

REMEDIISCAPE

A Multi-Scalar Design Intelligence Framework for Post-Industrial
Bioremediation at Dagenham Dock, East London

GLOBAL CONTEXT OF CONCRETE PRODUCTION

01 Planetary Burden of Concrete

02 Energy-Carbon-Water Nexus

03 Global Cement Emissions

04 Pollution Pathways to the Arctic

05 Cement Production Networks

01

Situating concrete production within the energy, urbanisation, emissions, and supply networks that externalise carbon, particulate, water, and ecological burdens.

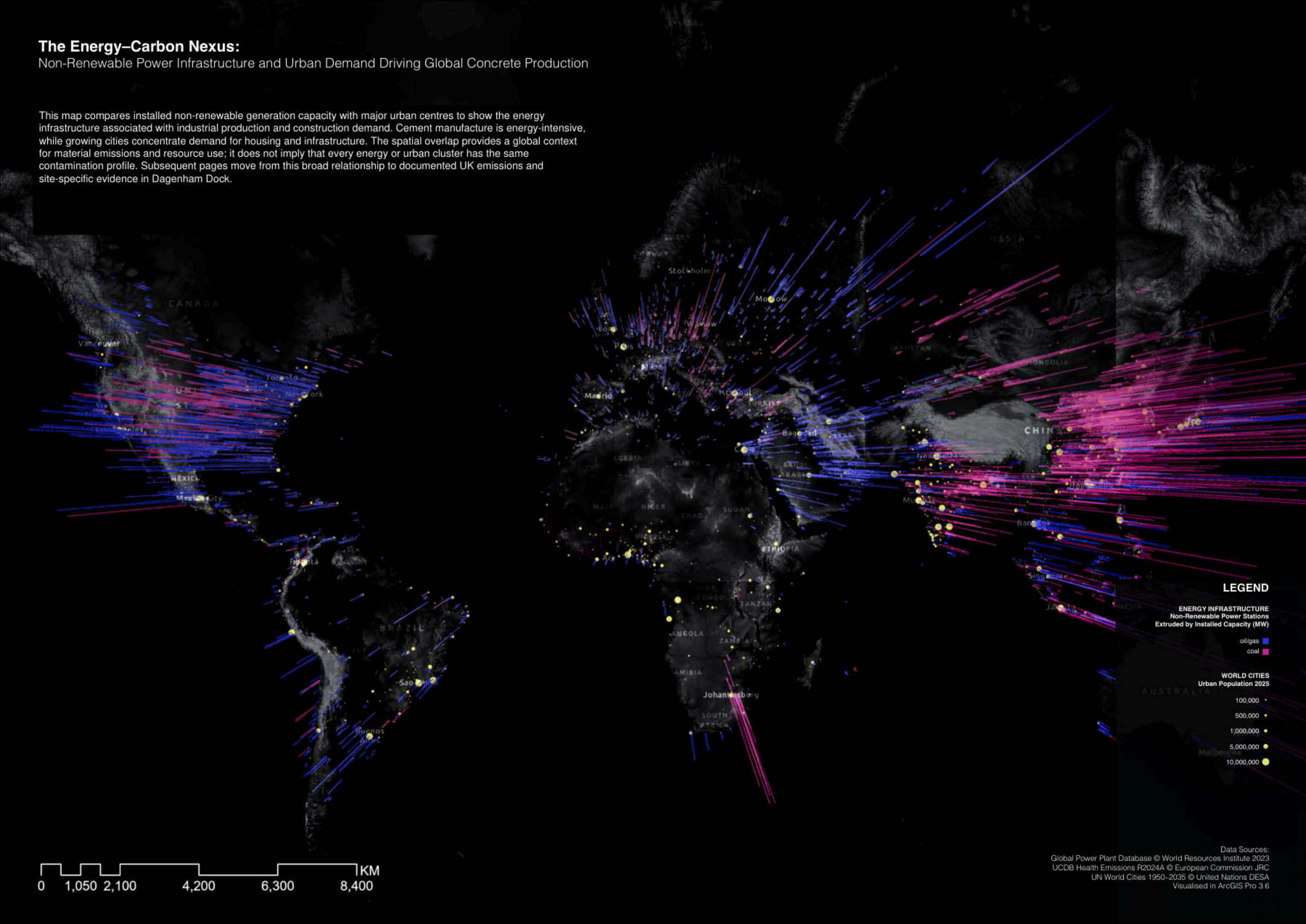
Global Energy Infrastructure, GHG Emissions, and the Cities That Concrete Built.

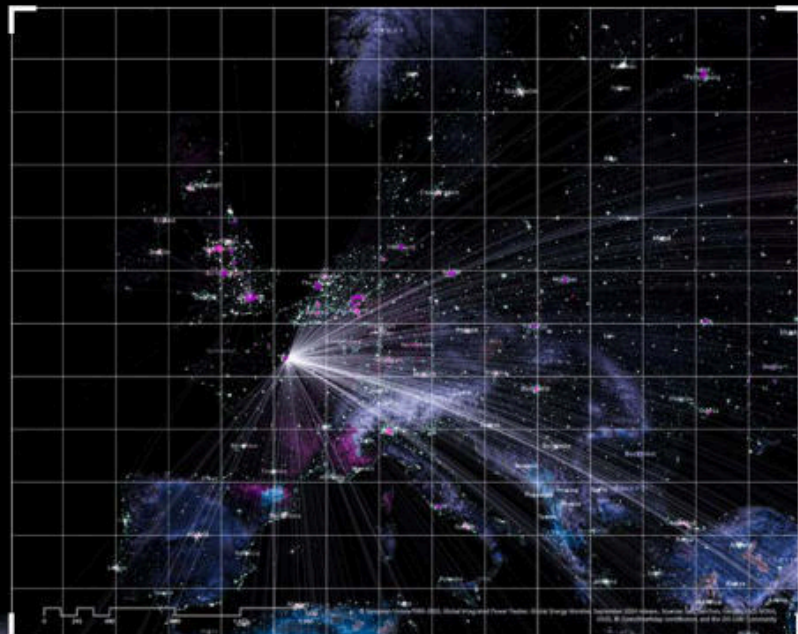
Global power, emissions, and urbanisation datasets are read together to situate concrete within the infrastructure that supports material extraction, manufacture, and construction demand. Concentrations of non-renewable generation and urban growth indicate where energy use and emissions are most intense; they do not by themselves establish local soil contamination. The following pages narrow this global context to England and, finally, to the post-industrial conditions of Dagenham Dock.



The Energy–Carbon Nexus:
Non-Renewable Power Infrastructure and Urban Demand Driving Global Concrete Production

This map compares installed non-renewable generation capacity with major urban centres to show the energy infrastructure associated with industrial production and construction demand. Cement manufacture is energy-intensive, while growing cities concentrate demand for housing and infrastructure. The spatial overlap provides a global context for material emissions and resource use; it does not imply that every energy or urban cluster has the same contamination profile. Subsequent pages move from this broad relationship to documented UK emissions and site-specific evidence in Dagenham Dock.



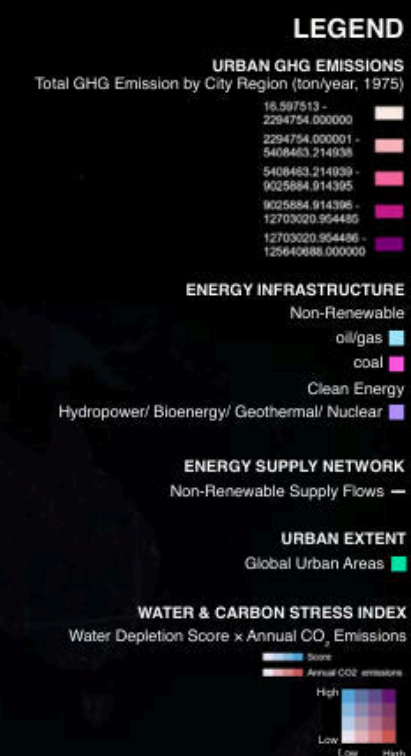


A map zoomed out to the perspective of Europe

ENTANGLED INFRASTRUCTURES:

Non-Renewable Energy Supply Networks & Urban Emission Clusters

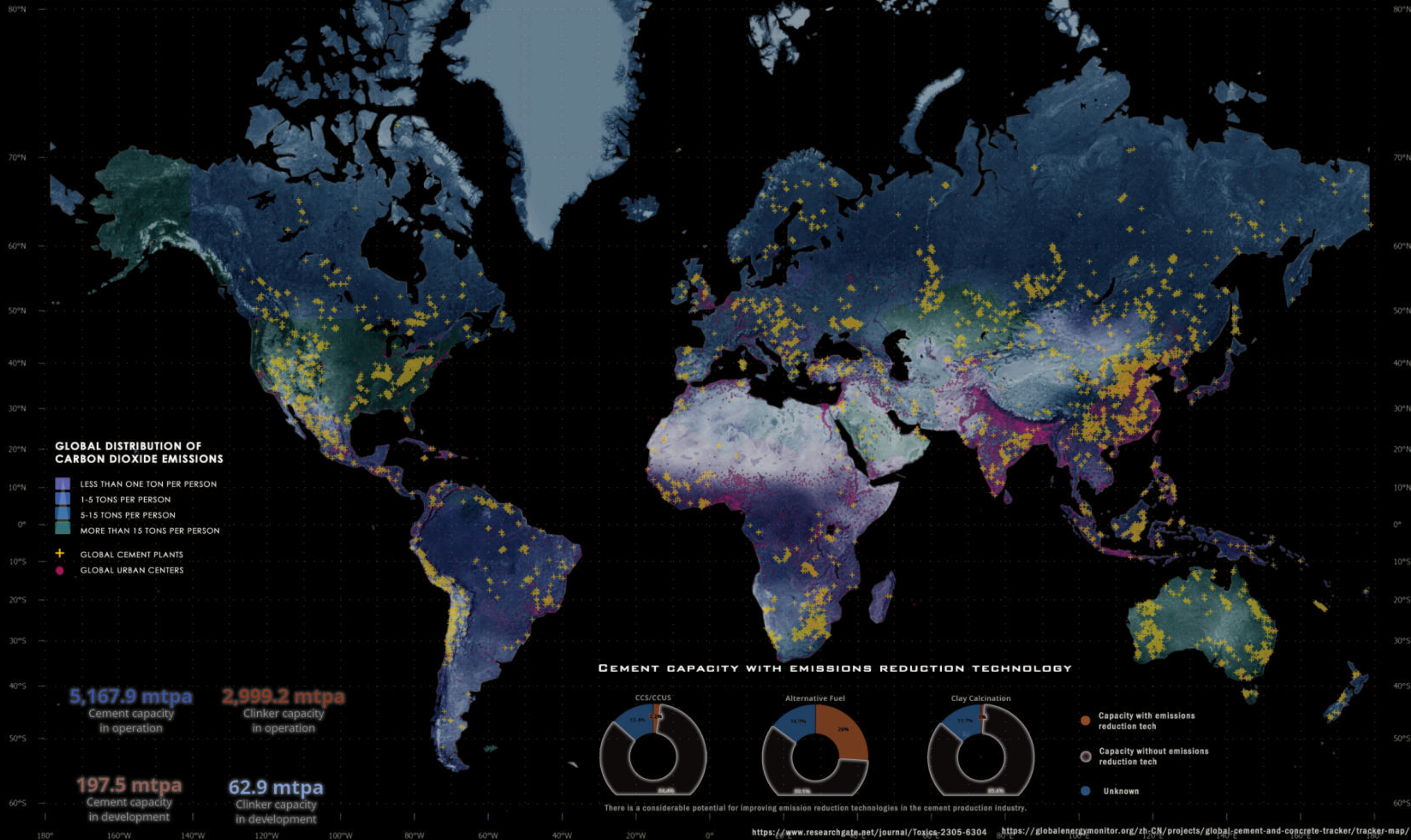
This map visualises the spatial entanglement of non-renewable energy supply chains, urban greenhouse gas emissions, and water depletion stress at a planetary scale. White flow lines trace non-renewable supply networks connecting source nodes (oil/gas/coal power plants) to urban demand centres. Pink-purple halos indicate cumulative GHG emission intensity by city region (UCDB, 1975). The bivariate legend cross-references water depletion score against annual CO₂ emissions, revealing zones of compounded ecological burden.



GLOBAL CO₂ EMISSIONS AND CEMENT INDUSTRY

Exploring the spatial relationship between cement industry emissions and global urban development

This map shows the global distribution of CO₂ emissions alongside cement plants and major urban centers. Areas with dense urban development and industrial activity tend to have higher emission levels. The pattern highlights the important role of the cement industry in global carbon emissions.



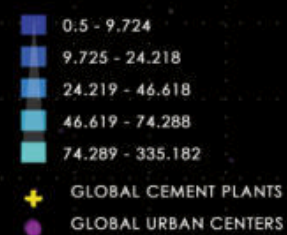
GLOBAL PM2.5 POLLUTION AND CEMENT INDUSTRY

Spatial distribution of cement plants, urban centers, and global PM2.5 pollution

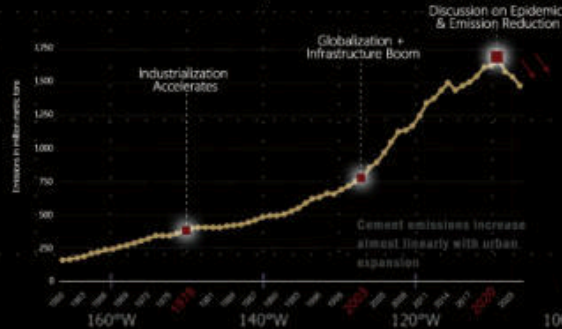
This map illustrates the global distribution of PM2.5 pollution alongside cement plants and major urban centers. Regions with dense industrial activities and large urban populations tend to show higher levels of air pollution. The spatial patterns highlight the influence of industrial production and urban development on global air quality.



GLOBAL PM2.5 EMISSIONS

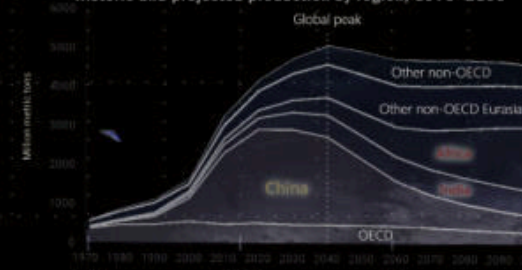


GLOBAL CO₂ EMISSIONS FROM CEMENT PRODUCTION, 1960-2024



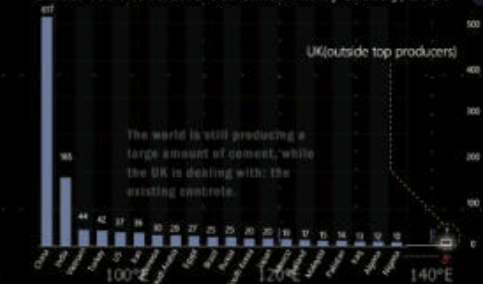
GLOBAL CEMENT PRODUCTION IS SHIFTING

Historic and projected production by region, 1970-2100



THE ASYMMETRY OF CEMENT EMISSIONS

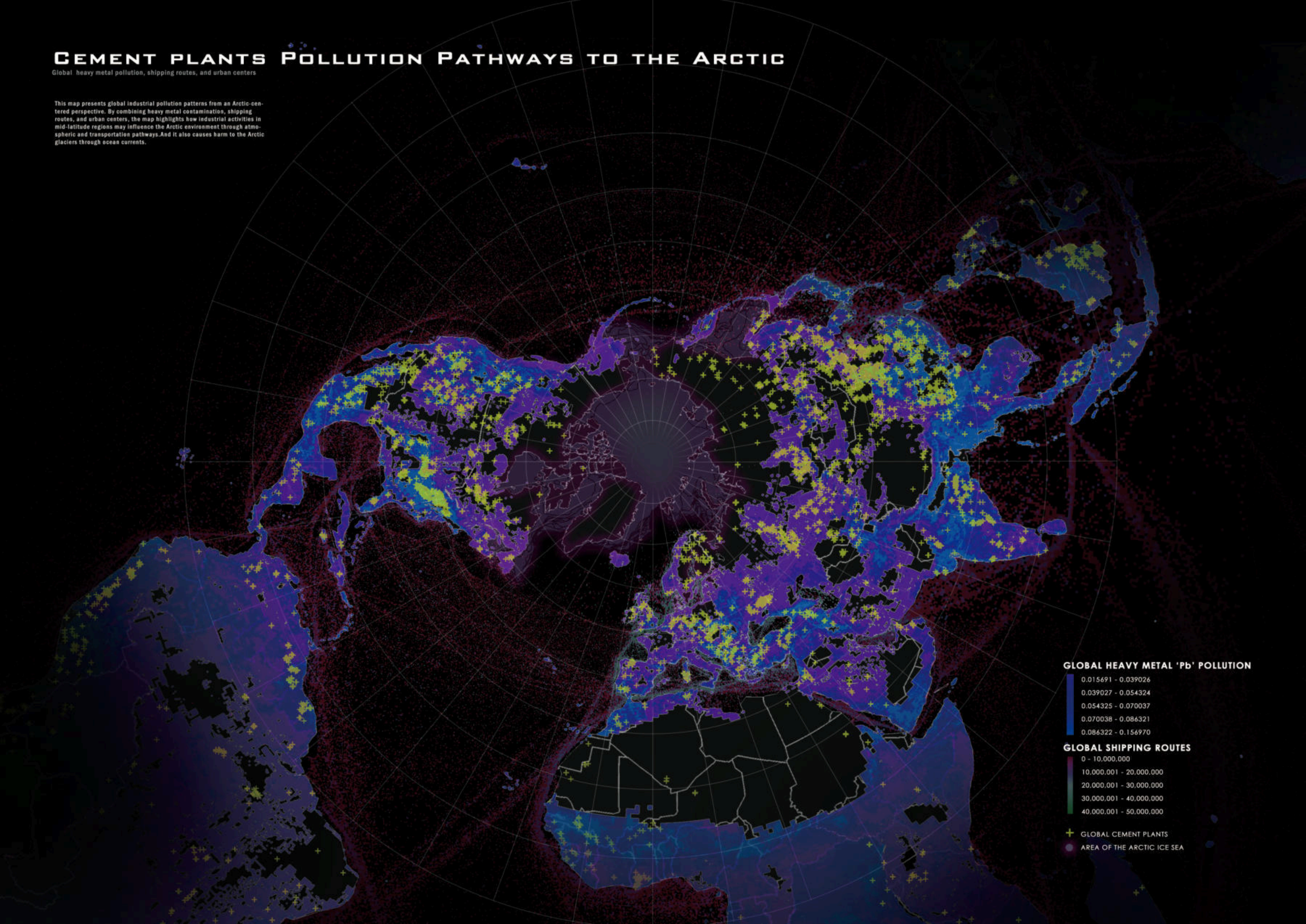
Global cement-related CO₂ emissions by country, 2024



CEMENT PLANTS POLLUTION PATHWAYS TO THE ARCTIC

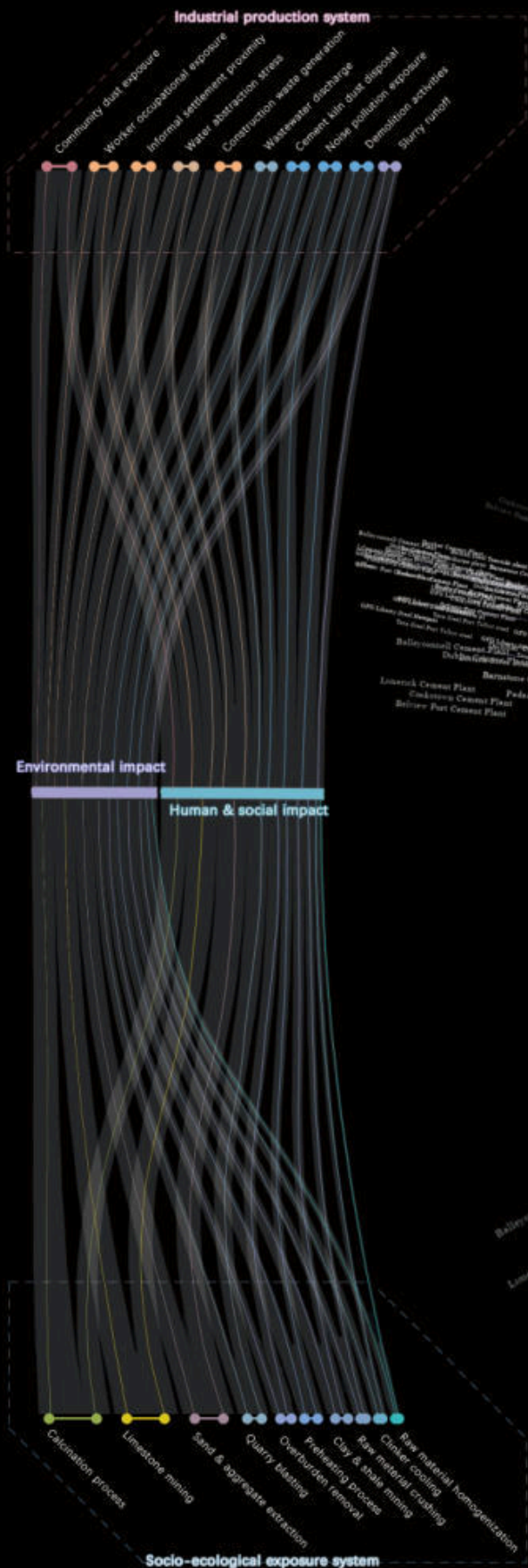
Global heavy metal pollution, shipping routes, and urban centers

This map presents global industrial pollution patterns from an Arctic-centered perspective. By combining heavy metal contamination, shipping routes, and urban centers, the map highlights how industrial activities in mid-latitude regions may influence the Arctic environment through atmospheric and transportation pathways. And it also causes harm to the Arctic glaciers through ocean currents.

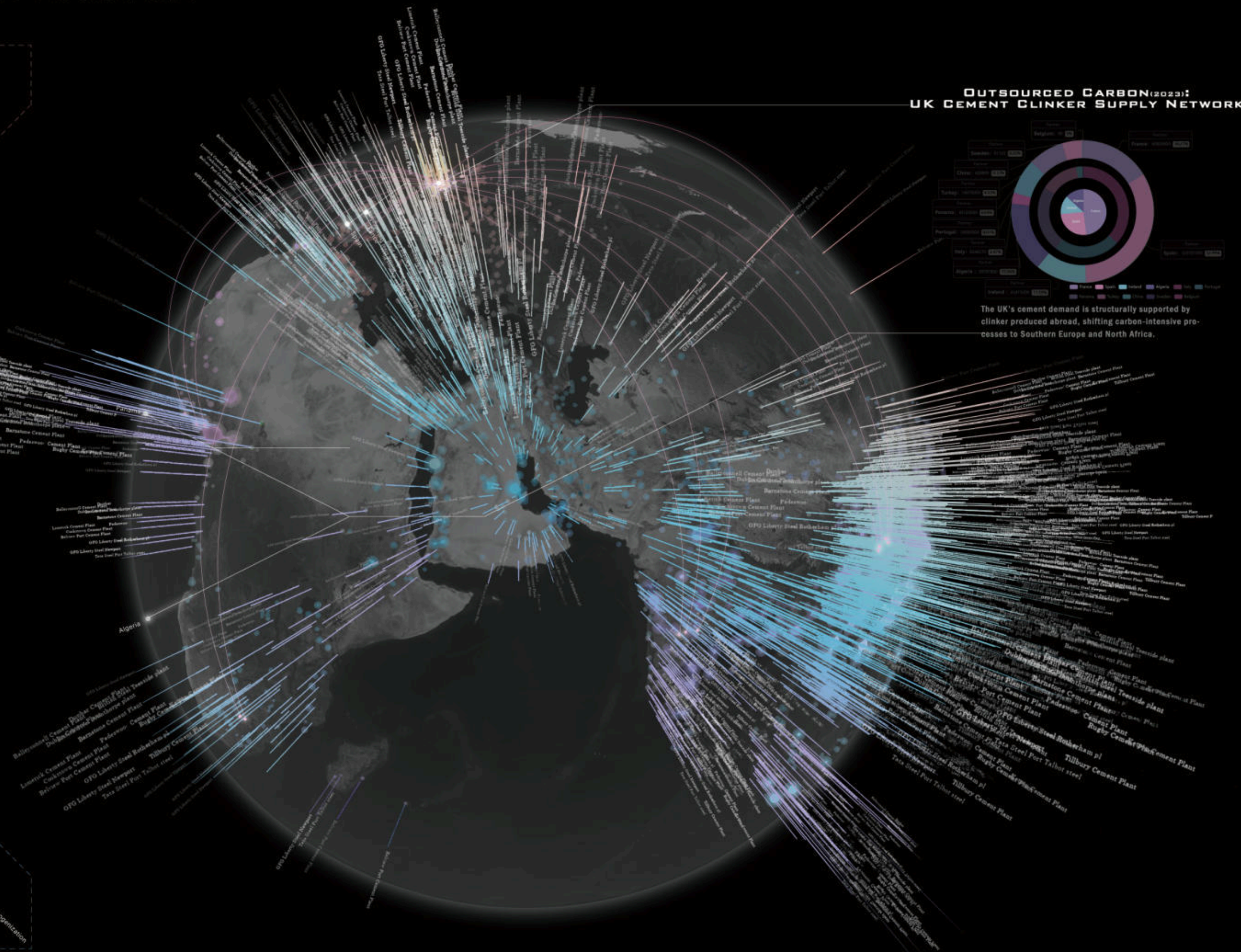


CONCRETE BEYOND BORDERS

Outsourced Carbon and the Global Cement System



The environmental and human impacts of concrete not only arise from the industrial production process, but also accumulate and manifest themselves within the social and ecological exposure system.



CONCRETE'S CONTAMINATION LEGACY

01 Infrastructure and Air Quality

02 Atmospheric Emissions

03 Construction-Waste Afterlife

04 Industrial Metal Residues

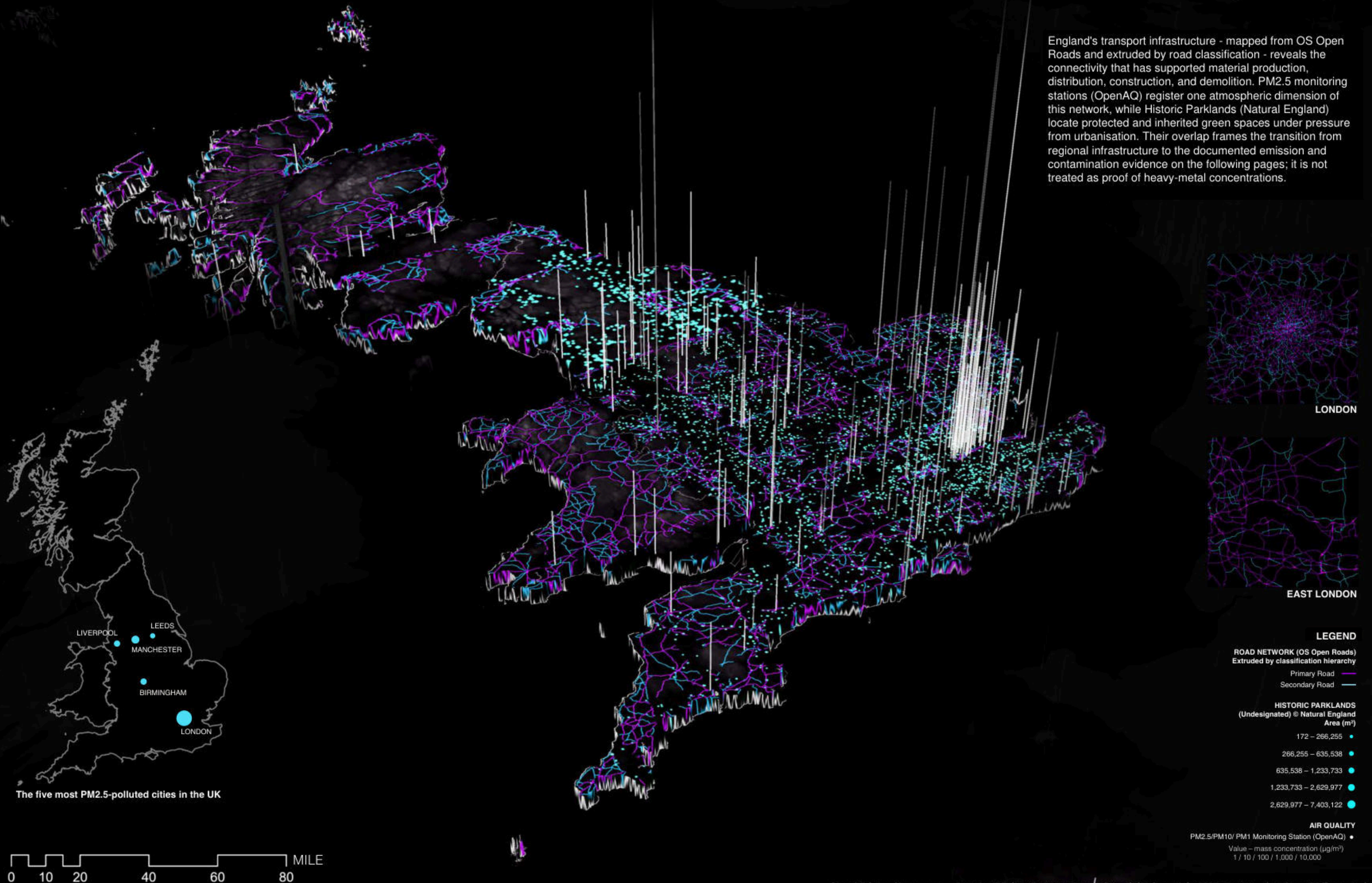
05 Site-Scale Chemical Stratigraphy

02

Tracing how transport, cement production, construction waste, and industrial residues overlap as atmospheric emissions and soil contamination from England to Dagenham Dock.

The Infrastructure–Ecology Inversion: Road Networks, Air Quality, and Residual Green Heritage Across England

England's transport infrastructure - mapped from OS Open Roads and extruded by road classification - reveals the connectivity that has supported material production, distribution, construction, and demolition. PM2.5 monitoring stations (OpenAQ) register one atmospheric dimension of this network, while Historic Parklands (Natural England) locate protected and inherited green spaces under pressure from urbanisation. Their overlap frames the transition from regional infrastructure to the documented emission and contamination evidence on the following pages; it is not treated as proof of heavy-metal concentrations.



The Atmospheric Legacy of Concrete

Tracing the Emission Footprint of Cement Production Across the UK Landscape

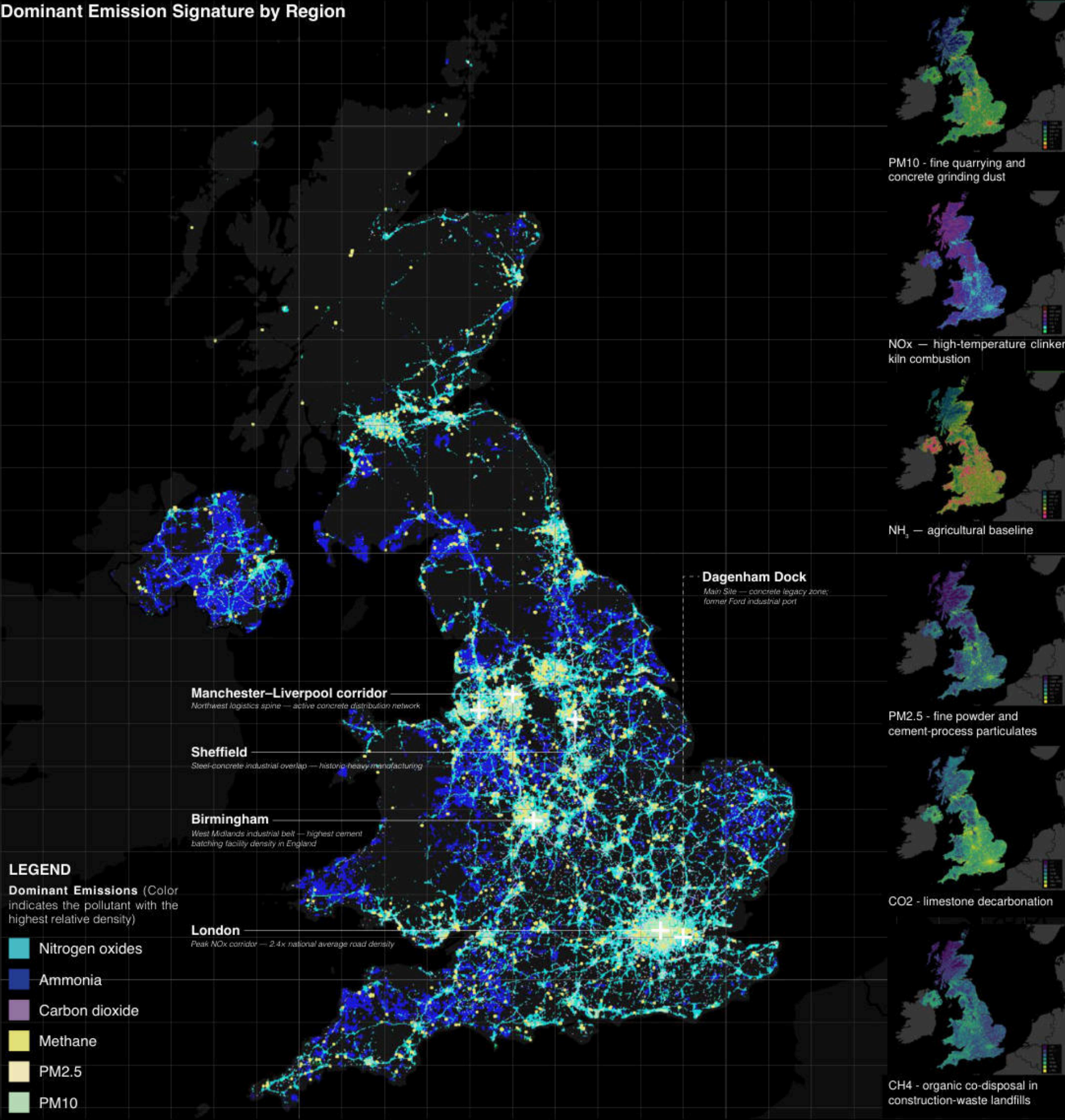
From Kiln to Atmosphere: The National Emission Baseline of Concrete Production

Cement manufacture is a major source of industrial carbon emissions, primarily through limestone calcination and fuel use. This national-scale study brings together NAEI gridded data across six pollutant categories to trace how the wider concrete production system is registered in the atmosphere - from NOx associated with high-temperature combustion to PM10 generated by quarrying, grinding, handling, and transport.

The maps show emissions intensifying along urban-industrial corridors where cement plants, batching facilities, waste sites, and logistics networks overlap. Rural ammonia signatures largely track agricultural land, distinguishing them from this industrial pattern. Read together, the datasets establish the regional context for Remediscape: Dagenham Dock lies within the southeast corridor where atmospheric burden, transport infrastructure, waste processing, and legacy soil contamination converge. The maps provide contextual evidence; they do not substitute for site investigation or chemical sampling.

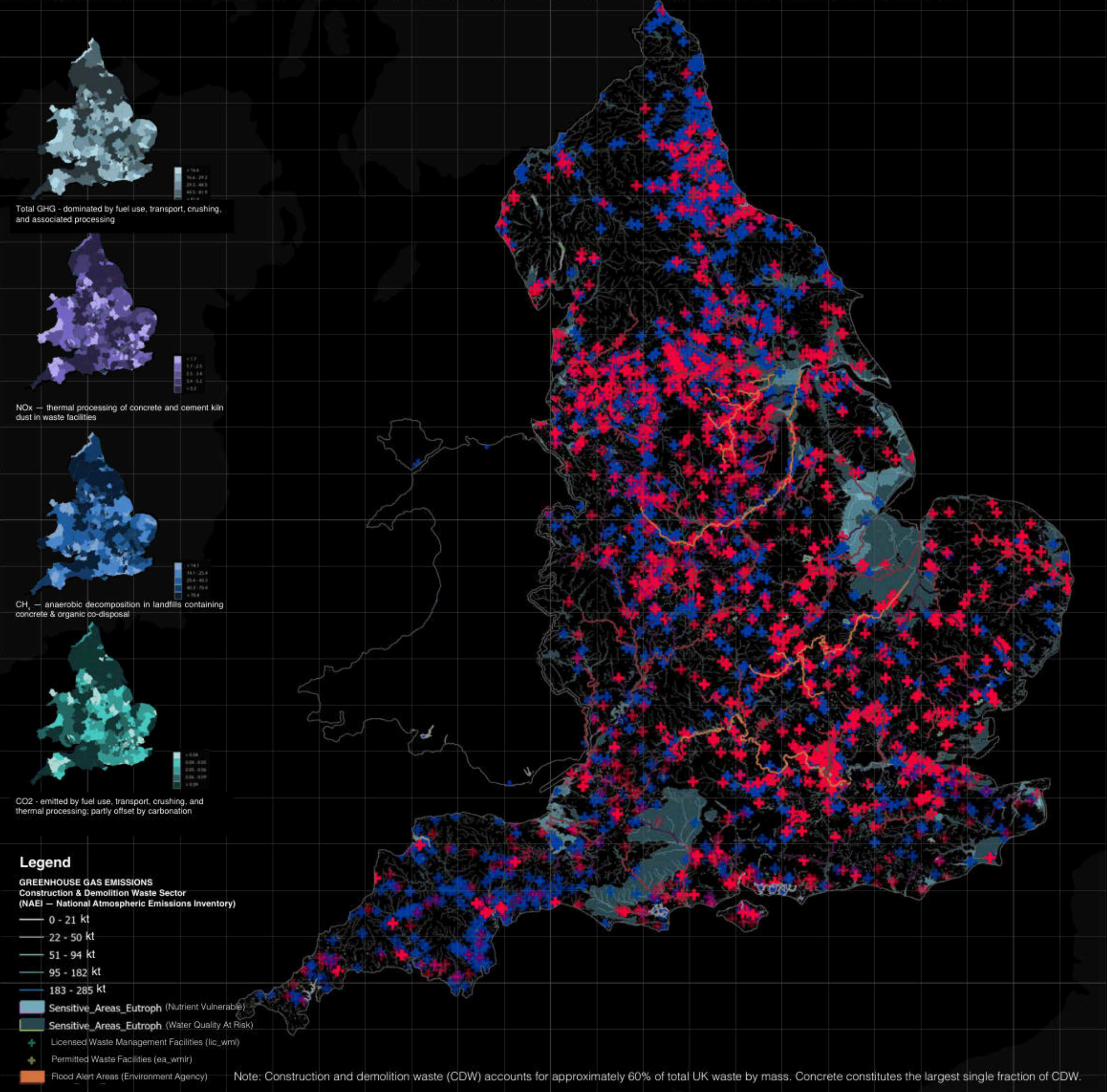
Data Synthesis Sources:
Atmospheric Emissions: National Atmospheric Emissions Inventory (NAEI), 1x1 km gridded, 2021
Cement Sector Emissions: BEIS UK Greenhouse Gas Inventory, IPCC Category 2A1
Spatial Reference: Ordnance Survey (OS) National Grid

Dominant Emission Signature by Region



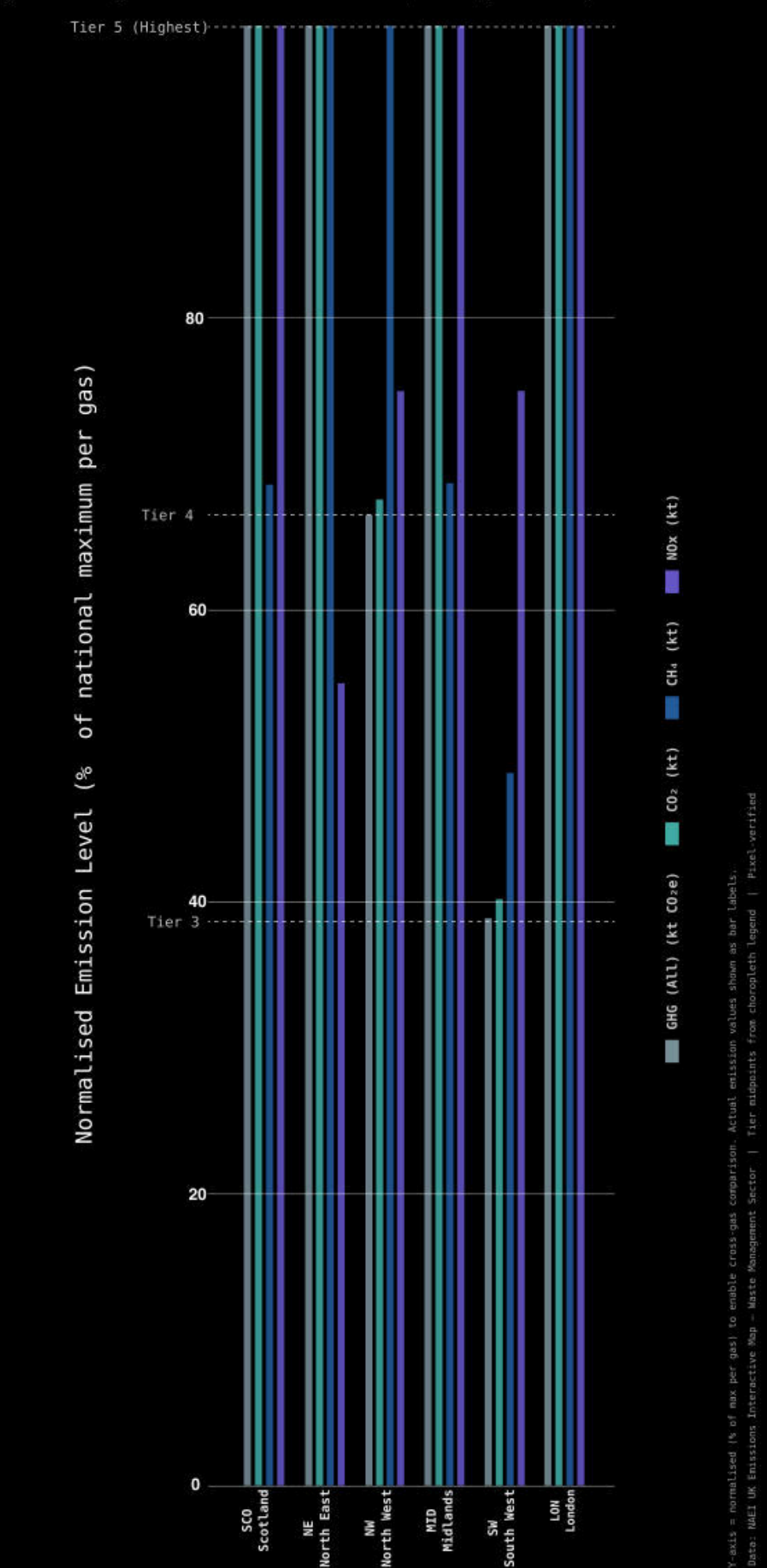
Concrete's Afterlife: The Waste Landscape of a Material Economy

Mapping Greenhouse Gas Emissions from Concrete Demolition Waste, Historic Landfills, and Flood-Vulnerable Disposal Sites



Regional Emission Profiles: Construction Waste Sector

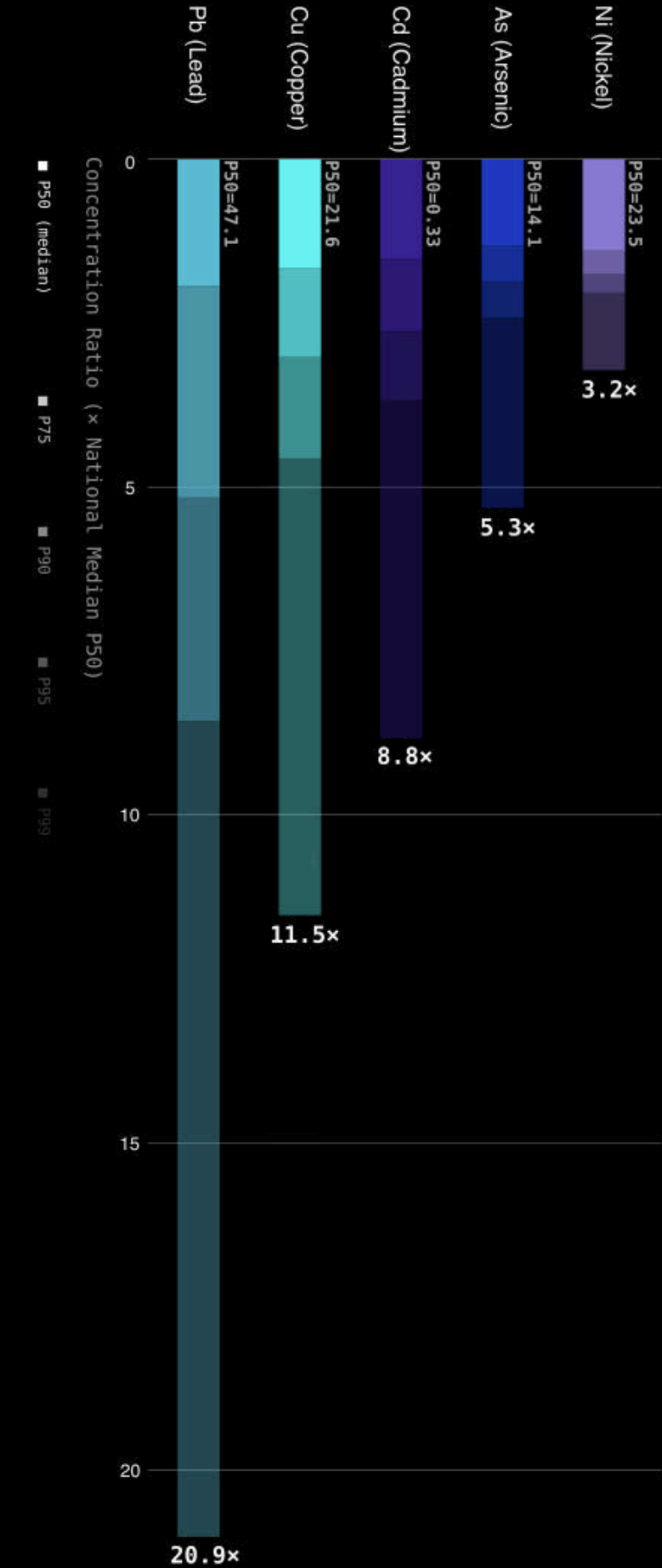
Normalised Emission Levels Across Six UK Regions | London consistently reaches Tier 4-5 across all gases — the highest concentration of concrete waste processing in the country



What Concrete Left Behind: Heavy Metals in England's Topsoil

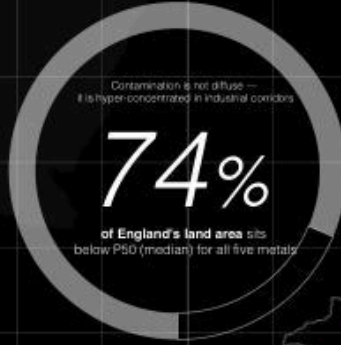
Tracing Industrial Residues from Cement Manufacture, Aggregate Quarrying, Reinforced Construction, and Post-Industrial Waste

Concentration Extremity Index: Industrial Metals in England's Topsoil

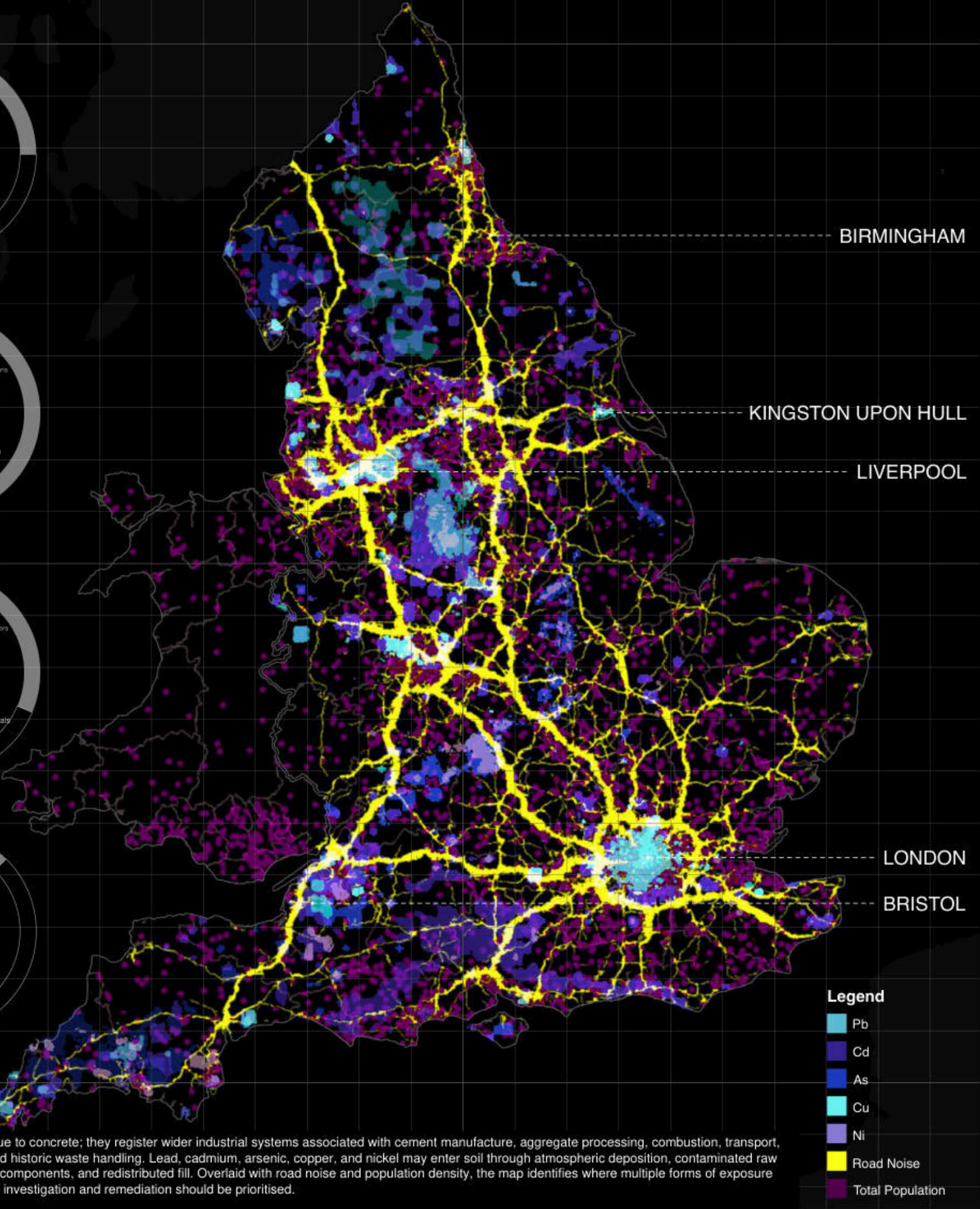


P99 / P50 Ratio – How extreme are contamination hotspots relative to national median?

Data: BGS Normal Background Concentrations (NBCs) in Soils, England

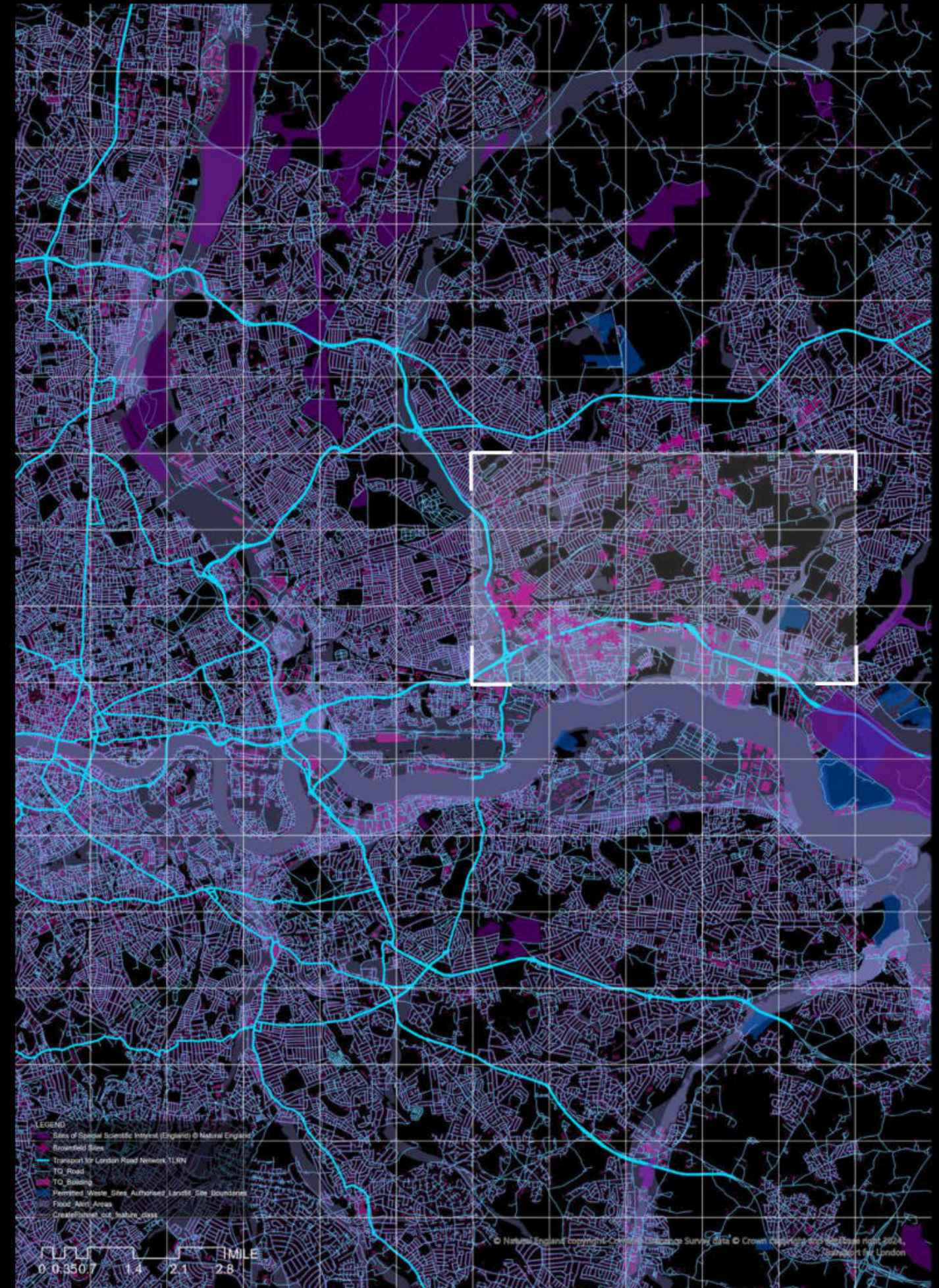
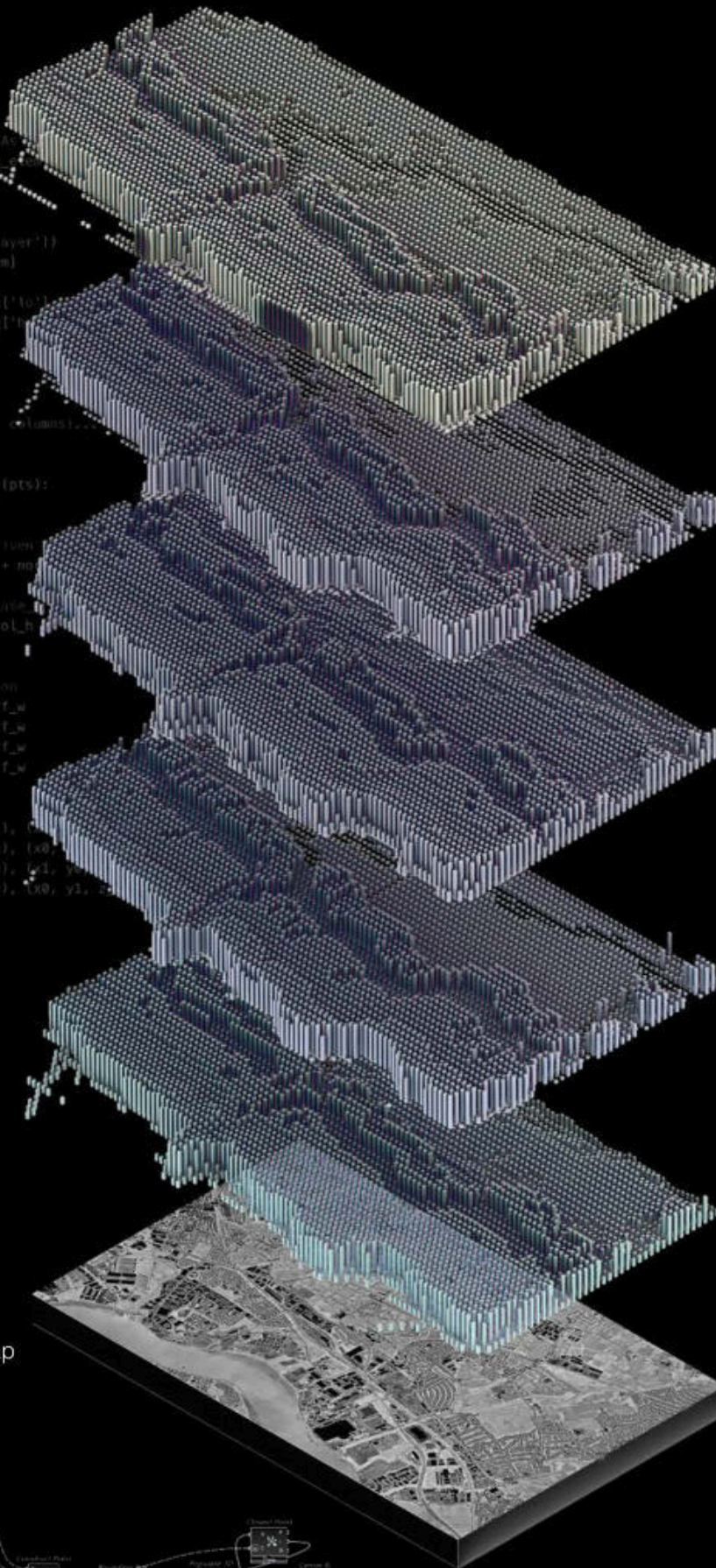


These metals are not unique to concrete; they register wider industrial systems associated with cement manufacture, aggregate processing, combustion, transport, reinforced construction, and historic waste handling. Lead, cadmium, arsenic, copper, and nickel may enter soil through atmospheric deposition, contaminated raw materials, corroding metal components, and redistributed fill. Overlaid with road noise and population density, the map identifies where multiple forms of exposure coincide and where further investigation and remediation should be prioritised.



Mapping a Remediation Priority Field - Five Metals Associated with Two Centuries of Industrial Activity

Buildings Base Map



MATERIAL PATHOLOGY & BIOREMEDIATION

01 Cement and Concrete Timeline

02 Production Hazards

03 Material and Metal Networks

04 Concrete versus Living Soil

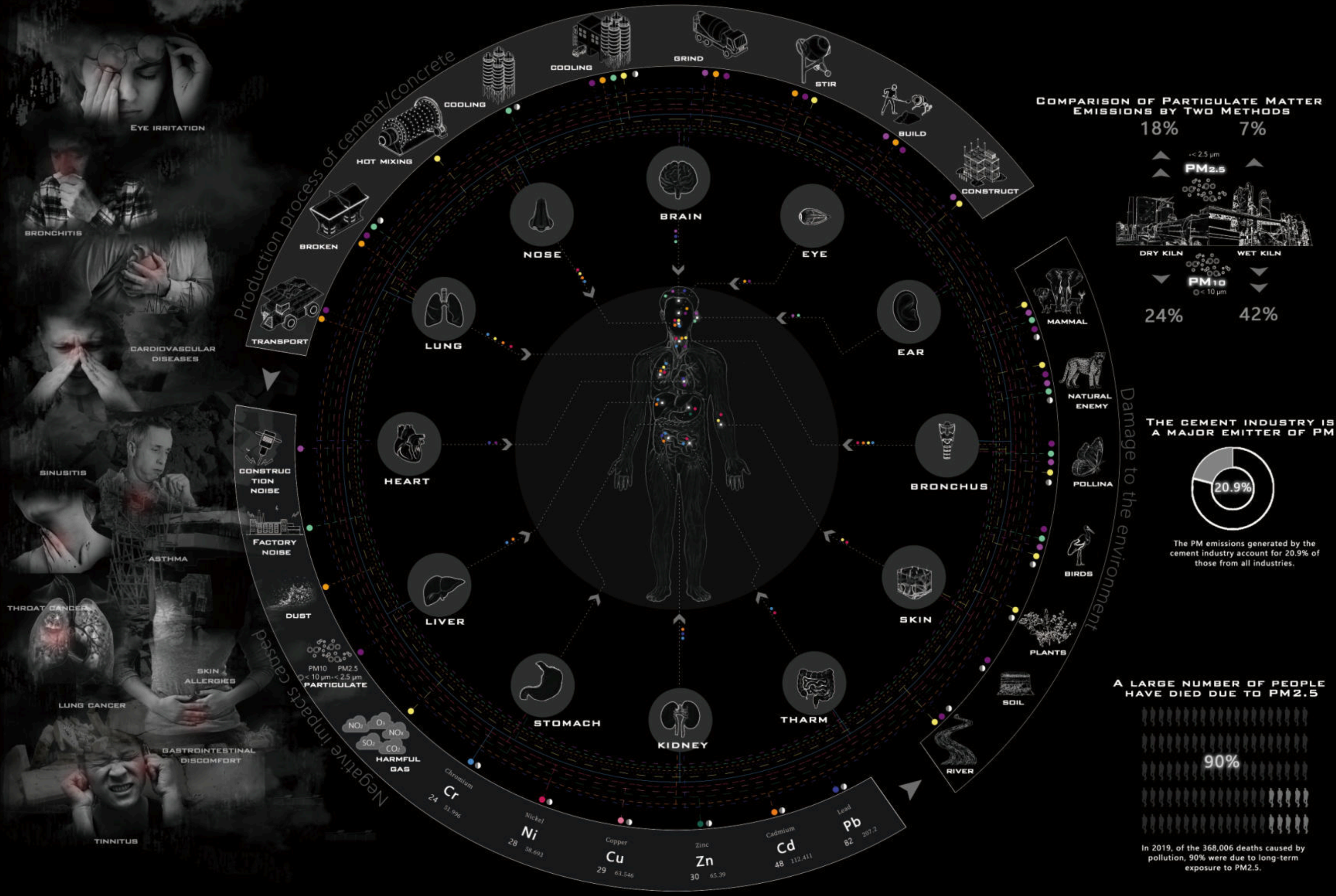
05 Bio-Cycling Process

03

Tracing how material production distributes hazards, then translating remediation into biological, chemical, and mechanical processes.

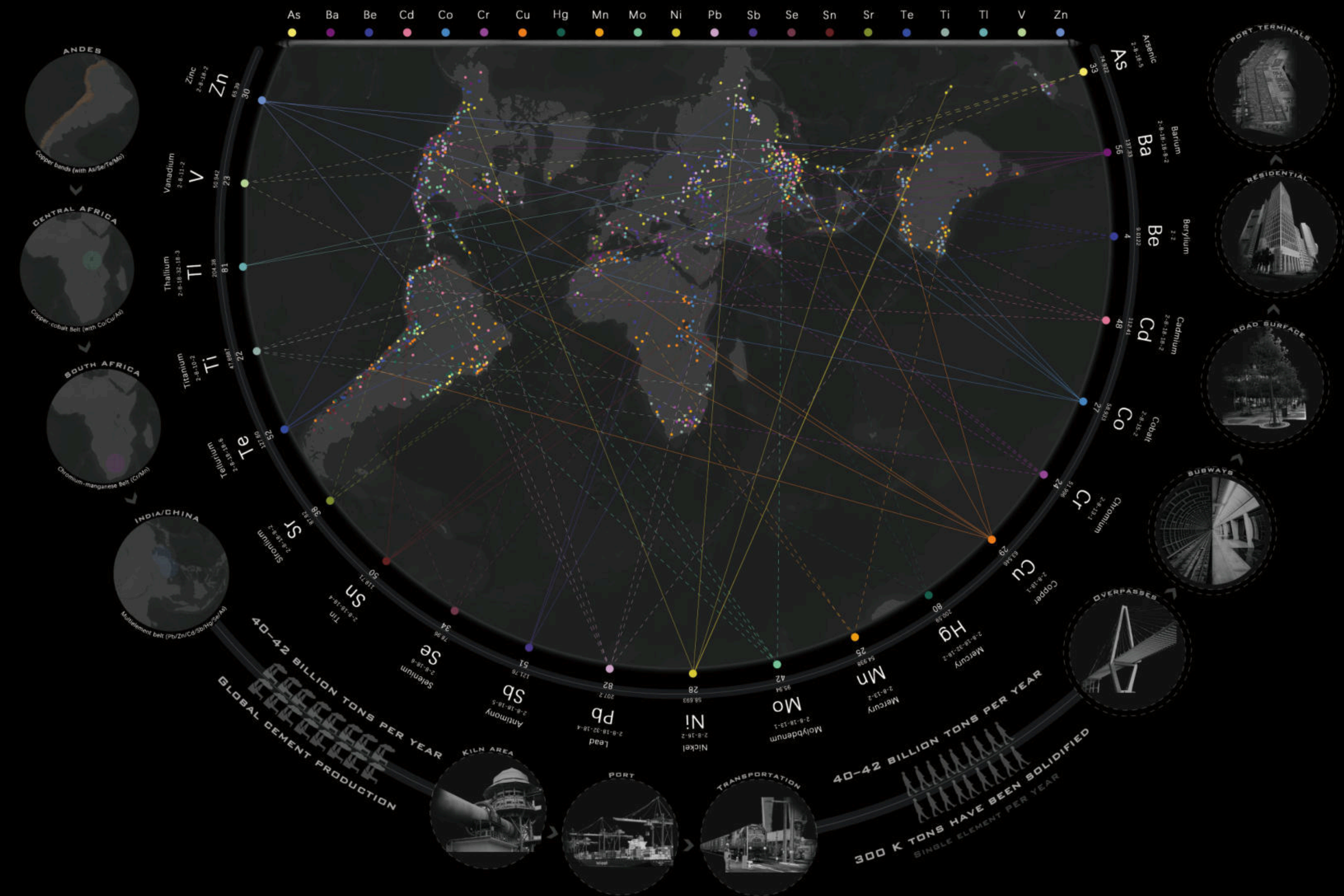
THE HAZARDS OF CEMENT & CONCRETE PRODUCTION

Harm human beings, the surrounding environment, the soil, and the habitats of living organisms.

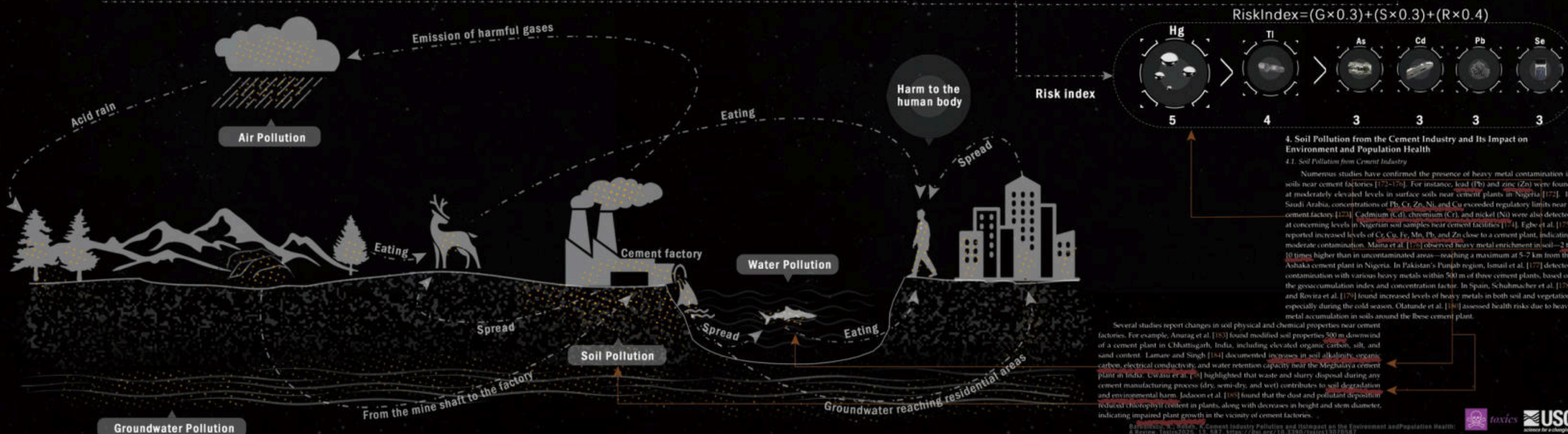


CONCRETE AS A GLOBAL MATERIAL NETWORK WITH HEAVY METAL

Tracing the Transboundary Circulation of Heavy Metals within the Global Cement Supply Chain

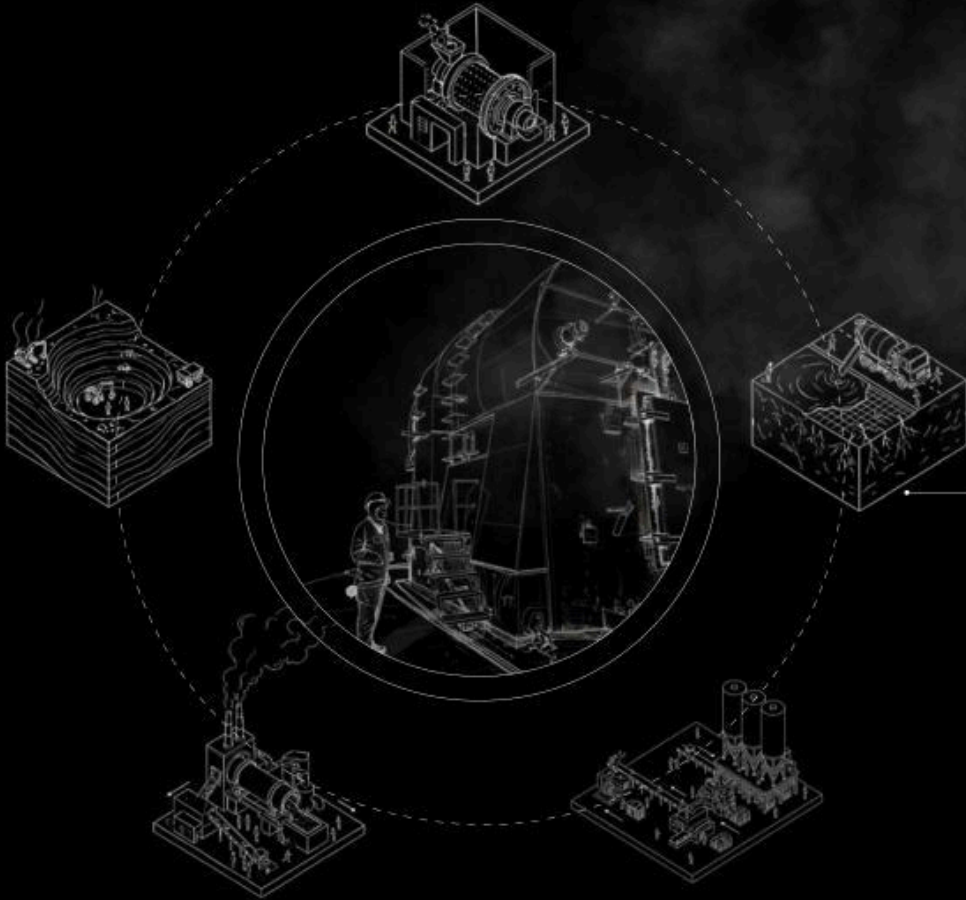


Outsourced Carbon and the Global Cement System

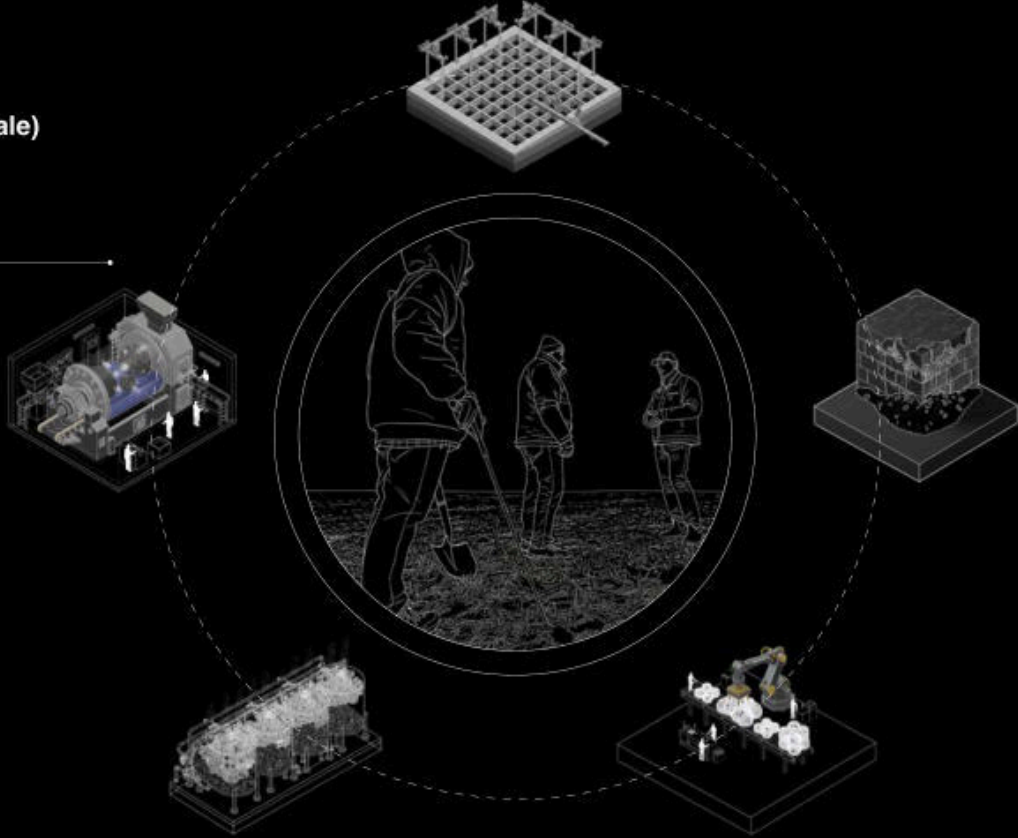
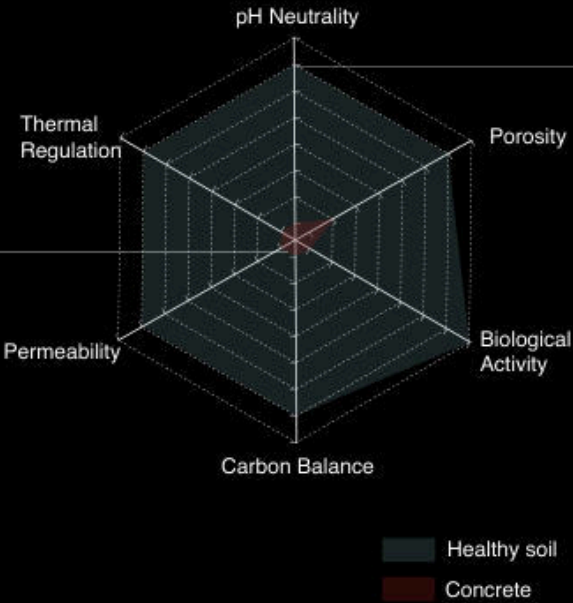


Several studies report changes in soil physical and chemical properties near cement factories. For example, Anurag et al. [182] found modified soil properties 500 m downwind of a cement plant in Chhattisgarh, India, including elevated organic carbon, silt, and sand content. Lamare and Singh [184] documented increases in soil alkalinity, organic carbon, electrical conductivity, and water retention capacity near the Meghalaya cement plant in India. Cwast et al. [185] highlighted that waste and slurry disposal during any cement manufacturing process (dry, semi-dry, and wet) contributes to soil degradation and environmental harm. Jadavson et al. [186] found that the dust and pollutant deposition reduced chlorophyll content in plants, along with decreases in height and stem diameter, indicating impaired plant growth in the vicinity of cement factories.

CONCRETE VERSUS LIVING SOIL
Material Confrontation



Material Performance Index: Concrete vs Healthy Soil (0–8 scale)



12–13 highly alkaline - unsuitable for most plants

15-20% limited connected porosity; poor rooting medium

VERY LOW
biological activity

Pb. Cd. Cr. Ni
potential trace-metal release depends on composition and weathering

HIGH THERMAL MASS
exposed slabs retain heat

< 0.01 mm/hr
sealed slabs restrict infiltration and increase runoff

pH

POROSITY

LIFE

METALS

HEAT

WATER

5.5–7.5
neutral to mildly acidic — optimal for plant life

40–60%
interconnected pores, continuous gas exchange

10⁹ / gram
bacteria, fungi, nematodes, arthropods

Biosorption
immobilised by organic matter and mycorrhizae

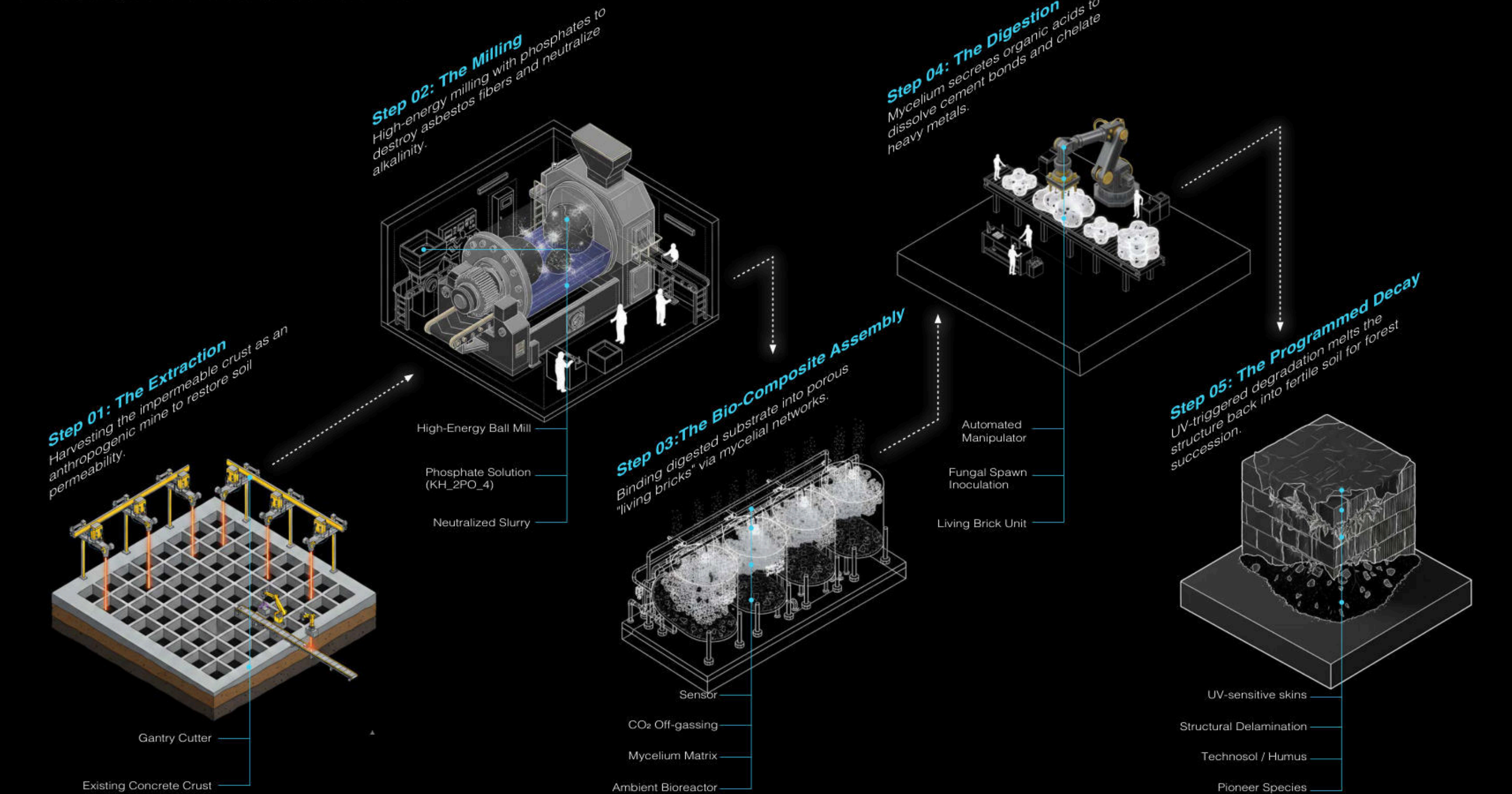
Buffered
thermal regulation through evapotranspiration

10–100 mm/hr
permeable — absorbs and filters rainfall



BIO-CYCLING PROCESS

One of four remediation pathways. Site evidence determines where it activates, when it transitions, and how different treatments are combined.



COST:

Phosphate Additive (KH₂PO₄)



EFFICIENCY: 93.9% Asbestos Inerting

Aspergillus niger



CALORIFIC VALUE: High (8,000 kcal/kg)

Pleurotus sajor-caju



SUBSTITUTION: 10% - 15% of Thermal Mix

Milled Substrate



LOSS FACTOR: 1.7 tonnes Raw = 1.0 tonne Clinker

Carbon Sequestration



CAPTURE: ~150 kg CO₂ / tonne

Black Soil/Humus



OUTPUT: 0.8 m³ Soil / tonne

SCIENTIFIC ANCHORS & DATA SOURCES:

Borges, R., Giroto, A. S., Guimarães, G. G. F., Reis, H. P. G., Farinas, C. S. and Ribeiro, C. (2022). Asbestos cement waste treatment through mechanochemical process with KH₂PO₄ for its utilization in soil pH correction and nutrient delivery. Environmental Science and Pollution Research, 29, 28804-28815.

Borges, R., Klac, R., Farinas, C. S. and Ribeiro, C. (2022). Biological treatment of asbestos cement wastes by Aspergillus niger and Acidithiobacillus thiooxidans. Applied Clay Science, 216, 106375.

Durczak, K., Pyzalski, M., Suja, A., Juszczyk, M., Sala, D. and Ustinovichius, L. (2024). Efficient Management of Asbestos Waste Through Utilization as Mineral Additives in Portland Cement Production. Materials, 17, 5793.

SITE SELECTION & EVIDENCE SYNTHESIS

01 Borough-Scale Dataset

02 Feature Extraction and K-Means

03 Cluster Classification

04 Digital Phenomenology

05 Multi-Layer Site Reading

04

Selecting Dagenham Dock through environmental clustering, resident perception, and multi-layer site analysis, then translating regional evidence into site-specific remediation priorities.

DATASET: BARKING & DAGENHAM

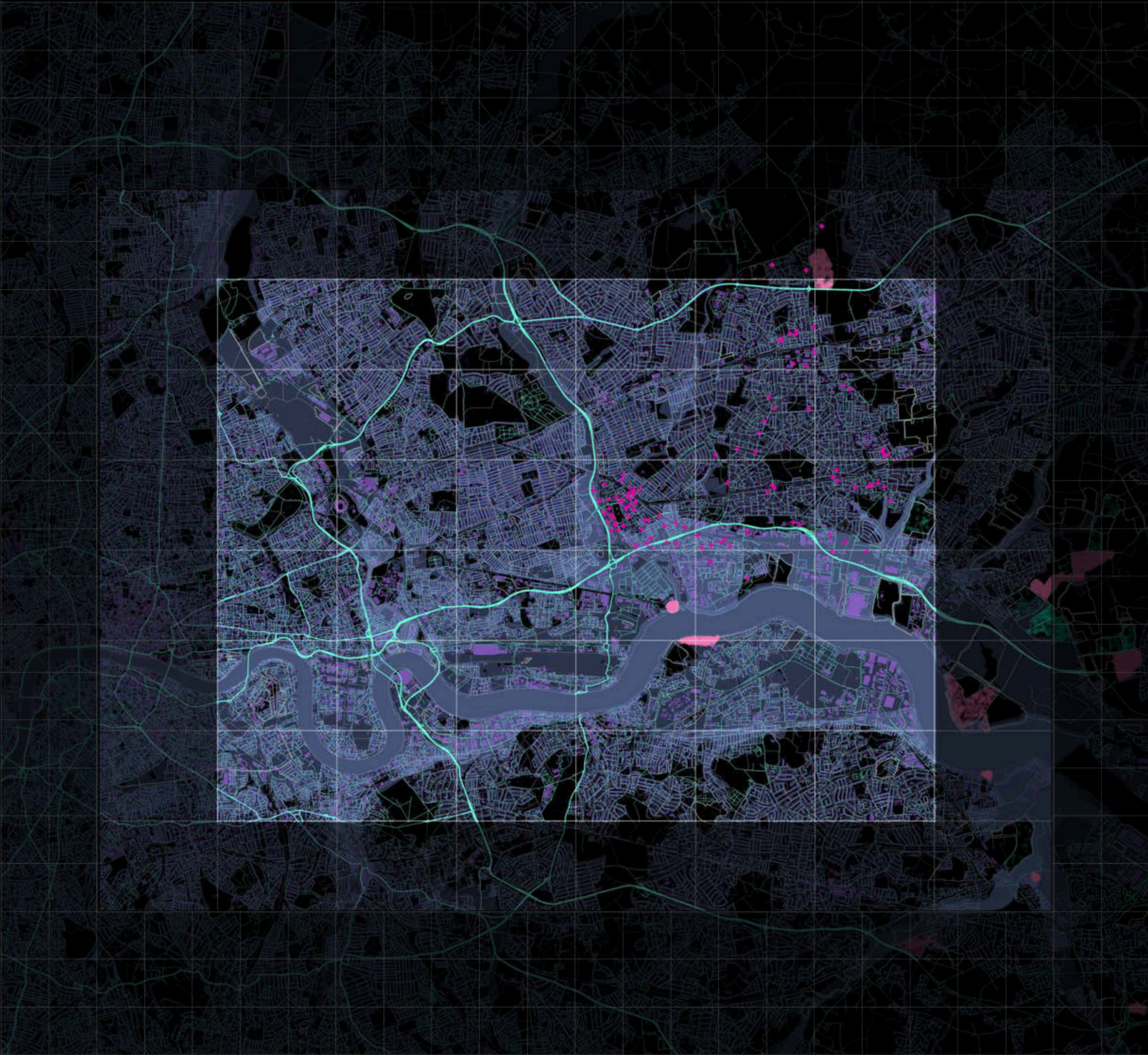
7.2 KM x 5.4 KM

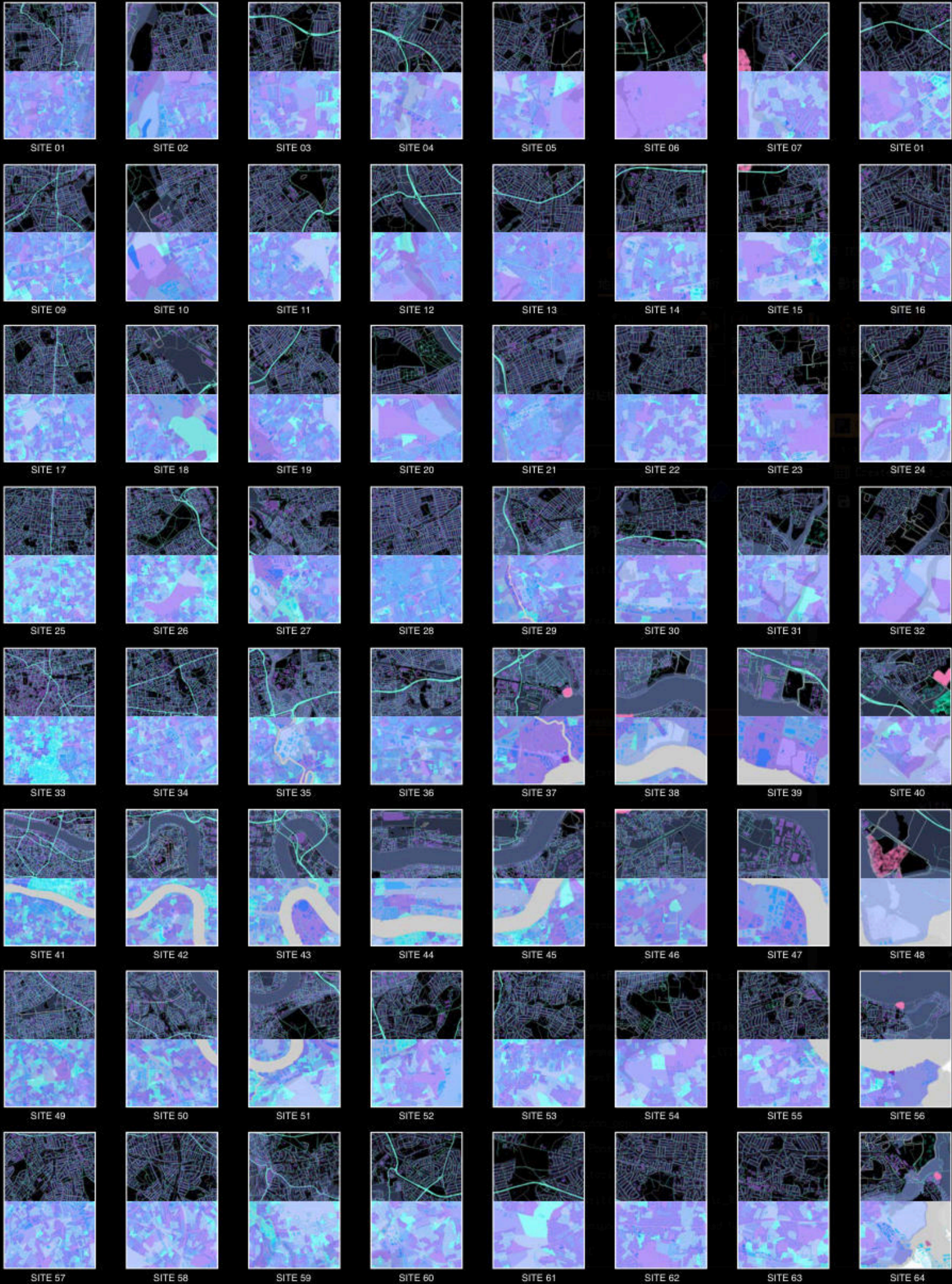
The London Borough of Barking & Dagenham lies within the Thames Gateway industrial corridor - a landscape shaped by manufacturing, logistics, waste processing, and large-scale redevelopment. In this study, the borough is examined where atmospheric emissions, brownfield land, flood exposure, waste infrastructure, population, and ecological sensitivity overlap.

To identify a focus area for Remediscape, six spatial datasets were compiled across environmental condition, land use, hydrological exposure, and demographic context. An 8 x 8 analytical grid (64 cells) converts each layer into a comparable feature vector for K-Means clustering. The result is a borough-scale comparison that directs more detailed site reading; it is not a substitute for intrusive site investigation or laboratory testing.

LEGEND

-  Brownfield Register (LBBD 2024)
-  Population Density (ONS Census)
-  Licensed Waste Sites (EA)
-  Permitted Waste Facilities (EA)
-  Building Footprint (OS OpenMap)
-  Flood Alert Zones (Environment Agency)
-  TfL Major Road Network
-  Road Network (OS OpenMap)
-  Analysis Grid (8x8, 690m x 525m per grid cell)





LABEL & FEATURE EXTRACTION

690m x 525m per grid cell

The Borough of Barking & Dagenham was divided into 64 equal grid cells (8 x 8). Each cell covers approximately 690 m x 525 m, providing a consistent comparative unit for borough-scale analysis. Every dataset is summarised per cell and normalised before clustering.

Six features describe brownfield intensity, building coverage, waste infrastructure, flood exposure, population, and ecological sensitivity. Together they distinguish regional site profiles and indicate where several pressures overlap. They do not represent measured contamination concentrations. The resulting 64 x 6 matrix is used as the input for K-Means clustering.

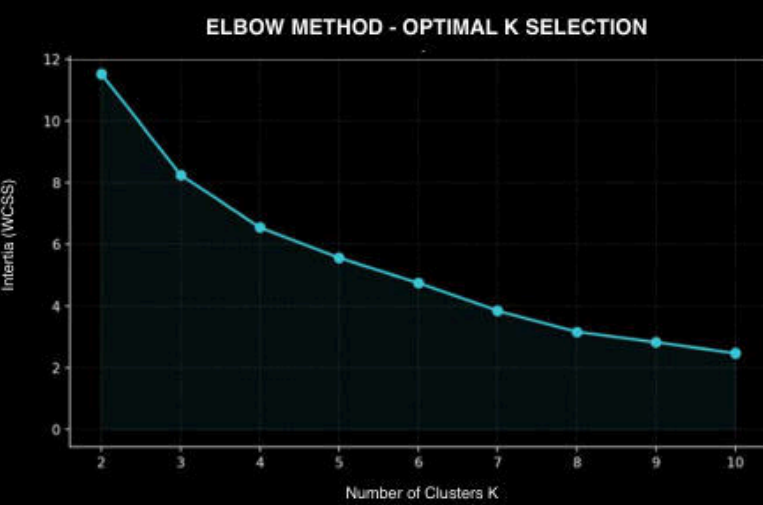
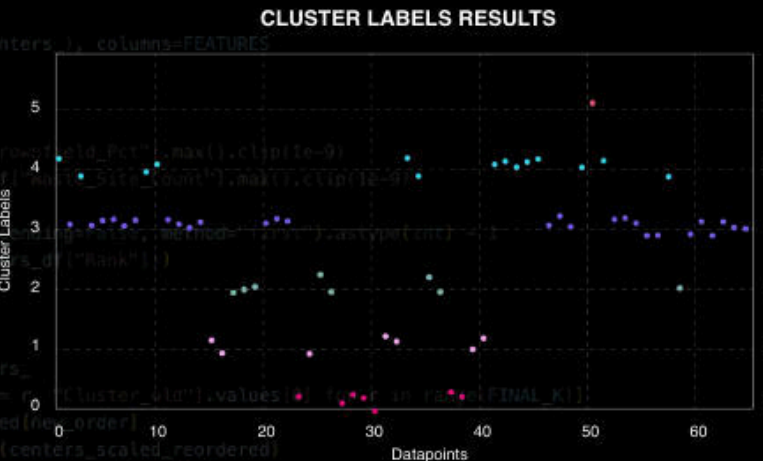
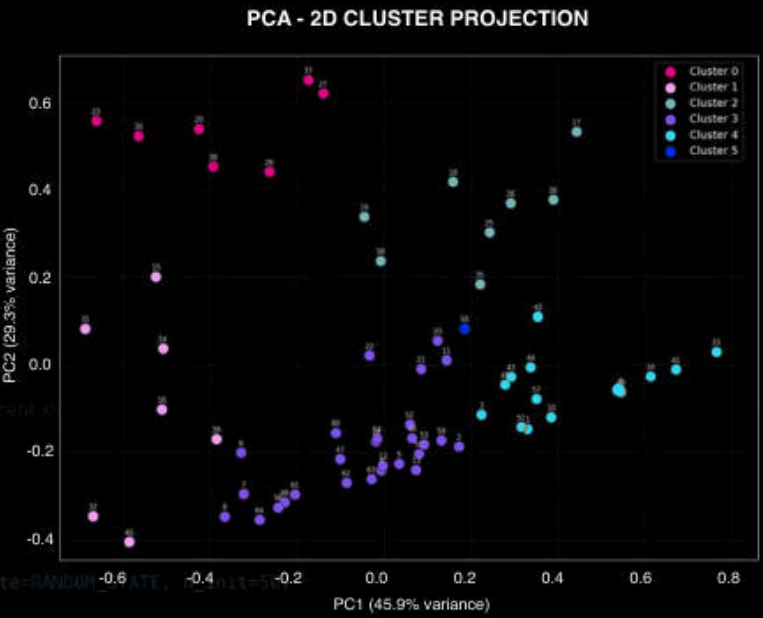
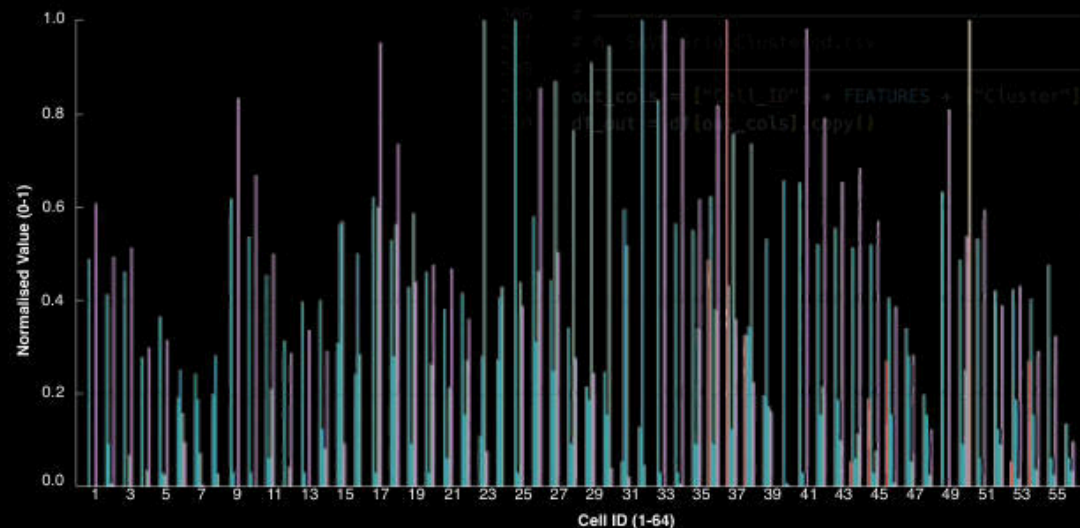
	Feature	Data Layer	Symbol
The map below	1. Brownfield Density	Brownfield Register (LBBD 2024)	
	2. Building Coverage	Building Footprint (OS OpenMap)	
	3. Population Density	Usual Residents (ONS Census 2021)	
The map above	4. Flood Risk Exposure	Flood Alert Zones (Environment Agency)	
	5. Waste Infrastructure	Licensed Waste Sites Permitted Facilities (EA)	
	6. Ecological Sensitivity	Sensitive Areas (Natural England)	

- Reference layers :
- Road Network (OS OpenMap)
 - TfL Major Road Network
 - Analysis Grid (8x8, 690m cells)

K-MEANS

K-Means groups the 64 cells using six normalised environmental and land-use features. K=6 is used here as a comparative resolution informed by the elbow curve and the need to retain distinct site profiles. PCA helps inspect how the groups separate in two dimensions; it does not validate contamination. The resulting clusters identify cells for closer review and later site-scale analysis, rather than measured classes of toxicity.

Cell_ID	Brownfield_Pct	Building_Cov	Waste_Site	Flood_Zone	Population	Sensitive_Art	Cluster
1	0	21.94	0	0	10000	0	0
2	0	17.47	0	1.14	10000	0	0
3	0	19.50	0	0.5	10750	0	0
4	0	17.40	0	1.20	10000	0	0
5	0	19.36	0	1.17	11500	0	0
6	0	9.47	0	0.55	10000	0	0
7	0	17.47	0	1.14	10000	0	0
8	0	9.79	0	0.91	10000	0	0
9	0	26.97	1	0	10000	0	0
10	0	19.50	1	0.5	10750	0	0
11	0	17.40	0	1.20	10000	0	0
12	0	19.36	1	1.17	11500	0	0
13	0	19.81	1	0	14475	0	0
14	0	19.36	0	1.14	10000	0	0
15	0	17.47	10	0.5	10000	0	0
16	0	19.36	10	1.14	10000	0	0
17	0	19.36	1	0.5	10000	0	0
18	0	17.47	0	1.14	10000	0	0
19	0	19.36	0	1.14	10000	0	0
20	0	19.36	1	0.5	10000	0	0
21	0	19.36	0	1.14	10000	0	0
22	0	17.47	0	1.14	10000	0	0
23	0	19.36	0	1.14	10000	0	0
24	0	19.36	0	1.14	10000	0	0
25	0	19.36	0	1.14	10000	0	0
26	0	19.36	0	1.14	10000	0	0
27	0	19.36	0	1.14	10000	0	0
28	0	19.36	0	1.14	10000	0	0
29	0	19.36	0	1.14	10000	0	0
30	0	19.36	0	1.14	10000	0	0
31	0	19.36	0	1.14	10000	0	0
32	0	19.36	0	1.14	10000	0	0
33	0	19.36	0	1.14	10000	0	0
34	0	19.36	0	1.14	10000	0	0
35	0	19.36	0	1.14	10000	0	0
36	0	19.36	0	1.14	10000	0	0
37	0	19.36	0	1.14	10000	0	0
38	0	19.36	0	1.14	10000	0	0
39	0	19.36	0	1.14	10000	0	0
40	0	19.36	0	1.14	10000	0	0
41	0	19.36	0	1.14	10000	0	0
42	0	19.36	0	1.14	10000	0	0
43	0	19.36	0	1.14	10000	0	0
44	0	19.36	0	1.14	10000	0	0
45	0	19.36	0	1.14	10000	0	0
46	0	19.36	0	1.14	10000	0	0
47	0	19.36	0	1.14	10000	0	0
48	0	19.36	0	1.14	10000	0	0
49	0	19.36	0	1.14	10000	0	0
50	0	19.36	0	1.14	10000	0	0
51	0	19.36	0	1.14	10000	0	0
52	0	19.36	0	1.14	10000	0	0
53	0	19.36	0	1.14	10000	0	0
54	0	19.36	0	1.14	10000	0	0
55	0	19.36	0	1.14	10000	0	0
56	0	19.36	0	1.14	10000	0	0
57	0	19.36	0	1.14	10000	0	0
58	0	19.36	0	1.14	10000	0	0
59	0	19.36	0	1.14	10000	0	0
60	0	19.36	0	1.14	10000	0	0
61	0	19.36	0	1.14	10000	0	0
62	0	19.36	0	1.14	10000	0	0
63	0	19.36	0	1.14	10000	0	0



- Feature
- 1. Brownfield Density
 - 2. Building Coverage
 - 3. Waste Infrastructure
 - 4. Flood Risk Exposure
 - 5. Population Density
 - 6. Ecological Sensitivity

Cluster 5

SITE 50

0.49
0.08
0.25
0.54
1

Cluster 4

SITE 01 SITE 03 SITE 09 SITE 10 SITE 33 SITE 34 SITE 41
SITE 42 SITE 43 SITE 44 SITE 45 SITE 51 SITE 49 SITE 57

0.67
0.05
0.05
0.74

Cluster 3

SITE 02 SITE 04 SITE 05 SITE 06 SITE 07 SITE 01 SITE 11
SITE 12 SITE 13 SITE 14 SITE 20 SITE 21 SITE 22 SITE 46
SITE 47 SITE 48 SITE 52 SITE 53 SITE 54 SITE 55 SITE 56
SITE 59 SITE 60 SITE 61 SITE 62 SITE 63 SITE 64

0.33
0.11
0.07
0.28

Cluster 2

SITE 17 SITE 18 SITE 19 SITE 25 SITE 26 SITE 35 SITE 36
SITE 58

0.06
0.60
0.14
0.48
0.68

Cluster 1

SITE 15 SITE 16 SITE 24 SITE 31 SITE 32 SITE 39 SITE 40

0.17
0.61
0.29
0.04

Cluster 0

SITE 23 SITE 27 SITE 28 SITE 29 SITE 30 SITE 37 SITE 38

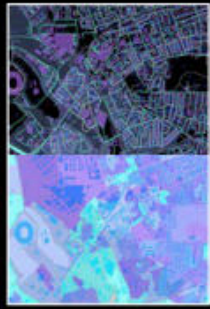
0.19
0.30
0.21
0.85
0.25

CLASSIFICATION FEATURES

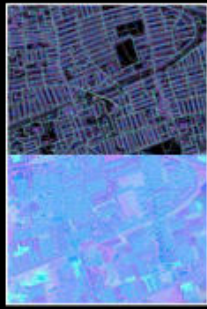
Cluster 0 combines high flood exposure, waste infrastructure, and brownfield intensity across seven cells. F4 values are dataset-derived exposure scores; values above 100 reflect overlapping source polygons and are not direct percentages of cell area.

1. Brownfield Density ■ 2. Building Coverage ■ 3. Waste Infrastructure ■ 4. Flood Risk Exposure ■ 5. Population Density ■ 6. Ecological Sensitivity ■

Cluster 0



SITE 27
F1_Brownfield = 0
F2_Building = 18.78%
F3_Waste = 8
F4_Flood = 129.45%
F5_Pop = 66,603
F6_Sensitive = 0



SITE 28
F1_Brownfield = 0
F2_Building = 14.52%
F3_Waste = 3
F4_Flood = 113.83%
F5_Pop = 36,714
F6_Sensitive = 0



SITE 29
F1_Brownfield = 0
F2_Building = 9.33%
F3_Waste = 6
F4_Flood = 135.24%
F5_Pop = 32,349
F6_Sensitive = 0



SITE 30
F1_Brownfield = 0
F2_Building = 10.63%
F3_Waste = 5
F4_Flood = 140.68%
F5_Pop = 5,368
F6_Sensitive = 0



SITE 37
F1_Brownfield = 37
F2_Building = 18.27%
F3_Waste = 4
F4_Flood = 112.62%
F5_Pop = 47,626
F6_Sensitive = 0



SITE 38
F1_Brownfield = 12
F2_Building = 13.97%
F3_Waste = 11
F4_Flood = 109.46%
F5_Pop = 29,784
F6_Sensitive = 0



SITE 23
F1_Brownfield = 0
F2_Building = 5.03%
F3_Waste = 9
F4_Flood = 149.06%
F5_Pop = 10,184
F6_Sensitive = 0

```
# 3. SILHOUETTE SCORES
#
print("\nSilhouette Scores -")
sil_scores = []
for k in K_RANGE:
    km = KMeans(n_clusters=k, random_state=RANDOM_STATE)
    labels = km.fit_predict(X_scaled)
    score = silhouette_score(X_scaled, labels)
    sil_scores.append(score)
    print(f" K={k} Silhouette={score:.4f}")

best_k_sil = list(K_RANGE)[int(np.argmax(sil_scores))]
print(f" → Best K by Silhouette: {best_k_sil}")

fig, ax = plt.subplots(figsize=(8, 5))
bars = ax.bar(list(K_RANGE), sil_scores, color="#2980b9")
bars[int(np.argmax(sil_scores))].set_color("#e0392b")
ax.axhline(y=max(sil_scores), color="#e0392b", linewidth=2)
ax.set_xlabel("Number of Clusters - K", fontsize=12)
ax.set_ylabel("Silhouette Score", fontsize=12)
ax.set_title("Silhouette Score - Optimal K Selection")
ax.set_xticks(list(K_RANGE))
ax.grid(True, axis="y", linestyle="--", alpha=0.4)
ax.spines["top"].set_visible(False)
ax.spines["right"].set_visible(False)

# Annotate best k
best_idx = int(np.argmax(sil_scores))
ax.annotate(
    f"Best K={best_k_sil}\n({max(sil_scores):.3f})",
    xy=(best_k_sil, max(sil_scores)),
    xytext=(best_k_sil + 0.5, max(sil_scores) + 0.03),
    fontsize=9,
```



```
random_state=RANDOM_STATE, n_init=20)

km.inertia_:.4f}")

=(8, 5))
, "o-", color="#e0392b", linewidth=2, markersize=7)
inertia, alpha=0.08, color="#e0392b")
ax.set_xlabel("Number of Clusters - K", fontsize=12)
", fontsize=12)
ptimal K Selection", fontsize=13, fontweight="bold")

alpha=0.4)
line)
=False)

UT_DIR, "elbow_plot.png")

new_path, dpi=300)

print(f"Best K={best_k_sil}\n({max(sil_scores):.3f})")
```

sil_scores = []

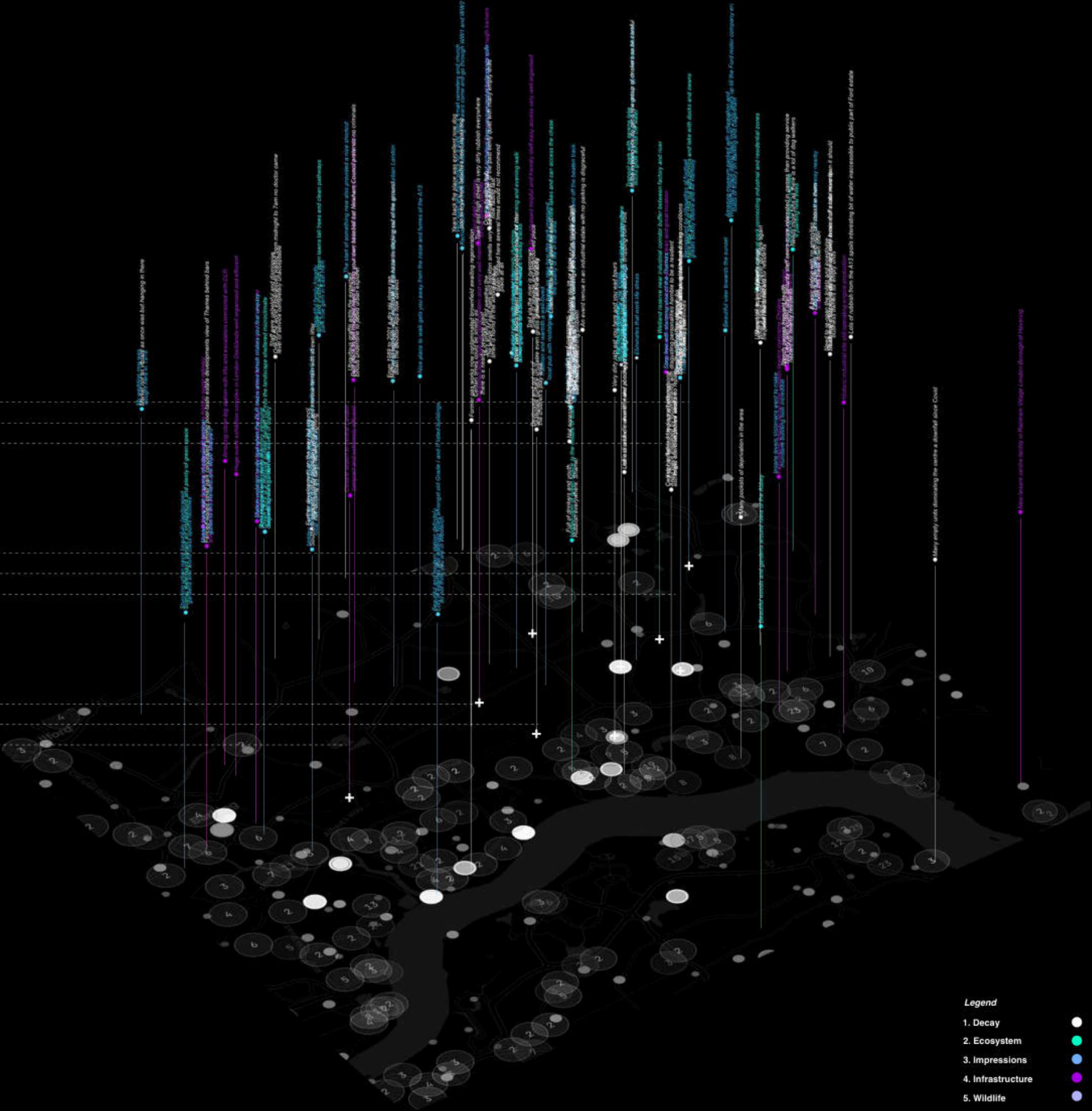
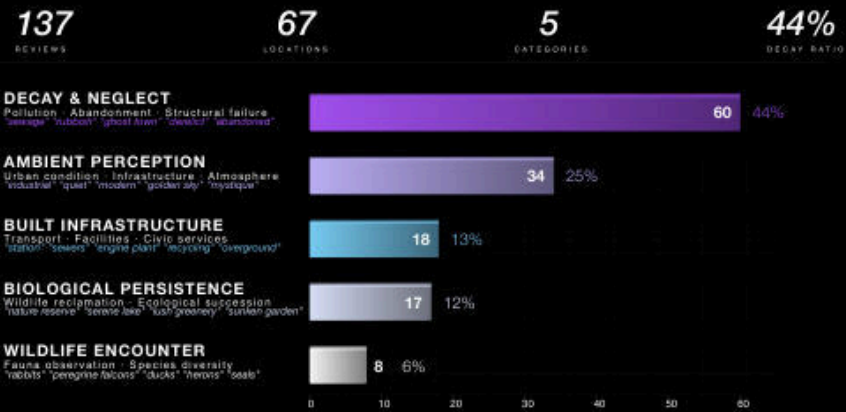
Digital Phenomenology: User Feedback
DAGENHAM AND BARKING DISTRICT & SURROUNDINGS

This study spatialises 137 geo-tagged resident narratives across 67 locations in East London. Five qualitative categories describe recurring perceptions of neglect, infrastructure, ambient condition, ecological persistence, and wildlife. The 44% 'Decay & Neglect' share is read alongside the quantitative site-selection layers as contextual evidence of place perception; it is not treated as a statistical validation of the K-Means clusters or of measured contamination.

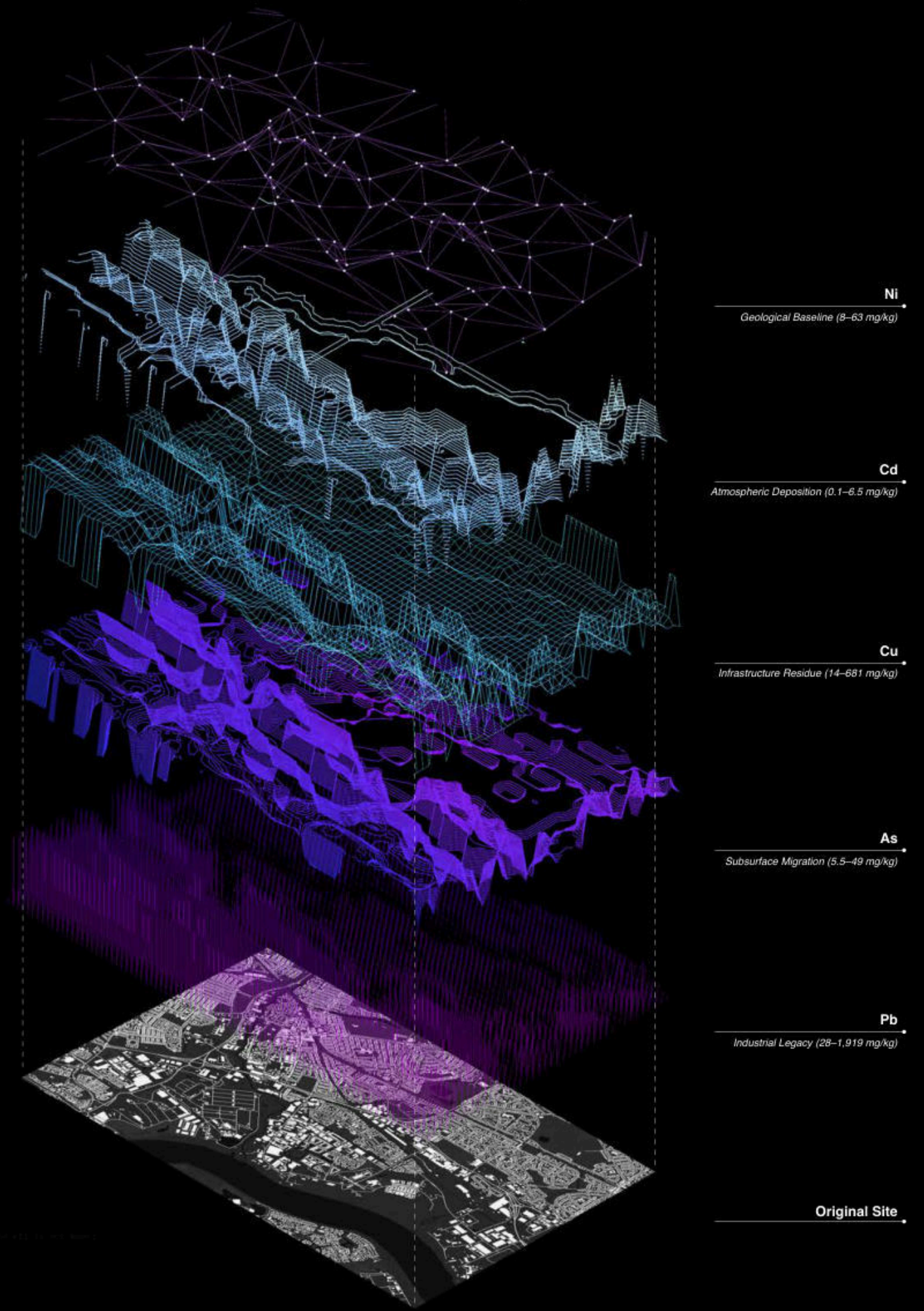
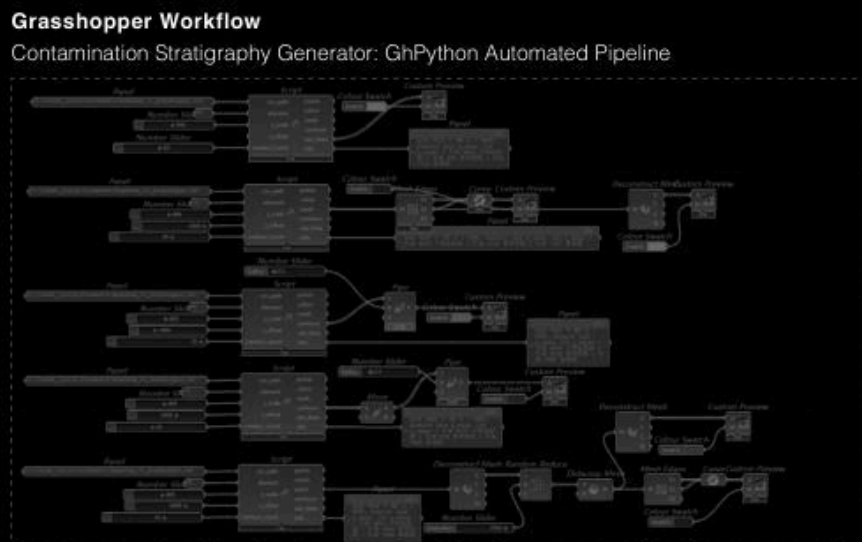


Sentiment Analysis

East London Industrial Corridor — Qualitative Feedback Dataset



Five heavy-metal indicators associated with industrial activity - Pb, As, Cu, Cd, and Ni - are vertically dissected to show a CSM-based relative-risk interpretation across a 3 km x 2 km post-industrial site.



SITE READING: Dagenham Dock Multi-Layer Analysis II

Above-ground spatial conditions - transport, built form, flood exposure, and community sentiment - are read together to support later site-scale remediation planning.

SENTIMENT COVERAGE FIELD

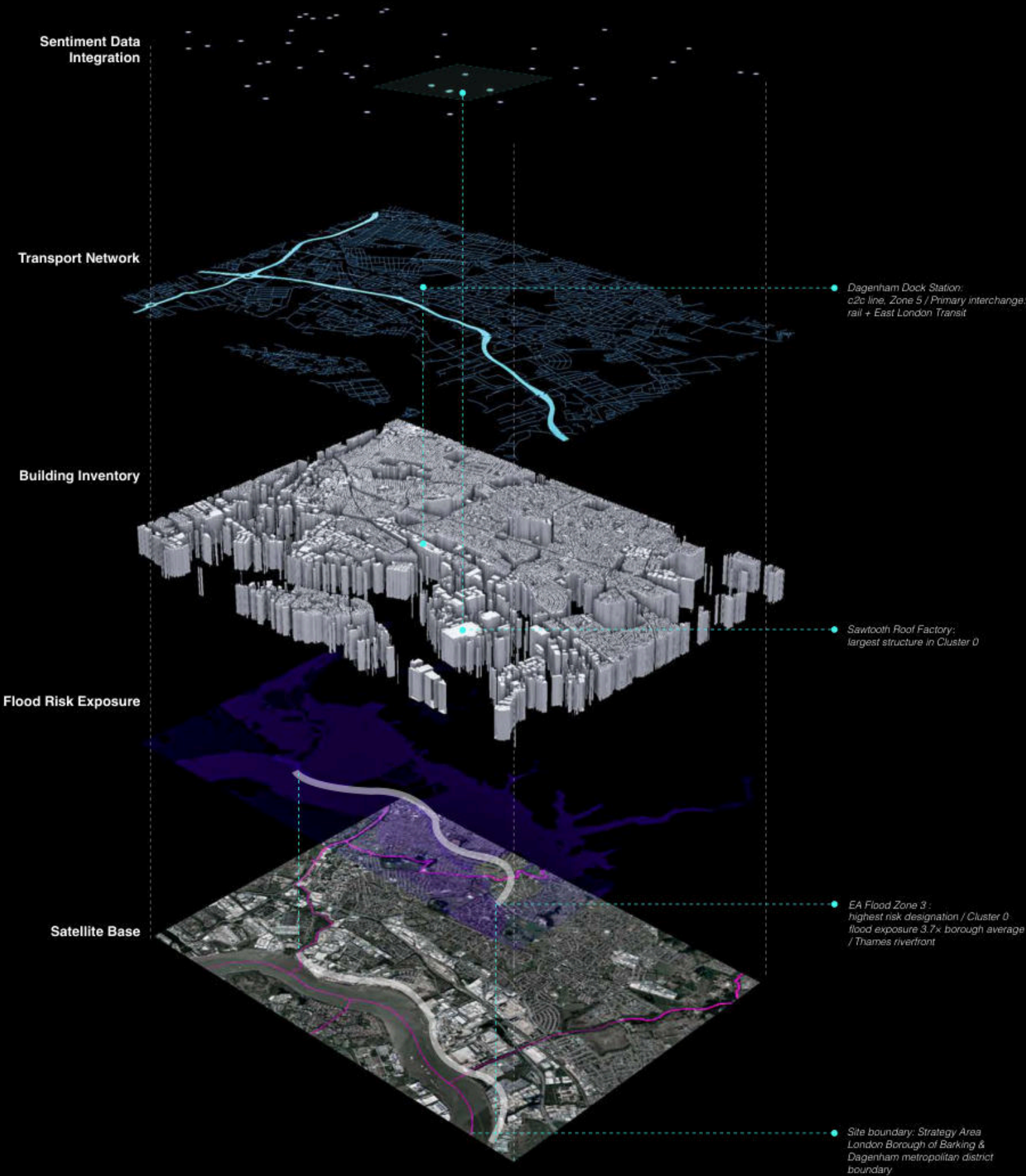
200 m perception radius around 67 geo-tagged review locations - overlap shows where qualitative coverage is densest.



- LEGEND**
- Dense overlap zone = highest data confidence
 - + Geo-tagged review location (Google Places API)
 - 200m perception radius — approximate range of environmental sensory experience (noise, odour, visual decay)

SITE STRATIFICATION: Above-Ground Conditions

Four spatial layers dissected to inform strategy zone allocation



REMEDATION DESIGN & LIVING INFRASTRUCTURE

01 Material Ground and Contamination Risk

02 CSM-Derived Strategy Logic

03 Plant-Trait Rules and Remediation Sections

04 Modular Shelter and Material Life Cycle

05 Thirty-Year Remediation Relay

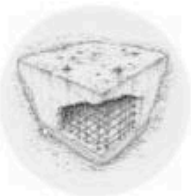
THE MATERIAL GROUND OF BARKING REACH

SITE MATERIAL INVENTORY

CONCRETE-BASED



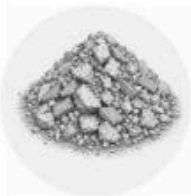
Recycled aggregate



Intact turbine foundation concrete



Sand



Crushed stone sub-base



PVC cable insulation



HDPE drainage pipes

STONE & MINERALS

PLASTICS, COATINGS

METALS



Rebar



Anchor bolts (M48-M80)



Structural steel



Sheet piling (1442mm)



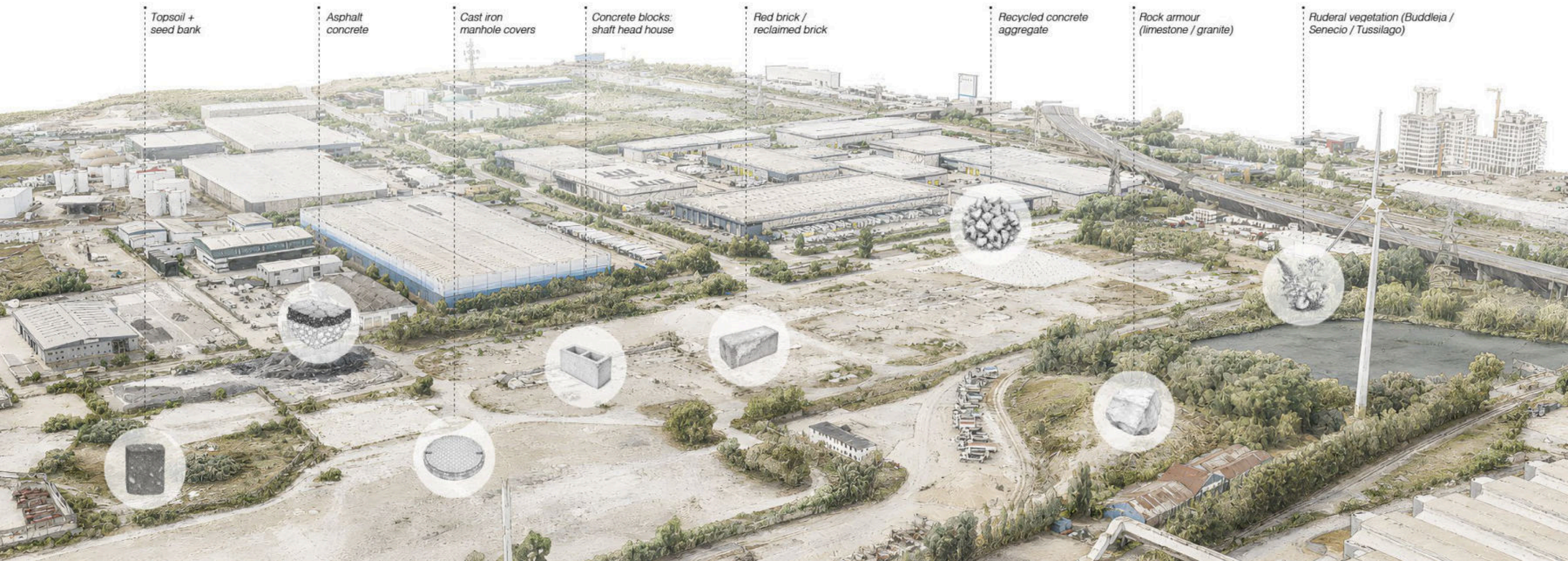
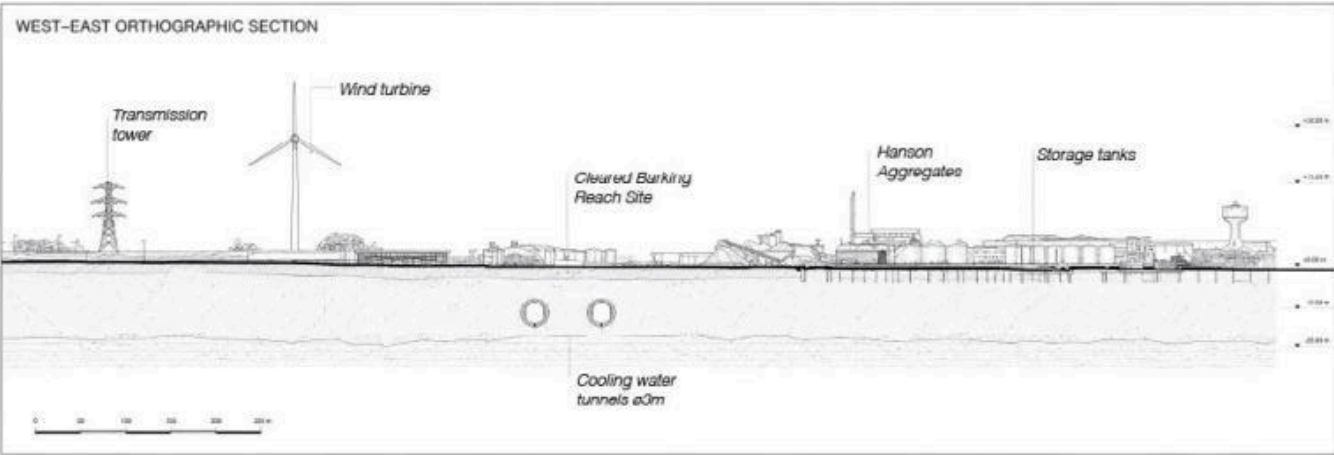
Copper / aluminium cabling

ABOVE GROUND, BELOW GROUND

ORTHOGRAPHIC ELEVATION, WEST TO EAST

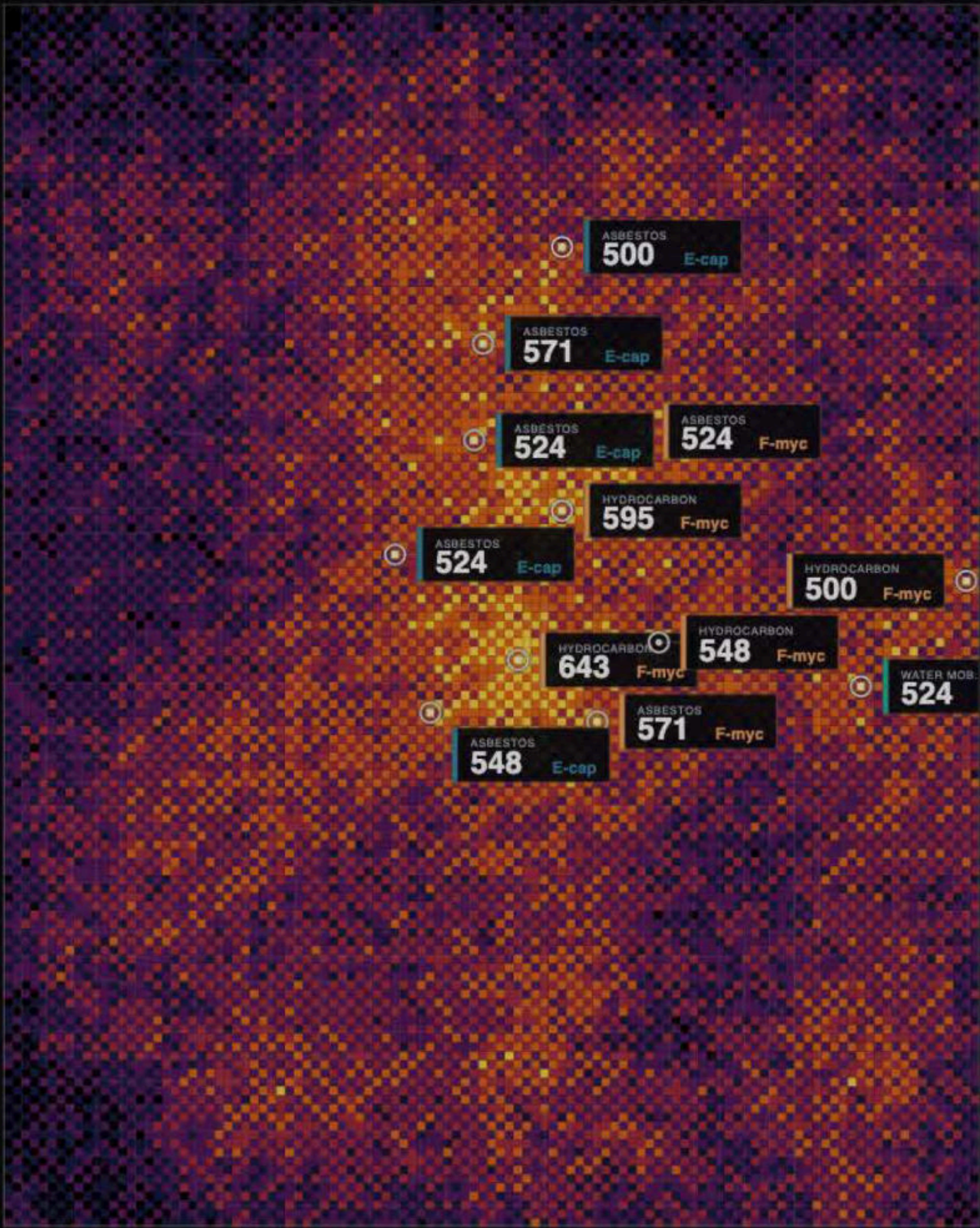
High-voltage pylons stand to the west. The cleared 42-acre Barking Reach site sits at centre. A Ford Dagenham wind turbine rises behind it. Tank farms of Hanson Aggregates extend to the east. Barking Reach was a 1,000 MW combined-cycle gas turbine power station, built between 1992 and 1995 and decommissioned in 2014. DDM brought down the two 55 m concrete chimneys, removed five HRSG units and the turbine hall, and crushed on-site concrete into 6F2 recycled aggregate. The City of London Corporation acquired the site in 2018 to relocate Smithfield, Billingsgate and Spitalfields wholesale markets. That plan was cancelled in November 2024.

Beneath the cleared surface, two cooling water tunnels run 38 to 45 m below ground level. They are 3 m in diameter, 630 m and 1,165 m in length. A dense pile grid extends across the full 42 acres, reaching chalk bedrock at 43.5 m. Original foundation slabs remain in place.



CSM-DERIVED CONTAMINATION RISK / TOTAL + SIX DIAGNOSTIC LAYERS

01 TOTAL RELATIVE RISK



TOTAL RISK OPACITY SCALE

15,429 cells · 5m grid



02 POLLUTANT FAMILY LAYERS

HYDROCARBON

TPH / PAH / fuel storage



mean 0.21 / max 0.69

METALS

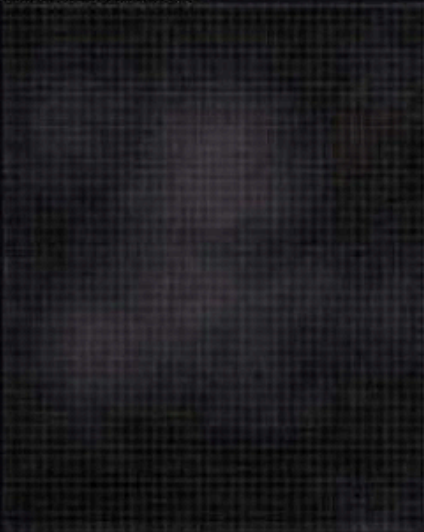
ash / made ground / rail



mean 0.19 / max 0.50

ASBESTOS + RUBBLE

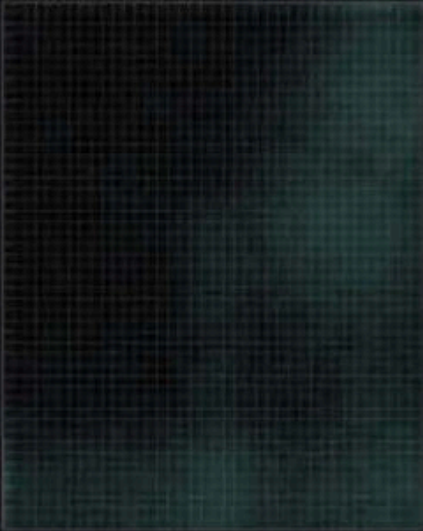
demolition fabric / hard risk



mean 0.18 / max 0.62

WATER MOBILITY

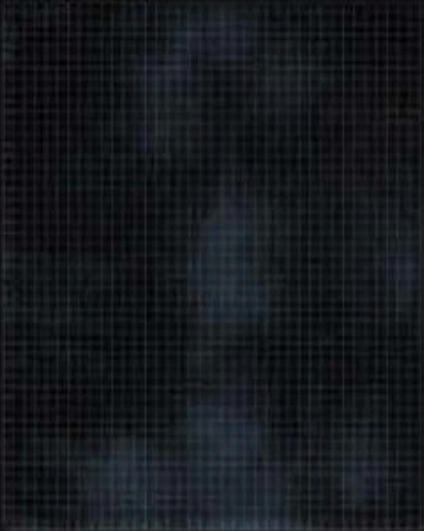
Thames / breach / alluvium



mean 0.19 / max 0.60

GROUND GAS

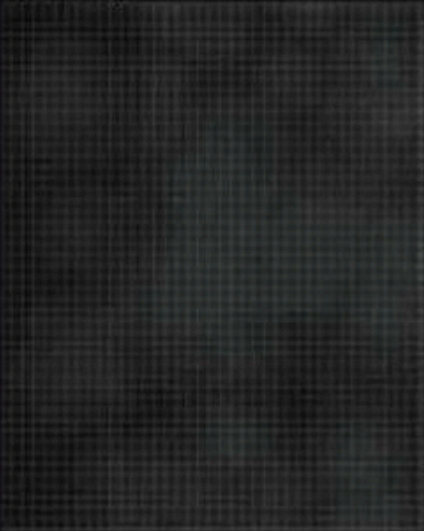
H2S / vapour / landfill



mean 0.11 / max 0.48

CONFIDENCE

evidence density



mean 0.55 / max 0.79

03 EVIDENCE + READING NOTES

EVIDENCE STACK

- Planning + remediation records
- Digimap Historic OS / 2005 labels
- EA landfill + BGS + OSM anchors

GRID SUMMARY

- 15,429 cells / 5m x 5m
- Study frame 555m x 695m
- Family score + confidence per cell

READING RULES

- Opacity = relative intensity
- Confidence = evidence density
- Not lab-measured concentration

risk-class distribution across the 5m CSM grid (Grid count)

Low: 1793

Low-medium: 6583

Medium: 5795

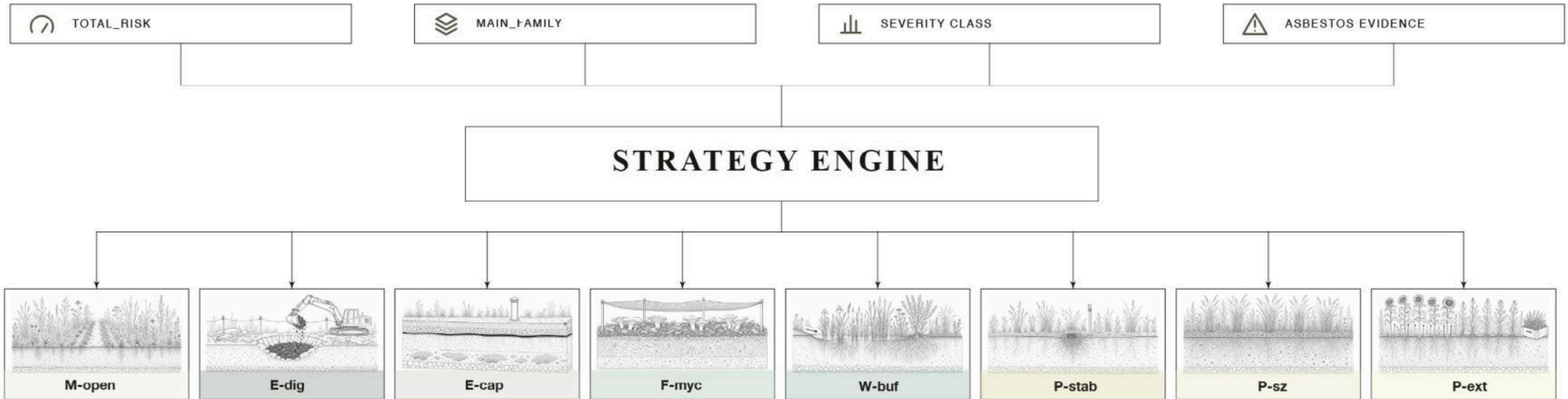
Medium-high: 1241

High: 17

REMEDIALATION STRATEGY LOGIC

HOW THE STRATEGY ENGINE WORKS

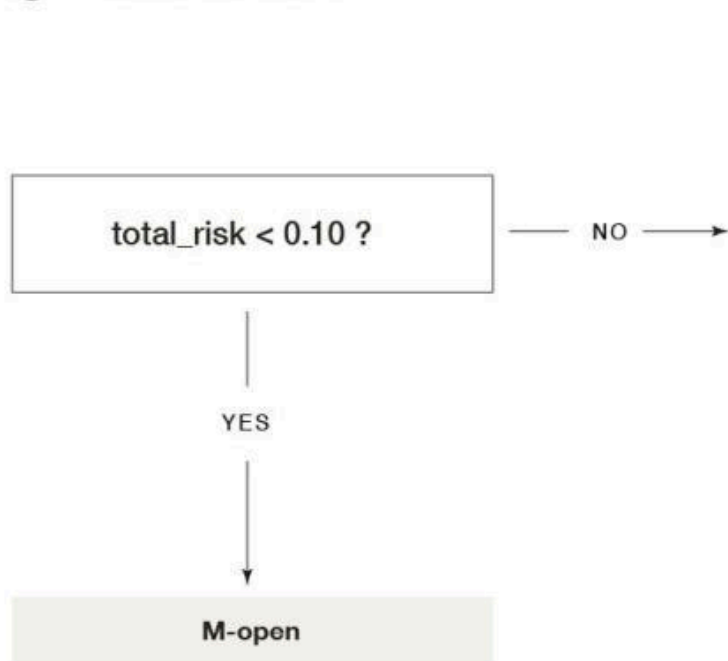
INPUTS → ENGINE → TRACK



THE ROUTING RULES

PER 5x5M CELL

1 LOW-RISK SCREEN



2 ROUTE BY DOMINANT POLLUTANT FAMILY

ASBESTOS / RUBBLE	> high	→	E-dig Excavate and Haul	Engineering-led — excavate hotspots, otherwise cap to break the exposure path.
	otherwise	→	E-cap Capping	
GROUND GAS	→ any	→	E-cap Capping / Drainage	Cap and vent to intercept upward vapour migration.
HYDROCARBON	→ organic	→	F-myc Mycelial Degradation	White-rot fungal enzymes oxidise hydrocarbons and PAH.
WATER MOBILITY	→ runoff	→	W-buf Wetland Buffer	Wetland buffer and riparian filtration intercept water-mobile metals.
METALS	high / medium_high	→	P-stab Spot Hotspot Stabilisation	Metals can't be degraded — stabilise where pollution is high, extract only where it's low.
	medium	→	P-sz Area Stabilisation	
	low_medium / low	→	P-ext Extraction	

The rule *assigns.*

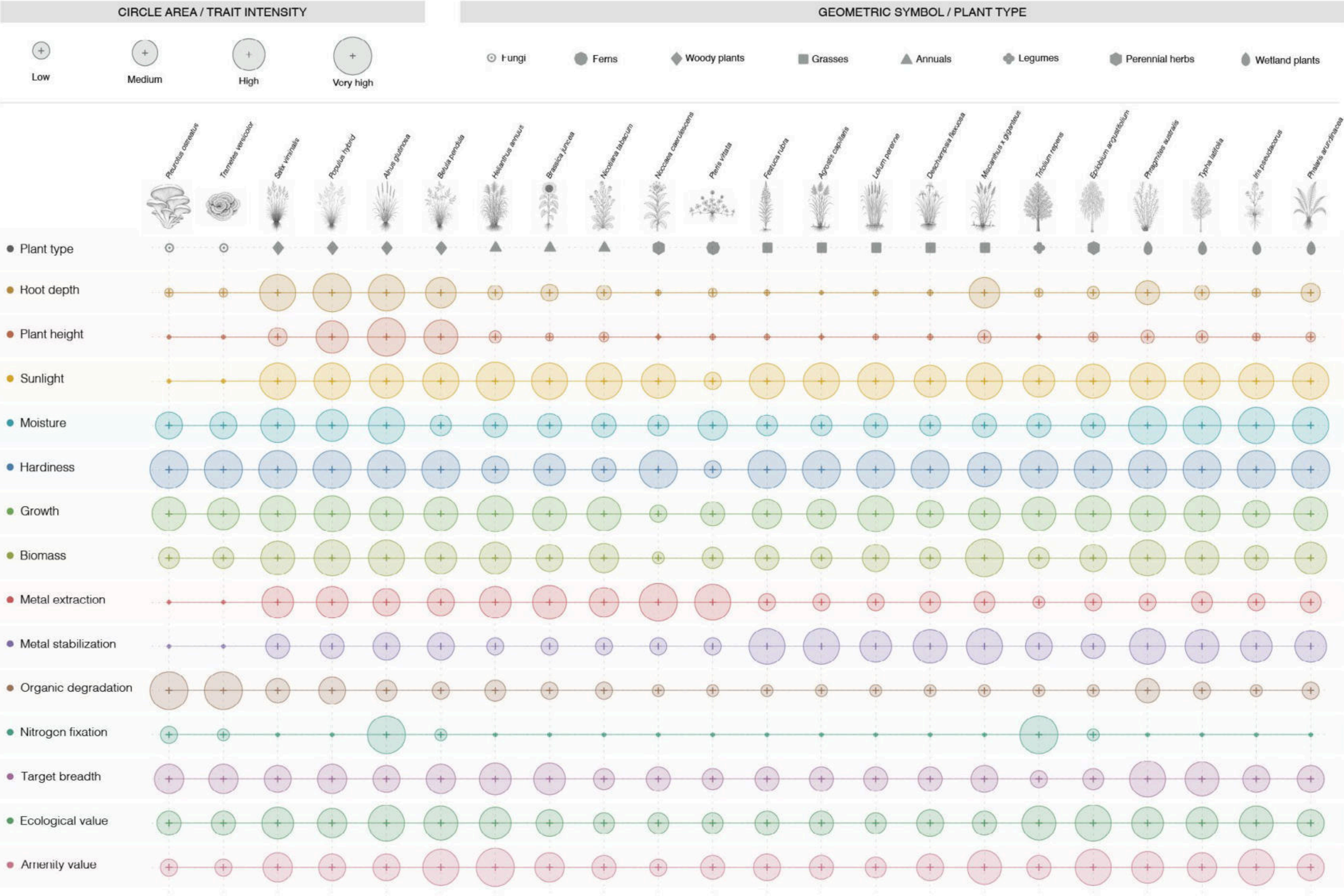
■ CSM-BASED STRATEGY OUTPUT

STRATEGY DISTRIBUTION • CELL COUNT (SMOOTHED)

Σ 15 429 CELLS



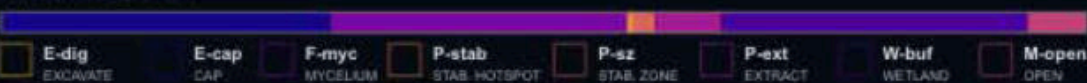
QUANTITATIVE PLANT TRAIT ANALYSIS



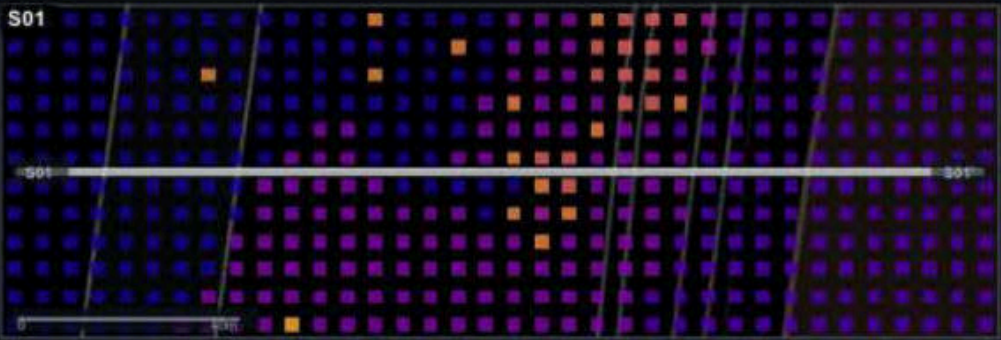
01 STRATEGY MASTERPLAN



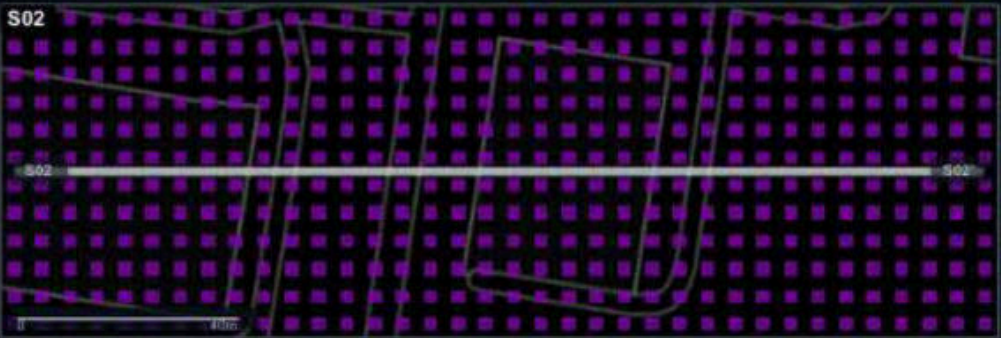
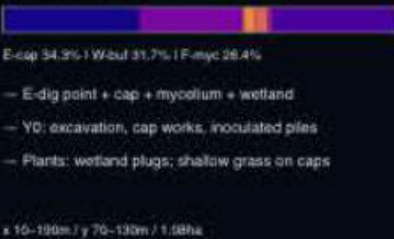
STRATEGY CODES



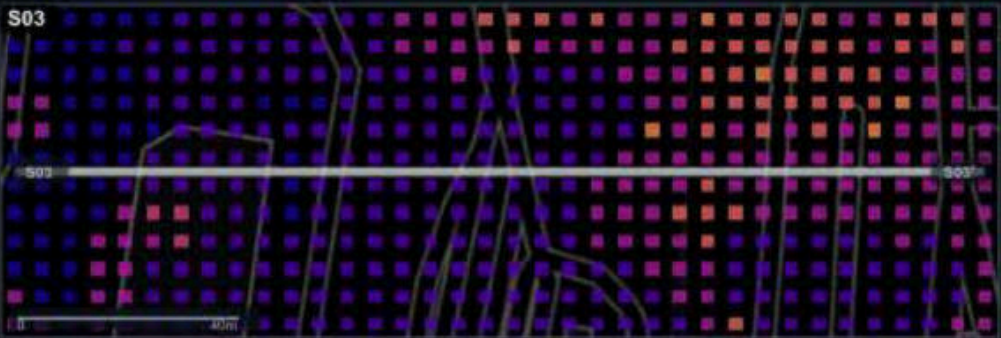
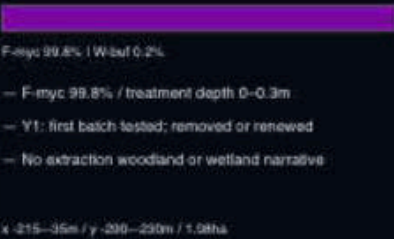
02 SECTIONS / EACH PLAN = 180m x 60m / SAME SCALE



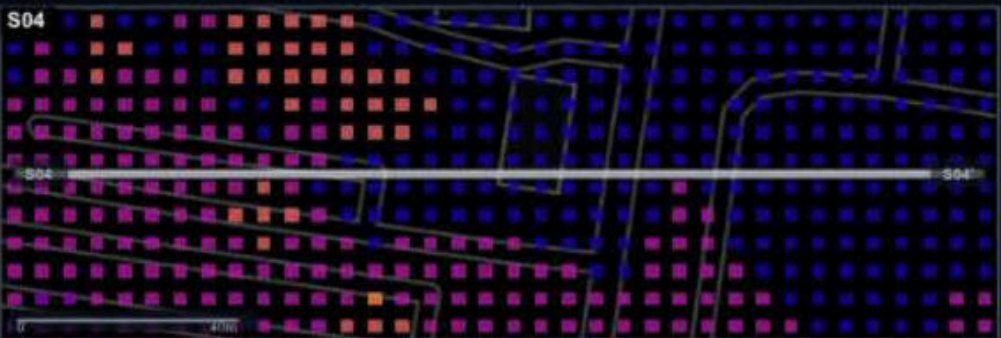
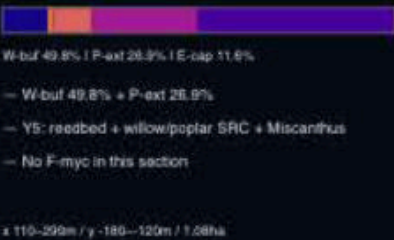
SECTION 01 / Y0 OBSERVATION
COMPOSITE START-UP



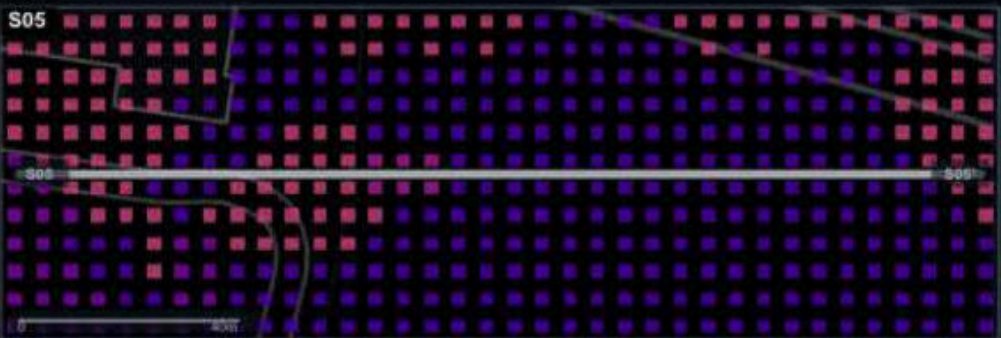
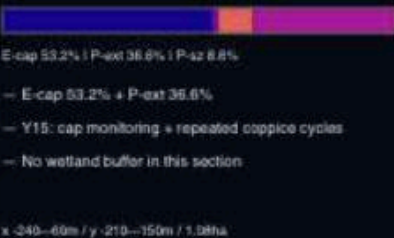
SECTION 02 / Y1 OBSERVATION
MYCELIUM FIELD



SECTION 03 / Y5 OBSERVATION
WETLAND-METAL MOSAIC



SECTION 04 / Y15 OBSERVATION
CAP-EXTRACTION FIELD



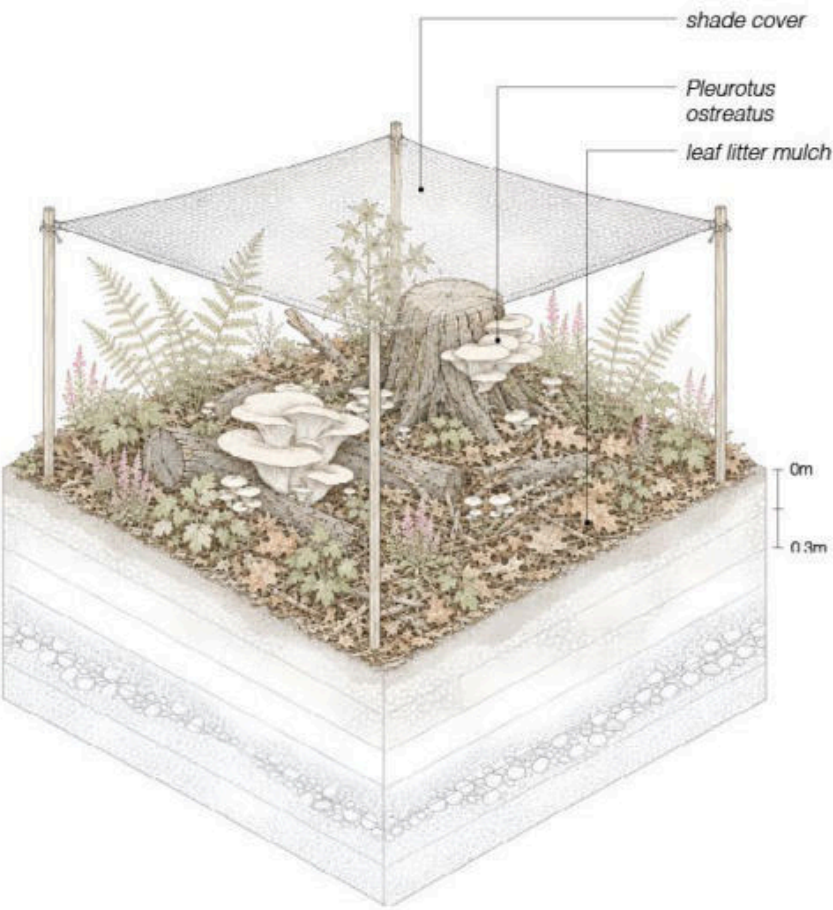
SECTION 05 / Y30 OBSERVATION
OPEN WETLAND



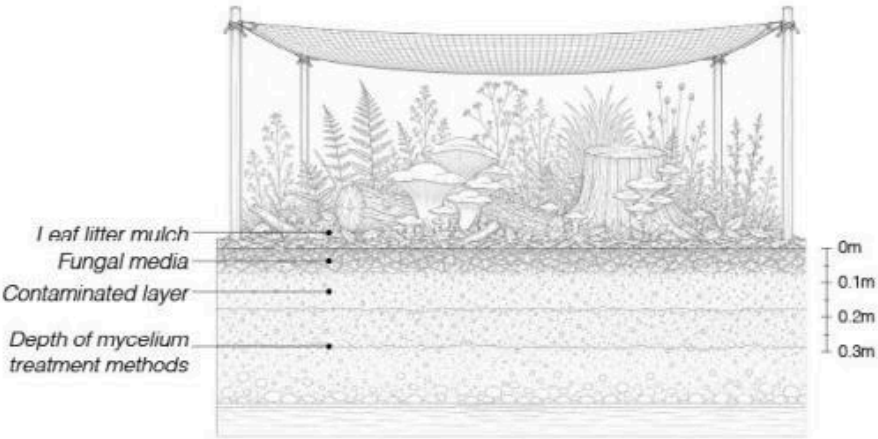
TRANSFORMING PLANT DATA INTO SPATIAL STRATEGIES

01 SURFACE BIOPILE & SHADED MYCOREMEDIATION

Mycelium Remediation Components

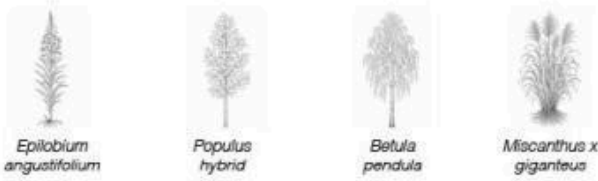


Treatment Layer Section



02 EXTRACTION FIELD & STABILIZATION MEADOW

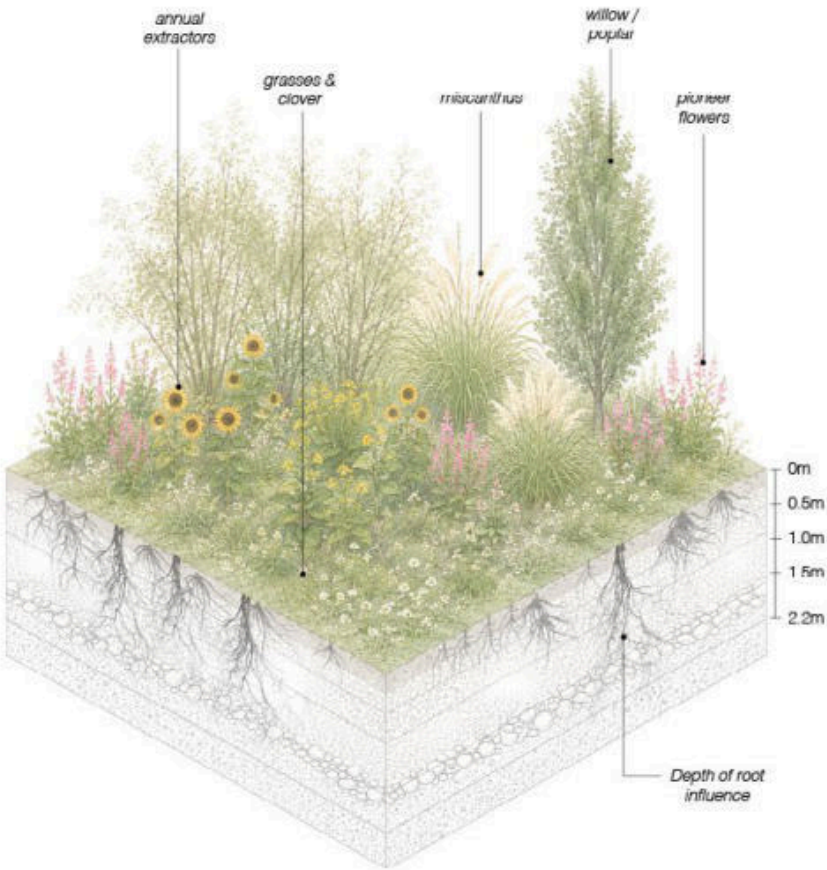
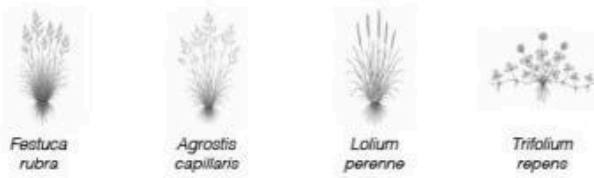
Pioneer Plants



Annual Extractors

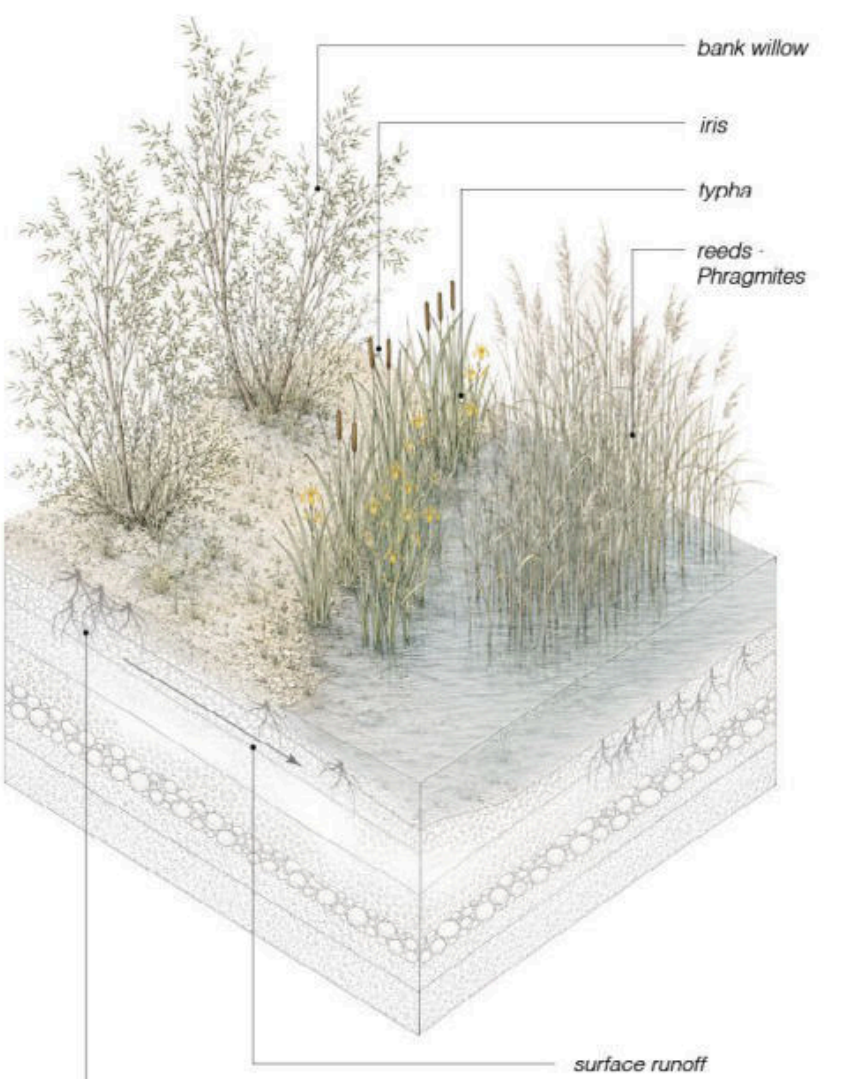


Grasses & Clover



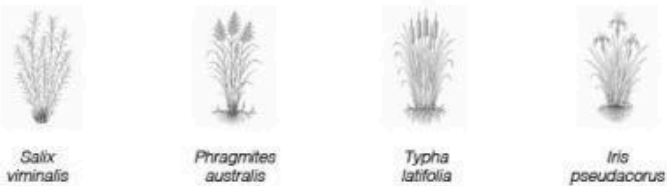
03 WETLAND BUFFER & RIPARIAN FILTRATION

Wetland Buffer Strategy

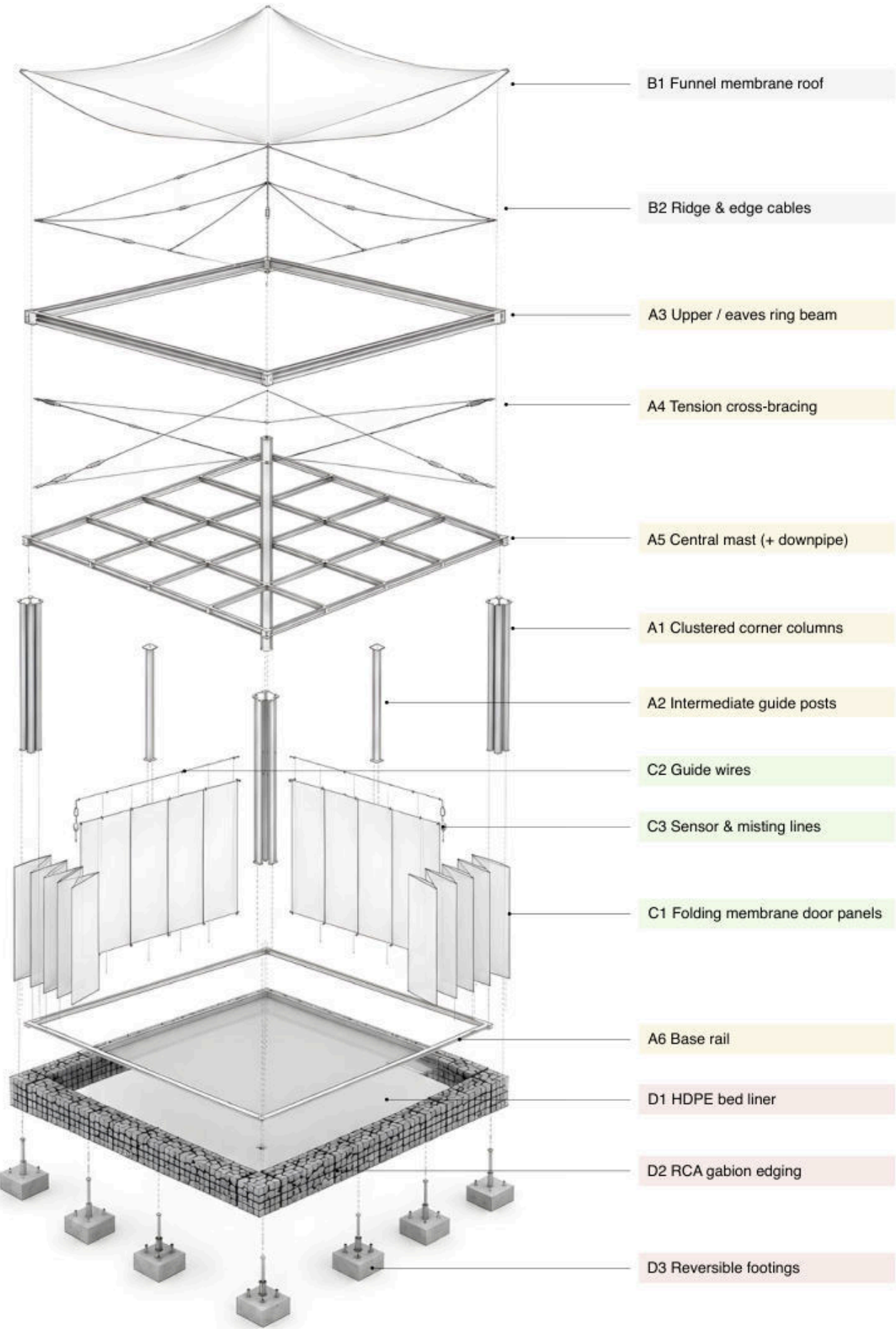


Metal is adsorbed and immobilized by roots/rhizomes (accumulated in roots, TF < 1)

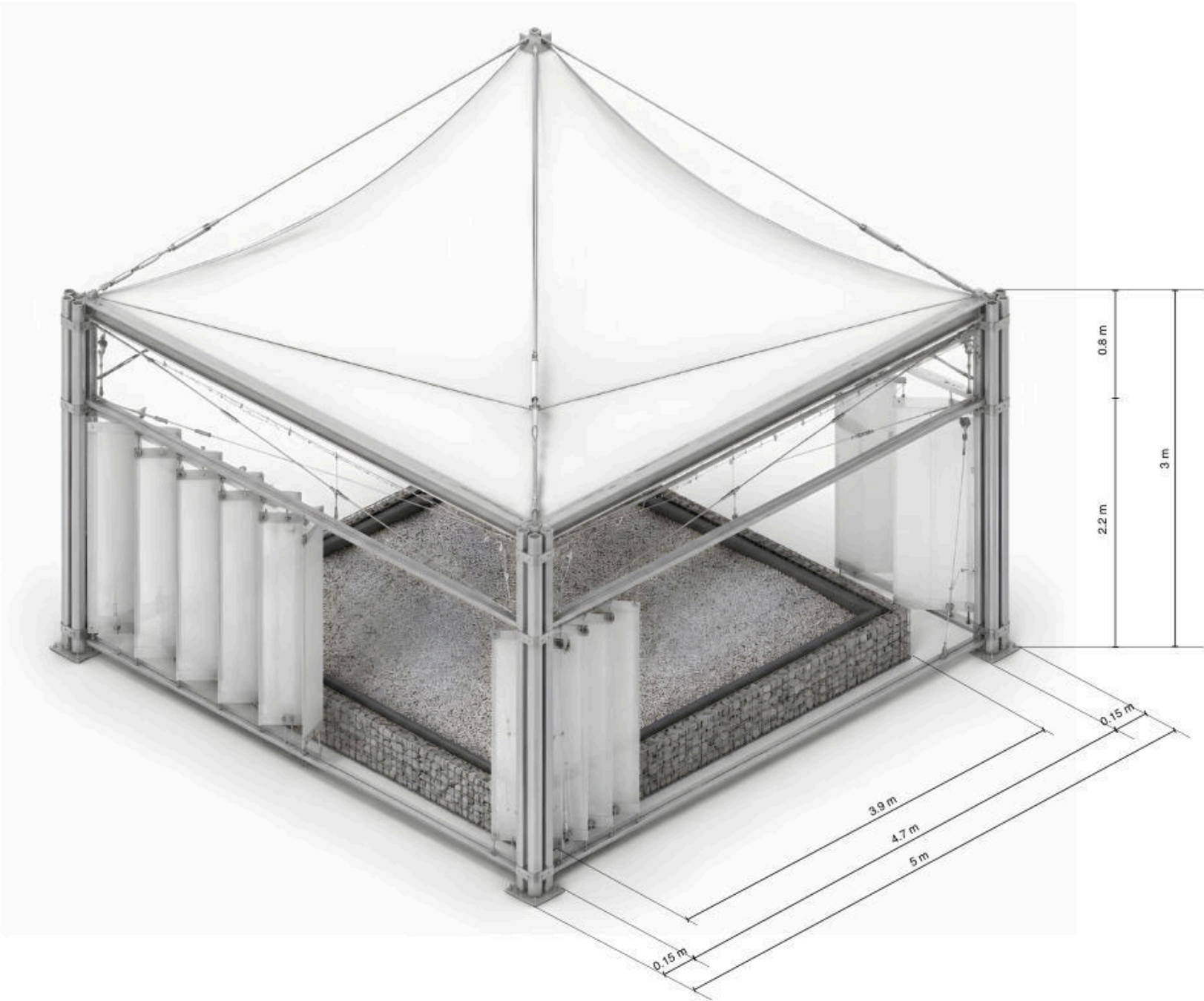
Wetland Buffer Plants



01 EXPLODED CONSTRUCTION AXONOMETRIC



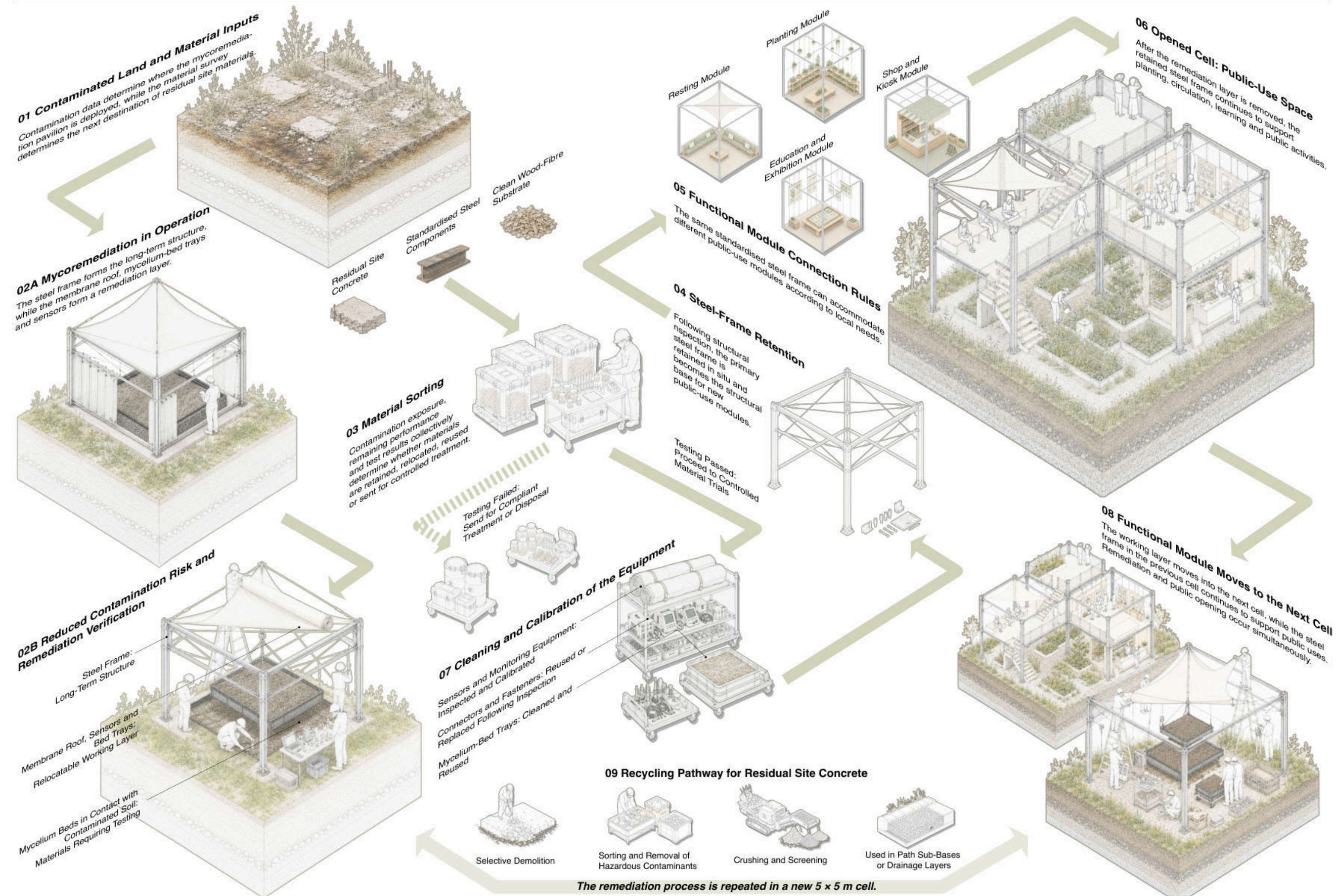
02 ASSEMBLED UNIT / PUBLIC FACE



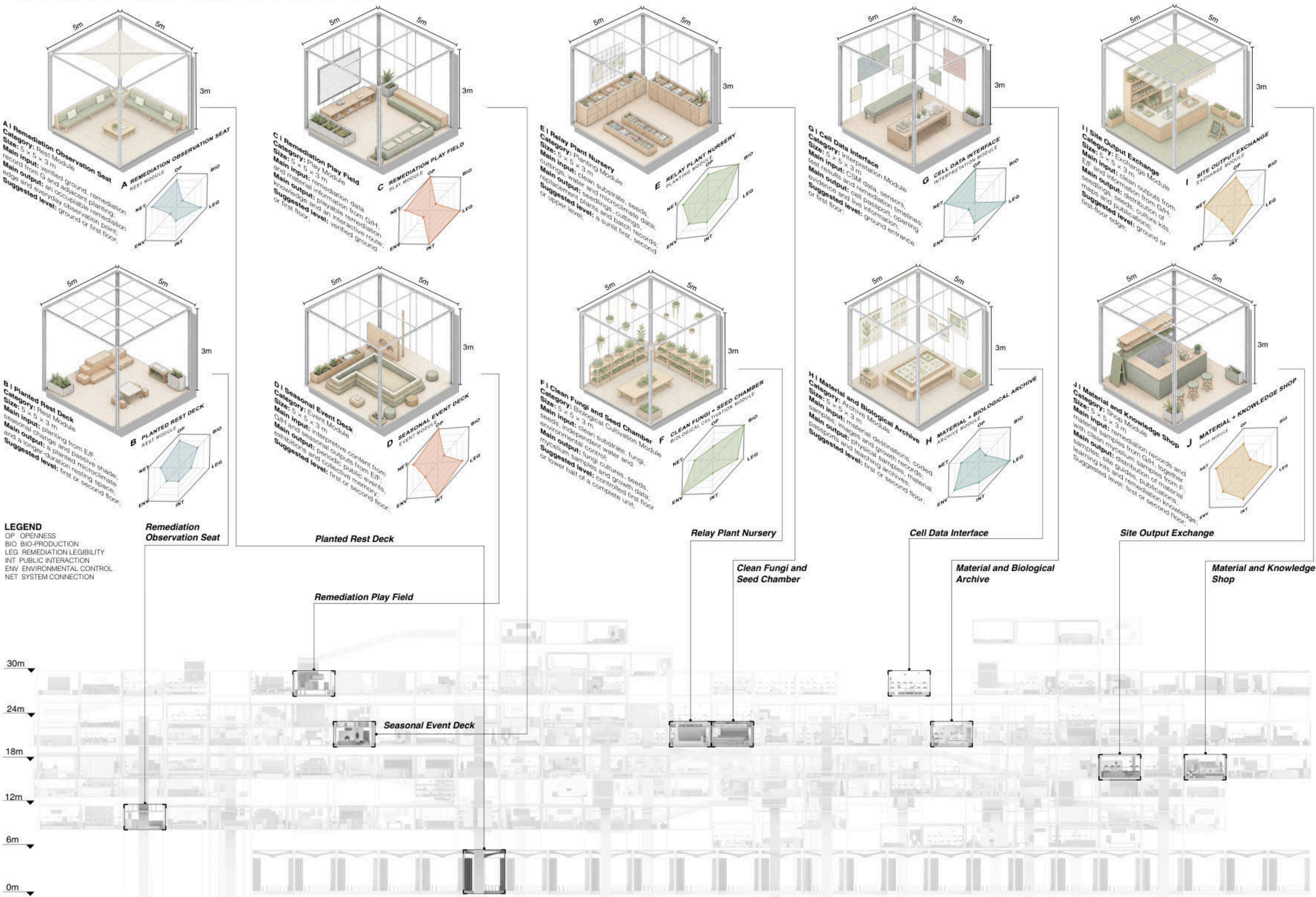
03 MATERIAL GRADES / FOUR LIFE-CYCLE ROLES

A: PERMANENT SCAFFOLD LAYER	B: CONSUMABLE EXECUTION LAYER	C: SEMI-PERMANENT ENCLOSURE LAYER	D: GROUND BIOLOGICAL LAYER
LIFE SPAN 30 years; retained after verified remediation	LIFE SPAN 15-20 years	LIFE SPAN 3-5 years, replaced per treatment cycle	LIFE SPAN dissolves with remediation progress
POST-TREATMENT STATE After verification: steel frame remains as public support; reusable treatment equipment moves to the next cell	STATE-MACHINE NODE Y15: enclosure leaves at the mycelium-to-plant handover	STATE-MACHINE NODE Every treatment cycle: parts are replaced, calibrated, or reinstalled	STATE-MACHINE NODE No exit: the bed is consumed and becomes productive public ground
MATERIAL ROLE white steel frame / ring beams / columns / mast	MATERIAL ROLE roof membrane / side membrane / folding panels	MATERIAL ROLE mist lines / sensors / guide wires / service parts	MATERIAL ROLE woodchip bed / mycelium substrate / composting soil

Material Cycles and Spatial Relay of the Remediation Unit



Material Cycles and Spatial Relay of the Remediation Unit



BARKING REACH REMEDIATION COMMONS · A 30-YEAR REMEDIATION RELAY

A 30-YEAR HANDOVER



01 · HUMAN-LED
YEAR 0 – YEAR 1



02 · SYSTEM-LED
YEAR 1 – YEAR 15



03 · PUBLIC-LED
YEAR 15 – YEAR 30



MODULAR AGGREGATION & SPATIAL PERFORMANCE

01 WASP Workflow and Module Set

02 Connectivity Rules

03 Iterative Aggregation

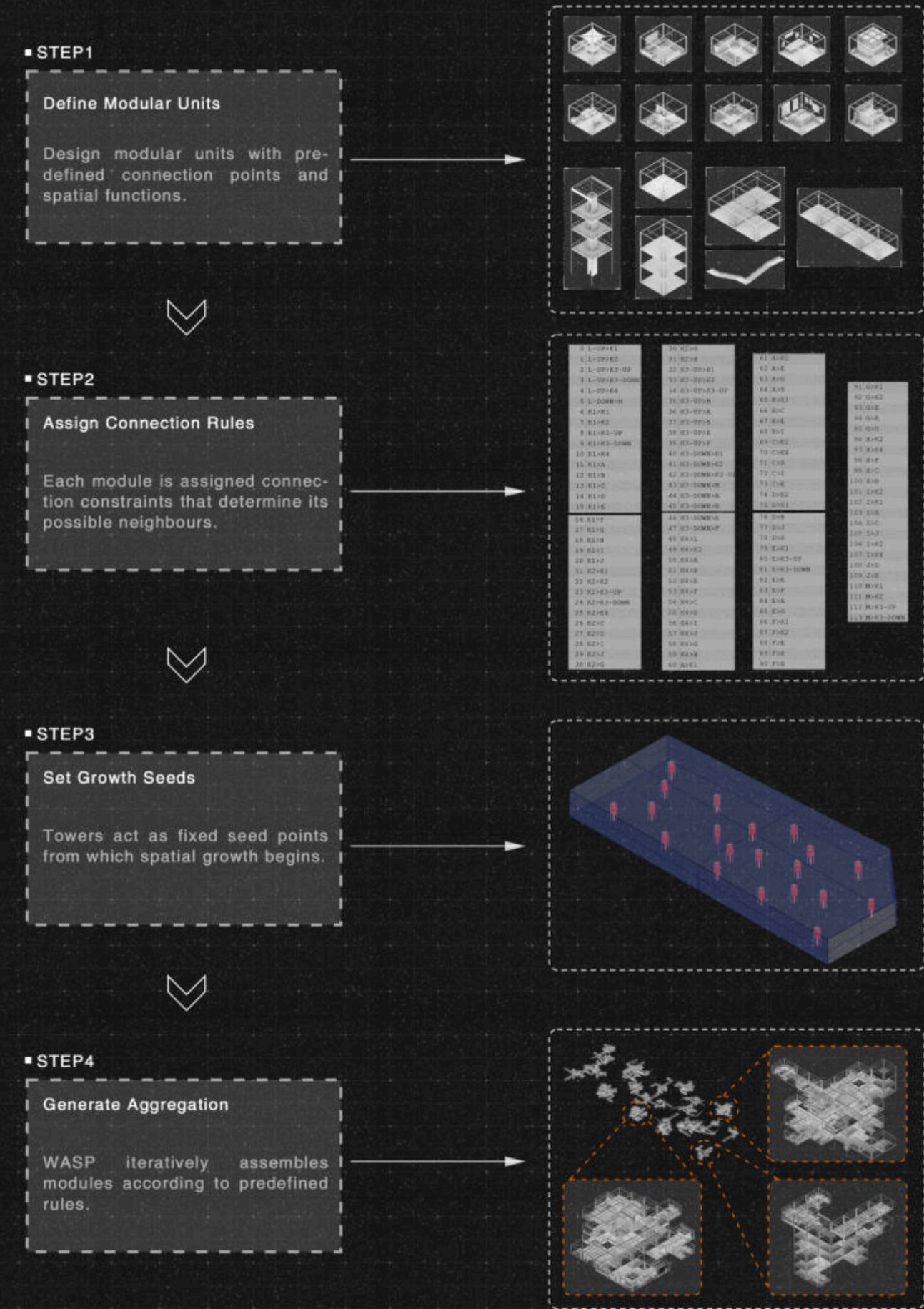
04 Environmental Optimisation and Solar Validation

05 Functional Distribution, Density and Circulation

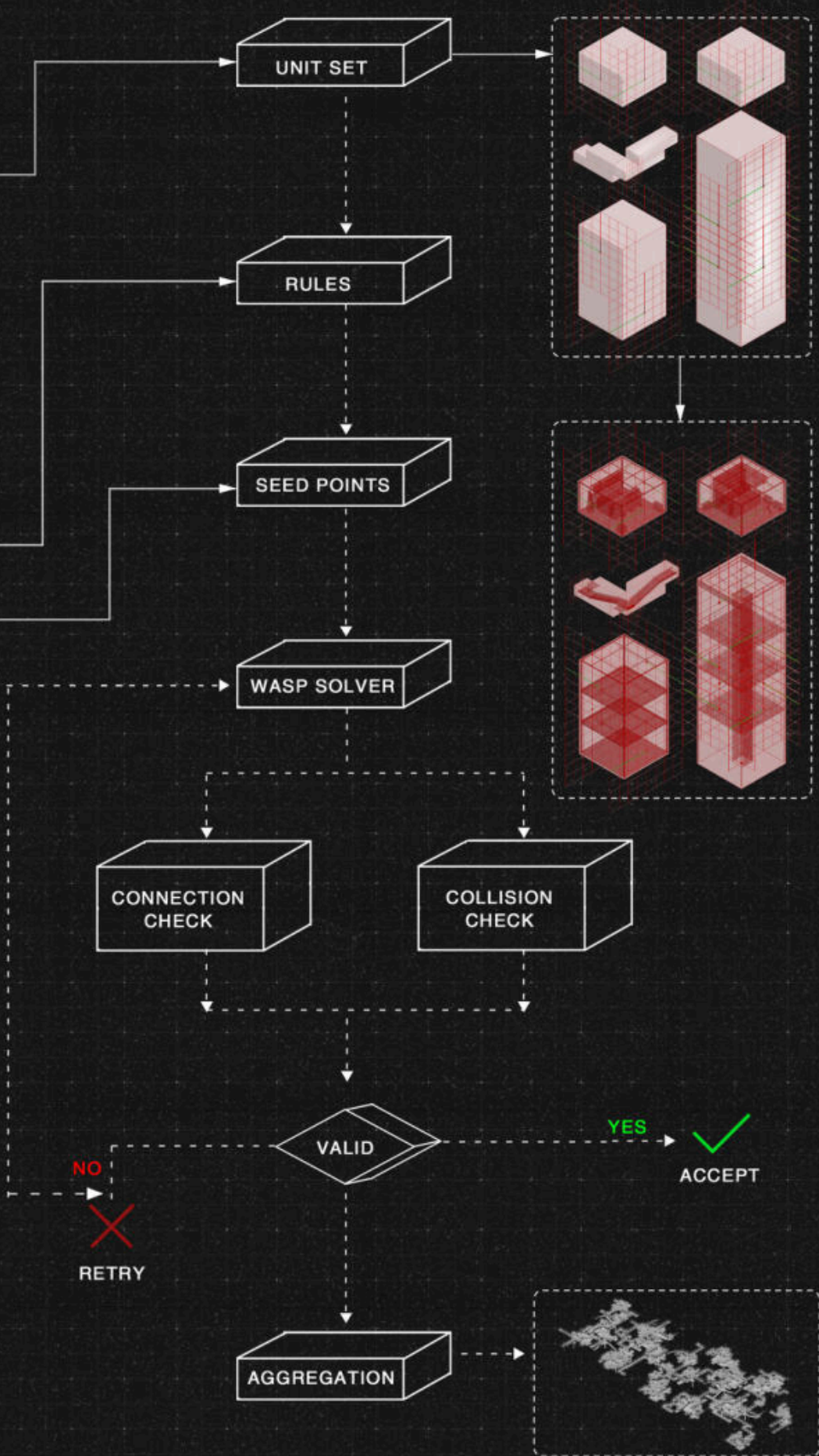
WASP INTRODUCTION

INTRODUCE THE WORKFLOW OF WASP

FOUR STAGES DEFINE THE WASP GENERATION PROCESS



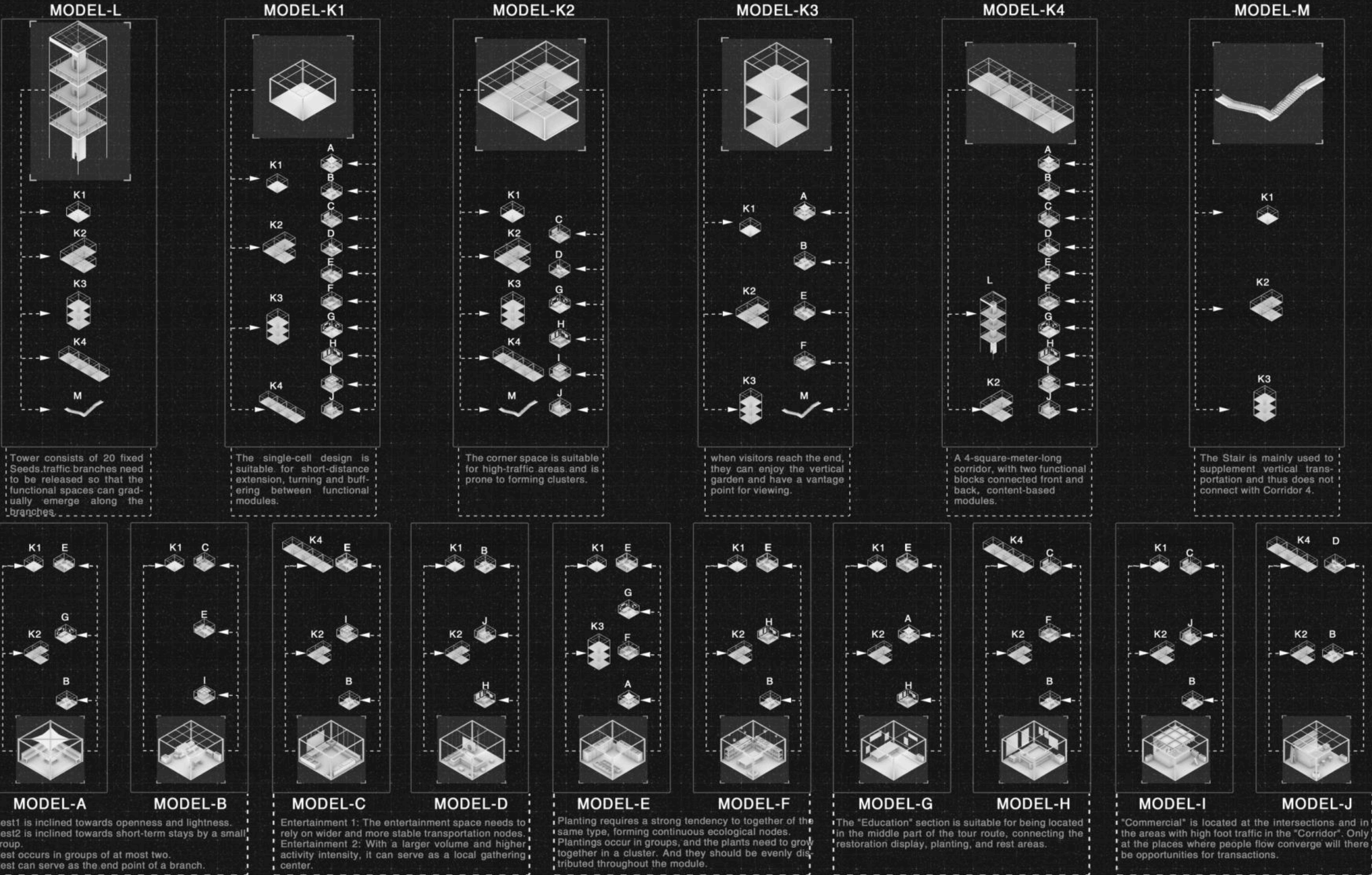
MODULES ARE TESTED, ACCEPTED AND AGGREGATED ITERATIVELY



CONNECTIVITY RULES

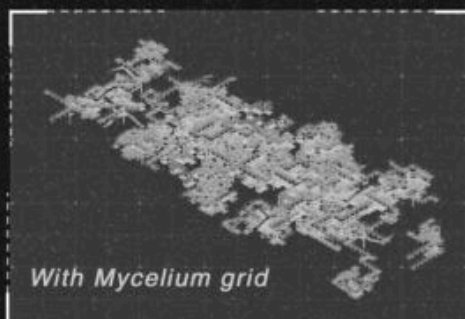
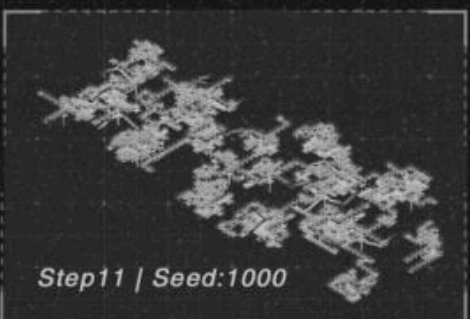
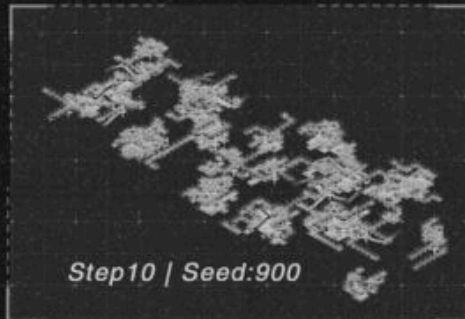
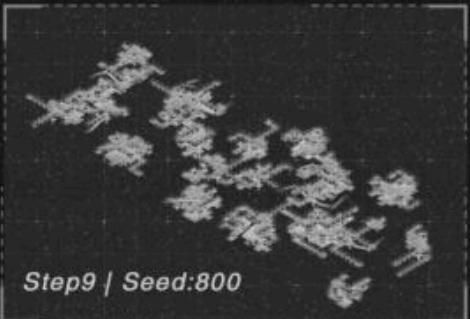
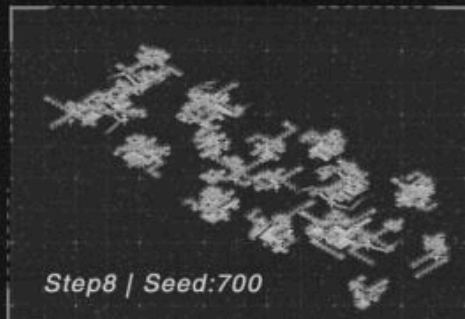
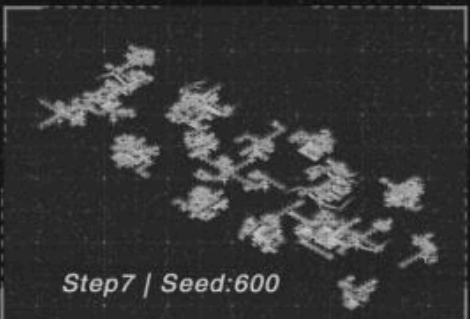
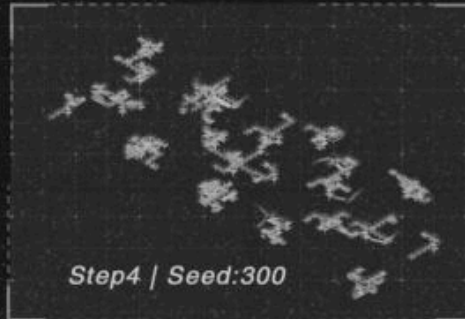
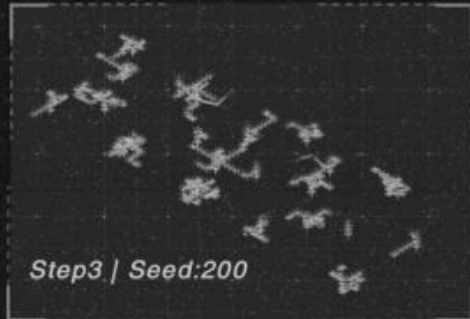
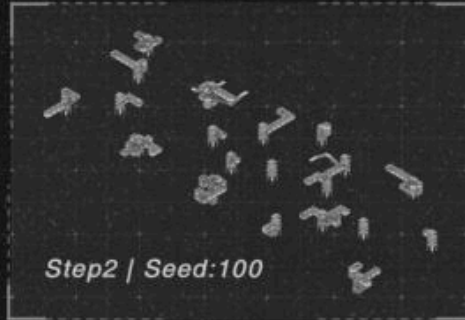
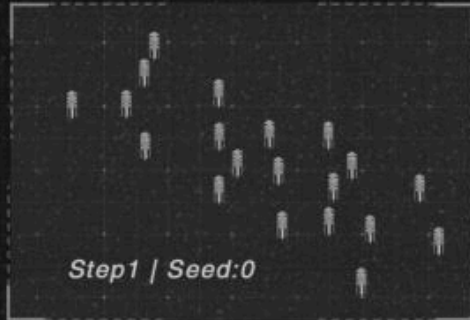
RULE-BASED RELATIONSHIPS BETWEEN MODULAR SPATIAL AGENTS

Predefined rules guide how modules connect and aggregate.

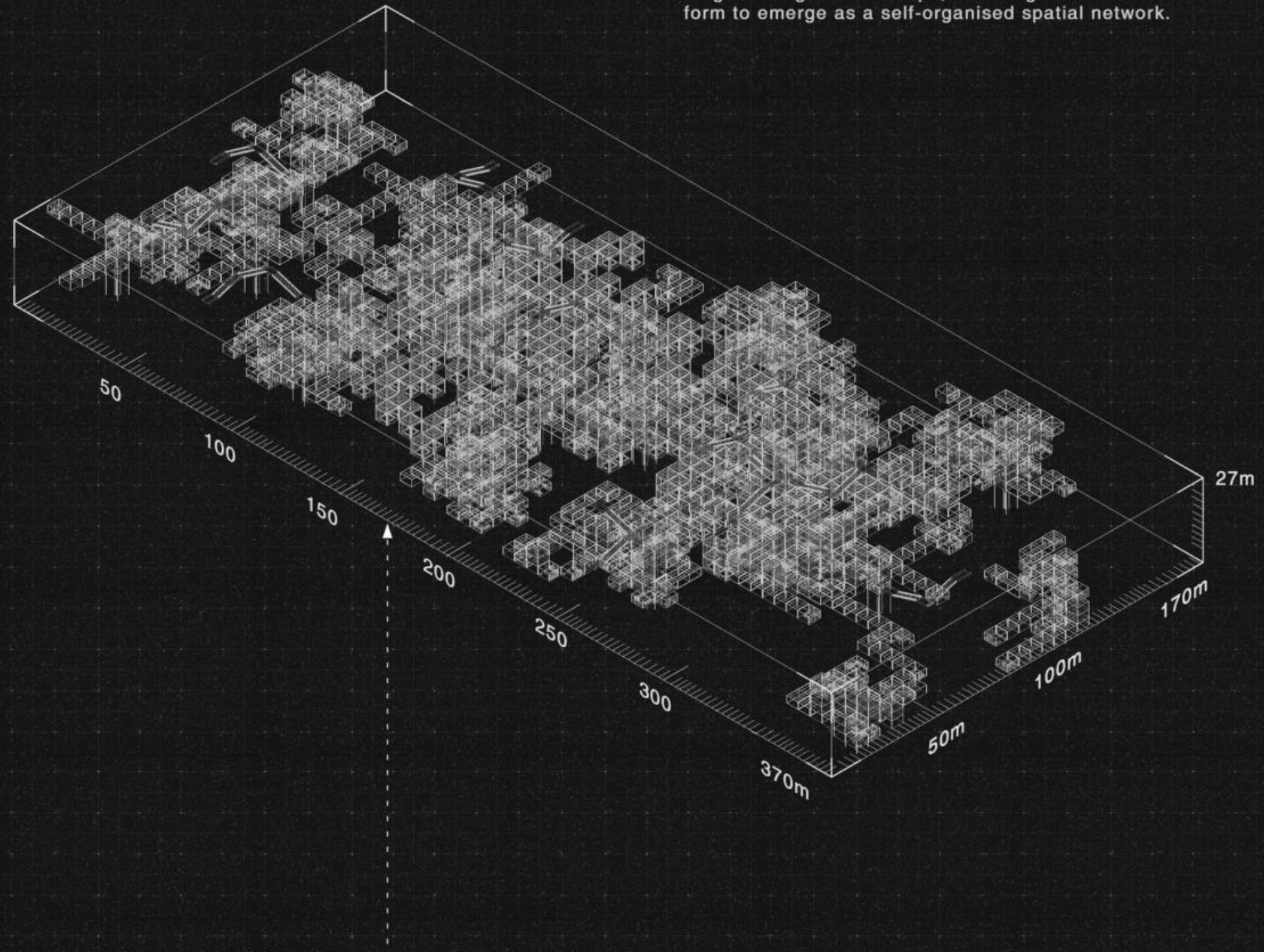


GENERATING IN WASP

ALGORITHMIC AGGREGATION BASED ON WASP MODULES

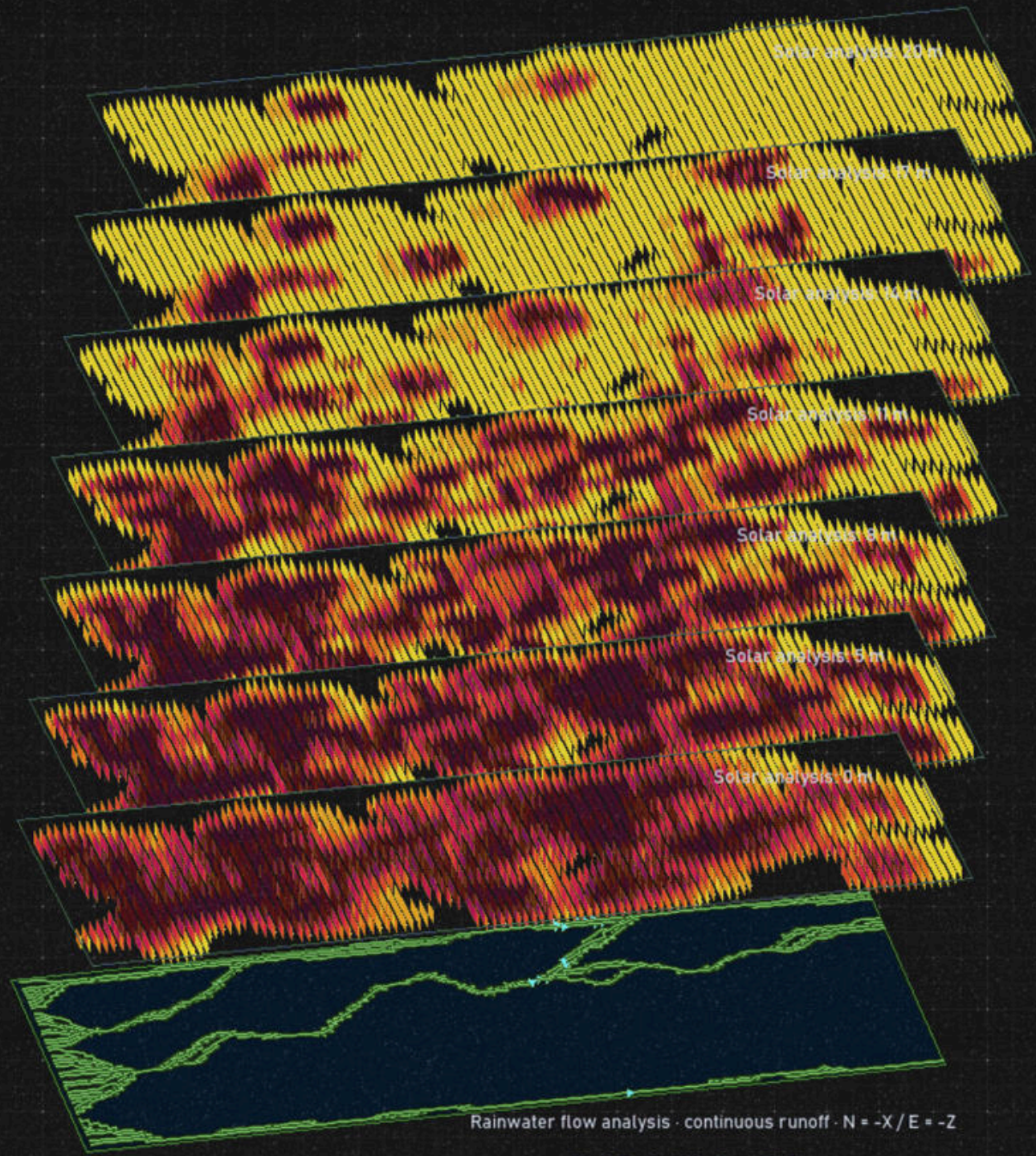


The spatial system develops through iterative aggregation rather than predefined composition. Modules are continuously added according to connection rules and neighbouring relationships, allowing the architectural form to emerge as a self-organised spatial network.



OPTIMIZATION BY LIGHT AND RAINFALL

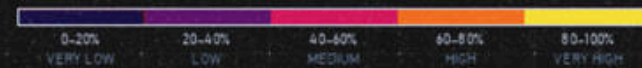
OPTIMIZE THE MODEL GENERATED BY WASP THROUGH LIGHTING AND RAINFALL, AND MAKE APPROPRIATE ADJUSTMENTS.



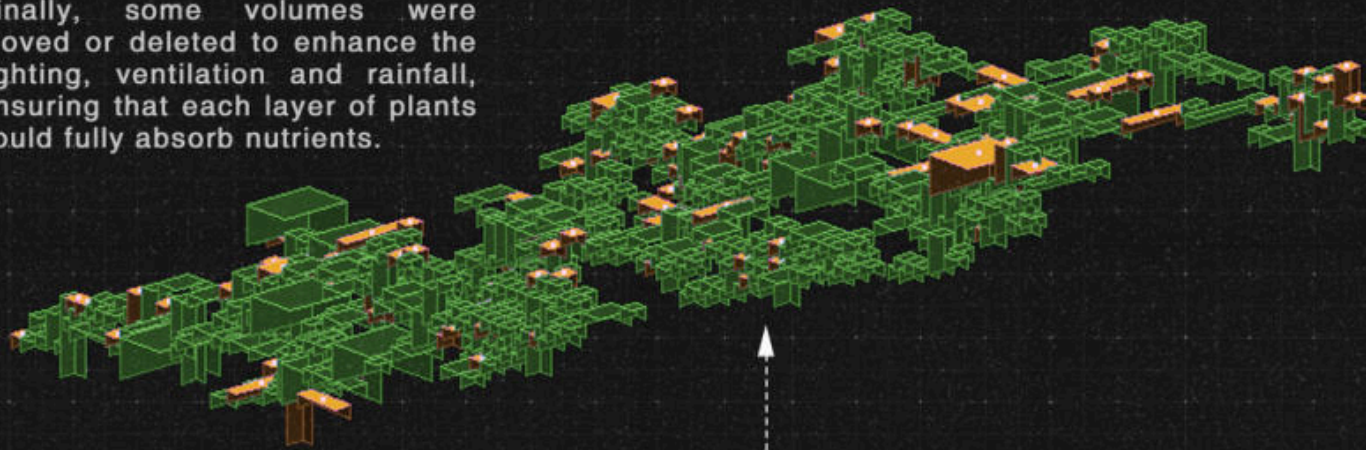
SELECTED PARETO SOLUTION

GEN 24 / IND 39 · SOLAR 17.5% · PLATFORM 84.9% · EDGE 69.5

SOLAR TRANSMISSION / RAY VISIBILITY

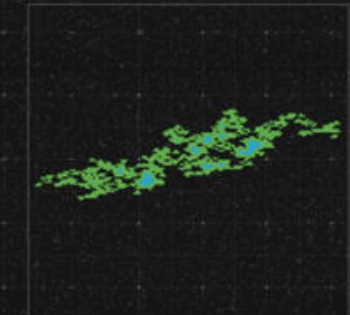
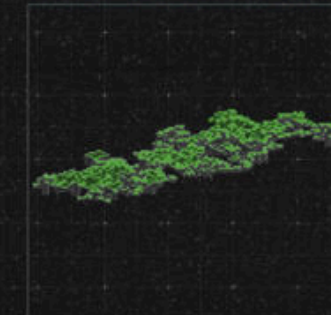
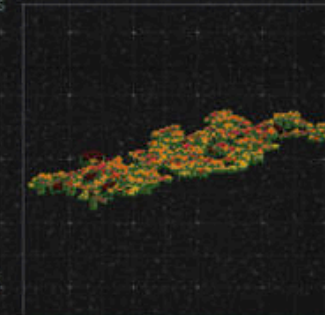
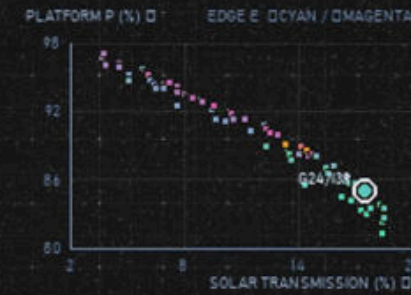


Finally, some volumes were moved or deleted to enhance the lighting, ventilation and rainfall, ensuring that each layer of plants could fully absorb nutrients.



EVOLUTIONARY MULTI-OBJECTIVE STUDY

30 GENERATIONS · 48 INDIVIDUALS · 1,002 MODULES



Objective #1

Maximize solar exposure

S: 18.8% · P: 83.4% · E: 69.8

BALANCED PARETO SELECTION

GEN 24 / IND 39 · SOLAR 17.5% · PLATFORM 84.9% · EDGE 69.5

Retained

Removed

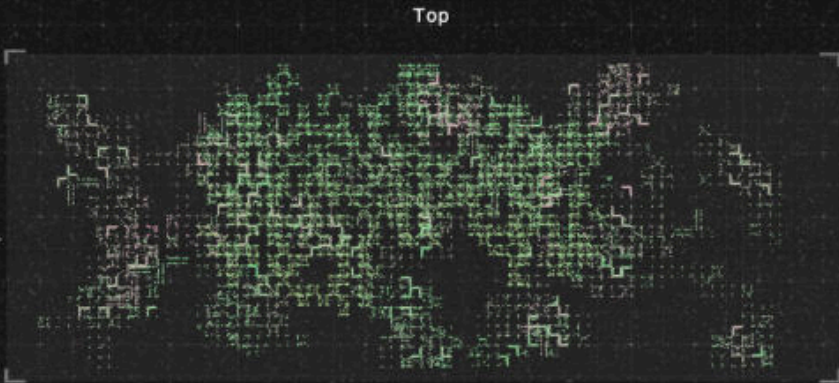
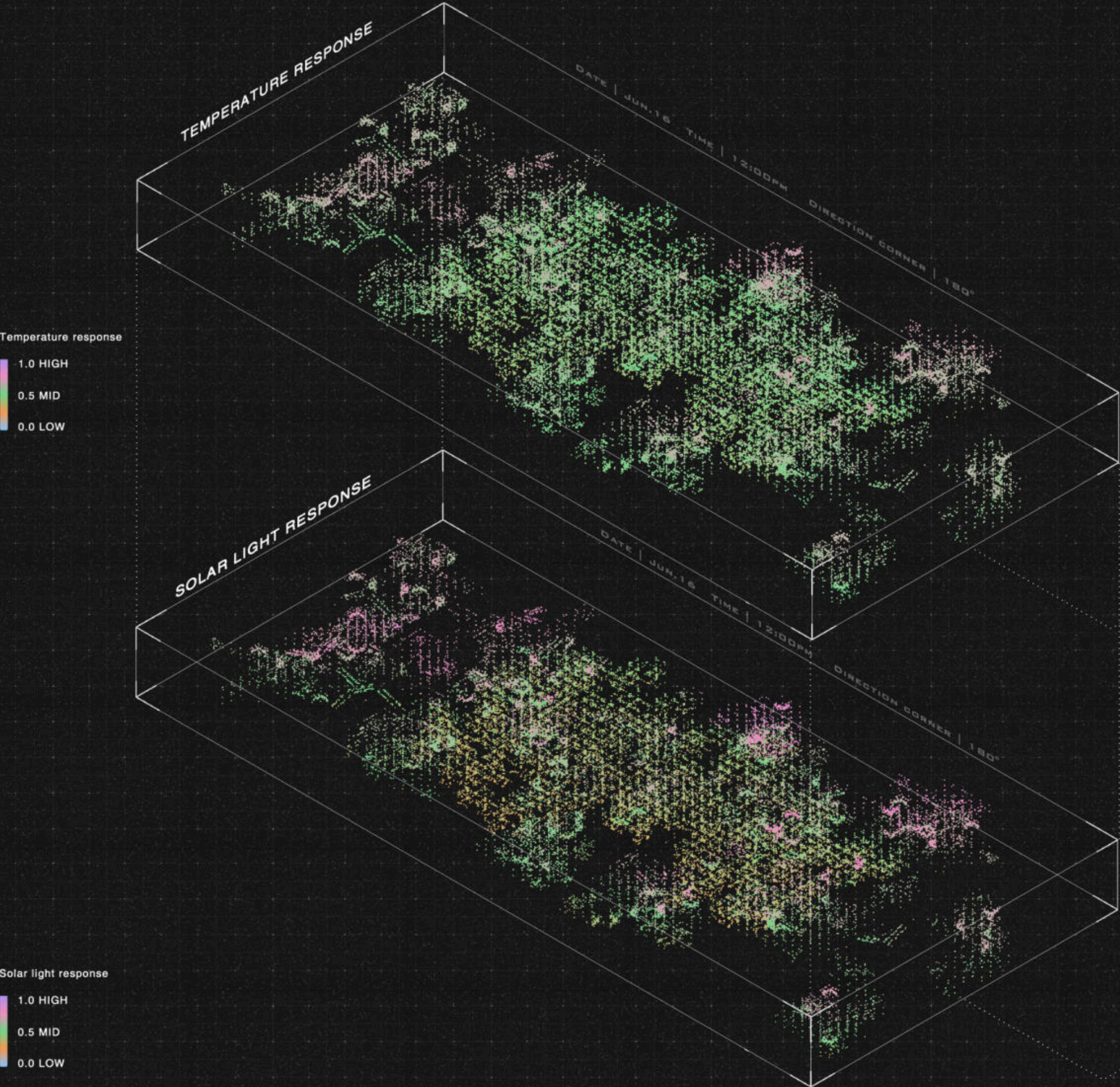
HARD CAP: 14% REMOVED · WEIGHTS: 39% SOLAR · 37% PLATFORM · 24% EDGE

EDGE + BOUNDARY / DAREA: BETTER

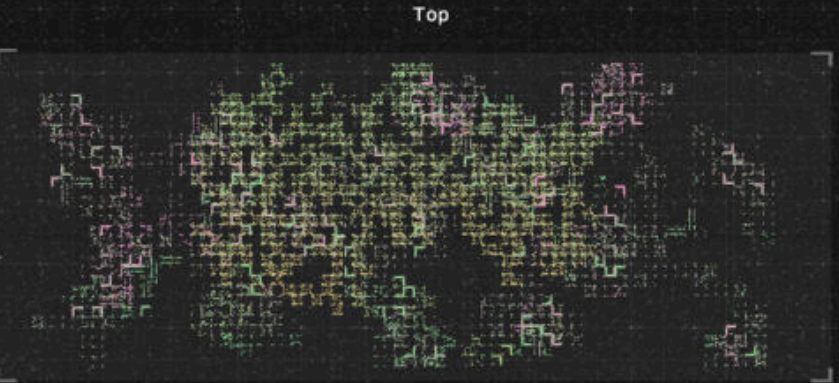


POST-OPTIMIZATION SOLAR PERFORMANCE

POINT-CLOUD EVALUATION OF THE WASP-GENERATED STRUCTURE AFTER SOLAR EXPOSURE OPTIMIZATION

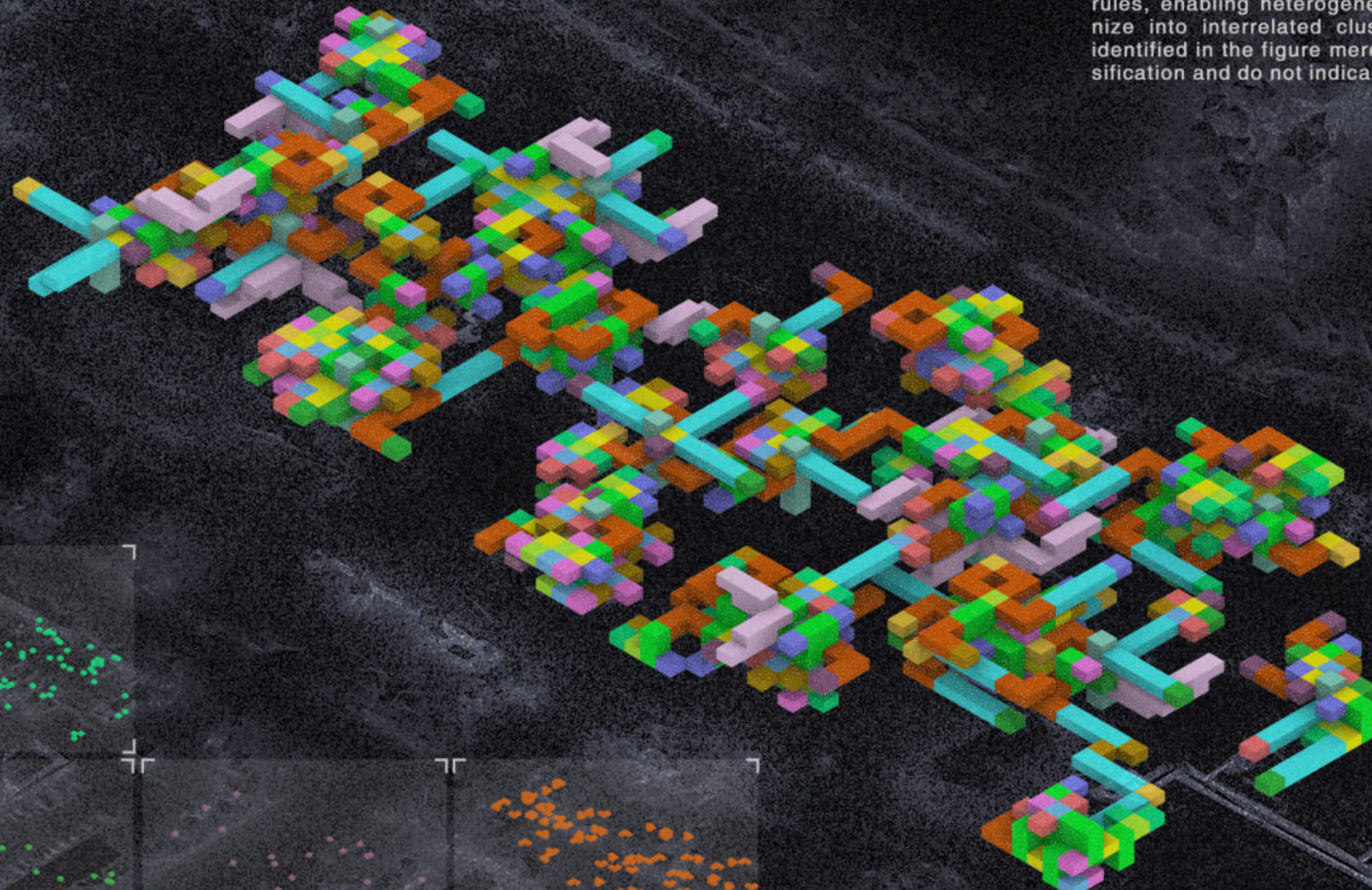
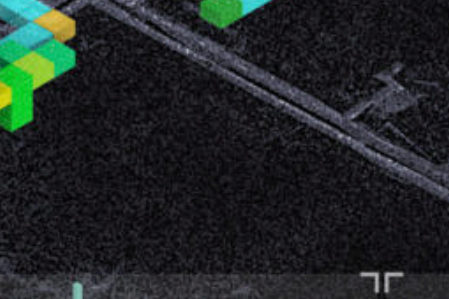
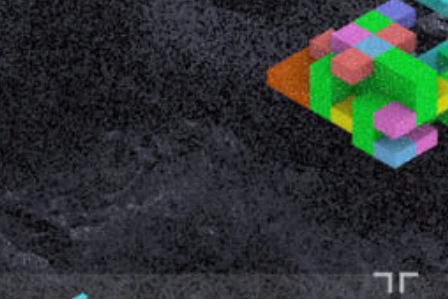
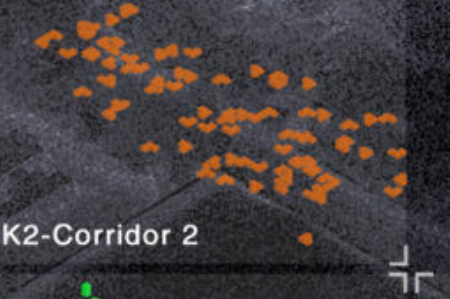
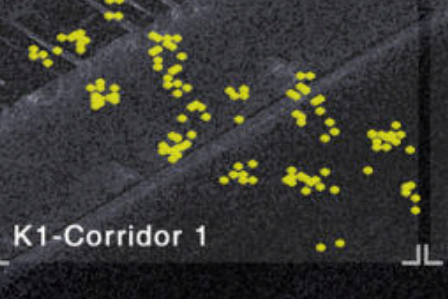
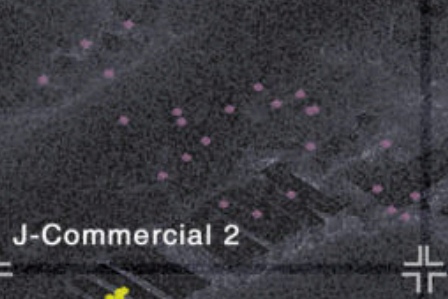
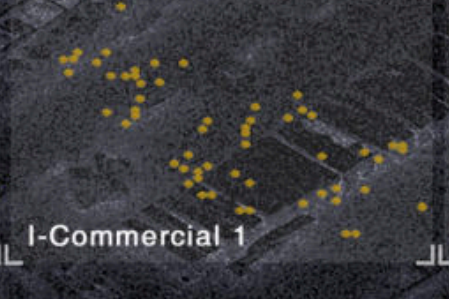
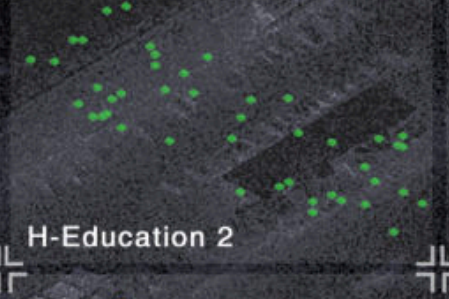
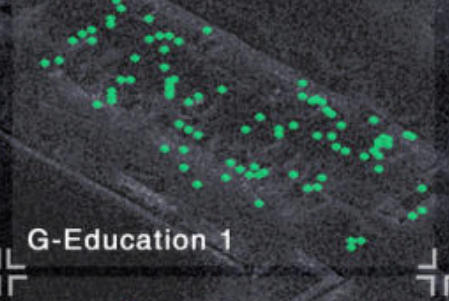
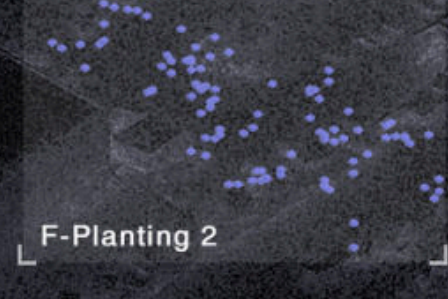
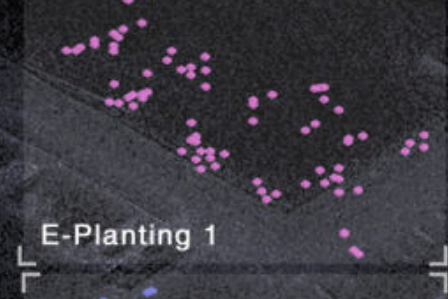
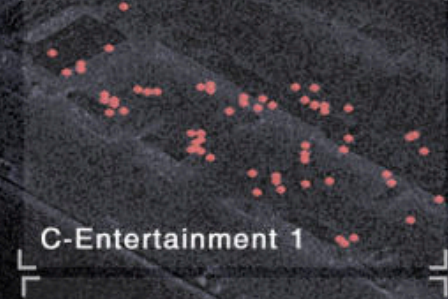
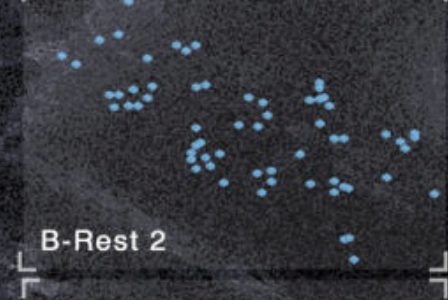
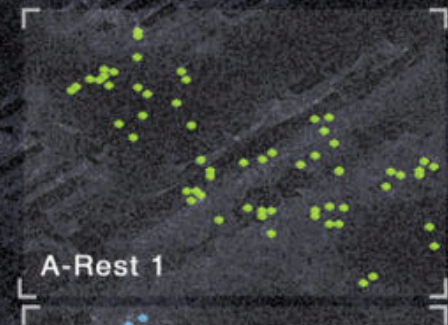


The optimized WASP model is converted into a point cloud to visualize its final solar exposure performance. The colour distribution demonstrates improved daylight penetration and a more balanced exposure across the spatial system after selected modules were repositioned or removed.



UNIT COLOR AGGREGATION

ALGORITHMICALLY GENERATED MODULAR ASSEMBLIES BASED ON FUNCTIONAL AGENTS

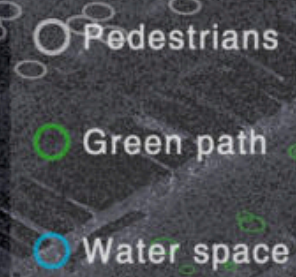
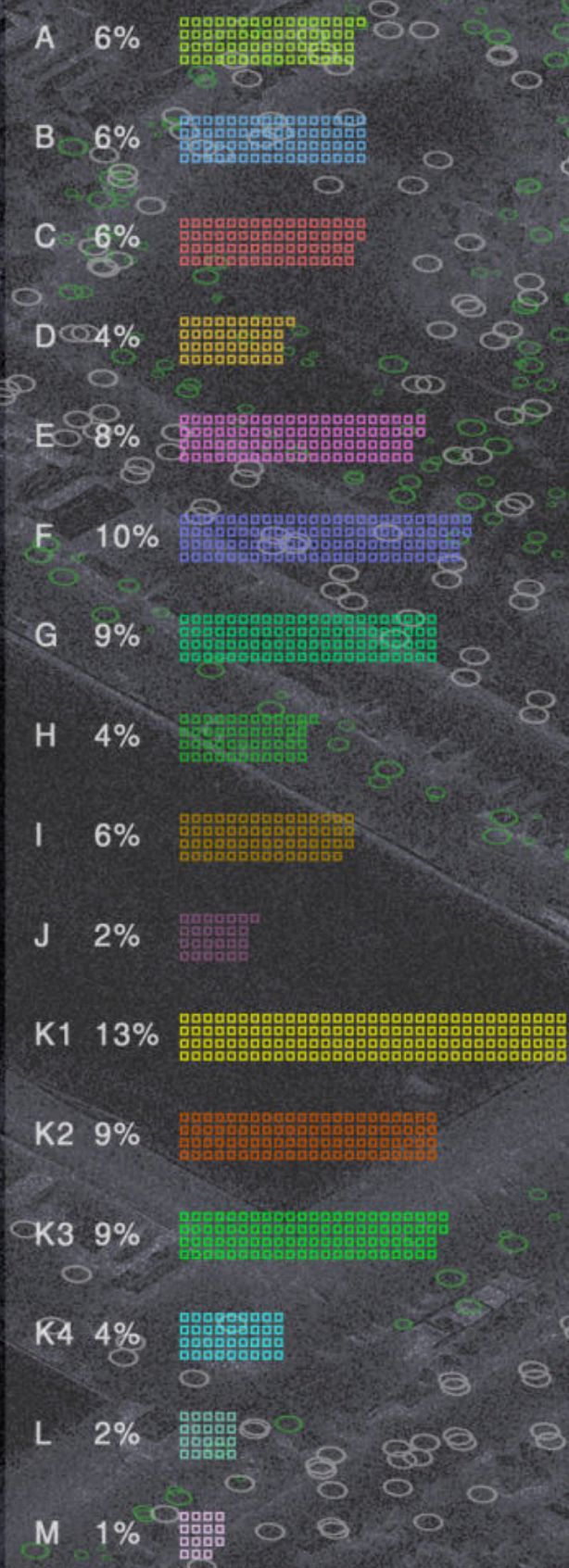


Each color represents a modular unit with a specific spatial function. WASP gradually generates and aggregates these modules according to preset connection rules, enabling heterogeneous functions to self-organize into interrelated clusters. However, the colors identified in the figure merely represent the color classification and do not indicate the generation sequence.

SPATIAL AGGREGATION OVERVIEW

WASP-BASED MODULAR SPATIAL DISTRIBUTION AND FUNCTIONAL COMPOSITION

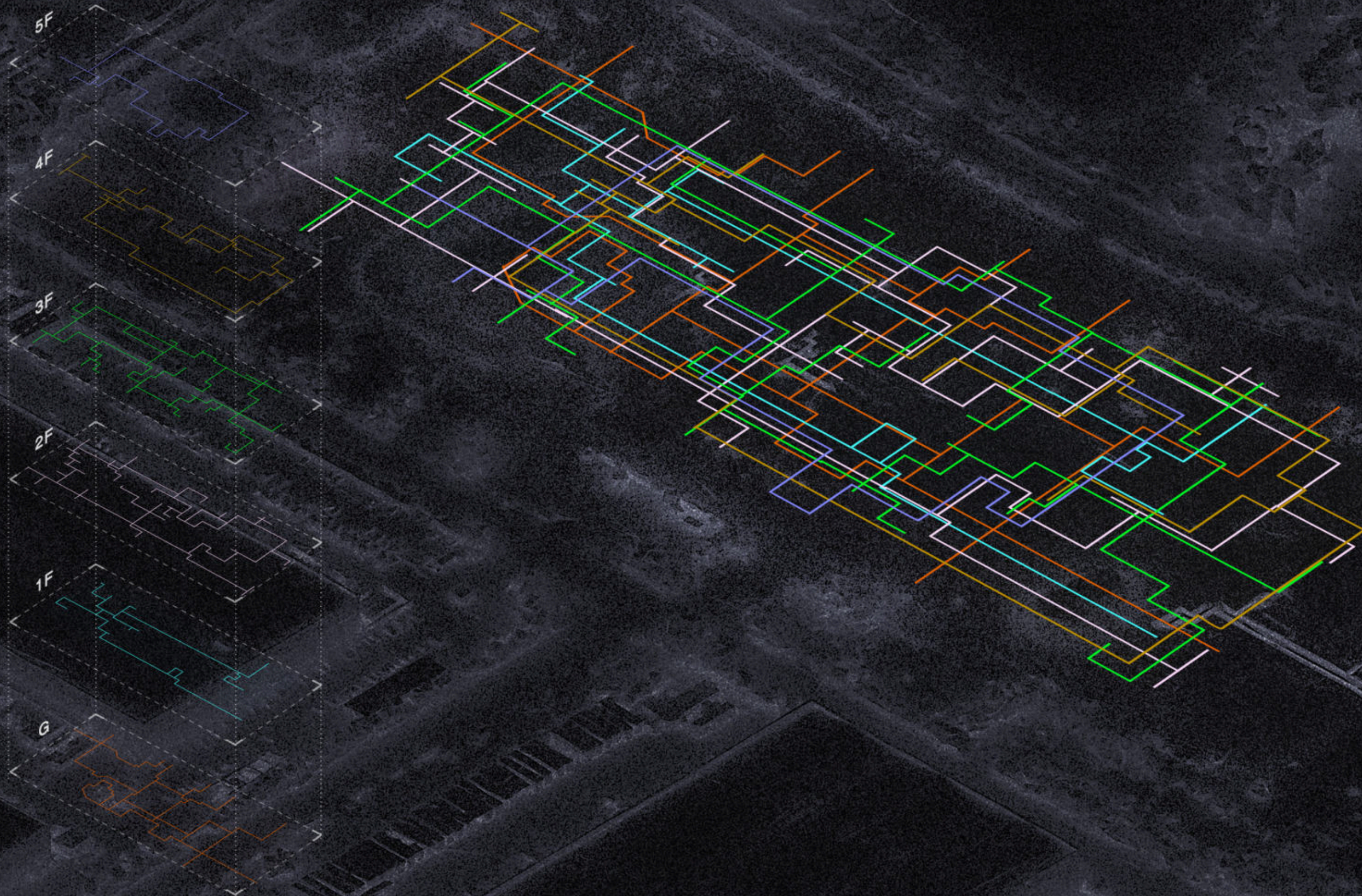
The generated spatial system explores how modular aggregation can organise a post-industrial landscape through adaptive growth rather than predefined planning. Individual modules act as spatial agents that assemble into interconnected clusters, producing diverse functional territories while maintaining overall continuity.



CIRCULATION NETWORK

MULTI-LEVEL CIRCULATION FRAMEWORK GENERATED THROUGH WASP AGGREGATION

Each color represents a different level of the transportation network. These levels collectively form a continuous vertical system, connecting the spatial settlements through corridors, stairs and towers, creating an efficient and flexible transportation framework.



T	F	Height
■	5F	17m
■	4F	14m
■	3F	11m
■	2F	8m
■	1F	5m
■	G	0m

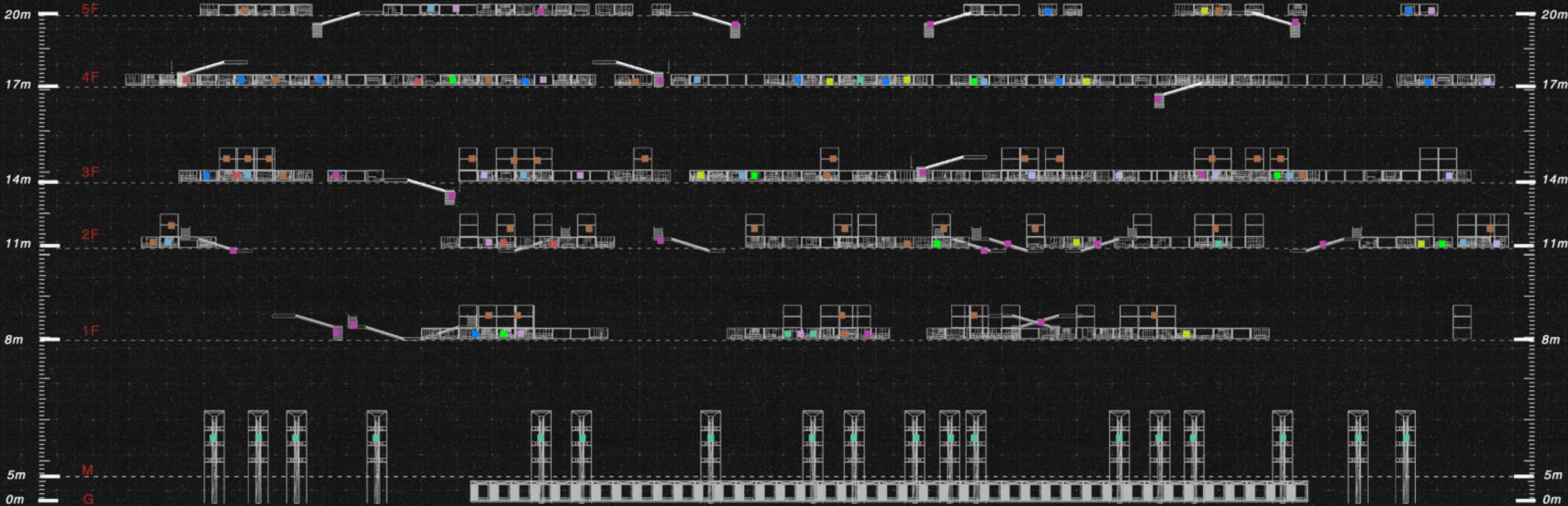
LEVEL DISTRIBUTION

MODULE COUNT ACROSS VERTICAL LEVELS

Modules are concentrated on 2F and 3F, forming the main functional and circulation core of the system.

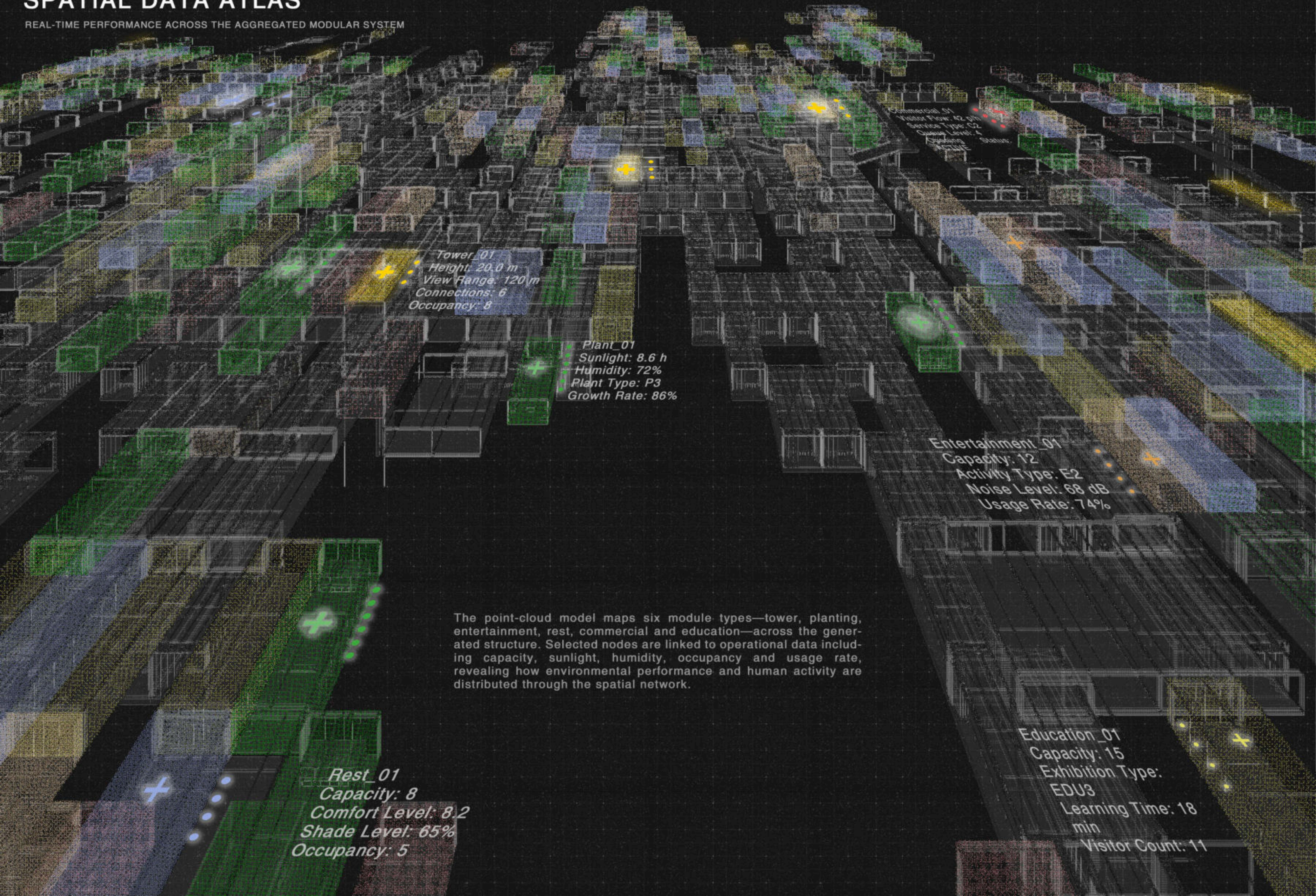


Rest Entertainment Planting Education Commercial Tower Corridor1 Corridor2 Corridor3 Corridor4 Stairs



SPATIAL DATA ATLAS

REAL-TIME PERFORMANCE ACROSS THE AGGREGATED MODULAR SYSTEM



Tower_01
Height: 20.0 m
View Range: 120 m
Connections: 6
Occupancy: 8

Plant_01
Sunlight: 8.6 h
Humidity: 72%
Plant Type: P3
Growth Rate: 86%

Entertainment_01
Capacity: 12
Activity Type: E2
Noise Level: 68 dB
Usage Rate: 74%

Rest_01
Capacity: 8
Comfort Level: 8.2
Shade Level: 65%
Occupancy: 5

Education_01
Capacity: 15
Exhibition Type:
EDU3
Learning Time: 18
min
Visitor Count: 11

The point-cloud model maps six module types—tower, planting, entertainment, rest, commercial and education—across the generated structure. Selected nodes are linked to operational data including capacity, sunlight, humidity, occupancy and usage rate, revealing how environmental performance and human activity are distributed through the spatial network.

FUNCTIONAL NODES IN AGGREGATION

FUNCTIONAL NODES AND CIRCULATION ACROSS THE WASP AGGREGATION

The point-cloud model reveals how rest, entertainment, planting, education and commercial modules are distributed throughout the generated structure. Each programme forms a distinct spatial cluster while remaining connected through a continuous circulation network. Their overlap creates a layered system of movement, activity and ecological exchange across the modular landscape.



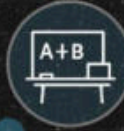
REST_01
Capacity: 8
Comfort: 8.2
Occupancy: 5



ENT_01
Capacity: 12
Noise: 68 dB
Usage: 74%



PLANT_01
Sunlight: 8.6 h
Humidity: 72%
Growth: 86%



EDU_01
Capacity: 15
Visit Time: 18 min
Visitors: 11



SHOP_01
Flow: 42 p/h
Queue: 4
Status: Active

PUBLIC EXPERIENCE & MONITORING INTERFACE

01 RemediScape 2056 Interface

02 Human Perspective

03 Remediation Control Dashboard

04 Biological and Algorithmic Perspectives

05 Closing Vision of the Commons

REMEDISCAPE

2 0 5 6

HUMAN PERSPECTIVE

BIOLOGICAL PERSPECTIVE

AI ALGORITHMIC PERSPECTIVE

ESC

EXIT

G

SETTINGS

AREA STATUS

● SITE REMEDIATION	98.9%
● PUBLIC OPEN	79%
● MEAN TPH	97 ppm ↓
● HEAVY PAH	41.7%
● NDVI	0.45 ↑
● SOIL MOISTURE	49%
● NOISE	53 dB ↓

BIODIVERSITY

	BEE	90%
	SQUIRREL	67%
	FOX	3%
	VISITORS	79%

OPEN ROUTE
126m

LEVEL CARD

ABOVE YOU - PUBLIC LAYERS

GROUND Remediation beds + open route (walk around healing bays)

L2 Public circulation — elevated walks cross ABOVE cells still under treatment → people enter before full cleanup

L3 Learning & observation — live-data stations, the digital gardener's desk, remediation shown in section

L4 Viewing platform — overlook the whole relay: woodland / active fields / bays still capped + Thames



UID: OBSERVER_0724



09:42 · SUMMER · YEAR 15 · 24°C · Soft Sunlight

Y22

LIVING SUCCESSION
PUBLIC HANDOVER · REMEDIATION ONGOING

OVERVIEW

EXPLORE

SYSTEM

DECIDE

Y22 · FRAME 12 / 14

BARKING REACH · REMEDIATION CONTROL REMEDATION OVERVIEW

SEARCH CELL ID (BR-____)

YEAR ▼ Y22

BR · REMEDIATION ASSISTANT

LIVE

Y22 MONITOR SYNC
COMPLETE.

TPH 18.6 mg/kg REMAINS
ABOVE THE HANDOVER
BAND.

RECOMMEND EXTENDING
BR-0171 P-EXT BY ONE
CYCLE TO Y26.

10:16

CONFIRMED.

GENERATE Y22 → Y30
STRATEGY UPDATE.

10:18

ASK BR ASSISTANT...



LAND REMEDIATION

HANDOVER PROGRESS

99.1%

15,290 HANDED OVER / 139 IN TREATMENT

NATURAL SYSTEM RECOVERY

TROPHIC NETWORK

62.4%

3 / 4 GROUPS ACTIVE / TOP PREDATORS 22%

PUBLIC ACCESS

OPEN-SPACE DELIVERY

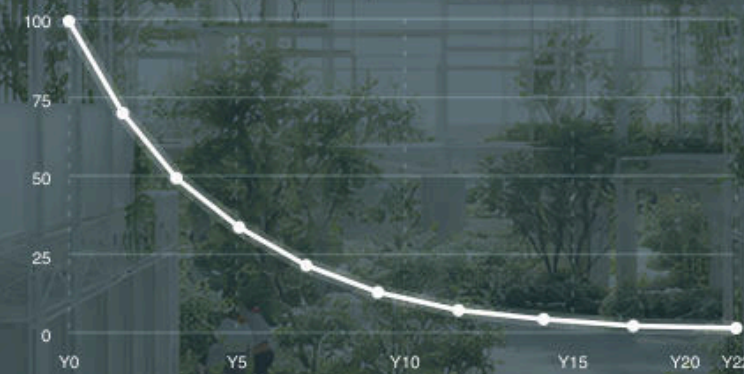
88.6%

ACCESS INDEX 0.82 / 1 MONITORED ZONE

DECONTAMINATION

-99.9%

CONTAMINANT LOAD REDUCTION



TPH

1.8 mg/kg

PAH

18.6 RESIDUAL

HANDOVER

15,290 CELLS

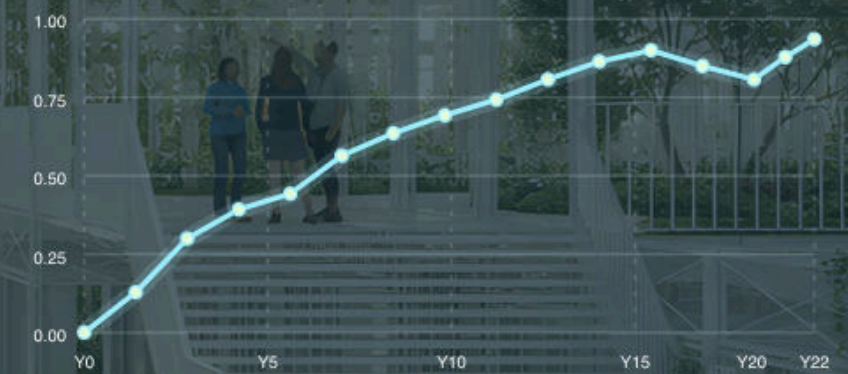
DELIVERY

99.1%

REGENERATION

0.74

NDVI · VEGETATION SUCCESSION



NDVI

0.74

VINE COVER

62%

CANOPY

78%

CORE SPECIES

4 PHRAGMITES / SALIX / BETULA / TYPHA



BR-0122
F-MYC ACTIVE
TARGET Y30



BR-0171
P-EXT ACTIVE
TARGET Y26



BR-0206
E-CAP COMPLETE
Y22 MONITORING COMPLETE

UPPER FRAME FUNCTIONS

PROGRAM LAYERS / ELEVATED USE

L4  VIEWING PLATFORM
REST + OVERLOOK**L3**  LEARNING DECK
OBSERVATION + EDUCATION
LIVE REMEDIATION FEED**L2**  PUBLIC CIRCULATION
EXHIBITION + ACCESS

ECOLOGICAL CORE

WETLAND / FOREST HABITAT

PLANT SPECIES

	AGE	NDVI
 Phragmites australis	Y1	0.71
 Salix	Y5	0.76
 Betula	Y15	0.78
 Typha	Y5	0.73

 NDVI
0.74

VERTICAL VEGETATION

+ CIRCULATION NETWORK

 CLIMBING VEGETATION PUBLIC ROUTE STAIRS CONNECTIVE SYSTEM

VINE COVER

62%

 GROWTH STATUS: ACTIVE

SUBSTRATE BASE

POLLUTION BARRIER + MYCELIUM LAYER

 **TPH** 1420 → 1.8mg/kg
BASELINE → NOW **PAH** 18.6 mg/kg
RESIDUAL · MONITORING **F-MYC** 240 d
TREATMENT CYCLE

POLLUTANT CONCENTRATION · BASELINE (mg/kg)

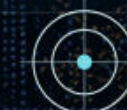


PUBLIC ACCESSIBILITY

OPEN USE / LIVE MONITORING

 OCCUPANCY **18** ACTIVITY NODES **6** OPEN ACCESS INDEX **0.82**

LIVE ACTIVITY



0 m

-1 m

-3 m



Observe:

Contamination cells passing handover gate

TPH sharply reduced; residual heavy PAH remains under monitoring.

Dynamic:

Woodland mosaic expands while public access opens in controlled phases.

CELL STRATEGY CARDS			
BR-0122			
BR-06965		Risk 0.169	
0.429		0.381	
BASELINE		TARGET	
241 ppm		0.000	
F-myc / mid		30y	
P-ext / mid-high		30y	
BR-0171		Risk 0.348	
BR-0009		0.429	
0.639		0.639	
BASELINE		TARGET	
890 mg/kg		0.000	
P-ext / high		24y	
BR-0206			
BR-0009		Risk 0.343	
0.429		0.639	
BASELINE		TARGET	
135 mg/kg		0.000	
E-cap / mid		12y	

BR-0122
0.169
241
0.000
30y
F-myc / mid

BR-0104
0.253
319
0.000
15y
P-ext / mid

BR-12687
0.286
0.286
0.500
30y
E-cap / medium

BR-0036
0.290
410
0.000
15y
E-cap / medium

BR-06008
0.236
0.309
0.476
5y
P-ext / mid

PLANT STATUS

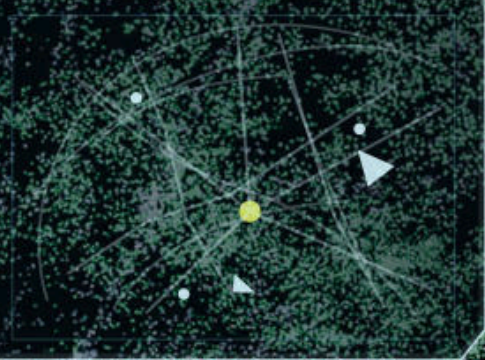


	PHOTOSYNTHESIS	ACTIVE
	SOIL MOISTURE	49 %
	ROOT DEPTH	1.5 m
	NDVI	0.45 ↑
	MYCORRHIZAL LINK	82 %
	LIGHT EXPOSURE	SOFT
	TPH BELOW ROOT ZONE	97 ppm ↓

ECOLOGICAL PERCEPTION

	CANOPY DENSITY	76%
	UNDERSTORY	58%
	POLLINATORS	90%
	VISITORS	79%

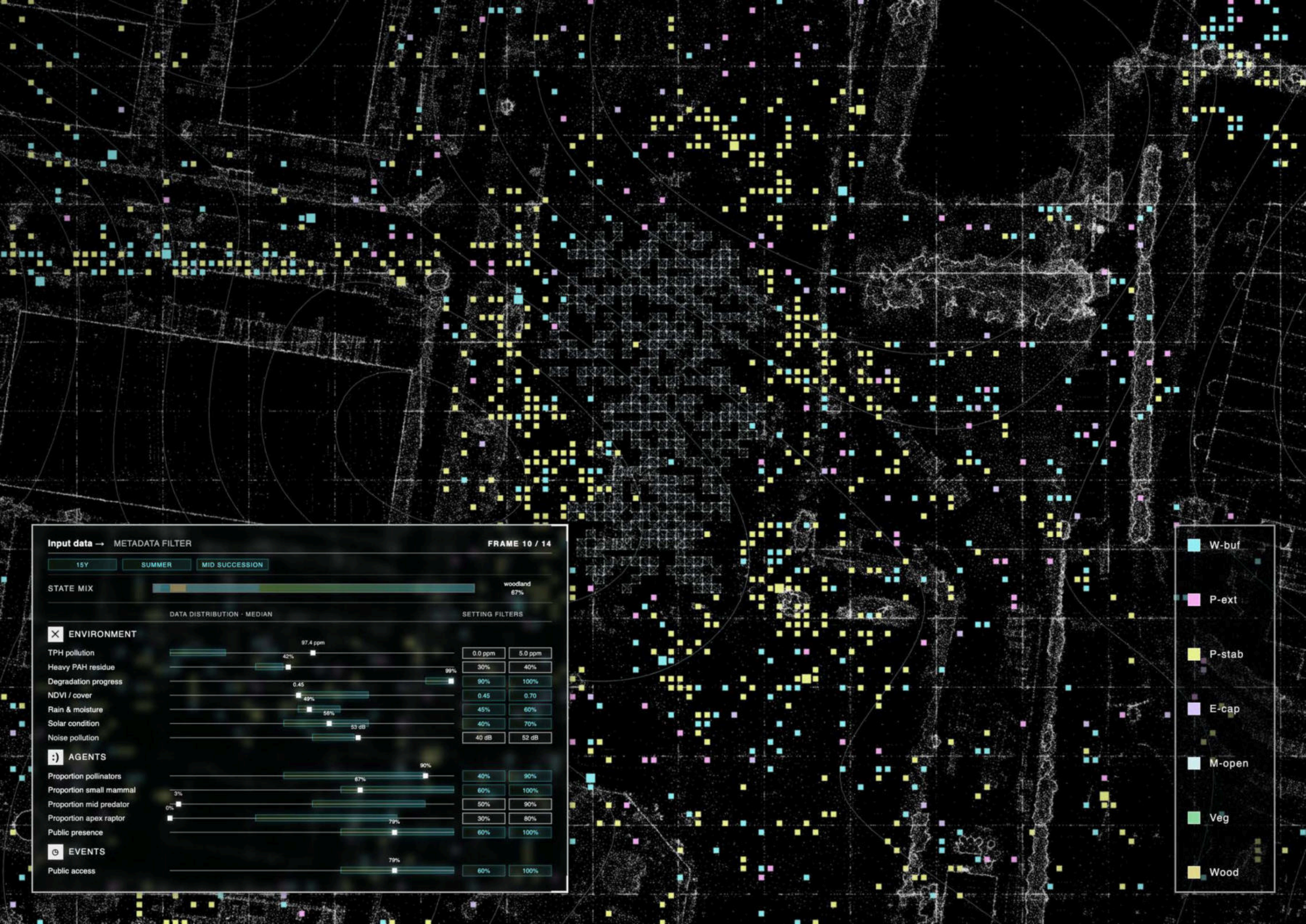
CANOPY SCAN



▶ I am a seed. The wind carries me over ground just come back to life.

▶ This alder went in at year three. It feeds the soil first.





Input data → METADATA FILTER

FRAME 10 / 14

15Y

SUMMER

MID SUCCESSION

STATE MIX

woodland
67%

DATA DISTRIBUTION - MEDIAN

SETTING FILTERS

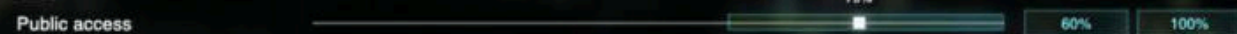
ENVIRONMENT



AGENTS



EVENTS



W-buf

P-ext

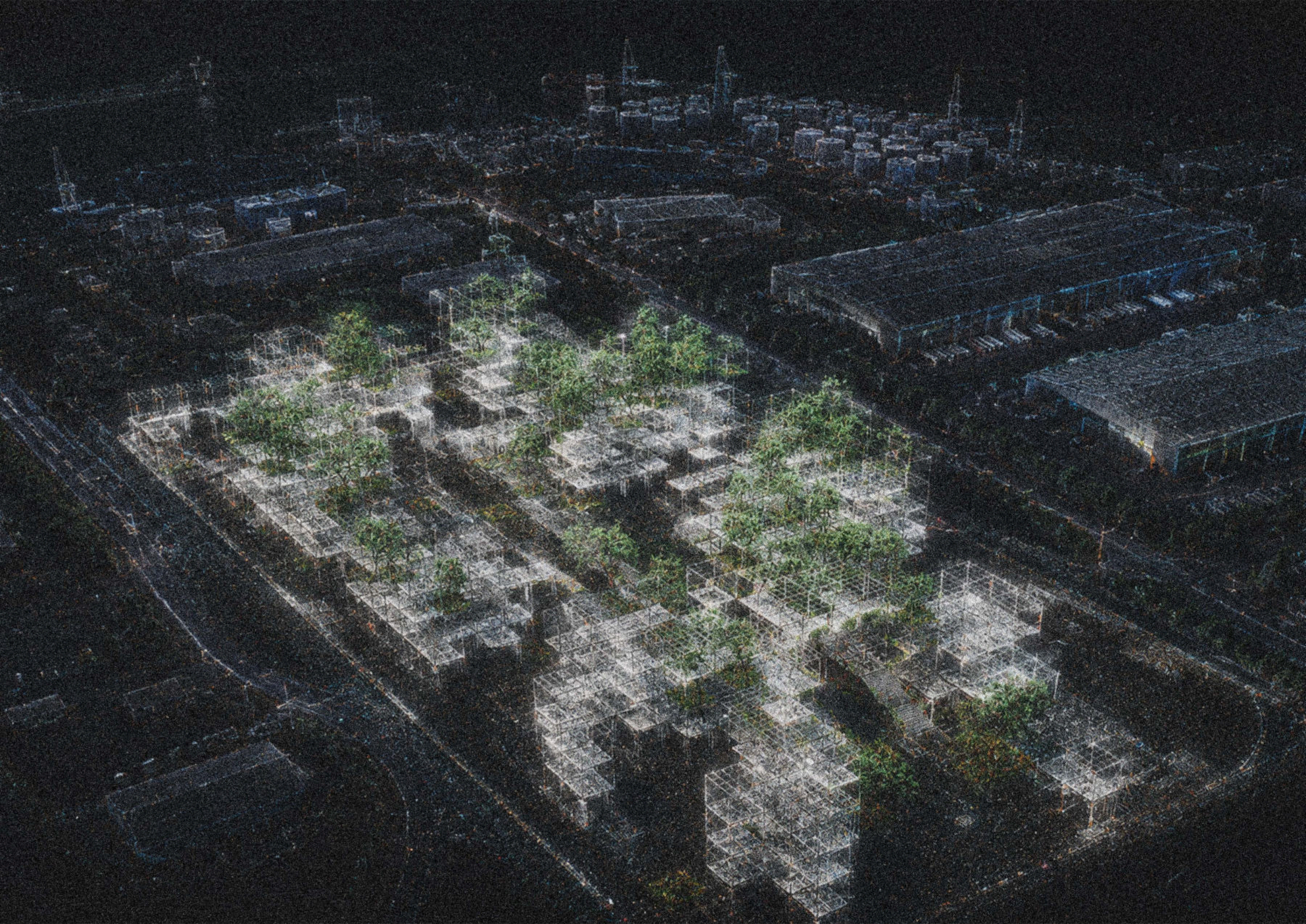
P-stab

E-cap

M-open

Veg

Wood



APPENDIX

ARCHIVED COMPUTATIONAL STUDIES

01 Pix2Pix Training Dataset

02 Architecture Plan Test

03 Pix2Pix-K-Means-NCA Experiment

04 Neural Cellular Automata Test

05 Hidden-State Study



Archived exploratory work retained as process documentation. These computational studies did not inform or contribute to the final Remediscape design proposal.

FLOOR PLAN TO PATTERN - DATABASE - RECYCLING FACTORY

Transform the floor plan of the factory into a database for functional zoning



Processing hall

Office

Storage

Courtyard

FLOOR PLAN TO PATTERN - DATABASE - EXPERIENCE CENTER

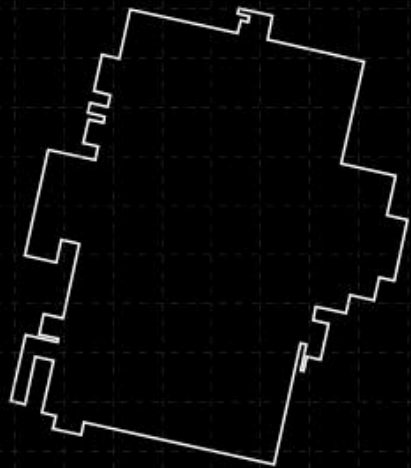
Transform the floor plan of the factory into a database for functional zoning

01_INFORMATION NAME: WORLD OF WOODS EXPERIENCE CENTER COUNTRY: INDIA ARCHITECTS: HERNANDEZ LARSEN AREA: 12000 SQ FT YEAR: 2022	01_OUTLINE	01_LINEAR PLAN	01_FUNCTIONAL PATTERN	11_INFORMATION NAME: COUTURE EXPERIENCE CENTER FOR NEW COUNTRY: CHINA ARCHITECTS: TANG SHI ARCHITECTS AREA: 11700 SQ FT YEAR: 2022	11_OUTLINE	11_LINEAR PLAN	11_FUNCTIONAL PATTERN	21_INFORMATION NAME: JINSHI NEW CULTURAL CENTER COUNTRY: CHINA ARCHITECTS: TANG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	21_OUTLINE	21_LINEAR PLAN	21_FUNCTIONAL PATTERN
02_INFORMATION NAME: EXPERIENCE CENTER COUNTRY: INDIA ARCHITECTS: CHH ARCHITECTS AREA: 10000 SQ FT YEAR: 2021	02_OUTLINE	02_LINEAR PLAN	02_FUNCTIONAL PATTERN	12_INFORMATION NAME: CHANGSHENG CENTRAL PARK USE EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: GAO AREA: 7700 SQ FT YEAR: 2021	12_OUTLINE	12_LINEAR PLAN	12_FUNCTIONAL PATTERN	22_INFORMATION NAME: GAIL GROUND MUSEUM COUNTRY: SOUTH KOREA ARCHITECTS: IMHYUN ARCHITECTS AREA: 10770 SQ FT YEAR: 2022	22_OUTLINE	22_LINEAR PLAN	22_FUNCTIONAL PATTERN
03_INFORMATION NAME: COLLAGE EXPERIENCE CENTER COUNTRY: INDIA ARCHITECTS: MULLAS AREA: 10000 SQ FT YEAR: 2022	03_OUTLINE	03_LINEAR PLAN	03_FUNCTIONAL PATTERN	13_INFORMATION NAME: COTTONWOOD GARDEN EXPERIENCE CENTER COUNTRY: UNITED STATES ARCHITECTS: SIGNAL 1 ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	13_OUTLINE	13_LINEAR PLAN	13_FUNCTIONAL PATTERN	23_INFORMATION NAME: PIONEER NORTH AMERICA EXPERIENCE CENTER AND HEADQUARTERS COUNTRY: UNITED STATES ARCHITECTS: HALL AREA: 24100 SQ FT YEAR: 2019	23_OUTLINE	23_LINEAR PLAN	23_FUNCTIONAL PATTERN
04_INFORMATION NAME: SHI EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	04_OUTLINE	04_LINEAR PLAN	04_FUNCTIONAL PATTERN	14_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: GERMANY ARCHITECTS: BEHNCKE ARCHITECTS AREA: 11200 SQ FT YEAR: 2022	14_OUTLINE	14_LINEAR PLAN	14_FUNCTIONAL PATTERN	24_INFORMATION NAME: LE MANUFACTURE CULTURAL CENTER COUNTRY: FRANCE ARCHITECTS: HALL ARCHITECTS AREA: 17000 SQ FT YEAR: 2022	24_OUTLINE	24_LINEAR PLAN	24_FUNCTIONAL PATTERN
05_INFORMATION NAME: LAND EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: AGONG AREA: 11110 SQ FT YEAR: 2021	05_OUTLINE	05_LINEAR PLAN	05_FUNCTIONAL PATTERN	15_INFORMATION NAME: YUNYAN EDUCATION CITY COUNTRY: CHINA ARCHITECTS: GAO AREA: 10000 SQ FT YEAR: 2021	15_OUTLINE	15_LINEAR PLAN	15_FUNCTIONAL PATTERN	25_INFORMATION NAME: FANG CHANGSHENG EDUCATIONAL CENTER COUNTRY: GEORGIA ARCHITECTS: HALLARCHITECTS AREA: 10000 SQ FT YEAR: 2022	25_OUTLINE	25_LINEAR PLAN	25_FUNCTIONAL PATTERN
06_INFORMATION NAME: SANCTUARY EXPERIENCE CENTER COUNTRY: INDIA ARCHITECTS: KAM DESIGN STUDIO AREA: 11000 SQ FT YEAR: 2022	06_OUTLINE	06_LINEAR PLAN	06_FUNCTIONAL PATTERN	16_INFORMATION NAME: TONG BEIYUO SHI PLAZA CENTER EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	16_OUTLINE	16_LINEAR PLAN	16_FUNCTIONAL PATTERN	26_INFORMATION NAME: CENTER FOR RENOVATION AND CREATIVE CENTER COUNTRY: GUATEMALA ARCHITECTS: SAI STANLEY WOODS PARTNER AREA: 10000 SQ FT YEAR: 2022	26_OUTLINE	26_LINEAR PLAN	26_FUNCTIONAL PATTERN
07_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: THE NETHERLANDS ARCHITECTS: OF DESIGN ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	07_OUTLINE	07_LINEAR PLAN	07_FUNCTIONAL PATTERN	17_INFORMATION NAME: YONGYANG MUSEUM SHI PLAZA CENTER COUNTRY: INDONESIA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	17_OUTLINE	17_LINEAR PLAN	17_FUNCTIONAL PATTERN	27_INFORMATION NAME: WAVE CULTURE CENTER COUNTRY: HONGKONG ARCHITECTS: YOUNG ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	27_OUTLINE	27_LINEAR PLAN	27_FUNCTIONAL PATTERN
08_INFORMATION NAME: YUNYAN EDUCATION CITY COUNTRY: CHINA ARCHITECTS: GAO AREA: 10000 SQ FT YEAR: 2022	08_OUTLINE	08_LINEAR PLAN	08_FUNCTIONAL PATTERN	18_INFORMATION NAME: YUNYAN EDUCATION CITY COUNTRY: CHINA ARCHITECTS: GAO AREA: 10000 SQ FT YEAR: 2022	18_OUTLINE	18_LINEAR PLAN	18_FUNCTIONAL PATTERN	28_INFORMATION NAME: ARSENAL CULTURE CENTER FOR THE CITY OF GREAT CAMPANIA COUNTRY: ITALY ARCHITECTS: YOUNG ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	28_OUTLINE	28_LINEAR PLAN	28_FUNCTIONAL PATTERN
09_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	09_OUTLINE	09_LINEAR PLAN	09_FUNCTIONAL PATTERN	19_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	19_OUTLINE	19_LINEAR PLAN	19_FUNCTIONAL PATTERN	29_INFORMATION NAME: STANLEY WOODS OF COUNTRY: USA ARCHITECTS: HALLARCHITECTS AREA: 10000 SQ FT YEAR: 2022	29_OUTLINE	29_LINEAR PLAN	29_FUNCTIONAL PATTERN
10_INFORMATION NAME: LE EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	10_OUTLINE	10_LINEAR PLAN	10_FUNCTIONAL PATTERN	20_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: CHINA ARCHITECTS: HONG SHI ARCHITECTS AREA: 10000 SQ FT YEAR: 2022	20_OUTLINE	20_LINEAR PLAN	20_FUNCTIONAL PATTERN	30_INFORMATION NAME: CLOCA EXPERIENCE CENTER COUNTRY: ITALY ARCHITECTS: HALLARCHITECTS AREA: 10000 SQ FT YEAR: 2022	30_OUTLINE	30_LINEAR PLAN	30_FUNCTIONAL PATTERN

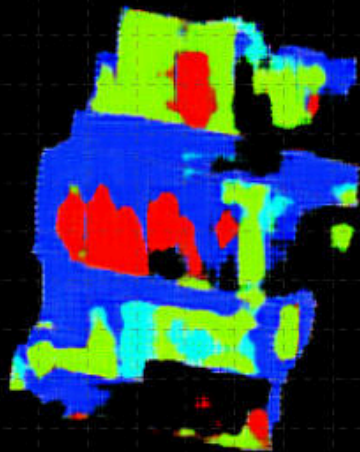
Exhibition Gallery Interactive Lab Impact Simulation Leisure Area

ARCHIVED TEST: ARCHITECTURE PLAN TRANSFER

Pix2Pix trained on 60 precedent layouts and applied to the former Ford Stamping Plant outline



Domain A — outline
Epochs: 480
 λ_{L1} : 100



Output Prediction

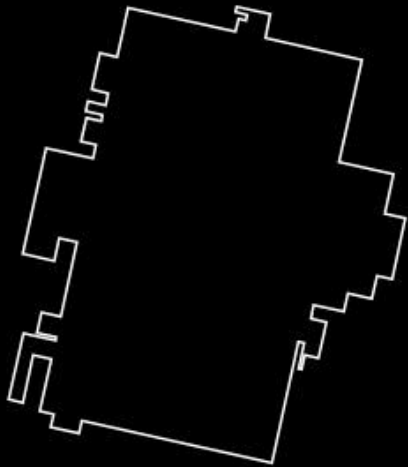
This archived Pix2Pix study used 60 precedent plans - 30 recycling facilities and 30 experience centres - as paired outline and functional-zoning datasets. The generator was then applied to the former Ford Stamping Plant outline, which was not part of the training set.

Outputs are shown across multiple checkpoints to document how colour distributions and boundaries changed during training. The images remain exploratory machine-learning outputs and were not used to generate, allocate, or validate the final Remediscap design proposal.

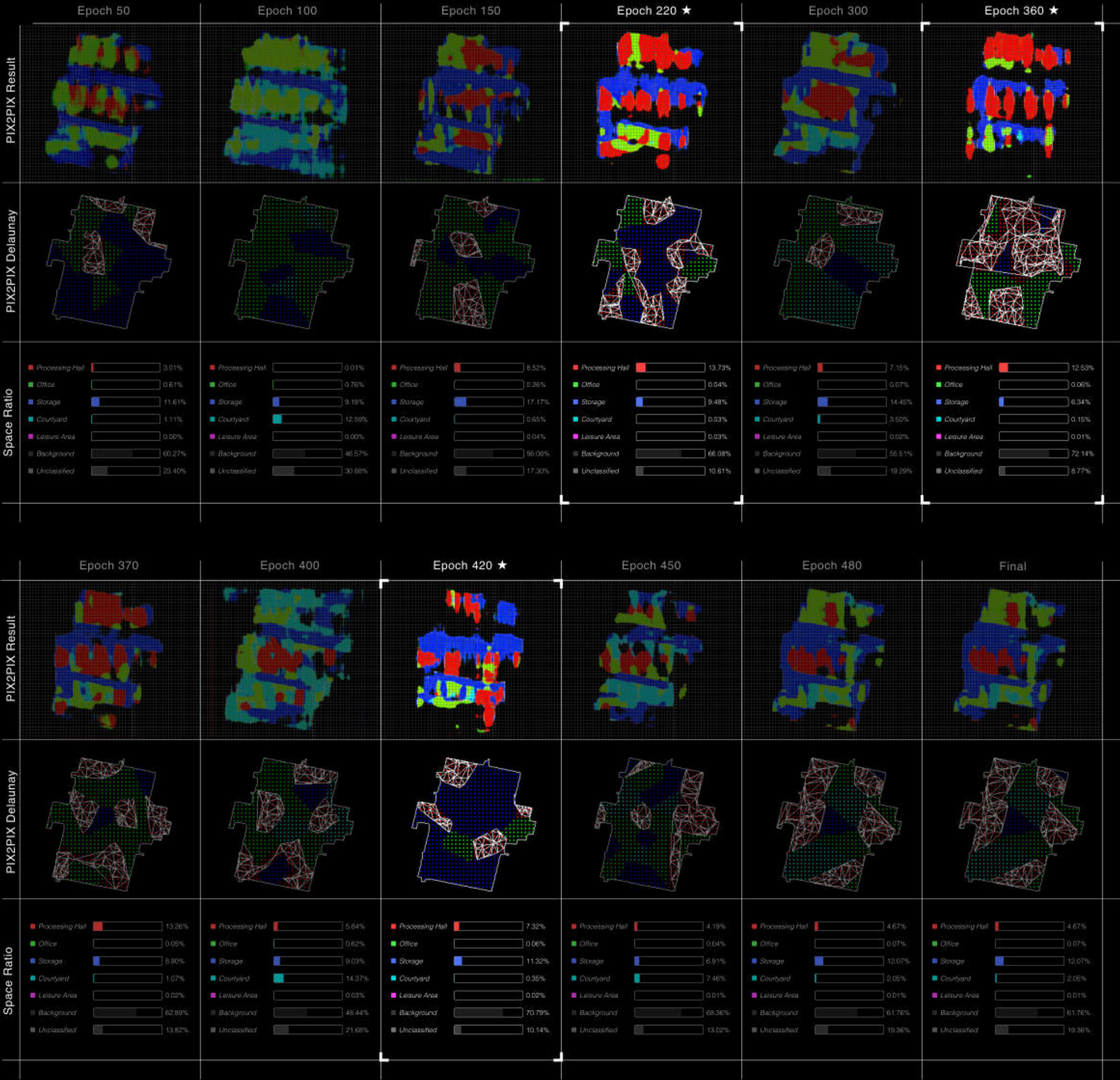


ARCHIVED TEST: VARIABLE EPOCH COMPARISON

Comparing checkpoints within an unused Pix2Pix experiment



> Training Set: n=60
> Mapping: Domain A → B
> Phase: Generative Inference



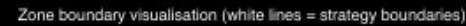
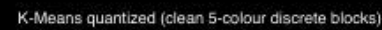
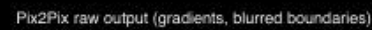
Method and archive status

Statistical loss does not by itself select an architecturally coherent output. This comparison reviewed how checkpoint choice affected colour distribution, boundary definition, and the subsequent Delaunay translation.

Epochs 220, 360, and 420 were retained at the time as relatively stable examples, not as a validated final result. The apparent spatial consensus is an artefact of the experimental workflow and was not carried into Remediscap's CSM-based remediation grid, 30-year phasing, or public programme.

The page is retained only as documentation of an earlier computational direction.

5-panel overview showing the complete Pix2Pix → K-Means → NCA pipeline:



Pix2Pix - K-Means - Neural Cellular Automata

This archived experiment tested a two-stage pipeline. Pix2Pix produced a continuous colour field from a building outline; K-Means converted the colour gradients into discrete blocks; a Neural Cellular Automata model then tested how those blocks changed through local interactions.

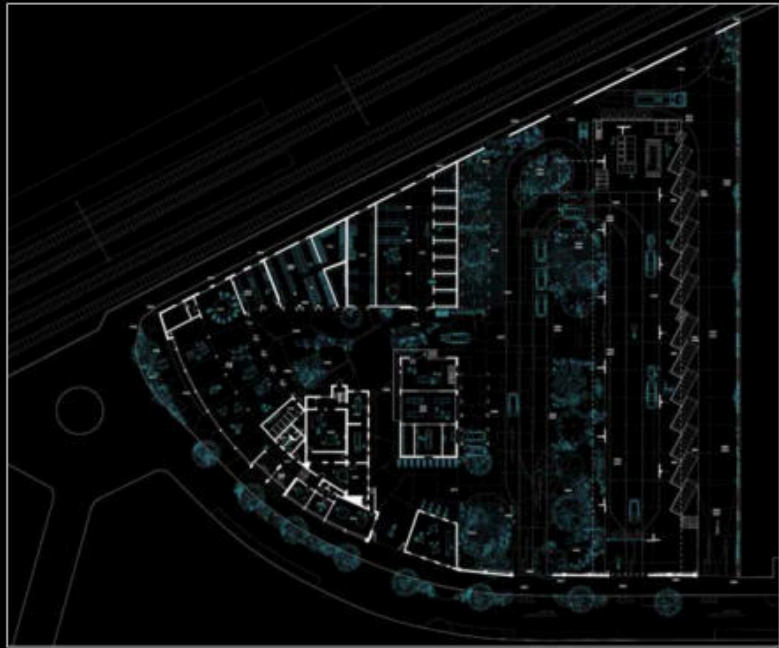
The workflow was developed before the final Remediscaple method was established. Its colour classes and temporal outputs were not used to define the CSM-based treatment zones, the five design sections, the mycoremediation shelter, the 30-year phasing, or the public handover strategy. It is retained only as process documentation.

ARCHIVED NEURAL CA TEST - TRAINING EVIDENCE AND TEMPORAL EVOLUTION

A simplified convergence study retained as process documentation

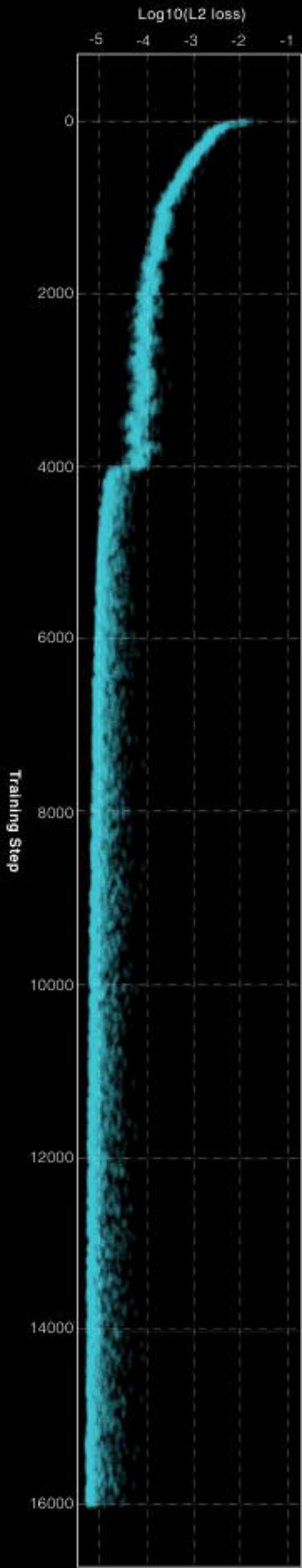
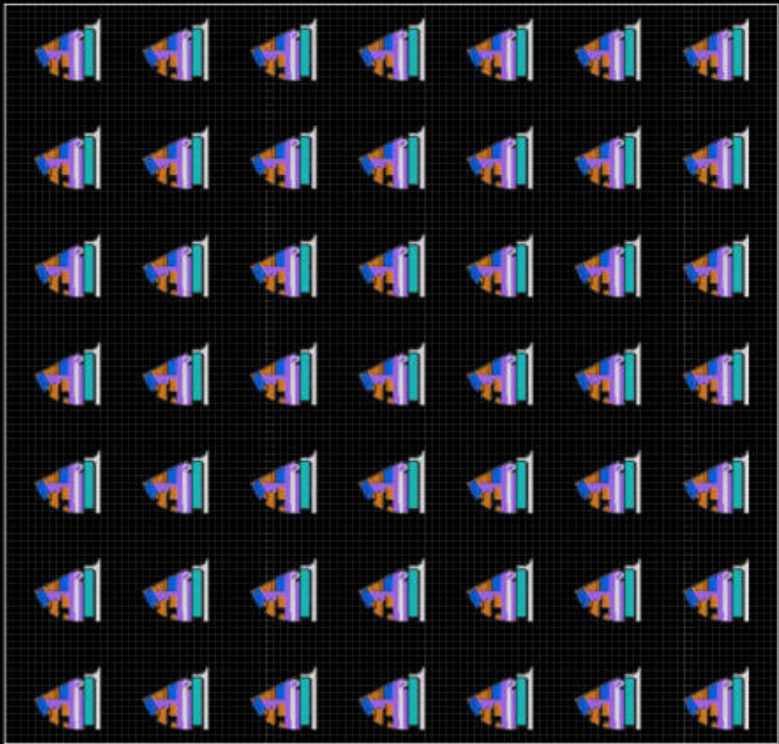
This archived experiment tested whether a Neural Cellular Automata model could reconstruct a simplified four-colour zoning target from local 3 x 3 interactions. The training and ensemble diagrams document convergence behaviour and sensitivity to initial conditions. They are retained as an early computational study only: the model did not generate, validate, or determine the final Remediscape remediation plan, phasing, or public programme.

The Original Plan For Training Neural CA
Recypark Jette



Sample Pool Grid — pool_16000

49 independent convergence tests: all samples in the training pool reconstruct the target zoning, demonstrating attractor stability.

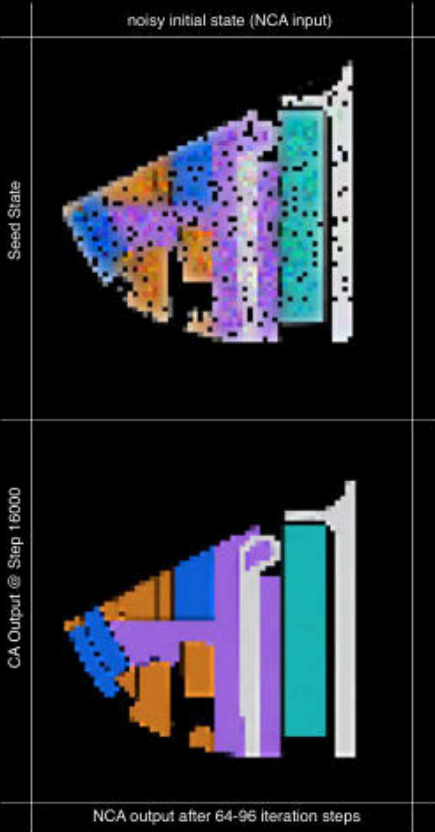
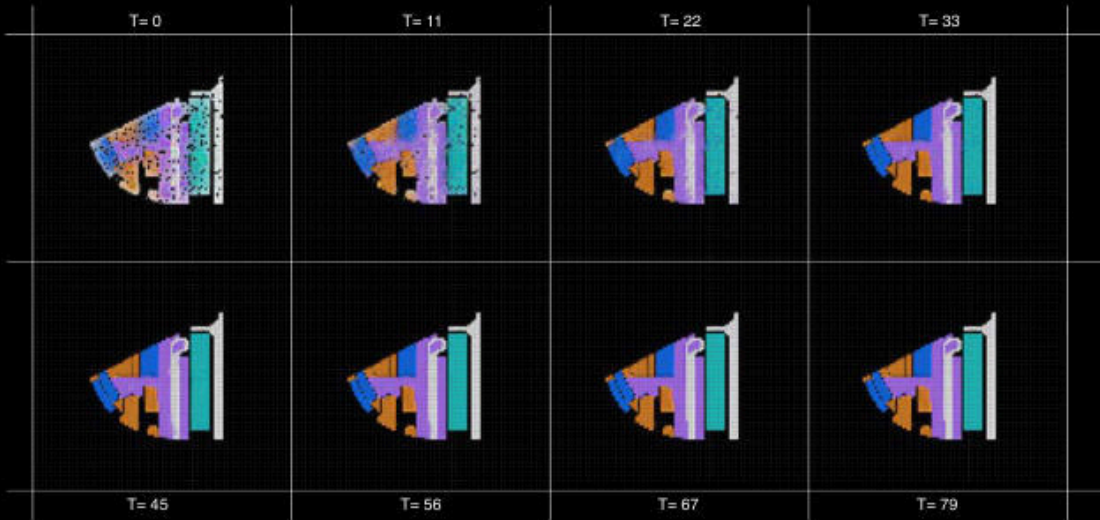


Training loss (log scale) — Decay Pattern Learning

Temporal Evolution

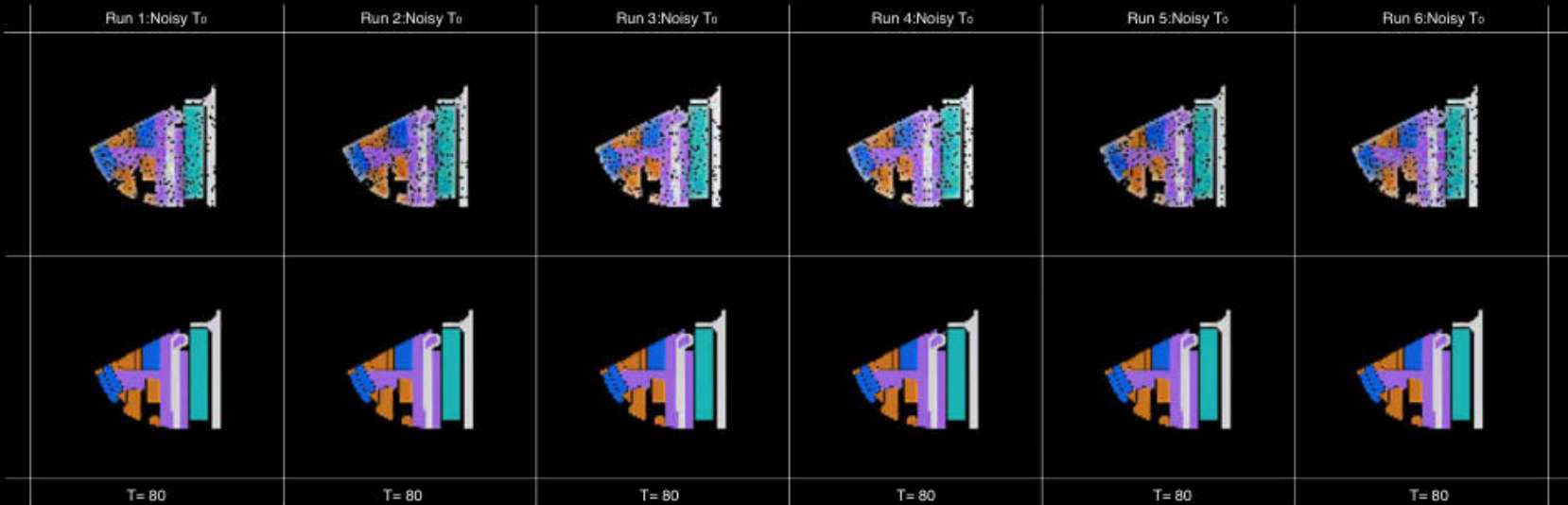
Same learned rules + different initial uncertainty → multiple possible final forms

Temporal evolution of Neural CA: from noisy initial zoning (t=0) to stable four-colour strategy configuration (t=79). The system's learned local rules transform spatial uncertainty into emergent order — each cell only sees its 3x3 neighbourhood, yet a coherent global pattern arises. This mirrors how remediation strategies might self-organise from initial policy interventions through neighbourhood-driven negotiation.



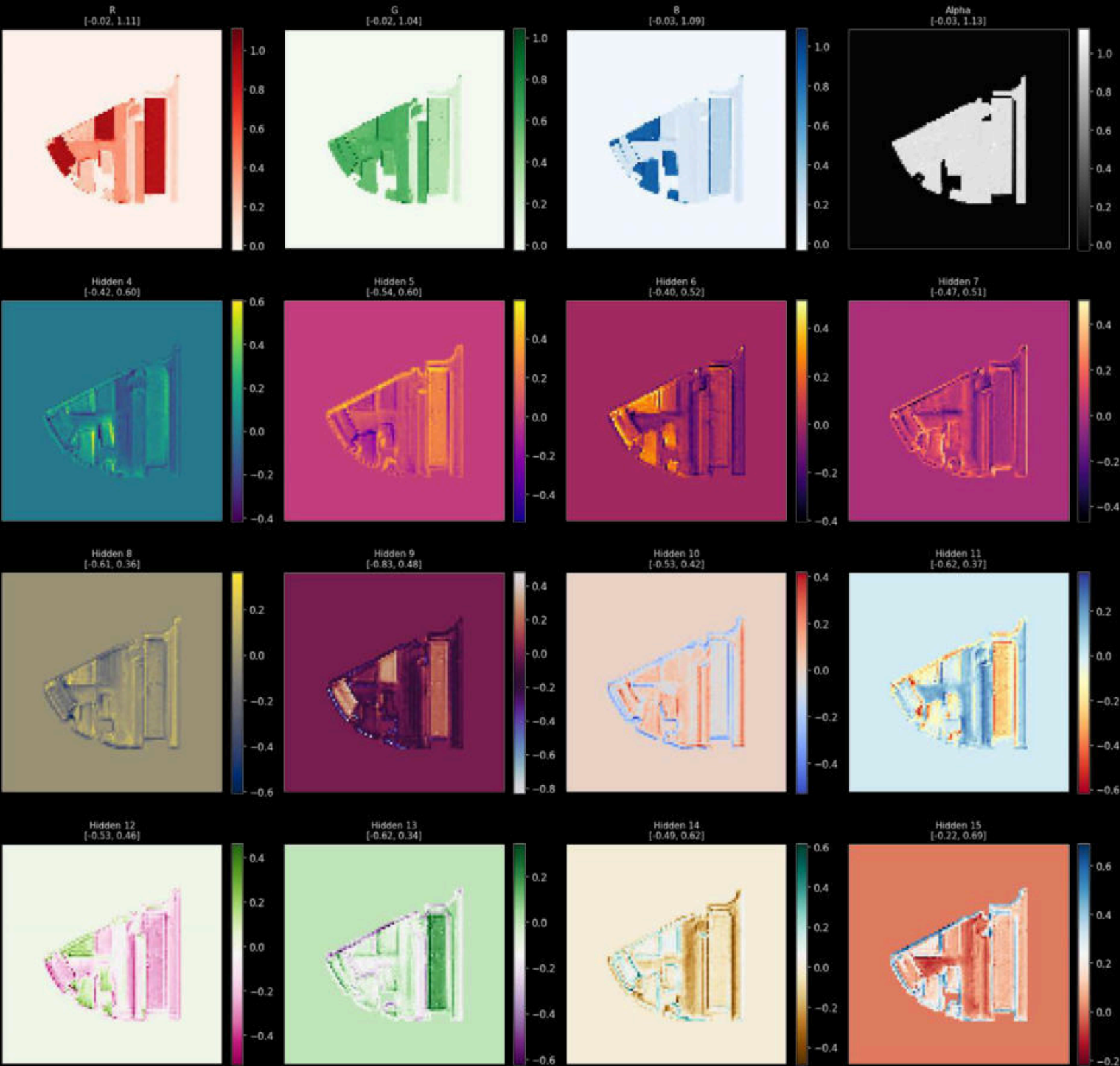
Ensemble Comparison

Same learned rules + different initial uncertainty → multiple possible final forms



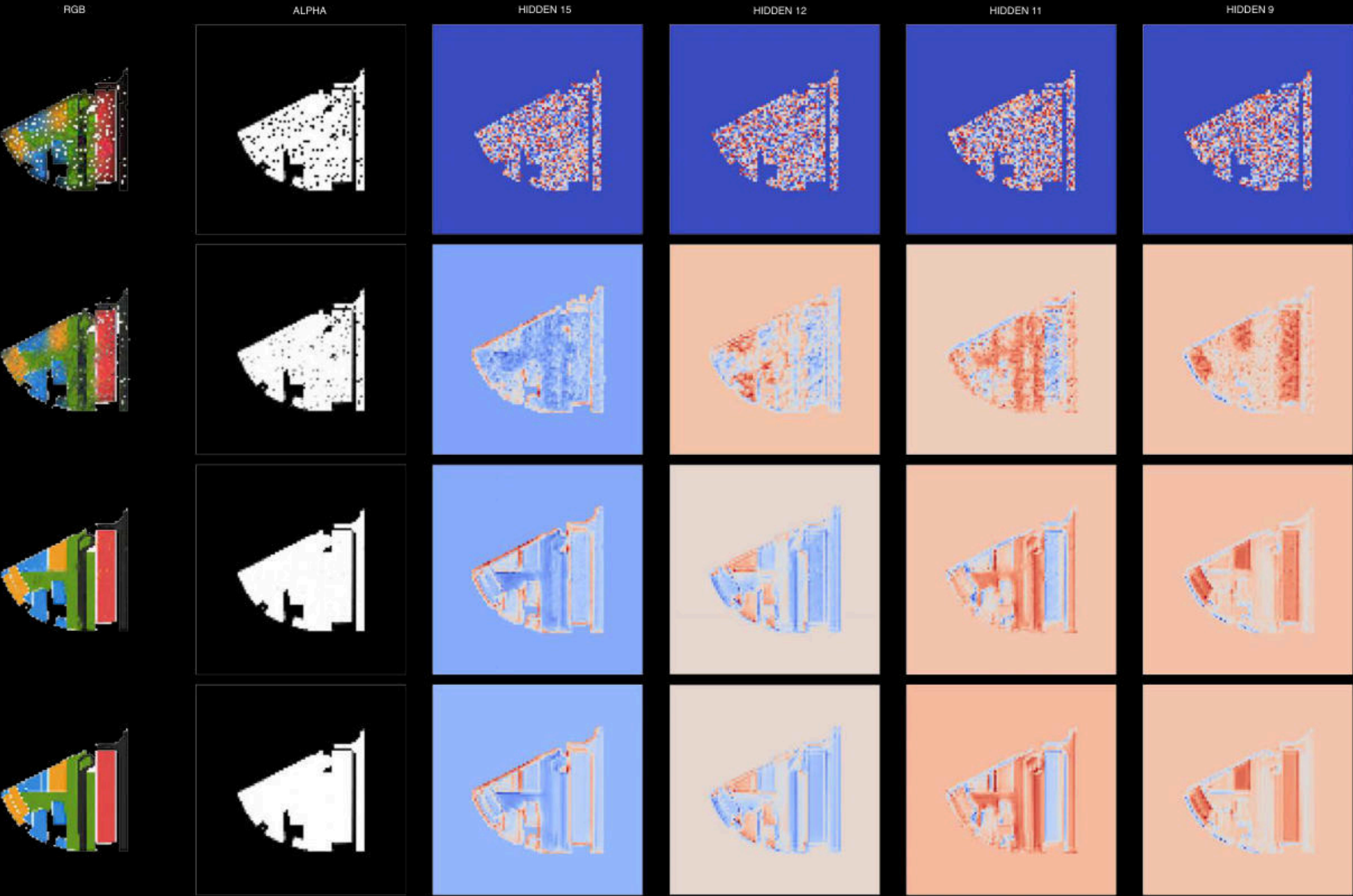
Hidden Channel Visualisation — channels_t0040

ch0-2 (RGB) | Visible strategy colours | Visible output
ch3 (Alpha) | Site outline (white=active, black=background) | Living mask
ch4 | Different strategy zones show different hues | Zone identity encoding
ch8 | Site outline and road skeleton highlighted | Structural memory
ch9 | Colour contrast at zone boundaries | Boundary detection
ch14-15 | Internal gradients | Diffusion direction / neighbourhood relations



Hidden State Summary

Four time steps (top to bottom: $T=0$, $T=20$, $T=50$, $T=80$) reveal how the NCA's internal representations develop over the evolution process. Row 1: at $T=0$, hidden channels contain only random noise — no spatial structure exists. Row 2: by $T=20$, faint outlines of strategy zones begin emerging in hidden states, though the visible RGB output is still partially disordered. Row 3: at $T=50$, hidden channels show clear spatial differentiation — each strategy zone registers as a distinct value cluster, and boundaries between zones sharpen into defined edges. Row 4: at $T=80$, hidden states have stabilised into clean, structured representations that mirror the visible four-colour output. This temporal sequence demonstrates that the NCA does not merely produce a correct image — it develops an internal spatial model that self-organises from chaos into order.



Remediscape - References

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02 Concrete's Contamination Legacy

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05 Remediation Design and Living Infrastructure

Author's CSM synthesis, plant-trait studies, architectural drawings, phasing, visualisations, and fieldwork.
--

06 Modular Aggregation and Spatial Performance

Author's WASP workflow, connection rules, environmental optimisation, solar validation, and spatial-performance studies.
--

07 Monitoring Interface and Public Experience

Author's immersive interface design, real-time monitoring visualisations, and multi-perspective renders.
--

Appendix: Archived Computational Studies

Pix2Pix (Conditional GAN)
<i>Isola, P. et al. (2017). 'Image-to-Image Translation with Conditional Adversarial Networks', <i>Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR)</i>, pp. 1125–1134. doi: 10.1109/CVPR.2017.632. Available at: https://arxiv.org/abs/1611.07004</i> <i>Goodfellow, I. et al. (2014). 'Generative Adversarial Nets', <i>Advances in Neural Information Processing Systems (NeurIPS)</i>, 27, pp. 2672–2680.</i>
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<i>Mordvintsev, A. et al. (2020). 'Growing Neural Cellular Automata', <i>Distill</i>, 5(2), e23. doi: 10.23915/distill.00023. Available at: https://distill.pub/2020/growing-ca/</i> <i>Gilpin, W. (2019). 'Cellular Automata as Convolutional Neural Networks', <i>Physical Review E</i>, 100(3), 032402. doi: 10.1103/PhysRevE.100.032402. Available at: https://arxiv.org/abs/1809.02942</i> <i>Batty, M. (2005). <i>Cities and Complexity: Understanding Cities with Cellular Automata, Agent-Based Models, and Fractals</i>. Cambridge, MA: MIT Press.</i>
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<i>Google Earth / Maxar Technologies. Satellite imagery of Dagenham Dock industrial corridor.</i> <i>Photographs of site buildings: author's own fieldwork and Google Street View.</i>