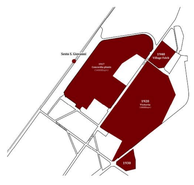
From its 1906 inception to its 1969 peak, the Falck plant's subsequent collapse transformed it into Italy's vastest industrial wasteland. Marred by capital market instability and chronic neglect, it stands today as an unhealed rupture in the metropolitan landscape.

**1906**

*Acciaierie e Ferriere Lombarde Falck is established and opens its steel plant in Sesto San Giovanni, kick-starting the city's industrial era.*

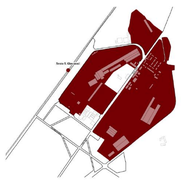
**1940**

*Falck builds a company village for workers and survives WWII; Sesto's workers (including Falck's) participate in historic anti-fascist strikes in 1943–44.*



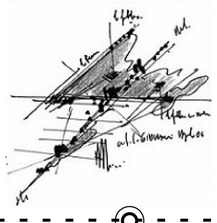
**1996**

*In the first half of 1996, all the steel plants in Sesto were decommissioned. The site becomes a 1.3 million $m^2$ brownfield. It focused its mission mainly on the production of energy from renewable sources.*



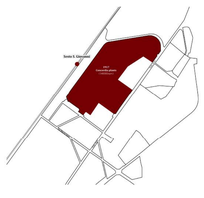
**2005**

*Luigi Zunino's Risanamento acquires the area for €88M.*
*Renzo Piano is hired to design a masterplan, which is presented in 2007–08. And adopted by the city, envisioning mixed-use redevelopment.*



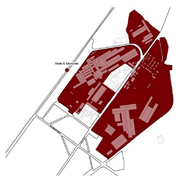
**2015**

*Luigi Zunino's Risanamento acquires the area for €88M.*
*Renzo Piano is hired to design a masterplan, which is presented in 2007–08*
*and adopted by the city, envisioning mixed-use redevelopment.*



*During WWI, Falck expands by building the Concordia, Vittoria, and Vulcano plants to augment the original Unione steelworks. Sesto becomes a key arms and steel production center.*

**1917**



*Economic boom; Falck modernizes and reaches peak output. Falck's Sesto plants employ 16,000+ workers at peak prosperity. Sesto is dubbed the "Italian Stalingrad" for its industrial workforce and leftist politics.*

**1964**

*In 2000 Pasini bought the former Falck for 400 billion old lire directly from Alberto Falck,*
*Pasini proposes an office district (with architect Mario Botta) for Banca Intesa, later a residential plan – but nothing is built due to planning conflicts.*

**2000**

INTESA SANPAOLO

*Following Risanamento's financial collapse, creditor banks arrange a sale to Davide Bizzi's consortium.*
*Milanosesto (Sesto Immobiliare) buys the ex-Falck land for €405M, backed by Intesa Sanpaolo.*

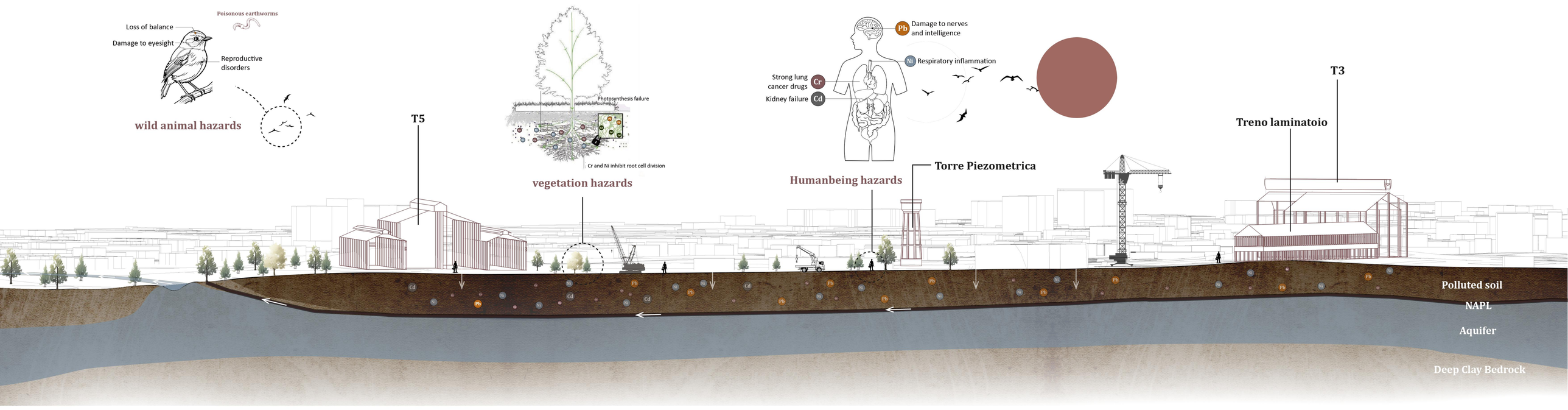
**2010**

*Groundbreaking for the new Renzo Piano designed Sesto San Giovanni station (July 2021) and site works for Unione 0 commence.*
*Major construction ongoing.*
*The new station (a symbolic gateway) is on track for completion.*
*Unione 0's buildings (housing, offices, etc.) rise, with first completions expected by 2025.*

**2022**

## POLLUTION SECTION

The remain contaminants at Area Falck pose a direct physical threat to local wildlife, vegetation, and the humanbeing.
Due to its proximity to the Lambro River, the highly permeable gravel substrate acts like a 'subterranean straw,' allowing soil pollutants to continuously leach into the groundwater and migrate into the river, effectively extending the environmental impact to the entire downstream basin.



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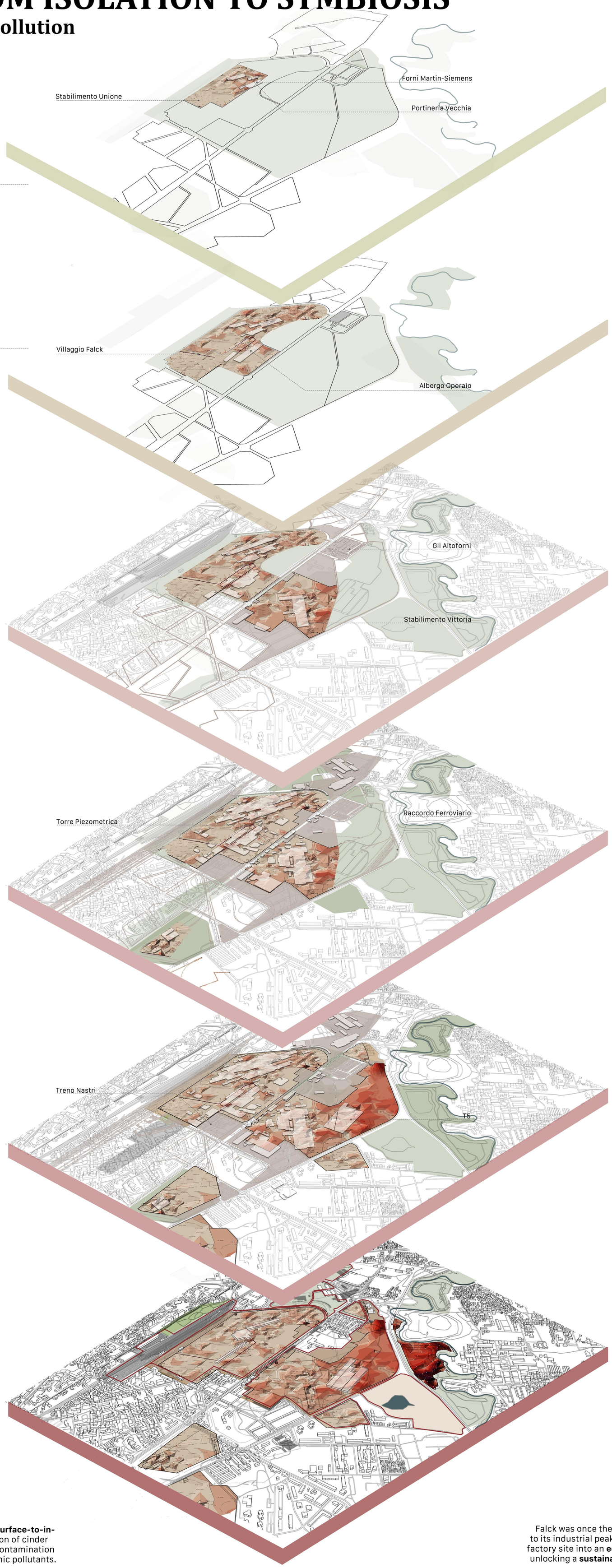
## Toxic files-production and pollution

We propose a simple but powerful idea: let the landscape heal itself. By planting specific layers of vegetation—Grass, Brush, and Trees—we tackle different levels of pollution over time. This approach turns the long cleanup process into a growing park. As the plants mature over 20+ years, they clean the ground below while creating a beautiful, usable space above.

Cropland
Parkland
Waste Greenland
Quarry
Industrial Pollution
Industrial Land




**1. 1906: THE ORIGIN OF DEPOSITION**
The establishment of the early steel furnaces marked the beginning of direct landfilling of raw industrial waste. Pollution at this time was mainly concentrated in the topsoil.
**Pollutants:** Ash, Sulfur

**1906** Giorgio Falck builds the first Unione factory, transforming Sesto from peaceful farmland into a budding centre for the steel industry.

**2. 1917: HEAVY METAL ACCUMULATION**
The First World War fuelled military production, and high-intensity smelting led to heavy metal particles leaching into the soil through soot deposition and waste accumulation.
**Pollutants:** Pb, Zn

**1917**

**3. 1920: THE BEGINNINGS OF BLACK GREASE**
This period saw the introduction of a large amount of machining equipment, with machinery requiring a lot of lubrication and cooling, thus changing the character of the pollution from purely heavy metal dust to organic pollution.
**Pollutants:** TPH, PAHs

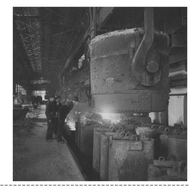
**1920** With the creation of the Villaggio Falck Workers' Village, residential and productive spaces were deeply integrated, establishing the form of a 'factory town' with paternalistic overtones.

**4. 1930: LUBRICANTS & HYDROCARBONS**
With the expansion of large rolling mills, the extensive use of mechanical lubrication and cooling systems has led to deep organic contamination due to leakage.
**Pollutants:** TPH, Mineral Oils

**1930** Driven by a policy of 'self-sufficiency', magnificent red-brick 'industrial cathedrals' such as T3 were erected to symbolise the heyday and independence of steel production.

**5. 1952: CHEMICAL COMPLEXITY**
Post-war reconstruction brought more complex chemical processes, making soil contamination components more complex and difficult to degrade.
**Pollutants:** Chromium VI, PAHs

**1952**



**6. 1975: TOXIC SATURATION**
Industrial capacity peaked, and the widespread use of electrical utilities (transformers) and insulation introduced POPs and asbestos.
**Pollutants:** PCBs, Asbestos

**1975** Industrial density has reached its physical limits, with factories and pipelines swallowing up every inch of land, and the suffocating congestion signalling the ultimate crisis in the environment and in the mode of production.

**7. 21st: LEGACY & LEACHING**
With the gradual shutdown of the plant and reduced maintenance, corrosion of the underground storage tanks resulted in the spread of contaminants to the aquifer and the formation of a subsurface contamination plume.
**Pollutants:** VOCs, Heavy Metals

**21st**

The contamination process at Area Falck is characterised by a **"surface-to-inside, physical-to-chemical"** evolution: from an early accumulation of cinder and slag, it gradually deepened into deep soil and groundwater contamination with heavy metals, petroleum hydrocarbons and persistent organic pollutants.

Falck was once the manufacturing heart of Italy, from its steel beginnings in 1906 to its industrial peak in 1975. Today, it is being transformed from a heavily polluted factory site into an **eco-healthy city**, preserving precious industrial memories while unlocking a **sustainable future** that combines research, green spaces and housing.



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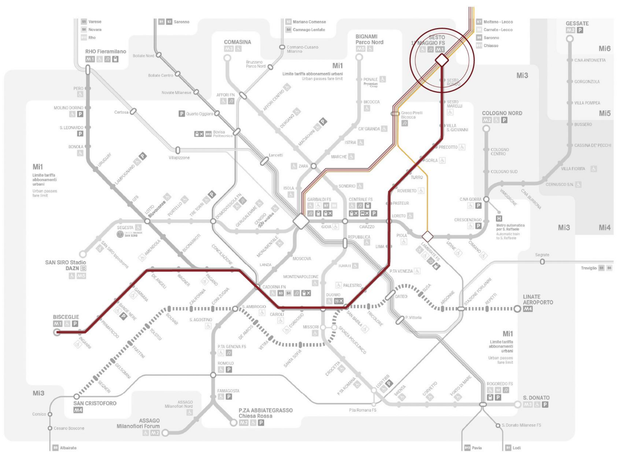
## DIAGNOSIS - THE INVISIBLE SCAR

### THE URBAN VOID

**Pysical isolation:**Bounded by the railway to the west and constrained by the Lambro River and elevated highway to the east, the area remains a land-locked urban island.High walls and barbed wire fences have turned the entire area of Falck into a restricted zone.

**Pollution isolation:**The soil's extreme toxicity makes any temporary use of the area impossible; Falck means dust, odor, and potential health risks.

**Metropolitan accessibility**



- M1 Rho Fiera/Bisceglie - Sesto Primo Maggio
- Milano – Carnate – Bergamo
- S7 Molteno - Lecco
- S8 Carnate – Lecco
- S9 Saronno – Albairate
- S11 Rho Fiera – Chiasso

SOFT MOBILITY — 15% Local feeders ~9000

TRAIN: LINE R & LINE S — 45% Inter-city commuters ~27000

METRO M1 — 40% urban connectors ~24000

TOTAL DAILY INTERCHANGE ~60000

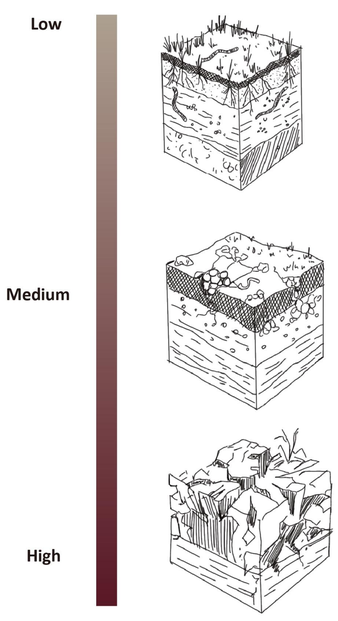
## Analysis of isolation factors

The planar analysis examines the factors that led to Area Falck becoming a segregated area and the extent to which it has significantly compressed the living radius of surrounding residents. The area is surrounded by elevated railway walls, and is also filled with abandoned green spaces, quarries, and brownfield sites—all negatively impacted areas.

SCALE:1:10000

**1 WASTE LAND**

*The entire Falck area is covered in wasteland, overgrown with weeds and littered with trash.*

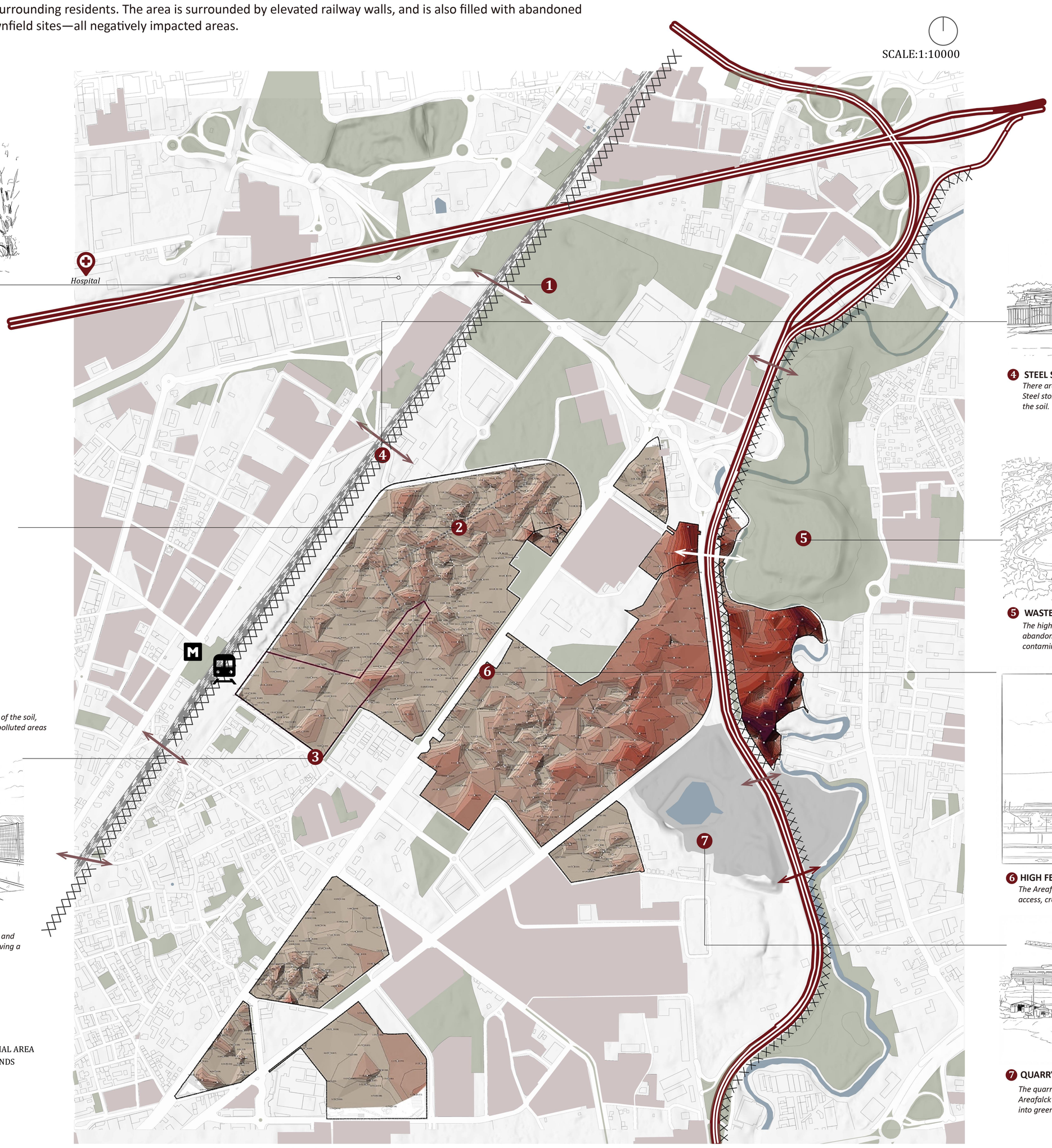



**2 POLLUTED AREA**

*Based on the pollutant and organic matter content of the soil, hotspot distribution of pollution in several heavily polluted areas was identified.*

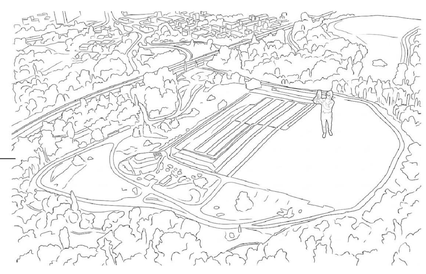
**3 CONSTRUCTION MARGINAL ZONE**

*Currently, the site is riddled with construction sites, and the dust, noise, and traffic control measures are having a significant impact on residents.*



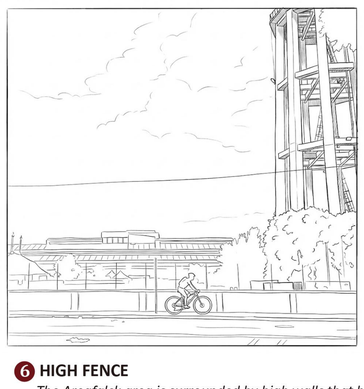
**4 STEEL SCRAP YARD**

*There are piles of scrap steel everywhere around the site. Steel stored in the open will cause secondary pollution to the soil.*



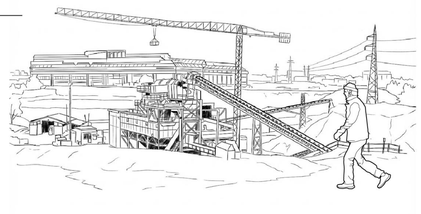
**5 WASTED HILL**

*The highest point on one side of the Lambro River is an abandoned mound, piled high with construction-related contaminants.*



**6 HIGH FENCE**

*The Areafalck area is surrounded by high walls that block access, creating physical isolation.*

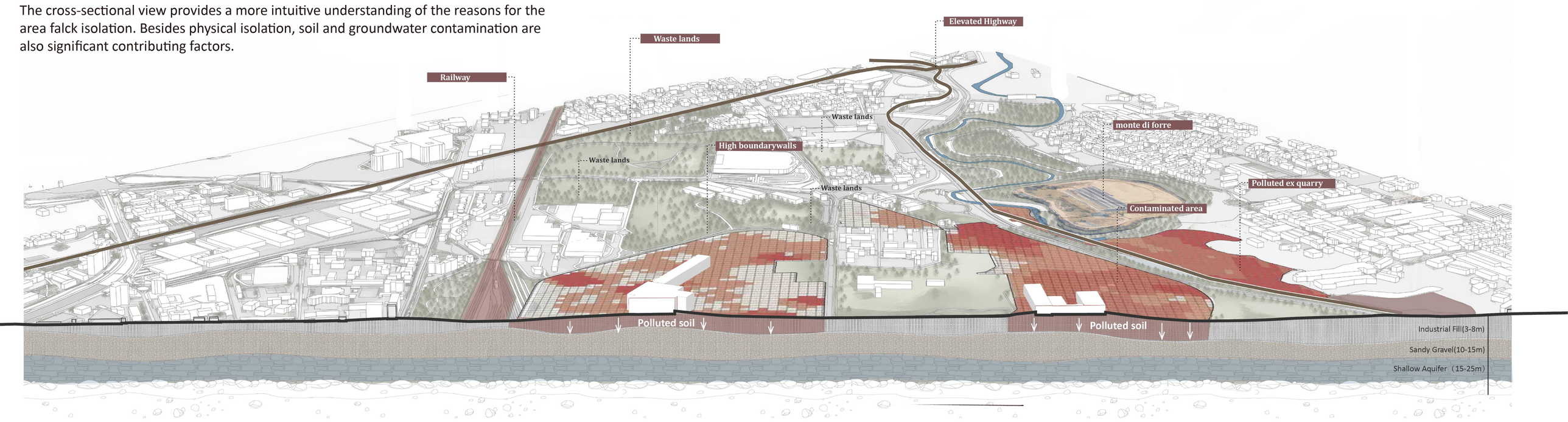


**7 QUARRY**

*The quarry on one side of the site is highly dependent on Areafalck's raw materials and will gradually be converted into green space as construction progresses.*

## Profile analysis of the causes of isolation

The cross-sectional view provides a more intuitive understanding of the reasons for the area falck isolation. Besides physical isolation, soil and groundwater contamination are also significant contributing factors.







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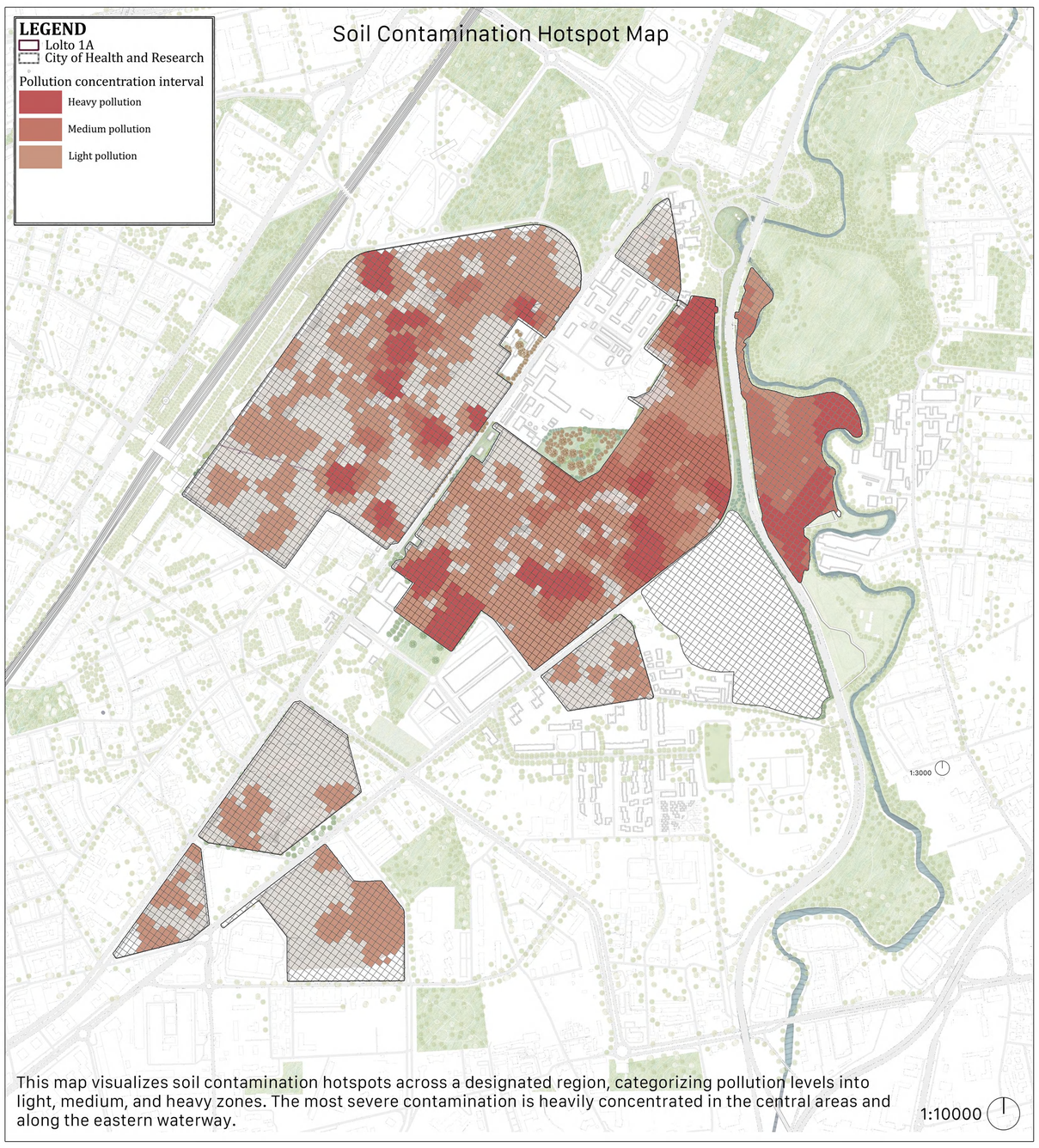
## PRESCRIPTION-Cut & Fill Remediation Strategy

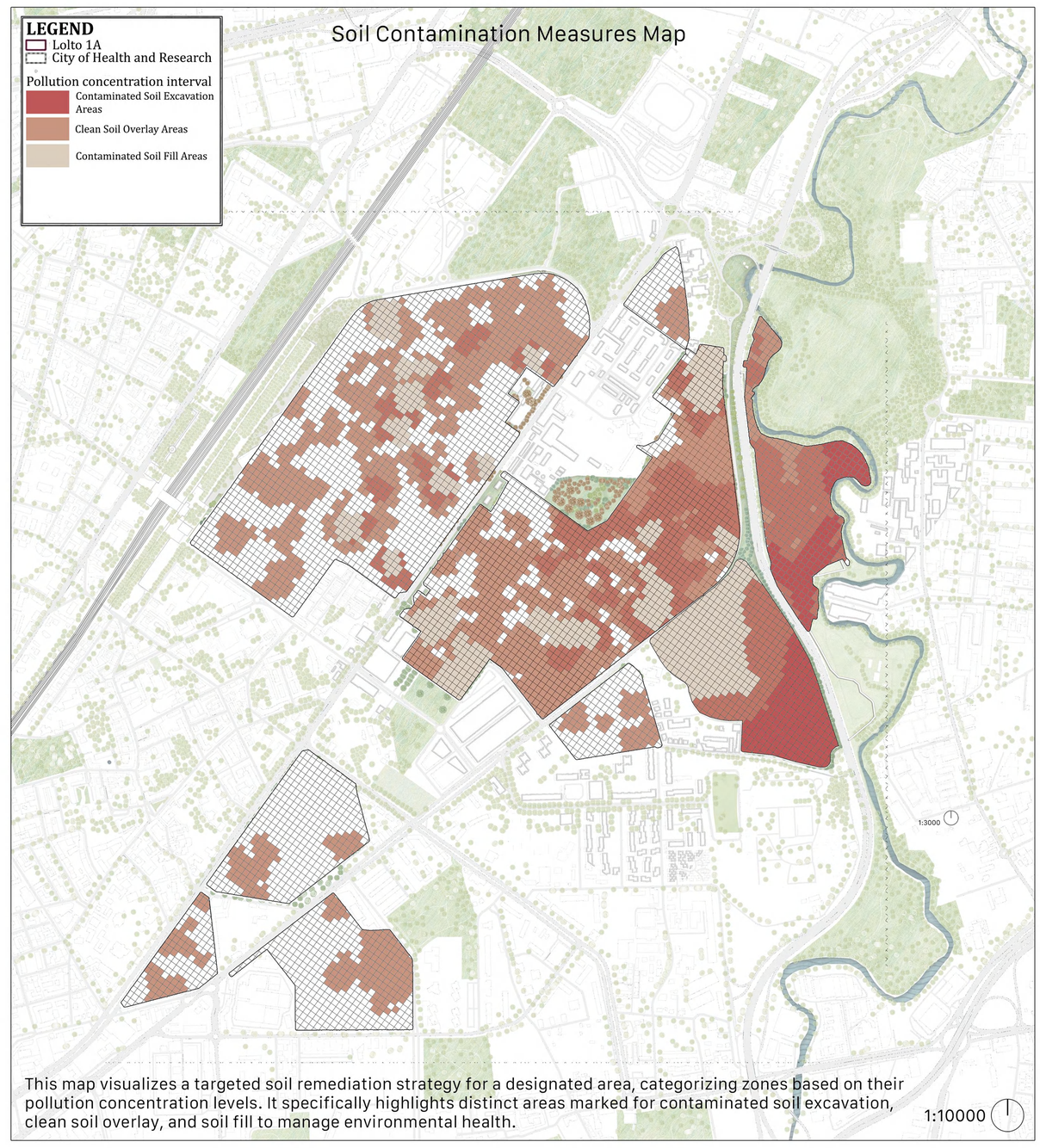
This proposal manages the soil through a precise, grid-based approach. We analyzed the site to determine exactly where to excavate and where to cover, ensuring all soil remains and is safely repurposed on-site. The section below demonstrates the timeline of repair: from site clearance to the final planting, visualizing the shift from a broken industrial site to a revitalized ecological hub.

### Mapping of Soil Contamination Hotspots and Remediation Engineering Plan




This map visualizes soil contamination hotspots across a designated region, categorizing pollution levels into light, medium, and heavy zones. The most severe contamination is heavily concentrated in the central areas and along the eastern waterway.

1:10000




This map visualizes a targeted soil remediation strategy for a designated area, categorizing zones based on their pollution concentration levels. It specifically highlights distinct areas marked for contaminated soil excavation, clean soil overlay, and soil fill to manage environmental health.

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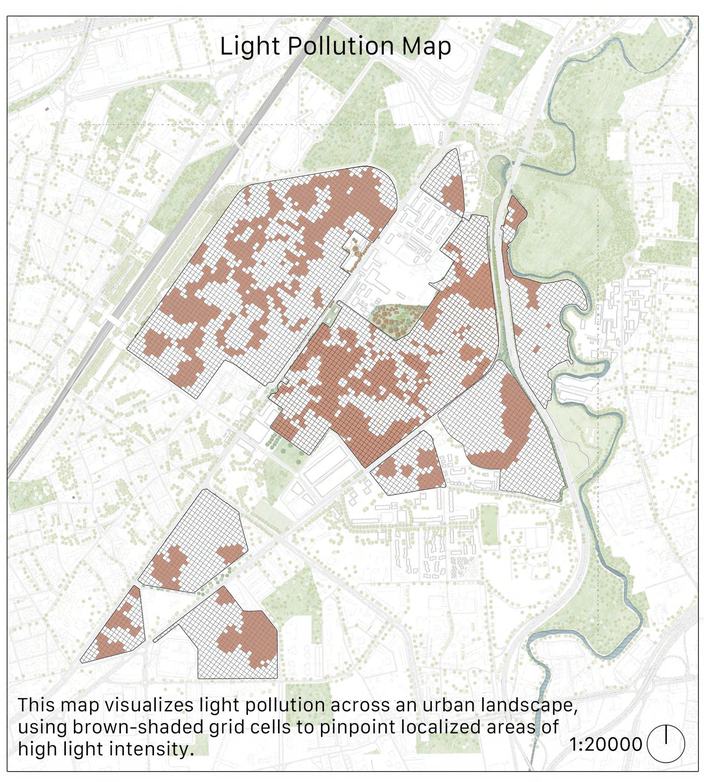
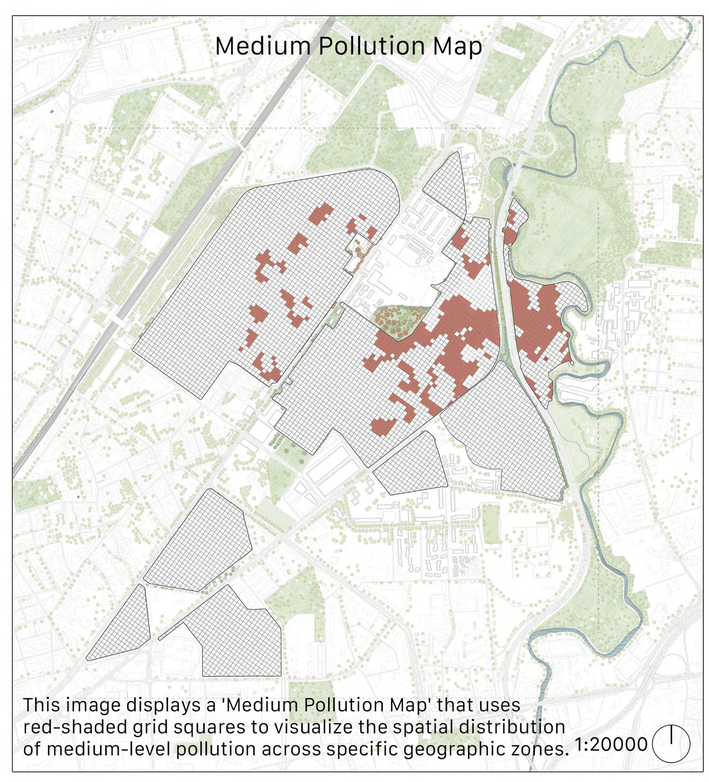


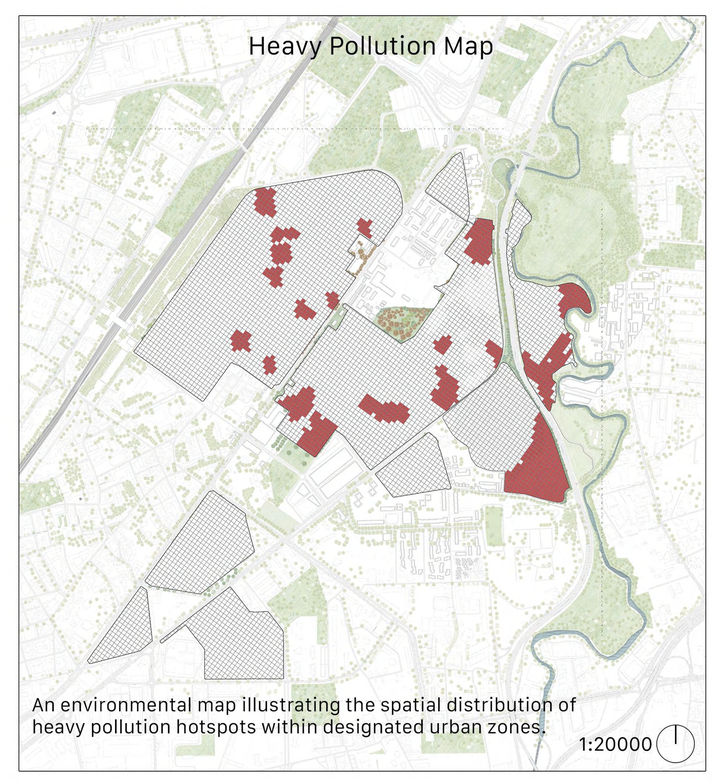

This map visualizes light pollution across an urban landscape, using brown-shaded grid cells to pinpoint localized areas of high light intensity.

1:20000




This image displays a 'Medium Pollution Map' that uses red-shaded grid squares to visualize the spatial distribution of medium-level pollution across specific geographic zones.

1:20000

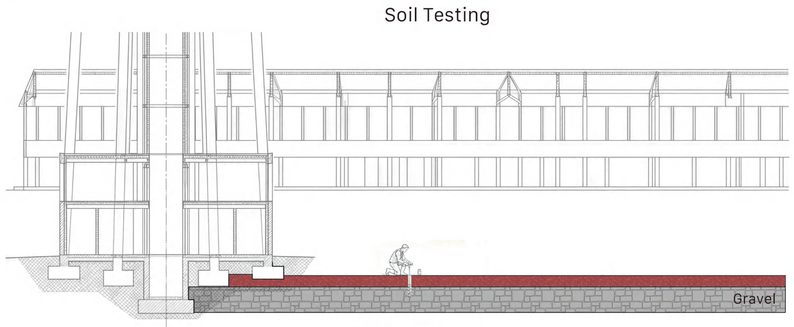



An environmental map illustrating the spatial distribution of heavy pollution hotspots within designated urban zones.

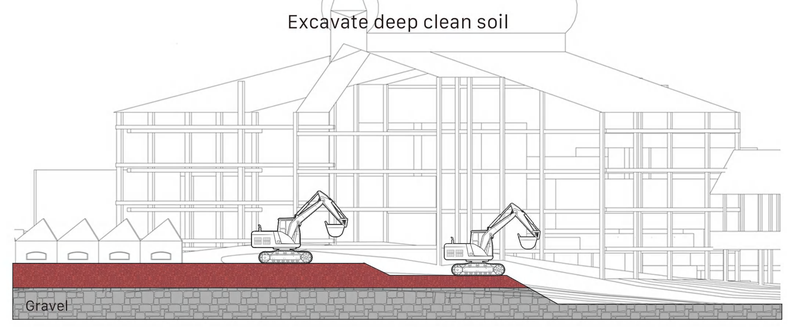
1:20000

### Sections of Graded Soil Remediation and Earthwork Strategies

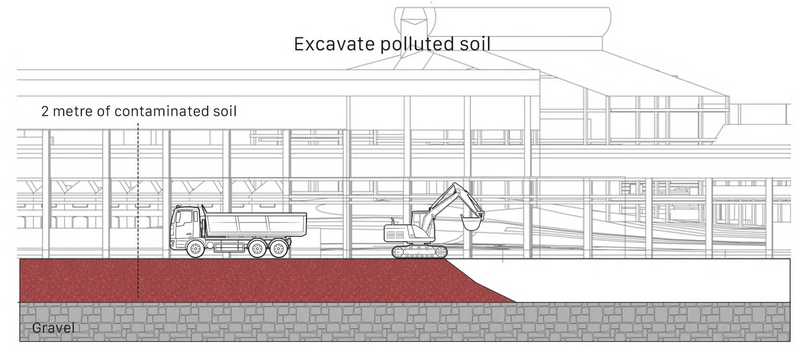
Soil Testing



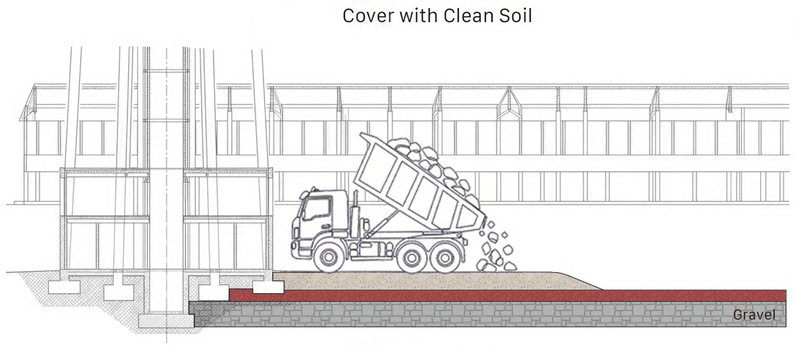

Excavate deep clean soil



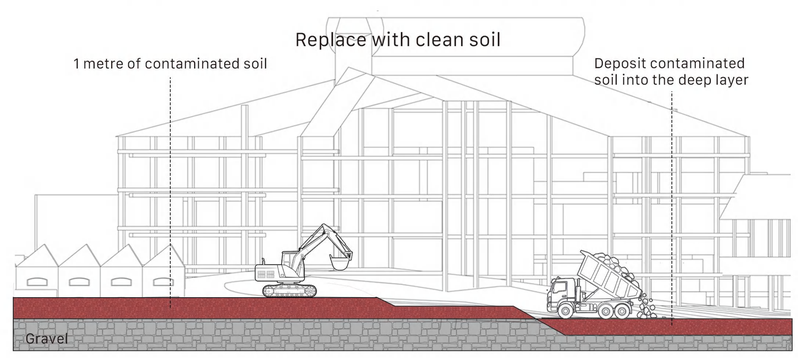

Excavate polluted soil



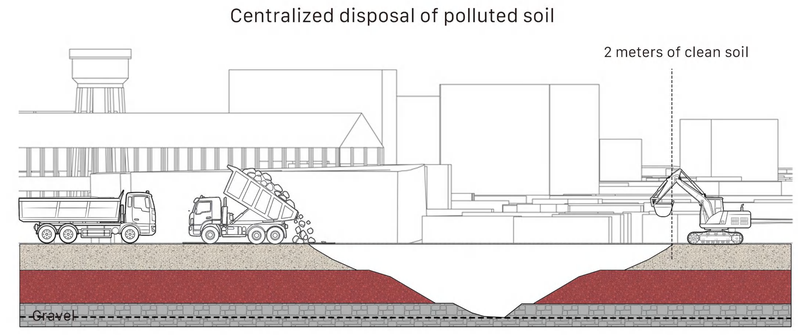

Cover with Clean Soil



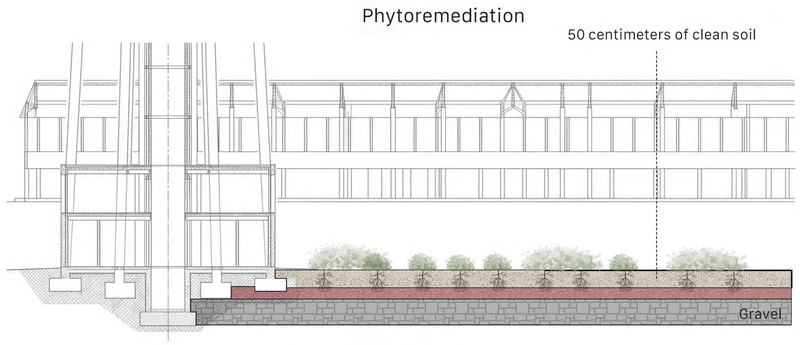

Replace with clean soil



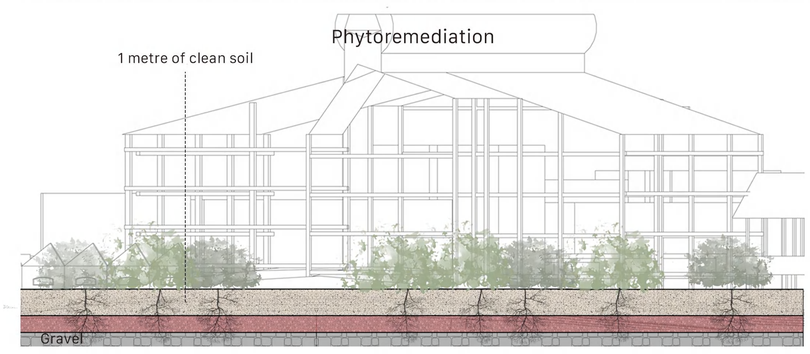

Centralized disposal of polluted soil



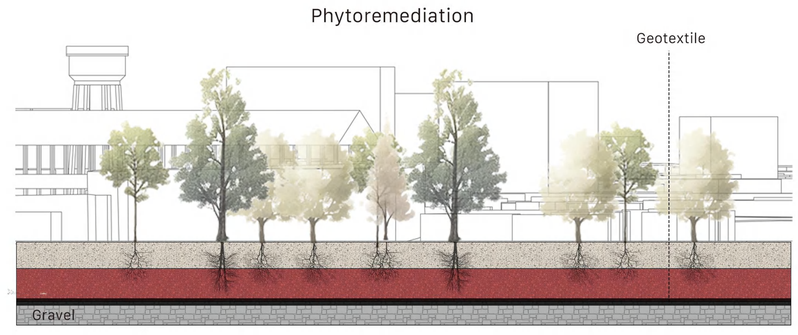

Phytoremediation




Phytoremediation




Phytoremediation



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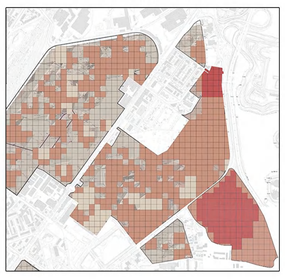
## PRESCRIPTION-Phyto-Remediation Tech

This strategy transforms the contaminated brownfield through a time-based ecological succession. By categorizing the site into three remediation layers—**Grasslands (Surface Stabilization), Brushwoods (Rhizodegradation), and Forest (Deep Extraction)**—we deploy specific plant communities to target different pollutants over four phases. From initial risk control (0-5 Yrs) to long-term ecosystem management (20+ Yrs), the landscape evolves from a restricted "treatment zone" into a thriving, safe public park, turning the invisible underground healing into a visible urban renaissance.

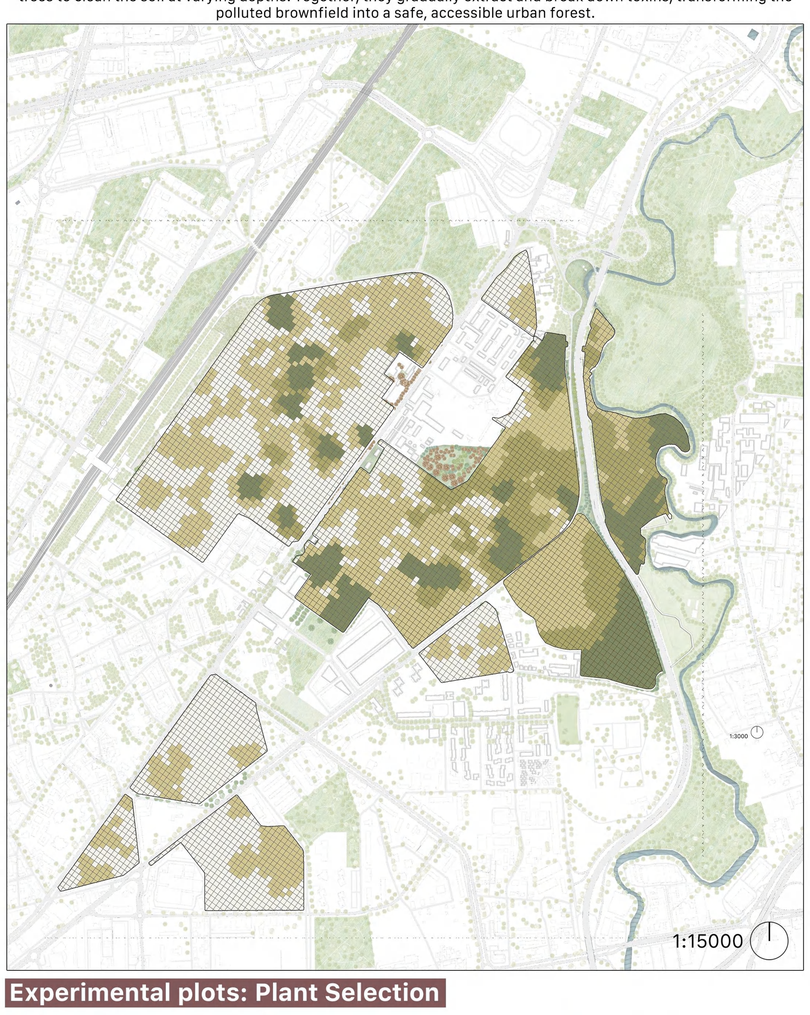
**Phase 0: Base**



## Experimental plots: co-designing with time and natural processes

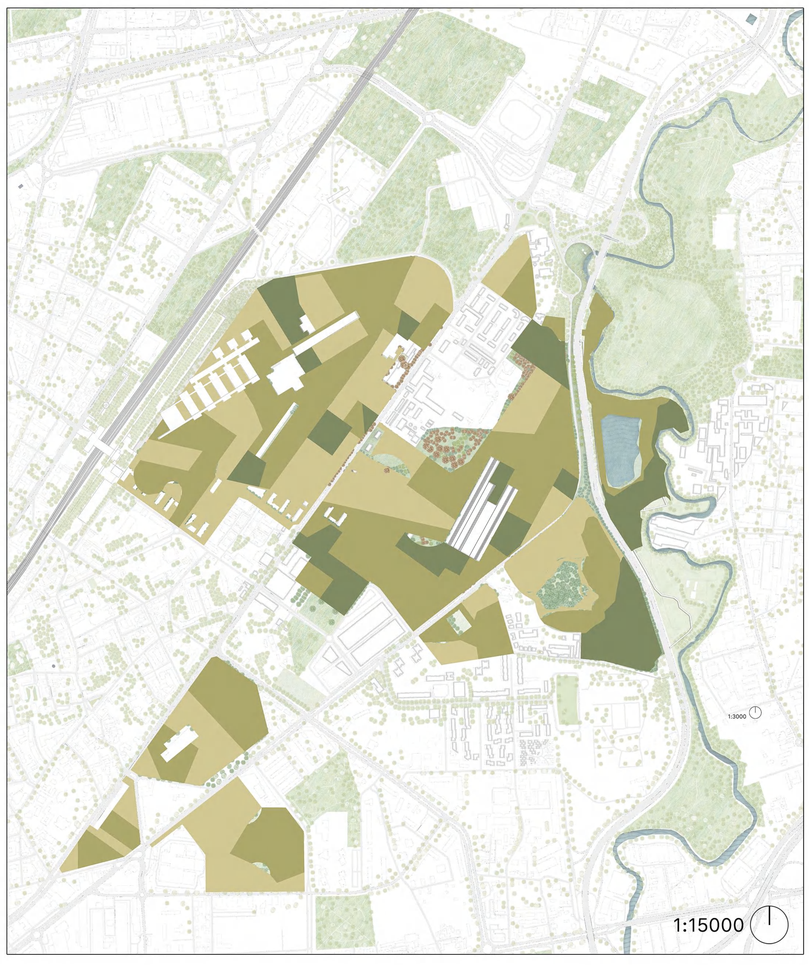
**Phase 1: Experiment**

The three plot categories use a layered phytoremediation strategy, planting shallow herbs, shrubs, and deep-rooted trees to clean the soil at varying depths. Together, they gradually extract and break down toxins, transforming the polluted brownfield into a safe, accessible urban forest.



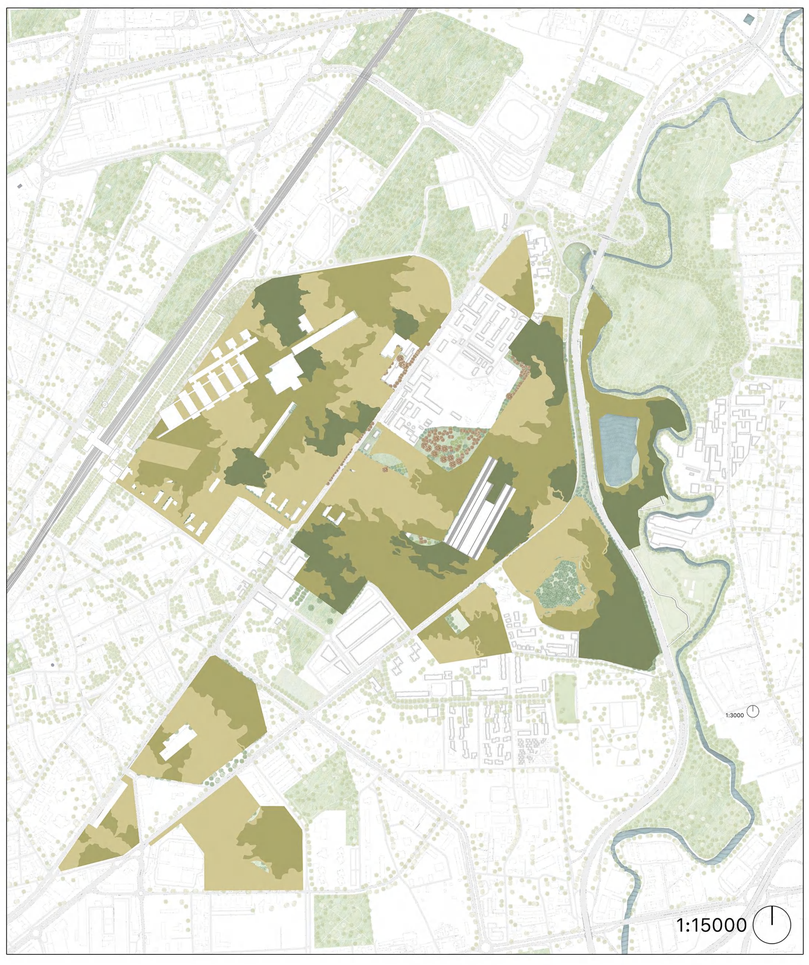

**Phase 2: Expand**

As the distinct planting zones grow and blend together, vibrant ecotones begin to emerge. These overlapping areas create rich transition habitats that significantly boost the site's overall biodiversity.




**Phase 3: Expedite**

As the landscape heals, rigid boundaries between the planting zones naturally dissolve. By stepping back and allowing time and natural processes to take over, the site evolves into a self-sustaining ecosystem.




## Experimental plots: Plant Selection

### Grasslands

- Festuca arundinacea
- Medicago sativa
- Brassica juncea
- Perennial Sunflowers
- Tall fescue

***Festuca arundinacea***
- Used for soil stabilization
- Decomposing organic toxins in the soil

***Medicago sativa***
- High tolerance
- Absorbing heavy metals
- High repair frequency

***Brassica juncea***
- Soil Amendment
- Nitrogen Fixation
- Hydraulic Control

***Perennial Sunflowers***
- Huge biomass
- Strong preference for lead (Pb).
- Decomposing petroleum hydrocarbons in soil

***Tall fescue***
- Extensive root system
- Degrades petroleum hydrocarbons
- Stabilizes heavy metals

### Brushwoods

- Ligustrum vulgare
- Viburnum opulus
- Cornus sanguinea
- Crataegus monogyna

***Ligustrum vulgare***
- Used for soil stabilization
- Decomposing organic toxins in the soil

***Viburnum opulus***
- Physically fixed pollutant
- Chemical passivation of contaminants

***Cornus sanguinea***
- High Tolerance
- Adjust pH value
- Hydraulic Control

***Crataegus monogyna***
- Deep Rooting
- Fixed heavy metals
- strong drought resistance

### Forest

- Populus nigra
- Salix alba
- Celtis australis
- Quercus robur

***Populus nigra***
- Cone of Depression
- Rhizodegradation
- Phytoextraction

***Celtis australis***
- Prevent contamination
- Improve soil structure
- Heavy metal dust collector

***Salix alba***
- Absorb Cd & Zn
- Bio-removal
- Against organic

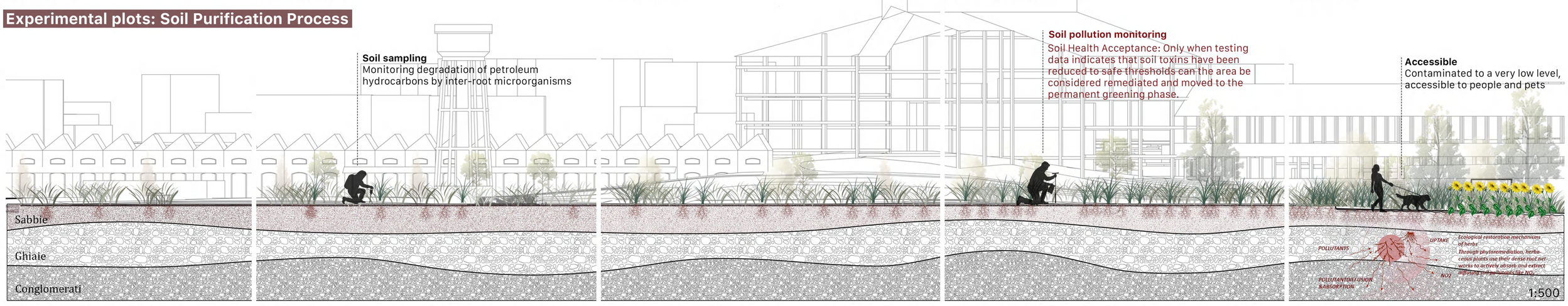
***Betula pendula***
- Pioneer species adaptability
- Accumulates Zinc
- Phytostabilization potential

## Experimental plots: Purification of Pollutants

| | 0-5 YRS PLANTING & RISK CONTROL | 5-10 YRS ESTABLISHMENT | 10-20 YRS FUNCTIONAL RESTORATION | 20+ YRS LONG-TERM MANAGEMENT |
|---|---|---|---|---|
| Priority 1: toxic, strong bioaccumulation | residue | Isolation/excavation | Inter-root degradation | Extremely small and controllable |
| Priority 2: Highly toxic heavy metals | residue | Isolation/excavation | Inter-root degradation | |
| Priority 3: High-risk organic pollutants | residue | Inter-root degradation | | |
| Priority 4: Other heavy metals + Fluoride | residue | Inter-root degradation | Extremely small and controllable | |
| Priority 5: Heavy-distillate petroleum hydrocarbons, etc. | residue | Inter-root degradation | | Extremely small and controllable |

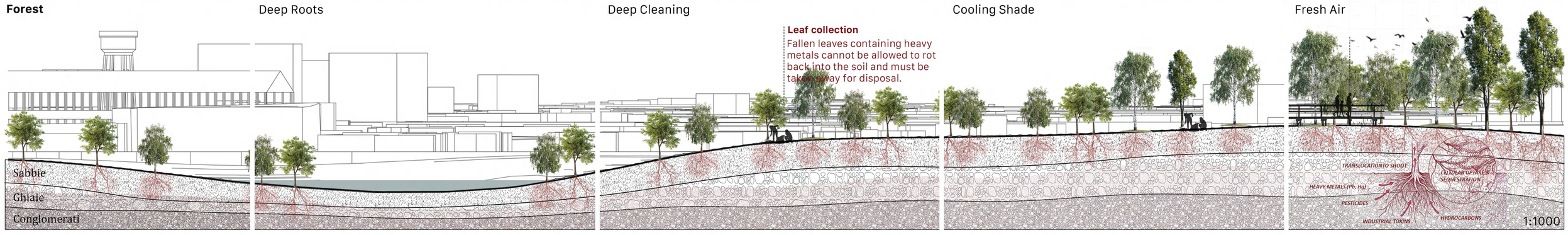
## Experimental plots: Soil Purification Process

**Grasslands** — Locking the Soil — Dust Control — Building Good Soil — Safe Lawn




**Brushwoods** — Waking Up Roots — Breaking Down Toxins — Feeding the Land — Wildlife Shelter

**Forest** — Deep Roots — Deep Cleaning — Cooling Shade — Fresh Air



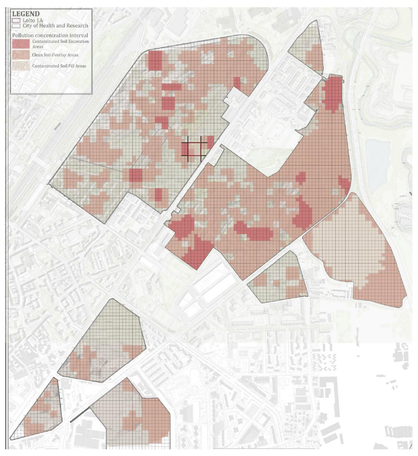




STUDENTS: Zhang Shuyi
Liu Jialin

# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## SURGERY - SPACE & FORM

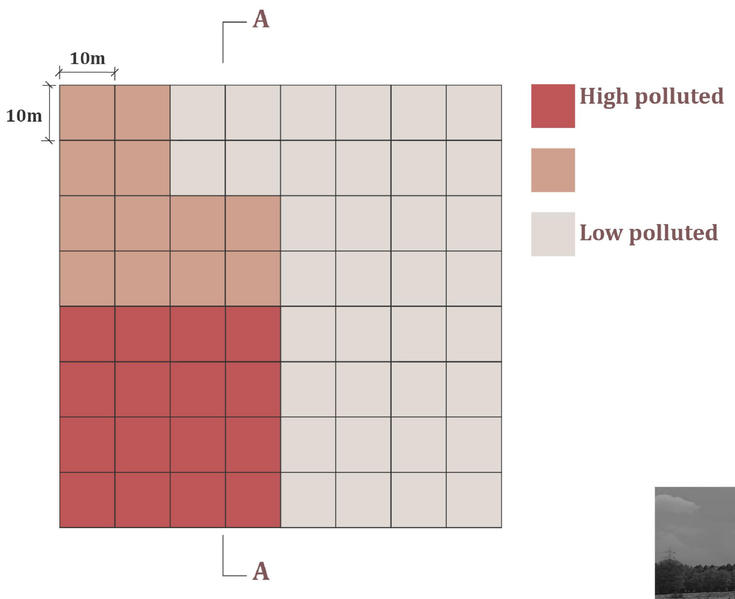


### AreaFalck Safety Interface Handbook

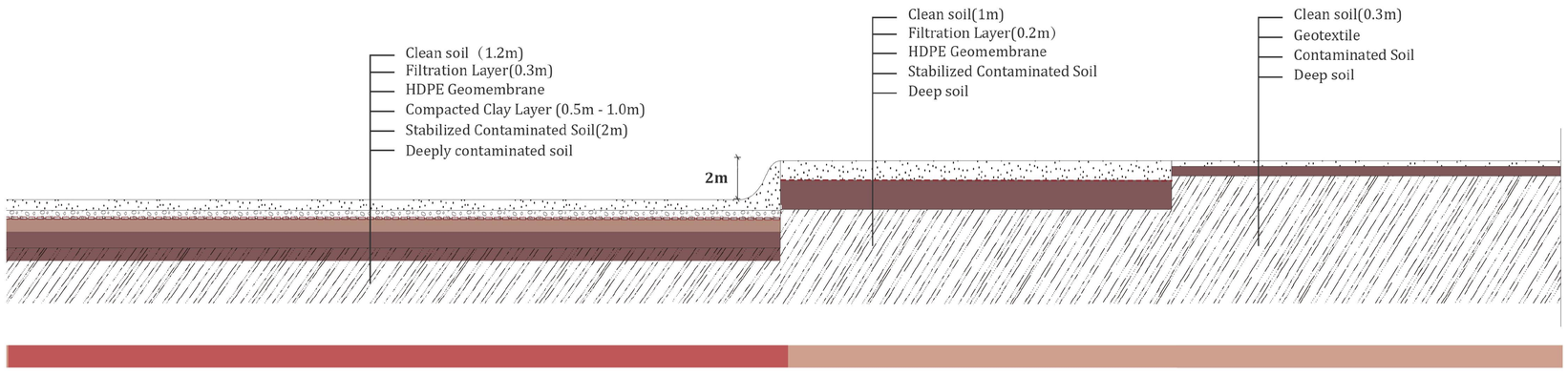
This implementation manual establishes a multi-level integrated remediation system for severely contaminated land. From the foundational treatment of earthwork to the biological extraction of phytoremediation, and the physical isolation of multi-dimensional safety interfaces, combined with dynamic water management and full-lifecycle monitoring, it achieves a leap from 'pollution containment' to 'ecological restoration.' This is not merely a repair of land scars, but the establishment of a multi-dimensional barrier for the safe symbiosis of humans and the environment through technical intervention.

### Fundation:Permeable Management

The landform is reshaped through precise 'cut-and-fill' control. The focus lies in the post-excavation substrate treatment, constructing a secure foundational barrier that primes the site for subsequent layers of containment, planting, and hydrological management.



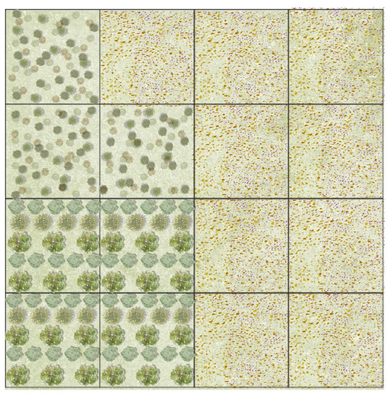

Grid-based Zoning



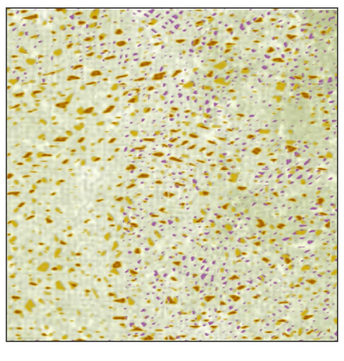

A-A SECTION
SCALE:1:200

### The Phytoremediation

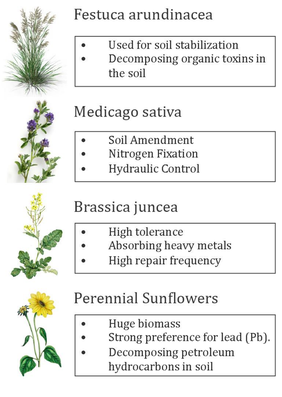
The landform is reshaped through precise 'cut-and-fill' control. The focus lies in the post-excavation substrate treatment, constructing a secure foundational barrier that primes the site for subsequent layers of containment, planting, and hydrological management.

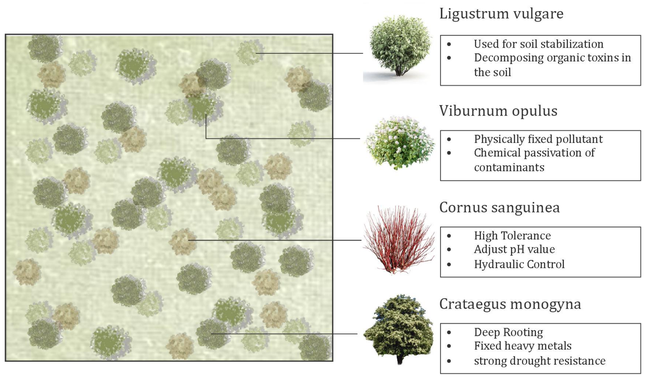


Multi-Phytoremediation Plan



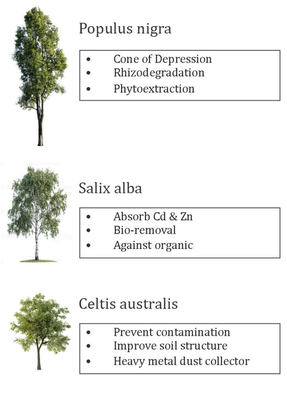
Low polluted

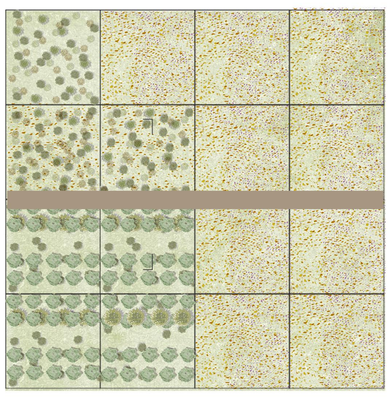


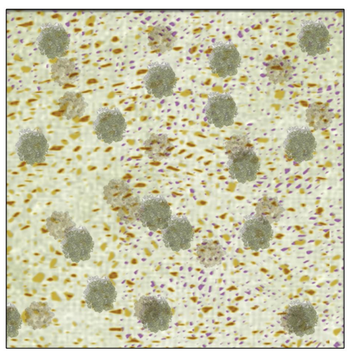
Moderate polluted

High polluted

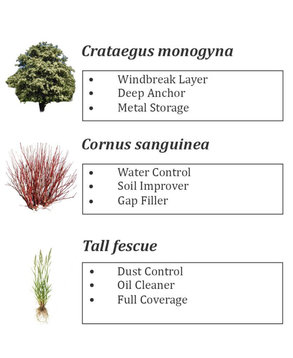


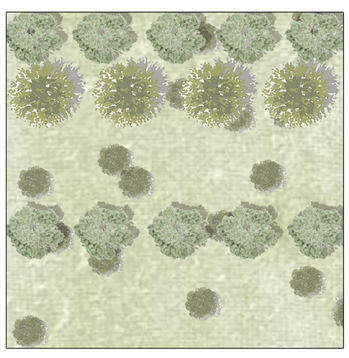



Multi-Phytoremediation Plan

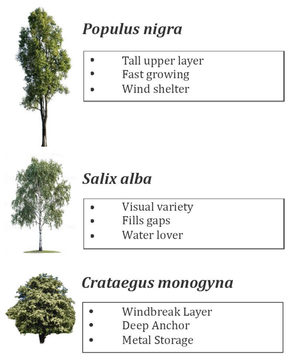


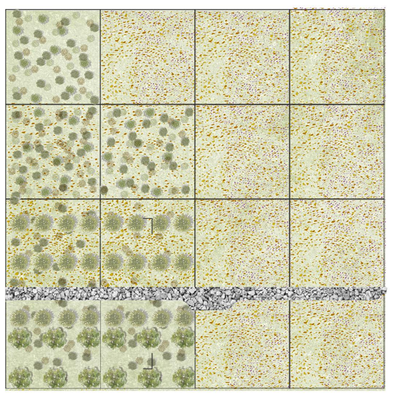
Shrub-herb mix



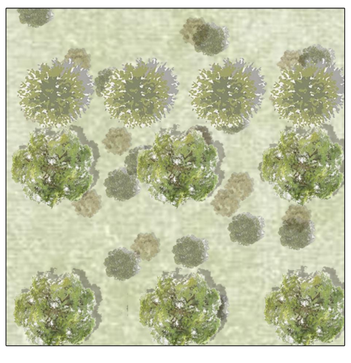



Tree-shrub mix

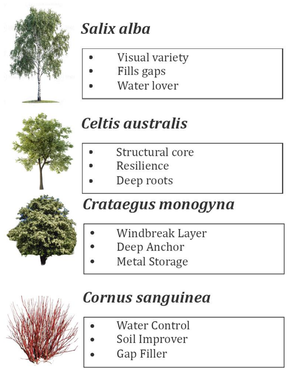


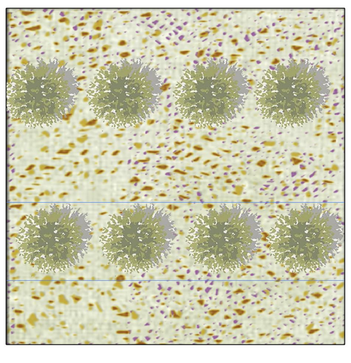


Multi-Phytoremediation Plan

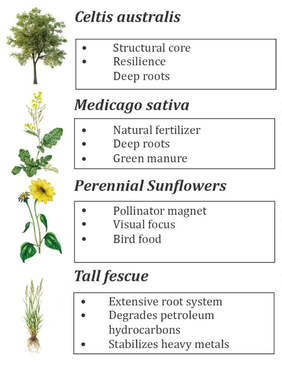


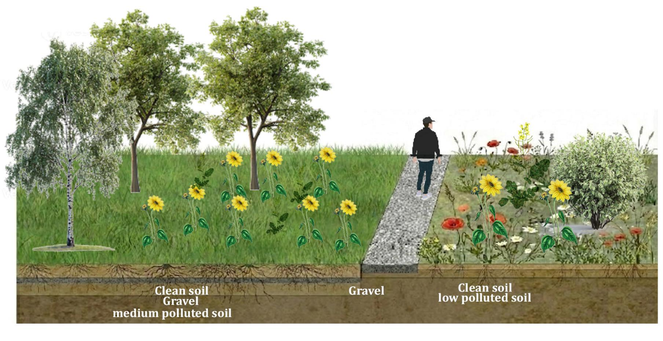
Tree-shrub-grass mix



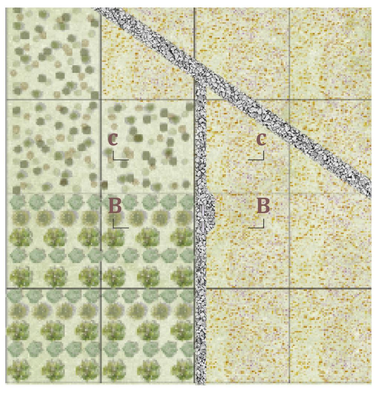
Tree-grass



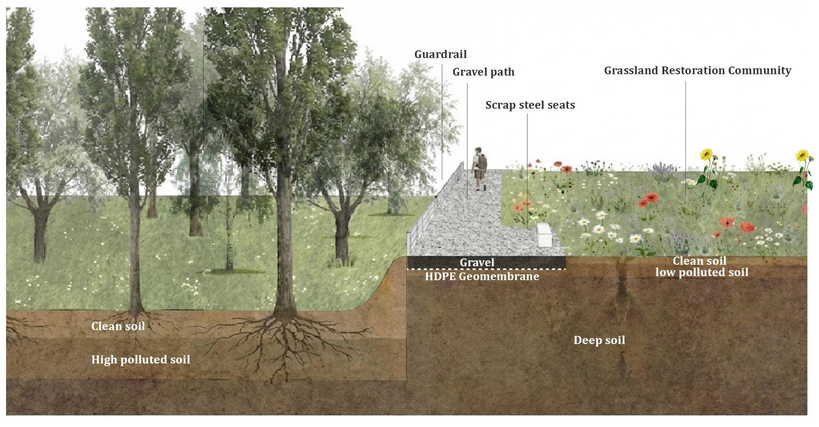



### The Human Interface

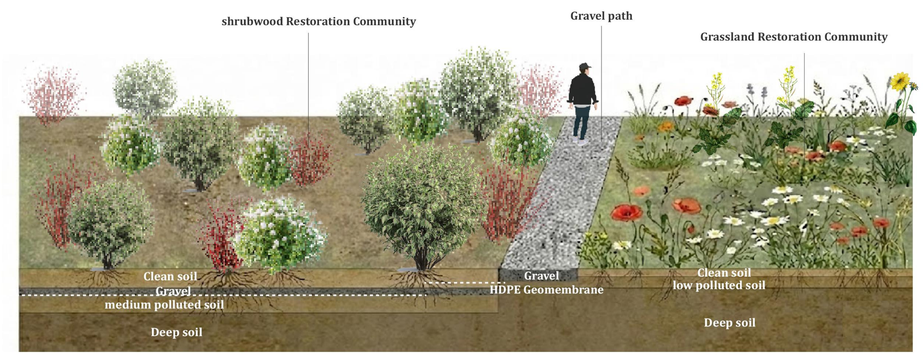
The landform is reshaped through precise 'cut-and-fill' control. The focus lies in the post-excavation substrate treatment, constructing a secure foundational barrier that primes the site for subsequent layers of containment, planting, and hydrological management.




Multi-Phytoremediation Plan




B-B SECTION（Heavily polluted isolation interface）




C-C SECTION（Moderate to lightly polluted isolation interface）

# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## SURGERY - THE MASTERPLAN

**Inspired by the ancient Chinese old melody The Threefold Echoes—a musical masterpiece exploring the profound emotions of parting—our design orchestrates a dignified and poetic farewell to the roaring industrial era. It is a spatial symphony of departure, healing, and rebirth.**

SCALE:1:10000

STUDENTS: Zhang Shuyi
Liu Jialin

# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## SURGERY- THE HEALING PRELUDE

### The first Echo - The Healing Prelude

The journey begins at the train station, immersing the reader in a dynamic, ecological green carpet.
The area actively extracts heavy metals from polluted soil using hyperaccumulating plants such as perennial sunflowers and ornamental grasses.
This is the site's "first layer"—a silent yet powerful prelude to the earth's self-healing before reaching the industrial heartland.

1. Tree Array Square
2. resilience bloom meadow
3. resilience bloom meadow
4. The Chords Shrubbery
5. Grove Chords
6. Observation Tower
7. The lawn

SCALE:1:5000

### Resilience bloom meadow

Remediation:
Revitalize soil activity and prevent soil erosion;
Absorb toxins from the soil;

landscape:
The canvas of changing seasons;
The Contrast of Hard and Soil;

### sunflower sea

Remediation:
as Phytoextraction,Rapid absorption of soil toxins;
Topsoil Activation;

landscape:
Perennial sunflowers have a long flowering period and can serve as a focal point in landscape design.

### Grove Chords

Remediation:
To prevent toxic substances from spreading to the surrounding area via groundwater;
Biodiversity Hub

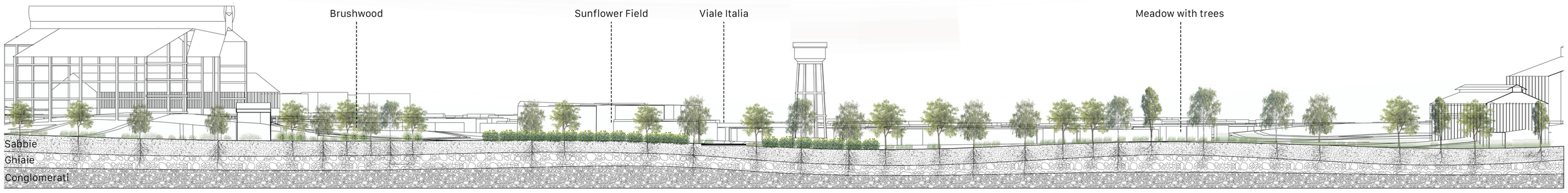
landscape:
Spatial Enclosure;
Increase the layers of the landscape

### chaparral woodland

Remediation:Revitalizing the Substrate and Resist surface erosion;The Earth's Purifier;

landscape:A Natural Canvas of Time;The Interweaving of Textures;

A-A'Section 1:1200



STUDENTS: Zhang Shuyi
Liu Jialin

# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## SURGERY- THE WATER AND EARTH DUET

### The second Echo - The water and earth duet

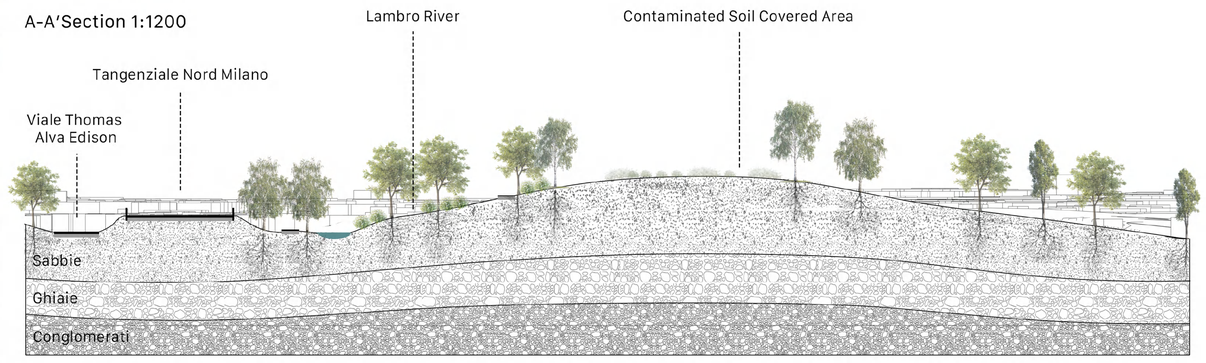
Venture deeper into The Quarry Sanctuary along the winding boardwalk. Beneath your feet lie tranquil, purified pools and lush wetland vegetation, instantly shutting out the city's clamor, leaving only the echoes of the wind and water droplets. Continue along the Lambro River, climbing step by step towards the highest point of Falck. As the altitude increases, the view gradually expands. Upon finally reaching the summit of Falck's spiritual mountain, the entire reborn Area Falck, the Milan skyline, and even the distant Alps will unfold before you, completing an emotional journey from "scarred earth" to "viewing from the clouds."

Spirit Hill

Remediation: Conserve upland soil and prevent slope erosion; Restore native grassland ecosystems; Protect geological heritage;

landscape: A prominent landmark of endurance; The synergy of physical vitality and open nature; Sweeping panoramas of the terrain;

A-A'Section 1:1200

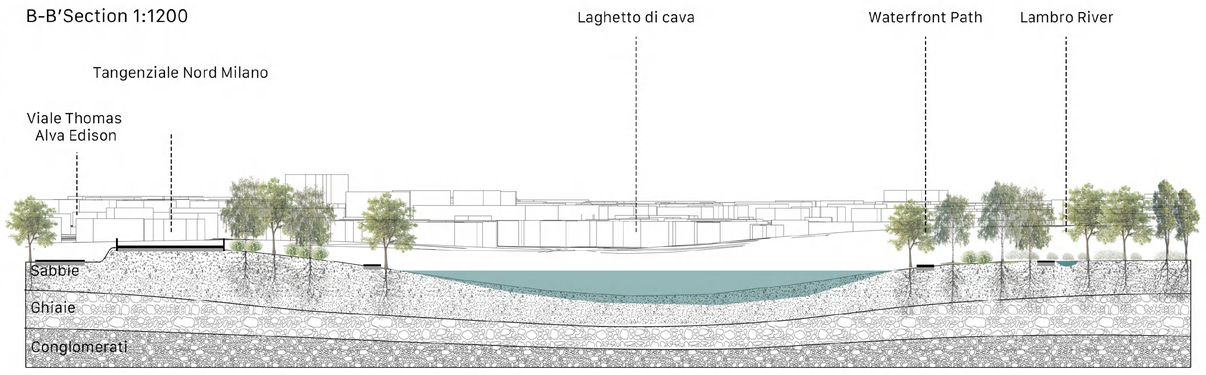


River Ecoregion

Remediation: Strengthen riparian buffers to prevent erosion; Maintain ecological corridors for wildlife; Mitigate flood risks naturally;

landscape: The dynamic rhythm of flowing water; A scenic corridor for exploration; The wild beauty of the riverbank;

B-B'Section 1:1200

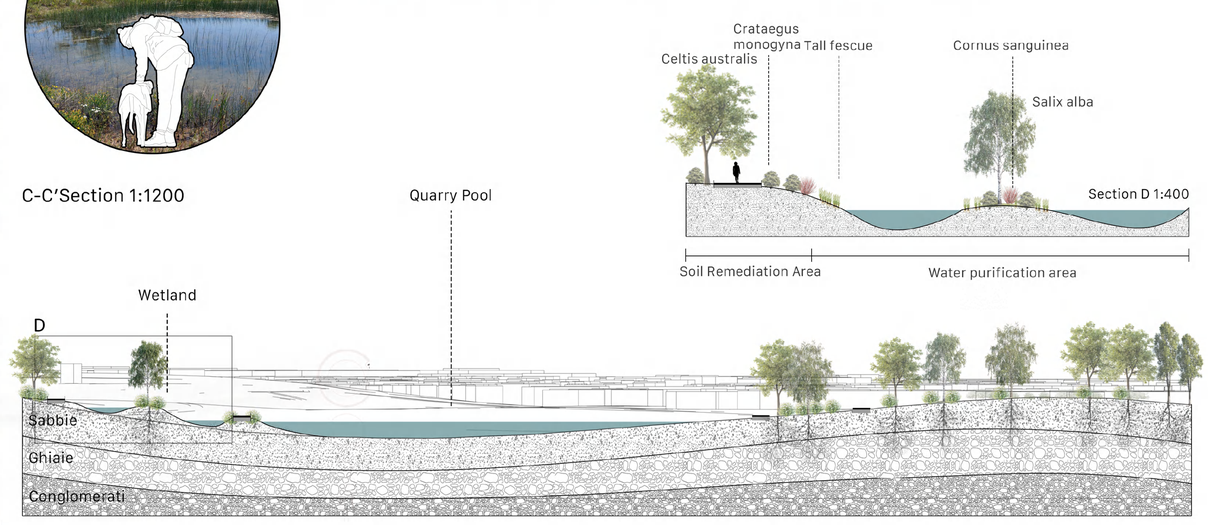


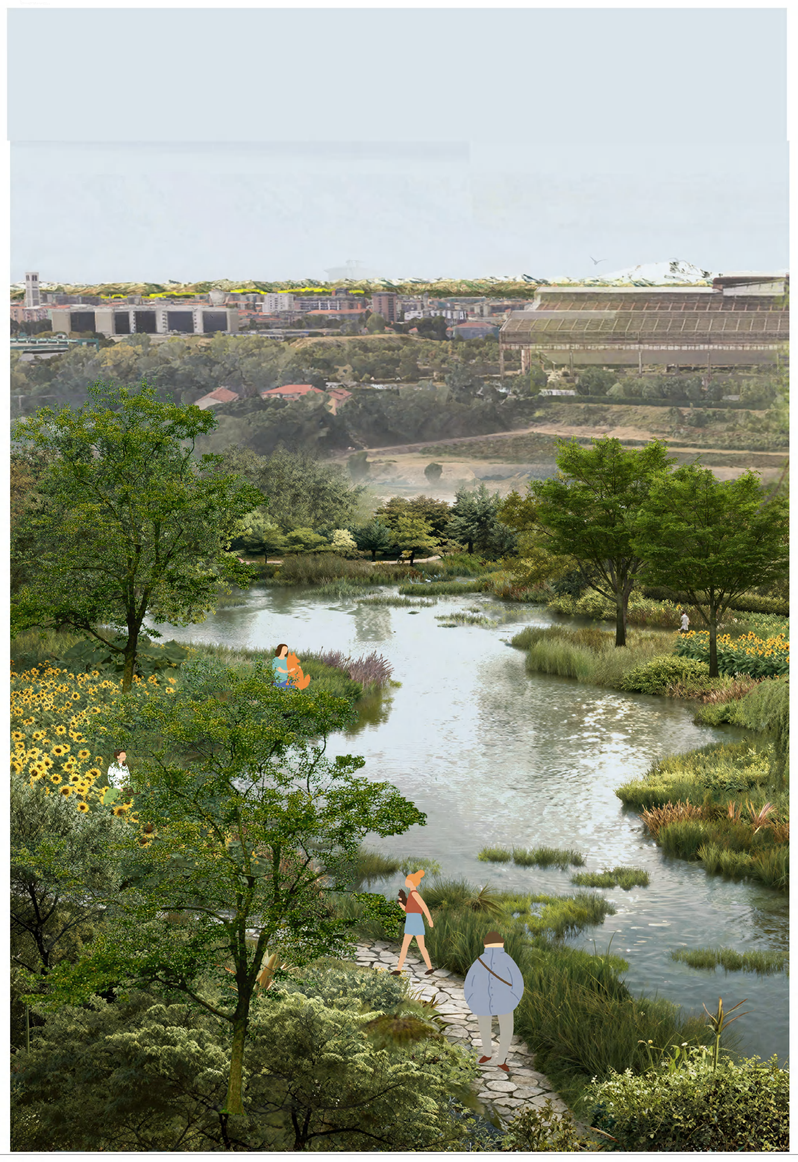
Healing Quarry Wetlands

Remediation: Purify water systems; Restore aquatic habitats; Stabilize excavated banks;

landscape: The reflection of rebirth; The contrast of industrial scars and soft ecology;

C-C'Section 1:1200



STUDENTS: Zhang Shuyi
Liu Jialin

# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## SURGERY- THE BREATH OF WILD

### The third Echo - The breath of wild

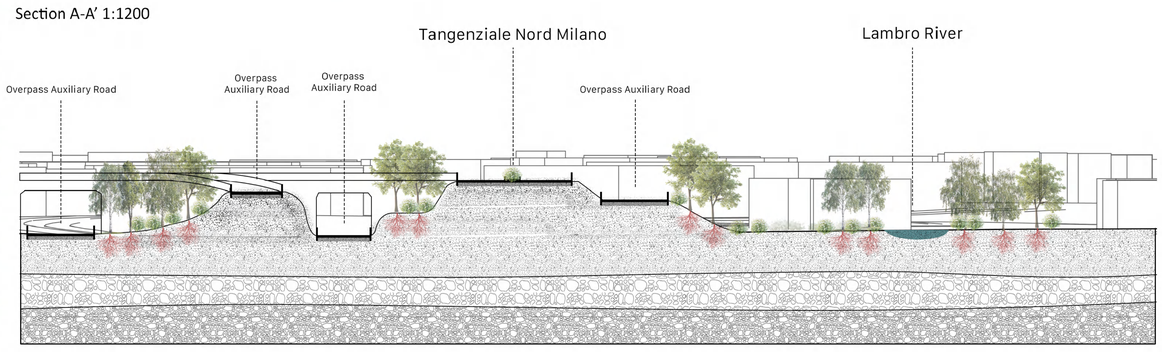
As the final healing chapter, the journey descends north from the summit. The trail winds through a tranquil tree-enclosed lawn, transitions into wild riparian woodlands and shrubs, and ultimately dissolves into expansive farmlands and blooming meadows. Swept by the wind, this route orchestrates a poetic return from the industrial ruins back to the living, breathing earth.

#### Flora meadow

Remediation:
A diverse array of wildflowers and herbs reawakens the microorganisms and mycorrhizal fungi that have been dormant in the dead soil of industry.
It significantly improves the pollination rate and yield of surrounding crops, realizing the feedback from industrial heritage to agriculture.

landscape:
Flora Meadow is incredibly light; a gentle breeze can create ripples on its surface. It also exhibits the highest level of seasonal variation.

Section A-A' 1:1200



#### Wild Rivershore

Remediation:
The gentle slopes and dense vegetation form a natural "sponge," effectively slowing down flood peaks during Milan's rainy season. The root system can also intercept and absorb residual heavy metals that may seep into the Area Falck site with surface runoff.

landscape:
On the wild and natural riverbank, watching the flowing water carry everything into the distance, this emotional experience of moving from "entering the world (ruins)" to "leaving the world (nature)" reaches its ultimate release here.

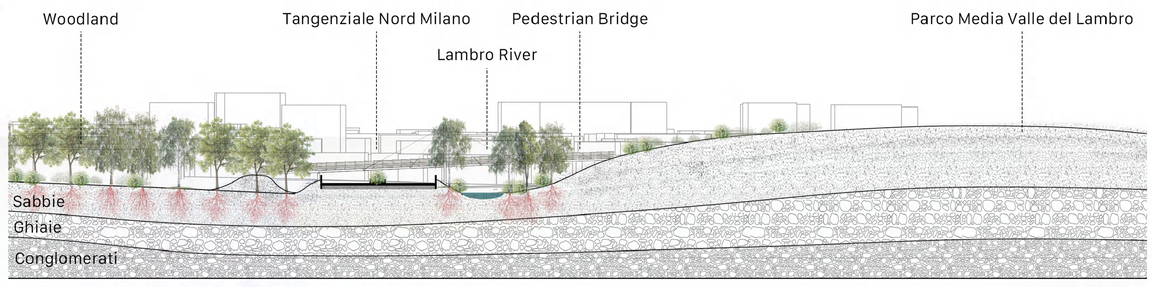
Section B-B' 1:1200

#### The Harmonic Grasslands

Remediation:
As the largest and relatively flat area on the site, the large lawn serves as an excellent rainwater infiltration zone in Area Falck. Through plant transpiration, the lawn significantly reduces the surface and surrounding air temperature.

landscape:
The view suddenly opens up. This "blank space" of the earth can instantly release psychological tension and bring a great sense of relaxation. The lawn is a democratic space that is completely open to the public. People are allowed to run, lie down, picnic, fly kites, and even hold open-air concerts.

Section C-C' 1:1200



STUDENTS: Zhang Shuyi
Liu Jialin

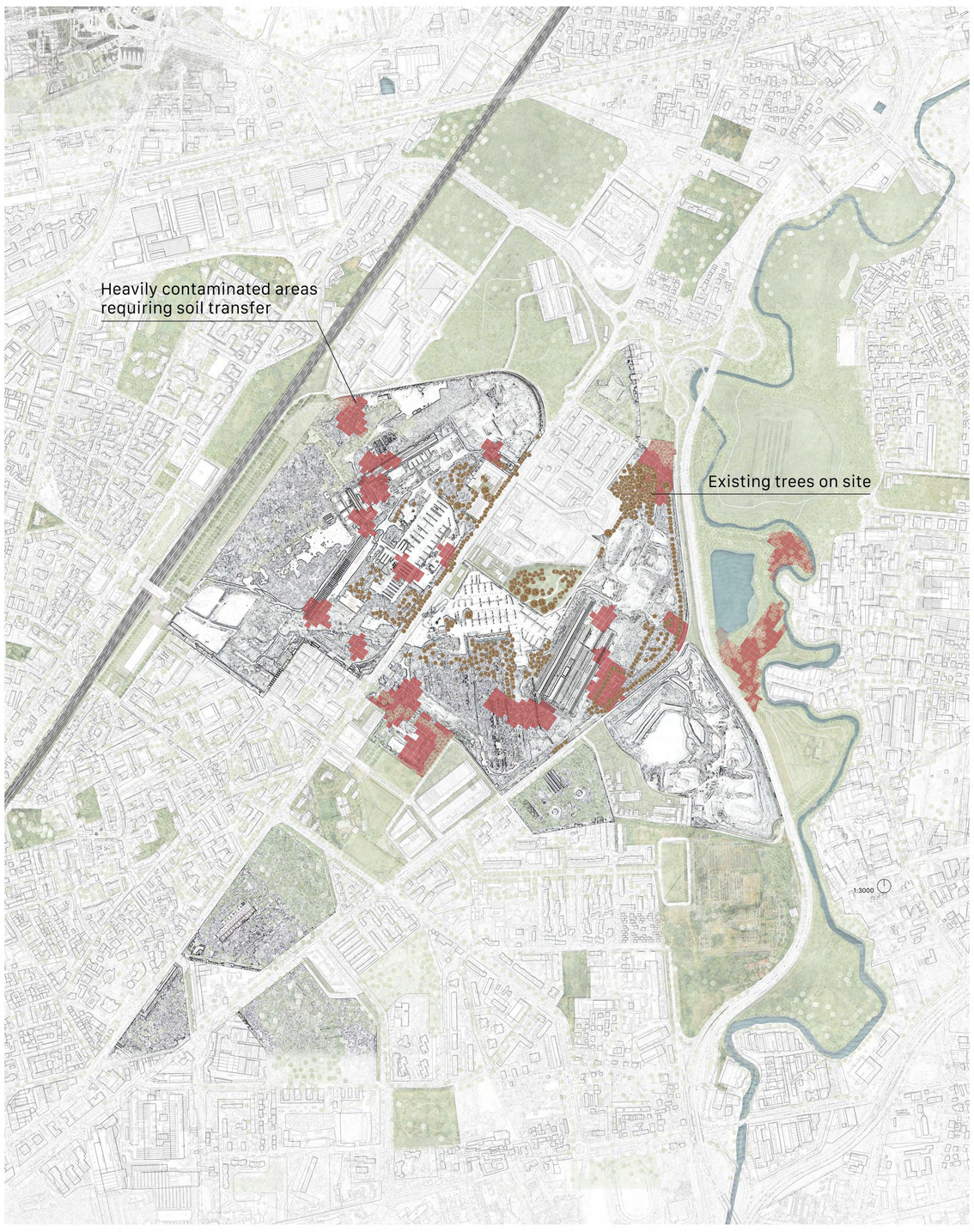
# AREA FALCK:FROM ISOLATION TO SYMBIOSIS

## RECOVERY - THE TRANSFORMATION PROCESS

### THE EVOLUTION OF AREA FALCK

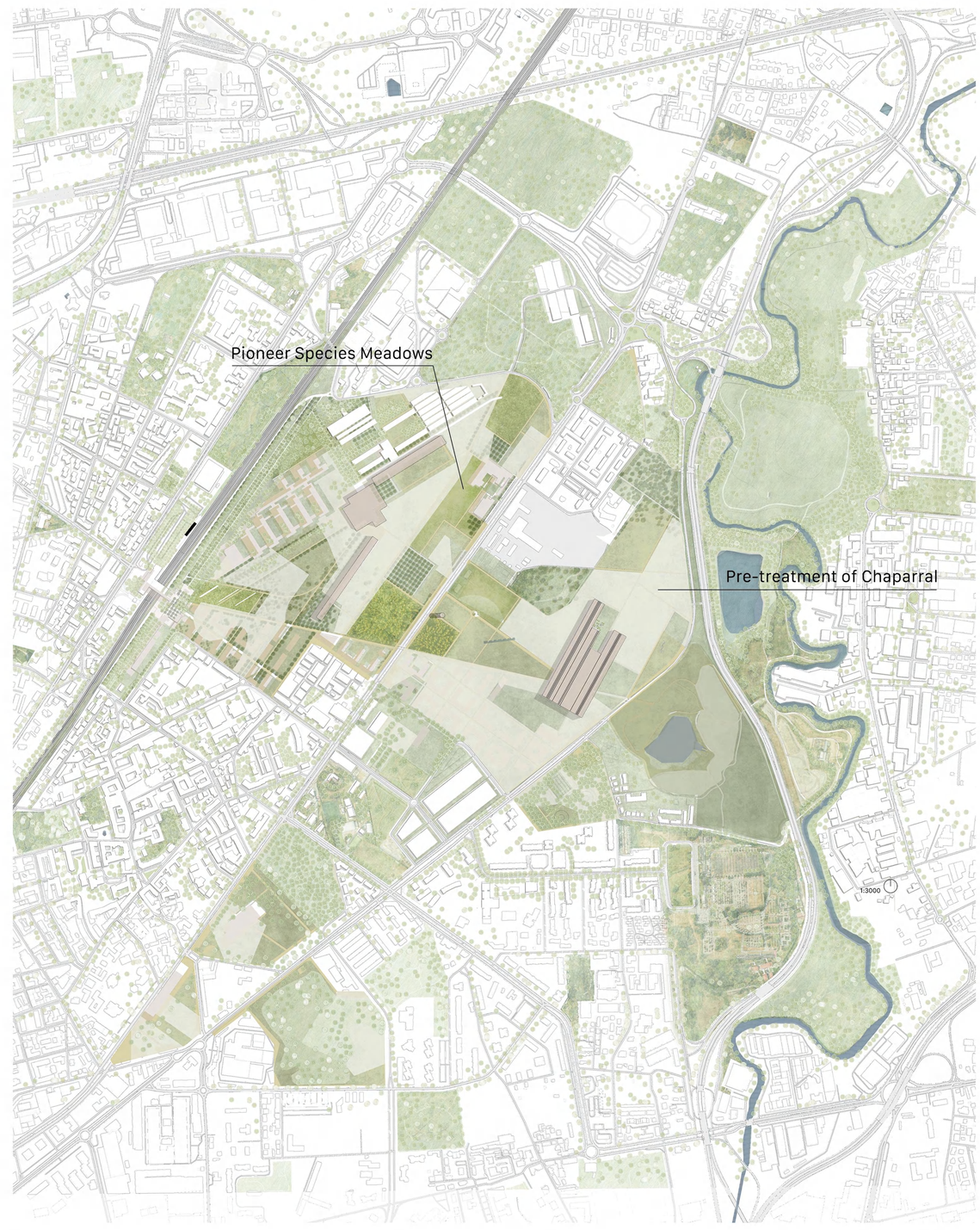
Conceived as a landscape "surgery," Area Falck's transformation evolves from physical soil remediation to biological symbiosis. By reshaping topography, applying phytoremediation, and guiding natural succession, the site will grow into a resilient, multi-layered ecosystem by 2070.

**2026 PLAN:** SOIL REMEDIATION & SUBSTRATE RESHAPING




Execute site-wide topographic preparation and soil balancing. Deep excavation targets polluted 'hot spots' to remove toxic soil, capping it with clean guest soil and an inert barrier to create a safe substrate for ecological intervention.

**2040 PLAN:** VEGETATION CLEARING & HABITAT PREPARATION




Introduce a carefully selected community of decontaminating herbs to initiate the ecological recovery. These robust 'pioneer plants' rapidly colonize and cover the surface to prevent toxic dust dispersion, while their extensive root systems actively absorb, fix, or degrade residual soil pollutants.

**2050 PLAN:** ESTABLISHMENT OF PHYTOREMEDIATION LAYER

As the pioneer herbs establish a secure base, hardy shrubs are progressively introduced. This intermediate layer not only diversifies the phytoremediation capabilities but also creates a sheltered microclimate. By breaking the wind and reducing soil evaporation, they act as "nurse plants," paving the way for larger flora.

**2070 PLAN:** AFFORESTATION & NATURAL SUCCESSION

Upon stabilization of the shrub and grass layers, trees are introduced to establish a multi-layered ecosystem. Over time, artificial guidance and natural succession combine to cultivate a flourishing plant community.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