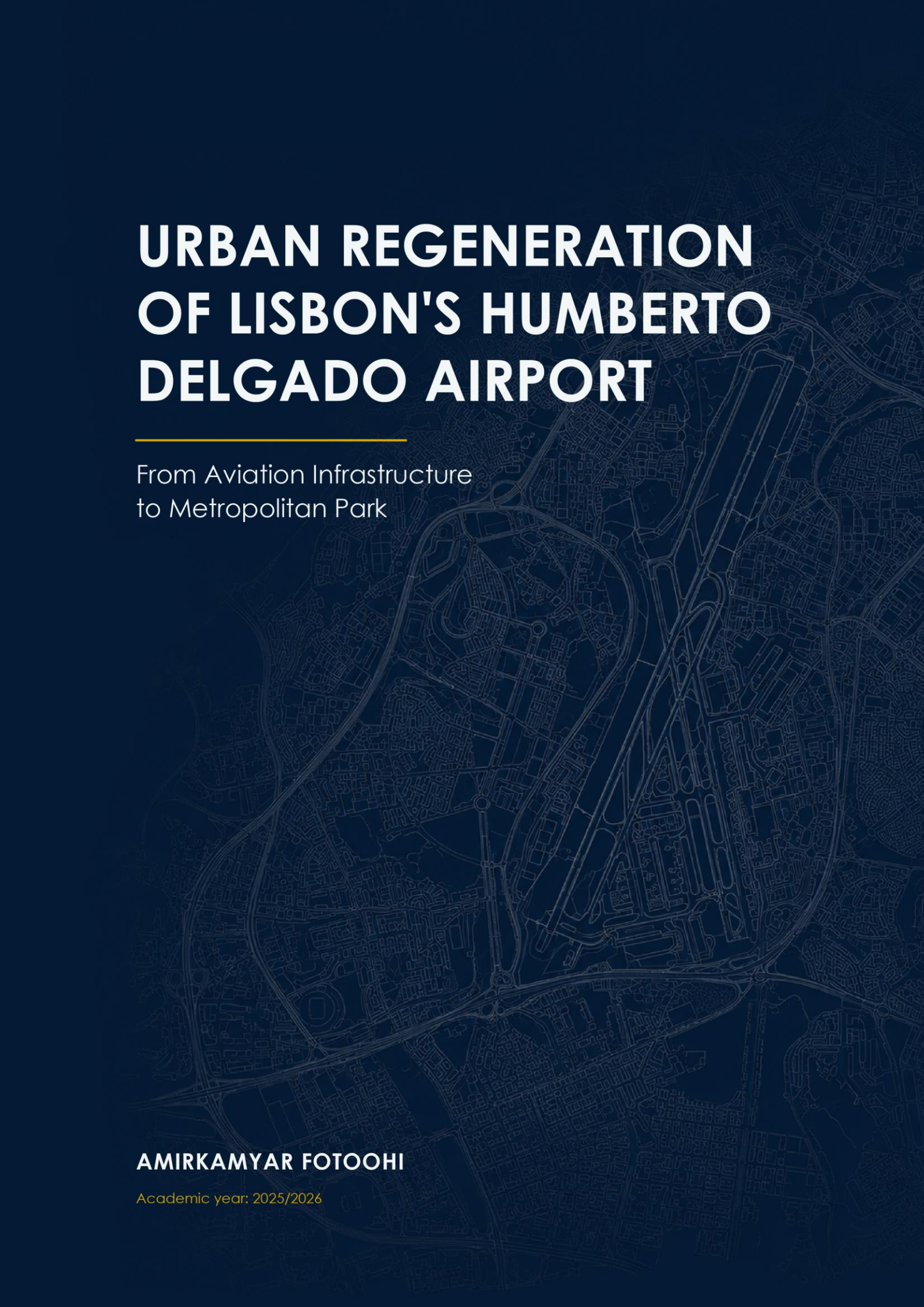
URBAN REGENERATION OF LISBON'S HUMBERTO DELGADO AIRPORT

From Aviation Infrastructure
to Metropolitan Park



AMIRKAMYAR FOTOOHI

Academic year: 2025/2026

Politecnico di Torino

Master's Degree in Urban and Regional Planning
Academic Year 2025/2026
Graduation Session: September 2026

Urban Regeneration of Lisbon's Humberto Delgado Airport

From Aviation Infrastructure to Metropolitan Park

Candidate:
Amirkamyar Fotoohi

Supervisor:
Prof. Antonio Di Campli

Table of contents

Acknowledgements 15

Abstract 16

1. Setting the Lens: Introduction and Research Framework 18

1.1. When Airports Become Urban Challenges 19

1.2. The First Encounter 20

1.3. The Hidden Costs 21

1.4. The Question 22

1.5. The Destination: Research Aim and Objectives 23

1.6. The Route: Research Methodology 24

1.6.1. Research Approach 24

1.6.2. Data Collection and Selection 25

1.6.3. Data Analysis and Design Process 25

1.6.4. Reliability and Ethics 26

1.7. Scope and Limitations 26

1.8. Assembling the Pieces 27

2. Zooming Out: Airport Urbanism & Comparative Cases 29

2.1. Introduction 30

2.2. Airport Urbanism and Post-Aviation Landscapes 30

2.2.1. The Infrastructure of Global Mobility and Airport Urbanism 30

2.2.2. Spatial Obsolescence and the Embedded Urban Airport 32

2.2.3. Post-Aviation Territories and the Debates of Urban Regeneration 33

2.3. Landscape Urbanism and the Drosscape of Obsolete Infrastructure 34

2.3.1. Landscape as an Organising Medium for Urban Transformation 34

2.3.2. The Drosscape and the Revaluation of Obsolete Infrastructure 35

2.3.3. Process, Indeterminacy, and Theoretical Limitations 38

2.4. Urban Permeability and Porous Spatial Structures 39

2.4.1. Conceptualising Permeability and Spatial Porosity 39

2.4.2. Infrastructural Severance and Morphological Re-stitching 40

2.4.3. Thresholds, Social Integration, and the Politics of Openness 41

2.5. Adaptive Reuse and Infrastructural Memory 42

2.5.1. Adaptive Reuse as a Territorial and Palimpsestic Practice 42

2.5.2. Infrastructural Memory, Identity, and Selective Reinterpretation 43

2.5.3. Navigating the Tensions and Limitations of Heritage Transformation 45

2.6. Environmental Regeneration and Climate-Responsive Landscape 46

2.6.1. Ecosystem Health and the Mechanisms of Urban Heat Mitigation 46
2.6.2. Spatial Scale and the Cooling Reach of Green Infrastructure 47
2.6.3. Urban Morphology and Localised Thermal Comfort 49
2.6.4. Mediterranean Constraints and Context-Specific Performance 50
2.7. Public Space, Civic Appropriation, and Temporal Use 51
2.7.1. Conceptualising Public Space and Civic Appropriation 51
2.7.2. Temporal Use and the Activation of Transitional Territories 53
2.7.3 Tensions, Governance, and the Politics of Inclusion 54
2.8. Case-Study Selection and Analytical Framework 55
2.8.1. Rationale for Comparative Case Selection 55
2.8.2. The Analytical Framework 56
2.9. Kai Tak project 57
2.9.1. Introduction: Kai Tak Development (KTD) 57
2.9.2. Historical Context 58
2.9.3. Core Problems 59
2.9.4. Vision and Core Objectives 60
2.9.5. Outcomes and Impacts 69
2.9.6. Before and After Redevelopment Images 69
2.10. The Ellinikon project 72
2.10.1. Introduction 72
2.10.2. Historical Context 73
2.10.3. Core Problems 73
2.10.4. Vision and Core Objectives 76
2.10.5. Outcomes and Impacts 84
2.10.6. Before and After Redevelopment Images 84
2.11. Tempelhofer Feld project 86
2.11.1. Introduction 86
2.11.2. Historical Context 86
2.11.3. Core Problems 89
2.11.4. Vision and Core Objectives 90
2.11.5. Outcomes and Impacts 95
2.11.6. Before and After Redevelopment Images 97
2.12. Parque Bicentenario project 98
2.12.1. Introduction 98
2.12.2. Historical Context 99
2.12.3. Core Problems 100

2.12.4. Vision and Core Objectives 101
2.12.5. Outcomes and Impacts 106
2.12.6. Before and After Redevelopment Images 108
2.13. Conclusion 109
2.13.1. Comparative Design Strategies and Transferable Lessons 109
2.13.2. Synthesis of Design Strategies 110
2.13.3. Implications for Lisbon Airport Transformation 111
3. Zooming In: Reading the Lisbon Airport 113
3.1. Introduction and Analytical Scope 114
3.2. Site Context and Existing Airport Structure 114
3.2.1. Site Location 115
3.2.2. Existing Airport Layout 116
3.2.3. Infrastructural Memory and Reuse Opportunities 120
3.3. Airport-City Interface and Urban Fabric 123
3.3.1. Metropolitan Land-Use and Land-Cover Structure 123
3.3.2. Local Building Uses and Sensitive Receptors 124
3.3.3. Adjacent Land Uses and Edge Conditions 125
3.3.4. Sectional Analysis 127
3.4. Mobility, Connectivity and Accessibility 128
3.4.1. Street Hierarchy and Urban Severance 128
3.4.2. Boundary Access Points, Barriers and Dead Ends 130
3.4.3. Rail, Metro and Tram Accessibility 131
3.4.4. Bus Network 132
3.4.5. Cycling Network 133
3.4.6. Pedestrian Potential and Walkability 134
3.5. Environmental and Climatic Analysis 135
3.5.1. Surface Imperviousness and Potential Permeability 135
3.5.2. Topography and Runway Profile 137
3.5.3. Hydrography and Surface Runoff 139
3.5.4. Green-Space Structure and Ecological Connectivity 141
3.5.5. Vegetation Cover and NDVI 143
3.5.6. Land Surface Temperature and Surface Heat Exposure 145
3.5.7. Solar Exposure and Morphological Exposure 147
3.5.8. Wind and Outdoor Thermal Comfort 150
3.6. Demographic and Social Context 153
3.6.1. Population Density 153

3.6.2. Age Distribution 154
3.7. Synthesis and Design Implications 157
3.7.1. Key Issues and Conflicts 157
3.7.2. Design Opportunities and Spatial Criteria 160
3.7.3. Analytical Synthesis and Transition to Design 162
4. Shifting the View: Design Proposal 163
4.1. Design Foundations 164
4.1.1. Design Objectives 164
4.1.2. Sponge Concept 165
4.2. Design Development Process 168
4.2.1. Reconnecting the site to the City 168
4.2.2. Formation of the Main Clusters 168
4.2.3. Development of the Sponge Structure 169
4.2.4. Formation of the Connectivity Network 170
4.3. Sponge Logic of the Project 171
4.3.1. Absorption 171
4.3.2. Percolation and Distribution 172
4.3.3. Retention 173
4.3.4. Exchange 173
4.4. Spatial and Programmatic Structure 174
4.4.1. Overall Spatial Structure 175
4.4.2. Programmatic Structure of the Zones 178
4.5. Green-Blue Infrastructure 183
4.5.1. Connection to Surrounding Green Corridors and the Wider Hydrological Context 184
4.5.2. Water-sensitive roles by zones 186
4.5.3. Vegetation Typology and Species Selection Criteria 189
4.6. Climatic System 195
4.6.1. Wind Strategy 195
4.6.2. Water Strategy 198
4.6.3. Thermal Differentiation and Heat Mitigation 204
4.6.4. Microclimatic Roles and Spatial Connectivity 207
4.6.5. Indicative Climatic Performance Estimation 210
4.7. Public Space System 213
4.7.1. Public Flow Absorption and Urban Attractors 214
4.7.2. Public-Space Typologies and Zone Characters 216
4.7.3. Activity Network and Temporal Use Scenarios 220

4.8. Masterplan, Urban Integration and Detailed Design 224
4.8.1. Integrated Masterplan 224
4.8.2. Contextual Land Use and Urban Integration 226
4.8.3. Edge Accessibility and External Connections 229
4.8.4. Detailed Urban Design Focus 232
4.9. Indicative Phasing and Implementation 238
4.10. Selected Quantitative Indicators **241**
5. The Final View: Conclusion 243
5.1. Research Synthesis **244**
5.2. Answering the Research Questions **244**
5.2.1. Climatic and Environmental Performance 244
5.2.2. Public Space and Urban-Social Performance 245
5.2.3. Answer to the Main Research Question 246
5.3. Main Findings and Contribution **248**
5.4. Limitations and Directions for Future Research **248**
5.5. Final Reflection **249**
References 250

List of figures

Figure 1.1: The evolution of Tempelhofer Feld: from Berlin's historic airport to an urban park. Source: berlin.de 19

Figure 1.2: Pictures of the workshop in Lisbon, April 2025 21

Figure 2.1: The emergence of global mobility networks and the "space of flows," visualised through early transnational air route mappings. Source: Dümpelmann (2014, p. 7) 31

Figure 2.2: Compressed Aerotropolis Schematic with Airport City Core. Source: Kasarda, (2016, p.4) 31

Figure 2.3: Morphological enclosure and spatial constraint: the embedded infrastructural footprint of an urban airport bounded by consolidated city fabric. Source: Waldheim & Favargiotti (2017, p. 42) 32

Figure 2.4: The monumental scale of post-aviation territories: a comparative morphological layout of decommissioned European airports. Source: Pedrycz et al. (2025, p. 4) 33

Figure 2.5: Landscape as a decentralised organising infrastructure, visualised through a structural framework of operational layers. Source: Waldheim (2016) 35

Figure 2.6: The conceptual framework of the drosscape, mapping the intersection of waste and vastness within dynamically evolving urban regions. Source: Berger (2006, p. 240) 36

Figure 2.7: Demobilisation and de-engineering: the morphological transition of obsolete urban infrastructure into an emergent landscape system. Source: Bélanger (2009, p. 85) 37

Figure 2.8: The staging of uncertainty: chronological phasing diagrams illustrating the long-term ecological succession and incremental transformation of a former airfield. Source: Waldheim (2016) 38

Figure 2.9: Urban permeability as a function of route choice: the morphological impact of block size on physical accessibility. Source: Bentley et al. (1985, p. 12) 39

Figure 2.10: Conceptual distinction between urban porosity and permeability, illustrating the transition from isolated spatial voids to interconnected morphological networks. Source: Castel'Branco & da Costa (2024, p. 9) 40

Figure 2.11: Mapping urban severance and permeability: identifying infrastructural barriers, unfriendly environments, and cross-site pedestrian connections, Castel'Branco & da Costa (2024, p. 14) 41

Figure 2.12: Morphological articulation of the active edge: demonstrating the interpenetration of public and private spheres to foster urban porosity and social integration. Source: Castel'Branco & da Costa (2024, p. 11) 42

Figure 2.13: Selected aviation structures preserved as technical and cultural heritage within a transformed former-airport territory. Source: Pijet-Migoń (2025, p. 13) 44

Figure 2.14: Mapping selective retention: a comparative matrix of surviving aviation infrastructure, spatial voids, and commemorative elements across decommissioned airports. Source: Pijet-Migoń (2025, p. 17) 44

Figure 2.15: Comprehensive redevelopment of a former airport and the associated loss of its legible aviation morphology. Source: Favargiotti (2018, p. 92) 45

Figure 2.16: Main categories of green–blue–grey infrastructure and their reported urban cooling performance. Source: Kumar et al. (2024) 47

Figure 2.17: The spatial reach of microclimatic regulation: illustrating the distance of cooling influence exerted by tree-dominated versus grass-dominated green spaces. Source: Grilo et al. (2020, p.1) 48

Figure 2.18: Modes of cooling provided by different urban green infrastructure options during summer and priority locations to optimise those cooling benefits. Source: Norton et al. (2015, p.6) 49

Figure 2.19: Mitigating extreme Mediterranean heat stress: comparative analysis of Physiologically Equivalent Temperature (PET) and Mean Radiant Temperature reductions following targeted nature-based interventions. Source: Tousi, Mela & Tseliou (2025, p. 22) 50

Figure 2.20: Estimated summer cooling potential of Lisbon's urban vegetation in relation to the city's nocturnal Urban Heat Island pattern. Source: Reis & Lopes (2019, p. 11) 51

Figure 2.21: Necessary, optional, and social activities as distinct but interrelated dimensions of public life. Source: Gehl (2011, p. 10) 52

Figure 2.22: The manifestation of loose space: the temporary appropriation of a vehicular street for informal social and recreational activities. Source: Franck & Huang (2023, p. 19) 53

Figure 2.23: Temporal variation and changing rhythms of use: the same urban site accommodating entirely different spatial programmes, informal appropriations, and user groups between day and night. Source: Dovey & Polakit in Franck & Stevens (2007, p. 123) 54

Figure 2.24: Overview of Kai Tak project. Source: global.chinadaily.com 58

Figure 2.25: Sub-areas of Kai Tak 61

Figure 2.26: Urban design master plan 62

Figure 2.27: Landscape plan 64

Figure 2.28: Road connections, strategic context 65

Figure 2.29: Road connections, local context 66

Figure 2.30: Enhanced pedestrian connections within Kai Tak 66

Figure 2.31: Landuse budget 67

Figure 2.32: Preliminary outline development plan 68

Figure 2.33: Left, Kai Tak airport in 1960 and Right, Kai Tak airport in 1990 69

Figure 2.34: 2019 Kai Tak Runway End Park 70
Figure 2.35: Kai Tak sky garden and residential towers 70
Figure 2.36: Kai Tak stadium 70
Figure 2.37: Kai Tak project, Before and after 71
Figure 2.38: The Ellinikon project 72
Figure 2.39: Panoramic View of the Site during the Airport Operation, before 2004 75
Figure 2.40: Panoramic View after the Olympics Games - November 2011 75
Figure 2.41: Site location (in Attica region and Athens Riviera) 76
Figure 2.42: Master plan of The Ellinikon 77
Figure 2.43: Walking distances 78
Figure 2.44: The Ellinikon Riviera 80
Figure 2.45: The Cove Villas 80
Figure 2.46: Riviera Tower 81
Figure 2.47: The Cove Residences 81
Figure 2.48: Left image: Marina Hotel and Branded Residences, Right image: Mandarin Oriental Hotel 81
Figure 2.49: Riviera Galleria 82
Figure 2.50: The Commercial Hub 82
Figure 2.51: The Ellinikon Park 83
Figure 2.52: Left image: Education Cluster, Right image: Sports Complex 83
Figure 2.53: Phase 1 diagram 83
Figure 2.54: The Ellinikon site in 2001 (first image) and 2026 (second image) during construction 85
Figure 2.55: Tempelhofer Feld current situation 86
Figure 2.56: Airport site 1928, Source: Berlin State Archives 87
Figure 2.57: Tempelhofer Feld open space 90
Figure 2.58: Different activities in Tempelhofer Feld 91
Figure 2.59: Area according to ThfG 93
Figure 2.60: Maintenance Plan (EPP) 94
Figure 2.61: Vision 2030+, the future of Tempelhof airport 94
Figure 2.62: The Tempelhofer Feld in 2006 (first image) and 2026 (second image) 97
Figure 2.63: “Parque Bicentenario” located in Quito 98
Figure 2.64: Quito’s Old Airport Terminal, Gates, and Control Tower (left in blue) 99
Figure 2.65: In this Jan. 8 2013 photo, a plane approaches the runway at the former airport 100

Figure 2.66: The winning proposal for the Parque del Lago ideas competition. Source: Ernesto Bilbao and Robert Sproull Jr. 102

Figure 2.67: Proposal included within resolution C-408. Source: Municipality of Quito. 104

Figure 2.68: Management units established by ordinance 0352. Source: Municipality of Quito. 105

Figure 2.69: playgrounds and green areas of Parque Bicentenario. Source: quitoinforma. 107

Figure 2.70: The Parque Bicentenario project in 2012 (first image) and 2026 (second image) 108

Figure 3.1: Overview of Humberto Delgado Airport: (a) exterior view of Terminal 1; (b) view across the airport's airside operational area, Sources: 114

(a) https://www.fsaddoncompare.com/product/10048/LPPT-Lisbon-Airport; 114

(b) https://www.theportugalnews.com/news/2022-08-10/lisbon-airport-6th-for-most-delays/69329 114

Figure 3.2: Runway 02/20 (Principal runway). Source: https://fselite.net/content/mk-studios-releases-lisbon-rebooted/ 117

Figure 3.3: Former Runway 17/35. Source: https://dlapilota.pl/wiadomosci/portugalia-chaos-na-lotniskach-wz-z-wdrazaniem-nowego-systemu-zarzadzania-granicami 118

Figure 3.4: Aircraft apron at Humberto Delgado Airport. Source: https://avaz.ba/vijesti/globus/248307/lisabon-istrcali-na-pistu-aerodroma-kako-bi-izbjegli-pasosku-kontrolu 118

Figure 3.5: Passenger terminal layout at Humberto Delgado Airport. Source: Airportmaps.com. 119

Figure 3.6: Location of the section lines. Source: Author, 2026 (based on Google Earth Pro). 127

Figure 4.1: Existing and proposed views of a former Dead end reopened as a neighbourhood entrance to the park. Existing image: Google Earth / Street View. Proposed image: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI. 232

Figure 4.2: Perspective of the preserved runway as a public promenade, showing everyday activities, cycling, shaded seating and temporary uses. Lower-heat and permeable surface treatments form part of the design strategy but are not differentiated in this illustrative view. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI. 236

Figure 4.3: Oblique perspective of the Southern Corridor at the western site boundary, showing the landscaped street and proposed signal-controlled pedestrian crossing. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI 236

Figure 4.4: Oblique perspective of Terminal 1, its public forecourt and the connection to the planted and water-based leisure landscape. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI 237

Figure 4.5: Oblique perspective of Zone 4, showing the Festival Field and Market and Exhibition Terrace connected by the preserved runway. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI. 238

List of Tables

Table 2.1: Typologies of temporary appropriation: categorising the informal economic, recreational, and sacral uses of public space. Source: Lara-Hernandez et al. (2019) 52

Table 2.2: Synthesis of design strategies. Source: Author, 2026 111

Table 3.1: Selected airport elements and their potential reuse directions. Source: Author, 2026 (based on NAV Portugal, AIP-LPPT; Câmara Municipal de Lisboa vector cartography; OpenStreetMap contributors, 2026). Note: The table identifies preliminary spatial opportunities rather than confirmed technical feasibility. Structural condition, contamination, ownership, legal restrictions, and economic viability require further investigation. 121

Table 3.2: Summary of the key issues and conflicts identified through the site analysis. Source: Author, 2026 (synthesis of the analytical findings presented in this chapter) 159

Table 3.3: Design opportunities and spatial criteria derived from the site analysis. Source: Author, 2026 (synthesis of the analytical findings presented in this chapter). Note: These criteria indicate the intended direction of spatial development rather than detailed technical standards. Soil conditions, contamination, drainage capacity, structural feasibility, and access restrictions require further investigation. 160

Table 4.1: Spatial rationale, potential stakeholders, and validation needs for the provisional programmes of the eight zones. Source: Author, 2026 182

Table 4.2: Summary of the main criteria used for species selection. Source: Author, 2026 193

Table 4.3: Indicative planting palette for the main vegetation typologies of the project. Source: Author, 2026 194

Table 4.4: Microclimatic roles by zone and main climatic function. Source: Author, 2026 208

Table 4.5: Comparative assessment of plausible local air-temperature differences across the proposal. Source: Author, 2026 211

Table 4.6: Public-Space Typologies and Zone Characters. Source: Author, 2026 216

Table 4.7: Possible temporal scenarios of use for each zone. Source: Author, 2026 222

Table 4.8: Social inclusion and public-space management principles. Source: Author, 2026 224

Table 4.9: Indicative phasing and implementation sequence. Source: Author, 2026 239
Table 4.10: Selected quantitative indicators of the proposed masterplan. Source: Author, 2026 241

List of Diagrams

Diagram 1.1: Research question framework, Source: Author, 2026 23
Diagram 1.2: Structure of the thesis, Source: Author, 2026 28
Diagram 3.1: Simplified functional layout of Humberto Delgado Airport. Source: airportspotting.com 120
Diagram 3.2: Section A1A2. Source: Author, 2026, Based on Google Earth pro elevation 127
Diagram 3.3: Section B1B2. Source: Author, 2026, Based on Google Earth pro elevation 128
Diagram 3.4: Section C1C2. Source: Author, 2026, Based on Google Earth pro elevation 128
Diagram 3.5: Longitudinal elevation profile of Runway 02/20. Source: Author, 2026 (NAV Portugal; Google Earth). 139
Diagram 3.6: Seasonal wind rose charts in Lisbon airport. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon 150
Diagram 3.7: Annual wind rose charts in Lisbon airport. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon 151
Diagram 3.8: First scenario, Heat map with sun & wind. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon 152
Diagram 3.9: Second scenario, Heat map without sun & wind. Source: CBE Clima Tool (Betti et al., 2024) 152
Diagram 4.1: Design objectives. Source: Author, 2026 165
Diagram 4.2: Sponge Concept. Source: Author, 2026 166
Diagram 4.3: Formation of preliminary clusters. Source: Author, 2026 169
Diagram 4.4: Design process, sponge structure definition. Source: Author, 2026 171
Diagram 4.5: Sponge behaviour of the site. Source: Author, 2026 174
Diagram 4.6: Overall spatial structure of the site. Source: Author, 2026 178
Diagram 4.7: Programmatic structure of the zones. Source: Author, 2026 181
Diagram 4.8: Water-sensitive roles by zones. Source: Author, 2026 189

Diagram 4.9: Vegetation Typology by Zone. Source: Author, 2026 192

Diagram 4.10: Porous northern threshold and indicative airflow paths. Source: Author, 2026 195

Diagram 4.11: Landscape measures supporting local thermal moderation along potential airflow paths. Source: Author, 2026 196

Diagram 4.12: Indicative airflow continuity through the open-space network. Source: Author, 2026 197

Diagram 4.13: Water Collection and Conveyance. Source: Author, 2026 199

Diagram 4.14: Distributed water retention and controlled reuse. Public-contact water features use separately treated and monitored water. Source: Author, 2026 201

Diagram 4.15: Rainwater collection, treatment, and controlled reuse, with potential local evaporative cooling. Source: Author, 2026 202

Diagram 4.16: Water Infiltration. Source: Author, 2026 204

Diagram 4.17: Heat-mitigation measures across landscape and reused built areas. Source: Author, 2026 207

Diagram 4.18: Indicative microclimatic design roles and spatial connections across the site. Source: Author, 2026 209

Diagram 4.19: Public Flow Absorption. Source: Author, 2026 215

Diagram 4.20: Public-space movement hierarchy. Source: Author, 2026 222

Diagram 4.21: Indicative cross-section of the Northern and Southern Corridors, combining pedestrian space, planting, cycling and low-speed vehicular access. Source: Author, 2026 231

Diagram 4.22: Indicative cross-section of the Central Corridor, showing pedestrian routes, a central cycle path, planted separation and shaded resting areas. Source: Author, 2026 231

Diagram 4.23: Indicative phasing sequence for the gradual public activation and development of the former airport site. Source: Author, 2026 240

Diagram 5.1: Transformation of Humberto Delgado Airport through the sponge concept. Source: Author, 2026. 247

Acknowledgements

First and foremost, I would like to express my sincere gratitude to my supervisor, Professor Antonio Di Campli. Throughout this journey, I have learned a great deal from his teaching, our conversations, and the care with which he approached my work. His thoughtful guidance, patience, and attention to detail encouraged me to question my assumptions, develop my ideas, and grow more confident in my own judgement. I am especially grateful for the time he devoted to helping me improve, and for deepening my interest in a subject that has become increasingly meaningful to me.

My deepest gratitude goes to my beloved mother. Her love, care, and unwavering support have sustained me throughout this chapter of my life. At every stage, she has been there to listen, to encourage me, and to help me find the strength to continue when things felt difficult. Beyond the work presented in these pages are countless moments of reassurance and kindness that belong to her. Thank you for caring so deeply, for believing in me, and for making sure I never felt alone in what I was trying to achieve. This achievement is yours as much as it is mine.

I am also deeply thankful to my brother for his care, encouragement, and willingness to help whenever I needed him. His support, both practical and personal, made the demanding moments of this journey easier to face.

My dear friend Parisa brought kindness and reassurance to the most demanding moments of this journey. Her encouragement and generous help with parts of this work made a real difference, and I deeply value her friendship and support.

I would also like to thank all my dear friends for their encouragement, companionship, and the moments of joy they brought to these years. They made this experience richer and reminded me to appreciate life beyond the work. My thanks extend to everyone who supported my academic journey, whether named here or not. Every act of kindness and help, however small, has contributed to my growth and made this achievement possible.

Finally, I am grateful to the academic and administrative staff of Politecnico di Torino for supporting my studies. My particular thanks go to Professor Claudia Cassatella for the opportunity to participate in the workshop that provided the starting point for this thesis. That experience opened a direction of inquiry that I was fortunate to pursue and develop into the work presented here.

Abstract

The prospect of relocating aviation activities from Humberto Delgado Airport opens an opportunity to reconsider an infrastructural enclave embedded within Lisbon. Although a metropolitan gateway, the airport functions locally as a restricted superblock that severs east–west and north–south connections, separates neighbourhoods, and concentrates impervious, heat-exposed surfaces. Its runway, terminals, hangars, and aprons nevertheless retain valuable spatial and infrastructural memory. The thesis therefore asks: "How can Humberto Delgado Airport be transformed into a climate-responsive and publicly accessible urban landscape that strengthens its relationship with the surrounding city while preserving and reinterpreting its spatial identity?"

A design-led case-study methodology combines theoretical inquiry, comparison of Kai Tak, The Ellinikon, Tempelhofer Feld, and Parque Bicentenario, and multi-scalar analysis of the Lisbon site. Spatial, remote-sensing, climatic, demographic, land-use, and mobility data identify conflicts and opportunities. The findings are translated into qualitative design criteria and tested through research by design from masterplan to detailed urban-design scale. The comparative study finds that no single model of former-airport regeneration is directly transferable. It instead identifies four context-sensitive principles: edge activation, distributed programmatic clusters, preservation of openness and infrastructural memory, and longitudinal sequencing. The site analysis shows that environmental, spatial, and social pressures overlap: continuous hard surfaces, low vegetation cover, solar exposure, limited infiltration, and fragmented green networks coincide with restricted access and severed routes, despite about 142,800 residents living within one kilometre of the airport.

In response, the thesis develops a sponge-based urban system organised by the preserved Runway 02/20, three transversal corridors, a secondary path network, and eight differentiated zones. Selective depaving, shade, permeable surfaces, water-sensitive landscapes, and Mediterranean-adapted planting are integrated with public routes and destinations. Terminals, hangars, and apron surfaces are adaptively reused as civic, educational, cultural, and economic anchors. Detailed testing of Zones 3–6 demonstrates how these systems can form a connected civic landscape while retaining distinct spatial characters. A benchmark-informed assessment suggests that treated comfort areas could experience local air temperatures about 1–3°C below equivalent existing conditions during favourable hot-summer periods. These values are indicative rather than predictive and require field measurement and technical simulation.

The thesis concludes that climatic performance, permeability, public life, and infrastructural memory are most effective when addressed through a shared spatial framework rather than as separate layers. Its principal contribution is a site-specific urban-design framework that operationalises sponge logic through absorption, percolation and distribution, retention, and exchange. The proposal is neither a

conventional metropolitan park nor a continuous new district, but a hybrid landscape that can transform the airport from a barrier and heat-intensive hardscape into a connected, climate-responsive, and shared urban territory without erasing its identity.

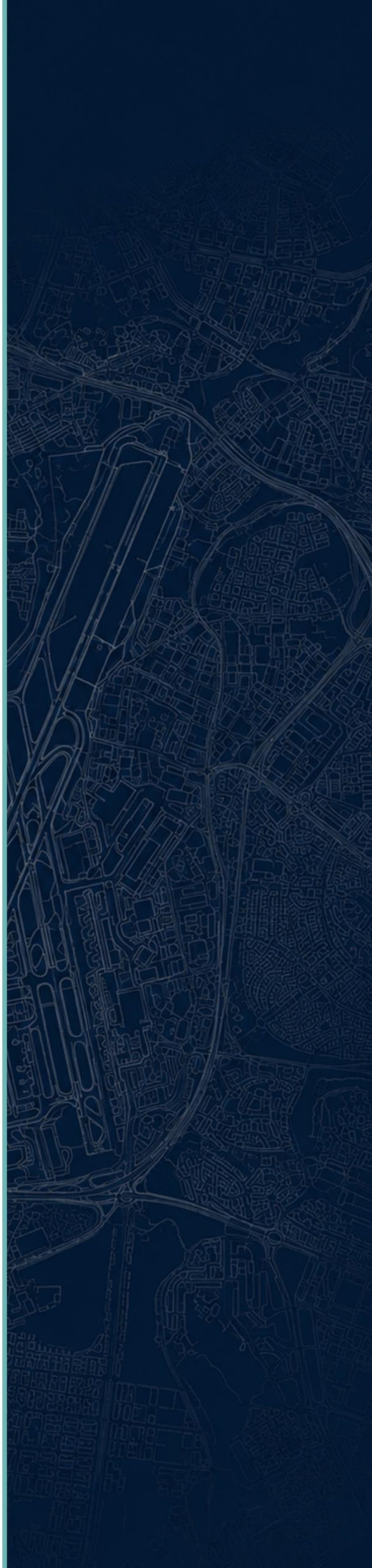
Keywords: *Post-aviation landscapes; Sponge urbanism; Climate-responsive urban design.*

CHAPTER

01

Setting the Lens

Introduction and Research Framework



1.1. When Airports Become Urban Challenges

Airports are among the largest and most specialised forms of infrastructure within metropolitan regions. Many were originally constructed at the urban fringe, where sufficient land was available for runways, terminals, technical facilities, and safety zones. As cities expanded, however, some of these airports gradually became enclosed by residential neighbourhoods, employment areas, transport networks, and other urban functions. Infrastructure that was initially designed to operate at a distance from the city consequently became embedded within it. This shift can create a fundamental tension between the metropolitan role of an airport and the conditions of its immediate surroundings. Controlled boundaries, long runways, and extensive operational areas interrupt the continuity of local street networks and can separate neighbourhoods located only a short distance apart. Large expanses of paved and impervious surfaces, limited vegetation, noise, traffic, and restricted public access further reinforce the contrast between the airport and the surrounding urban fabric.

The relocation or closure of an urban airport does not automatically resolve these conditions. Instead, it introduces a new urban question: what should happen to a large infrastructural territory once its original function disappears? Former airports are not ordinary vacant sites. Their runways, aprons, terminals, hangars, hard surfaces, spatial scale, and infrastructural history remain embedded in the landscape. Their transformation therefore involves choices about what should be removed, preserved, reused, or reinterpreted, while also determining how these previously isolated territories can become part of everyday urban life. This question has become increasingly relevant as cities face simultaneous demands for accessible public and green spaces, stronger spatial connections, and improved environmental and climatic performance. The transformation of a former airport can provide an unusual opportunity to address several of these needs within a single large urban territory, but its scale also makes the consequences of redevelopment particularly significant. In Lisbon, the planned replacement of Humberto Delgado Airport brings these wider questions into a concrete urban context, opening a debate about the future of a major infrastructural site that is now deeply embedded within the city.



Figure 1.1: *The evolution of Tempelhofer Feld: from Berlin's historic airport to an urban park. Source: berlin.de*

1.2. The First Encounter

The starting point of this thesis was the 2025 Erasmus+ Blended Intensive Programme Nature-Based Planning for Societal Urban Transitions. Led by Instituto Superior Técnico in Lisbon in collaboration with Politecnico di Torino, KTH Royal Institute of Technology, and Ghent University, the programme combined online preparation with an intensive in-person workshop held in Lisbon from 21 to 26 April 2025. Humberto Delgado Airport was selected as the main project area in relation to the long-term prospect of transferring airport operations to a new location outside the city. Rather than approaching the airport only as transport infrastructure, the workshop considered its possible future as a large urban territory undergoing transition. Lectures, territorial analysis, field visits, scenario-building exercises, discussions with local actors, and collaborative work provided different ways of understanding the airport and the neighbourhoods surrounding it. During the workshop, participants explored the future of the airport through six thematic perspectives: Environment, Economic Development, Housing, Connectivity and Mobility, Reconversion, and Identity. The work developed within these groups demonstrated that the transformation of such a large site could not be understood through a single issue, but required consideration of environmental, spatial, social, economic, and infrastructural conditions together. The author participated in the Connectivity and Mobility group, which examined how the airport and its surrounding infrastructure could shift from acting as barriers toward supporting stronger relationships across the wider urban area.

The workshop therefore represents the first encounter with the site rather than the starting framework of the present thesis. It provided direct exposure to Humberto Delgado Airport and its surrounding urban context and initially raised an interest in the possibilities associated with its future transformation. However, the present thesis does not directly continue the objectives, analytical framework, or proposal developed by the Connectivity and Mobility group. Following the workshop, the research was reframed as an independent study, with a different focus, research questions, theoretical basis, and design investigation. The workshop should therefore be understood primarily as the experience through which the site was first encountered and selected for further investigation, rather than as the conceptual or methodological basis of the thesis.







Figure 1.2: *Pictures of the workshop in Lisbon, April 2025*

1.3. The Hidden Costs

The significance of Humberto Delgado Airport extends beyond its role as transport infrastructure. As Lisbon expanded around it, the airport became embedded within a populated and increasingly continuous urban fabric, while retaining the spatial logic of a large, enclosed and highly specialised facility. Its scale, rigid runway geometry and restricted perimetre now create a sharp contrast with the finer-grained neighbourhoods that surround it. The result is a large infrastructural enclave occupying a strategic position within the city but remaining largely detached from everyday urban life.

One of the most visible consequences is spatial disconnection. The airport interrupts both east–west and north–south continuity, with numerous local streets terminating at its boundary and major arterial roads reinforcing separation along several edges. Although the airport is highly accessible at the metropolitan scale, this accessibility is primarily organised around passengers, vehicles and aviation functions rather than everyday movement between neighbouring districts. The same contradiction is visible socially: dense residential areas lie close to a very large open territory, yet surrounding

communities have limited access to the airport land, public amenities and large green or open spaces within it.

The environmental costs are even more pronounced. Runways, taxiways, aprons and other operational surfaces form a highly continuous impermeable landscape with limited vegetation and shade. The site analysis identifies the airport as a major heat-intensive area within Lisbon, characterised by elevated land-surface temperatures, low vegetation cover and strong solar exposure. Sealed surfaces also reduce infiltration and increase surface runoff, while the airport interrupts potential ecological and green-space connections across the wider urban structure. At the same time, its large open morphology participates in urban air movement, meaning that its climatic role extends beyond the boundaries of the site itself.

These environmental and climatic conditions emerge as a particularly important priority for the future transformation of the site. However, they cannot be considered independently from the spatial and social conditions around them. Improving environmental performance would have limited urban value if the territory remained disconnected from surrounding neighbourhoods or inaccessible to everyday public life. Likewise, improving connectivity alone would not address the thermal exposure, lack of vegetation, limited infiltration and ecological discontinuities associated with the existing airport landscape. The challenge is therefore defined by the overlap of climatic, spatial and social pressures rather than by a single isolated problem.

A further issue concerns the identity of the site itself. The runways, terminals, hangars and other infrastructural elements represent the physical evidence of the airport's history and give the territory a spatial character unlike that of ordinary vacant land. Future transformation therefore raises not only questions of environmental and urban performance, but also of how change can occur without completely erasing the site's infrastructural memory. Together, these hidden costs and competing needs establish the conditions from which the central question of this thesis emerges.

1.4. The Question

The challenges identified above lead to a broader question about the future transformation of Humberto Delgado Airport. The issue is not simply how to reuse a large former airport site, but how its transformation can respond simultaneously to the environmental conditions of the territory and to its relationship with the surrounding urban fabric and everyday public life.

The main research question of this thesis is therefore:

"How can Humberto Delgado Airport be transformed into a climate-responsive and publicly accessible urban landscape that strengthens its relationship with the surrounding city while preserving and reinterpreting its spatial identity?"

To address this question, the research is structured around two complementary lines of inquiry:

Sub-question 1 — Climatic and Environmental Performance

"How can the transformation of Humberto Delgado Airport improve the climatic and environmental performance of the site and its relationship with the surrounding urban environment?"

Sub-question 2 — Public Space and Urban-Social Performance

"How can the former airport become an accessible and socially active public landscape that strengthens its relationship with surrounding neighbourhoods while retaining and reinterpreting its spatial identity?"

The two questions are considered interdependent rather than as separate areas of investigation. Environmental performance influences the quality and usability of public space, while accessibility, public activity, and the relationship with surrounding neighbourhoods determine how environmental improvements can contribute to everyday urban life. Together, they establish the two complementary dimensions through which the transformation of the airport is investigated.

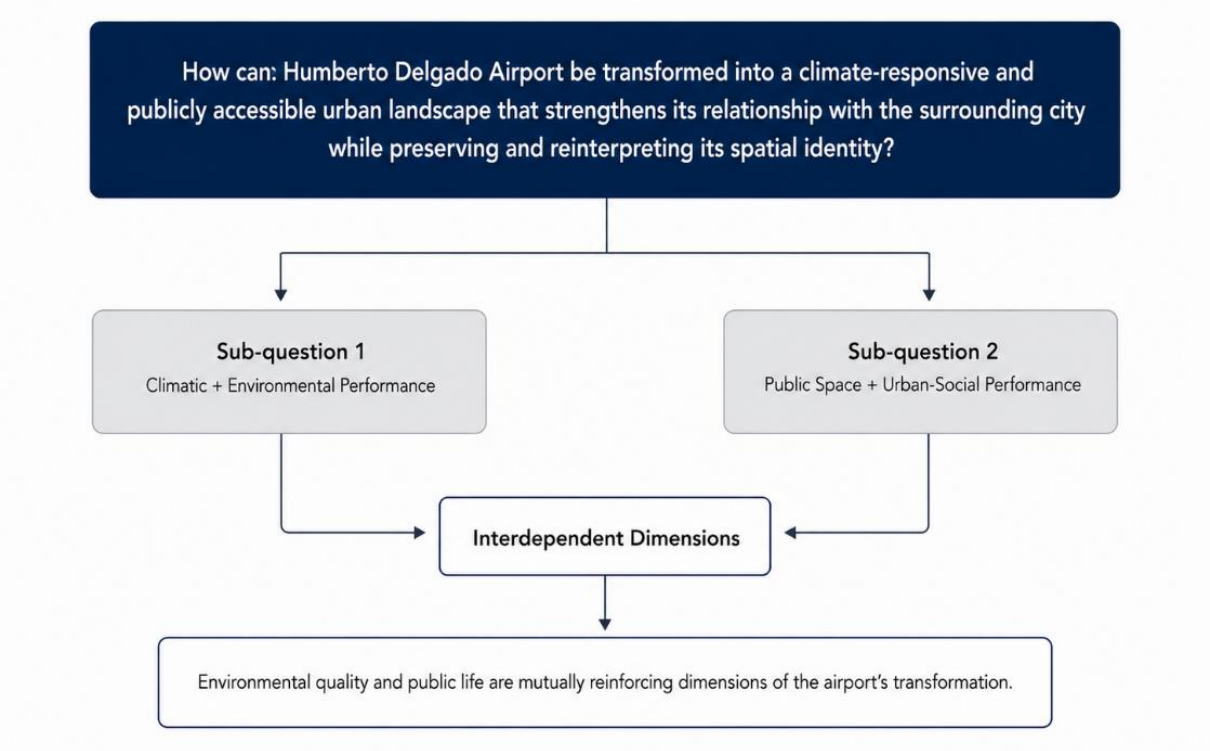


Diagram 1.1: *Research question framework, Source: Author, 2026*

1.5. The Destination: Research Aim and Objectives

The aim of this thesis is to investigate how the long-term post-aviation transformation of Humberto Delgado Airport can contribute to a climate-responsive, publicly accessible,

and better-connected urban landscape while preserving and reinterpreting the spatial and infrastructural identity of the site.

To pursue this aim, the research establishes six objectives:

1. To develop a theoretical and comparative understanding of the regeneration of former airport territories, identifying relevant concepts, approaches, opportunities, and limitations through existing discourse and selected international case studies.
2. To identify the principal environmental, climatic, spatial, infrastructural, and socio-urban conditions of Humberto Delgado Airport and its surrounding urban context that should inform its future transformation.
3. To determine the main priorities for improving the climatic and environmental performance of the airport territory, with particular attention to surface heat, solar exposure, vegetation, permeability, runoff, airflow, and ecological continuity.
4. To define the spatial conditions through which the former airport can strengthen its relationship with surrounding neighbourhoods and become an accessible, inclusive, and socially active public landscape.
5. To investigate how the spatial and infrastructural identity of the airport can be retained and reinterpreted during its transformation rather than treating the site as a blank slate.
6. To translate and test the combined theoretical, comparative, and site-specific findings through an integrated urban-design investigation and to evaluate its capacity to address the research questions while acknowledging the limitations of the study.

Together, these objectives establish the direction of the research and provide the basis for the methodological process described in the following section.

1.6. The Route: Research Methodology

1.6.1. Research Approach

This thesis used a design-led case-study approach supported by qualitative and quantitative spatial evidence. Humberto Delgado Airport was the main case through which the future transformation of a large urban airport was investigated.

This approach was selected because the research question required a site-specific urban-design response rather than the statistical testing of a hypothesis. Spatial data were used to identify measurable conditions, while qualitative interpretation helped explain the airport's morphology, identity, edge conditions, and relationship with the surrounding city.

1.6.2. Data Collection and Selection

The research used three main groups of material: academic and planning literature, comparative case studies, and site-specific spatial data. The literature was selected according to its relevance to former-airport transformation, public space, environmental performance, urban connectivity, and infrastructural reuse.

Kai Tak, The Ellinikon, Tempelhofer Feld, and Parque Bicentenario were selected because they shared the condition of a former urban airport but represented different approaches to development, public access, landscape transformation, and reuse. Information was collected from academic publications, official plans, project documents, maps, and aerial imagery.

The site analysis used municipal and national datasets, OpenStreetMap, Copernicus products, Landsat imagery, elevation models, INE Census data, aerial imagery, and climatic data from the Lisbon EnergyPlus Weather file. Data were selected according to their relevance, coverage, date, and resolution.

The 2025 Erasmus+ site visit provided photographs and direct observation of the airport. However, the research framework, analysis, design criteria, and final proposal were later developed independently. The workshop proposal was therefore not used as the basis of the thesis.

1.6.3. Data Analysis and Design Process

The four comparative cases were examined through the same criteria: urban integration, accessibility, balance between development and open space, reuse of airport infrastructure, public use, environmental strategies, and observed limitations. This made it possible to identify useful principles without treating any project as a model to copy directly.

The airport was analysed at metropolitan, neighbourhood, and site scales. QGIS was used to prepare, map, and compare the spatial data. The analysis considered four related dimensions: spatial form, accessibility and mobility, environmental conditions, and socio-demographic context. Different layers were read together; for example, thermal exposure was considered in relation to impervious surfaces, vegetation, solar conditions, and nearby population.

The findings were summarised as key issues, opportunities, and qualitative design criteria. Research by design was then used to test these criteria through diagrams, layered maps, plans, and sections. The design process moved from the overall airport territory to a selected focus area, allowing the wider strategy to be examined at a closer urban-design scale. The final proposal was assessed against the research questions, objectives, and criteria derived from the analysis.

1.6.4. Reliability and Ethics

Research reliability was supported by using traceable data sources, applying the same comparison criteria to all cases, and checking findings across different datasets and scales. The sources, dates, and resolutions of the data were recorded with the related maps.

The research did not include interviews, surveys, or personal data. Ethical considerations therefore focused on the correct attribution of academic, cartographic, photographic, and institutional sources. The scope and technical limitations of the study are discussed separately in Section 1.7.

1.7. Scope and Limitations

This thesis focuses on the long-term transformation of Humberto Delgado Airport following the relocation of its aviation activities. The airport territory constitutes the primary study and project area, while the surrounding neighbourhoods and wider urban systems are considered where they are necessary to understand the site's environmental conditions, urban relationships, and connection with the surrounding city.

The research is developed primarily at the scale of strategic urban design and landscape-led masterplanning. Public space, accessibility, programmes, adaptive reuse, building form, and landscape systems are examined as components of the overall spatial structure. A selected central-southern focus area is developed at a closer urban-design scale to test how the general framework can be translated into differentiated public spaces and relationships between existing structures and open ground. This focused study remains indicative and does not extend to architectural resolution, construction details, final material specifications, detailed planting design, or engineering design.

The study is based on a long-term post-aviation scenario in which Humberto Delgado Airport becomes available for transformation. It does not attempt to predict the exact date or process of airport closure, the official future programme of the site, the sequence in which airport land may become available, or the institutional procedures through which redevelopment may occur. The research should therefore be understood as an academic investigation of a possible future transformation rather than an officially adopted or predicted redevelopment plan.

Questions of implementation are also limited to the level necessary for the urban-design investigation. A detailed phasing strategy, financial-feasibility study, financing model, governance framework, land-ownership strategy, and legally binding planning regulations are not developed, as these would require separate economic, political, legal, and institutional studies.

Environmental and climatic considerations are examined primarily at the urban and masterplan scales. The research does not include detailed engineering calculations or project-specific simulations such as hydraulic dimensioning, infiltration testing, soil and

contamination assessment, or comprehensive airflow and pedestrian-level microclimatic modelling. Climatic performance is therefore considered in an indicative rather than predictive manner, based on the analysis of existing site conditions and evidence derived from relevant literature. The results are intended to assess the potential direction and relative performance of the proposed transformation rather than to predict exact future environmental conditions.

The socio-urban dimension is examined through demographic data, land-use patterns, accessibility conditions, the distribution of sensitive uses, and the spatial capacity of the site to support public life. The research does not include resident surveys, interviews, stakeholder workshops conducted specifically for the thesis, or post-occupancy evaluation. Consequently, assumptions concerning user needs, activity patterns, and social inclusion remain strategic design interpretations that would require participatory validation at a later stage. Similarly, mobility is assessed through network structure, access points, public-transport coverage, cycling continuity, and pedestrian potential rather than through traffic modelling or quantified travel-time analysis.

1.8. Assembling the Pieces

The thesis is structured in five interconnected chapters, each contributing a different piece to the overall research process. Rather than functioning as independent parts, the chapters progressively move from defining the problem and establishing a broader knowledge base to understanding the specific conditions of the site, developing a design response, and reflecting on the outcomes of the research.

Chapter 1 — Setting the Lens | Introduction and Research Framework

introduces the broader challenge of airport transformation and explains how Humberto Delgado Airport became the focus of the research. It identifies the key issues and priorities of the site, establishes the research question and objectives, defines the scope and limitations of the study, and sets out the methodological framework through which the thesis is developed.

Chapter 2 — Zooming Out | Airport Urbanism & Comparative Cases

places the research within the wider debate on the transformation of former airport territories. It examines relevant urban-design discourses and comparative international cases in order to identify concepts, experiences, opportunities, and limitations that can inform the interpretation of the Lisbon case.

Chapter 3 — Zooming In | Reading the Lisbon Airport

shifts from the broader theoretical and comparative perspective to the specific conditions of Humberto Delgado Airport. Through a multi-scalar site analysis, it examines the airport and its surrounding urban context from spatial, environmental, climatic, and socio-urban perspectives, identifying the main issues and potentials that inform the subsequent

design process. This reflects the actual analytical structure of the site-analysis chapter, which moves between metropolitan and local scales and combines physical, environmental, and socio-spatial readings.

Chapter 4 — Shifting the View | Design Proposal

translates the findings of the previous chapters into a design investigation for the future transformation of the airport. It develops the conceptual and spatial framework of the proposal and explores how climatic and environmental performance, public space, urban relationships, and the existing identity of the airport can be addressed within an integrated urban-design approach.

Chapter 5 — The Final View | Conclusion

brings the different pieces of the research together. It reflects on the design proposal in relation to the research questions and objectives, summarises the main findings and contributions of the thesis, acknowledges its limitations, and identifies possible directions for further investigation.



Diagram 1.2: *Structure of the thesis, Source: Author, 2026*

CHAPTER

02

Zooming Out

Airport Urbanism & Comparative Cases



2.1. Introduction

This chapter establishes the theoretical and comparative foundation for understanding the transformation of decommissioned urban airports. It first examines six interrelated discourses: Airport Urbanism and post-aviation landscapes, Landscape Urbanism and drosscape, urban permeability and spatial porosity, adaptive reuse and infrastructural memory, environmental regeneration and climate-responsive landscape, and public-space appropriation and temporal use. Together, these perspectives address the spatial, environmental, social, and institutional challenges associated with transforming large aviation territories after decommissioning.

The second part of the chapter examines four international cases: Kai Tak in Hong Kong, The Ellinikon in Athens, Tempelhofer Feld in Berlin, and Parque Bicentenario in Quito. A common analytical framework is used to compare their spatial strategies, landscape transformation, treatment of inherited infrastructure, public use, environmental approaches, governance, and implementation. The chapter concludes by identifying transferable lessons from these contrasting experiences.

2.2. Airport Urbanism and Post-Aviation Landscapes

2.2.1. The Infrastructure of Global Mobility and Airport Urbanism

The discourse of Airport Urbanism investigates the physical, economic, and socio-spatial impacts of aviation infrastructure on the contemporary metropolis. Historically, early airports were generally located on the urban periphery because of their extensive spatial requirements and the environmental nuisances associated with flight (Dümpelmann, 2014).

However, the rapid expansion of global air travel during the late twentieth century fundamentally repositioned these facilities. Rather than functioning solely as transport nodes, airports evolved into central hubs within global networks of mobility and exchange (Freestone, 2009).

In a highly globalised economy reliant on interregional trade, rapid logistics, and tourism, the airport became a multifaceted business enterprise. Driven partly by commercialisation and privatisation, this transition established airports as significant influences on metropolitan economic growth and urban form (Freestone, 2009).

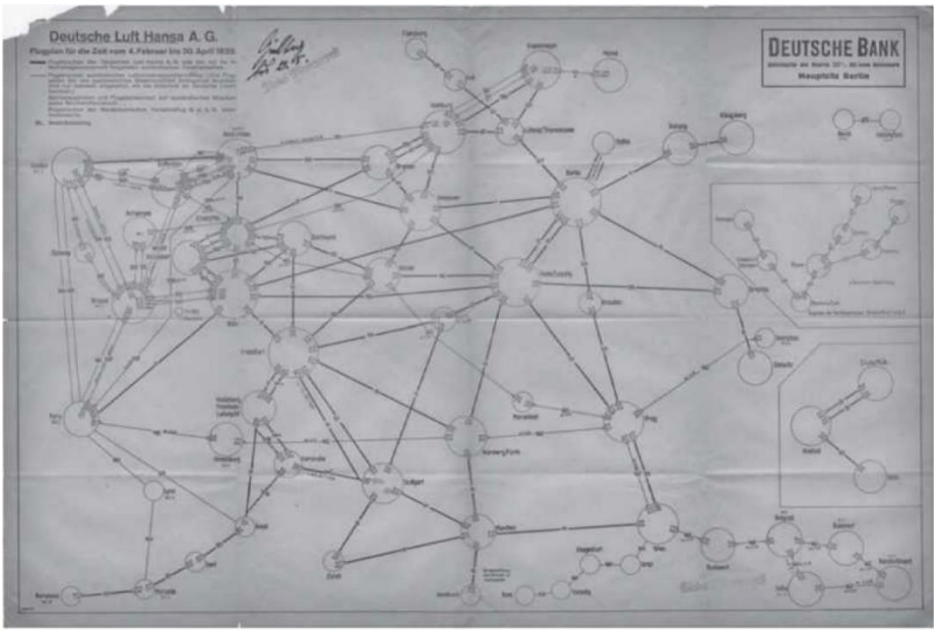


Figure 2.1: *The emergence of global mobility networks and the "space of flows," visualised through early transnational air route mappings. Source: Dümpelmann (2014, p. 7)*

An influential model within this discourse is the Aerotropolis, advanced by Kasarda (2016). This paradigm proposes that contemporary urban development is increasingly shaped by aviation infrastructure, much as twentieth-century urbanisation was influenced by highway networks. Within this model, the airport functions as a commercial core, or airport city, that influences the spatial and economic development of its surrounding region through multimodal transport corridors, logistics facilities, and aviation-related business districts. Proponents of the model describe airports as urban growth poles that use rapid global connectivity to attract time-sensitive industries and generate regional economic advantages (Kasarda, 2016).

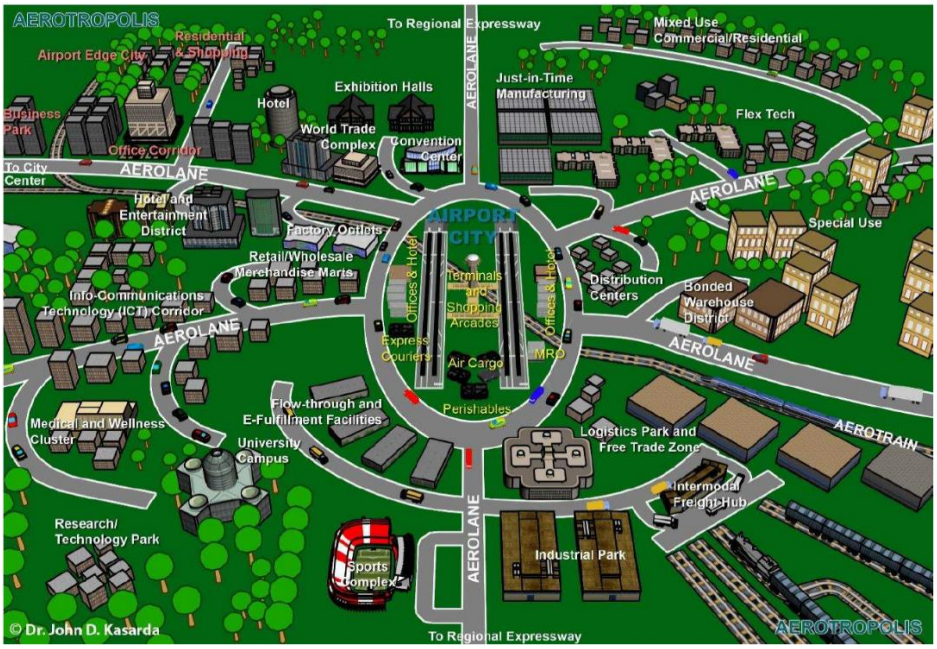


Figure 2.2: *Compressed Aerotropolis Schematic with Airport City Core. Source: Kasarda, (2016, p.4)*

However, this corporate-centred interpretation has also been expanded and critiqued within the broader literature. Hirsh (2016) challenges the disproportionate scholarly emphasis on iconic passenger terminals designed primarily for a highly mobile corporate class. Although airports retain the capacity to organise regional development, Airport Urbanism extends beyond iconic architecture and corporate investment by accounting for the spatial practices of a broader and more diverse flying public (Hirsh, 2016). Moreover, the pursuit of premium global connectivity can produce fragmented forms of urban development in which airports and their surrounding commercial districts function as enclave-like territories (Macrury, 2008). Such areas may be highly integrated into international networks while remaining physically and socially disconnected from their immediate surroundings, revealing a tension between global accessibility and local liveability (Freestone, 2009; Macrury, 2008).

2.2.2. Spatial Obsolescence and the Embedded Urban Airport

As metropolitan areas have expanded horizontally, many older municipal airports originally located on the urban fringe have gradually been surrounded by urban and suburban development, becoming embedded within dense and consolidated urban fabrics (Dümpelmann, 2014; Schwarz & von Kolpinski, 2025). This geographical confinement can produce significant functional and spatial incompatibilities between the airport and the host city. Contemporary aviation frequently requires operational and physical expansion to accommodate larger aircraft, increasing passenger volumes, and expanded safety requirements. Embedded airports, however, are often constrained by adjacent residential and commercial development, making such expansion difficult or impossible (Pijet-Migoń, 2025).



Figure 2.3: *Morphological enclosure and spatial constraint: the embedded infrastructural footprint of an urban airport bounded by consolidated city fabric. Source: Waldheim & Favargiotti (2017, p. 42)*

Conversely, an operational airport may impose considerable developmental and environmental constraints on the surrounding city. Aviation activity generates negative externalities, including noise pollution, localised traffic congestion, and airspace safeguarding regulations that restrict building heights in neighbouring districts (Freestone, 2009; Pijet-Migoń, 2025). This condition of mutual constraint—where the airport is unable to respond adequately to the operational demands of metropolitan growth while the city remains unable to integrate its extensive infrastructural footprint—may eventually result in functional and spatial obsolescence (Pijet-Migoń, 2025). The difficulty of reconciling the requirements of a major aviation hub with the spatial limitations of an expanding metropolis can create a long-term planning impasse. Over time, these conditions may lead authorities to relocate aviation activities to greenfield locations or newly constructed facilities, leaving behind extensive infrastructural territories within the existing urban fabric (Pijet-Migoń, 2025; Schwarz & von Kolpinski, 2025).

2.2.3. Post-Aviation Territories and the Debates of Urban Regeneration

Following decommissioning, former airports constitute a distinct category of urban territory. Compared with many post-industrial brownfields, post-aviation sites often encompass hundreds of hectares of contiguous land characterised by large-scale and highly engineered spatial features, including linear runways, extensive impermeable aprons, subterranean drainage systems, and specialised airport buildings, some of which may possess monumental or heritage value (Raffa & Moscatelli, 2026; Waldheim & Favargiotti, 2017). Waldheim and Favargiotti (2017) describe these abandoned sites as an "urban vacuum" (p. 29) that may present contamination and remediation challenges while also possessing considerable cultural, ecological, and economic potential. Their scale, morphology, and infrastructural legacy position post-aviation landscapes as strategic opportunities for urban repair and transformation (Raffa & Moscatelli, 2026; Waldheim & Favargiotti, 2017).

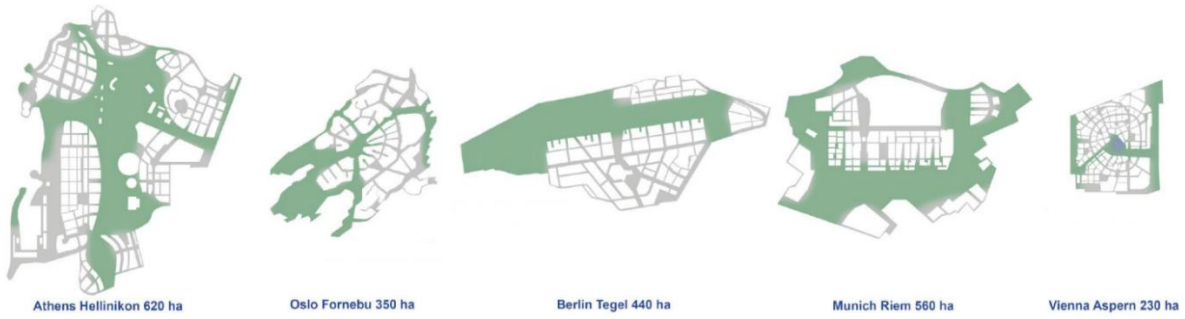


Figure 2.4: *The monumental scale of post-aviation territories: a comparative morphological layout of decommissioned European airports. Source: Pedrycz et al. (2025, p. 4)*

The regeneration of these obsolete or underused territories is shaped by competing spatial, political, and economic agendas. A central tension exists between market-oriented urban development and the preservation of large open areas. In growing

metropolitan regions where developable land is scarce, former airports may be viewed as opportunities for residential, commercial, and investment-led redevelopment. In some contexts, large redevelopment sites are used as anchors for economic restructuring, particularly where comprehensive spatial-governance frameworks are limited (Asprogerakas, 2024).

Mixed-use development, however, is not the only possible regeneration model. Alternative approaches may prioritise metropolitan open space, ecological restoration, civic activities, innovation-oriented development, or combinations of these functions, depending on local environmental conditions, governance arrangements, and social priorities (Schwarz & von Kolpinski, 2025; Waldheim & Favargiotti, 2017). Former airports may therefore evolve into parks, public landscapes, mixed-use districts, or hybrid territories in which development and open space coexist.

A related debate concerns the physical treatment of inherited aviation infrastructure. One approach favours extensive removal, allowing entirely new urban structures to be introduced. Another emphasises selective preservation and reinterpretation as means of maintaining the spatial identity of the former airport (Pijet-Migoń, 2025). Raffa and Moscatelli (2026) describe inherited airfield morphologies as "operative spatial structures" (p. 2), suggesting that runways, aprons, and other existing elements can actively influence the organisation of new urban, public, and landscape functions.

In synthesis, Airport Urbanism demonstrates how the decommissioning of embedded airports can transform major spatial barriers into strategic opportunities for metropolitan regeneration. These territories should therefore be understood not only as real-estate assets, but also as complex and evolving spatial systems shaped by infrastructure, landscape, historical traces, governance, and public use.

2.3. Landscape Urbanism and the Drosscape of Obsolete Infrastructure

2.3.1. Landscape as an Organising Medium for Urban Transformation

As metropolitan regions have expanded and deindustrialised over the late twentieth and early twenty-first centuries, architecturally led models applied to large infrastructural territories have frequently proven inadequate for managing vast, decentralised urban fields. In response, Landscape Urbanism emerged as a theoretical paradigm asserting that landscape, rather than architecture, is the most capable medium for organising contemporary urban environments (Balon et al., 2023; Waldheim, 2016). Moving beyond the historical perception of landscape as a scenic pastoral exception to the city or a mere decorative accompaniment to buildings, this discourse positions landscape as an active, structural framework for urban development. Waldheim (2016) argues that this represents a fundamental disciplinary realignment wherein landscape becomes the basic building block of urbanism, uniquely suited to address the horizontal extensivity and ecological complexity of the modern metropolis.

Central to this discourse is the conceptualisation of landscape itself as a form of multifunctional infrastructure. Bélanger (2009) critiques the conventional, highly centralised engineering of the twentieth century, advocating instead for the recognition of biophysical systems—such as hydrology, vegetation, and topography—as decentralised infrastructural networks that generate and sustain urban economies. By treating landscape as a performative and operational system, designers can utilise surface conditions to activate urban space without relying on the rigid apparatus of traditional space-making (Waldheim, 2016).

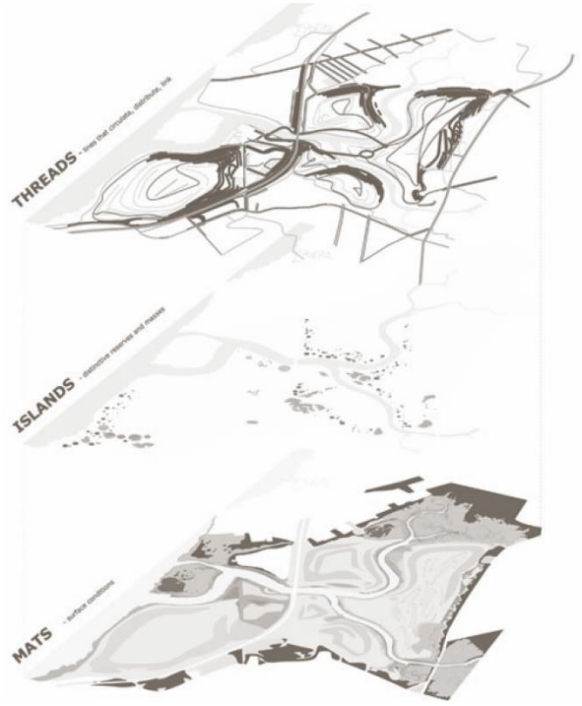


Figure 2.5: *Landscape as a decentralised organising infrastructure, visualised through a structural framework of operational layers. Source: Waldheim (2016)*

This theoretical shift is highly applicable to the regeneration of former urban airports. These territories consist of expansive, horizontal infrastructural fields that cannot be effectively structured by merely extrapolating the adjacent architectural grid. Applying the "Landscape First" principle, as reviewed by Balon et al. (2023, p. 747), allows urban planners to use the existing spatial, topographical, and ecological conditions of the obsolete airfield as the primary organisational matrix. By prioritising landscape as the foundational infrastructure, the former airport is not treated as a static void awaiting buildings, but rather as an active, living framework into which new forms of urban development, mobility, and public life can be integrated.

2.3.2. The Drosscape and the Revaluation of Obsolete Infrastructure

The transition of industrial and transport infrastructures into obsolescence has generated massive tracts of underused land within urban cores. Berger (2006) provides a critical vocabulary for these territories through his concept of the "drosscape". Berger defines drosscapes as the inevitable waste landscapes that accumulate in the wake of

technological innovation, deindustrialisation, and horizontal urban sprawl. Crucially, the discourse surrounding the drosscape distinguishes itself from a simplistic assumption that all such sites are heavily contaminated brownfields. While some obsolete landscapes do suffer from severe pollution requiring intensive remediation, Berger (2006) argues that dross is fundamentally a natural, interstitial byproduct of healthy, dynamically evolving cities. It encompasses any landscape that has become transitional, functionally redundant, or temporarily suspended between past economic uses and future urban reinvestment.

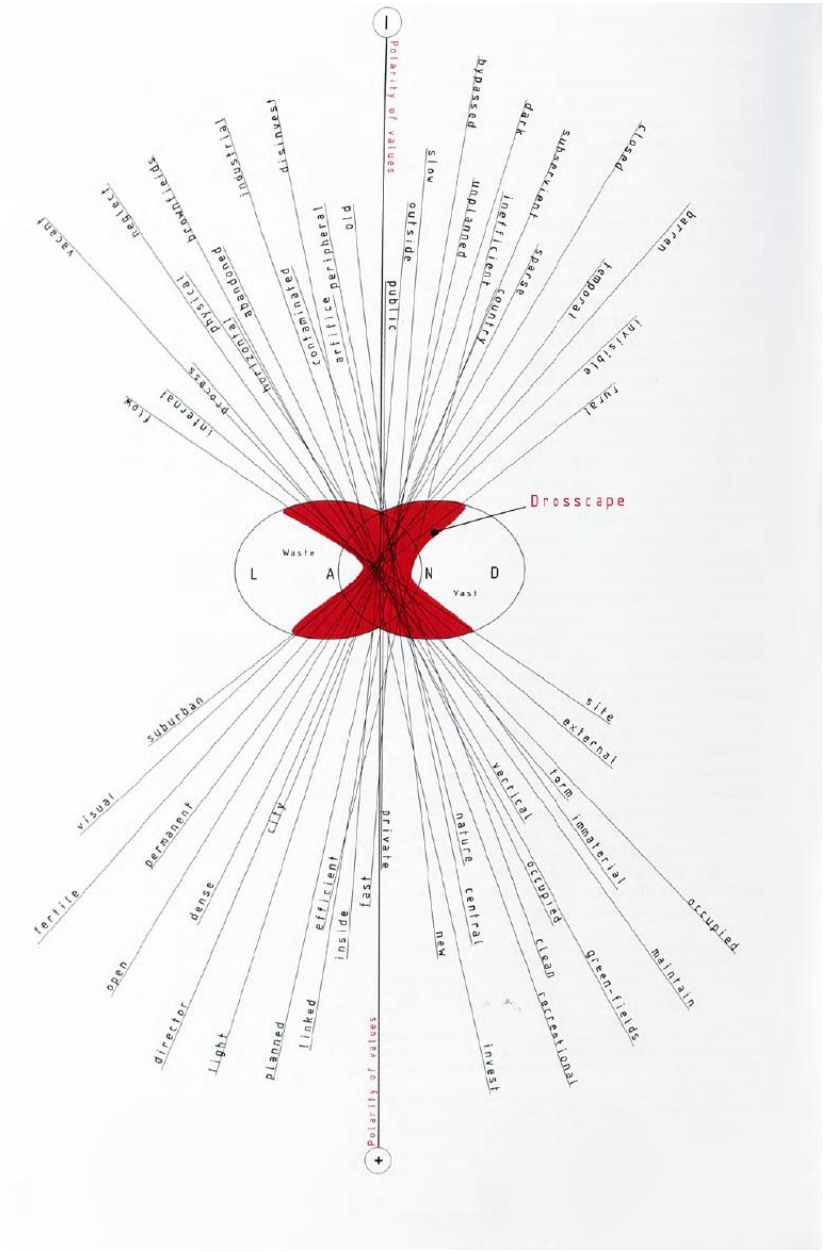


Figure 2.6: *The conceptual framework of the drosscape, mapping the intersection of waste and vastness within dynamically evolving urban regions. Source: Berger (2006, p. 240)*

This diagram (figure 2.6) conceptualises drosscape as the intersection between land perceived as waste and land characterised by its vast scale. The surrounding terms

represent contrasting social, spatial, economic, and environmental values—such as abandoned versus occupied, inefficient versus efficient, private versus public, and peripheral versus central—that shape how these territories are understood. Rather than presenting drosscape as simply vacant or obsolete land, the diagram highlights its ambiguous condition: it is simultaneously a residual product of urban and infrastructural change and a landscape with significant potential for reuse, adaptation, and future transformation.

Consequently, former airports are territories that can be interpreted through the drosscape concept, rather than automatically or definitively being drosscapes. Their defining characteristic in this context is their status as vast, liminal expanses left behind by shifts in global mobility and logistics. Landscape Urbanism challenges the traditional planning impulse to approach these obsolete infrastructural grounds as a *tabula rasa*—a blank slate requiring the total erasure of past interventions to impose a new urban vision.

Instead, theorists advocate for the selective reuse and productive reintegration of the existing ground. Bélanger (2009) argues for the de-engineering of urban infrastructure and emphasises the importance of material circulation. Treating these sites as dynamic systems allows for the recycling of site materials and the leveraging of existing infrastructural alignments to create new urban ecologies (Bélanger, 2009). For former airports, this implies that the heavy engineering of inherited surfaces need not be entirely demolished; rather, these existing hardscapes can be critically re-evaluated, partially unsealed, and reprogrammed to support new biological and social functions.



Figure 2.7: *Demobilisation and de-engineering: the morphological transition of obsolete urban infrastructure into an emergent landscape system. Source: Bélanger (2009, p. 85)*

2.3.3. Process, Indeterminacy, and Theoretical Limitations

A defining hallmark of Landscape Urbanism is its embrace of time, open-endedness, and ecological process as primary drivers of urban form. Unlike traditional master planning, which often attempts to dictate a fixed, final architectural composition, landscape-driven urbanism acknowledges the inherent unpredictability of the contemporary city. Waldheim (2016) highlights that landscape is uniquely capable of responding to temporal change and adaptation, making it an ideal model for the staging of uncertainty. By framing urban transformation as an ongoing, successional process, designers can establish flexible ecological and spatial parametres that allow the site to evolve gradually in response to shifting economic demands and social needs (Waldheim, 2016).

This process-based methodology relies heavily on the sequencing of long-term transformations (Bélanger, 2009). Rather than strictly maintaining a static, manicured park, former-airport territories can be designed to undergo phased natural succession, allowing flora, fauna, and water systems to mature alongside phased urban development. This approach can facilitate a resilient, incremental transformation that bridges ecology and urbanism over decades, addressing the large scale of an abandoned airfield without demanding an instantaneous, highly capital-intensive construction boom.

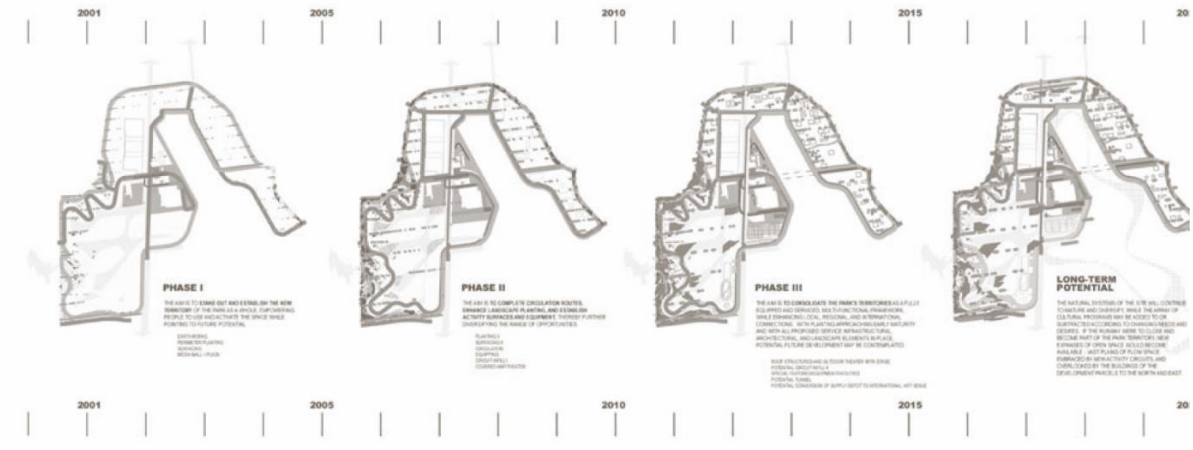


Figure 2.8: *The staging of uncertainty: chronological phasing diagrams illustrating the long-term ecological succession and incremental transformation of a former airfield. Source: Waldheim (2016)*

Despite its prominence in contemporary urban theory, Landscape Urbanism is subject to significant criticism. Balon et al. (2023) note that the discourse frequently suffers from lexical ambiguity and an overly abstract, theoretical nature. A primary critique is the absence of a concise methodological framework, which can lead to difficulties in distinguishing practical landscape urbanism projects from conventional landscape architecture (Balon et al., 2023). Furthermore, the application of these theories operates within complex political realities. Waldheim (2016) situates the discourse within neoliberal development conditions and identifies inherent tensions between ecological performance, design culture, and social or political engagement. This indicates that

relying on landscape to structure urban transformation requires navigating the broader economic forces that govern urban land.

In synthesis, Landscape Urbanism provides a useful conceptual framework for reconsidering the extensive and obsolete grounds of former airports as evolving spatial, ecological, and infrastructural systems. Its application, however, requires the translation of abstract principles of process, indeterminacy, and landscape performance into clear spatial and implementation strategies. This raises a related question concerning how large infrastructural territories can be reconnected to their surroundings and reorganised as accessible urban structures. The following section examines this question through the concepts of urban permeability and porous spatial structures.

2.4. Urban Permeability and Porous Spatial Structures

2.4.1. Conceptualising Permeability and Spatial Porosity

Within contemporary urban theory, the concepts of permeability and porosity are frequently conflated, yet they describe distinct spatial and morphological conditions. Permeability is primarily understood as a measure of physical accessibility and navigational choice. Bentley et al. (1985) define permeability as the extent to which an environment "allows people a choice of access through it, from place to place" (p. 12). High urban permeability is typically achieved through a fine-grained network of interconnected streets and short blocks, which provides a greater number of alternative routes, thereby enhancing both physical movement and visual awareness of the surrounding urban fabric (Bentley et al., 1985).

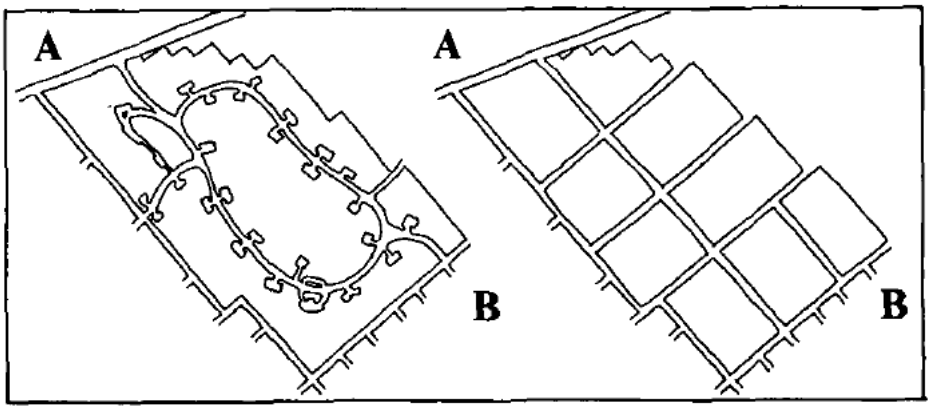


Figure 2.9: *Urban permeability as a function of route choice: the morphological impact of block size on physical accessibility. Source: Bentley et al. (1985, p. 12)*

Porosity, by contrast, operates as a broader socio-spatial concept. While permeability refers to the interconnectedness of pathways, porosity pertains to "soft transitions across geographies and to the interpenetration between spaces of a different character" (Castel'Branco & da Costa, 2024, p. 2). The theoretical foundation of urban porosity often traces back to Walter Benjamin and Asja Lacis's 1925 observations of Naples, where they described an urban condition defined by blurred boundaries, spatial ambiguity, and the

overlapping of public and private realms (Wolfrum et al., 2018). In this context, porosity accommodates fluid social interactions, temporal flexibility, and the co-existence of diverse urban functions within a shared spatial framework (Enright & Olmstead, 2023).

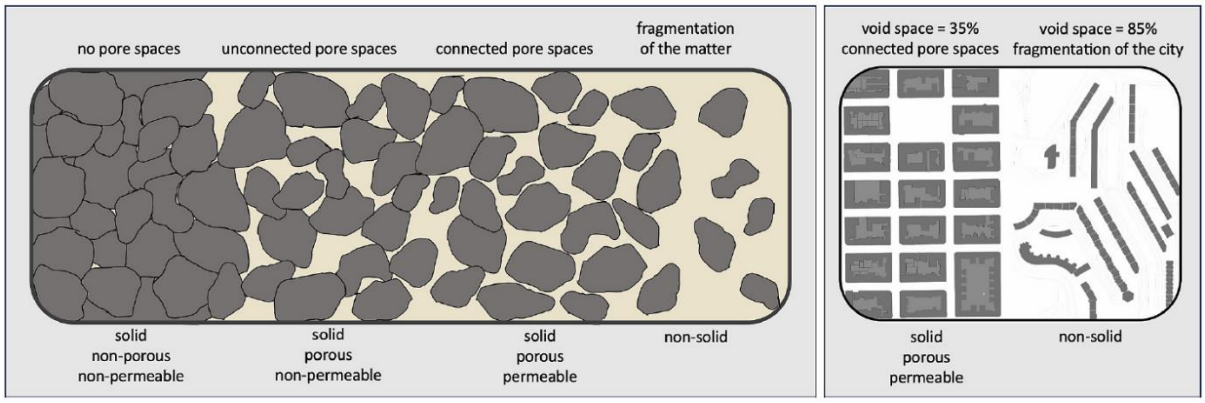


Figure 2.10: *Conceptual distinction between urban porosity and permeability, illustrating the transition from isolated spatial voids to interconnected morphological networks. Source: Castel'Branco & da Costa (2024, p. 9)*

For the regeneration of underused infrastructural territories, distinguishing between these concepts is methodologically useful. Establishing physical permeability is a fundamental step to reconnect an isolated site to the surrounding street network. Establishing spatial porosity, however, ensures that the site goes beyond mere transit to support the complex, indeterminate, and overlapping social practices that characterize diverse spatial environments.

2.4.2. Infrastructural Severance and Morphological Re-stitching

The necessity for urban permeability becomes particularly apparent when addressing the spatial fragmentation caused by twentieth-century modernist planning and large-scale transportation infrastructure. The modernist paradigm, characterised by strict functional segregation, large block sizes, and the prioritisation of high-speed vehicular corridors, fundamentally contradicted the principles of porous urban environments (Castel'Branco & da Costa, 2024). Operational urban airports frequently epitomise this condition of severance. Rather than universally impenetrable monuments, they are best understood as potentially extensive infrastructural enclosures that disrupt local continuity and establish rigid barrier effects across the metropolis.

Transitioning these enclosed territories back into the urban fabric—whether as mixed-use districts, metropolitan parks, or open landscapes—requires a systematic dismantling of their physical barriers. Although originally developed to assess accessibility in urban green spaces, the framework proposed by Barber et al. (2021) can be cautiously transferred to large infrastructural territories to systematically identify access restrictions. This framework categorises spatial limitations into three dimensions: "outside" barriers (e.g., surrounding high-speed arterial roads or railways that prevent approach), "boundary" barriers (such as continuous perimetre walls and fences), and

"inside" barriers (a lack of internal pathways or orienting infrastructure) (Barber et al., 2021). Achieving cross-site continuity demands that planners address all three levels, dissolving exclusionary perimetres to integrate the site with adjacent neighbourhoods.

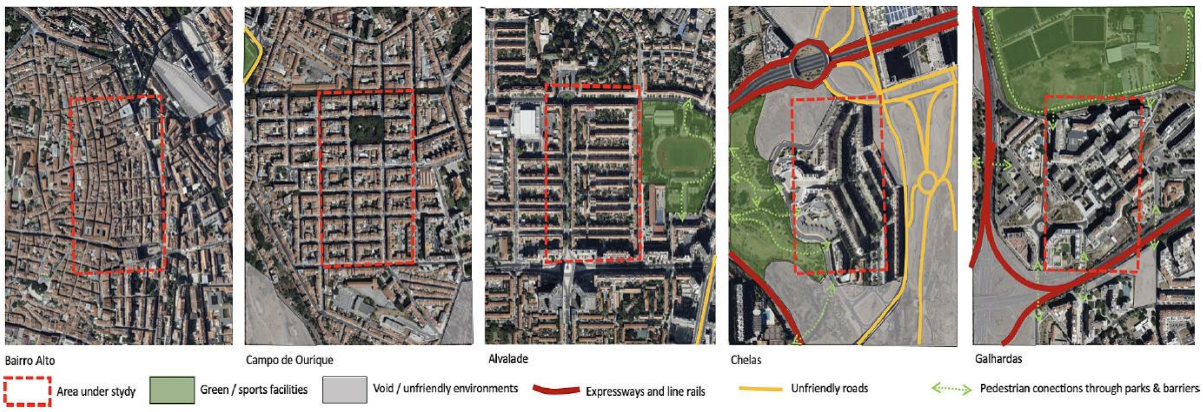


Figure 2.11: *Mapping urban severance and permeability: identifying infrastructural barriers, unfriendly environments, and cross-site pedestrian connections, Castel'Branco & da Costa (2024, p. 14)*

Furthermore, dismantling monolithic blocks through the introduction of spatial gaps and voids is also recognised as a morphological strategy for environmental permeability, facilitating necessary flows such as urban air ventilation (Ng et al., 2006).

However, achieving connectivity does not necessarily require the total erasure of the site's distinct scale. As theorised by Ungers et al. (1977) in their concept of the "green archipelago," vast urban territories can be preserved as distinct "islands" or urban "magnets." Rather than subsuming these territories entirely into a standard, fine-grained urban grid, their boundaries can be negotiated so that they remain identifiable open spaces that anchor metropolitan identity while simultaneously accommodating local cross-site movement.

2.4.3. Thresholds, Social Integration, and the Politics of Openness

The creation of a permeable and porous urban structure is not merely a technical exercise in carving new pathways; it is fundamentally about the architectural and social articulation of the public-private interface. To foster social integration, the edges of newly opened infrastructural sites must be conceived not as hard lines of demarcation, but as active "thresholds" (Wolfrum et al., 2018). A well-designed threshold creates a liminal space where differing social spheres can overlap safely, facilitating visual permeability and encouraging public use without compromising the necessary privacy of adjacent built forms (Bentley et al., 1985; Wolfrum et al., 2018).



Figure 2.12: *Morphological articulation of the active edge: demonstrating the interpenetration of public and private spheres to foster urban porosity and social integration. Source: Castel'Branco & da Costa (2024, p. 11)*

Despite its progressive connotations, the pursuit of urban porosity is accompanied by significant political ambiguities and limitations. Enright and Olmstead (2023) caution that porosity is a conceptually malleable term that can easily be co-opted by market-driven urban agendas. While planners may champion porosity as a means of fostering diversity, the unmitigated opening of previously enclosed territories often creates new frontiers for speculative real estate and capital accumulation.

In this context, scholars warn that removing physical boundaries does not automatically produce inclusive spaces. Detering and Beesley (2018) introduce the concepts of "negative porosity" and "pseudo porosity" to describe how market forces can exploit porous environments (p. 297). They argue that processes such as gentrification may produce certain short-term porosity effects in the form of social mixing, but these "pseudo-porous" conditions ultimately lead to long-term exclusion (Detering & Beesley, 2018, p. 298). The dismantling of borders can therefore expose vulnerable local communities to displacement by highly capitalised developments that mimic openness but function as socially exclusive enclaves (Enright & Olmstead, 2023).

In synthesis, the discourses of permeability and porosity establish that integrating a former airport into the city requires a critical approach to urban morphology. Designers must navigate the tension between establishing route choice across the wider metropolis and configuring thresholds that protect diverse social identities, ensuring that the resulting urban landscape is accessible without accelerating displacement.

2.5. Adaptive Reuse and Infrastructural Memory

2.5.1. Adaptive Reuse as a Territorial and Palimpsestic Practice

Within urban regeneration discourses, adaptive reuse is frequently understood as the functional and physical alteration of individual historic buildings. However, in the context of former aviation sites, this concept can be extended to encompass large infrastructural territories. Decommissioned airports comprise not only passenger terminals and hangars—which may sometimes possess significant architectural presence—but also

expansive horizontal surfaces, including runways, taxiways, and operational alignments (Pijet-Migoń, 2025). Rather than approaching these vast sites strictly through a *tabula rasa* methodology that assumes obsolete infrastructure should be completely cleared, or conversely, demanding their total preservation, scholars advocate for a more balanced spatial approach. This involves the careful consideration of retention, modification, replacement, and selective removal of existing structures to accommodate new urban realities (Plevoets & Van Cleempoel, 2019).

This territorial approach frequently relies on the conceptual metaphor of the palimpsest. Transferred from the practice of scraping and overwriting ancient manuscripts, the palimpsest metaphor frames the built environment as a layered territory where successive material and historical narratives coexist without completely erasing what came before (Plevoets & Van Cleempoel, 2019). Interpreting the site through the related lens of "infrastructural archaeology" allows planners to uncover, evaluate, and carefully integrate the physical traces of past aviation activities into new landscape and spatial systems (Favargiotti, 2018). Within this framework, it is methodologically useful to distinguish adaptive reuse from traditional conservation and restoration. While conservation focuses primarily on maintaining the existing historic fabric to prevent decay, and restoration seeks to return a place to a known earlier condition, adaptive reuse actively introduces a contemporary layer. This facilitates functional change while maintaining a legible dialogue with the site's history (Plevoets & Van Cleempoel, 2019; Vafaie et al., 2023).

2.5.2. Infrastructural Memory, Identity, and Selective Reinterpretation

Retaining inherited aviation infrastructure can play a significant role in establishing the identity of a regenerating district. The physical remnants of early flight experiments, wartime logistics, or civil passenger aviation can potentially support cultural awareness, historical education, and public remembrance (Pijet-Migoń, 2025; Szuta, 2019). By preserving selected elements, urban planners can connect contemporary communities with the historical continuum of their environment, anchoring new developments in a specific local context.

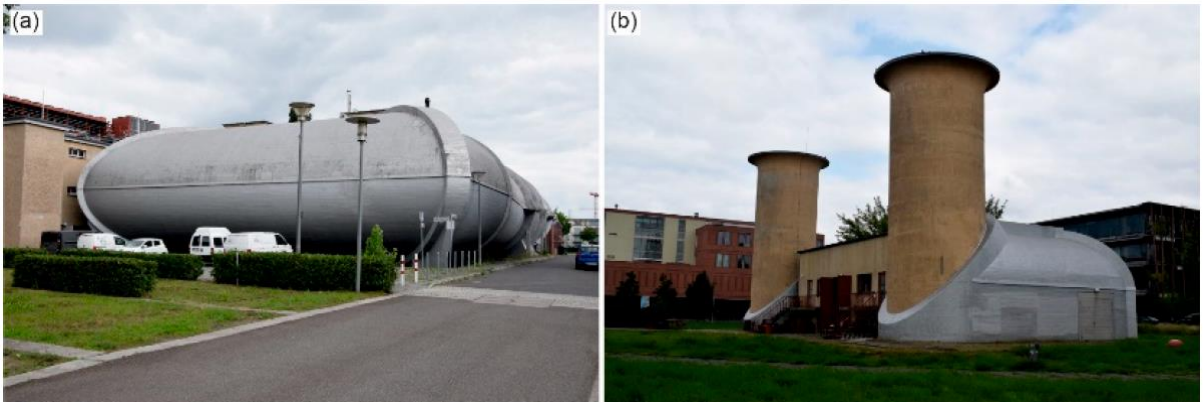




Figure 2.13: *Selected aviation structures preserved as technical and cultural heritage within a transformed former-airport territory. Source: Pijet-Migoń (2025, p. 13)*

However, the transition of a former airport into a functioning urban district requires an acknowledgement that heritage value must be rigorously assessed; it is not automatically possessed by every surviving infrastructural element. The designation of what constitutes a heritage monument is widely understood as a contemporary social construct (Plevoets & Van Cleempoel, 2019). This implies that planners must engage in a careful process of evaluation to determine which structures hold genuine historical or architectural significance, and which redundant elements may be selectively removed to open the site to new public uses.

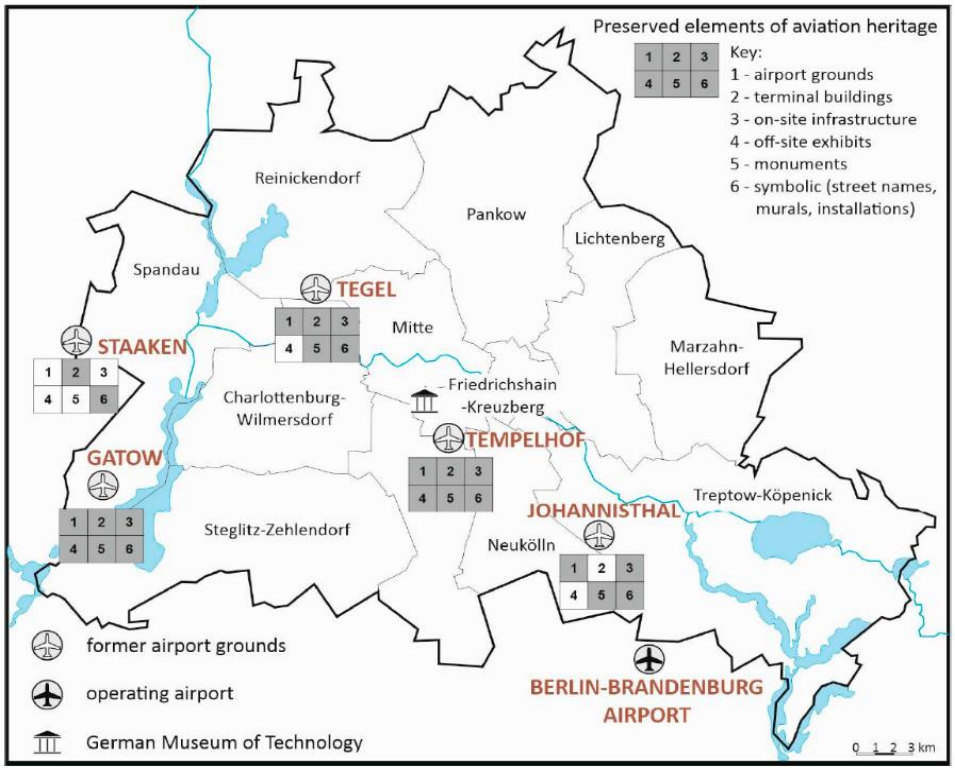


Figure 2.14: *Mapping selective retention: a comparative matrix of surviving aviation infrastructure, spatial voids, and commemorative elements across decommissioned airports. Source: Pijet-Migoń (2025, p. 17)*

For those structures and alignments that are retained, their integration often involves possible processes of "re-semiotisation" or "re-signification" (Ma et al., 2025). Through these processes, historical structures may be assigned new cultural narratives and contemporary urban functions, preventing them from becoming static relics. To achieve this theoretically, scholars look toward the classical principle of *aemulatio*. Rather than indicating a direct, uncritical imitation (*imitatio*) of the past or a mere aesthetic improvement, *aemulatio* is redefined within adaptive reuse as a creative reinterpretation of inherited qualities (Plevoets & Van Cleempoel, 2019). It suggests that historical forms and spatial logics can be critically translated to meet modern requirements, allowing the infrastructure to maintain its historical resonance while actively accommodating new civic or commercial programmes.

2.5.3. Navigating the Tensions and Limitations of Heritage Transformation

The transformation of decommissioned aviation territories involves navigating complex tensions between preservation and urban redevelopment. Because obsolete airfields often occupy vast tracts of land, they frequently face significant market and political pressures for extensive removal and replacement to accommodate urban growth (Markova & Stola, 2023). However, erasing the site entirely can delete its infrastructural memory, potentially resulting in generic urban developments that are disconnected from their historical context (Favargiotti, 2018; Pijet-Migoń, 2025).



Figure 2.15: *Comprehensive redevelopment of a former airport and the associated loss* of its legible aviation morphology. *Source:* Favargiotti (2018, p. 92)

Conversely, attempting comprehensive preservation presents its own spatial challenges. When structures are retained, designers must distinguish comprehensive preservation—which maintains both the internal spatial logic and structural integrity of a building—from façadism. Façadism involves preserving only the exterior shell of a historic structure

while entirely replacing its interior to serve new functions. While sometimes employed as a pragmatic compromise to retain streetscape character, critics warn that façadism can severely compromise a building's historical integrity (Plevoets & Van Cleempoel, 2019). Although façadism does not automatically result in "Disneyfication," treating heritage purely as a static visual aesthetic without genuine functional integration risks creating a superficial branding of the past (Plevoets & Van Cleempoel, 2019).

Furthermore, the practical implementation of adaptive reuse is constrained by numerous technical and regulatory factors. At the building scale, historical structures often fail to meet contemporary building codes, requiring invasive upgrades to satisfy modern legal standards for fire safety, energy efficiency, and accessibility (Vafaie et al., 2023). Economically and managerially, securing capital for remediation and establishing long-term management plans requires robust stakeholder coordination to ensure the new functional uses are compatible with the original structures (Vafaie et al., 2023). At the wider territorial scale, planners face the immense challenge of managing the massive horizontal footprints of the airfield, balancing the environmental impacts of vast sealed surfaces with the ecological and recreational potentials of the landscape (Favargiotti, 2018; Pijet-Migoń, 2025).

Ultimately, adaptive reuse requires an evidence-based balance between historical continuity, functional change, technical feasibility, economic viability, and contemporary social needs.

2.6. Environmental Regeneration and Climate-Responsive Landscape

2.6.1. Ecosystem Health and the Mechanisms of Urban Heat Mitigation

The large-scale transformation of obsolete infrastructural territories requires a comprehensive approach to environmental regeneration. When these sites are redeveloped, the process often involves brownfield reclamation, which aims to de-seal impervious surfaces and restore landscape quality (Oudes & Stremke, 2018). Within this context, integrating green infrastructure serves broader ecological purposes beyond climate adaptation, particularly by promoting biological diversity and supporting overall ecosystem health (Tzoulas et al., 2007). By implementing a combination of green, blue, and grey infrastructure, urban planners can harness multifunctional ecosystem services that manage stormwater runoff, enhance resilience, and mitigate urban overheating (Kumar et al., 2024).

To accurately evaluate how these landscapes modify the urban climate, it is helpful to distinguish between physical meteorological parametres and physiological indicators, as they capture different phenomena (Bartesaghi Koc et al., 2018). Land Surface Temperature (LST) refers to the temperature of land and built surfaces, which is usually estimated through thermal remote sensing. Ambient air temperature, by contrast, measures the actual heat of the atmosphere. To understand human thermal stress,

researchers use specific indices such as the Universal Thermal Climate Index (UTCI) or Physiologically Equivalent Temperature (PET). These indices estimate the physiological stress experienced by the human body by combining air temperature, radiant conditions (measured as Mean Radiant Temperature, or Tmrt), atmospheric humidity, and wind speed into a single metric (Bartesaghi Koc et al., 2018).

Vegetation and water bodies regulate these metrics through several physical processes. Canopy trees lower daytime surface temperatures primarily through shading; by intercepting solar radiation before it strikes the ground, they reduce both LST and Tmrt (Norton et al., 2015). Concurrently, plants cool the ambient air through evapotranspiration, a process in which water vapour is released into the atmosphere, converting sensible heat into latent heat (Azmeer et al., 2024). Blue infrastructure, such as constructed ponds or wetlands, provides evaporative cooling. However, water possesses a high heat capacity, allowing it to act as a thermal buffer. Consequently, blue infrastructure absorbs daytime heat and may release it at night, meaning its cooling efficiency fluctuates depending on local wind conditions and the time of day (Kumar et al., 2024).

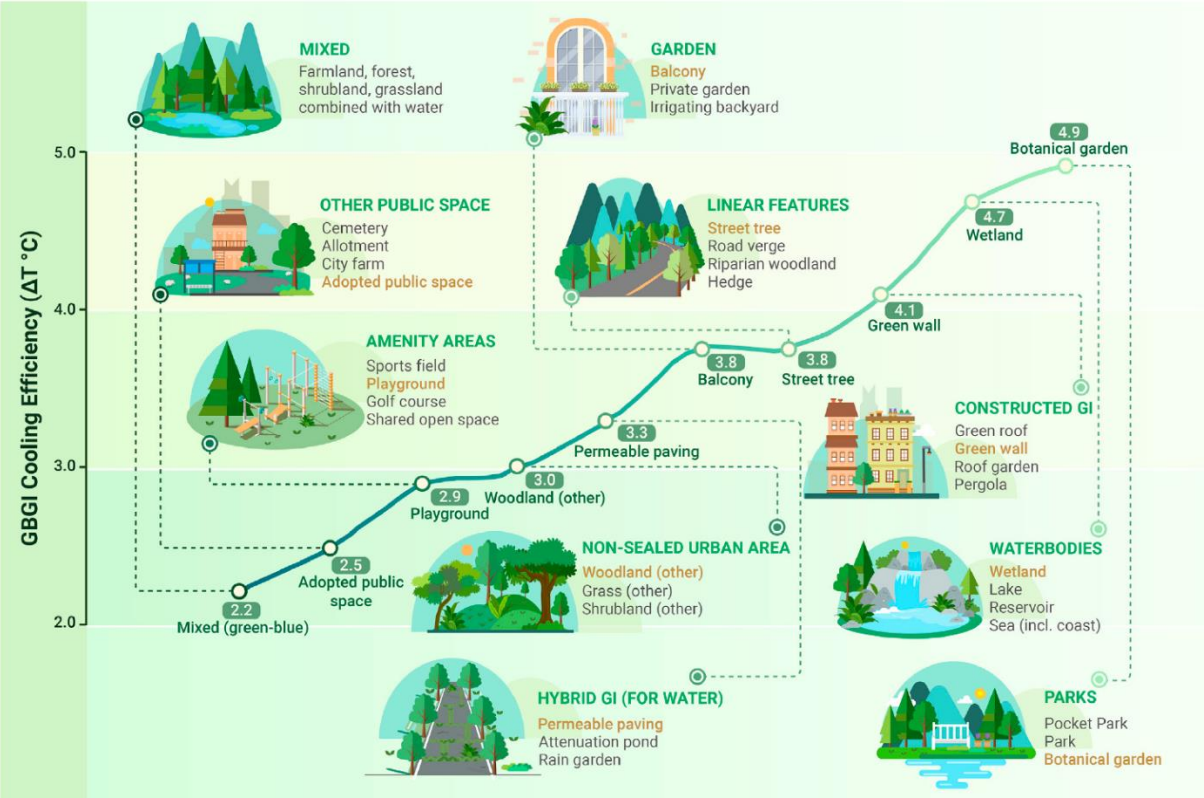


Figure 2.16: *Main categories of green–blue–grey infrastructure and their reported urban cooling performance. Source: Kumar et al. (2024)*

2.6.2. Spatial Scale and the Cooling Reach of Green Infrastructure

The climatic performance of green infrastructure varies across the different scales that define the urban environment, from the mesoscale of the wider city down to the microscale of individual streets and parks (Oke et al., 2017). At the mesoscale, large areas

of contiguous green space may influence local or mesoscale temperature and circulation patterns under specific meteorological conditions. Using the Weather Research and Forecasting (WRF) model to simulate a severe heatwave in the Greater Athens Area, Kalogeri et al. (2025) assessed the impacts of a planned coastal metropolitan park. The mesoscale simulations indicated that replacing sealed surfaces with a large-scale park could achieve daytime air temperature reductions of approximately 1.5 °C, with a cooling reach extending up to 2 kilometres. The study noted, however, that this cooling effect was highly dependent on the site's interaction with regional sea-breeze circulations (Kalogeri et al., 2025).

At the microscale, the distance of influence is generally shorter and is guided by the structural composition of the vegetation. In an empirical monitoring study of small green spaces (0.49 to 2.04 hectares) in Almada, within the Lisbon metropolitan region, Grilo et al. (2020) utilised a high-spatial-resolution sensor network to measure microclimatic variations. The statistical analysis showed that tree-dominated spaces reduced local air temperatures by 1 to 3 °C and increased relative humidity by 2 to 8%. Furthermore, the data indicated that the cooling influence of the tree canopy extended up to approximately 60 metres from the park boundaries (Grilo et al., 2020).

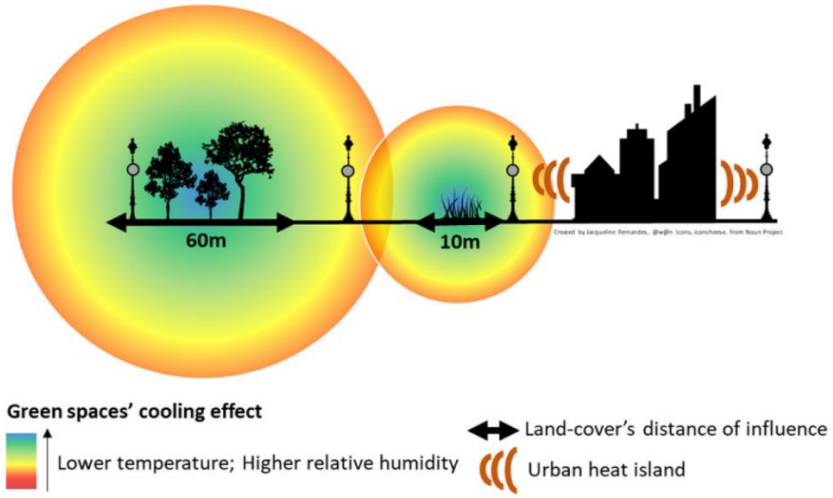


Figure 2.17: *The spatial reach of microclimatic regulation: illustrating the distance of cooling influence exerted by tree-dominated versus grass-dominated green spaces. Source: Grilo et al. (2020, p.1)*

The localised temperature difference between a vegetated area and its artificial surroundings is known as the Park Cool Island (PCI) effect. Oliveira, Andrade, and Vaz (2011) quantified this effect through field measurements in the 0.24-hectare Garden Teófilo de Braga in central Lisbon. They recorded a median air temperature cooling effect of 1.6 °C when comparing the park to sun-exposed streets. The maximum measured microclimatic difference reached 6.9 °C in air temperature and 39.2 °C in Tmrt between the shaded interior of the garden and an adjacent, unshaded east-west-oriented street. These findings illustrate that the magnitude of the Park Cool Island is influenced by the degree of solar exposure in the surrounding urban fabric (Oliveira et al., 2011).

2.6.3. Urban Morphology and Localised Thermal Comfort

Microclimatic variations in the built environment highlight the relationship between green infrastructure and the spatial morphology of the city. The geometrical configuration of buildings and streets is commonly expressed through the canyon aspect ratio (height-to-width, H:W) and the Sky View Factor (SVF), both of which influence the amount of solar radiation that enters a space and the longwave radiation that is trapped within it (Oke et al., 2017). Therefore, the integration of green infrastructure is most effective when tailored to these morphological conditions. Norton et al. (2015) suggest that the prioritisation of street trees can be guided by the self-shading capacity of the urban geometry; wide streets with low building heights (low H:W ratios) receive high solar exposure and therefore represent priority locations for canopy shading. Urban green open spaces cool more effectively if they contain scattered trees and receive irrigation and their spatial layout and vegetation structure will be important in determining their cooling potential

UGI	Green open spaces	Trees	Green roofs	Vertical greening
Shades canyon surfaces?	Yes, if grass rather than concrete	Yes	Shades roof, not internal canyon surfaces	Yes
Shades people?	Yes, if treed	Yes	No, only very intensive green roofs	No
Increases solar reflectivity?	Yes, when grassed	Yes	Yes, if plants healthy	Yes
Evapo-transpirative cooling?	Yes, with water	Yes (unless severe drought)	Yes, with water when hot	Yes, with water when hot
	No, without water		No, without water	No, without water
Priority locations	• Wide streets with low buildings – both sides • Wide streets with tall buildings – sunny side	• Wide streets, low buildings – both sides • Wide streets, tall buildings – sunny side • In green open spaces	• Sun exposed roofs • Poor insulated buildings • Low, large buildings • Dense areas with little available ground space	• Canyon walls with direct sunlight • Narrow or wide canyons where trees are unviable

Figure 2.18: *Modes of cooling provided by different urban green infrastructure options during summer and priority locations to optimise those cooling benefits. Source: Norton et al. (2015, p.6)*

The interaction between urban morphology and vegetation has a direct impact on outdoor thermal comfort. To assess this relationship, Reis, Nouri, and Lopes (2023) modelled the UTCI across various Local Climate Zones (LCZs) in Lisbon during very hot summer days. Their simulations indicated that densely wooded sample areas were on average 2 °C cooler during the day than highly compact, mineralised LCZs. When addressing thermal stress, the authors emphasised the combined importance of providing shade while preserving urban ventilation paths to support cooling and physiological recovery (Reis et al., 2023).

When targeted precisely, nature-based interventions can provide relief for populations vulnerable to thermal stress, such as senior citizens. Tousi, Mela, and Tseliou (2025) conducted ENVI-met simulations in a densely built neighbourhood in Athens to assess dynamic thermal comfort during a heatwave. By simulating an optimised scenario that integrated mature trees and 1-square-metre water features into the existing urban grid, the authors observed measurable improvements in the Physiologically Equivalent

Temperature (PET). During the peak afternoon hours (3:00 p.m.), the simulated nature-based interventions resulted in a maximum local PET reduction of 14.55 °C in newly shaded areas compared to the baseline scenario, demonstrating potential improvements in pedestrian thermal comfort (Tousi et al., 2025).

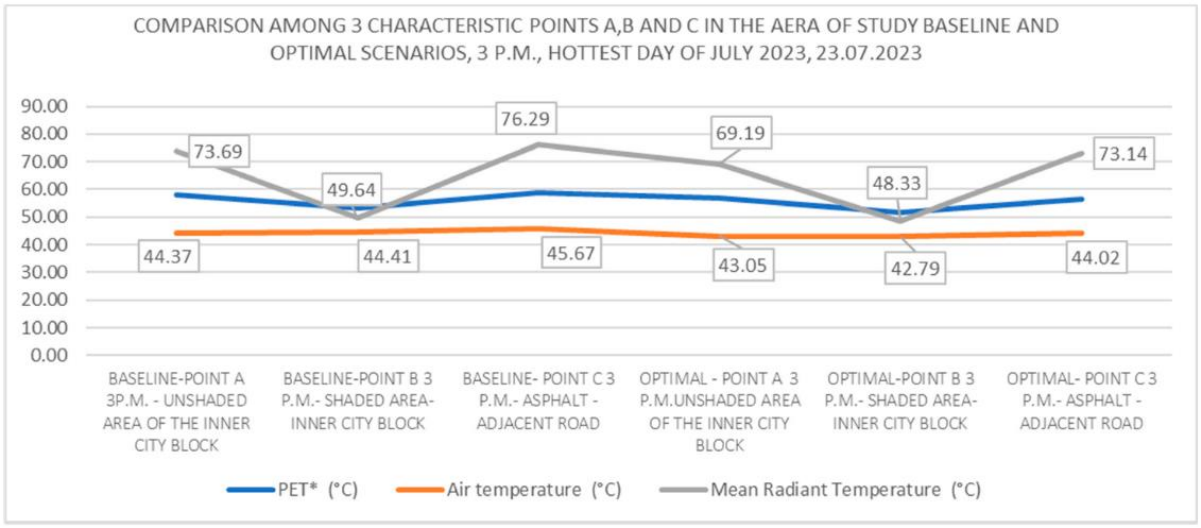


Figure 2.19: *Mitigating extreme Mediterranean heat stress: comparative analysis of Physiologically Equivalent Temperature (PET) and Mean Radiant Temperature reductions following targeted nature-based interventions. Source: Tousi, Mela & Tseliou (2025, p. 22)*

2.6.4. Mediterranean Constraints and Context-Specific Performance

Translating climate-responsive mechanisms into landscape redevelopments involves adapting to the practical constraints of the local geography. Mediterranean climates are characterised by a temporal mismatch, as the period of highest urban heat coincides with dry summers. During these seasonal droughts, the capacity of vegetation to naturally cool the air through evapotranspiration is restricted unless it is supported by irrigation (Azmeer et al., 2024). As Graça et al. (2022) note in their review of green space design, planners must navigate specific trade-offs; while extensive green and blue infrastructure helps mitigate heatwaves, its water demand may conflict with regional water scarcity. Climate adaptation in these regions requires careful species selection and integrated stormwater management to sustain the cooling functions of the landscape over time (Graça et al., 2022).

Generating a meaningful reduction in ambient temperatures across a city also involves significant spatial considerations. Reis and Lopes (2019) evaluated the cooling potential of green spaces in Lisbon using remote sensing imagery and field measurements. Through their analysis, they developed a study-specific statistical relationship indicating that achieving a 1 °C reduction in ambient air temperature corresponded to an increase of 50 square metres of planar vegetation for a given location. While this finding reflects a specific statistical observation, it highlights the spatial scale required to achieve measurable temperature reductions in a dense urban environment (Reis & Lopes, 2019).

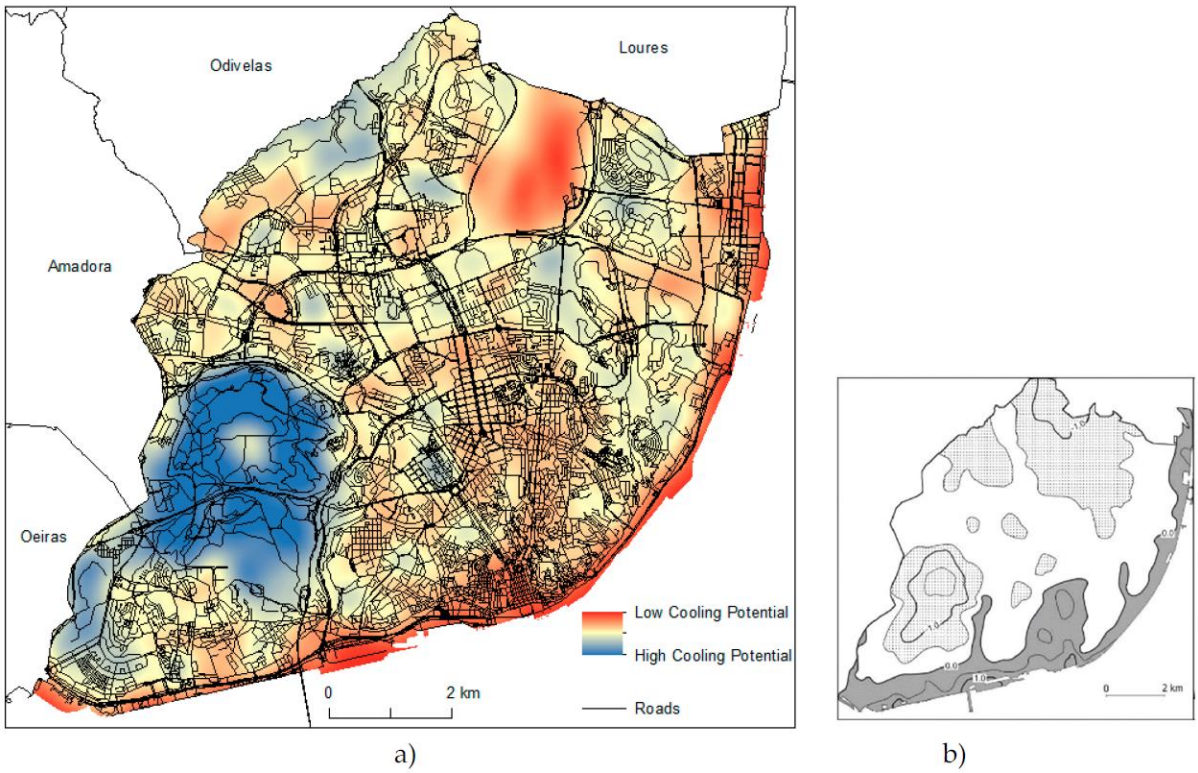


Figure 2.20: *Estimated summer cooling potential of Lisbon's urban vegetation in relation to the city's nocturnal Urban Heat Island pattern. Source: Reis & Lopes (2019, p. 11)*

In conclusion, large obsolete infrastructural territories may provide valuable opportunities for environmental regeneration, offering the contiguous space required to introduce significant unsealed soil and biomass into the urban matrix. However, their actual climatic performance remains dependent on site-specific assessment, the configuration of the surrounding urban morphology, and the sustainable management of water resources in a warming climate.

2.7. Public Space, Civic Appropriation, and Temporal Use

2.7.1. Conceptualising Public Space and Civic Appropriation

In contemporary urban theory, the public character of space cannot be reduced strictly to legal ownership or mere physical accessibility. While public ownership provides the fundamental legal framework for access, formal public status does not guarantee an active public life (Franck & Huang, 2023; Qi et al., 2024). To understand how spaces are actually inhabited, Gehl (2011) provides a useful distinction between three types of outdoor activities. Necessary activities, such as commuting to work or running errands, occur under most conditions regardless of the environment's quality. Optional activities, such as strolling or resting, depend more strongly on favourable environmental conditions that invite people to linger. Finally, social activities—ranging from passive people-watching to active conversations—emerge primarily through the presence and interaction of others within the space (Gehl, 2011).

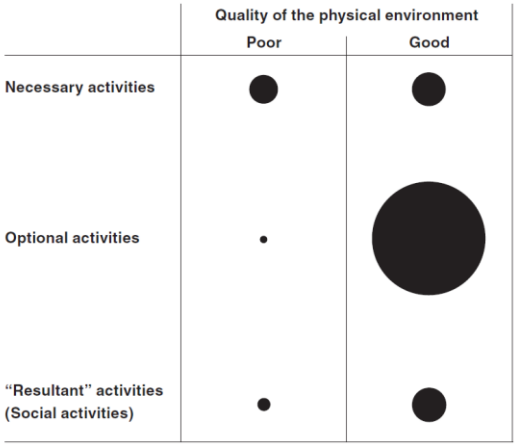


Figure 2.21: *Necessary, optional, and social activities as distinct but interrelated dimensions of public life. Source: Gehl (2011, p. 10)*

The activation of the public realm often involves processes of civic appropriation. Lara-Hernandez et al. (2019) describe appropriation as a dynamic practice wherein people use public spaces to carry out individual or collective activities that may differ from the site's original intended purpose. This capacity for unplanned use is central to the concept of loose space, explored by Franck and Stevens (2007). Unlike highly regulated or themed commercial environments, loose space is a condition characterised by possibility and diversity, where citizens can recognise affordances in the physical landscape and adapt them for informal social or recreational uses (Franck & Stevens, 2007).

Table 2.1: *Typologies of temporary appropriation: categorising the informal economic, recreational, and sacral uses of public space. Source: Lara-Hernandez et al. (2019)*

Categories	Economy		Leisure			Sacralisation
Description	Any activity in which a person or group uses the public space in order to obtain an economic benefit directly or indirectly.		Any activity in which a person or a group uses the public space for leisure purposes.			Any activity in which a person or a group uses the public space for religious purposes.
Sub-category	Work	Trade	Sports-games	Artistic expressions	Rest	-
Individual or collective	Advertising or promoting services, waiting, engaging in attracting potential clients.	Selling or buying products (food, handicraft, clothes, etc.)	Skateboarding, soccer, cards, marbles, hopscotch.	Playing music, dancing, painting, acrobatics, reciting and singing.	Eating, resting	Processions, praying, lighting candles and putting flowers.



Figure 2.22: *The manifestation of loose space: the temporary appropriation of a vehicular street for informal social and recreational activities. Source: Franck & Huang (2023, p. 19)*

In the context of large, decommissioned infrastructural territories such as former airports, looseness may provide a supportive condition for initial appropriation and unplanned use. However, while establishing a degree of spatial flexibility can be beneficial, it is not a compulsory requirement for successful regeneration; these vast, formerly exclusionary zones may gradually evolve into cohesive urban districts through a variety of structured and unstructured morphological approaches.

2.7.2. Temporal Use and the Activation of Transitional Territories

The transformation of obsolete urban infrastructure is increasingly understood as a time-based, transitional process. When large-scale sites become redundant, they often leave behind vacant lands that may resist immediate redevelopment due to contamination, high capital costs, or complex political negotiations (Németh & Langhorst, 2014). Within these transitional periods, temporary and "meanwhile" uses can emerge as complementary, experimental, and transitional tools rather than straightforward replacements for long-term urban planning.

Németh and Langhorst (2014) note that temporary uses can introduce an incremental flexibility to sites that might otherwise remain vacant. While temporary activities—such as informal markets, pop-up cultural events, or spontaneous recreation—do not immediately create a fully functioning civic life, they offer the potential to test alternative

urban futures before permanent infrastructural commitments are finalised. When strategically facilitated, these interim occupations can serve as "breeding grounds" (Oswalt et al., 2013, p. 11) for social innovation and cultural production.

Furthermore, the activation of these large territories frequently relies on temporal variation. Urban spaces are shared across time by different publics whose routines fluctuate by the hour, day, or season (Franck & Stevens, 2007). An expansive post-aviation landscape might host large-scale festivals on weekends while accommodating everyday pedestrian routines during the week. However, while temporal diversity may broaden the overall patterns of use, it does not automatically prevent the domination of the site by specific demographic groups, guarantee broad social inclusion, or inherently create a unified collective identity for the territory (Franck & Stevens, 2007; Qi et al., 2024).



Figure 2.23: *Temporal variation and changing rhythms of use: the same urban site accommodating entirely different spatial programmes, informal appropriations, and user groups between day and night. Source: Dovey & Polakit in Franck & Stevens (2007, p. 123)*

2.7.3 Tensions, Governance, and the Politics of Inclusion

While informality and temporary use are frequently championed as democratic practices, flexibility and openness do not automatically produce equitable public space. The appropriation of large urban voids is often accompanied by significant socio-spatial tensions, as diverse groups compete for the same territory with differing claims and varying definitions of acceptable behaviour (Franck & Stevens, 2007).

A primary tension exists between informal civic appropriation and the pressures of commercialisation. Unregulated temporary uses are sometimes leveraged by property owners or municipalities as branding tools to raise the profile of a derelict site (Oswalt et al., 2013). The subcultural energy of temporary art installations or informal markets can accelerate real-estate pressure in adjacent neighbourhoods. Consequently, this dynamic may contribute to gentrification, potentially leading to the displacement of the pioneer users and vulnerable populations who initially activated the space (Oswalt et al., 2013). Moreover, as formerly abandoned sites are formalised into officially sanctioned public spaces, they frequently undergo a tightening of regulations. The introduction of

surveillance, intensive maintenance regimes, and strict safety regulations is often necessary to manage large crowds, but this intensive regulation may have exclusionary effects, inadvertently marginalising certain groups in favour of a sanitised aesthetic of order (Franck & Huang, 2023).

Addressing these tensions requires a critical discussion of urban governance. Effective management of transitioning infrastructural territories combines enabling, regulation, negotiation, maintenance, and conflict management (Németh & Langhorst, 2014; Oswalt et al., 2013). Rather than rigidly programming every hectare, governance frameworks can maintain opportunities for adaptable, non-commercial, and user-led activities, ensuring that informal practices are not entirely subsumed by market-driven development. Ultimately, conflict and negotiation should be recognised as continuing, inherent features of public space, rather than assuming that complete social cohesion is an achievable or static end state (Franck & Stevens, 2007; Qi et al., 2024).

2.8. Case-Study Selection and Analytical Framework

2.8.1. Rationale for Comparative Case Selection

The decommissioning of large-scale urban airports presents one of the most profound spatial challenges in contemporary planning. When these sprawling aviation infrastructures become obsolete, they leave behind monumental voids deeply embedded within the consolidated city. To explore how different metropolitan regions navigate the complex transition from exclusionary operational airfields to integrated urban environments, this thesis examines four prominent international case studies: Kai Tak in Hong Kong, The Ellinikon in Athens, Tempelhofer Feld in Berlin, and Parque Bicentenario in Quito.

These four sites were selected because they embody a diverse spectrum of post-aviation urban regeneration. They are not presented here as universally successful examples, nor are they intended to serve as direct, replicable templates for the future transformation of Lisbon's Humberto Delgado Airport. Rather, their relevance lies in the contrasting experiences they present. By exploring their distinct implementation pathways, conflicts, and limitations, the thesis can extract nuanced, transferable lessons for managing large-scale infrastructural transitions.

As a comparative group, the four projects share a common baseline condition: each originated as a large, enclosed aviation territory embedded within or adjacent to consolidated urban areas, where airport infrastructure interrupted local spatial continuity and became increasingly incompatible with its urban context. However, beyond this shared starting point, they diverge significantly. Geographically, they span varied climates and topographies, from the dense coastal setting of Hong Kong's Victoria Harbour to the high-altitude Andean plateau of Quito. Morphologically, they range from elongated, constrained runway strips to vast, rounded airfield expanses.

Crucially, the selected cases capture a wide variety of redevelopment intensities and planning processes. Some projects, such as Kai Tak and The Ellinikon, involve development-intensive transformations in which substantial new urban programmes coexist with large public landscapes. However, they operate through different governance models: Kai Tak is primarily shaped by state-led planning and public infrastructure investment, whereas The Ellinikon follows a more explicitly investment-led development model. By contrast, Tempelhofer Feld represents a substantially different approach based on minimal physical intervention and the preservation of the open airfield. Here, extensive civic participation and the 2014 preservation referendum contributed to the legal protection of the field from conventional real-estate development. (Senate Department for Urban Development, Building and Housing, 2024).

By encompassing distinct governance structures, varying levels of public participation, and contrasting balances between new built construction and open landscape, this selection enables a critical evaluation of the divergent ways cities treat inherited infrastructure.

2.8.2. The Analytical Framework

To ensure a rigorous and objective comparative analysis, the examination of the four cases is structured around a common analytical framework. This framework translates the six theoretical discourses established in the preceding literature review into concrete criteria, providing a consistent academic lens through which to interrogate the spatial, social, and ecological realities of each site. Rather than assigning a fixed theoretical concept or a predetermined spatial strategy to each case in advance, this framework allows concepts to emerge organically from the comparative analysis.

First, drawing upon the discourse of *Airport Urbanism and Post-Aviation Landscapes*, the analysis investigates the specific causes of airport closure and spatial obsolescence. It considers how geographical constraints, capacity limitations, and the friction between expanding urban populations and the environmental impacts of inner-city flights ultimately forced the relocation of aviation operations, thereby opening the site for spatial restructuring.

Second, to understand how these isolated territories are stitched back into the metropolis, the framework utilises the principles of *Urban Permeability and Porous Spatial Structures*. This criterion evaluates the site's relationship with the surrounding urban fabric, focusing on the treatment of edges, the improvement of public access, and the morphological strategies deployed to establish transversal connectivity across former barriers.

Third, the analysis considers the balance between new development and open space, guided by *Landscape Urbanism and Drosscape* theory. It examines the physical transformation of massive horizontal surfaces—including runways, aprons, and sealed grounds. It questions whether the decommissioned airfield was treated as a blank slate

for conventional development or re-imagined as a dynamic landscape that acts as the primary organising medium for the new district.

Fourth, addressing the physical legacy of aviation, the framework applies concepts of *Adaptive Reuse and Infrastructural Memory*. This aspect explores the tension between material erasure and historical continuity. It scrutinises how planners approached the preservation, removal, or creative reinterpretation of monumental aviation heritage, evaluating how the memory of the airport is embedded within the contemporary urban landscape.

Fifth, the social dimension of the transformation is evaluated through the lens of *Public Space, Civic Appropriation, and Temporal Use*. This criterion investigates how each project transitioned from a highly controlled aviation facility to an accessible civic arena. It focuses on the accommodation of everyday use, temporary activities, and large-scale events, alongside the socio-spatial tensions that often emerge between spontaneous community appropriation and formal, market-driven planning (Delang & Ng, 2009).

Sixth, the framework assesses *Environmental Regeneration and Climate-Responsive Landscape* interventions. It evaluates whether and how each project addressed sealed surfaces, vegetation, water management, ecological continuity, and climatic performance after airport closure. This includes reviewing efforts to de-seal massive asphalt surfaces, restore soil functions, manage stormwater, and introduce ecological networks, paying close attention to context-specific performance and regional vulnerabilities such as Mediterranean water scarcity.

Finally, the analytical framework grounds these theoretical evaluations in the practical realities of urban planning by reviewing governance, phasing, implementation, and actual observed outcomes. By comparing the diverse management and financing models—ranging from state-led masterplanning and corporate oversight to bottom-up civic activism—the analysis captures the pragmatic compromises and ongoing conflicts that ultimately shape the physical reality of the regenerated landscape.

2.9. Kai Tak project

2.9.1. Introduction: Kai Tak Development (KTD)

The Kai Tak Development (KTD) represents one of the most ambitious and intricate urban regeneration initiatives in recent history. Spanning over 320 hectares, the project encompasses the site of the former international airport and its surrounding hinterland districts, including Kowloon City, Wong Tai Sin, and Kwun Tong. Rather than viewing the decommissioned airport as a mere "urban void," the KTD framework treats it as a strategic catalyst—a mega-development designed not only to reshape Hong Kong's future skyline but to breathe new life into the aging fabric of adjacent neighbourhoods. The vision for the Kai Tak Outline Zoning Plan is built around a multi-faceted identity: a heritage, green, sports, and tourism hub. By prioritizing a "people-oriented" approach,

the project seeks to transform this vast industrial relic into a vibrant, high-quality public realm fronting the iconic Victoria Harbour.



Figure 2.24: *Overview of Kai Tak project. Source: global.chinadaily.com*

2.9.2. Historical Context

The former Kai Tak Airport operated as Hong Kong's primary international aviation facility from 1925 until its closure in July 1998. Initially situated on reclaimed land along Kowloon Bay, the airport expanded progressively through successive reclamation phases between the 1950s and 1970s to accommodate escalating passenger and cargo demands. Its defining spatial feature was Runway 13/31, a 3,390-metre strip extending directly into the harbour (Delang & Ng, 2009).

Following the transfer of aviation operations to Chek Lap Kok in 1998, the site released one of the largest continuous waterfront territories in Hong Kong's history. Early redevelopment proposals in the late 1990s envisioned extensive further land reclamation within the harbour to maximise real-estate potential. However, significant public opposition and civic advocacy culminated in a 2004 ruling by the Court of Final Appeal, which strictly limited further harbour reclamation (Delang & Ng, 2009). This legal precedent forced a critical planning reorientation: the adoption of a "zero reclamation"

principle, mandating that the new urban district be accommodated entirely within the existing physical footprint of the obsolete airfield (CEDD, 2006).

2.9.3. Core Problems

The closure of Kai Tak resulted from the gradual accumulation of geographic, operational, environmental and urban constraints. The airport could no longer expand easily, while its presence increasingly limited the development and environmental quality of surrounding districts.

❖ Geographic and Physical Constraints

Kai Tak was constrained by water, dense urban development and mountainous terrain. Its single-runway configuration provided limited opportunities for expansion, while further development would have required additional harbour reclamation. The airport's approach path also passed at low altitude over densely populated areas, creating long-term operational and safety concerns.

❖ Capacity Saturation and Overcrowding

The growth of passenger and cargo traffic placed increasing pressure on the airport's runway, terminal and apron facilities. Because the surrounding urban fabric restricted physical expansion, the airport could not be substantially enlarged to respond to future aviation demand. Its obsolescence therefore resulted partly from the mismatch between increasing traffic and a fixed spatial footprint.

❖ Urban Encroachment and Safety Concerns

Residential development gradually surrounded the airport and extended close to its flight paths. This increased exposure to aircraft noise and reinforced public concerns about safety and environmental quality. At the same time, aviation regulations imposed height restrictions and other development controls on nearby neighbourhoods, creating a reciprocal conflict between airport operations and urban growth.

❖ Environmental and Operational Limitations

Official assessments identified poor air and water quality, land contamination and odour problems in the Kai Tak Approach Channel and surrounding water bodies. Some of these conditions resulted from the wider industrial and drainage context rather than the airport alone, but they added considerable complexity to the site's redevelopment (CEDD, 2006).

❖ Strategic Misalignment with Metropolitan Growth

By the late twentieth century, retaining a constrained airport on centrally located waterfront land had become increasingly inconsistent with Hong Kong's long-term aviation and spatial strategy. Relocation to Chek Lap Kok resolved the immediate aviation

problem but created a new planning challenge: how to transform the former airport without reproducing an isolated or exclusively property-led district.

2.9.4. Vision and Core Objectives

The official vision for Kai Tak combines mixed-use development with public open space, waterfront access, transport infrastructure and selected forms of heritage preservation. Its intended identity is expressed through the planning theme of a "Heritage, Green, Sports and Tourism Hub of Hong Kong" (Planning Department, 2006).

❖ Strategic Planning Themes

The framework is organised around several connected themes. Sport is represented by the major stadium complex and related recreational spaces. The people-oriented approach prioritises public access to the waterfront and connections between railway stations, neighbourhoods and activity nodes. Mixed residential, commercial and leisure uses are intended to maintain activity throughout the district. Environmental objectives include the no-reclamation principle, treatment of the Kai Tak Approach Channel, district cooling, greening and public-transport provision.

❖ Spatial Organisation and Sub-area Concepts

To manage the site's vast 328-hectare scale, the study area is divided into six distinct sub-areas, each with a specialised functional role (figure 2.25):

1. **Kai Tak City Centre (North Apron East):** Located near the SCL Kai Tak Station, this area is the premier commercial and residential core. It acts as a regeneration catalyst for the surrounding older districts of San Po Kong and Kowloon City.
2. **Sports Hub (North Apron West):** Positioned at a prominent harbor-front location, this area houses the iconic stadium complex. Its proximity to existing communities in To Kwa Wan and Kowloon City makes it a convenient sports centre for both locals and international visitors.
3. **Metro Park (Runway North):** To improve water circulation in the KTAC, a 600m opening is created at the runway's northern end. A piled deck over this gap maintains the historical runway configuration while providing a massive harbor-front park that connects the Sports Hub to the Runway Area.
4. **Runway Precinct (Middle Runway):** Exploiting its panoramic sea views, this area is designated for low-density waterfront housing and hotels. A vibrant shopping street links the Metro Park to the leisure hubs.
5. **Tourism and Leisure Hub (Runway South):** The southern tip is home to the Cruise Terminal. This area capitalizes on the stunning 360-degree harbor views to serve as a major international tourism gateway.

6. **South Apron Corner:** This area serves as a transition zone, featuring commercial and GIC (Government, Institution, or Community) uses that facilitate the regeneration of the nearby Kowloon Bay and Kwun Tong business areas.

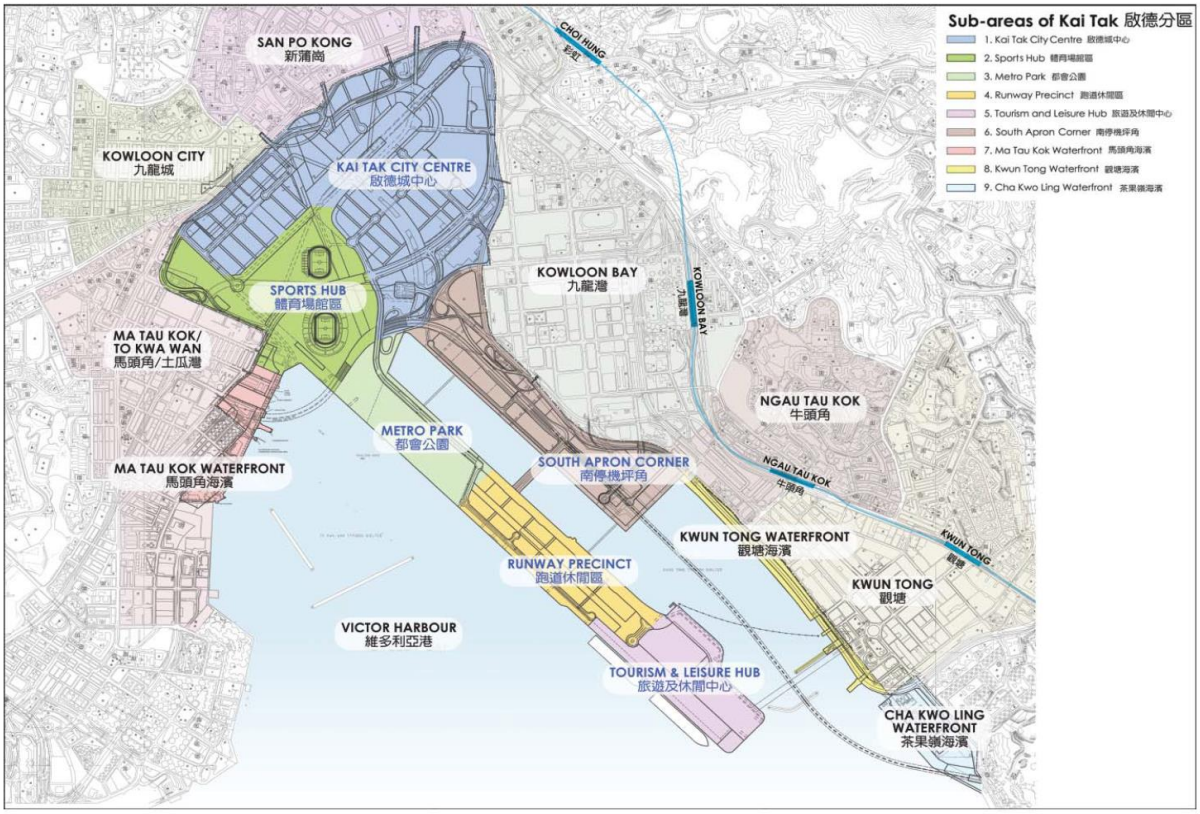


Figure 2.25: *Sub-areas of Kai Tak. Source: Kai Tak planning review executive summary (November, 2007)*

❖ Urban Design Proposals and Spatial Strategies

The urban-design framework is based on connecting neighbourhoods, creating activity nodes, activating the harbourfront and establishing a pedestrian-friendly environment. Later Urban Design Guidelines translate these principles into controls for block arrangement, building height, setbacks, frontage, views, greening and public access (CEDD, 2020a; CEDD, 2020b).

Connectivity and Neighbourhood Integration

A central theoretical ambition of the KTD is to increase urban permeability. The framework proposes a network of elevated walkways, footbridges, and pedestrian streets designed to dissolve the historical "barrier effect" and stitch the former airfield into the surrounding grid of East Kowloon.

Hierarchical Node Creation

Major nodes include the railway station, sports complex, cruise terminal, Metro Park and tourism area. These are supported by smaller neighbourhood parks, retail streets and public squares, creating different levels of activity across the site.

Activation of the Harbour-front

The waterfront is largely planned as a public realm composed of promenades, parks and recreational spaces, with commercial and tourism uses at selected locations. Design guidelines recommend active frontages and visual access to the water while discouraging blank walls and inaccessible private edges.

Pedestrian-Friendly Environment and "Podium-Free" Design

To mitigate the urban heat island effect and avoid the oppressive "wall effect" common in Hong Kong real estate, urban design guidelines explicitly discourage massive podium structures in certain zones, promoting improved natural air ventilation at the street level (URBIS/CEDD, 2012).

Dynamic Skyline and Celebrating the Views

Higher-density development is concentrated around selected commercial and transport nodes, while lower and stepped building forms are proposed near open spaces and the waterfront. View corridors towards Lion Rock, Victoria Harbour and surrounding ridgelines are protected through height and setback controls.

Defining the Gateways

The plan identifies multiple gateways rather than one main entrance. The cruise terminal acts as a maritime gateway, Station Square as a rail arrival point, and the sports complex and Metro Park as major public destinations. Pedestrian bridges and waterfront routes provide additional neighbourhood-scale entrances.

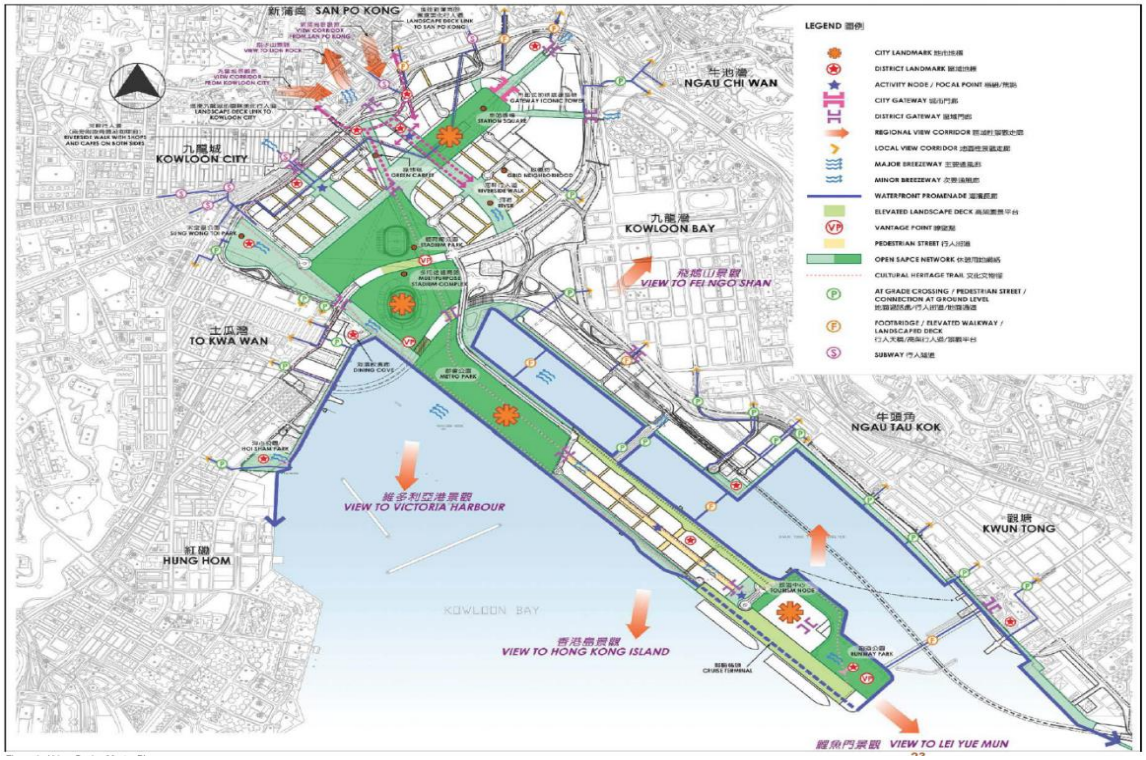


Figure 2.26: *Urban design master plan. Source: Kai Tak planning review executive summary (November, 2007)*

❖ Landscape Proposals

The vision “A Green Web for Sustainable Development” aims to establish a strong identity and cohesive community character for Kai Tak through an interconnected network of parks and gardens. This Landscape Master Plan organizes major open spaces—including Station Square, Metro Park, Stadium Park, Runway Park, Sung Wong Toi Park, Hoi Sham Park, and North Apron District Park—into an integrated green framework that links residential and commercial areas.

Continuous and Connected Green Network: Operating under the theme of "A Green Web for Sustainable Development," the landscape strategy proposes utilising open space as the primary structuring element, linking the Metro Park, Station Square, and Runway Park into a cohesive public realm.

Ecological Planting Framework: Extensive planting requirements aim to enhance local biodiversity and provide critical shading, directly targeting improvements in outdoor thermal comfort across the highly exposed, formerly sealed runway surfaces.

Integration of Open Space with Major Developments: Planners have attempted to integrate architecture and landscape through concepts such as the "Station in the Park" and the "Stadium in the Park," aiming to blur the boundaries between built facilities and civic recreation zones.

Pedestrian-Oriented Urban Connectivity: Green corridors are designed to prioritise pedestrian mobility over vehicular traffic, providing landscaped linkages between differing Programmatic zones.

Enhancement of Surrounding Landscaped Areas: The green network is intended to extend physically beyond the airport boundary to elevate the environmental quality of older adjacent industrial districts.

Innovative Urban Greening and Heritage Integration: While much of the aviation infrastructure was cleared, the plan incorporates a Heritage Trail and specifically establishes a 30-metre-wide preservation corridor to protect and display the excavated remnants of the historical Lung Tsun Stone Bridge (URBIS/CEDD, 2012).



Figure 2.27: *Landscape plan. Source: Kai Tak planning review executive summary (November, 2007)*

❖ Road, Railway and Pedestrian Connections

Road Connections

❖ Strategic Context

Kai Tak is strategically positioned within the East Kowloon region and benefits from strong connectivity to both existing and planned strategic highway networks. Of particular importance is the planned Route 6 corridor, which comprises the Central Kowloon Route, Trunk Road T2, and the Tseung Kwan O–Lam Tin Tunnel. The Central Kowloon Route will provide a direct and efficient east–west linkage between West Kowloon and East Kowloon. This infrastructure will significantly enhance regional accessibility and will include direct connections to both the North Apron and South Apron areas of Kai Tak, strengthening its integration into the metropolitan transport framework (Figure 2.28).

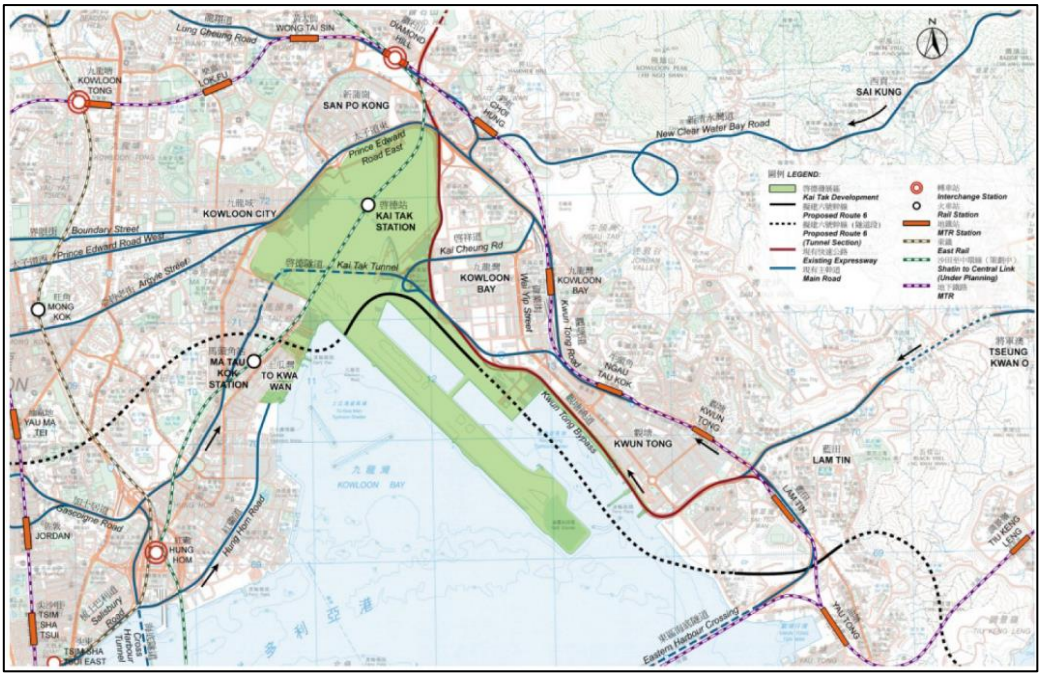


Figure 2.28: *Road connections, strategic context. Source: Kai Tak planning review executive summary (November, 2007)*

❖ Local Context

At the district level, Kai Tak is accessible from both Central Kowloon and East Kowloon through an established network of primary and district distributor roads. Multiple entry points ensure convenient vehicular access into the site. These include connections from To Kwa Wan Road and Sung Wong Toi Road; Olympic Avenue via the Olympic Garden Roundabout; Prince Edward Road East (serving both the Kowloon City and San Po Kong sections); Wang Kwong Road and Wang Chiu Road leading into Eastern Road; Kai Cheung Road linking to Kai Shing Street; and Cheung Yip Street. Collectively, these access routes distribute traffic efficiently and provide flexibility in movement to and from the development (Figure 2.29).

Railway

Kai Tak Station forms the principal public-transport anchor of the North Apron. Commercial and residential development is concentrated around the station, while Station Square connects rail passengers with surrounding neighbourhoods and major public facilities.

Monorail and Bridge Link to Kwun Tong

Initial masterplans heavily promoted an Environmentally Friendly Linkage System (EFLS), envisioned as an elevated monorail connecting the runway tip to Kwun Tong. However, following detailed feasibility studies regarding cost and technical constraints, this proposal was subsequently suspended in favour of a "multi-modal" approach relying primarily on electric buses.

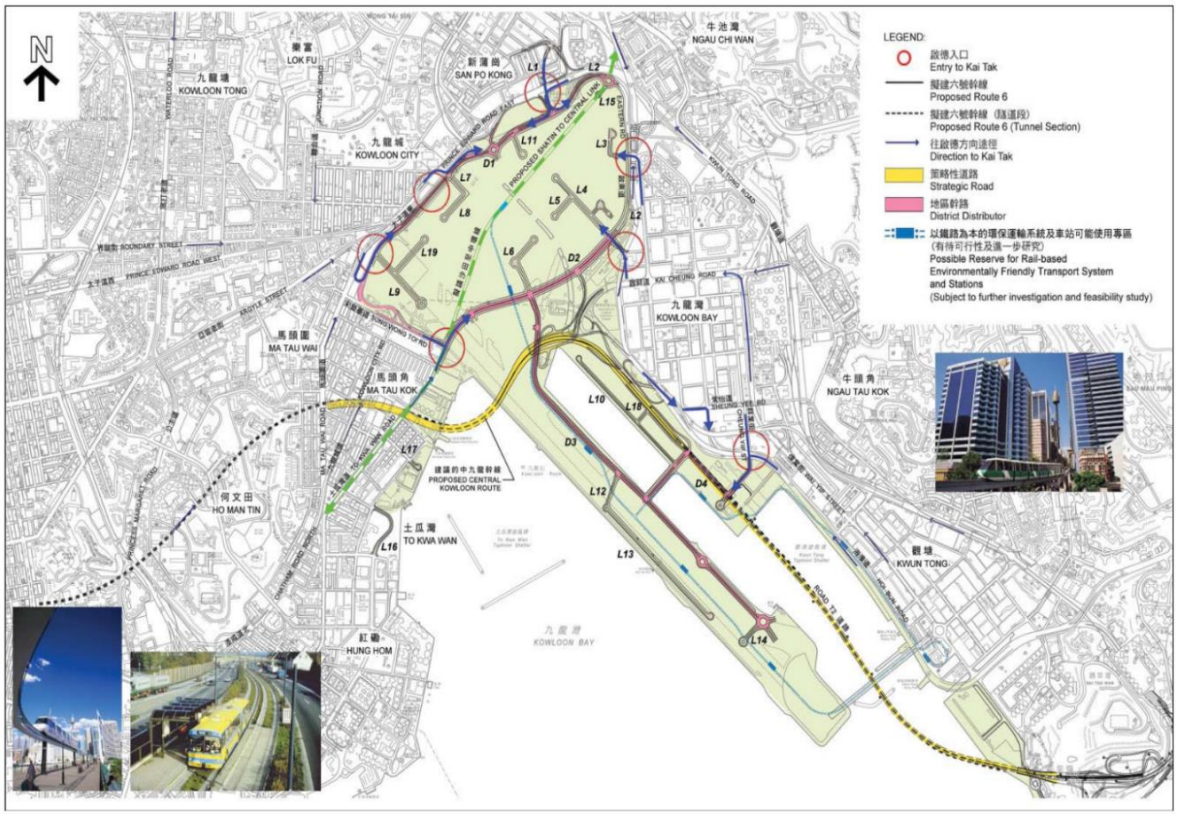


Figure 2.29: *Road connections, local context. Source: Kai Tak planning review executive summary (November, 2007)*

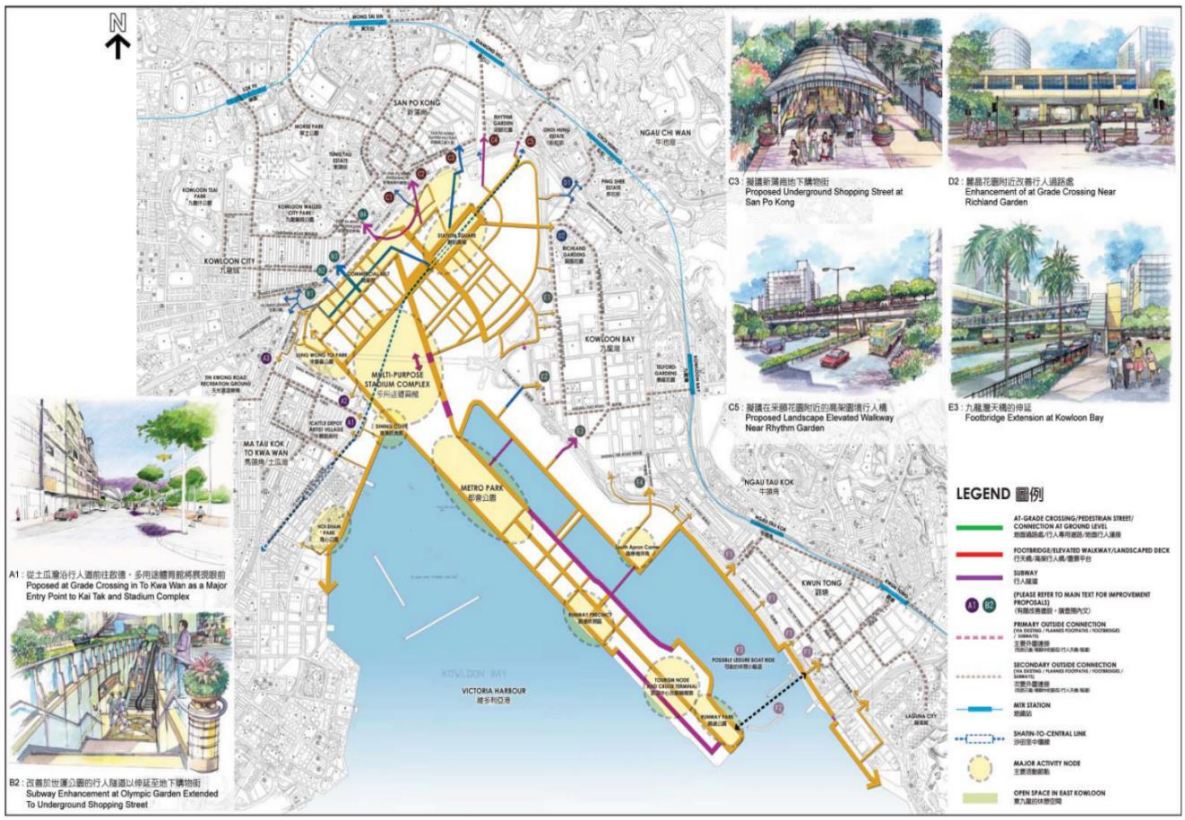


Figure 2.30: *Enhanced pedestrian connections within Kai Tak. Source: Kai Tak planning review executive summary (November, 2007)*

Pedestrian Connections

To physically reconnect the site with the hinterland, the plan relies on an extensive system of proposed underground shopping streets, at-grade crossings, and landscaped elevated walkways, particularly aimed at linking the new Kai Tak Station with San Po Kong and Kowloon City (Figure 2.30).

❖ Land Use Proposals

The land-use plan combines housing, commercial uses, public facilities, sport, tourism, transport and open space. Later planning documents identify approximately 100 hectares of open space and around 11 kilometres of waterfront within an area of about 320–323 hectares (Task Force on Kai Tak Harbourfront Development, 2015). Higher-density development is concentrated mainly in the North Apron and near transport nodes, while the former runway contains lower-density waterfront uses, public spaces and tourism functions. This arrangement seeks to balance development intensity with public access and landscape provision.

Land Use	*Area (ha)*	%
Commercial (Office/Hotel/Retail)	23.0[1]	7.0
Mixed Use (Housing & Commercial)	5.2	1.6
High to Medium Density Housing	32.1[2]	9.8
Low Density Housing	6.1	1.8
G/IC	38.3	11.7
Multi-purpose Stadium Complex	23.2	7.1
Cruise Terminal and Tourism Node	13.4	4.1
Other Specified Uses	10.1	3.1
Open Space (including Landscaped Deck/Landscape Elevated Walkway)	110.6	33.7
Road Network	57.6*	17.6
Amenity	8.4	2.5
Total Area	328	100%

1 Comprising two Sites designated as Comprehensive Development Area in Kai Tak City Centre
2 Comprising two Sites designated for public housing development

* Including: 14.9 ha existing roads
38.3 ha new roads
4.4 ha pedestrian streets

Figure 2.31: *Landuse budget. Source: Kai Tak planning review executive summary (November, 2007)*

❖ Proposed Development Timeline

The development of Kai Tak has been implemented through a series of infrastructure and development packages delivered progressively over time, rather than through a strictly defined linear phasing system. This reflects the project's complexity as a large-scale urban regeneration initiative led by multiple public agencies and private stakeholders.

Initial developments focused on enabling infrastructure and early activation of the site. These included the completion of key facilities such as the Kai Tak Cruise Terminal (first berth in 2013, second in 2014), the first phase of the District Cooling System, and early

public housing developments such as Kai Ching Estate and Tak Long Estate. These projects played a crucial role in establishing the first functional and residential presence within the former airport site.

Subsequent development stages expanded transport connectivity, public services, and recreational infrastructure. Major projects included the completion of the MTR Tuen Ma Line Kai Tak Station (2020), the Hong Kong Children's Hospital (2017), and the continued development of road infrastructure under Route 6. In parallel, landscape and public space projects such as the Kai Tak Sky Garden (2021) and the revitalised Kai Tak River contributed to the gradual transformation of the site into an active urban district.

The ongoing and final stages of development, extending beyond 2024, include large-scale flagship projects such as the Kai Tak Sports Park, additional commercial and residential developments within the North and South Apron areas, and further expansion of sustainable infrastructure systems. However, certain proposals, such as the Environmentally Friendly Linkage System (EFLS), have been suspended and remain under review due to technical and financial considerations.

Despite substantial progress, the Kai Tak Development is not yet fully completed and continues to evolve as a long-term, multi-decade urban regeneration project.

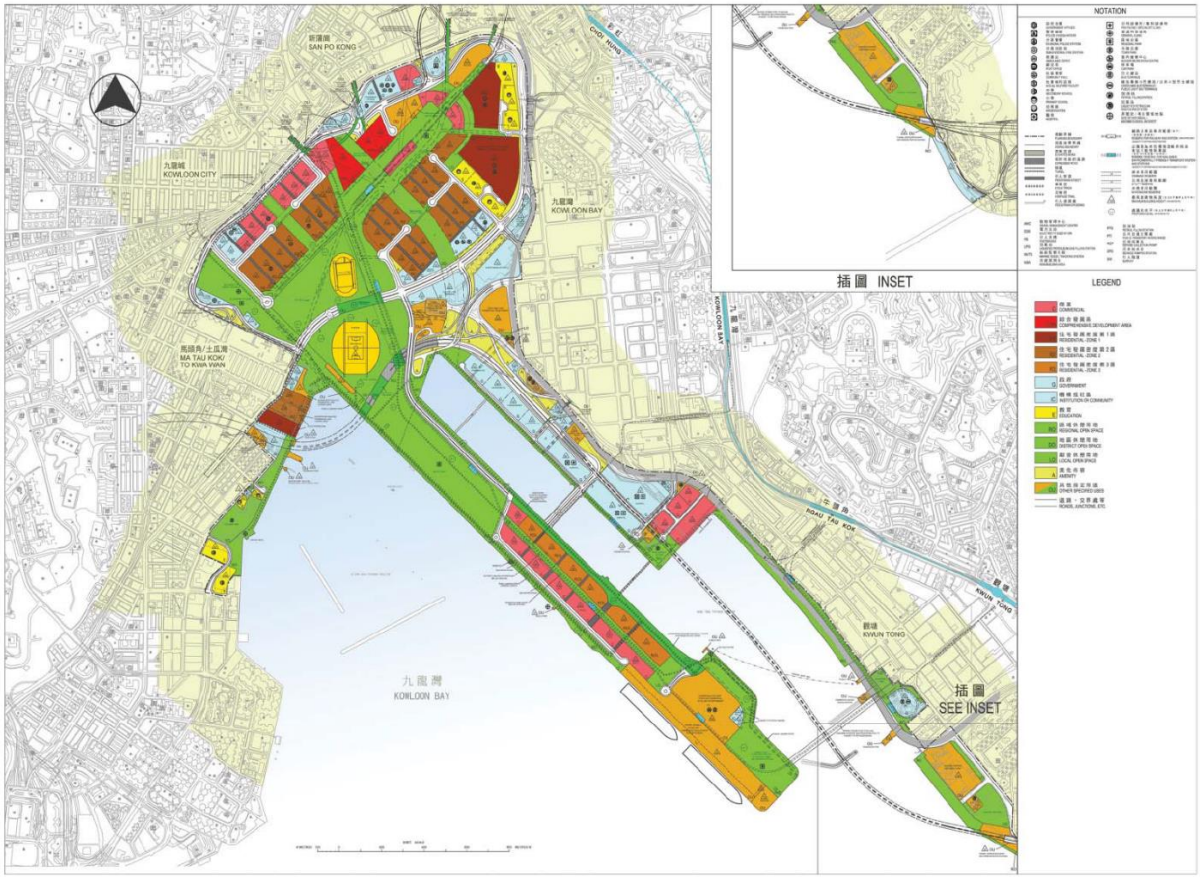


Figure 2.32: *Preliminary outline development plan. Source: Kai Tak planning review executive summary (November, 2007)*

2.9.5. Outcomes and Impacts

The ongoing regeneration of Kai Tak provides useful insights into the realities of post-aviation urbanism. Environmentally, the adoption of the no-reclamation planning approach, together with remediation and water-quality improvement measures in the Kai Tak Approach Channel, demonstrates the importance of integrating environmental repair into the redevelopment of former infrastructural territories.

Spatially, the project illustrates the selective nature of infrastructural memory and adaptive reuse. Although proposals were made to retain the former runway for aviation-related functions (Delang & Ng, 2009), most original airport buildings were demolished as the site was reorganised for new development and public facilities. Nevertheless, parts of the runway alignment and selected aviation references remain legible within the new public-space structure.

Finally, while the site has successfully transitioned into an active urban district, the suspension of the proposed monorail system highlights the practical limitations of mega-project implementation. Achieving genuine urban permeability across a 328-hectare former enclave remains an ongoing challenge, as the district continues to navigate the complexities of delivering robust, seamless pedestrian and transit connectivity to the surrounding urban fabric.

2.9.6. Before and After Redevelopment Images

This section presents a visual comparison of the Kai Tak site before and after its transformation, illustrating the transition from a dense aviation infrastructure into a mixed-use urban district.

Before images

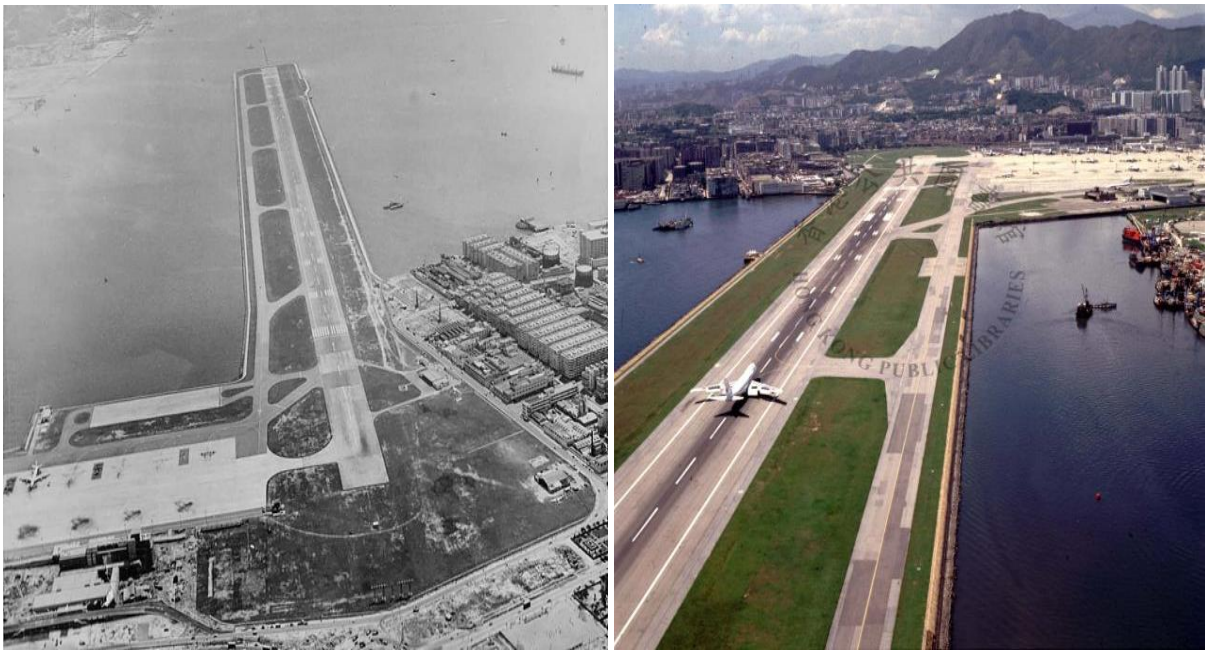


Figure 2.33: *Left, Kai Tak airport in 1960 and Right, Kai Tak airport in 1990*

After images



Figure 2.34: *2019 Kai Tak Runway End Park*



Figure 2.35: *Kai Tak sky garden and residential towers*



Figure 2.36: *Kai Tak stadium*

Before & After Development



Figure 2.37: *Kai Tak project, Before and after*

2.10. The Ellinikon project

2.10.1. Introduction

The Ellinikon is a massive urban regeneration project located in the southern suburbs of Athens, along the Saronic Gulf. Occupying 620 hectares (6.2 million square metres) of the former Ellinikon International Airport, the site represents one of the largest coastal redevelopment opportunities in contemporary Europe (Hellinikon SA, 2012). Strategically situated approximately 10 kilometres from the Acropolis and the Athens city centre, and 15 kilometres from Piraeus Port, the territory possesses exceptional regional connectivity.

Unlike the preservation-focused, low-intervention model of Berlin's Tempelhofer Feld, The Ellinikon is driven by a highly intensive, investment-led strategy. Managed by the private developer LAMDA Development under a 99-year lease agreement, the masterplan aims to balance the creation of a 2,000,000-square-metre metropolitan park with high-density luxury residential, commercial, and tourism infrastructure (LAMDA Development, 2023; Sasaki, 2023). The project seeks to convert an obsolete infrastructural barrier into a porous, mixed-use district, combining environmental restoration with significant economic restructuring.



Figure 2.38: *The Ellinikon project. Source: lamdadev.com*

A central ambition of the project is to establish a sustainable "15-minute city" model, where daily needs—living, working, shopping, leisure, and mobility—are accessible within a short walking distance. At the same time, the development emphasizes heritage preservation, technological advancement, and ecological performance, positioning The Ellinikon as a benchmark for 21st-century urban redevelopment in Greece and the wider Mediterranean region.

2.10.2. Historical Context

Ellinikon Airport opened in 1938 and gradually became Greece's principal domestic and international aviation gateway. During the German occupation between 1941 and 1944, it was used as a military airbase. From 1953 until 1993, part of the site was also occupied by the United States Air Force, adding a military layer to its civil aviation history (LAMDA Development, 2021).

The airport underwent several phases of expansion. Its runways were extended during the post-war period, with the principal runway reaching approximately 3,500 metres by 1970. In 1969, the East Terminal designed by Eero Saarinen opened as an important example of modern airport architecture. Nevertheless, the airport's position between the expanding southern suburbs, Mount Hymettus and the coast placed long-term limits on further development (Hellinikon S.A., 2012; LAMDA Development, 2021).

After decades of debate and technical studies, aviation operations were transferred to the new Athens International Airport at Spata in March 2001. Parts of Ellinikon were subsequently adapted for the 2004 Olympic Games, accommodating facilities for sports including baseball, softball, hockey, fencing, canoe–kayak and sailing. Several Olympic installations remained after the Games, but many experienced limited use or deterioration.

The post-airport territory became increasingly fragmented. A 2012 assessment identified approximately 350 buildings and facilities associated with civil aviation, defence, transport, Olympic venues, sports and tourism. The site was divided into disconnected areas, with only seven entrance points and limited general public access. Many buildings were considered unsuitable for reuse, although several heritage structures and operational facilities remained significant (Hellinikon S.A., 2012).

Debate over the site's future continued for more than a decade. Earlier proposals included the creation of a predominantly metropolitan park, while later strategies combined open space with urban development. Hellinikon S.A. was established in 2011 to manage the property. A development contract was signed with LAMDA Development in 2014 and ratified by the Greek Parliament in 2016. The Integrated Development Plan was approved by Presidential Decree in 2018, followed by more detailed urban-planning approvals in 2019. In 2021, LAMDA Development acquired full ownership of Hellinikon S.A. (LAMDA Development, 2021; 2023a).

2.10.3. Core Problems

The closure of Ellinikon International Airport in March 2001 was the outcome of a prolonged process of technical evaluation, spatial planning analysis, and national infrastructure policy reform. Rather than representing an abrupt administrative decision, the relocation of Athens' primary aviation gateway reflected decades of debate

concerning the airport's operational adequacy, environmental constraints, and long-term strategic viability.

❖ Structural and Geographical Constraints

The airport was positioned between the Saronic Gulf, Mount Hymettus and expanding residential areas. Its location restricted opportunities for additional runways, longer safety zones and major terminal expansion. A technical debate over these constraints had already emerged during the 1950s, when the suitability of Spata as an alternative site was examined (LAMDA Development, 2021). Although the existing airport was repeatedly upgraded, its surroundings became progressively more urbanised. The combination of limited land, nearby settlements and difficult atmospheric conditions reduced its capacity to respond flexibly to changing aviation requirements.

❖ Capacity Pressures and Traffic Forecasting

Passenger growth during the post-war decades placed increasing pressure on Ellinikon's runways and terminal facilities. In 1973, approximately six million of Greece's nine million air passengers were served by the airport. Forecasting studies produced different estimates of future demand, but the Technical Chamber of Greece concluded in 1975 that Ellinikon would probably become inadequate after 1990, even with further improvements (LAMDA Development, 2021). This assessment considered more than aviation capacity. It also acknowledged the social and spatial difficulty of maintaining a major airport within an increasingly consolidated urban area.

❖ Institutional and Legislative Framework for Relocation

Studies conducted during the 1970s evaluated a number of potential locations for a replacement airport, with Spata repeatedly identified as the preferred option. Law 811/1978 formally created the institutional basis for a new Athens airport and stipulated that Ellinikon would cease operating when the new facility opened (LAMDA Development, 2021). Construction was delayed by political and financial conditions, but the final development agreement for the Spata airport was signed in 1995. The new airport began operating in March 2001, allowing the transfer of commercial aviation activities from Ellinikon.

❖ National Modernization and Strategic Context

The airport's relocation formed part of a broader period of infrastructure modernisation associated with European integration, metropolitan transport investment and preparation for the 2004 Olympic Games. The new airport offered greater expansion capacity and more modern facilities, while the closure of Ellinikon released a strategically located coastal territory.

This opportunity was accompanied by substantial redevelopment difficulties. The site contained extensive paved surfaces, disconnected institutional areas, deteriorated

buildings and numerous overlapping historical layers. Its transformation therefore required not only a new land-use programme, but also the removal or reuse of infrastructure, improved accessibility and the integration of the former airport with adjacent municipalities and the coast.



Figure 2.39: *Panoramic View of the Site during the Airport Operation, before 2004. Source: hellinikon.com*



Figure 2.40: *Panoramic View after the Olympics Games - November 2011. Source: hellinikon.com*

2.10.4. Vision and Core Objectives

The current vision for The Ellinikon is based on the combination of a metropolitan park with a mixed-use urban district. Official project documents position it as a new centre for residential life, employment, recreation, tourism and culture along the Athens Riviera. These descriptions should be understood as the developer's intended vision rather than as an evaluation of the project's completed condition (LAMDA Development, 2023a).

❖ Site location

The site occupies a prominent position between Mount Hymettus and the Saronic Gulf. It is bordered by the municipalities of Alimos, Elliniko–Argyroupoli and Glyfada and lies between two major metropolitan routes: Vouliagmenis Avenue and Poseidonos Avenue. Two existing metro stations provide access along the eastern side, while the coastal tram serves the seafront. The relationship between these transport corridors, the metropolitan park and the coastline is central to the site's future accessibility.

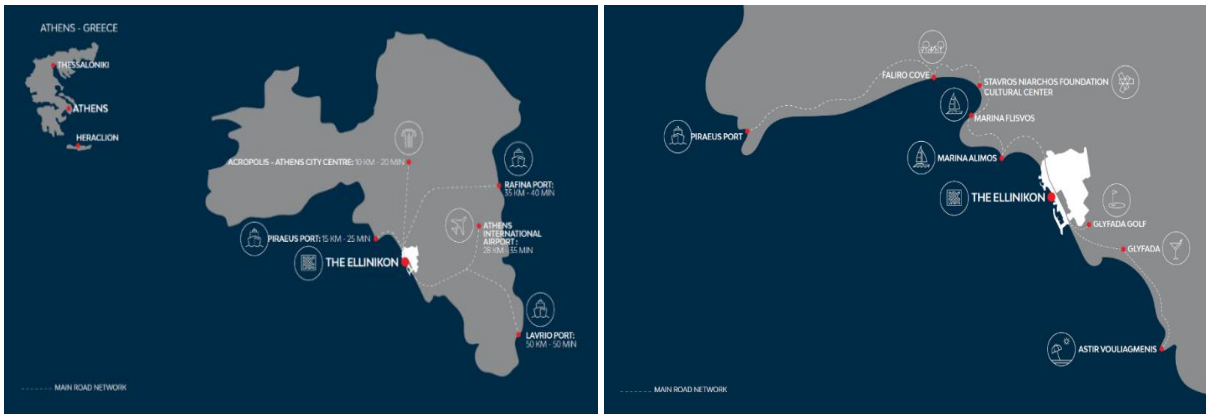


Figure 2.41: *Site location (in Attica region and Athens Riviera). Source: theellinikon.com*

❖ Masterplan Vision

The conceptual masterplan, designed by Foster + Partners, approaches the vast post-aviation landscape through an "archipelago" strategy. Rather than imposing a uniform grid across the 620 hectares, the masterplan organizes the site into a system of distinct, high-density urban "islands"—such as commercial hubs, residential neighbourhoods, and educational clusters—distributed around the continuous, unifying void of the central metropolitan park.



Figure 2.42: *Master plan of The Ellinikon. Source: theellinikon.com*

The vision is grounded in the principles of the "15-minute city," promoting proximity-based living in which residential, commercial, cultural, leisure, and employment functions are accessible within a short walking or cycling distance. This polycentric structure fosters walkability, reduces reliance on private vehicles, and enhances everyday convenience for residents, workers, and visitors. The integration of metro and tram connections further strengthens the site's connectivity to central Athens, Piraeus, and the broader metropolitan region.



Figure 2.43: *Walking distances. Source: theellinikon.com*

❖ Core Objectives

Integrated and Sustainable Urban Living

A primary objective of the masterplan is to harmonize high-density built form with natural systems. The design relies on the 2,000,000-square-metre park to act as the ecological core of the district, introducing significant per capita open space into an otherwise densely mineralised city. Developer projections estimate that the new district will ultimately accommodate thousands of permanent residents and workers in a highly integrated, smart-city environment.

Heritage is addressed through the proposed conservation and reuse of selected buildings and archaeological elements. These include Saarinen's East Terminal, three aviation hangars, the former British hangar and archaeological remains at Agios Kosmas. Their long-term role depends on how successfully they are integrated with public routes and contemporary programmes.

Urban Permeability and Connectivity

To dismantle the historical barrier effect of the airfield, the masterplan prioritises urban permeability. A proposed network of 50 kilometres of pedestrian and cycling paths aims to stitch the site into the surrounding neighbourhoods. A critical infrastructural intervention involves placing a portion of Poseidonos Avenue—the major coastal highway—underground. This underpass is designed to remove the physical severance between the inland park and the coastal front, allowing uninterrupted pedestrian flow to the sea (LAMDA Development, 2020).

Reconnection with the Sea and Landscape Integration

One of the masterplan's main spatial objectives is to strengthen public access between the city and its coastline. The planned underpass of Poseidonos Avenue is intended to reduce the barrier created by the existing coastal road, while the central pedestrian bridge connects the park with the waterfront. The project proposes a continuous public beach of approximately one kilometre, coastal promenades and a sequence of public and commercial spaces. These interventions have the potential to improve coastal accessibility, although public access will need to coexist with hotels, luxury residences, marinas and commercial destinations.

Adaptive Reuse and Cultural Heritage

While the development introduces immense volumes of new construction, it also engages with infrastructural memory. According to official plans, key historical structures are preserved and integrated into the new park. These include the iconic East Airport terminal building designed by Eero Saarinen in the 1960s, three Hellenic Air Force hangars, and the British "Pagoda" hangar (Kyriazis, 2020). The masterplan proposes stripping these buildings of later additions to restore their original architectural form, repurposing them as cultural and exhibition anchors.

Smart City and Technological Innovation

The Ellinikon aims to be a fully integrated **Smart City**, using advanced ICT (Information and Communication Technology) to enhance quality of life and urban efficiency. By merging technology with environmental responsibility, the project focuses on three key areas:

- **Public Infrastructure:** Utilising smart irrigation, intelligent lighting, and high-speed connectivity to optimize resources and improve safety.
- **Building Innovation:** Implementing smart platforms in residential and commercial spaces to monitor energy use, climate control, and security for better living standards.
- **Urban Operations:** Managing traffic, energy, and waste through intelligent systems to reduce congestion, promote recycling, and support a circular economy.

❖ Phase One Development

The September 2023 project material presented Phase One as the 2021–2026 implementation period. It includes enabling infrastructure, residential and commercial developments, parts of the coastal zone, sections of the park and several public or institutional facilities. These dates represent the developer's programme at the time of publication rather than verified completion dates (LAMDA Development, 2023a).

The Ellinikon Riviera

The Riviera component extends along the project's 3.5-kilometre coastline and combines public landscape with residential, hospitality, retail and marina uses. Its planned public elements include a one-kilometre beach, promenades, cycling routes, planted open spaces and a pedestrian bridge linking the coast with the park.

The coastal strategy is therefore both public and commercial. It improves physical access to the sea while using high-value waterfront development as a major component of the project's investment model.



Figure 2.44: *The Ellinikon Riviera. Source: theellinikon.com*

Residential Developments

Phase One introduces several flagship residential projects that establish the character of contemporary coastal living:

The Cove Villas: A limited collection of up to 28 beachfront villas offering direct sea access, landscaped private gardens, swimming pools, spa facilities, and 24-hour security. These residences combine exclusivity with integrated urban services.



Figure 2.45: *The Cove Villas. Source: theellinikon.com*

Riviera Tower: A 200-metre-high luxury residential tower of approximately 49 floors—the first of its kind in Greece. Designed as a vertical extension of the surrounding landscape, the tower features suspended gardens, generous terraces, panoramic sea and mountain views, and state-of-the-art resident amenities, including concierge services and wellness facilities.



Figure 2.46: *Riviera Tower. Source: theellinikon.com*

The Cove Residences: A collection of approximately 115 high-end apartments and duplexes designed by prominent Greek architectural practices. The development offers private pools for select units, landscaped courtyards, rooftop terraces, secure underground parking, and immediate proximity to the beach.

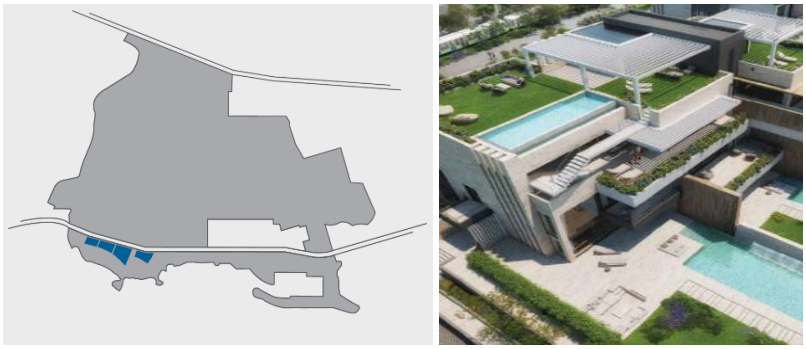


Figure 2.47: *The Cove Residences. Source: theellinikon.com*

Hospitality and Tourism Infrastructure

The hospitality programme includes the Marina Hotel and Branded Residences, planned with approximately 200 hotel rooms, and a Mandarin Oriental beachfront resort with around 160 rooms and branded residences. Both are positioned close to the marina and coastal developments. These projects support the strategy of extending Athens' tourism offer beyond its historic centre. At the same time, their concentration along the waterfront demonstrates the central role of international tourism and luxury real estate in the project's financial model.

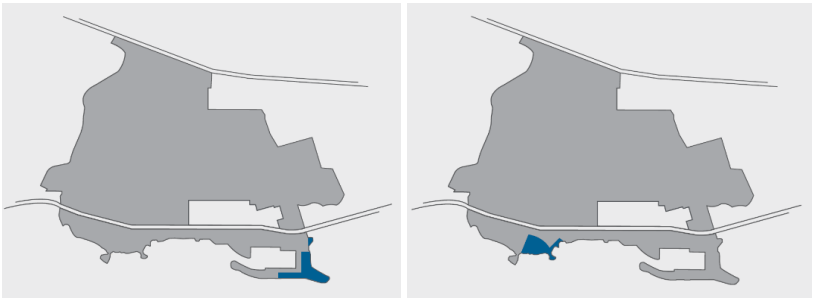


Figure 2.48: *Left image: Marina Hotel and Branded Residences, Right image: Mandarin Oriental Hotel. Source: theellinikon.com*

Retail and Commercial Destinations

Phase One introduces major commercial anchors designed to establish The Ellinikon as a metropolitan destination:

Riviera Galleria: A 19,000 m^2 premium retail and dining complex featuring high-end brands, signature restaurants, and event spaces overlooking the waterfront.



Figure 2.49: *Riviera Galleria. Source: theellinikon.com*

The Commercial Hub: A 185,000 m^2 mixed-use complex, including the largest shopping mall in Greece (approximately 90,000 m^2), office spaces, a retail park, and a mixed-use tower. Located adjacent to the Elliniko metro station, the hub integrates shopping, business, entertainment, and wellness within a unified indoor-outdoor scheme.



Figure 2.50: *The Commercial Hub. Source: theellinikon.com*

The Ellinikon Park and Experience Facilities

The two-million-square-metre Ellinikon Park is planned as the central public and ecological component of the project. Its design combines approximately 1.4 million square metres of soft landscape with sports, cultural spaces, gardens, wetlands, paths and event areas. The plan also proposes the reuse of concrete and asphalt from the former airport and a planting framework containing around 500 species (LAMDA Development, 2023b).

The 75,000-square-metre Experience Park is the first implemented section. It surrounds three listed aviation hangars and includes approximately 900 native trees, 80,000 plants, playgrounds, fitness facilities and an interactive water feature. The Experience Centre, located in Hangar C, opened to visitors in 2022 and presents the wider project through exhibitions and digital installations (LAMDA Development, 2023a; 2023b).



Figure 2.51: *The Ellinikon Park. Source: theellinikon.com*

Education and Sports Infrastructure

Phase One proposes an Education Cluster with a capacity for thousands of students, aiming to foster an integrated research and development environment. Concurrently, a state-of-the-art Sports Complex is planned within the park boundaries to support both professional athletics and community recreation.

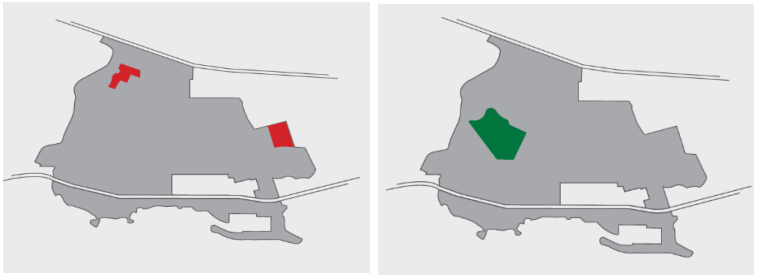


Figure 2.52: *Left image: Education Cluster, Right image: Sports Complex. Source: theellinikon.com*



Figure 2.53: *Phase 1 diagram. Source: theellinikon.com*

2.10.5. Outcomes and Impacts

As The Ellinikon remains largely under construction, its ultimate success relies heavily on the future delivery of its proposed interventions. Nevertheless, the official projections establish a clear set of expected social, economic, and environmental impacts.

❖ **Social Impact**

The primary social benefit of the project is the planned delivery of the largest coastal park in Europe, returning hundreds of hectares of previously inaccessible, sealed land to public use. However, the investment-led model inherent in the 99-year developer lease creates an ongoing tension. The prominence of luxury residential, tourism, and commercial development nevertheless raises questions about how broad public accessibility and social inclusion will coexist with high-value private investment.

❖ **Economic Impact**

The economic projections provided by LAMDA Development are staggering in scale. The total investment is estimated at €8 billion. Upon full completion, developer projections estimate that the project will contribute 2.4% to Greece's GDP, generate over €14 billion in state revenues, and create up to 85,000 new jobs (LAMDA Development, 2023). Furthermore, the project aims to attract an additional one million tourists annually, strategically widening the city's tourism season. While these figures represent a monumental economic restructuring, they remain long-term projections dependent on global market stability and sustained investment.

❖ **Environmental Impact**

Environmentally, the project presents a critical test case for Mediterranean climate adaptation. The landscape architecture firm Sasaki was commissioned to implement a "carbon-first" design framework for the metropolitan park, focusing on reducing embodied carbon and maximising soil sequestration. The masterplan includes the recycling of massive volumes of runway concrete and asphalt into the new park infrastructure. Crucially, implementing a 2,000,000-square-metre park in the drought-prone Mediterranean climate requires immense water resources. To mitigate this constraint, the design incorporates native, drought-tolerant species and proposes a large-scale, on-site wastewater treatment plant to generate safe, recycled water for irrigation (ASLA, 2023). If successfully delivered, the de-sealing of the airfield and the maturation of the urban canopy are expected to significantly enhance local biodiversity and mitigate the severe urban heat island effect currently generated by the vast expanse of historic runway asphalt.

2.10.6. Before and After Redevelopment Images

Visualising the transformation of The Ellinikon is crucial for understanding the scale of the intervention. Aerial photography from 2001 reveals a vast, austere expanse of concrete runways and taxiways dominating the coastline. Current imagery demonstrates

the massive earthworks and preparatory dismantling required to break the barrier of the old airfield. By 2026, renderings project the emergence of a densely forested park flanked by high-density, vertical architecture—a dramatic spatial shift from a horizontal, exclusionary transport node to an integrated, porous, and highly capitalised urban landscape.



Figure 2.54: *The Ellinikon site in 2001 (first image) and 2026 (second image) during construction. Source: Google Earth pro*

2.11. Tempelhofer Feld project

2.11.1. Introduction

The Tempelhofer Feld is a prominent urban regeneration site located in the southern inner city of Berlin. The complex occupies the former grounds of Berlin Tempelhof Airport, representing one of the most historically significant aviation sites in Europe. The site comprises two distinct but interrelated spatial entities: the massive 386-hectare former airport complex in its entirety, and the approximately 303-hectare protected airfield, officially known as Tempelhofer Feld (Grün Berlin GmbH, 2016). Following the cessation of flight operations in 2008, the extensive airfield was opened to the public in 2010. Today, Tempelhofer Feld represents a unique example of adaptive reuse and urban open-space planning. Instead of undergoing conventional real-estate redevelopment, the former airport runways and surrounding landscape were preserved and repurposed as a multifunctional urban park, while the monumental terminal building became the subject of long-term adaptive reuse strategies. The site functions as a vital recreational and ecological area for residents while serving as an important case study in participatory urban planning, community-led decision-making, and the ongoing political conflict over inner-city land use.



Figure 2.55: *Tempelhofer Feld current situation. Source: dezwartehond.nl*

2.11.2. Historical Context

❖ Early Development of Tempelhofer Feld

The history of Tempelhofer Feld predates aviation by several centuries. The open land developed north of the village of Tempelhof, which was established around 1200 in

association with the Knights Templar. For much of its early history, the area consisted of agricultural fields, pastures and fallow land crossed by a route connecting Tempelhof with Berlin. From 1722 until the First World War, much of the field was used as a military training and parade ground by the Prussian Army. Temporary barracks and military hospitals were also established during periods of conflict. Despite this military function, substantial parts of the landscape remained publicly accessible and were used for walking, gatherings and recreation. A racecourse was established in the south-eastern part of the field in 1830, illustrating its early combination of controlled and public uses.

❖ Early Urban Development Around the Field

During the late 19th and early 20th centuries, rapid urban expansion encircled the field. Wilhelminian-style residential blocks emerged in bordering districts such as Neukölln and Kreuzberg. The periphery of the site was also shaped by the establishment of several historic cemetreies and the Werner-Seelenbinder-Sportpark, deeply embedding the open space within the dense urban fabric of southern Berlin (SenStadt, 2024).

❖ Establishment of Tempelhof Airport

The growth of civil aviation after the First World War created demand for an airport close to central Berlin. From 1922, part of the former military ground was levelled and adapted for aviation, and Berlin Airport officially began operating on 8 October 1923. The first major facilities were constructed during the 1920s. Two aircraft hangars were completed between 1924 and 1925, followed by arrival, terminal and apron facilities designed by Heinrich Kosina, Paul Mahlberg and Paul and Klaus Engler. Tempelhof quickly developed into an important European aviation centre and became closely associated with the emergence of commercial air travel in Berlin.

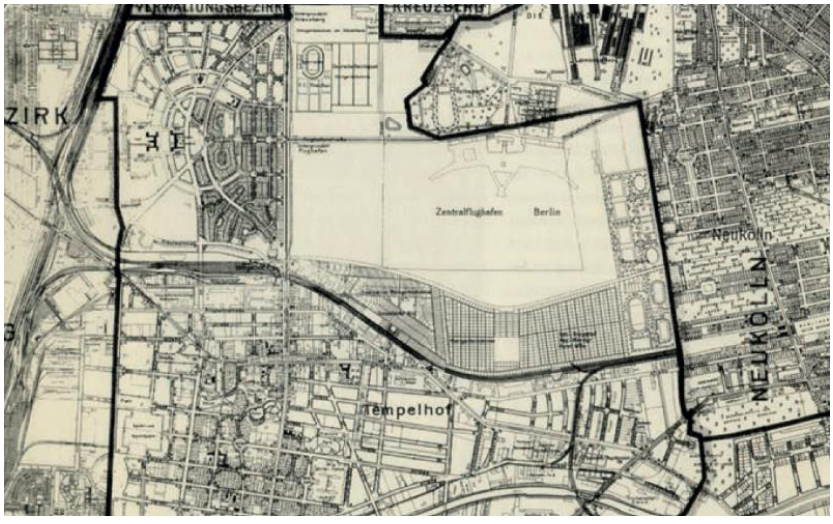


Figure 2.56: *Airport site 1928, Source: Berlin State Archives*

❖ Nazi-Era Expansion and Monumental Architecture

In 1934, the Nazi government initiated a massive expansion of the airport under the direction of architect Ernst Sagebiel. The project aimed to create a monumental transport

hub reflecting the ideological aesthetics and technological ambitions of the regime. The architectural composition featured a 1.2-kilometre semicircular terminal complex and expansive hangars with a distinctive column-free steel canopy projecting over the apron. However, due to the outbreak of the Second World War, this monumental iteration of the airport was never fully completed (SenStadt, 2024).

❖ War-Time Functions and Forced Labour

During the Second World War, civil aviation declined as the site was repurposed for military operations and aircraft production by companies such as Weser Flugzeugbau. The Tempelhof site became a centre for forced labour; several camps were established on the airfield's periphery, including the Columbia-Haus concentration camp and the Lilienthal camp. Thousands of forced labourers from occupied territories were exploited here, establishing a dark historical legacy that modern planning frameworks attempt to commemorate (SenStadt, 2024).

❖ The Berlin Airlift and Post-War Transformation

The United States Air Force took control of the airport in 1945 and gradually repaired and expanded its infrastructure. Tempelhof gained a new political meaning during the Soviet blockade of West Berlin between June 1948 and May 1949. During the Berlin Airlift, Tempelhof became one of the principal locations through which the Western Allies supplied West Berlin. The operation required almost continuous aircraft movements and contributed to the construction of additional runways, freight facilities and air-traffic infrastructure. The airport consequently became a symbol of Western support for the city and of West Berlin's political survival. This meaning was commemorated through the renaming of the forecourt as Platz der Luftbrücke and the construction of the Airlift Memorial, inaugurated in 1951. The symbolism of the site was therefore partly transformed after the war, although its earlier history was not erased.

❖ Late 20th Century Airport Operations

Civil aviation resumed in 1950. Tempelhof initially played an important role in maintaining connections between West Berlin and West Germany, but the growing scale of commercial air travel gradually exceeded the capacity of its central location and relatively short runways. After the expansion of Tegel Airport, Tempelhof was closed to most civilian air traffic in 1975, although it continued to operate as a United States military facility. Civil flights resumed in 1985, mainly serving domestic, regional and business routes. The United States military presence ended in 1993, and the airport permanently ceased operations on 31 October 2008.

❖ Transformation into Tempelhofer Feld Park

After closure, ownership of the airport complex was consolidated under the State of Berlin. The airfield remained closed to the public for approximately two years before reopening in May 2010.

The initial transformation required relatively little conventional park construction. Runways and taxiways were retained for movement and recreation, while large meadow areas remained open. Temporary and community-led projects were introduced mainly near the edges and entrances. This low-intervention approach preserved the scale, openness and recognisable geometry of the former airport while allowing new uses to emerge gradually.

Planning studies nevertheless proposed more extensive redevelopment. The Tempelhofer Freiheit process considered residential, commercial, institutional and landscape development around a central park. These proposals eventually became the focus of substantial public opposition.

❖ Contemporary Debates and Future Prospects

In 2014, a citizen-initiated referendum resulted in the adoption of the Act on the Conservation of Tempelhofer Feld, or ThFG. The law protected the airfield's landscape, ecological, recreational and historical qualities and significantly restricted permanent construction. The debate has not ended. Berlin's housing shortage has repeatedly encouraged political proposals to reconsider limited development around the field's edges. A new dialogue process and ideas competition initiated in 2024 examined both continued preservation and the possibility of cautious peripheral development. However, the competition was intended to inform public and political discussion; it did not itself amend the ThFG or authorise construction. Tempelhofer Feld therefore remains both a protected public landscape and a contested metropolitan territory whose future is negotiated through law, planning and civic participation.

2.11.3. Core Problems

The former Berlin Tempelhof Airport was officially closed on 30 October 2008 due to a combination of economic, operational, urban planning, and environmental factors. The closure was part of a broader strategy to reorganize the airport infrastructure of Berlin. The main reasons are summarized below.

❖ Airport System Reorganisation in Berlin

Following German reunification, authorities determined that maintaining three inner-city airports was inefficient. In 1996, the decision was made to consolidate regional air traffic into a single modern facility at Berlin Brandenburg Airport (BER) and gradually decommission Tegel and Tempelhof.

❖ Economic and Operational Inefficiency

By the 2000s, Tempelhof's passenger traffic was comparatively low, limited primarily to business and regional flights. The facility required extensive public subsidies to cover high operating deficits. Planners argued that maintaining the constrained airport was no longer economically justifiable for the city.

❖ Urban and Environmental Concerns

The airport's position within densely populated urban neighbourhoods created persistent friction. Aircraft operations generated significant noise pollution and safety concerns. Conversely, planners recognised that releasing the vast, unbuilt airfield could provide critical relief for the city's microclimate and offer an unparalleled recreational asset (SenStadt, 2024).

❖ Political Decision and Referendum

The closure was highly politicised. In April 2008, a public referendum was held on whether the airport should remain operational. Although a majority of those who voted supported keeping the airport open, the overall turnout failed to meet the legal quorum required to validate the result. Consequently, the Berlin Senate proceeded with the closure, and operations ceased in October 2008 (SenStadt, 2024).

2.11.4. Vision and Core Objectives

❖ Transformation from Airport to Urban Public Space

The initial post-closure transformation focused on opening the site rather than giving it a completely new physical form. This allowed the existing runway system, meadow landscape and aviation markings to become the basis of public use. The field now accommodates both programmed and unprogrammed activities. Runways support cycling, running, skating and wind sports, while the grasslands provide space for recreation, picnics and nature conservation. Community gardens, educational activities and temporary civic projects are concentrated mainly in selected edge areas. The main spatial objective has therefore been to preserve openness while permitting gradual adaptation. The airfield operates less as a formally designed park than as an extensive public field whose identity depends on scale, freedom of movement and flexible use.



Figure 2.57: *Tempelhofer Feld open space. Source: vmspace.com*

❖ The Battle Between Development and Preservation

Early post-closure plans proposed a large central park surrounded by new urban districts containing housing, employment and public facilities. This model sought to combine the preservation of most of the open space with development along selected edges.

Opponents argued that even peripheral construction could fragment the landscape, weaken ecological and climatic functions and gradually commercialise a rare non-consumption-oriented public space. The citizen initiative 100% Tempelhofer Feld collected sufficient support to initiate the 2014 referendum. The resulting ThFG shifted the planning framework from development with a central park to the legal conservation of the field as a whole. The later reopening of the debate demonstrates that the conflict is not simply between park and housing, but between different understandings of public value, metropolitan need and democratic legitimacy.

❖ Current Adaptive Reuse

The reuse of Tempelhof occurs at two related but distinct scales. The airfield functions as an open public landscape, while the terminal and hangars accommodate institutional, cultural, commercial and temporary uses. The airport building has hosted exhibitions, conferences, concerts, trade fairs and large events. Parts of the administrative complex are used as offices, while significant areas have also accommodated the police, cultural institutions and emergency housing. The seven hangars, main hall, apron and extensive interior spaces provide unusual capacity for activities that would be difficult to accommodate elsewhere. Nevertheless, the building remains only partially accessible and requires substantial renovation. Fences and temporary uses also weaken the spatial connection between the terminal, apron and open field. Adaptive reuse is therefore ongoing rather than complete.



Figure 2.58: *Different activities in Tempelhofer Feld. Source: amusingplanet.com*

❖ Preservation, Sustainability, and Future Development

Preserving Europe's Largest Architectural Monument

The terminal is one of Europe's largest surviving aviation complexes and has been protected as a monument since the 1990s. Its value lies not only in its scale and technical construction but also in its complex political history. Preservation must therefore address both material conservation and critical interpretation. The terminal, hangars, apron and airfield form a broader historical ensemble. Separating the building from the landscape would weaken the understanding of how the airport originally functioned and how its political meanings developed.

Development and Renovation Concepts

Three strategic frameworks guide the site's long-term transformation: the development concept, the renovation concept, and the Technical Infrastructure 2030 (TI 2030) programme.

- The **development concept** provides a flexible, structured framework addressing sustainability, heritage protection, mobility, logistics, public space, and infrastructure. It connects city-wide planning strategies with detailed architectural interventions, defining short-, medium-, and long-term priorities.
- The **renovation concept** focuses on restoring and modernizing the historic buildings. It establishes standards for interventions, covering structural safety, fire protection, building types, and material conservation. Life-cycle analysis is used to select renovation strategies that balance cost, environmental performance, and long-term operational efficiency.

Technical Infrastructure 2030 and Climate Strategy

The terminal retains extensive networks for water, heating, electricity and technical services, many of which require modernisation. Infrastructure planning considers the gradual replacement of these systems together with energy efficiency, renewable energy and reduced operational emissions. Such measures should be understood as planned components of long-term renovation rather than completed environmental outcomes. Their performance will depend on funding, heritage constraints and the sequence in which different building sections are restored and occupied.

Strategic Activation and Future Adaptive Reuse of Building Spaces

The spatial scale of the terminal makes a single programme neither practical nor desirable. The strategy instead divides the complex into areas suitable for permanent cultural and institutional use, flexible events, offices, creative activities and public access. Under Vision 2030+, the western hangars were identified for longer-term cultural functions, while the eastern hangars, main hall, apron and courtyard could continue accommodating large temporary events. Administrative wings could support office and creative uses, with public programmes introduced at ground level where possible. This mixed strategy allows parts of the building to become active before the renovation of the entire complex is complete. However, it also creates management challenges related to security, access and coordination among different users.

Cooperative Development and Civic Participation

Participation has become a central feature of Tempelhof's governance. Civic organisations, field users, public authorities and management bodies have contributed to discussions about access, ecology, history, sport and temporary projects. This cooperative model does not remove conflict. Public actors often hold different positions on conservation, housing and the acceptable level of intervention. Its significance lies

instead in making these disagreements visible and creating formal channels through which future measures can be discussed.

❖ The ThFG Legal Framework and Spatial Zoning

The 2014 Act on the Conservation of Tempelhofer Feld (ThFG) divides the 303-hectare airfield into distinct regulatory zones to balance use and ecology. The "Central Meadow Area" (approx. 202 hectares) is strictly protected to preserve characteristic flora, fauna, and the site's microclimatic function. The "Outer Meadow Ring" (approx. 101 hectares) permits temporary civic projects and intensive recreational use. Notably, Section 9 of the ThFG includes an exemption permitting refugee housing facilities on approximately 14 hectares of the eastern apron until December 2028 (SenStadt, 2024).



Figure 2.59: *Area according to ThfG. Source: thfgesetz.de*

❖ The Development and Maintenance Plan (EPP)

Following the ThFG, an extensive participatory process produced the Development and Maintenance Plan (EPP) in 2016. Drafted in collaboration with citizens, the EPP outlines ten guidelines—including the preservation of the site's vast extent, the prioritisation of nature, transparency, and the integration of historical memory—which dictate how the field is managed and ecologically maintained (Grün Berlin GmbH, 2016).



Figure 2.60: *Maintenance Plan (EPP). Source: tempelhofer-feld-archiv.liqd.net*

❖ Vision 2030+: A Public Space for Experimentation and Exchange

Vision 2030+, adopted in 2020, concerns primarily the future of the airport building rather than urban construction across the protected field. It proposes a gradual transformation of the terminal into a mixed cultural, institutional, creative and event-oriented complex. Its emphasis on flexible use reflects the difficulty of renovating and operating such an extensive monument. Permanent cultural institutions may coexist with temporary events, offices and experimental programmes. Publicly accessible ground floors and improved connections between internal courtyards, hangars and the apron are intended to make the building less isolated. The vision remains a long-term framework whose delivery depends on major investment and phased renovation. It should therefore be presented as an evolving strategy rather than a completed transformation.

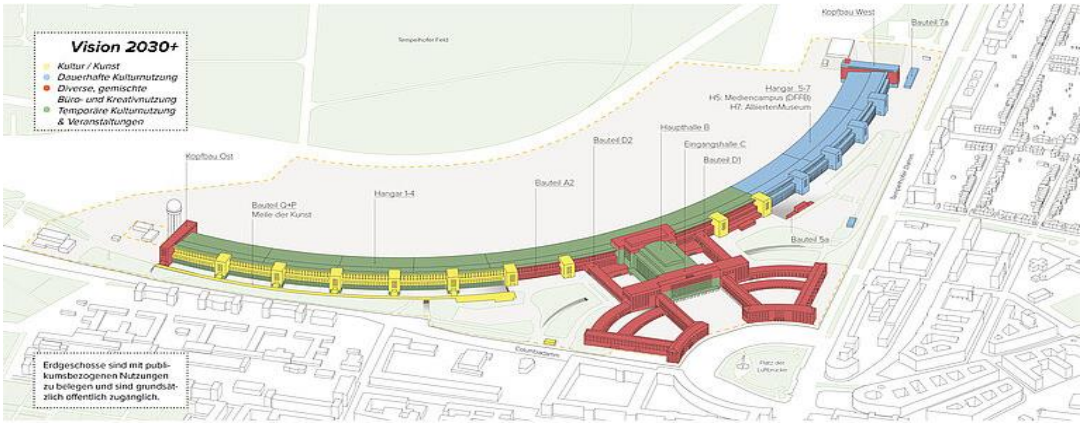


Figure 2.61: *Vision 2030+, the future of Tempelhof airport. Source: thf-berlin.de/en/development/vision-2030*

2.11.5. Outcomes and Impacts

❖ Cultural and Historical Preservation

The protection and adaptive reuse of Tempelhof have retained an unusually complete combination of terminal, hangars, apron, runways, and open airfield. These elements allow different layers of the site's history—including National Socialism, forced labour, the Berlin Airlift, Cold War aviation, and later civic use—to remain spatially legible. Renovation of the terminal is ongoing, however, and substantial parts of the complex remain only partially accessible or reused.

❖ Environmental and Climate Impact

Tempelhofer Feld already provides important ecological and climatic functions through its extensive open meadow landscape. The field supports biodiversity and contributes to local cold-air generation, while seasonal management measures protect sensitive habitats such as those used by the Eurasian skylark.

Technical Infrastructure 2030 addresses the future environmental performance of the terminal complex through proposed energy-efficiency measures, renewable-energy systems, and infrastructure upgrades. These measures should be treated as long-term targets and planned interventions rather than as fully realised outcomes.

Additionally, the Tempelhofer Feld continues to provide a vital urban green space, protecting native flora and fauna, supporting biodiversity, and maintaining the city's microclimate. Seasonal restrictions safeguard breeding habitats for species like the Eurasian skylark, demonstrating a balance between public access and environmental conservation.

❖ Social and Civic Outcomes

Tempelhofer Feld supports a wide range of recreational and civic activities, including cycling, skating, sport, picnics, community projects, and temporary events. Initiatives such as Torhaus Berlin e.V. and other participatory projects demonstrate the importance of civic involvement in the site's continuing development. Its free public access and relatively open programming support broad use, although accessibility remains influenced by the limited number of entrances and the site's extensive scale.

❖ Economic and Creative Impacts

The terminal, hangars, and apron support cultural events, exhibitions, fairs, offices, and temporary activities that generate economic and creative activity within the complex. These uses contribute to the activation of the listed buildings and provide partial revenue streams. However, they do not eliminate the substantial long-term costs associated with renovation, maintenance, and management of the historic complex.

❖ Urban and Spatial Impacts

The preservation of the airfield has maintained a major open landscape within the inner city and retained the long sightlines and spatial scale associated with the former airport. However, the surrounding roads, fencing, limited entrances, and incomplete connection between the terminal and field mean that integration with adjacent neighbourhoods remains partial.

❖ Emergency and Strategic Functions

The scale and flexibility of the airport complex have also supported temporary emergency functions, most notably refugee reception and accommodation. Proposed infrastructure upgrades may strengthen the site's future resilience, but these should be understood as part of long-term planning rather than as established outcomes.

❖ Summary of Impacts

Tempelhofer Feld represents a distinct model of post-aviation transformation based on preservation, public appropriation and minimal physical intervention. Its principal achievement is the retention of a large, accessible and recognisable airport landscape that supports recreation, biodiversity, urban climate functions and civic activity.

Its limitations are equally important. The terminal remains costly and only partially reused, the field's edges are not fully integrated with surrounding districts, and political conflict over housing and development continues.

The case demonstrates that leaving space open is not the absence of planning. It requires legal protection, ecological management, public participation, financial resources and continuous negotiation. Tempelhof's broader lesson is therefore not that every former airport should remain undeveloped, but that existing openness, public use and infrastructural memory can themselves constitute valuable forms of urban regeneration.

2.11.6. Before and After Redevelopment Images

This section presents a visual comparison of the Tempelhofer Feld project before and after its transformation.



Figure 2.62: *The Tempelhofer Feld in 2006 (first image) and 2026 (second image). Source: Google Earth*

2.12. Parque Bicentenario project

2.12.1. Introduction

Parque Bicentenario is a major urban regeneration project located in Quito, the capital city of Ecuador. The initiative involves the transformation of the former Mariscal Sucre International Airport into a vast metropolitan public space. Following the cessation of aviation operations in 2013—prompted by the construction of a new international airport outside the urban periphery—this 126-hectare site became available for redevelopment, presenting an unprecedented opportunity to reshape the spatial structure of northern Quito. Rather than dividing the decommissioned airfield for conventional real-estate development, the Municipality of Quito elected to convert the site into a public park to provide recreational, social, and ecological amenities for the growing metropolis. The overarching ambition was to reconnect severed neighbourhoods and establish a multifunctional urban landscape capable of accommodating civic activities and environmental initiatives. However, the project's evolution from a visionary, landscape-driven competition entry to a highly regulated and fragmented municipal development illustrates the profound challenges of executing large-scale infrastructural transitions. Parque Bicentenario currently serves as a critical case study in public appropriation, revealing the tensions between conceptual ecological planning, municipal governance limitations, and the realities of market-driven urban regeneration (Salvador, 2022).



Figure 2.63: *"Parque Bicentenario" located in Quito. Source: REINVENTING CITIES Making the future possible, today*

2.12.2. Historical Context

The site served as Quito's principal international airport from 1960 until February 2013. At the time of its establishment, the airport was located near the urban edge, but rapid expansion during the second half of the twentieth century gradually surrounded it with predominantly low-rise residential neighbourhoods. Airport-related height restrictions, noise and environmental impacts influenced the development and value of the adjoining urban fabric.



Figure 2.64: *Quito's Old Airport Terminal, Gates, and Control Tower (left in blue). Source: nomading.world*

By the late twentieth century, the relationship between airport operations and the surrounding city had become increasingly difficult. The airport occupied a narrow plateau at high altitude within Quito's Andean geography, while adjacent development left little opportunity for substantial expansion or the introduction of wider safety margins. Plans to transfer aviation activities to the Tumbaco valley were developed over several decades, eventually resulting in the opening of the new Mariscal Sucre International Airport in Tababela in February 2013.

Discussion about the future of the old airport began before its closure. In 2007, Joan Busquets and Felipe Correa explored the potential of the site as a generator of a new urban centrality. Their work emphasised that the transformation required an integrated Urban Project capable of coordinating landscape, surrounding development, environmental repair and public–private action rather than a collection of unrelated interventions.

In 2008, the Municipality of Quito launched the international Parque del Lago ideas competition. The brief called for a 126-hectare park that would increase recreational and civic space, improve east–west connections, restructure areas previously constrained by airport regulations and address environmental degradation. The winning proposal by Ernesto Bilbao and Robert Sproull Jr. was selected in 2009.

The former airport opened as Parque Bicentenario shortly after aviation operations ended in 2013. Initial use relied substantially on the existing runways, open grounds and

former airport facilities. Over time, sports areas, event spaces, institutional facilities and landscape interventions were introduced, although the complete ecological and spatial vision of the winning proposal was not implemented (Salvador, 2022).

2.12.3. Core Problems

The closure of the former Mariscal Sucre International Airport in Quito in February 2013 was the result of multiple long-term challenges related to urban growth, aviation safety, environmental impacts, and infrastructural limitations. Over several decades, the airport gradually became incompatible with the surrounding urban environment and the operational requirements of modern aviation.

❖ Urban Expansion and Land-Use Conflicts

The city gradually expanded around the airport until residential buildings directly bordered much of its perimetre. This proximity exposed local communities to aircraft noise and pollution while restricting building heights and redevelopment opportunities in surrounding neighbourhoods. The airport also functioned as an extensive enclosed barrier within northern Quito. Its elongated form limited east–west movement and separated neighbourhoods located on opposite sides of the runway. Relocation consequently offered opportunities both to remove environmental pressures and to reconsider the urban structure of the wider area. A study cited by Salvador found that after the cessation of aviation noise, a substantial proportion of nearby residents perceived an improvement in their quality of life. This benefit was associated not only with the removal of aircraft operations, but also with the presence of the new public space and expectations surrounding improved public transport (Salvador, 2022).



Figure 2.65: *In this Jan. 8 2013 photo, a plane approaches the runway at the former airport. Source: foxnews.com/world/quitos-nerve-trying-urban-airport-shuts-down*

❖ Aviation Safety and Geographic Constraints

The operational safety of the airport was critically compromised by Quito's geography. Situated in a high Andean valley at an elevation of approximately 2,850 metres above sea level, the airport forced aircraft to operate in thin air, which required higher landing speeds and longer takeoff distances. Furthermore, the mountainous terrain and complex local weather patterns necessitated steep, technically demanding flight approaches over densely populated neighbourhoods. The constrained runway left minimal margins for error, and a series of serious runway overruns and aviation accidents heightened public anxiety regarding the facility's safety.

❖ Limited Capacity and Infrastructure Constraints

The airport's embedded urban location provided little room for runway extension, terminal expansion or additional operational infrastructure. Increasing air-travel demand could therefore not be accommodated easily within the existing site. The new airport in Tababela offered a less constrained location with greater potential for long-term development. Its opening resolved the immediate aviation limitations but transferred a different responsibility to the municipality: managing a large and strategically located former airport as both a public landscape and a catalyst for urban regeneration.

2.12.4. Vision and Core Objectives

The transformation of the former Mariscal Sucre International Airport into Parque Bicentenario represents one of the most ambitious urban regeneration initiatives in Quito. Following the relocation of the airport in 2013, the municipality envisioned the redevelopment of the 126-hectare site as a large-scale public landscape project that would address environmental, social, and spatial challenges created by decades of airport operations. The project aims to recompose the urban structure of northern Quito while introducing a new model of eco-urban development based on landscape transformation, connectivity, and public accessibility.

❖ Site Location

Parque Bicentenario occupies a strategic 126-hectare footprint in northern Quito. Surrounded by consolidated residential and commercial neighbourhoods, the site functions as an immense void within the dense plateau. Its redevelopment aimed to transition the space from a severe urban barrier into an accessible, connective centrepiece for the metropolitan area.

❖ International Design Competition and Masterplan Vision

The 2008 *Parque del Lago* competition sought to redefine the obsolete airfield. The winning proposal by Bilbao and Sproull Jr. was deeply rooted in landscape urbanism. It eschewed conventional, highly programmed real-estate development in favour of a

dynamic landscape transformation. The original concept aimed to gradually replace the vast asphalt surfaces with native ecologies, restricting new construction to preserve the monumental scale and emptiness of the aviation void (Salvador, 2022).

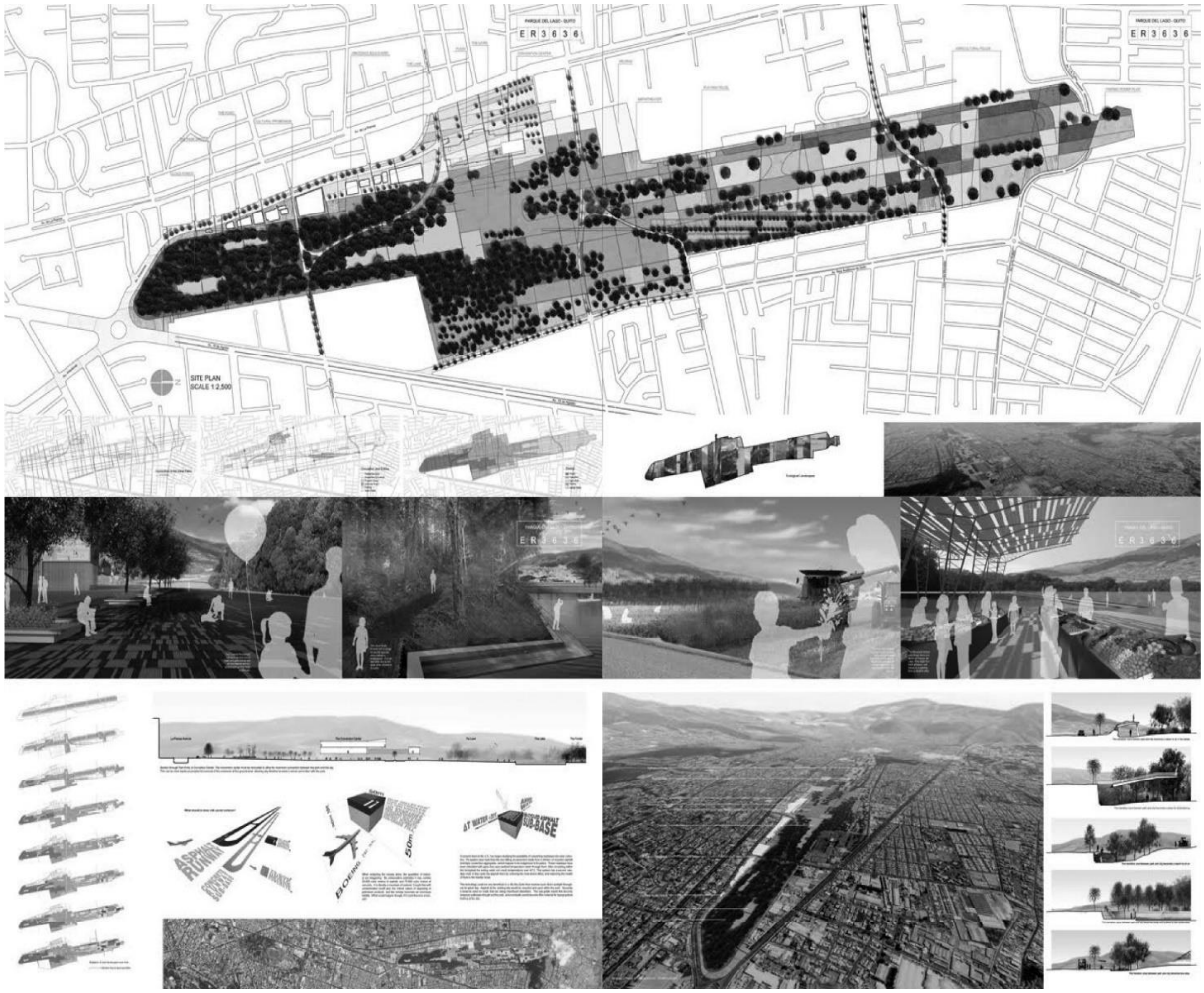


Figure 2.66: *The winning proposal for the Parque del Lago ideas competition. Source: Ernesto Bilbao and Robert Sproull Jr.*

❖ Landscape and Ecological Vision

The original proposal drew inspiration from the changing landscapes found along Quito's north–south plateau. Across the 3.4-kilometre site, it imagined a gradient ranging from denser vegetation and water-related landscapes in the south to drier areas, productive gardens and urban agriculture in the north. This ecological sequence was intended to represent the environmental diversity of Quito at the scale of the former airport. Existing runway surfaces would be progressively replaced or integrated into new landscape systems, while cultural and institutional buildings occupied a comparatively limited portion of the site. The current park does not reproduce this vision in full. Salvador's 2022 assessment notes that it had not developed the extensive tree cover, water systems or ecological differentiation proposed in the competition scheme. The original landscape framework should therefore be understood as a design ambition rather than a completed condition.

❖ Urban Connectivity and Spatial Integration

Improving east–west connectivity was one of the central objectives of the competition. The winning scheme proposed pedestrian connections across the park while placing three principal vehicular routes below the landscape, thereby maintaining continuity at ground level.

Later planning decisions changed this relationship. Municipal plans prioritised surface roads crossing or cutting into the former airport territory. The southern section was particularly affected by infrastructure connecting the city to the El Labrador transport interchange.

These roads improved metropolitan circulation but also introduced new barriers within the park. The case demonstrates that permeability should not be measured only by the number of crossings; the design, level and mode of those connections determine whether they unite or fragment the public landscape.

❖ Public Space, Cultural Facilities, and Social Activities

Parque Bicentenario supports everyday walking, cycling, informal sport, family recreation and large public gatherings. The long runway and open grassed areas allow activities that require more space than Quito's conventional neighbourhood parks. The planning framework also introduced cultural, educational, commercial and event-related facilities. The Quito Metropolitan Convention Centre became an important programme near the western edge of the park, while further proposals included hospitality, business, cultural and entertainment uses. Reinventing Cities presented a second-phase development area of approximately 75,000 square metres as part of a wider objective to establish a new northern urban centrality (Reinventing Cities, n.d.). The combination of informal public use and large institutional facilities gives the park a hybrid identity. However, these components do not yet form a fully integrated public-space system.

❖ Sustainable Infrastructure and Resource Reuse

The reuse of the former runway and other airport surfaces is one of the clearest forms of resource continuity within the park. Rather than removing all evidence of aviation immediately, existing paved areas have supported walking, cycling, events and temporary sport. The original proposal explored more ambitious forms of ecological transformation and material reuse. However, the sources reviewed for this study do not confirm the full implementation of technical ideas such as extensive pavement recycling, heat-collection systems or comprehensive water landscapes. These elements should therefore be described as design proposals rather than existing environmental infrastructure. More recent municipal investment has continued through incremental upgrades rather than the delivery of the original masterplan as a single project. In 2025, official works included the rehabilitation of sports facilities, green areas and landscape elements within parts of the park.

❖ Long-Term Evolution and Adaptive Development

Bilbao and Sproull Jr. envisioned the park not as a static, finished product, but as an adaptive framework that would evolve in response to ecological growth and civic needs over decades. This conceptual flexibility was intended to allow the municipality to test pilot projects and adjust programming based on observed public use.

❖ Current Challenges and Critiques of the Bicentenario Project

Loss of Landscape Vision in Later Planning Phases

As academic critiques highlight, the original landscape-driven vision was heavily compromised during subsequent municipal planning phases. In 2012, Resolution C-408 fundamentally altered the project's trajectory by introducing over 107,000 square metres of new built infrastructure, including a convention centre, hotel towers, and an arena (Salvador, 2022). This pivot reflected a desire to position Quito as an international business and events destination. The *Reinventing Cities* initiative further underscores this shift, outlining a 75,000-square-metre Phase Two development programme on the site aimed at expanding hospitality, retail, and commercial capacities. Consequently, the park evolved from an ecological sanctuary into a hybrid, investment-led development model.

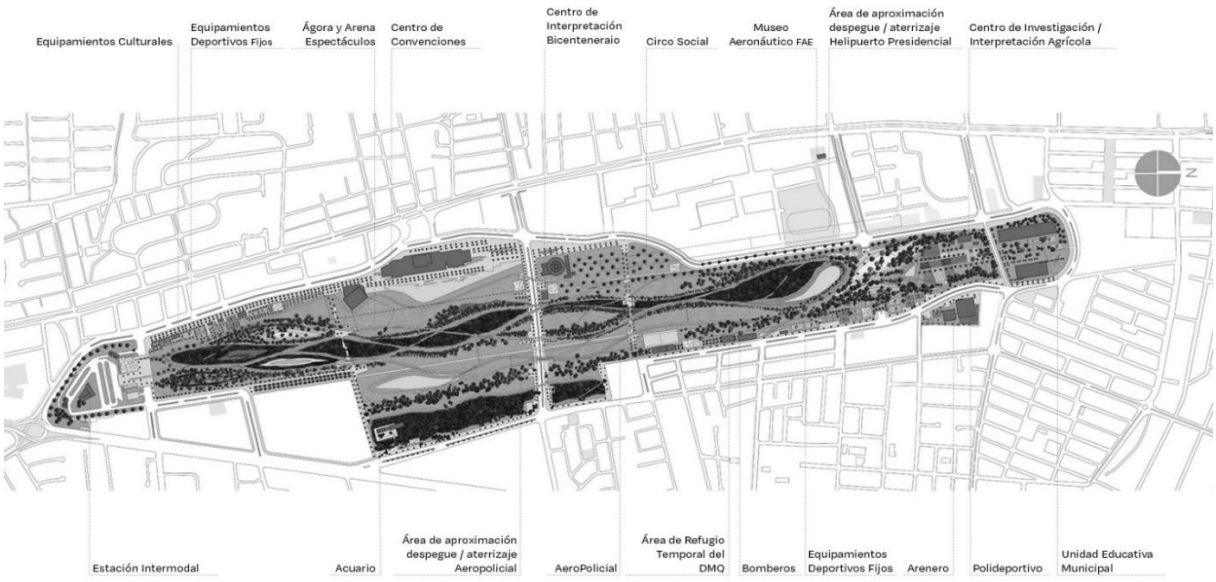


Figure 2.67: *Proposal included within resolution C-408. Source: Municipality of Quito.*

Spatial Fragmentation and Infrastructure Barriers

The execution of the park has resulted in significant spatial fragmentation. Contrary to the initial proposals for uninterrupted landscapes, the park lacks dense vegetation and large water bodies. The historical perimetre walls of the airport remain largely intact, preserving the site's exclusionary boundary. Furthermore, the municipal decision to introduce a surface-level east-west road effectively severed the southern portion of the park from the main landscape. The placement of the new multimodal metro station (El

Labrador) at the extreme southern edge, more than a kilometre away from the convention centre, highlights a lack of functional integration across the vast site (Salvador, 2022).

Weak Integration with the Urban Context

The competition brief referred to integrated urban development, but it did not define clearly how the design of the park would coordinate the transformation of adjacent neighbourhoods. The park and its surrounding regeneration area were consequently addressed through different instruments. One focused on landscape and facilities within the former airport, while another regulated building potential outside it. The absence of a coherent intermediate-scale urban design framework weakened the relationship between the two.

Urban Regeneration Strategies and Planning Regulations

To stimulate development around the park, the Metropolitan Council passed Ordinance 0352 in 2013. This legislation established a transformation zone allowing for approximately 6 million square metres of potential construction, divided into 51 management units. To attract investment, the ordinance permitted building heights of up to 30 storeys in areas previously restricted to three or four. However, practical implementation has proven highly problematic. The management units require the consolidation of highly fragmented land ownership, forcing the amalgamation of plots as small as 200 square metres into minimum viable development parcels of 600 to 5,000 square metres. Achieving consensus among numerous private owners has stalled large-scale regeneration (Salvador, 2022).

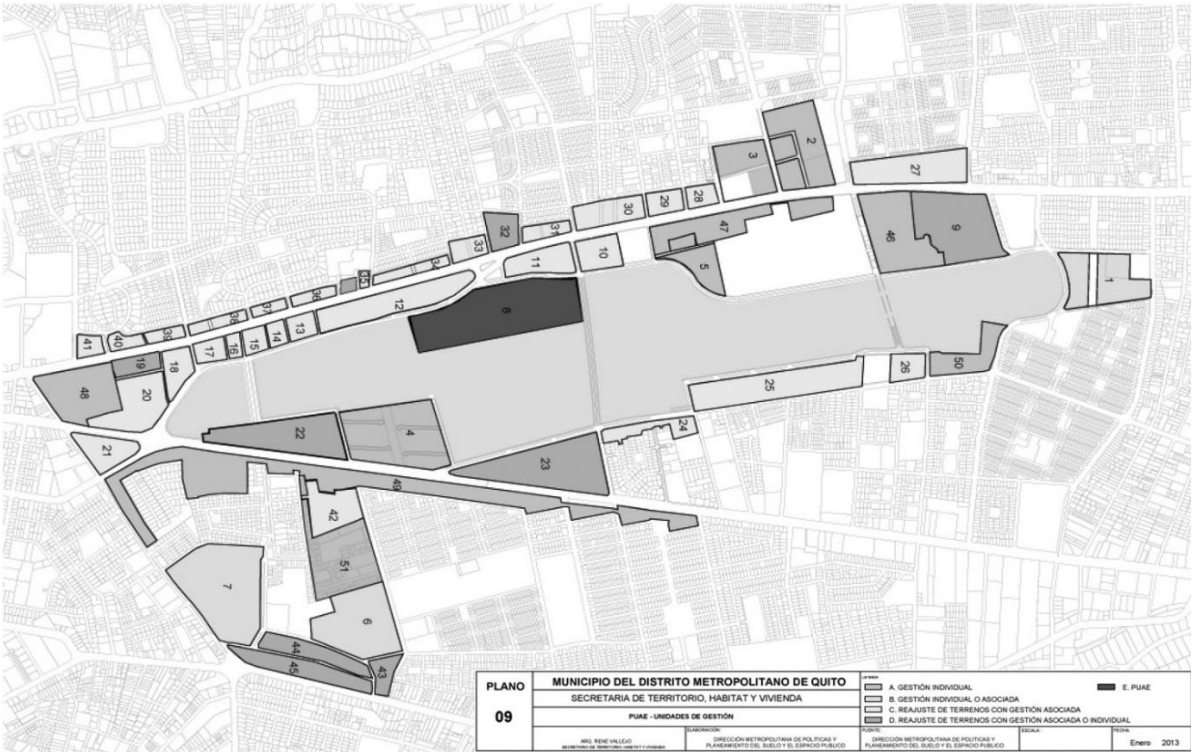


Figure 2.68: *Management units established by ordinance 0352. Source: Municipality of Quito.*

Market Limitations and Development Uncertainty

Quito's property market has historically operated through gradual plot-by-plot redevelopment rather than the coordinated transformation of complete urban blocks. The management-unit model therefore required forms of land assembly, financing and development unfamiliar to many local actors. Salvador (2022) argues that the limited physical transformation of the park and its less central position compared with established investment areas reduced market interest. Development rights alone were insufficient to generate the coordinated urban transformation anticipated by the plan.

Public Appropriation and Emerging Urban Identity

Despite these significant planning and governance limitations, Parque Bicentenario has successfully cultivated a distinct civic identity through informal public appropriation. Upon its opening in 2013, citizens immediately claimed the vast, unprogrammed voids for cycling, sports, and community gatherings. The sheer scale of the open runway, coupled with uninterrupted panoramic views of the Andes, provides a spatial experience entirely unique within Quito's dense urban environment, proving that profound civic value can emerge even in the absence of finalised landscape infrastructure (Salvador, 2022).

2.12.5. Outcomes and Impacts

The transformation of Quito's former airport into Parque Bicentenario represents one of the most significant urban regeneration initiatives in the city in recent decades. The project generated important spatial and social outcomes, creating a large public space while also revealing several planning and governance challenges that continue to influence its development.

❖ Creation of a Metropolitan Public Space

The most immediate outcome was the conversion of approximately 126 hectares of former airport land into publicly accessible open space. While not the largest park in Quito—surpassed significantly by Parque Metropolitano (557 hectares) and Parque Metrosur (750 hectares)—Bicentenario represents a vital recreational asset. The pragmatic repurposing of the runway asphalt into expansive cycling and pedestrian corridors facilitated immediate public use without requiring extensive initial capital expenditure.

❖ Social Use and Public Appropriation

Since opening in 2013, the park has supported walking, cycling, informal sport, family recreation and large events. These uses do not depend on the complete implementation of the original plan and have allowed the site to function while its long-term transformation remains unresolved. Public appropriation is therefore one of the project's strongest outcomes. Its value lies partly in the availability of open, adaptable ground rather than in highly designed or programme-specific spaces.



Figure 2.69: *playgrounds and green areas of Parque Bicentenario. Source: quitoinforma.*

❖ Preservation of Historical Elements

The most visible evidence of the former airport is the runway geometry, paved surfaces and elongated spatial structure. These elements allow visitors to understand the site's previous function even where buildings or technical installations have changed. Several cultural and aeronautical facilities appeared in planning proposals, but the available sources do not confirm that all were implemented as intended. The principal form of infrastructural memory is therefore the continued visibility and reuse of the airfield itself.

❖ Weak Integration with Surrounding Urban Development

The projected urban regeneration of the surrounding neighbourhoods remains largely unrealised. Because the municipality relied heavily on abstract regulatory zoning rather than proactive urban design, the physical interface between the park and the city has not been meaningfully improved. The anticipated high-density, 30-storey perimetre has yet to materialise coherently, leaving the park surrounded by the older, low-rise urban fabric.

❖ Governance and Implementation Challenges

Responsibility for the area has been divided among municipal planning, park management, transport, tourism and other institutional actors. The absence of a strong coordinating body has made it difficult to maintain continuity between the competition proposal, later regulations and individual projects. The case demonstrates that a large urban project requires more than a design and zoning ordinance. It also needs long-term management, financing, coordination and the ability to revise the spatial framework without losing its central objectives.

❖ Planning Limitations at the Urban Design Scale

The Bicentenario case underscores the risks of a "missing middle" in urban planning. The municipality successfully executed high-level zoning legislation (Ordinance 0352) and commissioned individual architectural buildings (the Convention Centre), but failed to implement an intermediate urban-design framework to stitch these elements together.

Consequently, spatial continuity, pedestrian scaled-edges, and detailed landscape features remain unresolved.

❖ Development of a New Urban Landscape

Ultimately, Parque Bicentenario has evolved into a compelling, if unfinished, urban landscape. Its current condition represents a negotiation between the remnants of heavy aviation infrastructure, municipal investment ambitions, and spontaneous civic use. While it fell short of its initial ecological promises and struggles with urban integration, the preservation of the vast, open void ensures that the site will continue to function as a crucial social and environmental reserve for Quito's future development.

2.12.6. Before and After Redevelopment Images



Figure 2.70: *The Parque Bicentenario project in 2012 (first image) and 2026 (second image). Source: Google Earth*

2.13. Conclusion

The comparison of Kai Tak Development in Hong Kong, The Ellinikon in Athens, Tempelhofer Feld in Berlin, and Parque Bicentenario in Quito demonstrates that the transformation of former urban airports does not follow a single redevelopment model. Although all four sites emerged from the obsolescence of large, enclosed aviation territories, their subsequent trajectories differ considerably in terms of development intensity, landscape treatment, public access, heritage, governance, and implementation. The four cases should therefore not be understood as complete or directly transferable templates. Each combines several spatial and institutional approaches, and each remains shaped by unresolved tensions. Nevertheless, the comparison reveals four dominant spatial logics that help explain how development, open landscape, inherited infrastructure, and public use have been organised. These strategies provide a comparative framework for considering other post-aviation territories, while the differences between the cases demonstrate that their effectiveness depends on the relationship between spatial design, public access, governance, and long-term implementation.

2.13.1. Comparative Design Strategies and Transferable Lessons

The comparative review of the four cases reveals distinct design strategies that structure the transformation of former airfields into new urban landscapes. These strategy labels operate as analytical interpretations derived from the comparison, rather than official terminology used by the projects themselves, and they highlight transferable spatial logics applicable to similar large-scale regeneration contexts.

Densification of Edges (Kai Tak, Hong Kong)

The regeneration of Kai Tak demonstrates a strategy in which new development is concentrated around accessible edges, transport nodes, and major activity areas rather than distributed uniformly across the former airport. Higher-intensity residential and commercial programmes are combined with waterfront public spaces, parks, and lower-density areas associated with the former runway. The transferable value of this approach lies in using selective intensification to strengthen relationships with the surrounding city while maintaining a connected public-space framework across the site.

Archipelago Urbanism (Ellinikon, Athens)

The Ellinikon can be interpreted as an archipelago-like urban structure in which distinct residential, commercial, cultural, educational, tourism, and recreational clusters are distributed around a continuous metropolitan park. Rather than extending a uniform urban grid across the former airport, the masterplan establishes a collection of differentiated development areas connected by landscape, pedestrian and cycling routes, and metropolitan infrastructure. This organisation allows different programmes to maintain their own identities while participating in a wider spatial framework. It also

supports phased implementation because individual clusters can be developed at different times without requiring the simultaneous completion of the entire site. In this sense, the landscape operates as the main organising medium, providing continuity between otherwise separate urban components.

The effectiveness of the archipelago strategy depends on maintaining strong relationships between its individual clusters. Shared landscapes, accessible pedestrian and cycling routes, and common civic spaces can ensure that differentiated programme areas remain part of a coherent urban structure. The Ellinikon therefore demonstrates how distributed development can support programme diversity and phased implementation when the individual clusters remain connected through a continuous public landscape.

Landscape Preservation and Suspension (Tempelhof, Berlin)

Tempelhofer Feld represents a strategy based on landscape preservation and minimal physical intervention. The open meadows provide ecological, recreational, and climatic functions, while the retained runways operate as movement surfaces and visible traces of the site's aviation history. This condition is not the absence of planning: its continuation depends on legal protection, ecological management, civic participation, and long-term maintenance. The case therefore demonstrates how openness and infrastructural memory can themselves become active components of post-aviation regeneration.

Linear Sequencing Strategy (Parque Bicentenario, Quito)

The redevelopment of Parque Bicentenario introduces a strategy particularly relevant for constrained, elongated airfield morphologies. The original 2008 competition envisioned a linear sequencing strategy, proposing an uninterrupted ecological and Programmatic gradient that transitioned from simulated cloud forests to urban agriculture along the runway's axis. However, later implementation weakened parts of the spatial and ecological continuity proposed in the original competition scheme. Surface roads and separately implemented facilities introduced new interruptions within the linear landscape. The case therefore demonstrates that linear sequencing is most effective when transport infrastructure, landscape, and individual development phases are coordinated through a consistent urban-design framework.

2.13.2. Synthesis of Design Strategies

Taken together, the four strategies translate the theoretical discourses into complementary spatial approaches for the transformation of large post-aviation territories. Edge densification demonstrates how new development can be concentrated near existing neighbourhoods, transport connections, and strategic nodes, while preserving a substantial continuous landscape within the site. Archipelago urbanism provides a flexible structure in which distinct programme clusters can be developed in

phases while remaining connected through a shared landscape framework. Landscape preservation highlights the value of openness, ecological continuity, public appropriation, and infrastructural memory, while linear sequencing offers a clear organisational logic for elongated airport territories. These approaches are not mutually exclusive. They can be combined according to the morphology, environmental conditions, and urban context of each site. Their successful application depends on the careful relationship between built development and open space, the continuity of pedestrian and ecological networks, the design of active thresholds, and the coordination of implementation over time. Governance, phasing, and long-term management therefore support the spatial strategies rather than replacing them.

Table 2.2: *Synthesis of design strategies. Source: Author, 2026*

Strategy	Project	Core Idea	Spatial Logic
Densification of Edges	Kai Tak	Concentrate development near accessible edges and strategic nodes	Selective intensification + public-space continuity
Archipelago Urbanism	The Ellinikon	Organise distinct programme clusters within a shared landscape	Distributed clusters + landscape connections
Landscape Preservation	Tempelhof	Retain openness, public use, and selected aviation traces	Protected and adaptable open field
Linear Sequencing	Parque Bicentenario	Organise programmes and landscapes along the runway axis	Longitudinal sequence + transversal connections

2.13.3. Implications for Lisbon Airport Transformation

The comparative analysis provides a conceptual toolkit for considering the future transformation of Humberto Delgado Airport without prescribing a single redevelopment model. The four cases suggest complementary spatial directions that may be adapted according to the site's morphology, urban context, environmental conditions, and existing infrastructure.

In particular, the comparison identifies four relevant principles:

- **edge densification,** which can strengthen relationships between a former airport and the surrounding urban fabric;
- **archipelago-like Programmatic clustering,** which can support diversity, differentiated spatial identities, and flexible transformation;

- **preservation and reinterpretation of runway structures,** which can maintain spatial continuity and infrastructural memory while accommodating new public uses;
- **linear sequencing,** which can provide a clear organisational structure for elongated former-airport territories.

These strategies are complementary rather than mutually exclusive. Their potential combination suggests a model in which selective development, continuous landscape, inherited infrastructure, and cross-site connections can operate as parts of a coherent spatial system.

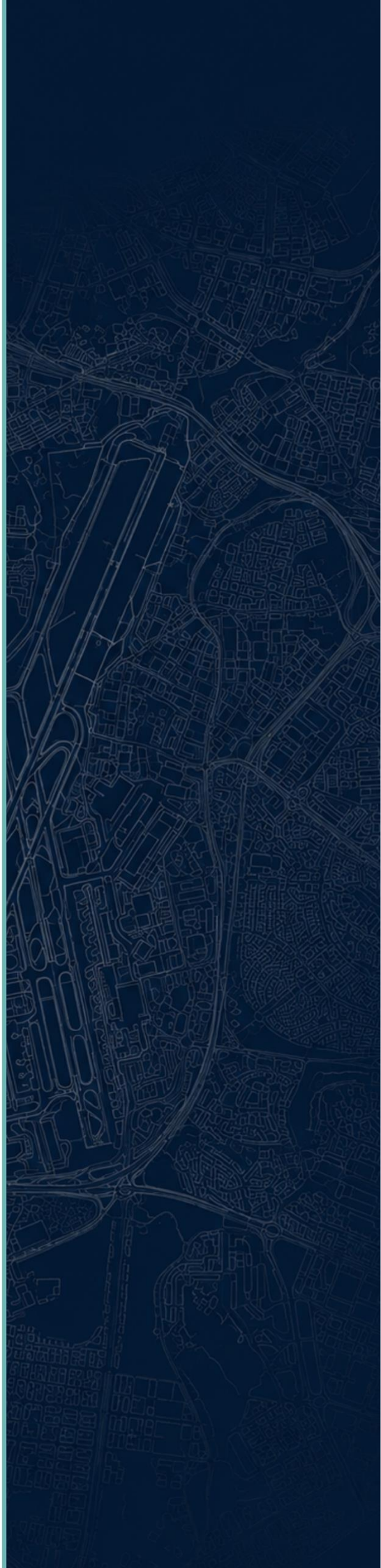
The theoretical and comparative analysis also highlights the importance of transversal permeability, active thresholds, adaptive reuse, temporary public use, and climate-responsive landscape. In Lisbon, the relevance of environmental strategies must be considered in relation to Mediterranean conditions, particularly summer heat, water availability, vegetation, shading, stormwater management, and urban ventilation. These principles do not constitute the design proposal itself. Their site-specific interpretation and integration are developed in Chapter 4, where the design responds directly to the spatial and environmental conditions identified through the Lisbon Airport analysis.

CHAPTER

03

Zooming In

Reading the Lisbon Airport



3.1. Introduction and Analytical Scope

Humberto Delgado Airport represents one of the most significant infrastructural discontinuities within Lisbon's urban fabric. As metropolitan development expanded around the airport, a facility originally located near the urban edge became surrounded by residential, institutional, productive, and transport-related areas. The airport now operates simultaneously as a metropolitan gateway and as a large restricted territory that affects local connectivity, environmental performance, and the relationship between adjacent neighbourhoods. This chapter examines the site at two complementary scales. At the metropolitan scale, the analysis considers the airport's relationship with Lisbon's land-use structure, ecological systems, mobility networks, and wider environmental conditions. At the local scale, it focuses on the airport boundary, adjacent neighbourhoods, accessibility conditions, surface characteristics, demographic context, and potential points of connection. The analysis combines spatial mapping, environmental datasets, demographic information, and interpretative diagrams to identify the main constraints and transformation opportunities of the site. Rather than treating the airport only as transport infrastructure, the chapter examines it as an urban territory whose redevelopment could reduce existing spatial discontinuities and support a more accessible and climate-responsive relationship with the surrounding city.

3.2. Site Context and Existing Airport Structure

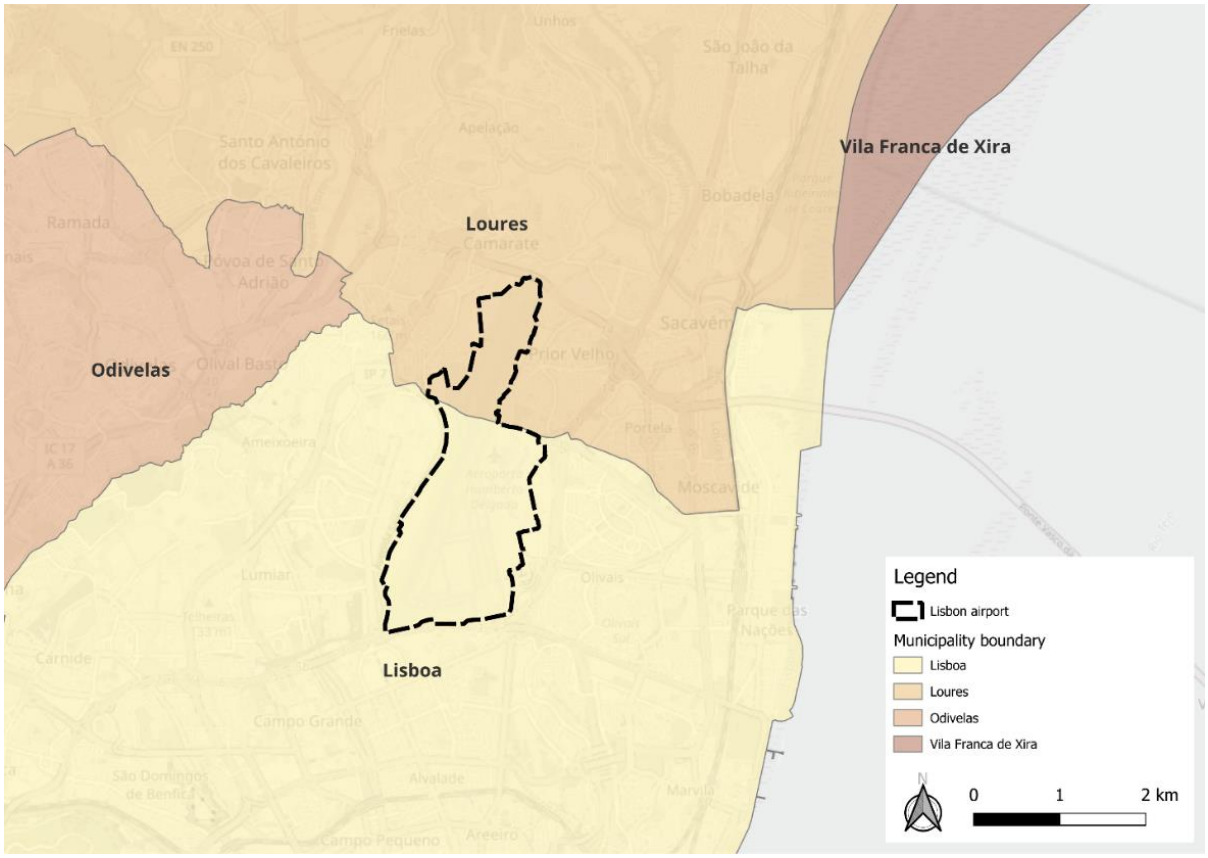
This section introduces the selected site, Humberto Delgado Airport, and examines its spatial, functional, and urban context as the foundation for the subsequent design proposal. It provides an overview of the airport's location within the metropolitan structure of Lisbon, its internal layout and physical characteristics, and the conditions of its boundaries where the site interfaces with surrounding urban fabric. Together, these aspects establish a comprehensive understanding of the site's constraints, potentials, and transformation capacity.



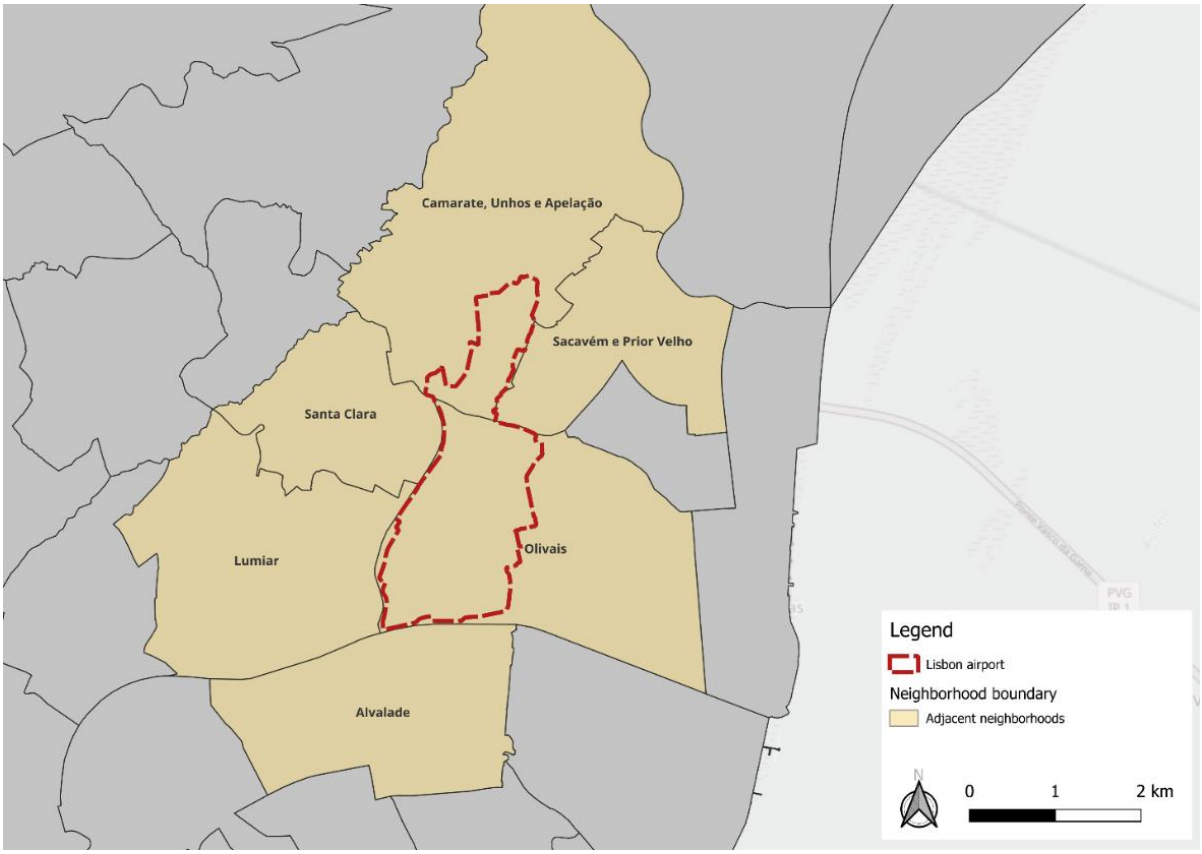
Figure 3.1: *Overview of Humberto Delgado Airport: (a) exterior view of Terminal 1; (b) view across the airport's airside operational area, Sources:*
(a) https://www.fsaddoncompare.com/product/10048/LPPT-Lisbon-Airport;
(b) https://www.theportugalnews.com/news/2022-08-10/lisbon-airport-6th-for-most-delays/69329

3.2.1. Site Location

Humberto Delgado Airport is located in the north-eastern part of Lisbon, approximately seven kilometres from the historic centre. The site is bordered by urban areas associated with Olivais, Alvalade, Lumiar, and Santa Clara and is now largely surrounded by consolidated urban development. Originally established in a comparatively peripheral location, the airport was progressively enclosed by the expansion of Lisbon. Its present boundary interfaces with residential neighbourhoods, institutional areas, commercial and industrial uses, major transport infrastructure, and open land. This condition creates a complex relationship between metropolitan accessibility and local environmental and spatial pressures. Previous research has identified urban and aircraft-related noise as an important environmental concern in Lisbon and in the areas surrounding the airport (Martins Pereira et al., 2021). The location of the airport therefore raises questions concerning land-use compatibility, environmental exposure, local connectivity, and the future role of this large restricted territory within the city.



Map 3.1: *Adjacent municipalities and location of Humberto Delgado Airport. Source: Author, 2026 (based on Lisboa Aberta).*



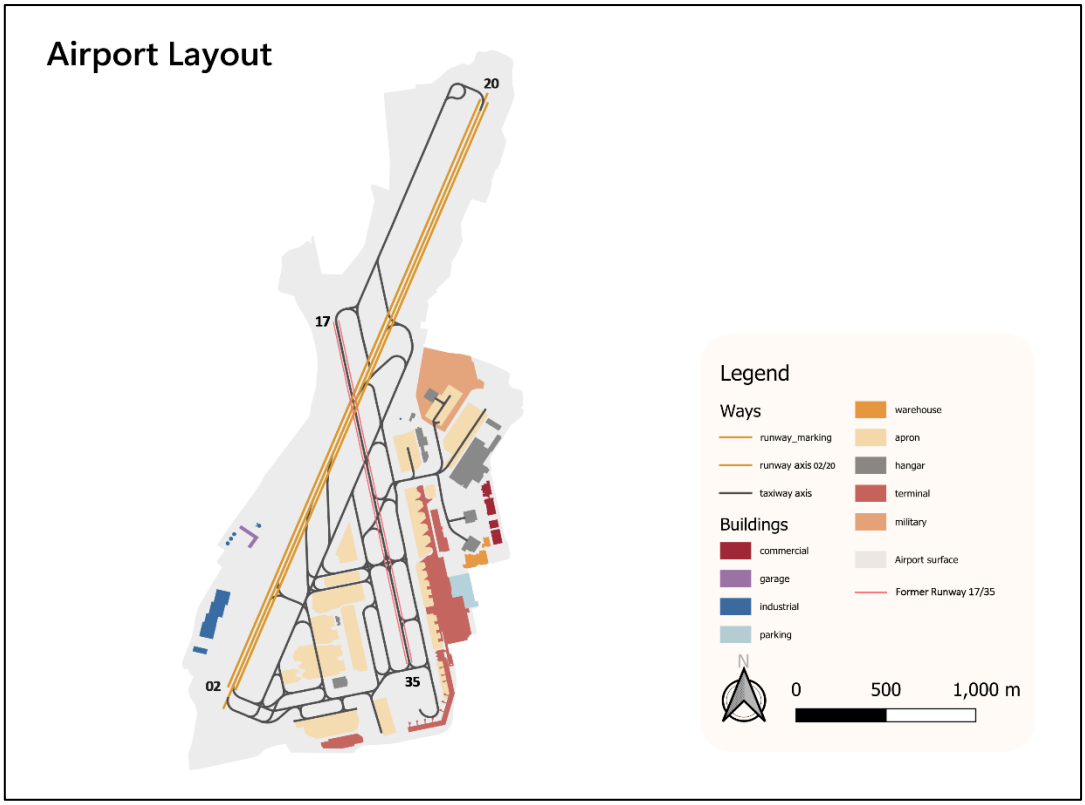
Map 3.2: *Adjacent civil parishes and location of Humberto Delgado Airport. Source: Author, 2026 (based on Lisboa Aberta).*

3.2.2. Existing Airport Layout

This section provides a detailed morphological analysis of Humberto Delgado Airport's existing internal layout, dissecting its physical and functional anatomy. By examining the primary aviation infrastructure, the spatial distribution of the terminal complexes, and the extensive coverage of impervious surfaces, the analysis aims to decode the site's current spatial logic. Ultimately, understanding this massive hardscape and its functional zoning is essential for evaluating the airport's physical constraints and its overarching environmental footprint within the city.

Airport functional layout

The airport layout reveals a highly infrastructure-led geometry shaped by the runway system, taxiways, aprons, terminals, hangars, and operational support areas. Large open aviation surfaces occupy most of the central and western parts of the site, while terminal, maintenance, cargo, and military structures are more strongly concentrated along the southern and eastern edges.



Map 3.3: *Functional layout of Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors)*

The Circulatory Skeleton:

- **Runways:** The airfield is organised around the principal Runway 02/20 and the intersecting alignment of former Runway 17/35, which remains visible within the present taxiway system. Together, these axes establish the cross-shaped morphology of the airport and strongly influence the orientation and scale of the site. The current operational designation and use of each alignment should be understood according to official aeronautical information rather than inferred only from aerial imagery.



Figure 3.2: *Runway 02/20 (Principal runway). Source: https://fselite.net/content/mk-studios-releases-lisbon-rebooted/*



Figure 3.3: *Former Runway 17/35. Source: https://dlapilota.pl/wiadomosci/portugalia-chaos-na-lotniskach-wz-z-wdrazaniem-nowego-systemu-zarzadzania-granicami*

- **Taxiways:** A dense network of asphalt paths runs parallel to the main runway, connecting the aprons to the takeoff points. These lines significantly expand the site's impervious surface coverage.

Functional Zoning and Built Mass:

- **Aprons:** Expansive, uninterrupted concrete surfaces located in front of the terminals and hangars, utilised for aircraft parking and refueling. These areas constitute the largest continuous hardscape zones within the airport perimetre.



Figure 3.4: *Aircraft apron at Humberto Delgado Airport. Source: https://avaz.ba/vijesti/globus/248307/lisabon-istrcali-na-pistu-aerodroma-kako-bi-izbjegli-pasosku-kontrolu*

- **Hangars:** Located north of Terminal 1, these massive industrial blocks house the TAP Air Portugal Maintenance and Engineering centre. These structures feature the largest structural volumes and roof spans within the site.
- **Military:** Aeródromo de Trânsito N.º 1 (AT1), located at Figo Maduro occupies a significant portion of the eastern boundary, operating with its own dedicated aprons and support buildings.
- **Airport Surface (Softscape):** Grassed and bare-soil areas remain between runways, taxiways, and other operational surfaces. These areas constitute the principal pervious surfaces within the airport boundary, but they remain spatially fragmented, restricted from public access, and largely managed according to aviation safety requirements.
- **Terminals:** Terminal 1 is the principal passenger terminal and is directly connected to Lisbon's Metro network, as well as bus, taxi, and car-rental services. Terminal 2 is a smaller and more specialised facility connected to Terminal 1 and the wider transport network through road-based and shuttle services. The separation of the two terminal areas contributes to the fragmented functional structure of the southern part of the airport.

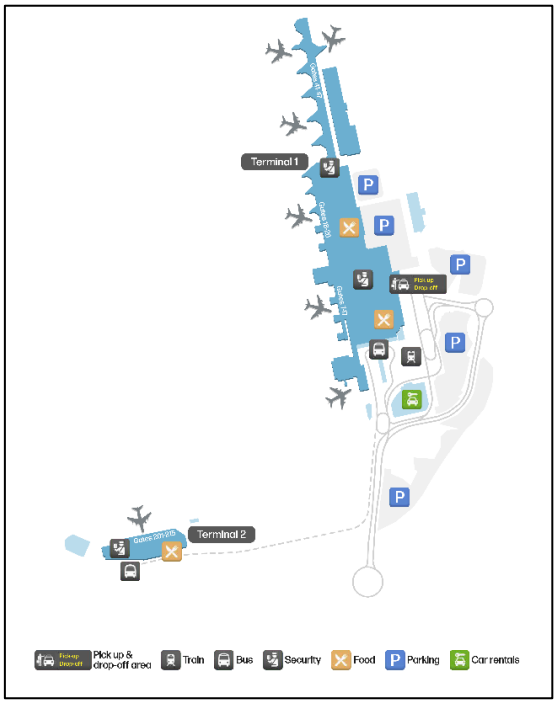


Figure 3.5: *Passenger terminal layout at Humberto Delgado Airport. Source: Airportmaps.com.*

The simplified layout diagram shows a pronounced concentration of built structures along the southern and eastern parts of the site, while the western side contains fewer major buildings and a larger proportion of open operational land. This asymmetry is relevant to future transformation because different parts of the site present different

conditions for adaptive reuse, landscape intervention, new connections, and selective development.

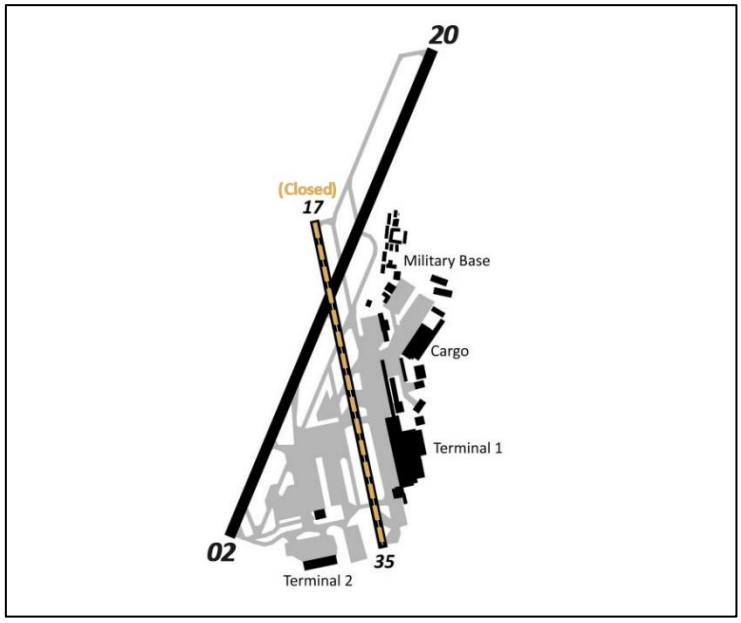


Diagram 3.1: *Simplified functional layout of Humberto Delgado Airport. Source: airportspotting.com*

3.2.3. Infrastructural Memory and Reuse Opportunities

The previous section documented the functional layout of Humberto Delgado Airport, including its runways, terminals, hangars, aprons, cargo facilities, service buildings, and military areas. This section does not repeat that inventory. Instead, it identifies selected elements that may contribute to the future transformation of the site because of their spatial characteristics, connection to the airport's identity, and possible capacity to accommodate new uses.

The analysis is qualitative and is based on characteristics that can be observed through existing cartography, aerial imagery, available photographs, and the present spatial organisation of the airport. These characteristics include the scale and continuity of each element, its relationship with surrounding open spaces and infrastructure, its accessibility, and its association with the historical and functional identity of the airport. The identification of a reuse opportunity does not confirm the structural or technical suitability of an element. It indicates that the element is spatially relevant and should be considered for more detailed investigation before demolition or replacement.

The principal reuse opportunities identified through this qualitative assessment are summarised in Table 3.1.

Table 3.1: *Selected airport elements and their potential reuse directions. Source: Author, 2026 (based on NAV Portugal, AIP-LPPT; Câmara Municipal de Lisboa vector cartography; OpenStreetMap contributors, 2026). Note: The table identifies preliminary spatial opportunities rather than confirmed technical feasibility. Structural condition, contamination, ownership, legal restrictions, and economic viability require further investigation.*

Existing element	Basis for identifying reuse opportunity	Possible reuse direction
Main runway 02/20	Continuous linear structure, large scale, and strong association with the airport's identity	Principal public spine for walking, cycling, landscape, and temporary activities
Terminal 1	Large building footprint, established airport identity, proximity to public transport, and connection to the main apron	Civic, cultural, commercial, and public-service functions
Main hangars and maintenance buildings	Large internal volumes, industrial character, and direct relationship with adjacent apron surfaces	Education, research, workshops, exhibitions, and flexible workspaces
Terminal 2	Existing building capacity and direct connection to the southern apron	Leisure, commercial, entertainment, or other flexible indoor uses, subject to technical assessment
Main apron areas	Large, open, and relatively unobstructed surfaces connected to major airport buildings	Public squares, event spaces, markets, and landscaped open spaces through selective retention and depaving
Former runway 17/35	Partial visibility of the former airfield layout despite its fragmented condition	Selective preservation as pathways, pavement traces, or interpretive landscape elements
Cargo and secondary service buildings	Existing built capacity, but varied typologies and insufficient information about their condition	Individual assessment followed by selective reuse, transformation, or removal
Military complex	Potential historical association with the airport, but restricted access and insufficient information	Further investigation before any reuse or preservation decision

The main runway 02/20 is the most continuous and recognisable infrastructural element within the airport. Extending for approximately 3.7 kilometres, it provides a clear longitudinal orientation across the site and preserves the large scale of the former airfield. Its uninterrupted geometry and strong visual identity give it the potential to be retained and reinterpreted as a public spine for walking, cycling, movement, temporary

activities, and collective use. Its reuse would therefore preserve an important part of the airport's spatial memory without requiring the runway to maintain its original aviation function.

Terminal 1 represents one of the principal built assets of the site. Its large footprint, long association with the public image of the airport, direct relationship with extensive apron surfaces, and proximity to the existing metro, bus, taxi, and road-access systems make it a relevant candidate for adaptive reuse. Its size could support a combination of civic, cultural, commercial, service, work, and indoor public functions. The surrounding apron also provides sufficient space for the terminal to be connected to new public squares and outdoor activities. However, the internal configuration and technical condition of the building would require further architectural and structural investigation before specific programmes could be confirmed.

The main hangars and maintenance buildings also present clear reuse opportunities. Their large volumes and direct relationship with the apron system distinguish them from smaller and more fragmented airport buildings. Hangar typologies generally provide broad internal spaces that may accommodate educational facilities, research and innovation activities, workshops, exhibitions, creative production, or flexible working environments. Their industrial character can also help preserve the technological dimension of the airport's identity. Nevertheless, their structural condition, internal organisation, ownership, and possible presence of hazardous materials would need to be verified.

Terminal 2 is smaller and less strongly connected to public transport than Terminal 1, but its existing building and adjacent apron still offer an opportunity for reuse. Its location in the southern part of the site could allow it to operate as a secondary public anchor supporting leisure, entertainment, commercial, or flexible indoor activities. Unlike Terminal 1, its historical significance is more limited, and its potential is mainly associated with its available building volume and relationship with the surrounding paved surfaces. Its retention should therefore remain subject to a more detailed assessment of its physical condition and capacity to accept new programmes.

The existing apron areas should be understood as transformation resources rather than surfaces that must be preserved entirely. Their scale and direct relationship with the terminals and hangars create opportunities for large civic spaces, event platforms, markets, outdoor activities, and connections between reused buildings. At the same time, their extensive impervious coverage contributes to heat accumulation and surface runoff. Their transformation should therefore combine the selective retention of airport pavement with depaving, planting, shading, permeable surfaces, and water-management interventions. Selected markings or pavement fragments may also be retained to communicate the former aviation use of the site.

The former runway 17/35 remains partly legible within the present taxiway system but is less continuous than the principal runway. Rather than being transformed into a second major public spine, selected traces of its alignment could be incorporated into paths, landscape elements, pavement patterns, or interpretative features. This would preserve evidence of the earlier cross-shaped airfield morphology without requiring the entire former runway to be reconstructed or maintained.

Cargo, service, and smaller support buildings form a more heterogeneous group. Although some individual structures may be suitable for new uses, the available spatial information is insufficient to support a single reuse strategy for the entire group. These buildings should therefore be identified as requiring further investigation. Individual decisions can later be made according to building size, structural condition, access, environmental constraints, and compatibility with the proposed programmes.

The military complex is also excluded from a definitive reuse decision because its ownership, security requirements, operational status, and internal building conditions are not sufficiently documented. It should be represented on the map as a restricted area requiring further investigation rather than as an area proposed for either reuse or removal.

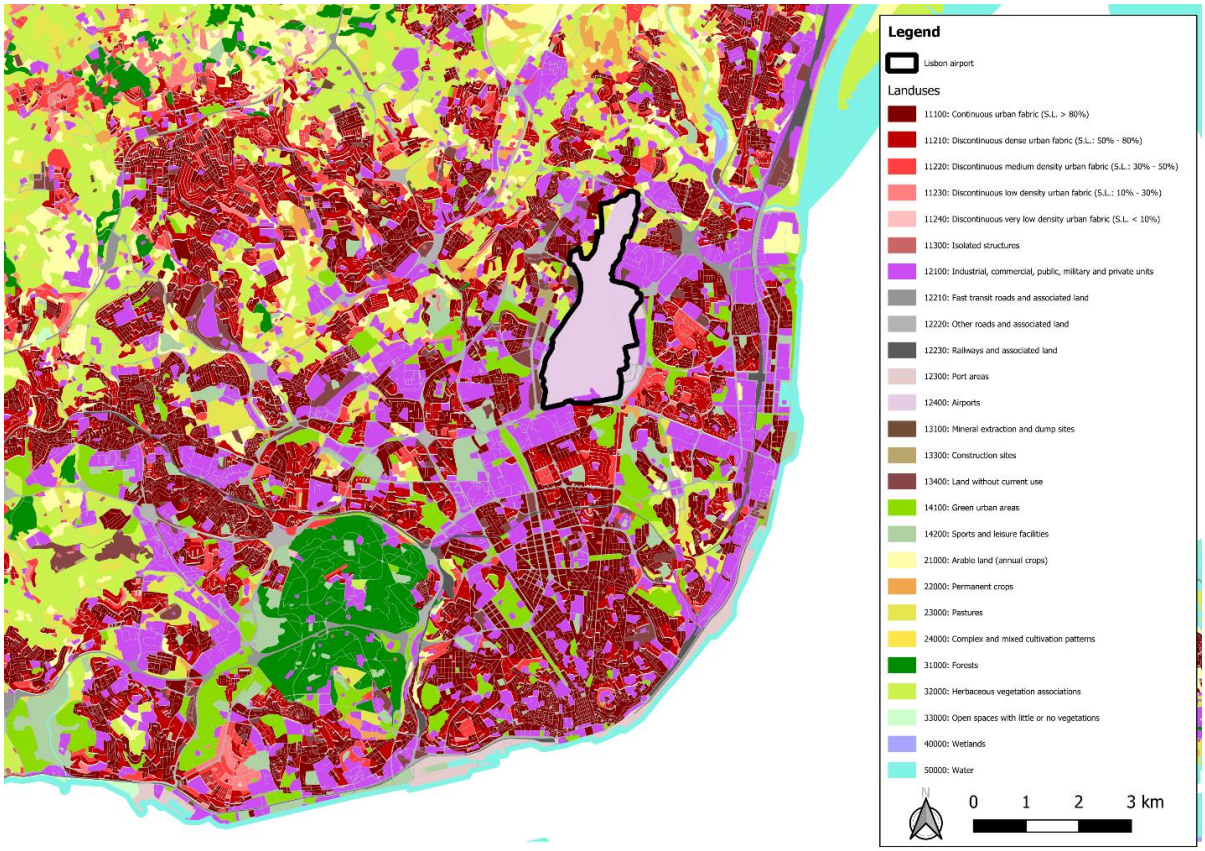
Overall, the analysis identifies the main runway, Terminal 1, the principal hangars, Terminal 2, and selected apron surfaces as the elements with the clearest spatial relevance for future transformation. These elements provide different forms of reuse opportunity: the runway preserves longitudinal continuity and infrastructural memory; Terminal 1 and the hangars provide the principal built anchors; Terminal 2 offers a possible secondary anchor; and the aprons provide extensive surfaces for selective public-space and landscape transformation. The identified opportunities should be understood as an urban-scale interpretation rather than a technical feasibility assessment. Structural stability, fire safety, building services, contamination, ownership, legal restrictions, and economic viability require separate professional investigation before final decisions on retention, modification, or demolition can be made.

3.3. Airport-City Interface and Urban Fabric

3.3.1. Metropolitan Land-Use and Land-Cover Structure

The macro-scale land use analysis of Lisbon reveals the airport as a large mono-functional enclave embedded within a heterogeneous urban fabric. The site, classified as an airport facility, forms a significant spatial interruption that contrasts with the surrounding dense and fragmented residential (red tones) and industrial/commercial zones (purple). A key observation from this municipal-scale map is the uneven distribution of green infrastructure. While the southwestern sector of the city is supported by large-scale ecological systems, such as Monsanto Forest Park, the northern sector—where Lisbon Airport is located—appears to have a more limited and fragmented provision of green

spaces. Furthermore, the immediate surroundings of the airport are dominated by industrial, commercial, and infrastructural land uses, which function as transitional zones between residential neighbourhoods and the airport boundary. These areas contribute to a discontinuous and weakly integrated urban structure.

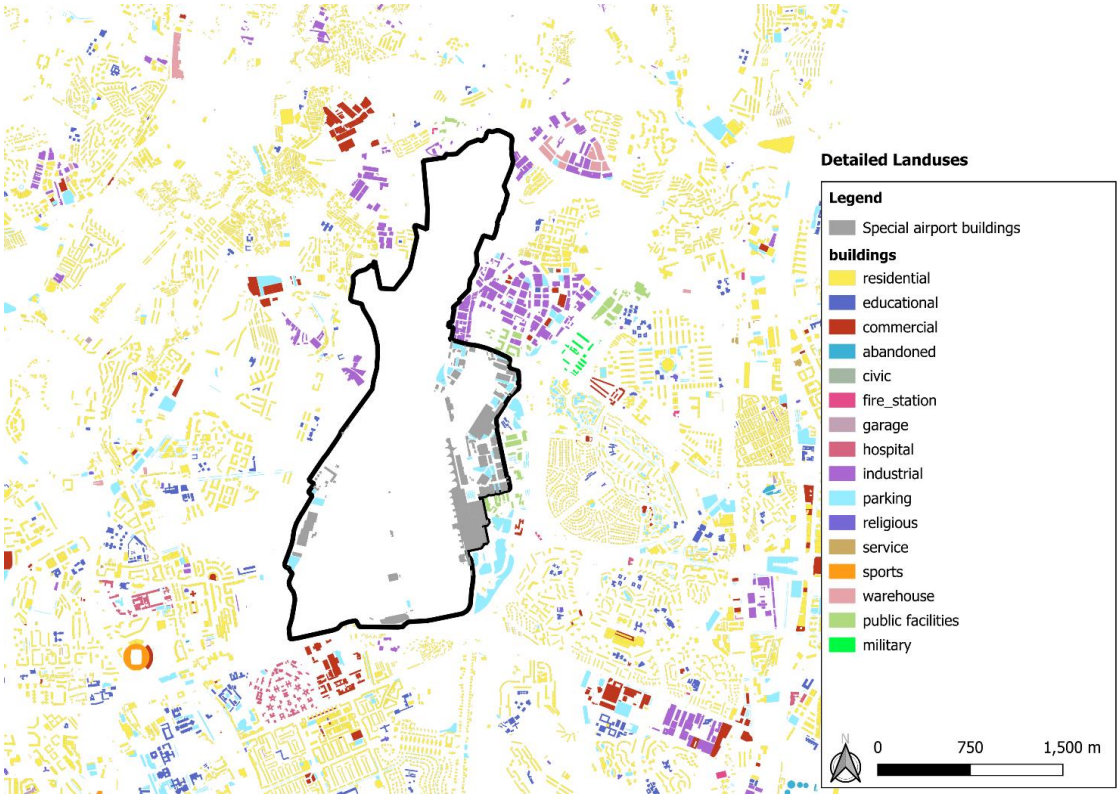


Map 3.4: *Land cover of Lisbon and the airport surroundings. Source: Author, 2026 (based on Copernicus Land Monitoring Service, Urban Atlas 2021).*

3.3.2. Local Building Uses and Sensitive Receptors

A strong Programmatic dichotomy can be observed between the eastern and western boundaries of Lisbon Airport. The eastern edge is predominantly characterised by industrial and commercial buildings (purple and red clusters), accompanied by a significant presence of large-scale parking areas. Together, these uses form a relatively continuous non-residential edge composed of large plots and infrastructure-related functions. This condition provides a degree of separation from residential areas, but its future transformation potential cannot be determined without additional information on occupancy, ownership, building condition, and operational requirements.

In contrast, the western and southern edges are defined by a high concentration of sensitive receptors, particularly residential areas (yellow) and educational facilities (blue), located in close proximity to the airport boundary. This direct adjacency highlights potential spatial conflicts related to noise, environmental quality, and overall livability.



Map 3.5: *Detailed building and land uses around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

3.3.3. Adjacent Land Uses and Edge Conditions



Map 3.6: *Land uses adjacent to Humberto Delgado Airport. Source: Author, 2026 (based on Copernicus Land Monitoring Service and Google earth pro).*

To examine the immediate urban context of Humberto Delgado Airport, a 1-kilometre buffer zone was established around the airport boundary. This distance was selected to capture the primary belt of urban functions that directly interact with the site at the neighbourhood scale, including adjacent residential areas, industrial facilities, transportation infrastructures, and open spaces. The 1-km buffer is used as a geographical frame for analysing the airport's immediate surroundings. It does not represent a network-based walking catchment, as actual pedestrian access depends on routes, crossings, barriers, and available entrances.

Western Edge

The western edge of the airport is predominantly defined by high-density residential areas, with some interspersed local services and small green patches. This creates a highly sensitive interface where a large population is directly exposed to the environmental impacts of the airport. The proximity of housing to the site boundary indicates strong social pressure and highlights the need for permeable, community-oriented edge conditions that can support daily use while mitigating noise and pollution.

Eastern Edge

The eastern boundary is characterised by large industrial, commercial, military, and transport-related parcels, together with extensive parking and infrastructural surfaces. These uses form a relatively continuous non-residential edge and create a different relationship with the airport from the residential conditions found to the west and south. The large plots and lower-intensity urban fabric may present future transformation opportunities, but any conclusion concerning vacancy or underuse would require additional land-occupation and building-use data.

Southern Edge

The southern edge shows a mix of land uses, including low- and high-density residential areas, commercial zones, and significant institutional functions such as health services and educational facilities. This concentration of sensitive uses increases the importance of environmental mitigation. At the same time, the diversity of functions suggests strong potential for active public interfaces and multifunctional landscape interventions.

Northern Edge

The northern edge presents a more heterogeneous and less dense configuration, including scattered vegetation, low-density residential areas, and some open or undeveloped land. Compared to other edges, this zone experiences lower urban pressure and offers greater spatial flexibility. Its relatively open structure suggests potential for ecological integration and the development of continuous green corridors.

Overall, the contact zone is highly fragmented, with each edge exhibiting distinct spatial and functional characteristics. Rather than a gradual transition, the airport boundary is defined by abrupt contrasts between incompatible land uses. This condition highlights

the need for a differentiated edge strategy, where each side of the site responds to its specific context—ranging from socially active and permeable interfaces in residential areas to buffered and ecologically structured edges in industrial and transitional zones.

3.3.4. Sectional Analysis

To complement the plan-based analyses, a series of sectional diagrams is used to reveal the spatial relationships that are not fully legible in maps. These sections cut across the airport boundary and its surrounding areas to illustrate variations in topography, built form, infrastructure, and open space, as well as the physical transitions between the airport interior and adjacent urban fabric.

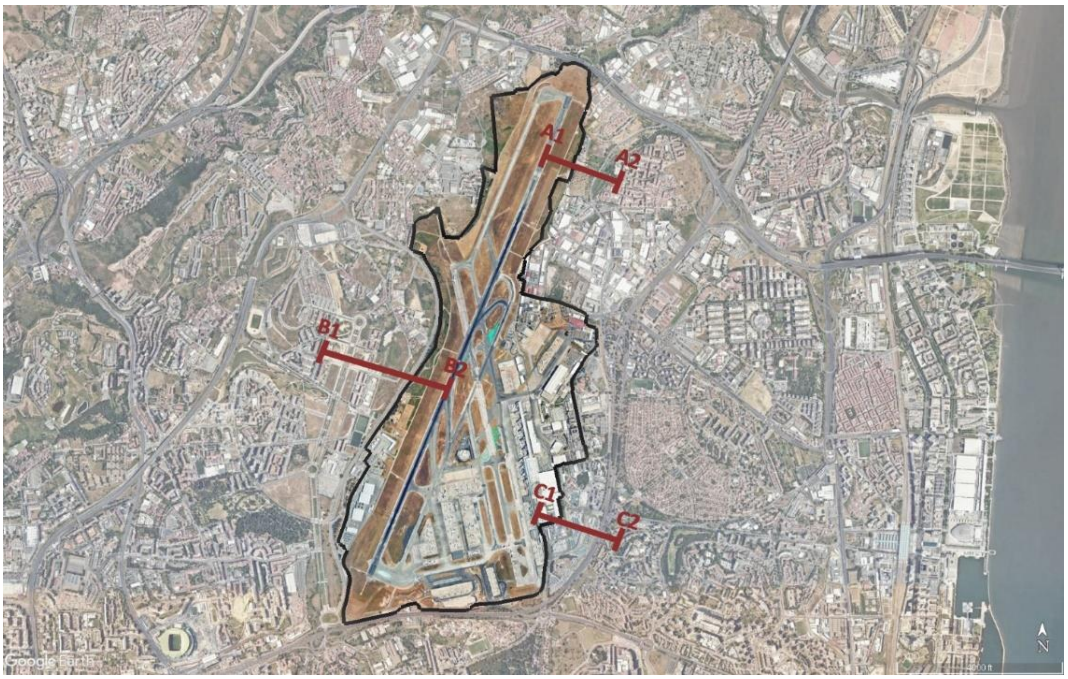


Figure 3.6: *Location of the section lines. Source: Author, 2026 (based on Google Earth Pro).*

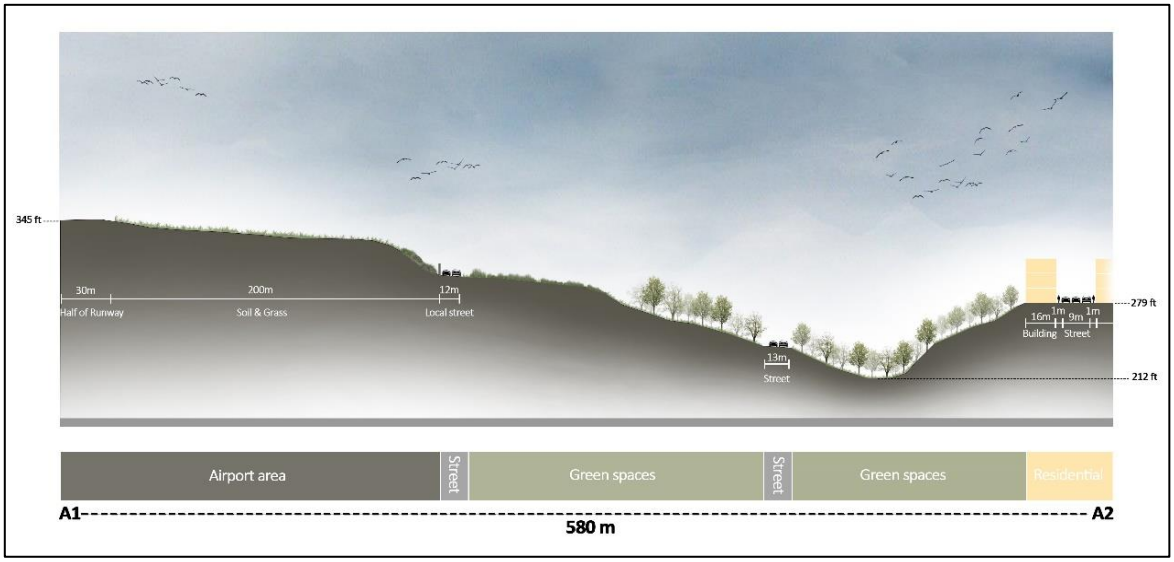


Diagram 3.2: *Section A1A2. Source: Author, 2026, Based on Google Earth pro elevation*



Diagram 3.3: *Section B1B2. Source: Author, 2026, Based on Google Earth pro elevation*

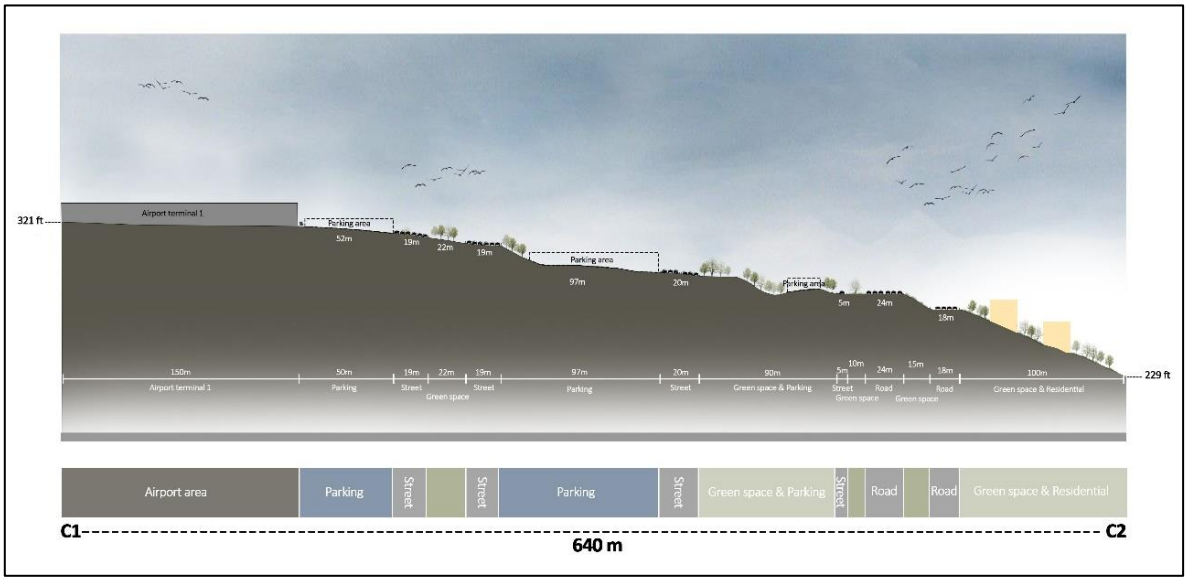


Diagram 3.4: *Section C1C2. Source: Author, 2026, Based on Google Earth pro elevation*

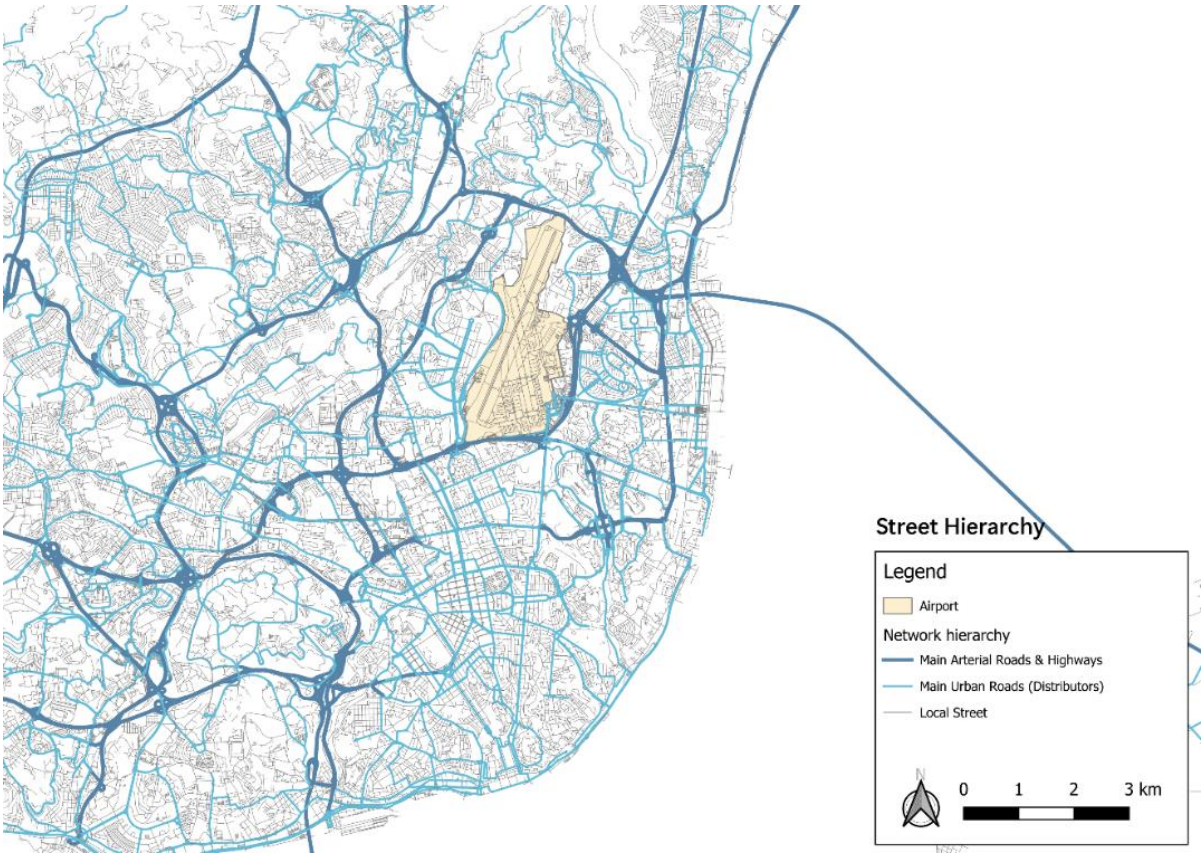
3.4. Mobility, Connectivity and Accessibility

This section examines the accessibility of the site through multiple layers of urban mobility, including rail-based public transport, bus networks, cycling infrastructure, and pedestrian potential. Together, these maps provide a comprehensive understanding of how different movement systems operate across the city and how effectively they connect the airport to its surrounding urban context.

3.4.1. Street Hierarchy and Urban Severance

The street network hierarchy of Lisbon reveals a well-structured system of arterial roads, urban distributors, and local streets that collectively ensure connectivity across the metropolitan area. At the city scale, a network of high-capacity arterial roads and highways forms a continuous framework, enabling efficient east–west and north–south

movement. These primary infrastructures are complemented by a dense grid of distributor roads that penetrate deeper into the urban fabric, particularly in the central and southern districts. However, the presence of the airport introduces a significant disruption within this otherwise continuous system. The airport occupies a large, centrally located area that is almost entirely excluded from the surrounding street network.

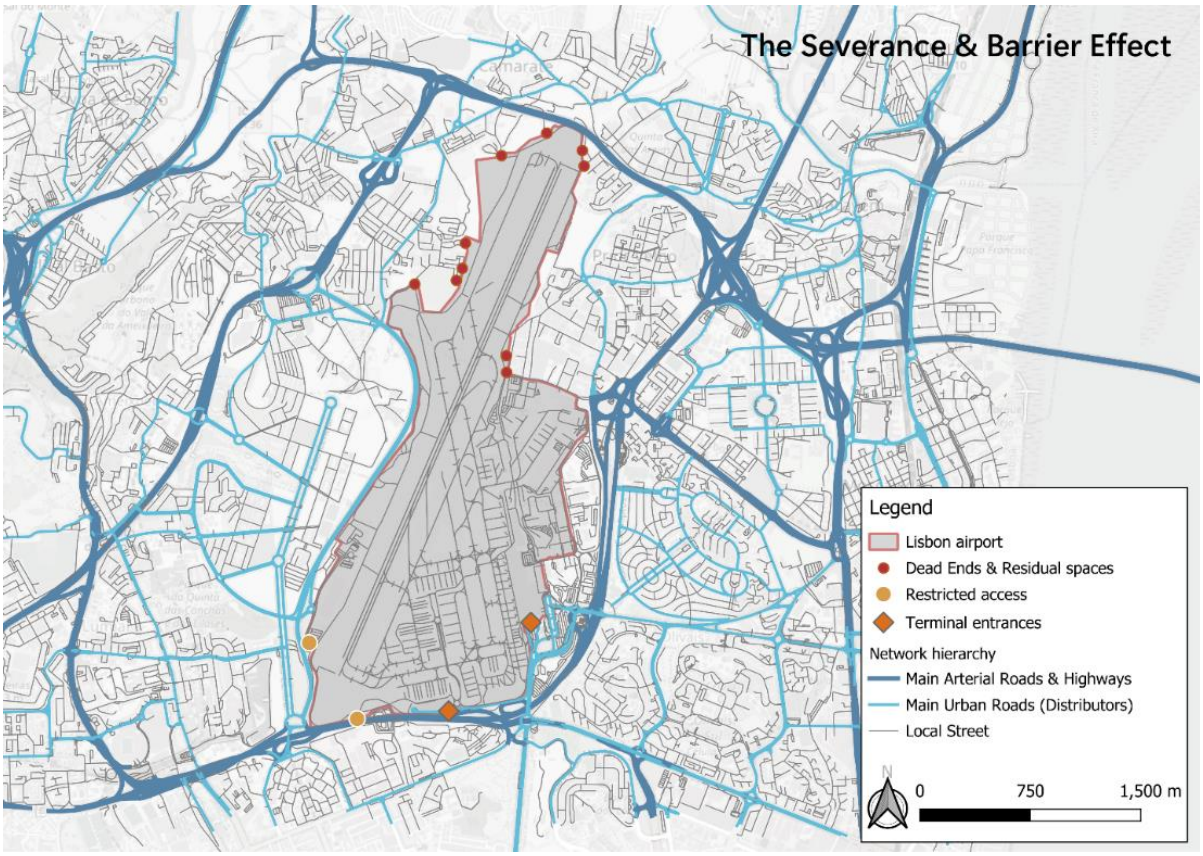


Map 3.7: *Street hierarchy around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

At the edges of the airport, the network exhibits a clear hierarchical imbalance. While major arterial roads and highways define the perimetre and provide high-capacity movement around the site, they simultaneously act as barriers that limit local accessibility. These infrastructures prioritise vehicular flow over permeability, reducing opportunities for fine-grain connections between adjacent neighbourhoods. Consequently, the surrounding local street networks terminate at the airport boundary, often forming dead-ends or fragmented patterns rather than continuous connections. This condition is particularly evident in the contrast between the dense and interconnected street fabric in areas south of the airport and the more fragmented, less permeable configurations along its immediate edges. The airport effectively interrupts potential transversal routes, forcing movement to be redirected around its perimetre rather than through it.

In spatial terms, the airport functions as a large-scale infrastructural enclave that disconnects the hierarchical continuity of the street network. Instead of acting as a node within the system, it behaves as a barrier that separates urban sectors. This results in increased travel distances, reduced walkability, and limited integration between neighbourhoods located on opposite sides of the site.

3.4.2. Boundary Access Points, Barriers and Dead Ends



Map 3.8: *Street-network connections around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and the author's observations).*

The analysis of network connections examines how the airport interfaces with the surrounding urban mobility system and to what extent it is physically integrated or segregated from adjacent neighbourhoods. This section focuses on the hierarchy of road infrastructure, points of access, and the continuity (or discontinuity) of local street networks around Humberto Delgado Airport. Understanding these connections is essential for identifying mobility barriers, potential entry points, and opportunities for improving spatial integration between the airport site and the urban fabric of Lisbon.

1. Dominance of High-Capacity Infrastructure

Major arterial roads and highways form a ring-like structure around the airport perimetre. These routes provide efficient regional access to the terminals but function as high-speed corridors with limited pedestrian permeability. As a result, they reinforce the airport's isolation from nearby urban areas despite their physical proximity.

2. Limited Access Points

Only a small number of controlled entry points connect the airport interior to the city, primarily concentrated along the southern edge where terminal facilities are located. This funneling effect channels movement through a few gateways, creating congestion risks while preventing distributed access from other sides.

3. Street-Network Interpretation

The airport interrupts potential east–west and north–south connections and causes surrounding local streets to terminate or be redirected along its perimetre. This condition indicates a structural discontinuity in the urban network. However, the street-hierarchy map alone does not quantify changes in travel distance, travel time, or pedestrian comfort. These effects would require a separate network-based accessibility analysis and a detailed assessment of crossings, sidewalks, traffic conditions, and boundary permeability.

4. Restricted Perimetre Conditions

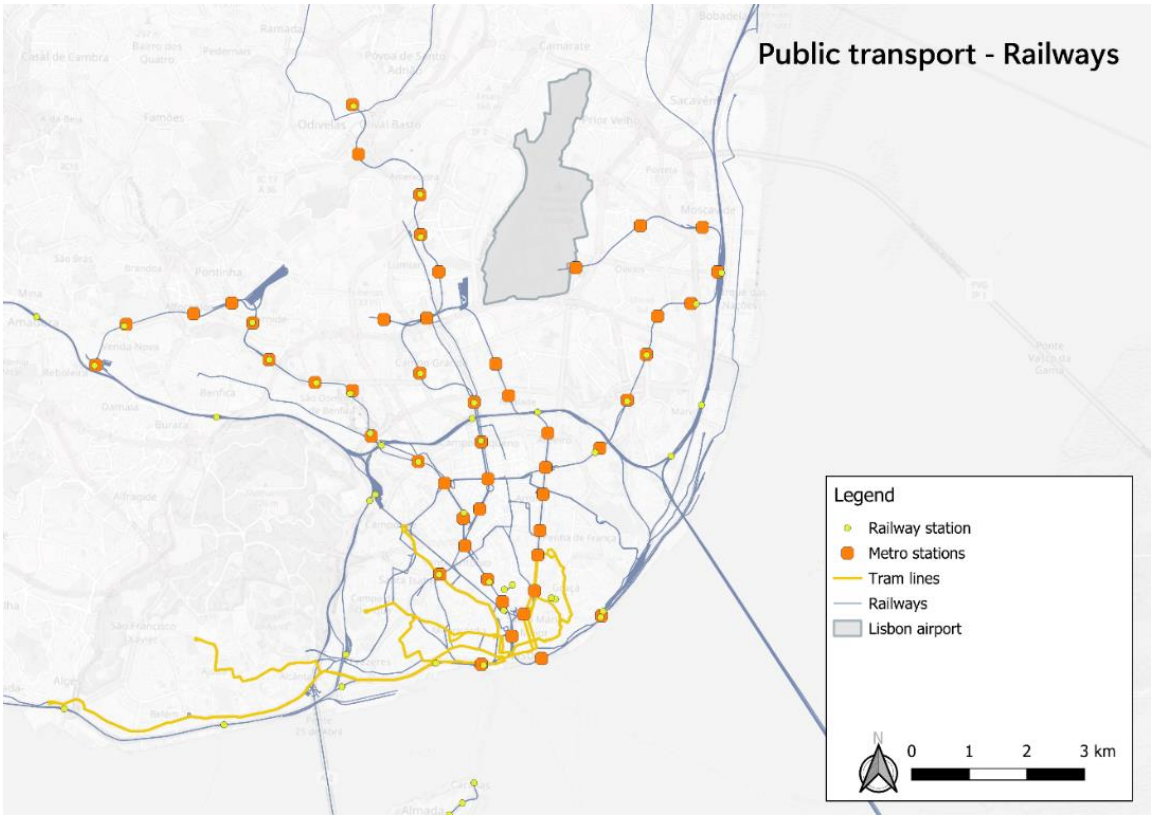
Several parts of the airport perimetre are mapped as restricted or physically inaccessible under the existing operational condition. These segments reduce opportunities for pedestrian crossing and visual interaction with the surrounding urban fabric. More detailed information on ownership, security requirements, topography, and road-crossing conditions would be required to determine which parts could realistically become accessible after airport closure.

5. Terminal-Oriented Connectivity

Connectivity is strongly biased toward passenger access rather than urban integration. Roads are designed to deliver vehicles directly to terminal entrances rather than to support through-movement or neighbourhood circulation, reinforcing a single-purpose mobility pattern.

3.4.3. Rail, Metro and Tram Accessibility

The rail-based public transport network demonstrates a clear concentration of accessibility in the central and southern parts of Lisbon, where metro stations and multimodal connections are most dense. In contrast, the airport, located in the northeastern sector, sits at the edge of this highly connected core. Although it is directly served by a metro line, which provides an important link to the city centre, the overall network intensity around the airport remains relatively moderate. The surrounding areas benefit from some metro coverage, but lack the overlapping layers of transport systems—such as tram and railway interchanges—that characterize more central areas. Additionally, while regional railway lines pass near the airport, there is limited evidence of strong intermodal integration at this site. As a result, the airport functions as a partially connected node within the rail network rather than a fully integrated transport hub, highlighting opportunities to strengthen its role within the broader mobility system.



Map 3.9: *Railway, metro and tram connections around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

3.4.4. Bus Network



Map 3.10: *Bus routes around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

The mapping of municipal bus routes highlights the airport's role as a major physical barrier within Lisbon's local mobility network. A relatively dense concentration of routes can be observed along the southern and eastern edges, but no public bus routes cross the restricted airport site. Services must therefore follow the perimetre road network, limiting direct east–west connections between surrounding neighbourhoods. This condition may result in less direct journeys; however, its effects on travel time, congestion, and operational efficiency would require a dedicated public-transport network analysis.

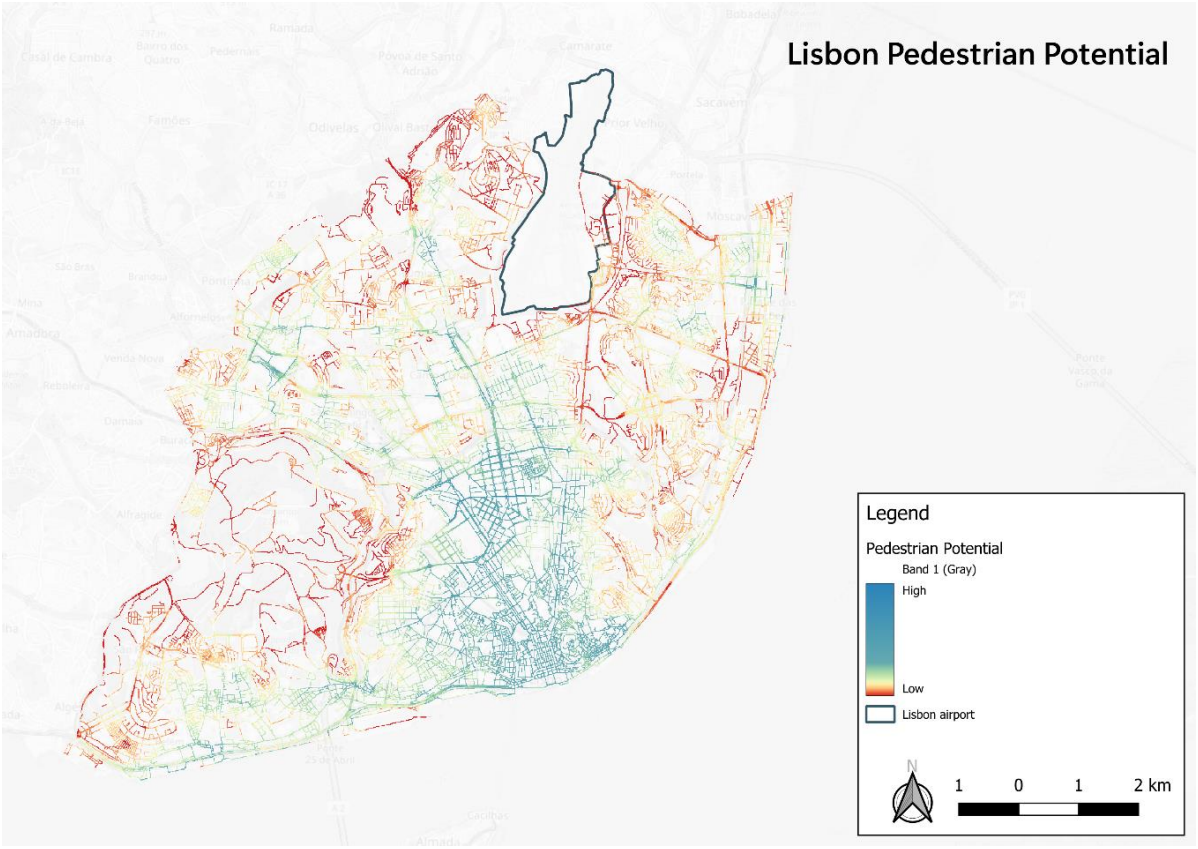
3.4.5. Cycling Network

The cycling network shown in the map is relatively well developed in the central and western parts of Lisbon, where paths form more continuous and interconnected routes, particularly in flatter areas and along the waterfront. However, in the vicinity of the airport, the network becomes noticeably fragmented and sparse. While there are some cycling paths around neighbourhoods such as Olivais and Parque das Nações, they are not fully integrated into a coherent system and do not directly connect through or across the airport area. The airport itself acts as a major physical barrier, interrupting potential east–west and north–south cycling continuity. This limits the role of cycling as an efficient mode of daily mobility in this part of the city.



Map 3.11: *Existing cycling network around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

3.4.6. Pedestrian Potential and Walkability



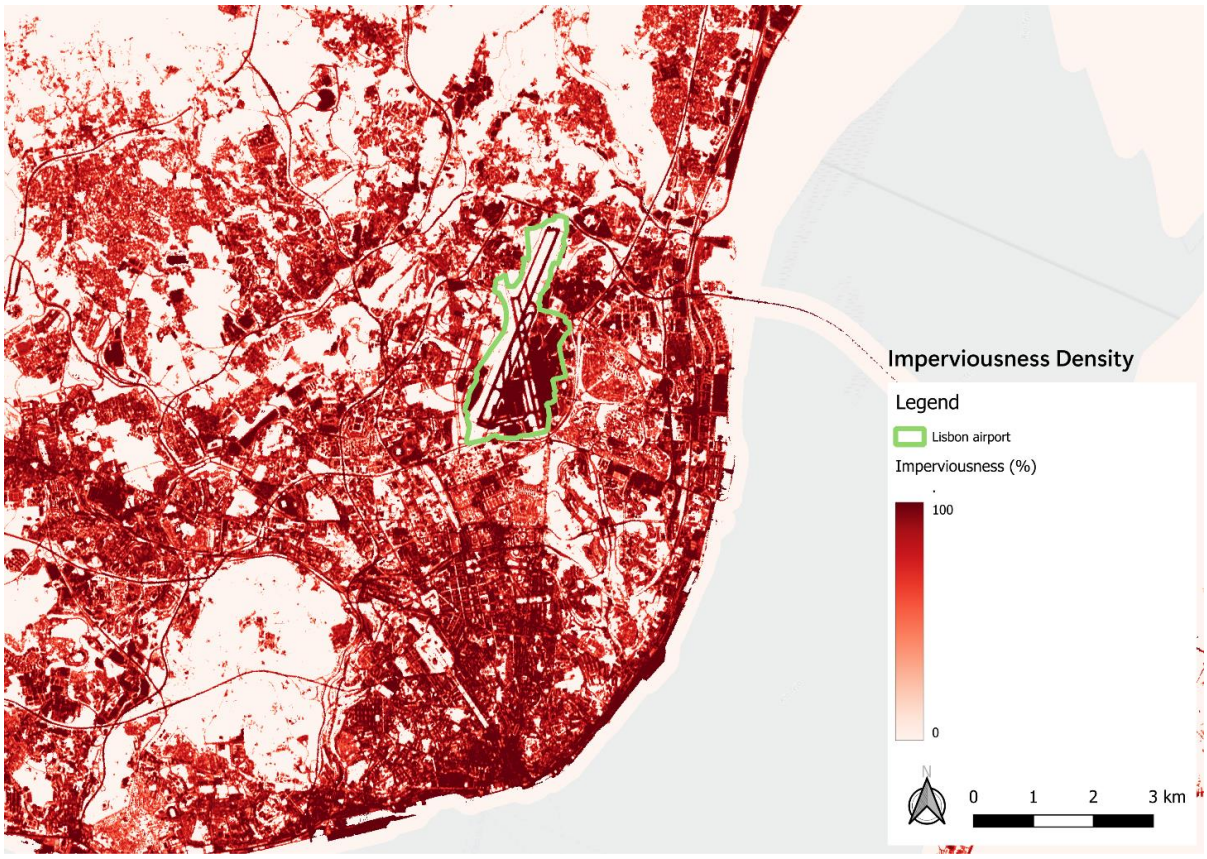
Map 3.12: *Pedestrian potential and walkability around Humberto Delgado Airport. Source: Author, 2026 (based on dados.cm-lisboa.pt)*

The analysis of Lisbon's pedestrian potential provides the final layer of the site's mobility assessment. The map illustrates a stark contrast between the highly walkable, dense networks of the southern historical centre (indicated by blue/green) and the northern infrastructural zone. The airport site forms a major barrier to public pedestrian movement, with access concentrated around the terminals and no public cross-site walking connections through the restricted airfield. Furthermore, the immediate perimetre surrounding the airport is heavily dominated by low pedestrian potential (indicated by red/orange lines). This reflects a hostile boundary condition characterised by wide arterial roads, heavy vehicular traffic, and a lack of safe pedestrian spaces. By designing safe, highly walkable interfaces and entrance nodes along the boundaries, the regeneration project can successfully extend Lisbon's walkable footprint into the northern district, encouraging active mobility and social integration.

3.5. Environmental and Climatic Analysis

3.5.1. Surface Imperviousness and Potential Permeability

City-scale imperviousness

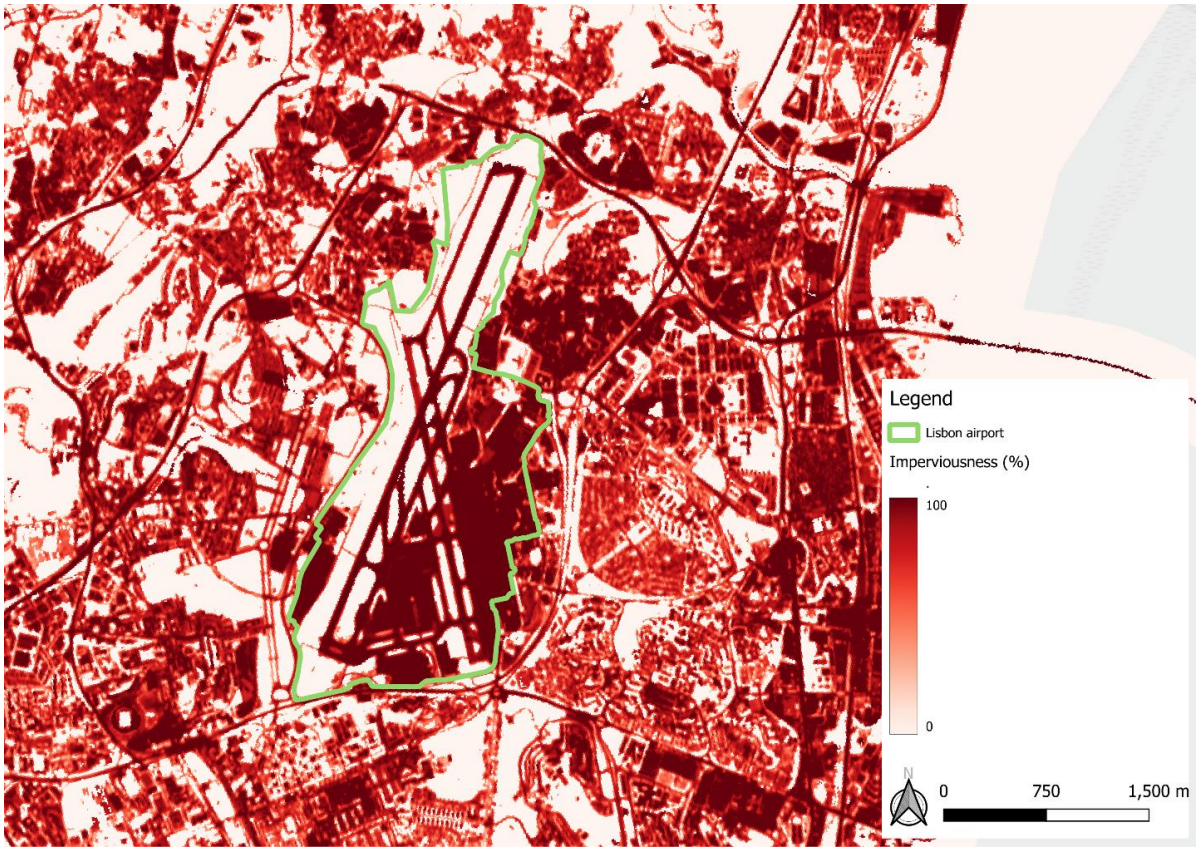


Map 3.13: *Imperviousness density in Lisbon. Source: Author, 2026 (based on Copernicus Land Monitoring Service, Imperviousness Density 2024)*

At the metropolitan scale (map 3.13), Lisbon exhibits a heterogeneous pattern of surface imperviousness, reflecting its varied urban structure. Highly impervious areas are concentrated in the historic core and consolidated urban districts, where dense building footprints and road networks dominate. In contrast, peripheral zones and natural areas display significantly lower imperviousness, corresponding to agricultural land, open spaces, and green infrastructures. This gradient illustrates the typical transition from compact urban fabric to more permeable landscapes at the edges.

Airport-scale imperviousness

At the local scale (Map 3.14), the airport emerges as one of Lisbon's largest concentrations of continuous impervious ground. Runways, taxiways, aprons, and other operational areas form extensive asphalt and concrete surfaces, although grassed and bare-soil areas remain between them. The principal environmental issue is therefore not the complete sealing of the entire site, but the scale and continuity of its major paved surfaces.



Map 3.14: *Imperviousness density around Humberto Delgado Airport. Source: Author, 2026 (based on Copernicus Land Monitoring Service, Imperviousness Density 2024)*

The airport is distinguished by the size and connectivity of its paved operational surfaces. These coexist with grassed and bare-soil areas, producing a heterogeneous surface pattern rather than a completely sealed field. The main concern is the environmental performance of the extensive connected paved areas and their limited tree shade.

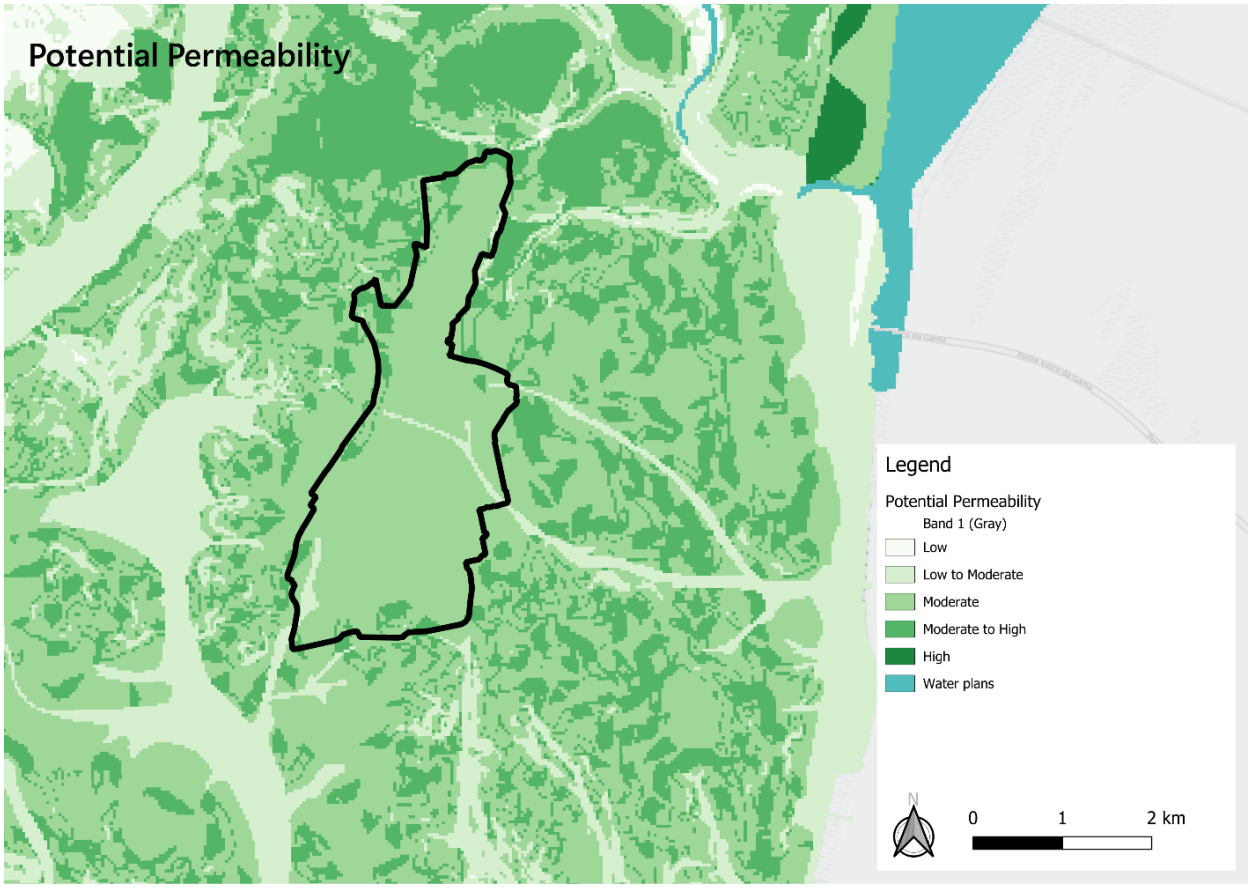
This condition has significant environmental implications. The high concentration of impervious surfaces reduces natural infiltration capacity, increases surface runoff, and contributes to the intensification of urban heat island effects. The limited tree canopy and lack of shade over extensive paved areas further exacerbates heat accumulation, reinforcing the airport's role as a thermal hotspot.

Moreover, the sharp contrast between the highly sealed airport surface and the relatively more permeable surrounding areas creates a strong environmental discontinuity. Rather than functioning as part of a broader ecological system, the site acts as a barrier that interrupts potential flows of water and ecological processes.

Potential permeability

Map 3.15 presents mapped potential permeability classes, which should be distinguished from current surface sealing shown in Maps 3.13 and 3.14. Potential permeability does not establish the actual infiltration performance of paved or compacted ground. Its

relevance to future depaving and water-sensitive interventions therefore requires verification of the source-layer definition and site-specific soil and infiltration conditions.

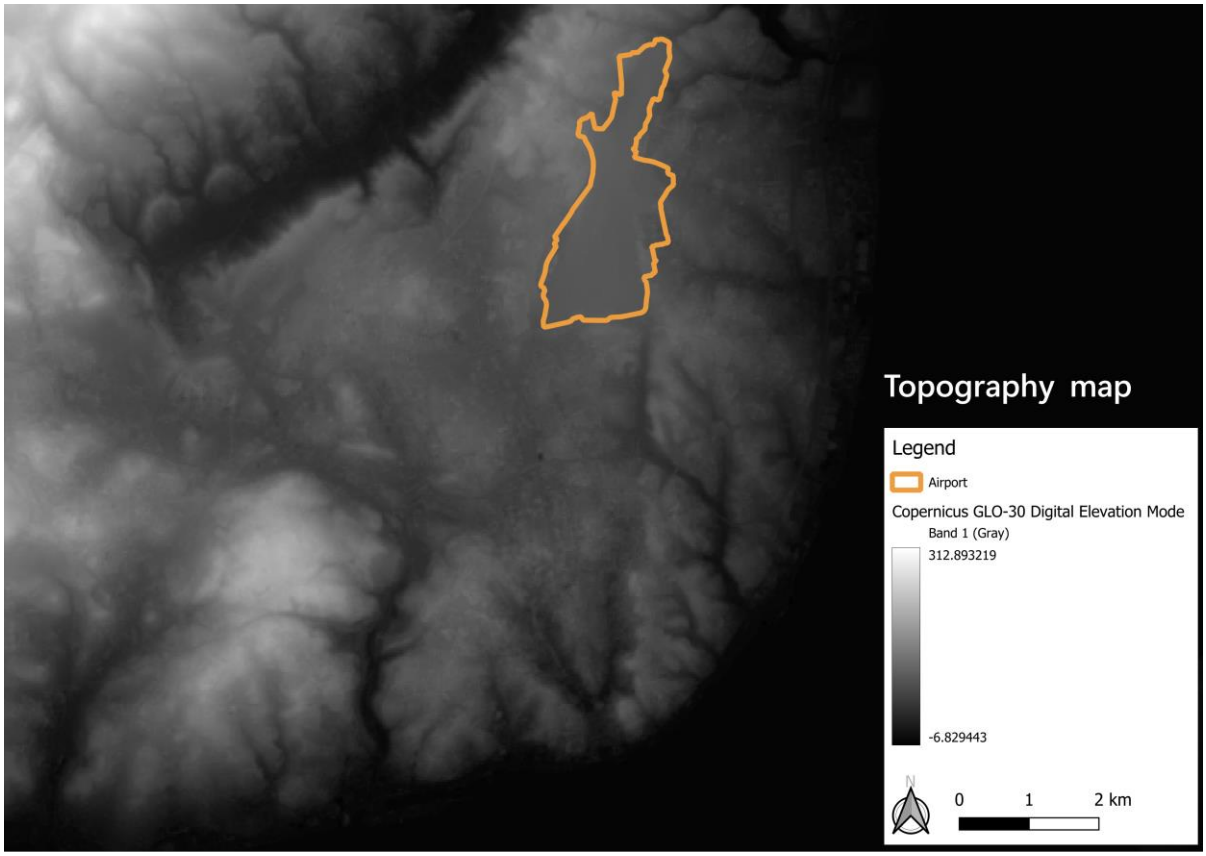


Map 3.15: *Potential surface permeability around Humberto Delgado Airport. Source: Author, 2026 (based on dados.cm-lisboa.pt)*

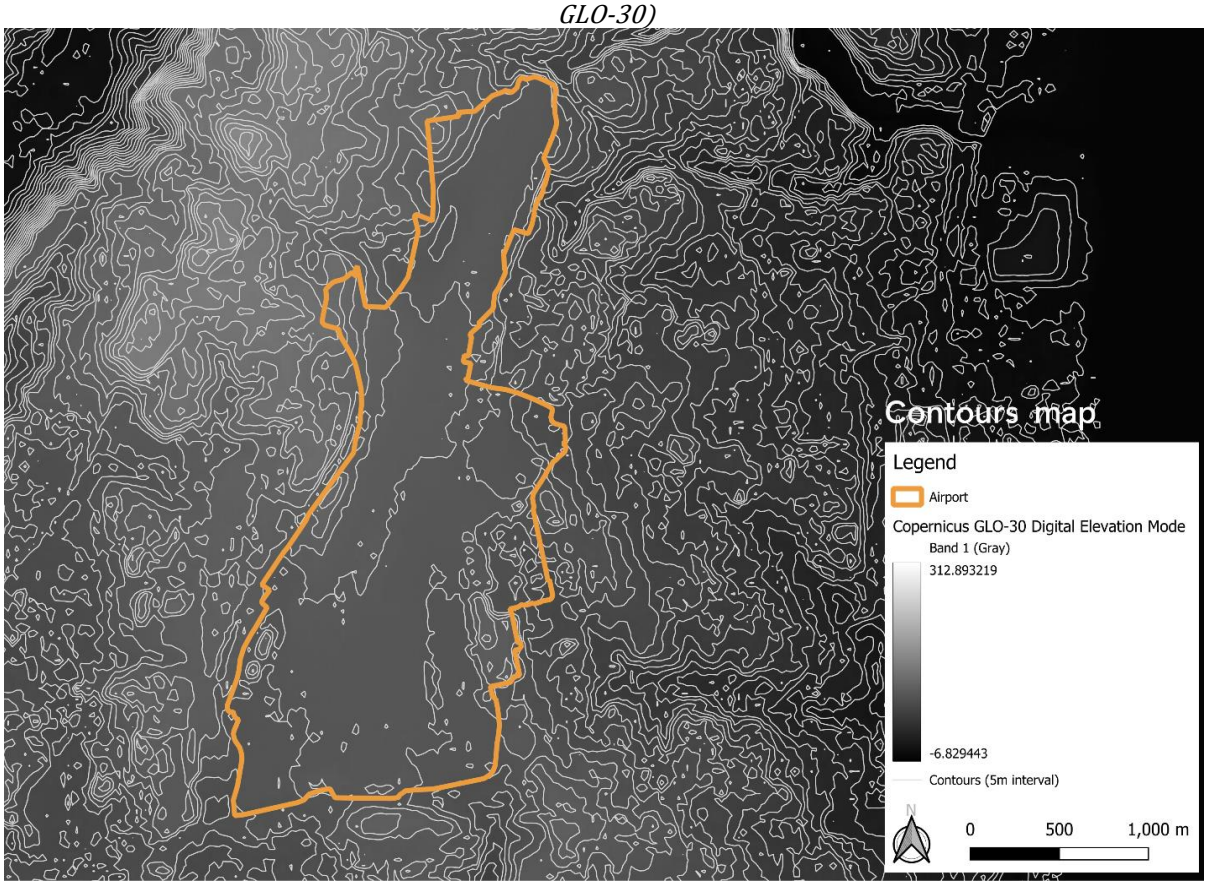
3.5.2. Topography and Runway Profile

The topography of Humberto Delgado Airport was examined at two complementary scales using the Copernicus GLO-30 Digital Surface Model. With an approximate spatial resolution of 30 metres, this dataset is suitable for identifying the general morphology of the airport and its surroundings, although it does not provide the level of precision required for detailed grading or drainage design. As a Digital Surface Model, it may also include the elevation of vegetation, buildings, and infrastructure rather than representing a completely bare-earth terrain surface (Copernicus Programme, 2022).

At the territorial scale, the airport occupies a broad and comparatively smooth platform positioned between more articulated and higher terrain to the west and north-west and generally lower ground toward the east and south-east. The airport therefore forms a transitional topographic surface within the wider urban landscape. Its relatively uniform appearance contrasts with the more irregular relief of the surrounding territory and reflects the extensive levelling and modification required for aviation infrastructure.



Map 3.16: *Topographic context of Humberto Delgado Airport. Source: Author, 2026 (Copernicus DEM GLO-30)*



Map 3.17: *Five-metre elevation contours within and around Humberto Delgado Airport. Source: Author, 2026 (Copernicus DEM GLO-30)*

The contour map reinforces this interpretation. Within the airport boundary, the five-metre contour lines are generally more widely spaced and continuous, particularly along the runway and former operational surfaces. Outside the airport, the contours become denser and more fragmented, indicating greater variations in relief. This contrast reveals the airport as an engineered ground plane imposed upon a more varied natural terrain. Nevertheless, the site is not entirely flat: gradual level changes remain visible across its elongated north–south extent, while stronger transitions occur along parts of its perimetre. These edge conditions may influence the location and gradient of future pedestrian connections between the former airport platform and the surrounding neighbourhoods.

The longitudinal profile of Runway 02/20 provides a more detailed understanding of these variations. The runway is 3,707 metres long. Official aeronautical data record an elevation of 100.6 metres at the southern Runway 02 threshold and 105.6 metres at the northern Runway 20 threshold.

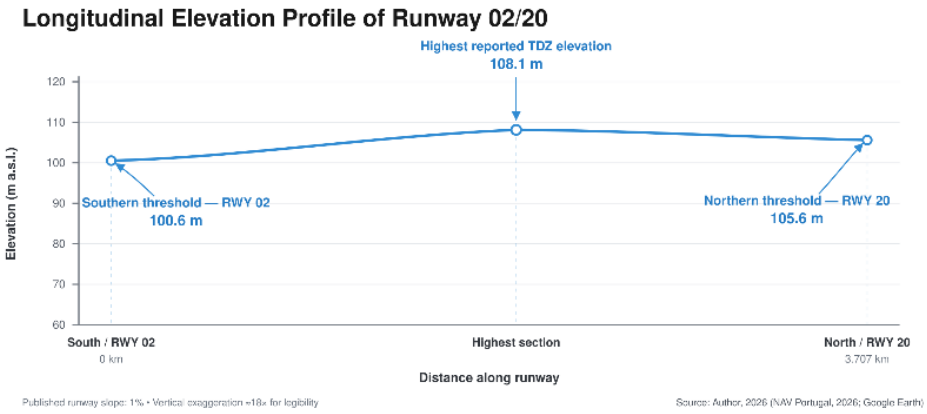


Diagram 3.5: *Longitudinal elevation profile of Runway 02/20. Source: Author, 2026 (NAV Portugal; Google Earth).*

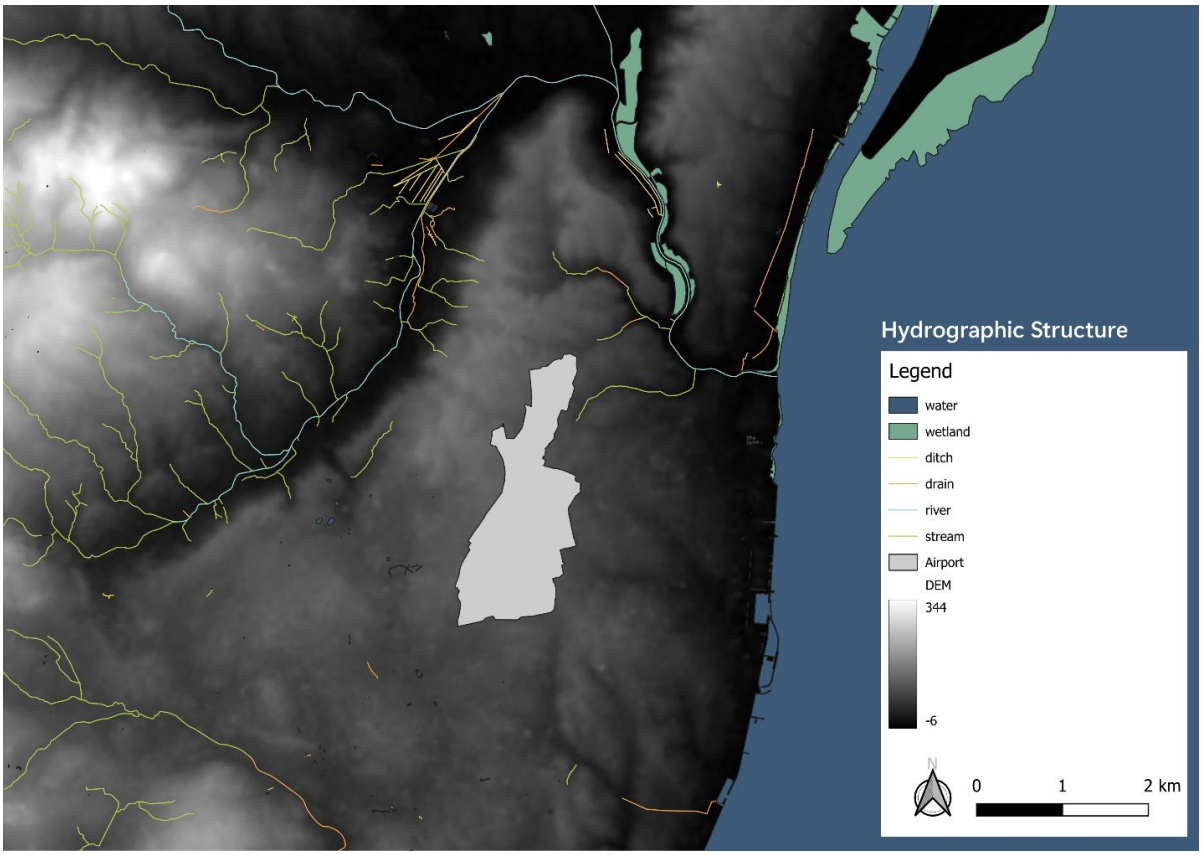
The highest reported touchdown-zone elevation reaches approximately 108.1 metres, while the published runway slope is 1% (NAV Portugal, 2026). The profile therefore indicates a gradual rise from the southern end toward the central and northern portions of the runway, followed by only limited elevation variation near the northern end. The difference between the southern threshold and the highest reported runway section is approximately 7.5 metres.

These conditions have two main implications for the future transformation of the site. First, the generally gentle gradients allow the runway and adjacent operational surfaces to be reused as continuous and accessible public-space structures without extensive reshaping of the ground. Second, the lower elevation of the southern part of the site provides an initial topographic rationale for locating water-sensitive landscape functions.

3.5.3. Hydrography and Surface Runoff

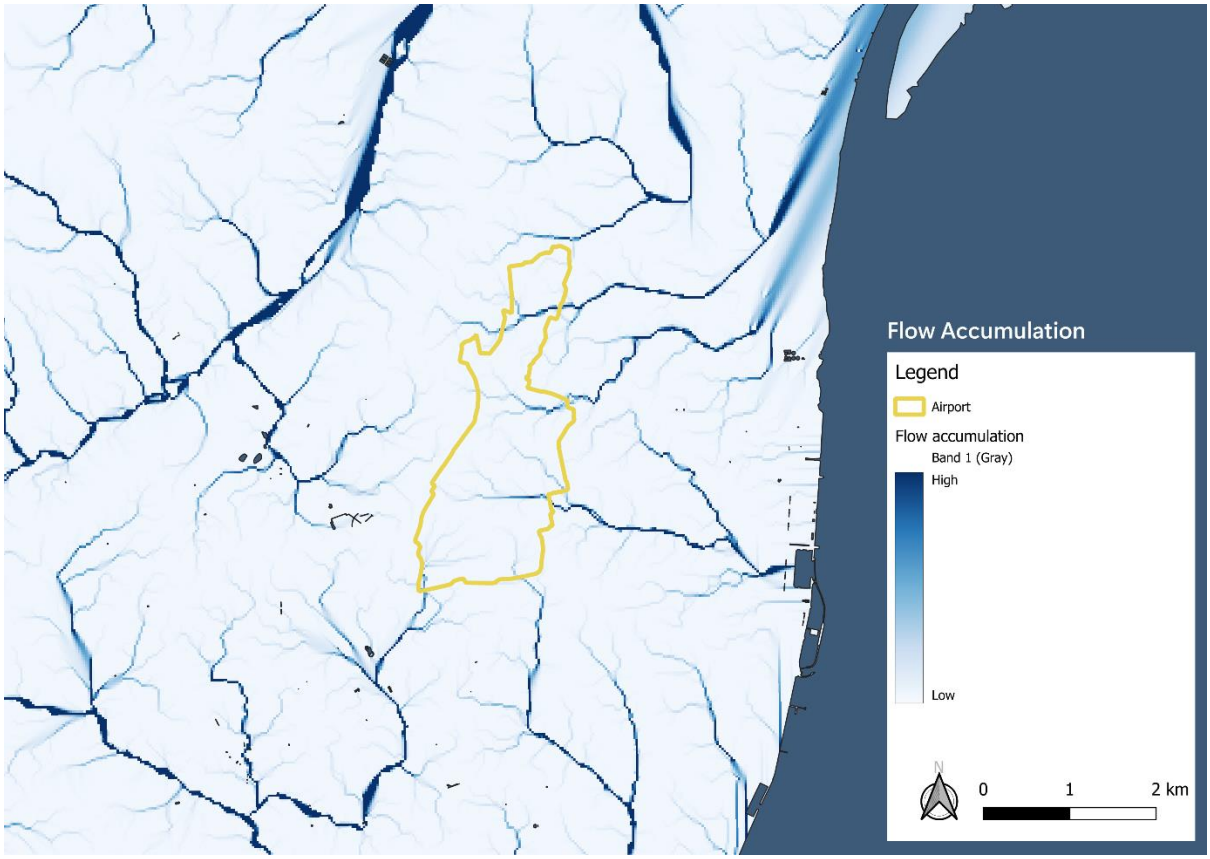
Water management and hydrological resilience are fundamental pillars of contemporary landscape urbanism. This section investigates the water dynamics of the Humberto

Delgado Airport site and its integration with the broader urban catchment area. To provide a comprehensive understanding of the site's behaviour, the analysis is structured into two sequential layers: first, an examination of the macro-scale hydrographic network to identify structural gaps in the natural water system; and second, a topographical simulation of surface runoff (Flow Accumulation) to map micro-drainage patterns.



Map 3.18: *Hydrographic structure around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Continental Europe DTM)*

The Hydrographic Structure map indicates that the airport occupies a relatively flat and low-gradient surface within a wider catchment system, positioned between higher western terrains and the eastern estuarine edge. While the surrounding landscape is articulated by a network of streams, drainage lines, and wetlands—particularly toward the Tagus estuary—the airport itself is characterised by a near absence of visible surface water systems. This condition reflects decades of land leveling, infrastructural expansion, and extensive soil sealing, which have significantly altered and simplified the natural hydrographic patterns of the site. In this context, the airport can be interpreted as a hydrologically disconnected surface, functioning as a spatial interruption within the broader water network. Its vast impervious cover limits infiltration, accelerates surface runoff, and potentially increases pressure on downstream drainage systems. As a result, the site contributes to a disruption in the ecological and hydrological continuity between the upstream catchments and the lower eastern aquatic systems.



Map 3.19: *Flow accumulation around Humberto Delgado Airport. Source: Author, 2026 (derived from Continental Europe DTM using Fill sinks (Wang & Liu) and Flow Accumulation (Top-Down) in QGIS.)*

The Flow Accumulation map provides a more analytical understanding of how water moves across the landscape, beyond just the visible hydrographic network.

The darker blue lines represent areas where a large number of upstream cells drain into a single path, meaning these are the main water flow corridors and potential stream or runoff channels. Lighter areas indicate low accumulation, where water disperses rather than concentrates. From the map, it is clear that the strongest flow lines form a branching network that generally converges toward larger drainage paths outside the airport boundary, eventually connecting to the river system to the east.

Within the airport boundary (highlighted in yellow), the flow accumulation is relatively low to moderate, which suggests that the site itself is not a primary collector of large-scale upstream runoff. However, several secondary flow paths intersect or pass very close to the site edges, especially along the southern and eastern sides. This indicates that while the airport is not located in a major drainage basin, it is still influenced by surrounding micro-catchments and localised surface runoff.

3.5.4. Green-Space Structure and Ecological Connectivity

The green landcover map of Lisbon Airport (map 3.20) reveals a highly fragmented ecological structure at the metropolitan scale of Lisbon, where green areas are distributed as discontinuous patches rather than as an integrated system. The spatial

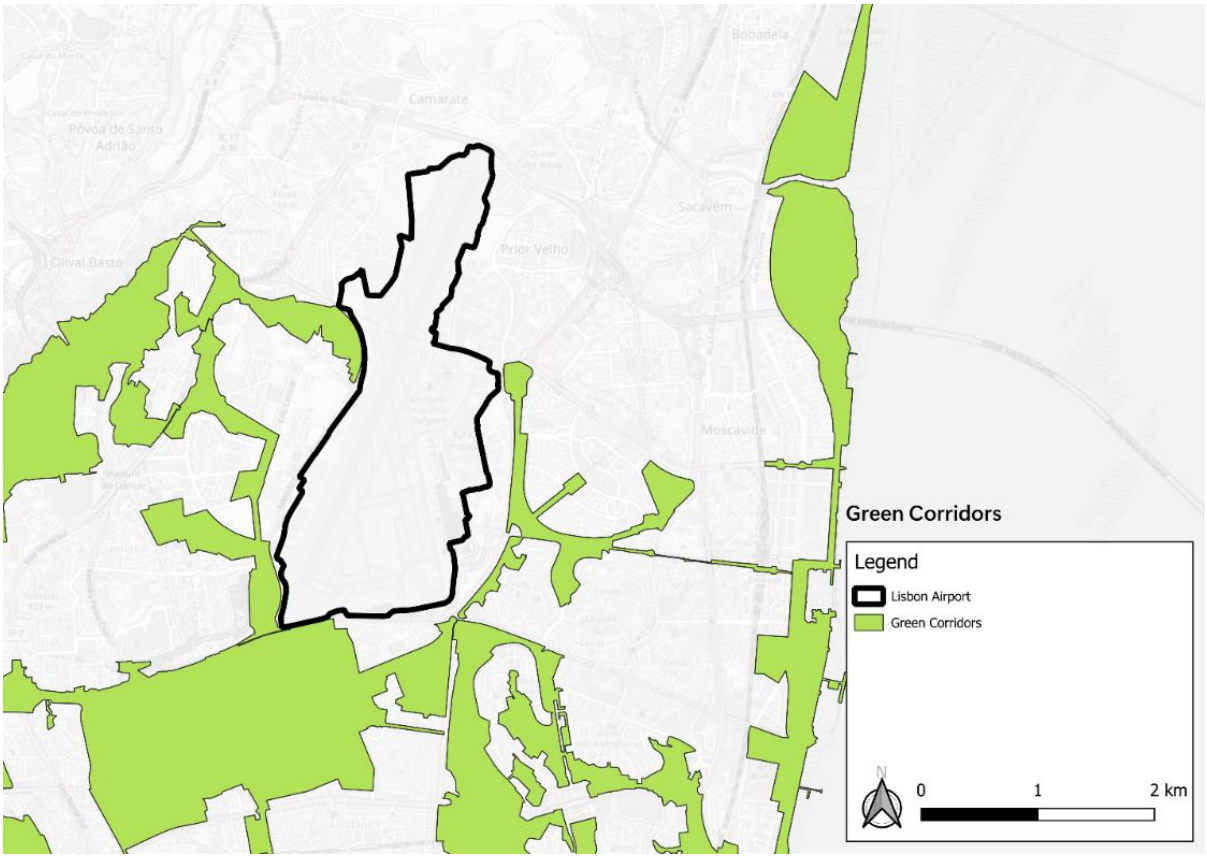
pattern suggests a lack of coherence in the urban green network, with vegetated areas appearing unevenly dispersed across the territory.



Map 3.20: *Green landcover around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

At the centre of this territorial analysis, the airport functions as a major discontinuity within Lisbon's green network. Although grassed and bare-soil safety areas remain between aviation surfaces, they are fragmented, restricted, and weakly connected to surrounding ecological systems. The extensive paved areas and limited tree cover reduce the site's capacity to support ecological continuity, shade, and wider public environmental benefits. In stark contrast, the western and southwestern boundaries present a fine-grained, permeable matrix. In these zones, the open residential fabric—characterised by communal courtyards, private gardens, and street trees—interacts with formal public parks to create a localised, resilient micro-habitat that physically buffers the adjacent urban populations from the aviation infrastructure. Conversely, the northern and eastern perimetres exhibit distinctly different ecological typologies. The northern edge dissolves into a peri-urban landscape, where extensive agricultural tracts and dense vegetation patches form a naturalized, transitional boundary between the dense city and the regional territory. The eastern flank, however, suffers from a severe ecological deficit. Dominated by industrial complexes, highways, and logistical infrastructure, the permeable surfaces in this sector are highly fragmented and scattered.

This disparity highlights a pronounced spatial inequity, leaving the eastern communities significantly more vulnerable to environmental stressors.



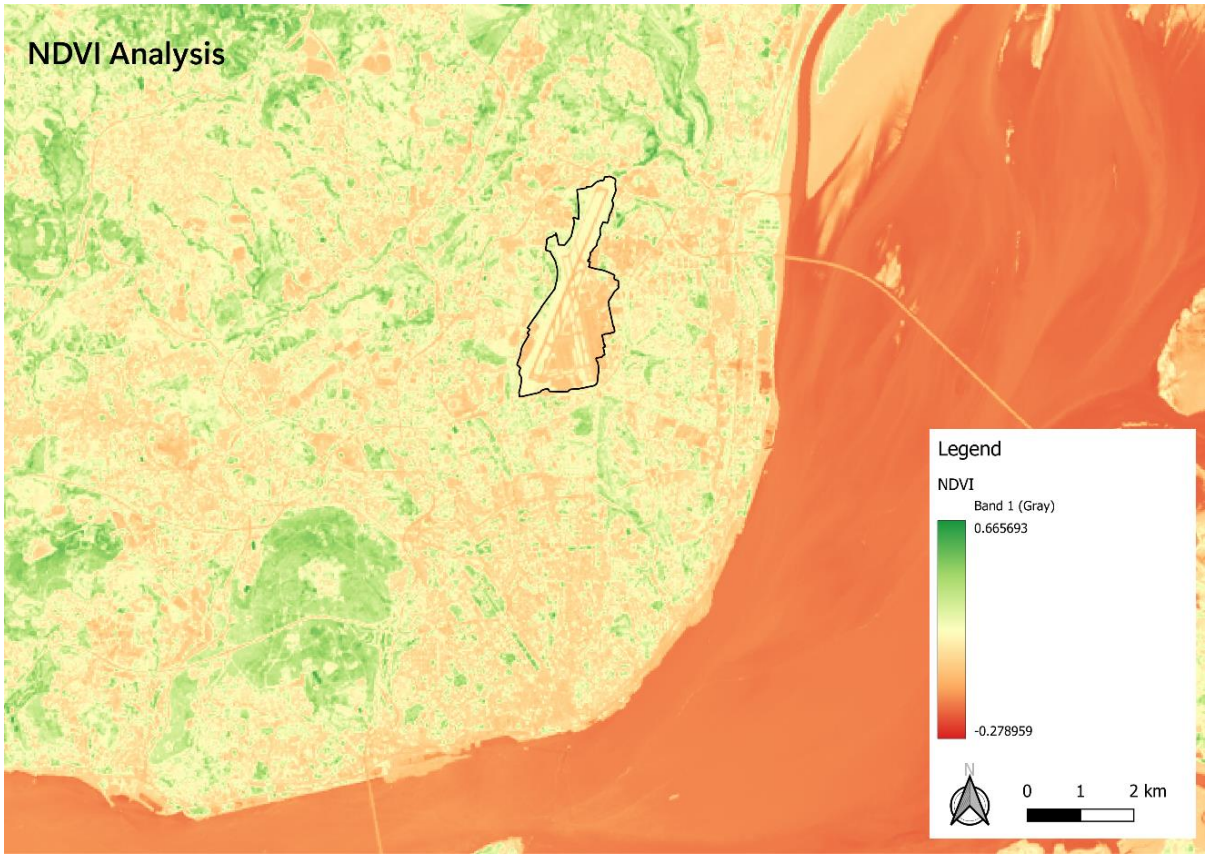
Map 3.21: *Green corridors around Humberto Delgado Airport. Source: Author, 2026 (based on OpenStreetMap contributors and Lisboa Aberta)*

The green corridors map of Lisbon Airport reveals a spatial structure that is fundamentally more strategic than the simple landcover distribution, as it attempts to identify potential lines of ecological continuity within the metropolitan fabric of Lisbon. Unlike the fragmented patches observed in the previous analysis, this map highlights a system of linear and semi-continuous green elements that, in principle, could function as connectors between larger ecological areas. However, their current configuration exposes significant discontinuities, particularly in relation to the airport, which emerges once again as a critical point of interruption.

3.5.5. Vegetation Cover and NDVI

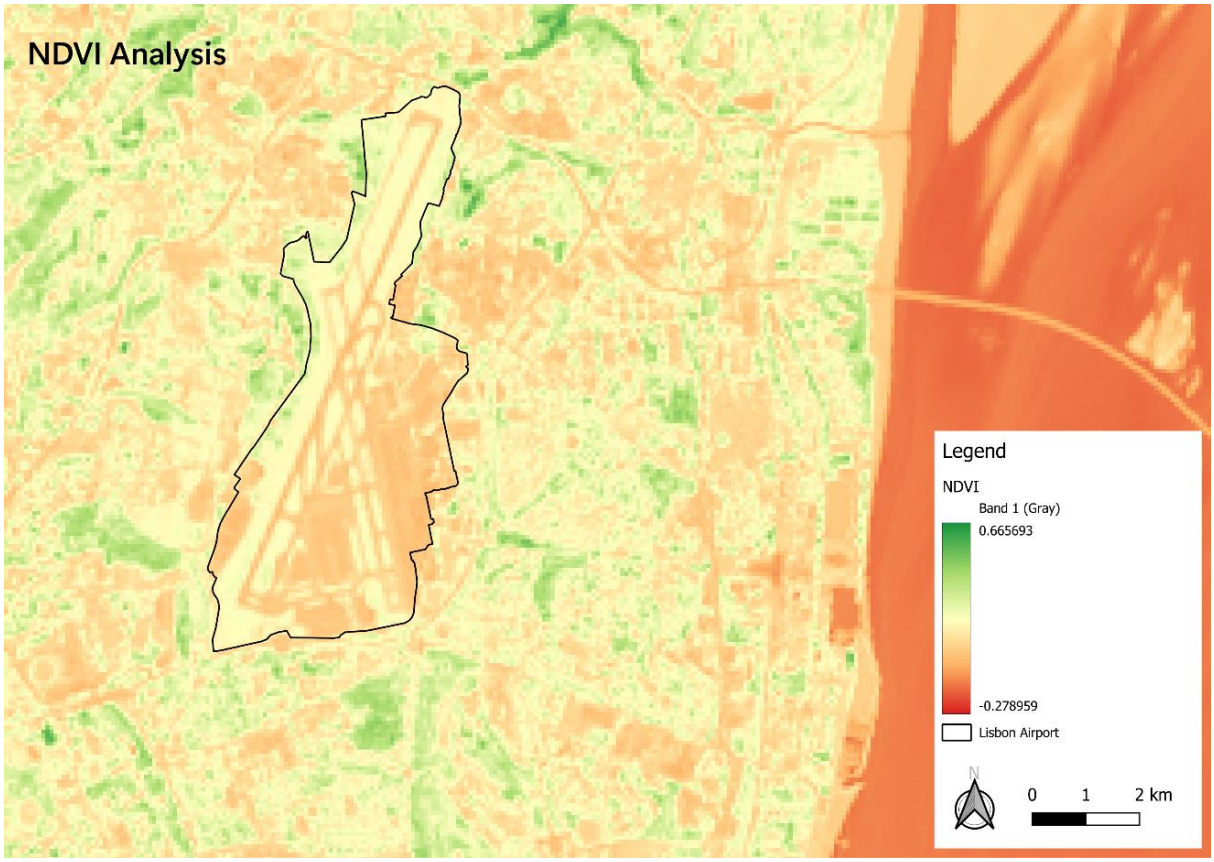
The NDVI (Normalized Difference Vegetation Index) analysis reveals a clear spatial gradient in vegetation distribution across Lisbon (map 3.22), highlighting the contrast between densely built urban areas and areas with higher ecological value. At the metropolitan scale, areas with high NDVI values (depicted in darker green tones) are primarily concentrated in peripheral zones, natural landscapes, and large urban parks. These include forested hills, agricultural lands, and continuous green corridors that play a crucial role in supporting biodiversity and regulating microclimatic conditions. In

contrast, the central and more consolidated urban areas are dominated by low NDVI values (orange to red tones), indicating sparse vegetation cover and a predominance of built surfaces. This pattern reflects the compact urban fabric of Lisbon, where high building density and extensive impervious surfaces limit the presence of vegetation.



Map 3.22: *Normalized Difference Vegetation Index (NDVI) of Lisbon. NDVI was calculated in QGIS from the Red (Band 4) and Near-Infrared (Band 5) bands of Landsat 9 imagery using the formula NDVI = (NIR − Red) / (NIR + Red). Source: USGS EarthExplorer (Landsat 9, Collection 2, Level-1)*

The airport area is dominated by low NDVI values (orange tones), indicating a very limited presence of vegetation due to the extensive impervious surfaces such as runways, taxiways, and operational zones (map 3.23). In comparison, the surrounding urban fabric shows a more diverse vegetation pattern, with patches of moderate to high NDVI (green tones), particularly in parks, open spaces, and some residential areas. However, these vegetated areas are scattered and lack continuity, forming isolated patches rather than a connected green network. A significant observation is the abrupt transition at the airport edge, where vegetated areas immediately give way to non-vegetated surfaces. This reinforces the role of the airport as an ecological barrier, interrupting potential green corridors and limiting environmental connectivity across the site.

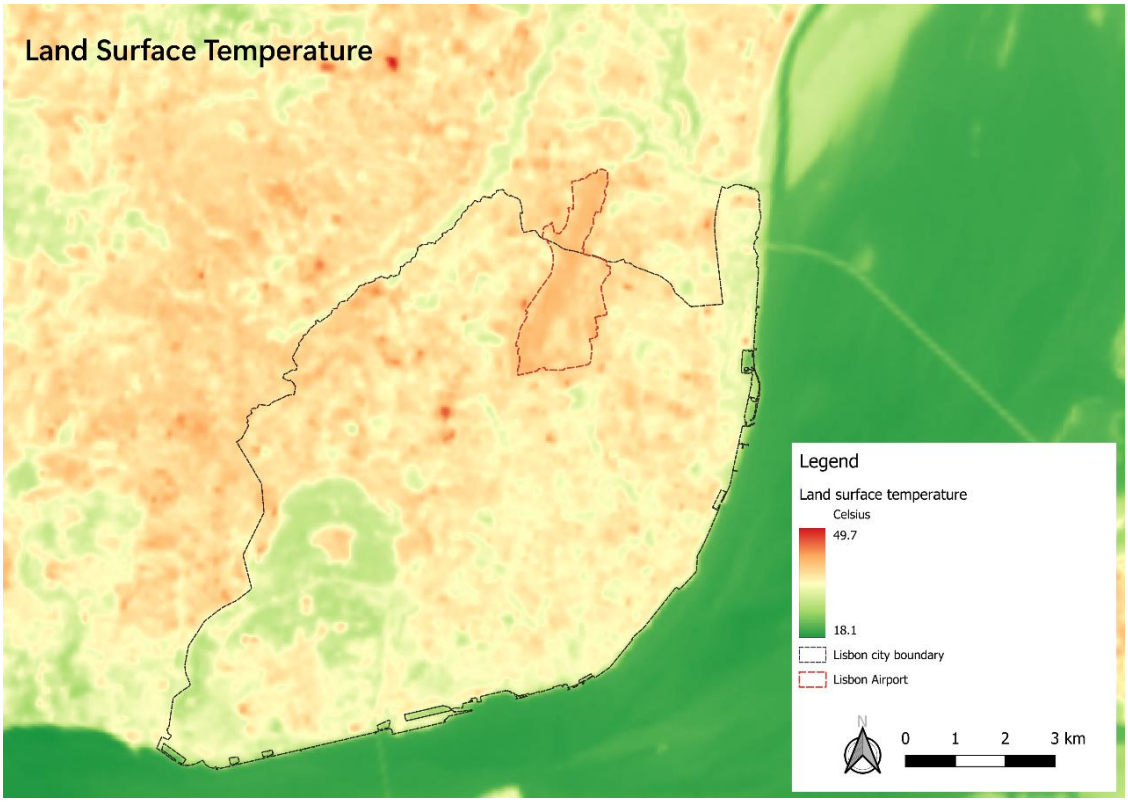


Map 3.23: *Normalized Difference Vegetation Index (NDVI) around Humberto Delgado Airport. NDVI was calculated in QGIS from the Red (Band 4) and Near-Infrared (Band 5) bands of Landsat 9 imagery using the formula NDVI = (NIR − Red) / (NIR + Red). Source: USGS EarthExplorer (Landsat 9, Collection 2, Level-1)*

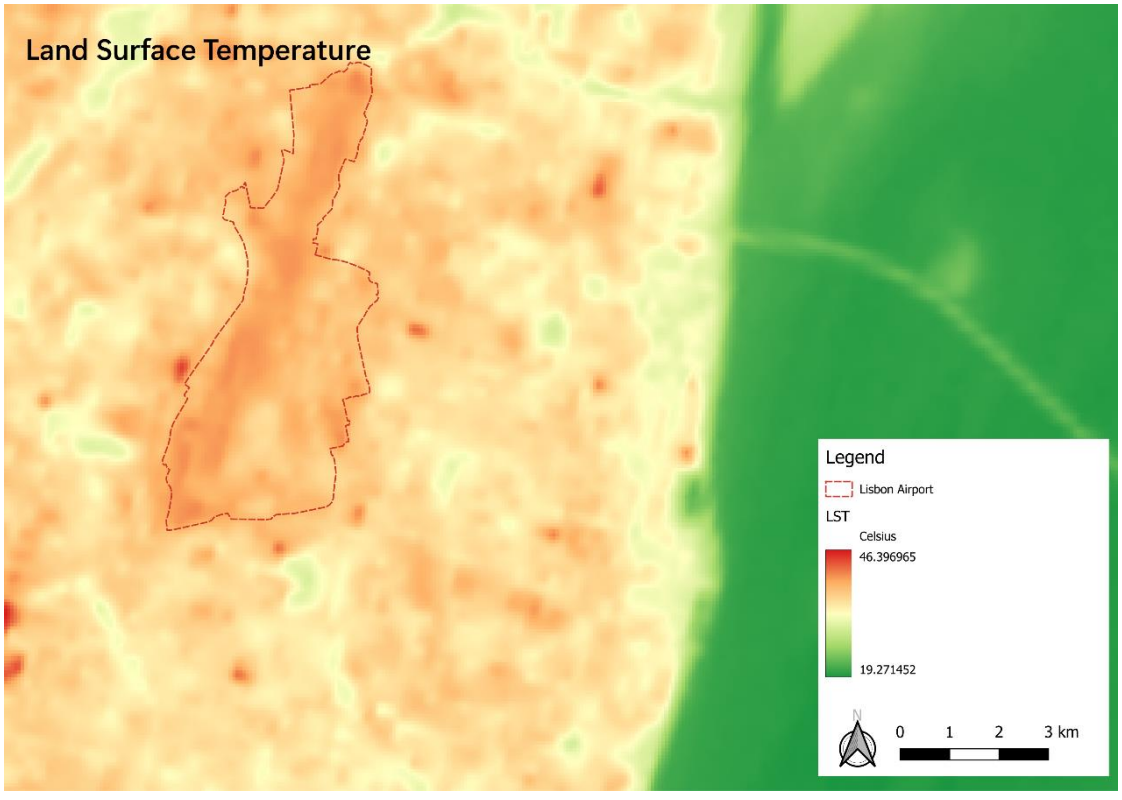
3.5.6. Land Surface Temperature and Surface Heat Exposure

The Land Surface Temperature (LST) map (map 3.24) at the city scale reveals a clear spatial pattern of thermal distribution across Lisbon. Higher temperatures (orange to red tones) are predominantly associated with dense urbanised and impervious areas, while lower temperatures (green tones) correspond to water bodies, vegetated zones, and less built-up areas. The airport contains extensive paved operational surfaces associated with elevated daytime land surface temperatures. However, its thermal pattern is not entirely uniform, as grassed areas, bare ground, buildings, and paved surfaces exhibit spatial variation. The mapped temperatures describe conditions at the satellite acquisition time rather than a uniform or year-round thermal state.

At the airport scale (Map 3.25), the site appears as a large and continuous surface thermal hotspot. The analysis identifies elevated daytime surface temperatures across extensive paved areas, but it does not directly measure pedestrian-level air temperature or demonstrate the transfer of heat to adjacent neighbourhoods. Evaluating such effects would require field measurements or atmospheric and microclimatic modelling.



Map 3.24: *Land Surface Temperature (LST) in Lisbon. Landsat 9 imagery acquired on 15 July 2025 was processed in QGIS to derive land surface temperature using thermal infrared data. Source: USGS EarthExplorer (Landsat 9 Collection 2, Level-1)*

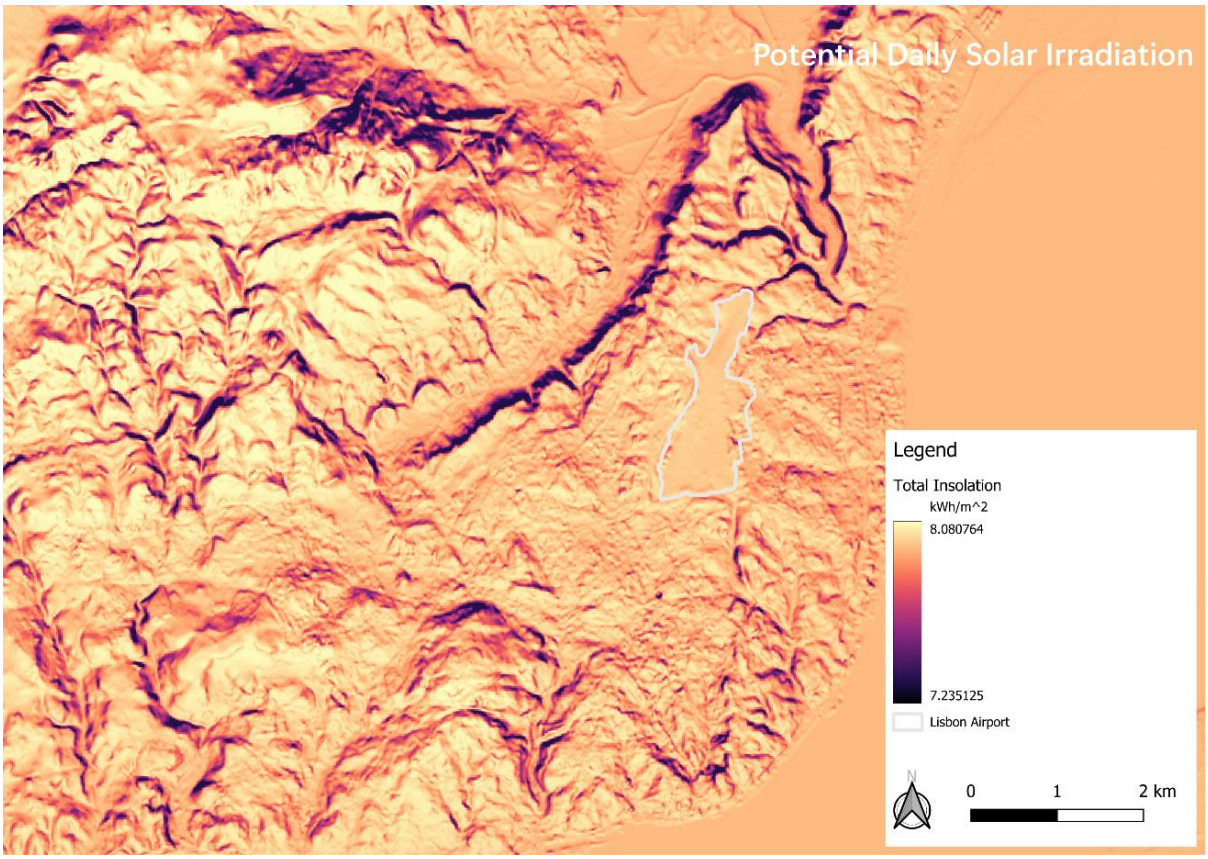


Map 3.25: *Land Surface Temperature (LST) around Humberto Delgado Airport. Landsat 9 imagery acquired on 15 July 2025 was processed in QGIS to derive land surface temperature using thermal infrared data. Source: USGS EarthExplorer (Landsat 9 Collection 2, Level-1)*

3.5.7. Solar Exposure and Morphological Exposure

Solar Radiation

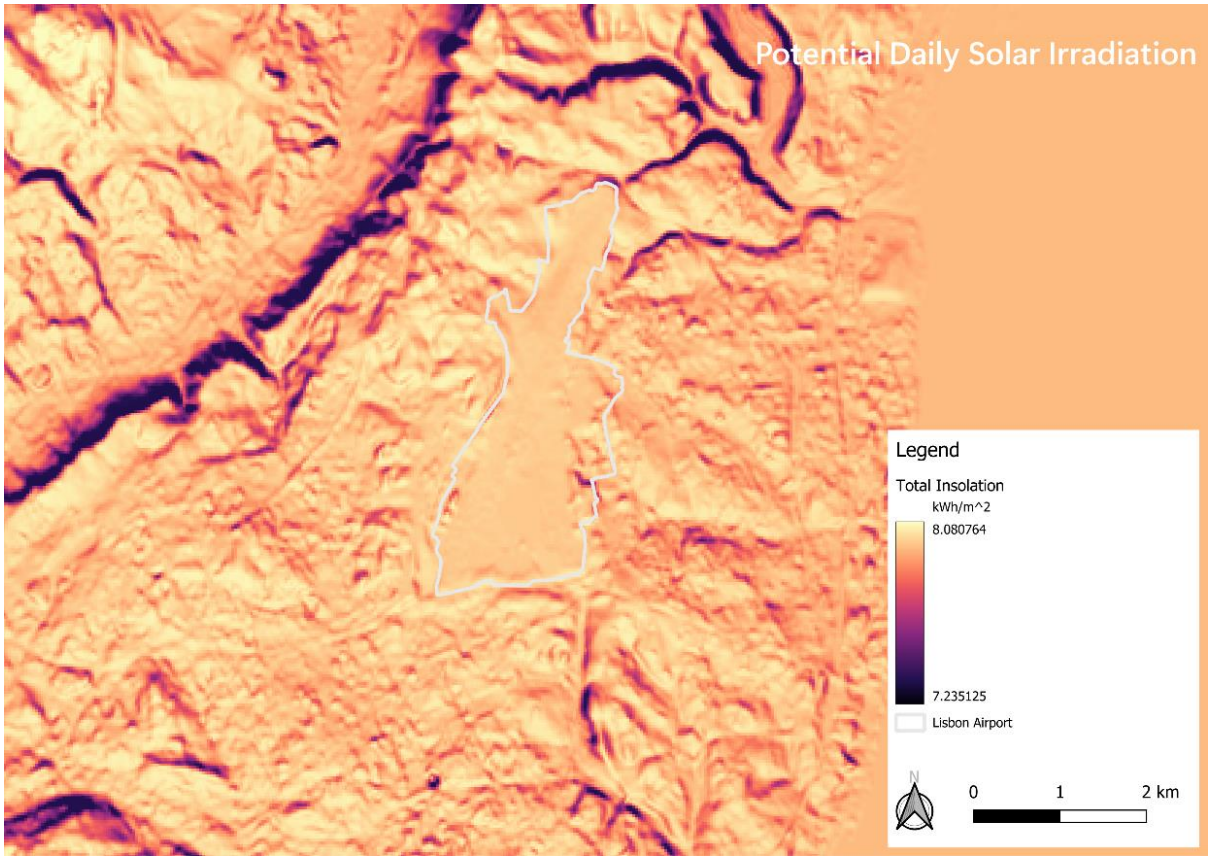
According to map 3.26, we can say that solar irradiation across Lisbon is strongly shaped by topography and exposure. The highest values appear on the more open and uniformly exposed surfaces, while the lower values concentrate along steeper slopes, shaded valleys, and more topographically complex areas. In the wider city, this means that solar potential is not evenly distributed: some districts benefit from strong direct exposure, while others are naturally limited by relief and shadow patterns. The airport stands out as a large and highly exposed surface, with very limited shading and almost no topographic obstruction. Because of its flat, open morphology, it receives consistently high solar radiation, especially on roofs, paved areas, and runway-adjacent surfaces.



Map 3.26: *Potential daily solar irradiation in Lisbon. Solar irradiation was calculated in QGIS using the GRASS GIS r.sun model, based on a Digital Surface Model (DSM) to account for terrain and surface features. The analysis represents solar irradiation for 15 July 2025. Source of DSM: Copernicus GLO-30 DSM*

At the site scale (Map 3.27), the analysis confirms the airport's high level of solar exposure and supports the need for shading, planting, and materials with lower heat absorption. It may also indicate broad areas in which solar-energy systems could be investigated in the future. However, because the analysis is based on the 30 m Copernicus GLO-30 DSM, it is suitable for strategic comparison rather than detailed photovoltaic feasibility, roof-scale assessment, or shading design. In this thesis, its principal role is

therefore to identify exposure conditions that should inform outdoor thermal-comfort strategies.



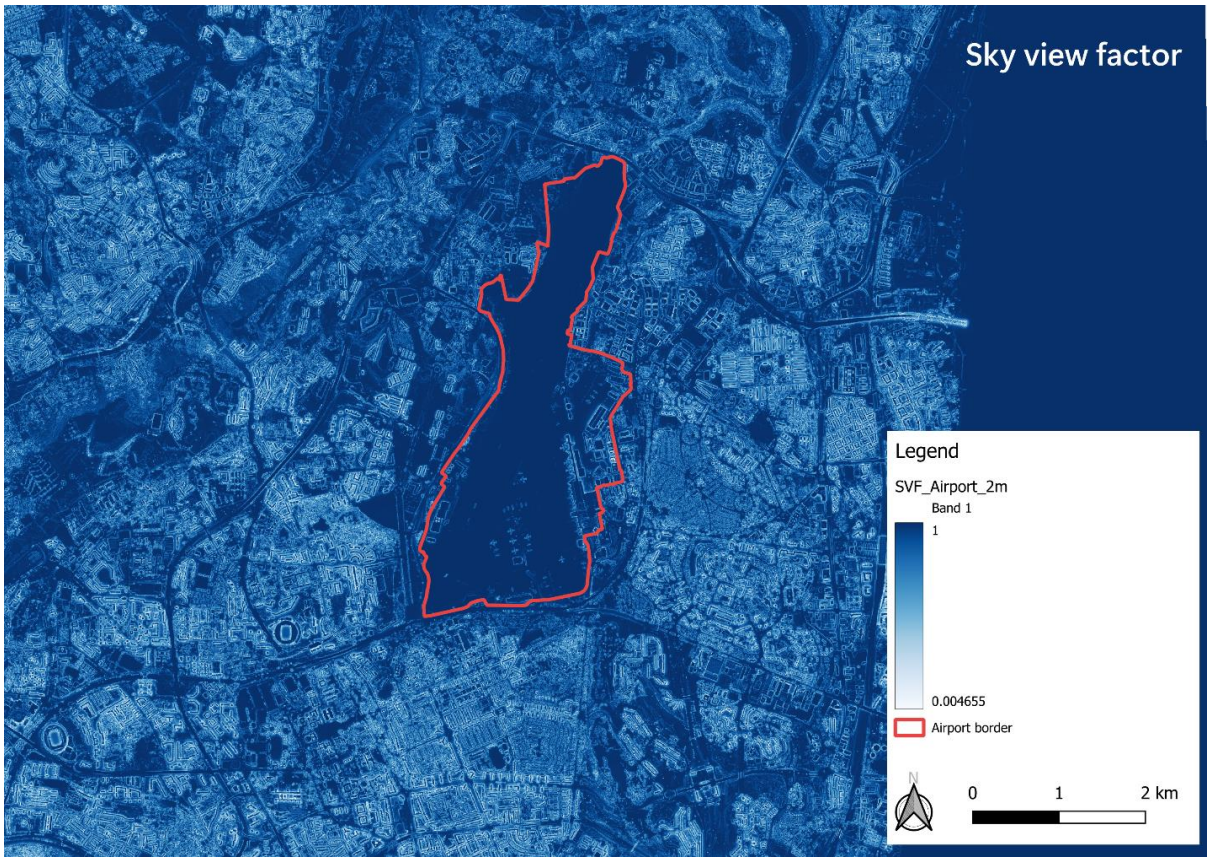
Map 3.27: *Potential daily solar irradiation around Humberto Delgado Airport. Solar irradiation was calculated in QGIS using the GRASS GIS r.sun model, based on a Digital Surface Model (DSM) to account for terrain and surface features. The analysis represents solar irradiation for 15 July 2025. Source of DSM: Copernicus GLO-30 DSM*

Sky View Factor

The Sky View Factor (SVF) analysis provides a critical understanding of the spatial and microclimatic conditions of Lisbon Airport, particularly in relation to solar exposure, thermal behaviour, and environmental comfort. SVF values range from 0 to 1 and represent the proportion of visible sky from a given point; higher values indicate open, unobstructed conditions, while lower values correspond to more enclosed environments shaped by buildings, vegetation, or topography.

The map reveals that the airport site is characterised by consistently high SVF values, approaching 1 across almost its entire extent. This indicates a highly exposed spatial condition, where the sky is almost fully visible and vertical obstructions are virtually absent. The morphology of the site—defined by large, flat, and impermeable surfaces such as runways and aprons—reinforces this condition, resulting in a homogeneous and uninterrupted open landscape. In contrast, the surrounding urban fabric exhibits significantly lower and more varied SVF values, reflecting the presence of buildings, street canyons, and vegetated areas that partially obstruct the sky and create more

articulated microclimatic conditions. This contrast highlights a strong spatial discontinuity between the airport and its urban context. From an environmental perspective, high SVF values have direct implications for solar radiation and thermal performance. The near-total exposure to the sky allows for maximum solar gain during daytime, increasing surface temperatures, particularly in areas dominated by asphalt and other heat-absorbing materials. At the same time, high SVF also facilitates longwave radiation loss during nighttime, potentially leading to rapid cooling. High SVF indicates substantial sky exposure, but it does not establish the net balance between daytime heating and nighttime cooling. Assessing heat retention and pedestrian-level air temperatures would require time-resolved measurements or microclimatic modelling. Furthermore, the lack of vertical elements and shading structures reduces the potential for thermal comfort in outdoor environments. The absence of spatial enclosure or vegetative cover limits opportunities for shade, wind modulation, and microclimatic diversity. As a result, the site currently offers minimal protection from solar exposure, reinforcing its characterisation as an environmentally extreme and human-unfriendly landscape.



Map 3.28: *Sky View Factor within and around Humberto Delgado Airport. Source: Author, 2026. Sky View Factor was calculated for the airport area using a 2 m resolution DSM (Centro de Dados DGT) and the SAGA GIS sky view factor algorithm.*

3.5.8. Wind and Outdoor Thermal Comfort

Wind analysis

The wind analysis developed in this study focuses specifically on the microclimatic conditions of Lisbon Airport and its immediate surroundings, rather than the broader urban context of Lisbon. Understanding these site-specific aerodynamic flows is fundamental for the regeneration project, as it dictates the potential for leveraging passive ventilation to mitigate the severe thermal stress and Urban Heat Island (UHI) effects identified in previous sections.

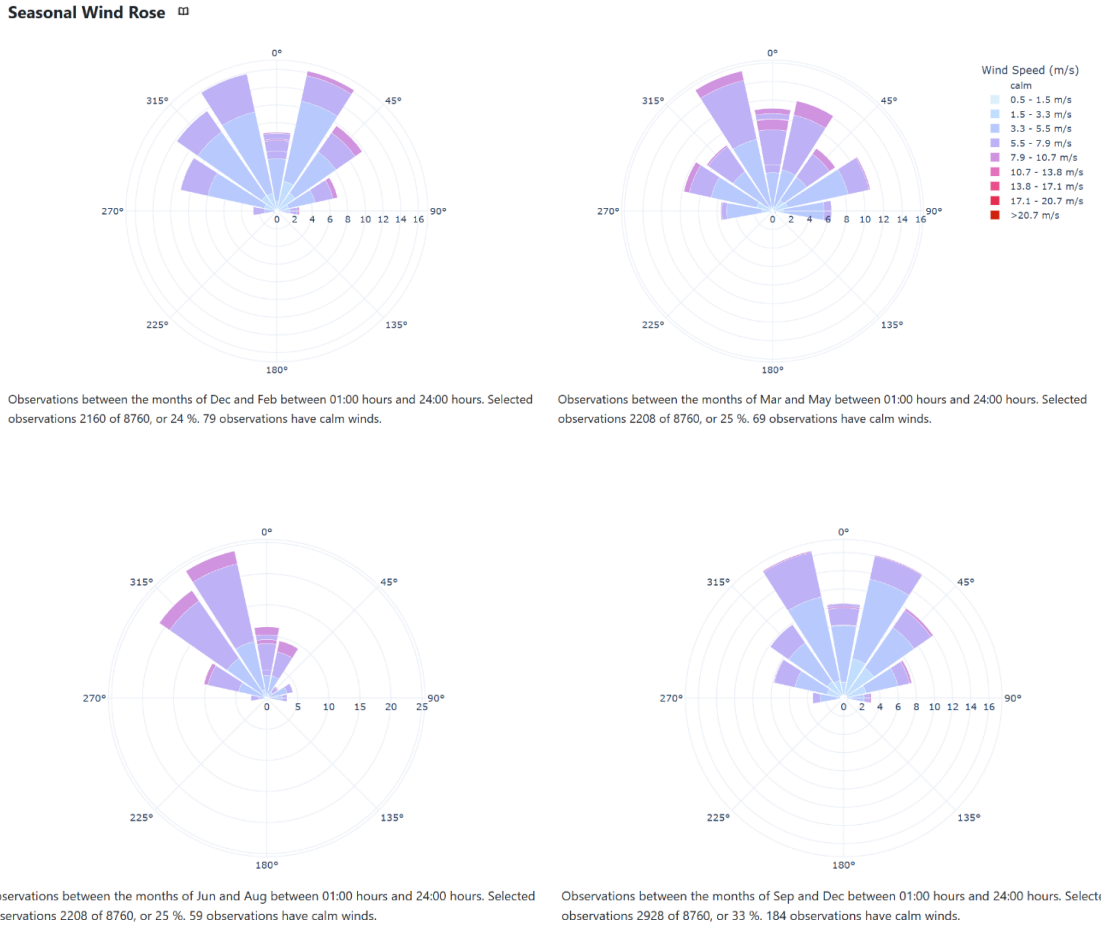


Diagram 3.6: *Seasonal wind rose charts in Lisbon airport. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon*

A review of the seasonal charts reveals a pronounced aerodynamic asymmetry throughout the year. During the warmer months, specifically Spring (MAM) and Summer (JJA), the site is overwhelmingly dominated by strong prevailing winds originating from the North and North-Northwest. This summer regime, locally characteristic of the "Nortada," exhibits high frequencies and significant velocities, frequently exceeding 8.8 m/s. Conversely, the colder months of Autumn (SON) and Winter (DJF) display a much more omnidirectional and variable wind pattern. During these periods, the northern dominance recedes, yielding to lower overall velocities and a broader distribution of

secondary currents emerging from the eastern and southern quadrants. The airport's large and comparatively open surface allows prevailing northern winds to move across the site with limited obstruction. The extensive paved areas may reduce the cooling benefit associated with this airflow by increasing surface heat exposure; however, the effect on downwind neighbourhoods is not quantified by the wind-rose analysis. The design implication is therefore to preserve wind permeability while reducing surface heating through shade, vegetation, water-sensitive landscapes, and materials with lower heat absorption.



Diagram 3.7: *Annual wind rose charts in Lisbon airport. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon*

The annual wind rose indicates a clear and persistent prevailing wind pattern originating primarily from the North and North-Northwest throughout the year. These winds occur with relatively high frequency and are generally within a low to moderate velocity range, confirming a stable and consistent wind regime at the site.

At the scale of Lisbon Airport, the existing spatial configuration plays a significant role in shaping airflow behaviour. The airport's large, open, and unobstructed surfaces allow wind to move across the site with minimal resistance, resulting in relatively continuous and uniform exposure to prevailing northern winds. This condition suggests that the site functions as an area of increased wind permeability compared to the surrounding urban fabric. While the interaction between airflow and surface conditions is not directly quantified in this analysis, the predominance of extensive impermeable surfaces, such as asphalt, may influence local thermal conditions and reduce the potential cooling effect typically associated with air movement. This highlights the importance of integrating climatic considerations into future regeneration strategies.

UTCI Thermal Comfort Analysis

The evaluation of the Universal Thermal Climate Index (UTCI) heatmaps provides a precise, quantifiable assessment of human thermal comfort on the site throughout the year. In the context of the Humberto Delgado Airport regeneration, assessing thermal

stress is paramount due to the site's vast, exposed infrastructural footprint and its role as an urban heat island.

In the first scenario (including sun and wind), the diagram shows that the most critical thermal stress occurs between late spring and early autumn, particularly during midday hours (approximately 11:00 to 17:00). During this period, the dominance of red and orange tones indicates **strong to very strong heat stress**, meaning that the combined effect of solar radiation and atmospheric conditions significantly increases the perceived temperature. In contrast, early morning and nighttime hours remain mostly within the range of no thermal stress or slight cold stress, reflecting a noticeable daily fluctuation.

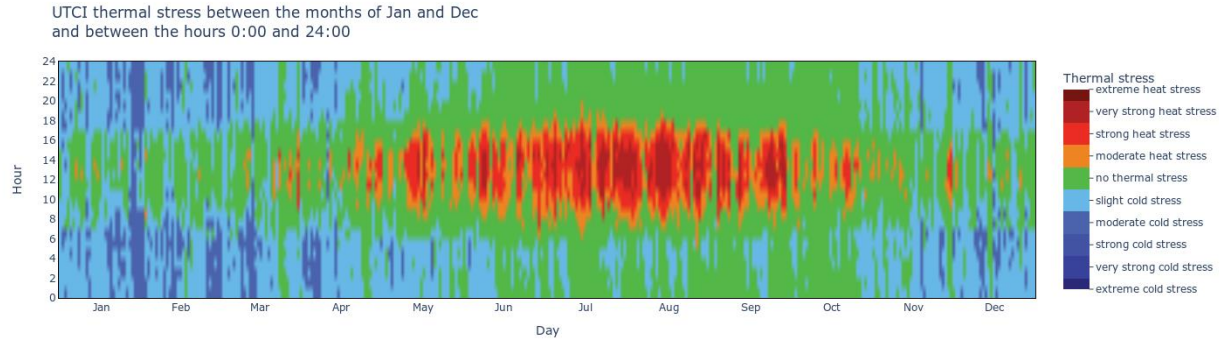


Diagram 3.8: *First scenario, Heat map with sun & wind. Source: CBE Clima Tool (Betti et al., 2024). The underlying climatic conditions and wind speed values are based on the EnergyPlus Weather (EPW) synthetic data series for Lisbon*

In the second scenario (without sun and wind), the overall thermal stress pattern becomes considerably milder. The intensity and frequency of high-stress conditions are reduced, and much of the year falls within the range of no thermal stress or moderate conditions. The second scenario shows lower thermal stress under the combined no-sun and no-wind assumptions. Because both solar exposure and wind conditions change between the scenarios, this comparison does not isolate their individual contributions.

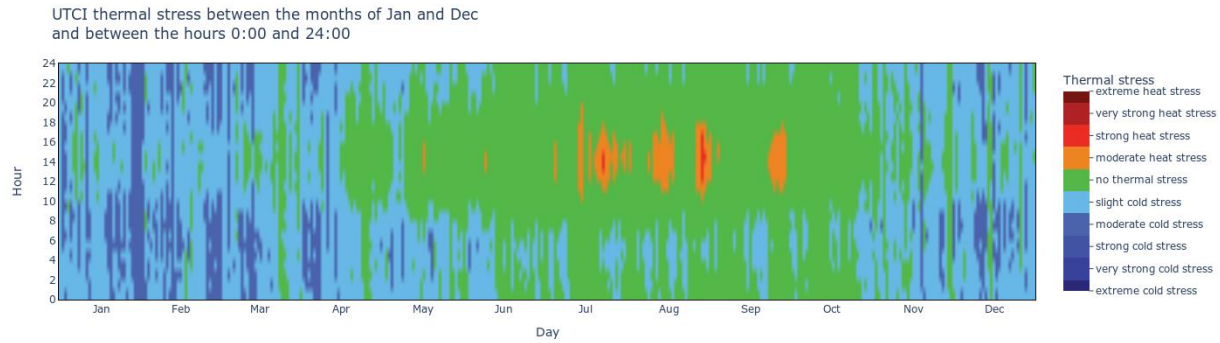


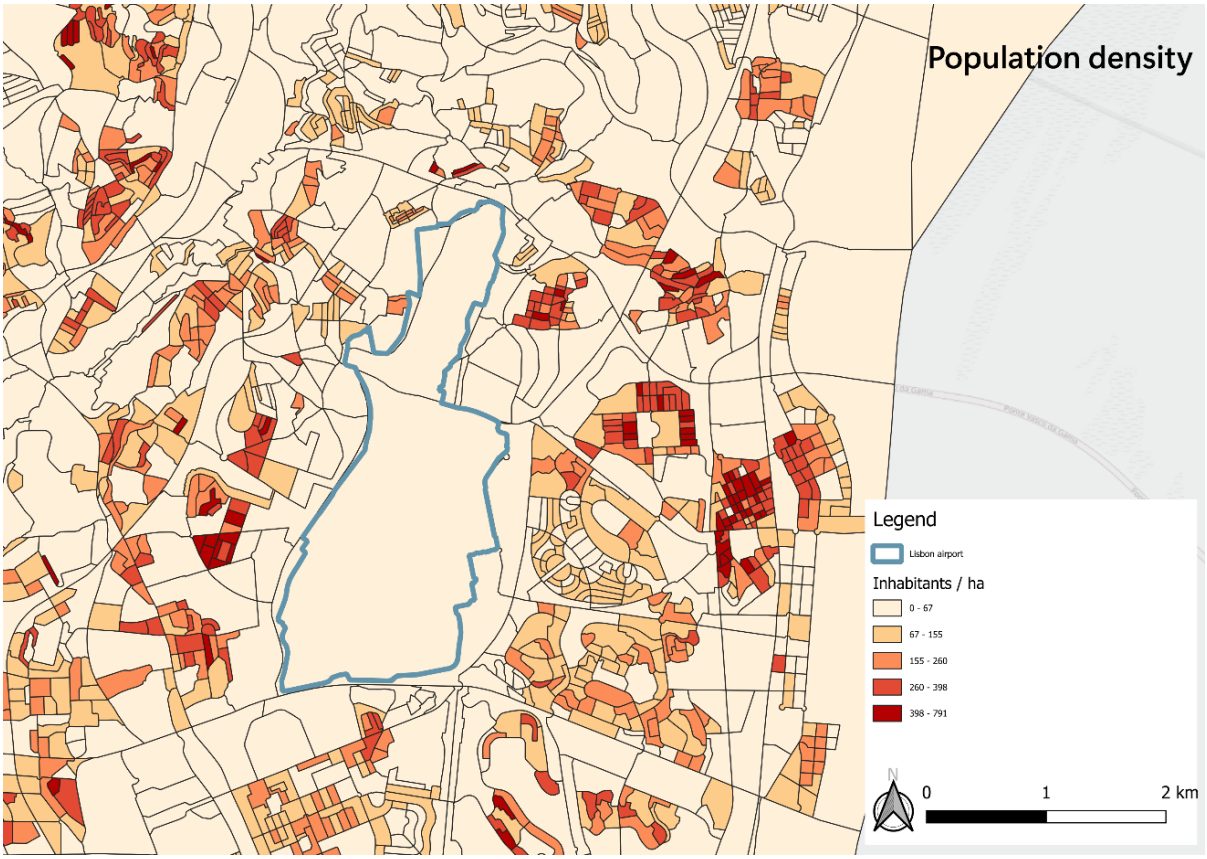
Diagram 3.9: *Second scenario, Heat map without sun & wind. Source: CBE Clima Tool (Betti et al., 2024)*

Together with the mapped solar exposure, these results support the provision of shaded outdoor spaces while maintaining opportunities for ventilation. However, the relative contributions of solar radiation and wind require comparisons in which one variable is changed while the others are held constant.

3.6. Demographic and Social Context

3.6.1. Population Density

The population density analysis within the 1000-metre catchment area highlights a clear spatial contrast between the airport site and its surrounding urban fabric. While the airport itself represents a large, uninhabited infrastructural area, it is directly bordered by relatively dense residential neighbourhoods, particularly in areas such as Olivais, Moscavide, and Alvalade. This condition creates a sharp transition between a mono-functional, low-occupancy zone and a fine-grained, populated urban context.

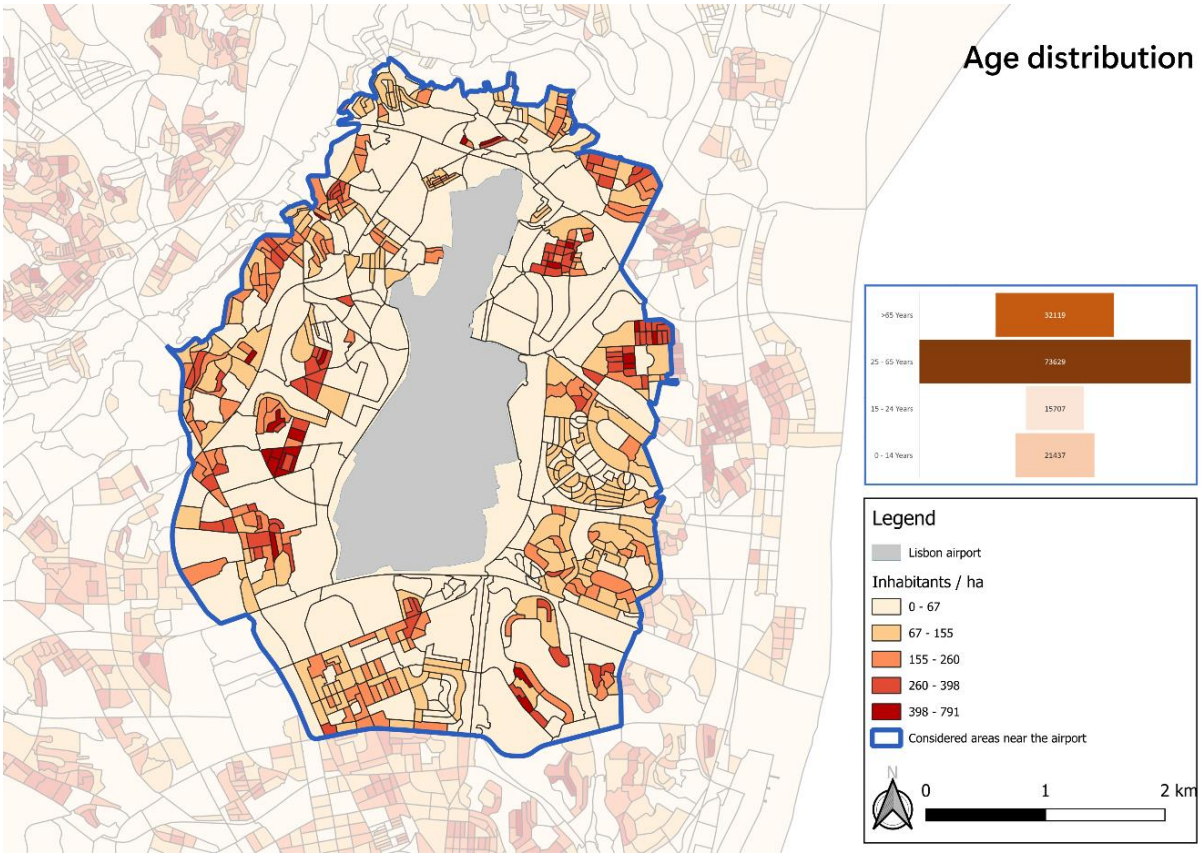


Map 3.29: *Population density around Humberto Delgado Airport. Source: Author, 2026 (based on INE, Censos 2021–BGRI2021)*

The mapping indicates that several residential clusters in the immediate vicinity of the airport exhibit comparatively high population densities. This proximity suggests that a significant number of residents are directly exposed to the environmental and spatial impacts of the airport, including noise, heat accumulation, and limited access to large-scale open or green spaces within walking distance. In addition, the airport site acts as a substantial physical interruption within the urban structure. Its scale and restricted accessibility reduce direct connections between neighbourhoods located on its eastern and western edges, contributing to longer movement paths and reduced local permeability at the urban scale. From an analytical perspective, the density distribution provides an important basis for understanding spatial demand in the area. Higher-

density zones along the edges of the site indicate potential pressure for accessible public space, services, and social infrastructure, while areas with lower density toward the northern edges suggest opportunities for less intensive, more ecological or landscape-oriented interventions.

3.6.2. Age Distribution



Map 3.30: *Population distribution by age group within 1 km of Humberto Delgado Airport. Source: Author, 2026 (based on INE, Censos 2021–BGRI2021)*

To further refine the social context of the regeneration project, an age distribution analysis was conducted strictly within the defined 1000-metre catchment area surrounding the airport. It is imperative to note that the quantitative data presented in this analysis reflects the highly localised, immediate perimetre of the site, rather than generalized municipal averages for the city of Lisbon. The demographic data within this targeted boundary reveals a massive localised population of approximately 142,800 residents directly interfacing with the infrastructural void, emphasizing the profound scale of social impact the future park will have.

A critical breakdown of this localised demographic profile indicates a diverse, multi-generational community with highly specific spatial, physical, and social needs. Notably, the elderly population (over 65 years) constitutes a significant cohort of more than 32,100 residents. In the context of urban climatology, this aging demographic is physiologically the most vulnerable to the extreme Urban Heat Island (UHI) effects and

environmental stressors currently generated by the airport's impervious surfaces. Furthermore, the presence of over 37,100 children and young adults (combined 0-24 years cohorts) highlights a severe local deficit in safe, accessible outdoor recreational and educational environments. The largest segment, adults between 25 and 65 years (accounting for over 73,600 residents), underscores a massive local demand for active mobility networks, daily commuting corridors, and physical exercise spaces.

Spatial Distribution of Age Cohorts (Elderly vs. Youth)

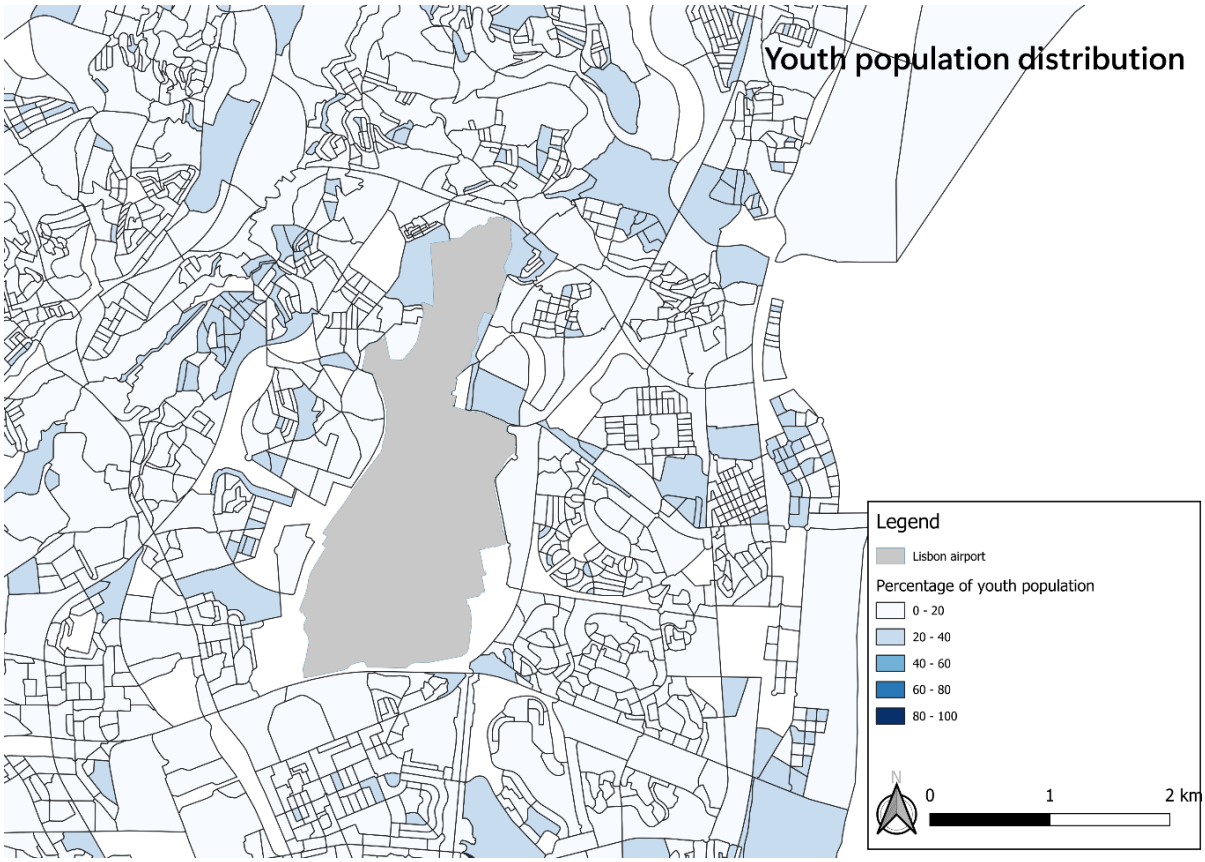
While the general demographic profile establishes the total volume of different age groups, mapping their precise spatial distribution reveals critical geographic disparities. A comparative analysis of the two cohort maps demonstrates that the elderly and youth populations interact with the airport site in fundamentally different ways.

The elderly population distribution map reveals several highly concentrated pockets of older residents, particularly along parts of the immediate eastern and south-western airport boundaries. By contrast, the youth population is more dispersed throughout the wider catchment area and does not form the same type of concentrated spatial clusters. These findings do not directly determine the programme or micro-zoning of the future redevelopment. Instead, they establish demographic criteria for accessibility, comfort, and spatial inclusion. Areas connected to concentrations of elderly residents should prioritise barrier-free movement, shaded routes, frequent seating, clear wayfinding, safe pedestrian crossings, and convenient access to everyday services and public amenities. Adaptive reuse near these contact areas may also support accessible community-oriented and daily-use functions, provided that noise, traffic, and evening activity are appropriately managed.

The dispersed distribution of younger residents suggests that active recreational spaces should not be designed exclusively for one particular edge. Instead, sport, play, and dynamic public activities should be connected to the main public-movement network and positioned where they can be reached from several surrounding neighbourhoods. The demographic analysis therefore supports a universally accessible public-space system rather than the creation of separate age-specific zones.



Map 3.31: *Distribution of the elderly population around Humberto Delgado Airport. Source: Author, 2026 (based on INE, Censos 2021–BGRI2021)*



Map 3.32: *Distribution of the youth population around Humberto Delgado Airport. Source: Author, 2026 (based on INE, Censos 2021–BGRI2021)*

3.7. Synthesis and Design Implications

3.7.1. Key Issues and Conflicts

A. Spatial & Morphological Issues

The spatial analysis reveals that the airport operates as a large-scale infrastructural superblock that disrupts the continuity of the surrounding urban fabric. Its extensive footprint, defined by rigid runway geometries and enclosed operational zones, creates a strong morphological discontinuity between the site and adjacent neighbourhoods.

A primary issue is the severance effect, where the airport acts as a physical barrier interrupting east–west and north–south urban connections. As demonstrated in the network analysis, numerous local streets terminate at the airport boundary, producing dead ends and limiting cross-site permeability.

However, the edge condition is not uniform. While certain segments—particularly where local streets meet the airport boundary—generate residual and inactive spaces, other parts of the perimetre are defined by major arterial roads that physically separate the airport from surrounding areas. These infrastructures create a different type of barrier condition: not through emptiness, but through high-speed, low-permeability corridors.

Additionally, a strong contrast exists between the large-scale, mono-functional airport layout and the finer-grained, mixed-use urban fabric of surrounding neighbourhoods. This mismatch in scale prevents gradual spatial transitions and reinforces the airport's isolation within the city.

B. Environmental & Ecological Issues

The environmental analysis identifies the airport as a major climatic hotspot within the urban system. The dominance of impervious surfaces significantly contributes to heat accumulation and the formation of an urban heat island (UHI).

The combination of high land surface temperatures, low vegetation cover (NDVI), and high sky view factor results in intense solar exposure and elevated daytime thermal stress. The absence of shading further exacerbates thermal discomfort.

Hydrologically, the site exhibits very limited capacity for water infiltration due to sealed surfaces, increasing surface runoff and reducing ecological performance. At the same time, flow accumulation patterns indicate that the site is influenced by surrounding micro-catchments, particularly along its edges, highlighting opportunities for water-sensitive design interventions.

Despite the presence of green spaces in surrounding areas, ecological networks remain discontinuous. The airport interrupts potential green corridors, preventing the formation of an integrated blue-green system at the urban scale.

Climatic analyses show that the airport's open terrain is exposed to prevailing winds such as the Nortada and may support important ventilation pathways. However, the present analysis does not quantify how heated surfaces modify downwind air temperatures. Future transformation should therefore preserve airflow while reducing surface heat exposure.

Topographically, the site is relatively flat, which facilitates infrastructure but limits environmental diversity and natural drainage dynamics.

Together, these conditions position the site not only as an environmental problem but also as a latent opportunity for large-scale climate regulation and ecological restoration.

C. Accessibility & Mobility Issues

The mobility analysis reveals a strong imbalance between metropolitan accessibility and local connectivity. While the airport is well connected through major road networks and public transport systems, this accessibility primarily serves vehicular and passenger flows rather than everyday urban movement.

The surrounding network is dominated by high-capacity arterial roads, which act as physical and perceptual barriers for pedestrians and cyclists, reducing permeability and reinforcing spatial separation.

Access to the site is limited and centralized, mainly along the southern edge, restricting distributed connectivity and integration with surrounding neighbourhoods.

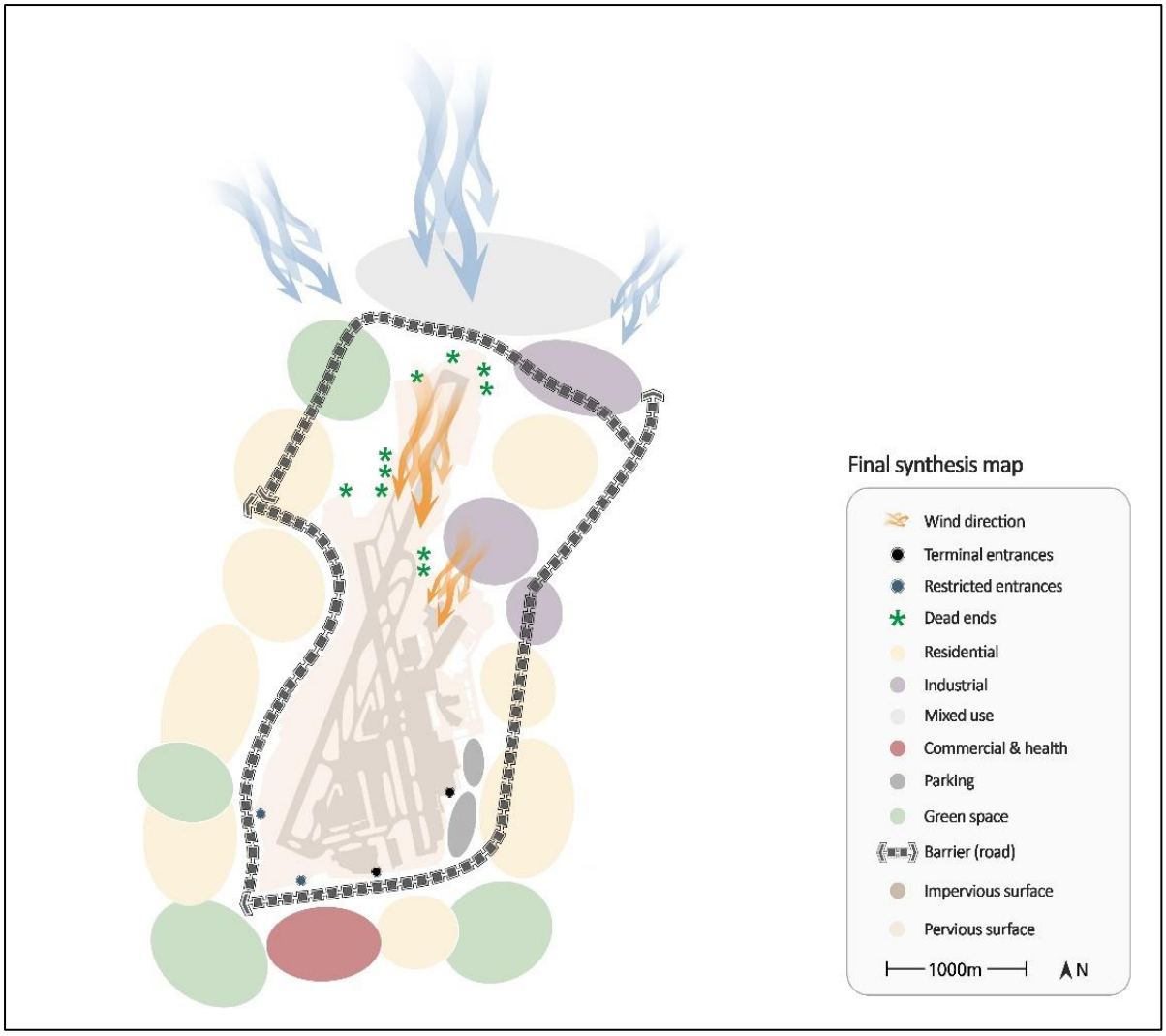
Furthermore, the lack of fine-grain pedestrian and cycling infrastructure weakens local accessibility, preventing the site from functioning as part of a continuous and inclusive mobility system.

D. Socio-Functional Issues

From a socio-functional perspective, the airport operates as a mono-functional enclave with minimal interaction with surrounding urban life. Its Programmatic structure is almost entirely dedicated to aviation-related uses, limiting opportunities for public engagement and mixed-use integration. Despite its proximity to dense residential neighbourhoods, there is a clear lack of functional integration. Surrounding communities—particularly those with high population densities and vulnerable groups—have limited access to green spaces and public amenities, while the airport land remains inaccessible. In some edge segments, underutilised and transitional spaces indicate weak spatial relationships between the site and its surroundings, representing missed opportunities for activation. This creates a fundamental paradox: a centrally located, large-scale urban site that remains disconnected from the everyday needs and dynamics of the city.

Table 3.2: *Summary of the key issues and conflicts identified through the site analysis. Source: Author, 2026 (synthesis of the analytical findings presented in this chapter)*

Category	Key Issues (Condensed)
Spatial & Morphological	- Airport functions as a large superblock disrupting urban continuity - Strong severance effect blocking east–west and north–south connections - Numerous dead-end streets at the boundary reduce permeability - Non-uniform edges: residual inactive spaces vs. arterial road barriers - Barriers formed both by emptiness and high-speed infrastructure - Scale mismatch between airport and fine-grain urban fabric
Environmental & Ecological	- Extensive impervious surfaces → Urban Heat Island (UHI) - High LST + low NDVI + high SVF → intense thermal stress - Lack of shading increases discomfort - Low infiltration & high runoff due to sealed ground - Fragmented ecological networks; no continuous green corridors - Prevailing Nortada winds create ventilation potential, while extensive paved surfaces may reduce their cooling benefit - Flat topography limits drainage & environmental diversity
Accessibility & Mobility	- Strong metropolitan access, weak local connectivity - System prioritises vehicles over pedestrians/cyclists - Arterial roads act as physical & perceptual barriers - Limited, centralized entrances (mainly south) - Lack of distributed access reduces integration - Weak pedestrian & cycling networks → low permeability
Socio-Functional	- Airport as a mono-functional enclave - Minimal interaction with surrounding urban life - Lack of mixed-use and public engagement - Nearby communities lack access to green/public spaces - Presence of underutilised edge spaces



Map 3.33: *Synthesis of Existing Spatial and Environmental Conditions. Source: Author, 2026*

3.7.2. Design Opportunities and Spatial Criteria

Building on the reuse opportunities identified above, the spatial, environmental, mobility, and demographic findings were translated into a set of qualitative design criteria. These criteria do not prescribe a final physical solution. Instead, they define the spatial performance that the future proposal should achieve and establish a clear link between the site analysis and the design development presented in Chapter 4.

Table 3.3: *Design opportunities and spatial criteria derived from the site analysis. Source: Author, 2026 (synthesis of the analytical findings presented in this chapter). Note: These criteria indicate the intended direction of spatial development rather than detailed technical standards. Soil conditions, contamination, drainage capacity, structural feasibility, and access restrictions require further investigation.*

Analytical condition	Design opportunity	Spatial criterion
Airport superblock, interrupted streets, and weak local connectivity	Reconnect the eastern and western sides of the site	Introduce selected pedestrian and cycling connections aligned with existing streets,

		feasible entrance points, and public-transport stops.
Continuous and recognisable geometry of the main runway 02/20	Preserve longitudinal continuity and infrastructural memory	Retain the runway alignment as a clear public spine, while locating planting, shade, seating, and pause spaces mainly along its edges.
Scale difference between the airport and surrounding neighbourhoods	Create a more legible and human-scale spatial structure	Organise new uses into distinct but connected areas with permeable boundaries and gradual transitions towards the surrounding urban fabric.
High land-surface temperatures, high Sky View Factor, and extensive solar exposure	Improve outdoor thermal comfort	Prioritise trees, shade structures, seating, and materials with lower heat absorption along principal routes and intensively used public spaces.
Extensive sealed surfaces and identifiable runoff paths	Develop a water-sensitive landscape	Apply selective depaving, permeable surfaces, temporary water retention, filtration, and reuse in relation to mapped low points and flow-accumulation paths.
Prevailing northerly winds and the open character of the site	Use airflow as part of the cooling strategy	Maintain open and porous ventilation paths and avoid continuous built or vegetated barriers across the principal airflow directions.
Low vegetation cover and fragmented ecological networks	Restore green-blue continuity	Connect new planted areas and water-sensitive landscapes to surrounding green spaces through continuous corridors or smaller stepping-stone habitats.
Dense and age-diverse surrounding neighbourhoods with limited access to public amenities	Support inclusive and diverse public use	Provide distributed entrances, step-free routes, shaded seating, safe crossings, everyday services, and activities accessible to different age groups.
Different residential, infrastructural, industrial, and restricted boundary conditions	Develop differentiated site edges	Create more open and active interfaces near residential areas and public transport, while using landscape buffers and selective connections near arterial roads, industrial areas, and restricted land.

Together, these criteria support a spatial structure in which the preserved runway provides north–south continuity, selected transversal connections restore east–west permeability, and different programme areas remain linked through porous and climate-responsive open spaces. Environmental measures should be concentrated where they

can also improve public use, particularly around entrances, principal movement routes, adaptive-reuse anchors, and intensively occupied public spaces.

3.7.3. Analytical Synthesis and Transition to Design

Rather than establishing an additional set of research questions, the analytical findings clarify the site-specific priorities through which the main question and the two sub-questions introduced in Chapter 1 can be addressed during the design phase.

In relation to Sub-question 1 — Climatic and Environmental Performance, the analysis identifies extensive impervious surfaces, high solar exposure, thermal stress, limited vegetation, weak infiltration capacity, and fragmented green-blue networks as the principal environmental pressures affecting the site. At the same time, the mapped runoff paths, relatively flat terrain, and exposure to prevailing winds reveal opportunities for environmental transformation. These findings establish the need to investigate selective depaving, shade, vegetation, water retention and reuse, and the preservation of airflow as interconnected components of the future spatial strategy.

In relation to Sub-question 2 — Public Space and Urban-Social Performance, the analysis demonstrates that the airport operates as a large and inaccessible superblock despite its proximity to dense and age-diverse neighbourhoods and metropolitan public transport. Limited entrances, interrupted local streets, arterial-road barriers, and weak pedestrian and cycling networks reduce its relationship with everyday urban life. The design phase should therefore respond through selected new entrances, transversal connections, inclusive movement networks, accessible public spaces, and a diversity of everyday and temporary activities.

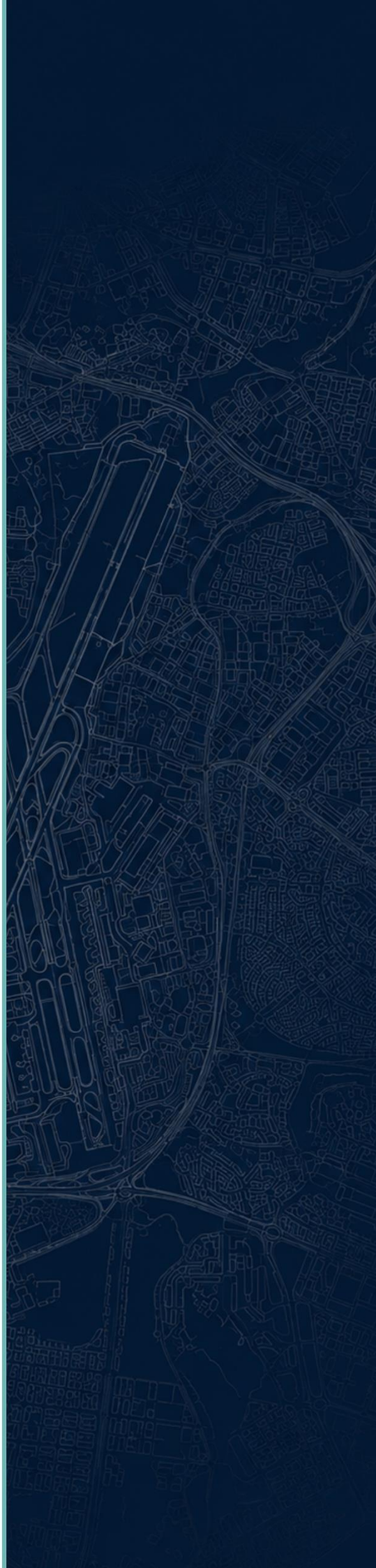
The preservation and reinterpretation of the airport's spatial identity operate across both lines of inquiry. The main runway 02/20, terminals, hangars, apron surfaces, and other infrastructural traces provide an existing spatial framework that can support continuity, orientation, adaptive reuse, and public activity without treating the airport as a blank site.

CHAPTER

04

Shifting the View

Design Proposal



4.1. Design Foundations

4.1.1. Design Objectives

The transformation of Lisbon Airport presents a unique opportunity to redefine a large-scale urban void and reintegrate it into the surrounding metropolitan structure. As one of the most extensive and inaccessible areas within the city, the airport currently functions as a physical and environmental barrier. The analytical findings presented in the previous chapters reveal a consistent pattern of spatial, environmental, and social pressures concentrated around the airport site. The land surface temperature analysis identifies the airport as one of the most thermally intense zones within the city, driven by the near-total imperviousness of its runways, aprons, and operational surfaces. The NDVI mapping confirms the near-total absence of vegetation cover across the site, while the flow-accumulation analysis indicates potential surface-runoff pathways across the extensively sealed airport terrain and suggests that rainfall may be directed toward adjacent urban areas during intense precipitation events. At the same time, the mobility and pedestrian potential analyses expose the airport as a critical barrier within the northern urban fabric of Lisbon, interrupting cross-site east–west connectivity and limiting local permeability around its perimetre. The demographic data further reveal that approximately 142,800 residents live within a one-kilometre radius of the site, many of whom — particularly the elderly population concentrated along the eastern boundary — lack adequate access to green space, thermal comfort, and public amenity.

In response to these conditions, the design proposal is structured around two primary and inseparable objectives. The first is environmental and climatic: to transform the site from a thermal hotspot and hydrological barrier into an active climate-regulating system capable of supporting airflow, preserving ventilation pathways, managing rainfall (through temporary storage, filtration, reuse, controlled conveyance, and infiltration where soil and environmental conditions permit), reducing surface temperatures, and improving outdoor thermal comfort for surrounding communities.

The second is spatial and social: to convert this long-inaccessible territory into a continuous, permeable, and programmatically diverse public landscape that improves cross-site connectivity, reopens selected pedestrian relationships, and supports new forms of public life.

These two objectives are conceived not as parallel or competing agendas, but as a single integrated design ambition. Every spatial decision within the project, from the organisation of zones and the routing of corridors to the selection of vegetation typologies and the adaptive reuse of existing structures, is evaluated against both dimensions simultaneously. Each spatial decision is considered in relation to both climatic and public-space objectives, although the relative emphasis varies according to the role and existing condition of each zone. A programmatically intensive zone may make a limited but still relevant climatic contribution, while a landscape-led zone may

carry a stronger environmental role. Equally, a climate strategy that fails to support inhabitable and socially active public space falls short of the project's intentions.

In this sense, the design does not seek to produce a park in the conventional sense, nor a new urban district in the manner of a typical masterplan. Instead, it proposes a porous urban field in which the preserved runway, island-like zones, transversal corridors, open voids, and secondary paths operate together as an interconnected public and environmental system.

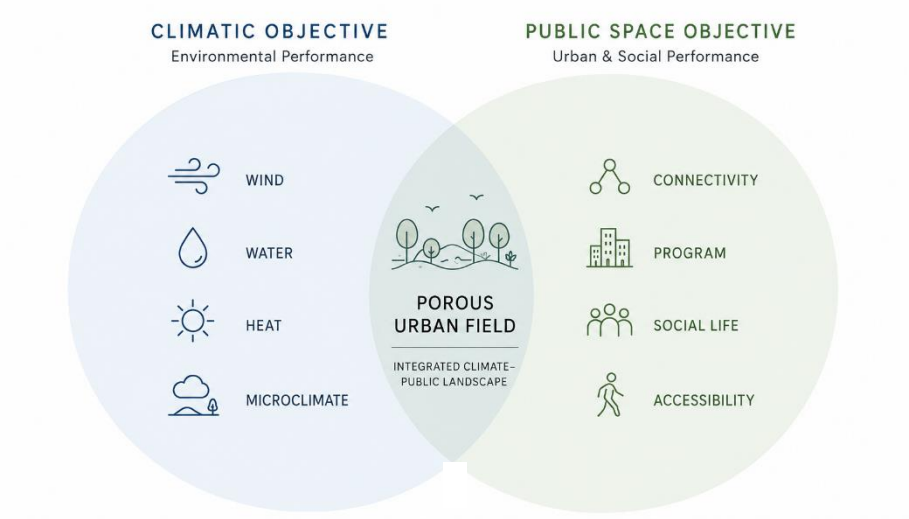


Diagram 4.1: *Design objectives. Source: Author, 2026*

4.1.2. Sponge Concept

The conceptual foundation of the project is derived from the behavioural logic of a sponge rather than its physical appearance. The proposal does not attempt to replicate the form of a sponge; instead, it translates the processes through which a sponge interacts with its environment into an urban design strategy for the transformation of Lisbon Airport.

A sponge is neither a solid object nor an empty void. It functions as a porous and interconnected system capable of receiving external flows, regulating their movement, storing them temporarily, and facilitating continuous exchange between different parts of the system. Its performance emerges from the relationship between cavities, channels, and connections, allowing multiple flows to coexist and interact within a single structure.

This behaviour provides a powerful analogy for the future of the airport site. In its current condition, the airport operates as a sealed and impermeable infrastructure. Its runways, aprons, and restricted boundaries interrupt urban continuity, accelerate surface runoff, and prevent environmental and social interactions across the site. The proposed transformation seeks to reverse this condition by reimagining the airport as a porous urban landscape capable of interacting with the surrounding city.

The sponge concept is therefore understood as a dynamic system based on four interconnected processes: absorption, percolation and distribution, retention, and

exchange. Rather than excluding or rapidly discharging incoming flows, the project is designed to receive, regulate, accommodate, and redistribute them through a differentiated spatial system. Environmental processes such as airflow, water movement, moisture, and thermal exchange are managed alongside human movement, public activity, and urban use within a shared spatial framework.

Within this framework, the airport is no longer conceived as a singular object or a collection of isolated functions. Instead, it becomes a porous urban field composed of island-like zones, open voids, transversal and secondary connections, and a preserved runway that provides a stable longitudinal spine. Each component performs a specific role while simultaneously contributing to the performance of the whole network. As in a sponge, the value of the system lies not in the individual elements themselves, but in the relationships established between them.

The sponge therefore serves as an operational model for organizing space, flows, and interactions across the site. It provides the conceptual basis for the creation of a climate-responsive and publicly accessible landscape in which environmental processes and urban life become mutually reinforcing components of a single adaptive system.

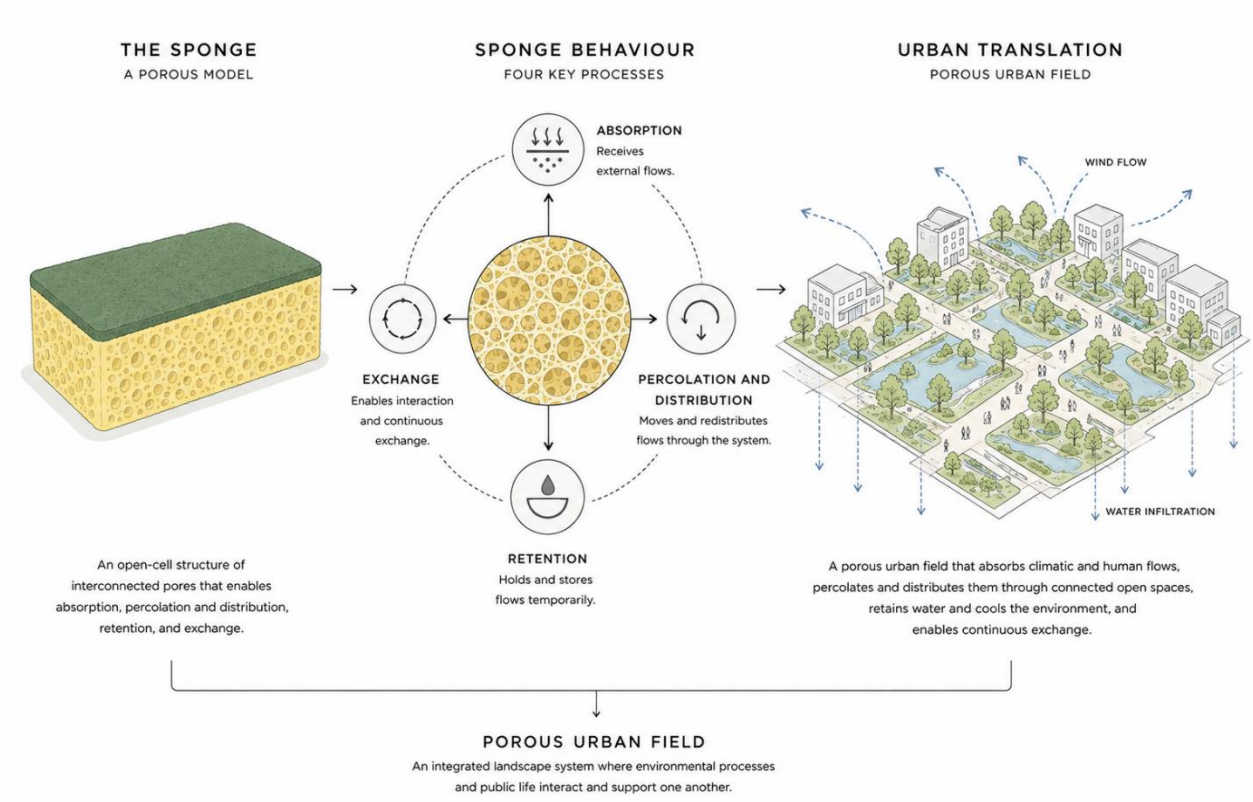


Diagram 4.2: *Sponge Concept. Source: Author, 2026*

Design Principles Derived from Case Studies

The case studies examined in the previous chapter provided a set of transferable design principles for the transformation of large former infrastructural sites. These principles

were not reproduced as fixed solutions, but were adapted to the spatial, climatic, environmental, and urban conditions of Humberto Delgado Airport.

The first principle is the selective densification and activation of edges. The case studies demonstrated that the boundaries of former airport sites can play an important role in reconnecting large redevelopment areas with the surrounding city. In the proposed project, however, densification is not applied uniformly around the entire perimetre. Built concentration is introduced selectively where new or reused volumes can activate public space, reinforce urban relationships, and help define openings through which prevailing airflow can be guided into the site. The arrangement of buildings is therefore intended to support climatic objectives through low-rise, discontinuous, and porous configurations rather than through the construction of a continuous urban wall. Other edges remain more open, landscape-led, or buffered where residential sensitivity, ecological continuity, ventilation, or existing infrastructural constraints require a lower level of built intensity.

The second principle is the organisation of programmes into distinct but interconnected spatial clusters. The case studies showed that large sites can become more legible and manageable when activities are grouped into identifiable areas rather than being distributed uniformly. In this project, clustering allows different programmes and public-space characters to develop with their own identities while remaining connected to the wider spatial system. These clusters are not conceived as isolated or rigid districts. Their boundaries remain permeable, allowing movement, landscape conditions, and public activity to extend between them.

The third principle is the preservation and reinterpretation of existing infrastructural elements. Rather than removing the former runway, the proposal retains it as the principal longitudinal axis of the project. The runway maintains the spatial memory of the airport while providing orientation, continuity, and a common public route across the site. Its role is not to distribute all environmental processes directly, but to organise public movement and connect the different parts of the proposal. Climatic and water-sensitive interventions are mainly developed through the open spaces, landscape areas, and treated edges located around it.

The fourth principle is the sequential organisation of spaces along a continuous linear structure. The arrangement of different areas around the preserved runway creates a clear spatial order and allows users to move between changing programmes, landscape conditions, and public-space experiences. This longitudinal organisation does not produce a one-directional sequence. The transversal corridors and the spaces between the clusters allow movement to occur in several directions and create connections across the former airport territory.

Together, these principles translate the general sponge concept into a site-specific urban design approach. Selective edge densification helps activate particular contact areas,

frame public space, and support the guidance of airflow without enclosing the site. Programmatic clustering creates recognisable areas capable of retaining activities and public life. The preserved runway provides continuity, orientation, and collective memory, while transversal connections and open spaces distribute movement and maintain permeability across the site. The resulting strategy combines built concentration, adaptive reuse, open landscape, and differentiated edge conditions rather than applying a single solution uniformly throughout the project.

4.2. Design Development Process

4.2.1. Reconnecting the site to the City

The first step in the design process focused on overcoming the airport's role as a physical barrier within the urban structure of Lisbon. For decades, the airport functioned as a large impermeable enclave that interrupted spatial continuity between the eastern and western parts of the city, limiting movement and reducing opportunities for interaction between adjacent neighbourhoods.

To address this condition, the project begins by re-establishing transversal connections across the site. Rather than treating the former airport as an isolated redevelopment area, the proposal integrates it into the surrounding urban fabric through a series of east–west corridors that improve cross-site permeability and establish new pedestrian relationships between selected parts of the surrounding urban fabric. These connections create new routes for movement and improve accessibility between the eastern and western sides of the former airport territory. Three primary transversal corridors were introduced at strategic locations along the former airport territory. Together, they form a cross-site framework that improves urban permeability and creates the potential for new pedestrian links between the site and its surrounding neighbourhoods. As a result, the airport is no longer conceived as a barrier within the city but as a connective urban landscape capable of strengthening relationships between its surrounding districts.

At this stage, the corridors are introduced as strategic east–west connections; their specific spatial character and operational roles are refined in the subsequent stages of the design process.

4.2.2. Formation of the Main Clusters

Following the re-establishment of east–west connections, the next step of the design process focused on defining an initial spatial structure for the airport site. Analysis of the surrounding urban fabric revealed that the neighbouring districts are not organised as a continuous homogeneous field, but rather as a collection of distinct urban clusters separated by infrastructure, open spaces, and landscape elements. In response to this fragmented context, the project adopts a differentiated rather than uniform spatial organisation. The site is initially structured into four primary clusters distributed along its longitudinal axis. Their location is informed by the three transversal connections,

which divide the former airport into four broad sectors, as well as by the preserved runway, existing airport structures, reuse opportunities, and the different contextual conditions around the site.

Each preliminary cluster occupies a different position along the site and responds to a specific combination of surrounding land uses, cross-site connections, existing airport structures, landscape opportunities, and anticipated public activity. Despite these differences, the four clusters are unified by a single continuous element: the former runway, which runs through all of them along the full length of the site. The runway does not belong to any single cluster but passes through each one, functioning as the primary connective spine that links the four groupings into a coherent whole.

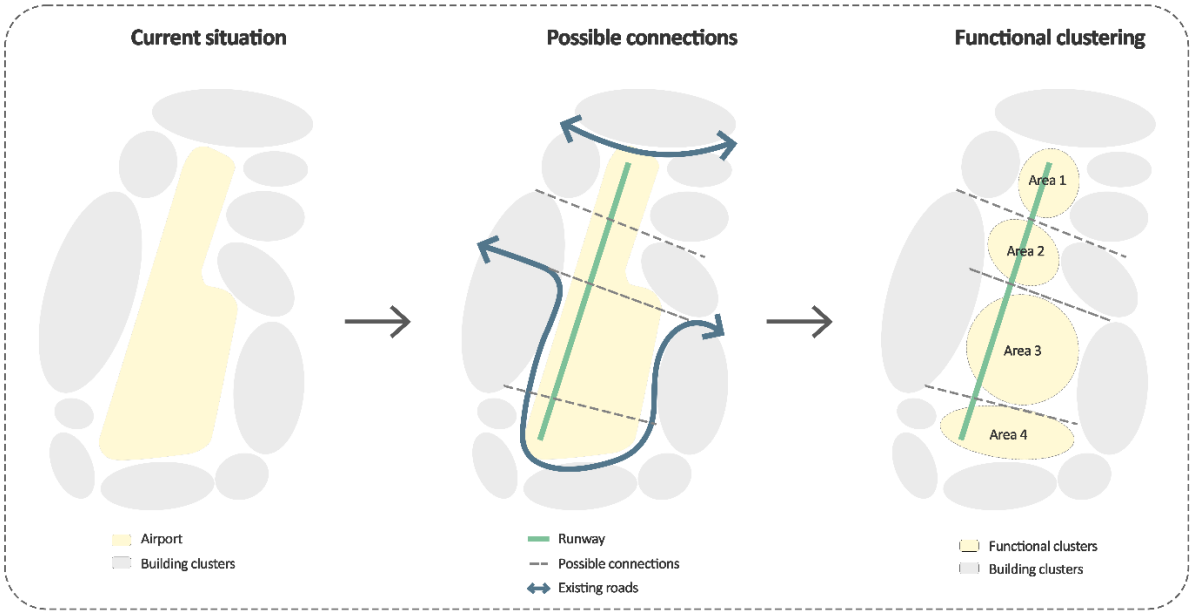


Diagram 4.3: *Formation of preliminary clusters. Source: Author, 2026*

4.2.3. Development of the Sponge Structure

While the four primary clusters established an initial spatial framework for the site, they remained relatively compact and self-contained entities. Such a configuration would have limited the capacity of the project to accommodate environmental flows, public movement, and spatial exchange across the former airport territory. Therefore, a further transformation was required to translate the sponge concept into spatial form.

Rather than treating each cluster as a single continuous mass, the clusters were subdivided into a series of smaller spatial units. This operation was inspired by the non-uniform and interconnected porosity of natural sponges, in which solid and open components form a continuous system rather than a single compact mass. The objective was not to assign a direct physical equivalent to each sponge component, but to translate its organisational behaviour into a porous urban structure.

The subdivision process generated a system of islands separated by open spaces and interconnected through a network of corridors. These island-like zones vary in size,

position, and degree of openness according to existing buildings, adaptive-reuse opportunities, Programmatic requirements, contextual interfaces, landscape and climatic conditions, and their relationship with the runway and transversal corridors.

Through this process, spatial porosity became a defining characteristic of the project. The resulting structure allows flows to penetrate, circulate, and interact throughout the site rather than being blocked by large continuous masses. Open spaces are therefore no longer residual elements between built forms, but active components of a larger spatial system. The transformation from clusters to islands establishes the physical foundation of the sponge structure. It creates a porous urban field capable of supporting the absorption, percolation and distribution, retention, and exchange of climatic and human flows, which are further developed in the subsequent stages of the project.

The transformation from four preliminary clusters to eight island-like zones establishes the physical basis of the sponge field. The zones provide differentiated programme and identity, while the open voids between them preserve porosity and allow landscape, public movement, and environmental processes to extend across the site. Their boundaries remain indicative and permeable rather than functioning as rigid or enclosed precincts.

4.2.4. Formation of the Connectivity Network

The emergence of the sponge structure in the previous step had a direct consequence on the nature of the connections within the site. The three transversal corridors introduced in the first stage of the design process were initially conceived as relatively straight east–west links — functional routes whose primary purpose was to restore urban permeability across the former airport boundary. However, as the internal subdivision of the clusters produced islands of varying sizes and positions, the geometry of these corridors could no longer remain linear.

The corridors were reshaped to respond to the geometry of the island-like zones, the location of existing structures, and the distribution of open landscape areas. Their curved alignment creates a more varied pedestrian experience, increases contact with adjoining zones, and provides opportunities for pause, orientation, and alternative movement. In comparison with a direct route, this configuration may encourage slower and more exploratory pedestrian movement. However, the curvature is primarily a spatial and experiential device and is not assumed to slow water or airflow. The hydrological performance of the corridors depends instead on their gradient, surface roughness, cross-section, permeable materials, planted drainage strips, bioswales, rain gardens, and retention elements. These technical and landscape measures allow runoff to be conveyed, slowed, filtered, and temporarily retained. The curved alignment and the water-management system should therefore be understood as coordinated but distinct components of the proposal.

Running through all three corridors and across all four clusters, the former runway continues to operate as the primary organising axis of the project. Unlike the transversal corridors, which carry flows laterally across the site, the runway spine supports longitudinal movement in both directions and provides continuity between the northern, central, and southern parts of the site. It is at once a heritage element, a public promenade, and the structural backbone through which the entire connectivity system is held together.

A finer network of porous secondary paths extends between the island-like zones. These paths do not operate as formal streets, but as slower pedestrian and cycling connections that allow lateral movement, alternative routes, informal occupation, and gradual exchange across the open field.

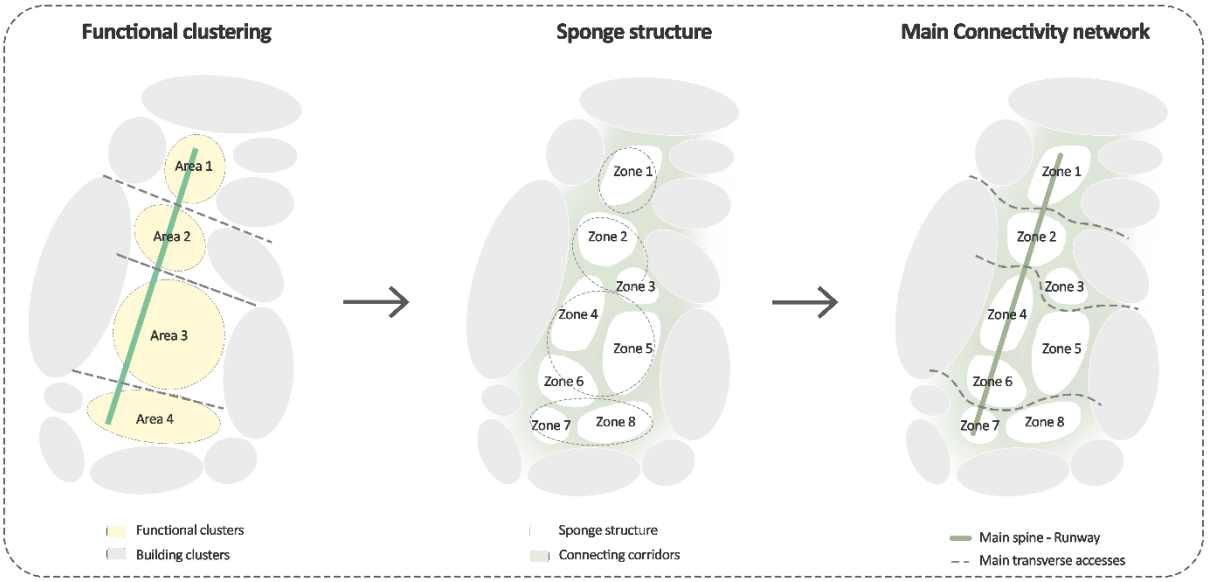


Diagram 4.4: *Design process, sponge structure definition. Source: Author, 2026*

4.3. Sponge Logic of the Project

The transformation of Lisbon Airport is guided by the behavioural logic of a sponge rather than its physical appearance. A sponge operates through a continuous porous structure capable of absorbing, percolating and distributing, retaining, and exchanging multiple flows within a single system. This behaviour provides the conceptual framework for the project, allowing the former airport to evolve from a closed and impermeable infrastructure into an open and adaptive urban landscape. The design development process described in the previous section established the physical structure of the sponge. The present section explains how this structure operates as a system through the four behavioural processes of absorption, percolation, retention, and exchange.

4.3.1. Absorption

The transformation of the airport begins with the capacity of the site to absorb flows from its surroundings. Unlike the existing airport, which operates as a highly impermeable and

isolated infrastructure, the proposed sponge system is conceived as an open urban field capable of receiving environmental and human flows from multiple directions.

At the environmental scale, absorption refers to the capacity of the site to receive external climatic inputs and conditions. Airflow and rainfall enter the site, while its surfaces absorb solar radiation and store part of this energy as heat. Rainfall and surface runoff are also received within the site and gradually slowed, collected, filtered, stored, reused, or infiltrated where soil and environmental conditions permit. Open spaces and porous built arrangements simultaneously allow airflow to enter and move through the site rather than being blocked by continuous development. At the public and urban scale, absorption refers to the capacity of the site to receive residents, workers, students, visitors, and recreational or cultural users from different parts of the surrounding city. These users enter through distributed pedestrian connections and are drawn toward different zones according to daily needs, events, climatic conditions, and time of day.

Absorption therefore represents the capacity of the project to receive external environmental conditions and urban users without applying the same response to every edge. Distributed pedestrian connections, differentiated contact zones, open landscape areas, and Programmatic attractors allow flows to enter the site from multiple directions, while the internal sponge field gradually redistributes them according to the role of each zone.

4.3.2. Percolation and Distribution

The ability to absorb flows is only effective when those flows can move through the system. In natural sponge structures, absorbed matter does not remain concentrated at a single point; instead, it travels through a network of interconnected cavities and channels that distribute it across the entire structure.

A similar principle guides the spatial organisation of the project. Once public and environmental flows enter the site, they are redistributed through distinct but coordinated networks. Public movement is organised through the preserved runway, the three transversal corridors, and the porous secondary paths between the island-like zones. Airflow is supported through open voids, porous built arrangements, and wind-permeable landscape areas, while rainfall and runoff are managed through grading, planted conveyance systems, temporary storage, reuse, and infiltration where technically feasible.

Percolation is understood differently for each type of movement within the project. Public movement is distributed through the runway, transversal corridors, and secondary paths, where route hierarchy, spatial variation, and opportunities for pause support slower and more exploratory occupation. Rainfall and runoff are managed separately through grading, surface roughness, permeable ground, planted conveyance systems, and retention devices. Potential airflow is supported by maintaining open spaces and avoiding continuous built or vegetated barriers. The sponge framework therefore

coordinates these different systems without assuming that the same spatial mechanism slows or controls every type of flow.

4.3.3. Retention

Retention refers to the capacity of the project to delay the immediate passage or release of what it receives. Within the sponge logic, flows are not expected to enter and leave the site without interruption. Instead, the spatial structure creates conditions in which water, climatic effects, people, and activities can remain within the site for different periods of time.

At the environmental scale, retention may occur through planted depressions, rain gardens, permeable surfaces, shaded vegetation, temporary storage landscapes, and other water-sensitive ground conditions. These elements slow runoff, hold water temporarily, support moisture within the landscape, and contribute to the formation of more comfortable local microclimates. The exact duration and method of retention vary according to rainfall intensity, soil conditions, seasonal requirements, and the technical characteristics of each area.

At the public and Programmatic scale, the island-like structure creates identifiable destinations in which users can pause, gather, participate in activities, or remain for longer periods rather than simply crossing the site. Different areas may retain different types and intensities of activity, while the spaces between them support gradual movement and exchange.

Retention is therefore not a uniform condition applied equally throughout the project. Some spaces may primarily retain public activity, others may have stronger environmental or water-management functions, and some may combine both. This differentiated approach establishes the conceptual basis for assigning more specific roles to the zones during the later stages of the design.

4.3.4. Exchange

The final stage of the sponge logic is exchange. In a sponge, individual cavities do not operate independently; they continuously interact through the transfer of matter, energy, and pressure across the network. The performance of the whole system emerges from these relationships rather than from the behaviour of any single component. The proposed project adopts the same principle. Each island is assigned a distinct identity and role within the overall structure, yet its effectiveness depends on its relationship with the surrounding islands and corridors. Climatic conditions created or moderated within one part of the system may support environmental exchange with adjacent spaces, depending on wind direction, temperature differences, vegetation structure, and seasonal conditions.

Exchange therefore operates simultaneously at multiple levels. Environmental exchange occurs through several distinct mechanisms: airflow moves through open and wind-

permeable spaces; water is collected, conveyed, retained, filtered, and reused through the green-blue system; and localised differences between warmer hard surfaces and cooler landscape areas may support thermal and humidity exchange. Public activities interact through movement patterns, complementary programmes, and shared public spaces. Exchange also extends beyond the internal zones. Reopened former dead ends create new pedestrian relationships with surrounding neighbourhoods, while the transversal corridors connect different sides of the former airport territory. These interfaces allow nearby residential, productive, institutional, commercial, and recreational contexts to influence the intensity, timing, and type of public activity occurring within the site. Together, these interactions establish a dynamic system in which individual components continuously influence one another. Rather than functioning as a collection of separate zones, the project operates as an integrated sponge network whose performance emerges from the continuous exchange taking place between its constituent elements.

The project therefore operates through the interaction of two complementary structures. The island-like zones, open voids, and porous secondary paths provide the adaptable behaviour of the sponge by absorbing, retaining, and exchanging different programmes and environmental conditions. The preserved runway provides the stable spine that maintains continuity, orientation, collective memory, and longitudinal distribution. Exchange occurs across the porous field, along the transversal connections, between warmer and cooler landscape conditions, and between the project and its surrounding urban context.

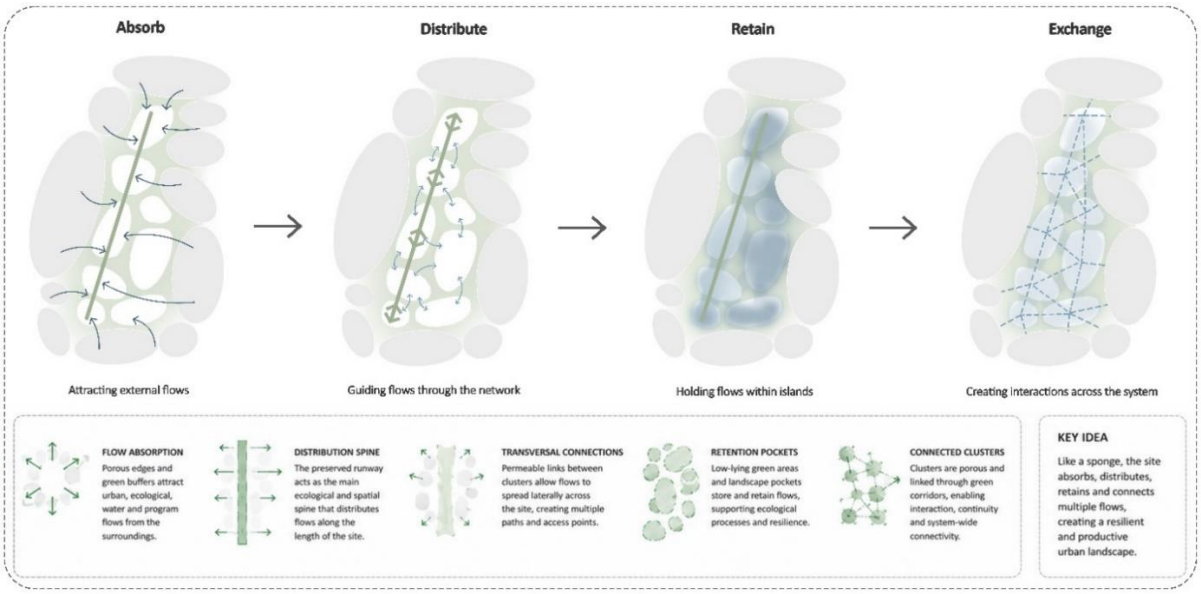


Diagram 4.5: *Sponge behaviour of the site. Source: Author, 2026*

4.4. Spatial and Programmatic Structure

The design proposal is organised through a spatial and Programmatic structure that defines the physical basis of the project before the development of its green-blue, climatic, and public space systems. This structure brings together the preserved runway, the

transversal corridors, the island-like zones, and the open spaces between them, establishing the main framework through which the former airport is transformed into a porous urban field.

4.4.1. Overall Spatial Structure

Within this framework, the overall spatial structure is developed as a morphological system rather than as a continuous urban fabric. The proposal uses the elongated geometry of the former airport to create a sequence of island-like fields organised around a strong longitudinal axis and crossed by three transversal corridors. This arrangement translates the sponge concept into a clear physical order in which longitudinal continuity and cross-site permeability operate together.

The preserved runway acts as the main longitudinal spine of the project. It extends through the site from north to south and provides a continuous reference line within the elongated airport territory. Its preservation maintains the memory of the former infrastructure while giving the new project a strong organizing axis. Around this spine, the different zones are arranged as a sequence of island-like fields rather than as a continuous urban block.

Rationale for the Eight-Zone Structure

The number, boundaries, and programmes of the eight zones are presented as design hypotheses rather than as fixed zoning or as outcomes derived from a detailed assessment of functional demand. The subdivision emerged through a sequential design process beginning with the primary spatial problem identified in Chapter 3: the airport's interruption of east–west urban continuity.

The first step was therefore to introduce three transversal corridors at locations offering the strongest potential alignment with the surrounding street network and neighbouring urban areas. The detailed configuration of their crossings at the airport edges would require further design development, but their position established the principal framework for reconnecting the eastern and western sides of the site. Once these corridors were defined, the elongated airport territory was divided into four broad clusters located between them.

These clusters were not treated as final programme areas. They were subdivided where the spatial conditions and required forms of intervention changed. The main criteria included the presence or absence of reusable airport buildings, the distinction between paved and open ground, the relationship with the runway and transversal corridors, the density and sensitivity of surrounding land uses, and the compatibility of potential activities with adjacent residential, industrial, commercial, and landscape areas. The subdivision also applied transferable strategies identified in Chapter 2, including the adaptive reuse of infrastructural buildings, the selective densification and activation of urban edges, flexible and temporary programming, and landscape-led transformation.

The sponge concept reinforced this differentiated structure. A sponge operates through interconnected cells of different sizes rather than through one uniform internal space. In the proposal, the zones perform as spatial cells that receive, distribute, and retain different forms of public activity while remaining connected through the runway, transversal corridors, secondary paths, and open landscape voids. This explains why some apparently continuous open areas were divided into separate zones. Zones 4 and 6, for example, are both predominantly open in the existing airport, but their position, public role, environmental performance, and management requirements are different: Zone 4 operates as a flexible cultural and event landscape, whereas Zone 6 is organised around water retention, climatic comfort, and leisure.

The resulting eight-zone structure should therefore not be understood as the only possible numerical solution. It represents an adaptable configuration produced by the interaction of connectivity, existing structures, edge conditions, environmental roles, and programme hypotheses. The subdivision also supports phased implementation, since individual zones can be tested, temporarily activated, or developed at different times while remaining connected through the common spatial framework. Their final boundaries and programmes could consequently be adjusted through technical studies, stakeholder participation, and future socio-economic assessment.

The arrangement of the eight zones follows a north–south sequence, but their position is also defined by their relationship to the runway and to the lateral open spaces around it. Zone 1 forms the northern threshold of the project and is located close to the upper part of the runway. Zone 2 is positioned immediately south of it and remains directly connected to the spine, creating an intermediate landscape condition between the northern edge and the central body of the project. Zone 3 is placed laterally to the east of the runway as one of the central island-like fields, while Zone 4 occupies the western side of the central sequence. Zone 5 forms a larger eastern island around Terminal 1 and its former apron surfaces, becoming one of the main built and civic anchors of the project. Zone 6 is located further south along the runway and marks the transition toward the southern landscape areas. Zones 7 and 8 complete the sequence: Zone 7 remains connected to the southern part of the spine, while Zone 8 forms a lateral southern anchor.

This arrangement creates a differentiated longitudinal composition across the site. The northern part is characterised by a relatively fine-grained and porous condition that mediates between the project and the surrounding urban fabric. The central part becomes more articulated, with zones positioned on both sides of the runway and separated by larger open voids. Toward the south, the surrounding spatial fields broaden into landscape-led, recreational, and hybrid public areas, while the preserved runway remains a hard and continuous axis extending to the southern threshold. The gradient therefore occurs through changes in the scale, programme, and landscape character of the areas around the runway rather than through a transformation of the runway itself.

The transversal corridors form the second organizing layer of the project. The northern corridor crosses the site between Zone 1 and Zone 2, structuring the relationship between the northern threshold and the first landscape island while opening the site toward the east and west. The central corridor operates around the middle of the project, between Zones 2, 3, 4, and 5. It creates a major break within the elongated form of the airport and organizes the central group of islands around a shared east–west connection. The southern corridor is located between Zones 5, 6, 7, and 8, defining the transition from the central body of the project toward the southern landscape, sport, and entertainment areas. Together, these corridors divide the former airport into a sequence of sectors while maintaining transversal continuity across the site.

The island-like zones are separated by open voids that give the project its porous character. These voids prevent the proposal from becoming a compact and continuous fabric. Instead, they create intervals between the islands, allowing the structure to remain open, permeable, and adaptable. They also establish the physical space through which later design layers, such as green-blue infrastructure, climatic flows, and pedestrian movement, can operate. Within these voids, a finer network of porous secondary paths later connects the island-like zones, allowing gradual movement, informal exchange, and landscape continuity between the main programmed areas. In this sense, the project is composed not only of programmed zones, but also of the spaces between them, which are essential to its morphology.

The edges of the site complete the overall spatial framework through differentiated relationships with the surrounding urban fabric. The northern edge is treated as a relatively open and low-density threshold, combining porous development with landscape continuity. Along the western side, where high-density residential areas are located close to the former airport boundary, landscape-led zones, accessible public spaces, and reopened pedestrian connections establish a more sensitive interface with nearby neighbourhoods. The eastern edge faces a stronger concentration of industrial, military, and infrastructural uses and therefore develops a more selective relationship through adaptive reuse areas, landscape buffering, and transversal connections. Toward the south, recreational landscapes and stronger public anchors respond to a mixed context of residential, commercial, educational, health-related, and public uses. These differentiated edge conditions replace the former uniform airport boundary with a series of context-responsive urban interfaces.

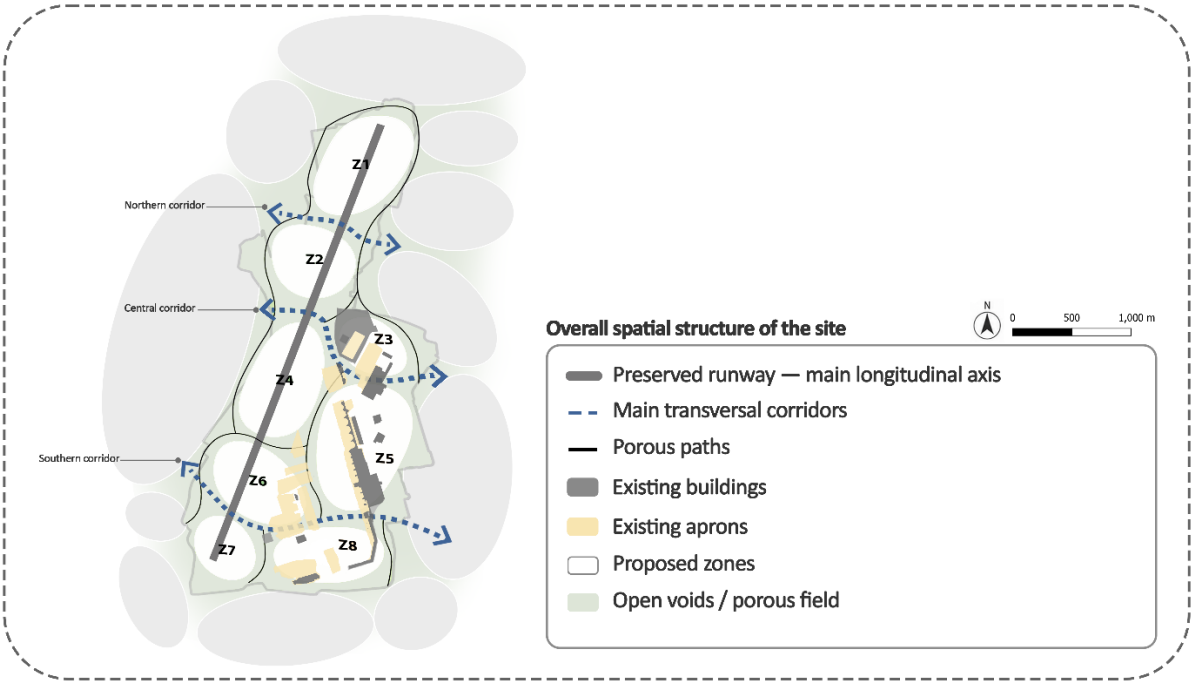


Diagram 4.6: *Overall spatial structure of the site. Source: Author, 2026*

Overall, the project is organised through the preserved runway as its main longitudinal axis, three transversal corridors, eight island-like zones, a continuous system of open voids, and a finer network of porous secondary paths. The runway provides longitudinal continuity and spatial memory; the transversal corridors establish cross-site permeability; the zones define the main Programmatic and morphological fields; and the open voids and secondary paths create local porosity, lateral movement, and gradual connections between them. This framework forms the physical basis for the green-blue, climatic, and public-space strategies developed in the following sections.

4.4.2. Programmatic Structure of the Zones

Within this spatial framework, the programmes assigned to the eight zones are treated as provisional design hypotheses. The site analysis establishes spatial, environmental, demographic, and accessibility criteria, but it does not confirm specific demand for housing, research facilities, entertainment, or economic activities. The proposed programme mix therefore tests how different uses could occupy the site according to its adaptive-reuse capacity, surrounding context, environmental role, and the transferable principles identified through the comparative case studies. Final programme decisions would require socio-economic assessment, stakeholder consultation, institutional commitment, and staged testing.

The physical transformation of the zones follows three main approaches: adaptive reuse, selective new construction, and landscape-led intervention. Zones 3, 5, and 8 primarily explore the reuse of existing airport structures and apron surfaces. Zone 1 tests selective low-rise development at the northern threshold, while Zones 2, 4, and 6 remain

predominantly landscape-based. Zone 7 combines an open recreational landscape with a limited number of support buildings.

Zone 1 — Live + Work is located at the northern threshold of the project, where the existing airport contains limited built fabric suitable for adaptive reuse and the surrounding urban structure is less residentially intensive than along several other edges of the site. Its programme is proposed as a design hypothesis derived partly from the strategy of selective edge densification identified in the comparative case studies. Rather than extending a compact urban block into the former airport, the zone tests a low-rise, low-density, and porous form of development that creates a gradual transition between the surrounding city and the open interior landscape while maintaining broad gaps for potential airflow. The proposed mix includes housing, possible student or researcher accommodation, small offices, co-working facilities, and local services. These uses introduce two complementary patterns of occupation: a longer-term everyday presence associated with residents and a more temporary daytime presence generated by workers and shared facilities. This combination could help activate the northern threshold throughout different periods of the day without turning it into a predominantly commercial destination. Because of its residential component, the zone requires a clear public–semi-public–private gradient, with active and shared functions positioned along the public network and quieter living areas organised around protected courtyards and internal passages. The proposal does not claim to demonstrate housing or workspace demand; the quantity, affordability, tenure, and final balance of these uses would require further socio-economic assessment and consultation.

Zone 2 — Comfort + Rest is mainly an open area in the existing condition and does not contain major built structures to be reused. The proposal keeps this zone predominantly landscape-based, without adding significant building mass. Its programme is organised around shaded gardens, seating areas, rain gardens, permeable surfaces, small cafés or kiosks, and landscape elements that support comfort and everyday use. As a result, Zone 2 functions as a soft open-space transition between the northern built edge and the more active central parts of the project.

Zone 3 — Knowledge + Innovation contains a group of former military and airport-related structures that provide an opportunity for adaptive reuse. Their scale, robust spatial character, and relationship with existing paved courts make them potentially suitable for flexible learning, research, workshop, production, and shared working environments. Reusing these structures would reduce the need for demolition and new construction while preserving another layer of the airport's infrastructural memory. The zone is positioned on the eastern side of the site, where immediate exposure to residential neighbourhoods is more limited than along several western edges and where surrounding industrial and productive uses provide a comparatively compatible context for workshops, laboratories, and innovation-related activities. Its connection with the Central Corridor could also make it accessible from different surrounding

neighbourhoods without placing these potentially intensive activities directly beside the most sensitive residential edges. As a programme hypothesis, the zone seeks to attract students, researchers, innovators, and productive organisations as a distinct group of users within the wider public landscape. Possible uses include learning spaces, laboratories, start-up facilities, co-working areas, workshops, exhibitions, and shared institutional spaces. Their final allocation would require confirmation of institutional interest, user demand, structural suitability, accessibility, and operational feasibility.

Zone 4 — Culture + Events is mainly an open area and does not rely on the reuse of large existing buildings. The proposal keeps this zone as a flexible landscape field rather than introducing permanent building masses. Its programme is based on open event spaces, outdoor cultural areas, temporary installations, markets, performances, and collective gathering areas. Any built elements remain small, lightweight, and supportive, such as service pavilions, temporary structures, or landscape furniture. The main character of the zone is therefore defined by openness, flexibility, and adaptability.

Zone 5 — Urban Core contains one of the most significant existing airport structures on the site: Terminal 1, together with its related apron surfaces and surrounding paved areas. The proposal treats this zone as a major adaptive reuse area. Terminal 1 is reprogrammed as a civic, cultural, commercial, and service-oriented core for the redeveloped airport site. Possible programmes include public services, exhibition spaces, cultural facilities, retail, restaurants, workspaces, and indoor public activities. The apron areas around the terminal are reinterpreted as large civic open spaces, allowing the zone to combine built reuse with a strong public ground condition.

Zone 6 — Water + Leisure is mainly an open area without significant building structures suitable for reuse. The proposal maintains its landscape-based character and does not introduce major new construction. Its programme combines retention landscapes, planted water edges, permeable ground, shaded seating, and seasonally activated public water elements. Water becomes a visible design component in this zone, but it is not conceived as a permanently wet or continuously high-consumption landscape. Interactive features, shallow water elements, or controlled misting operate selectively according to seasonal water availability and require appropriately treated non-potable water. Any additional built elements remain minor and supportive, such as decks, small shelters, or landscape furniture.

Zone 7 — Sport + Recreation does not currently contain significant buildings suitable for adaptive reuse. The proposal introduces new built elements, but only as low-rise, low-density, and porous additions that support the main open-space character of the zone. The programme includes outdoor sports fields, running and cycling paths, outdoor and indoor fitness areas, flexible recreational grounds, changing rooms, equipment storage, small cafés, and community support facilities. Selected sports fields and open recreational surfaces may be designed as slightly lowered areas, allowing them to temporarily hold excess stormwater during intense rainfall events. In this way, the zone

combines everyday sport and recreation with a secondary and occasional water-management capacity, without changing its main open-air character. The new buildings are distributed as small volumes within a larger open landscape rather than forming a continuous built mass.

Zone 8 — Entertainment + Economy contains Terminal 2 and its related apron surfaces at the southern edge of the former airport. Its proposed role is based on the combined spatial potential of this large reusable building, the presence of residential and commercial areas to the south, nearby population-attracting uses, and the green corridors that increase the potential relationship between this part of the site and its surrounding urban context. These conditions make the zone a plausible location for testing a more active southern destination without requiring the construction of an entirely new anchor building. The programme hypothesis explores the adaptation of Terminal 2 for entertainment, leisure, creative-economy, and selected commercial activities, including food spaces, performances, temporary markets, flexible indoor events, and other uses that could operate during evenings and weekends as well as during the day. This temporal role would complement the more everyday, civic, educational, and landscape-based activities distributed across the other zones. However, the proposal does not assume that these functions respond to confirmed market demand. Their scale and balance would require economic and transport assessment, consultation with nearby communities, and clear rules concerning noise, evening activity, commercialisation, affordability, and permanent public access to the surrounding apron spaces.

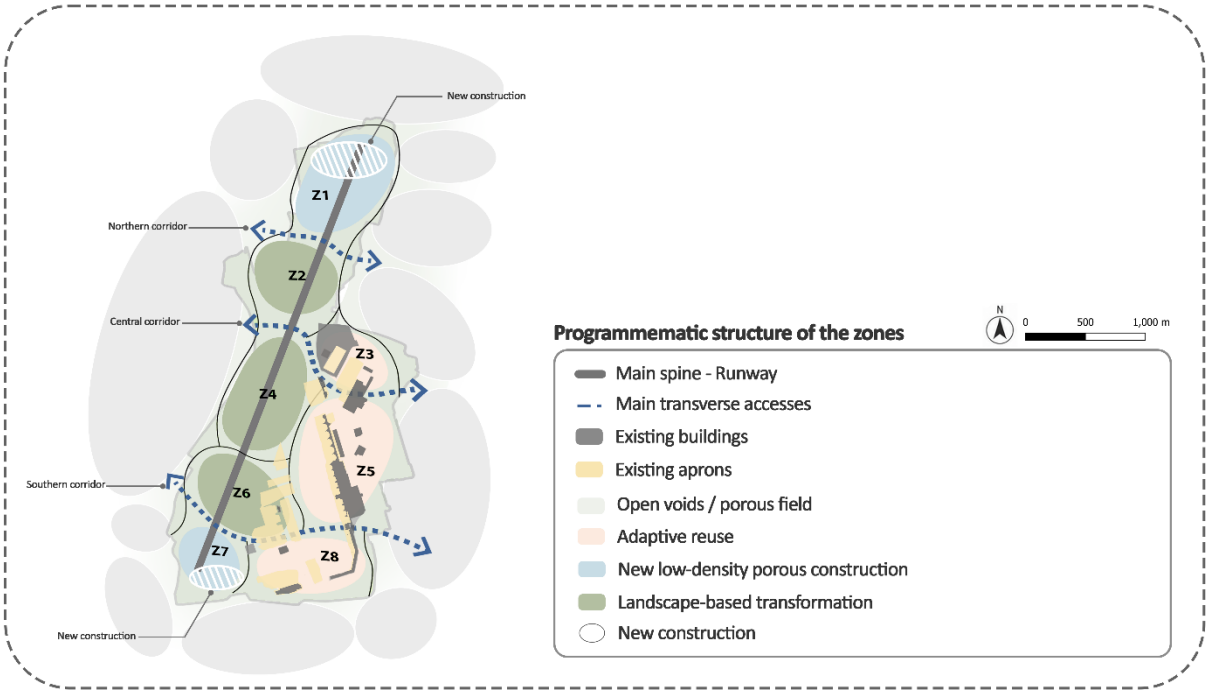


Diagram 4.7: *Programmatic structure of the zones. Source: Author, 2026*

Overall, through this differentiated combination, the project balances infrastructural memory, new urban programmes, climatic openness, and landscape continuity while

maintaining the overall porosity of the proposal. Diagram 4.7 illustrates this distribution, identifying the zones of adaptive reuse, new low-density construction, and landscape-based transformation across the site.

Table 4.1: *Spatial rationale, potential stakeholders, and validation needs for the provisional programmes of the eight zones. Source: Author, 2026*

Zone and provisional programme	Spatial and contextual rationale	Potential stakeholders	Further validation required
Zone 1 — Live + Work	Northern threshold with limited reusable buildings and relatively low residential intensity; opportunity to test low-rise, porous edge densification and combine residential presence with daytime work activity.	Municipality; housing providers and co-operatives; universities; local residents.	Housing and workspace demand; affordability and tenure; neighbourhood impacts.
Zone 2 — Comfort + Rest	Open and highly exposed area between the northern and central zones; suitable for shade, rest, rain gardens, and accessible everyday public space.	Municipality and park services; local associations; organisations representing older people and families.	Microclimatic performance; accessibility; user preferences; maintenance capacity.
Zone 3 — Knowledge + Innovation	Reusable former military and airport buildings; access from the Central Corridor; compatibility with the industrial and productive eastern context and less immediate residential exposure.	Universities; research and vocational institutions; incubators; productive and creative organisations.	Institutional demand; building suitability; operational and financial feasibility.
Zone 4 — Culture + Events	Large open field close to western neighbourhoods; suitable for flexible cultural, community-led, and temporary uses without major permanent construction.	Municipality; cultural institutions; local associations; community groups; event organisers.	Community interest; event demand; noise management; maintenance; non-commercial access.
Zone 5 — Urban Core	Terminal 1 and its apron form the strongest adaptive-reuse and civic anchor, centrally connected to the runway and transversal corridors.	Municipality; civic and cultural institutions; public-service providers; local enterprises.	Structural and heritage assessment; operating model; civic–commercial balance; permanent public access.

Zone 6 — Water + Leisure	Open landscape connected to the green-blue network; distinct potential for water retention, climatic comfort, and leisure activities.	Municipal environmental and water services; park managers; local residents and community groups.	Hydraulic and soil studies; water availability; safety; seasonal operation and maintenance.
Zone 7 — Sport + Recreation	Large open southern field within a mixed urban context; suitable for sport, recreation, limited support buildings, and occasional stormwater detention.	Municipality; schools; sports clubs; public-health and community organisations.	Local demand; sports-space requirements; drainage performance; accessibility and maintenance.
Zone 8 — Entertainment + Economy	Terminal 2 and its apron provide a major reuse opportunity within a southern residential and commercial context connected to nearby attractors and green corridors.	Municipality; cultural and creative-economy organisations; local businesses; community representatives; regulated operators.	Market and institutional demand; transport capacity; noise and evening impacts; commercialisation; public access.

Note: The programmes are design hypotheses rather than confirmed functional demands and would require further socio-economic, technical, and participatory validation.

4.5. Green-Blue Infrastructure

Green-blue infrastructure is introduced as a supporting design layer rather than as an independent objective of the project. Its role is to strengthen the two main aims of the proposal: climatic performance and public space quality. Through vegetation, permeable surfaces, water-sensitive landscapes, shaded open spaces, and planted corridors, the project uses green-blue systems to support cooling, water management, spatial continuity, and everyday comfort.

Following the spatial and Programmatic structure defined in the previous section, the green-blue infrastructure is distributed according to the character and existing condition of each zone. Landscape-led zones provide larger areas for vegetation, water-sensitive ground, and shaded open space, while adaptive-reuse and built zones integrate green-blue elements through courtyards, planted edges, permeable surfaces, and adapted public areas. The green-blue layer therefore does not operate as a separate park system, but as an integrated landscape network extending through the open voids, selected corridors, zone interiors, and planted edges of the preserved runway. The runway itself remains a hard and continuous public axis. The strategy is developed through three aspects: the relationship with surrounding green structures and the wider hydrological context, the internal distribution of water-sensitive landscapes, and the placement and selection of vegetation according to the role of each part of the project.

4.5.1. Connection to Surrounding Green Corridors and the Wider Hydrological Context

At the urban scale, the former Lisbon Airport is located between several green corridors, green landcover patches, and open landscape systems. These elements are present around the site mainly toward its western and southern edges, with a smaller corridor extending from the south-east. By contrast, the northern part of the surrounding fabric does not present a comparable green corridor. Water-related elements mapped toward the north and north-east remain outside the airport boundary and are therefore treated only as part of the wider hydrological context, rather than as direct landscape connections to the site. In the existing condition, however, the airport does not operate as part of this landscape network. Due to its large impermeable surfaces, restricted accessibility, and infrastructural enclosure, it functions as a gap within the wider green structure of the city.

The proposal addresses this condition by transforming the airport from an interruption into a connective landscape field. The aim is not simply to introduce new green areas within the site, but to use the redevelopment of the airport to strengthen potential relationships between surrounding green structures and to reduce the landscape discontinuity created by the former airport. The open voids between the island-like zones, the transversal corridors, and the landscape-oriented zones provide the main physical structure for this connection. Through these elements, the project allows landscape continuity to extend into the site from selected edges and to extend across the former airport territory, particularly along its western and southern boundaries, where the surrounding network is strongest.

The preserved runway has a specific role within the green-blue strategy. It remains the principal longitudinal public and memory axis, but its identity does not depend on retaining the entire surface as exposed hardscape. Its width, alignment, markings, long views, material character, and selected fragments of original paving preserve the legibility of the former airport infrastructure. Green-blue continuity is developed through planted drainage edges, filtration strips, permeable inserts, and selectively depaved or resurfaced areas where technically feasible. Tree groups and lightweight shade structures are distributed along the principal walking, cycling, seating, and pause areas rather than being limited to the landscape edges. These interventions reduce solar exposure and surface heat while retaining open views and sufficient flexibility for movement and temporary activities.

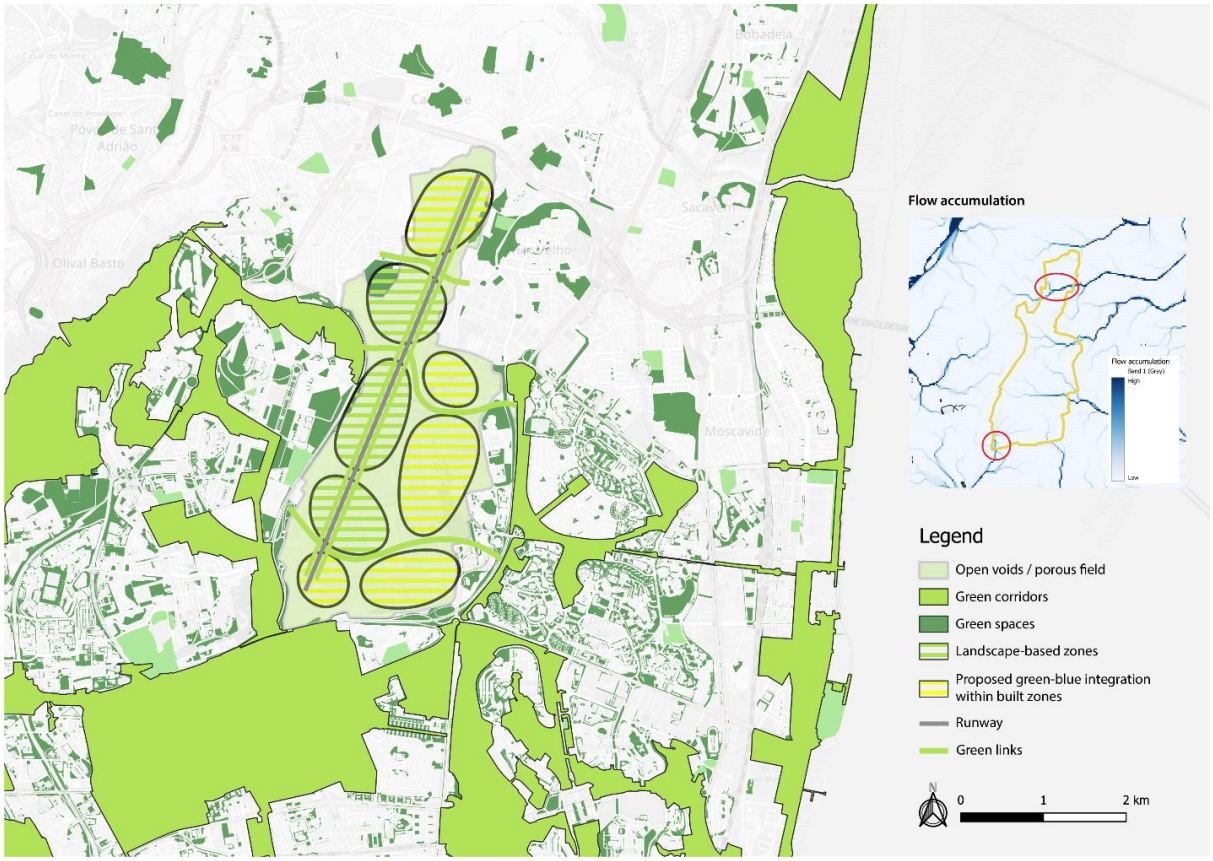
The transversal corridors strengthen this connection at the east–west scale. In the previous airport condition, the site acted as a barrier between neighbourhoods and landscape systems on opposite sides. In the proposal, the northern, central, and southern corridors operate as green links that open the site laterally and connect it to the surrounding urban fabric. These corridors are not only routes of movement; they also

provide space for planting, shaded edges, permeable ground, and water-sensitive landscape elements. However, vegetation within these corridors is carefully calibrated to maintain wind porosity and minimise obstruction to the prevailing northern and north-western airflows entering the site. In this way, the project combines spatial permeability, landscape continuity, and climatic openness.

The wider hydrological context also supports the green-blue strategy. The flow accumulation and hydrographic analyses indicate that the airport is located within a broader drainage environment, with potential surface-drainage pathways approaching or meeting specific parts of the airport boundary. These conditions do not indicate the presence of a natural watercourse within the airport site, nor does the proposal claim to restore a river or stream through the project. Instead, they identify potential interfaces where the project can respond to the wider drainage context through constructed water-sensitive landscapes, activated primarily during rainfall periods rather than as a permanent natural feature.

Two such interfaces are particularly relevant to the spatial structure of the project. The first occurs near the northern-central part of the site, close to the boundary between Zones 1 and 2. This proximity reinforces the comfort and water-sensitive role already assigned to Zone 2, further developed in Section 4.5.2. The second occurs further south, near the boundary of Zone 7, adjacent to Zone 6. This reinforces the role of Zone 6 as the principal water-based landscape anchor of the project, while Zone 7 retains a secondary, occasional water-management capacity linked to its sport and recreation programme.

The connection strategy therefore operates through both green and blue layers, but at different levels of intensity and permanence. Green continuity is established through the surrounding corridors, the open voids, the transversal landscape links, and the planted edges of the runway. Blue capacity is introduced more selectively through seasonal water-sensitive interfaces, filtration areas, and retention landscapes activated primarily during rainfall events. The proposal therefore reduces the former airport's role as a landscape gap and supports potential relationships with the wider green and hydrological context, without claiming to create a continuous ecological corridor or to restore a natural watercourse through the site.



Map 4.1: *Connection to surrounding green corridors and the wider hydrological context. Source: Author, 2026*

The diagram shows how the former airport is transformed from a gap within the surrounding green structure into a porous connective field. Existing green corridors and green spaces are linked through open voids, landscape-based zones, green links, and runway-edge integration, while the inset identifies the wider flow-accumulation context and the two strategic water-sensitive interface areas.

4.5.2. Water-sensitive roles by zones

Within the site, the green-blue infrastructure is organised as an internal network of planted edges, open voids, permeable surfaces, and water-sensitive landscape elements. This network does not replace the preserved runway or transform it into a green corridor. The runway remains the main public spine of the project, while the green-blue system is developed along its edges, within the open spaces between the zones, and through specific landscape areas that support water retention, filtration, shade, environmental comfort, and infiltration where soil and environmental conditions permit.

The internal green-blue network is structured around a clear spatial hierarchy. The edges of the runway provide linear opportunities for planted drainage and filtration strips combined with low vegetation. These elements can receive and slow runoff from adjacent paved surfaces, while infiltration is introduced only where soil quality, contamination risk, compaction, and groundwater conditions allow. These planted edges are kept low

and discontinuous in order to preserve the runway's openness, visual continuity, and general permeability to airflow. The transversal corridors also operate as planted drainage and landscape links, combining pedestrian permeability with bioswales, shaded edges, and permeable surfaces. Their vegetation is therefore calibrated to support green-blue continuity without blocking the movement of air through the site.

The porous secondary paths between the zones also form part of this internal green-blue ground layer. They connect the island-like zones through soft pedestrian surfaces, planted edges, and small permeable pockets, supporting landscape continuity while allowing water-sensitive ground treatment to extend into the spaces between the main zones.

Zone 2 plays an important role as a comfort landscape with a water-sensitive function. Its position near one of the regional surface-water interfaces identified in Section 4.5.1 supports the introduction of rain gardens, planted depressions, and permeable ground. These elements allow the zone to slow down and absorb local runoff while also improving shade, thermal comfort, and everyday usability. However, Zone 2 is not defined as the main water-based zone of the project. Its blue component remains integrated within a broader comfort landscape, where water-sensitive elements support the spatial and climatic role of the zone rather than defining its entire identity.

Zone 6 operates as the primary water-based landscape anchor of the project. In contrast to Zone 2, where water is integrated through rain gardens and filtration areas, Zone 6 is structured around more visible and spatially dominant blue elements. Water gardens, retention areas with variable water levels, permeable ground, shaded seating spaces, and planted water edges define the character of this zone. In selected public areas, shallow interactive water features or low-flow water-play elements may also be introduced as part of the public landscape, particularly where they can support cooling and social use. These elements are not conceived as permanently high-consumption water features, but as controlled and potentially recirculating systems that can be activated selectively according to seasonal water availability. Zone 6 therefore functions as the main point where water becomes a visible part of the public landscape, while also supporting microclimatic thermal mitigation, soil moisture, and the broader green-blue capacity of the project. The visible blue character of Zone 6 is seasonal and operational rather than permanently wet. Retention landscapes may remain dry or planted during periods of low rainfall, while interactive water elements are selectively activated using appropriately treated water according to seasonal availability and public-health requirements.

Zone 7 introduces a different type of water-sensitive landscape. Its main identity remains sport and recreation, but some of its open sports fields and recreational grounds are designed as slightly lowered surfaces. During normal conditions, these areas function as active open spaces for sport and informal use. During heavy rainfall events, they can temporarily hold excess water, operating as a secondary, occasional detention capacity

that complements the main retention role of the adjacent Zone 6, without compromising the everyday function of the zone.

In the adaptive-reuse zones, roof runoff and ground-level runoff are managed separately because they may present different water-quality conditions. In Zone 5, runoff from the roof of Terminal 1 can be collected separately and, subject to roof-material assessment, water-quality monitoring, and appropriate treatment, stored for non-potable uses such as irrigation, landscape maintenance, or controlled misting. Runoff from the surrounding former apron surfaces first passes through planted strips, permeable surfaces, and vegetated filtration areas as a form of landscape-based pre-treatment. Where contamination levels or reuse standards require it, additional engineered treatment or controlled discharge would be necessary. The same distinction applies in Zone 8, where Terminal 2 roof runoff may be harvested separately, while apron runoff is filtered and assessed before any infiltration, storage, or reuse. In both zones, planted edges, tree pockets, and adapted surfaces also help moderate heat accumulation around the reused hardscapes.

Zones 1 and 3 have a more limited role within the water-sensitive network. In Zone 1, new low-density and porous buildings allow for permeable surfaces, planted courtyards, and small landscape pockets between built volumes. These elements reduce runoff, increase surface permeability, and support potential infiltration (where soil and environmental conditions permit), but they are not defined as major rain-garden systems. In Zone 3, where a compact group of existing structures is reused, the green-blue intervention is more modest and is mainly limited to planted edges, small permeable pockets, and courtyard or threshold spaces where spatially possible. These limited interventions help integrate the reused buildings into the wider green-blue network without assigning Zone 3 a primary water-management role.

Zone 4 remains primarily a flexible green landscape and cultural-event open field. Its role in the green-blue infrastructure is mainly connected to vegetation, shade, permeable ground, and open landscape continuity rather than to visible water retention. Its open character is also important for maintaining wind permeability through the central corridor, while avoiding excessive planting density and minimizing obstruction to airflow across this part of the site. This distinction is essential because not all landscape-oriented zones perform the same function: Zone 6 acts as the main blue landscape anchor, Zone 2 functions as a comfort landscape with rain gardens and filtration areas, Zone 4 provides flexible planted open space, and Zone 7 combines sport and recreation with a secondary detention capacity.

Overall, the internal green-blue network consists of differentiated water-sensitive elements distributed according to the spatial character and existing condition of each zone. Runway-edge drainage, filtration, and potential infiltration strips support the longitudinal structure, while transversal bioswales and planted links extend water-sensitive treatment laterally. Rain gardens and planted depressions reinforce the comfort

role of Zone 2; the seasonal water-based landscape of Zone 6 forms the principal blue anchor; and selected lowered areas in Zone 7 provide secondary and occasional detention. In the adaptive-reuse areas, Zones 5 and 8 combine separately collected and appropriately treated roof runoff with landscape-based pre-treatment of former apron runoff, supplemented by further treatment where required.

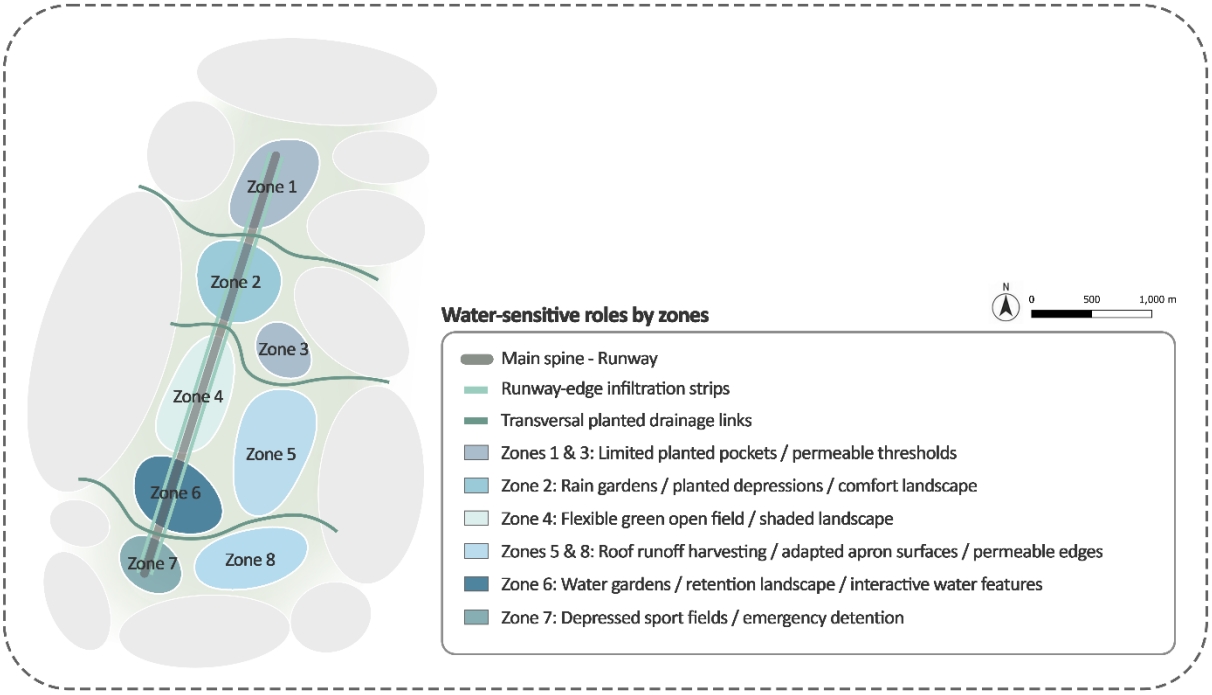


Diagram 4.8: *Water-sensitive roles by zones. Source: Author, 2026*

4.5.3. Vegetation Typology and Species Selection Criteria

Vegetation in the project is not treated as a decorative layer, but as an operational component of the green-blue infrastructure. Its placement responds to the spatial role of each zone, the need for shade and thermal comfort, the management of runoff, the preservation of wind permeability, and the transformation of former airport hardscapes into more porous public landscapes. For this reason, the vegetation strategy is developed through a zone-based typology rather than through a uniform planting approach across the entire site.

The vegetation typology also supports the microclimatic structure developed later in Section 4.6.4. Zones 2, 4, and 6 form the principal shaded and water-sensitive cooling landscapes, although each performs a different role. Zone 2 provides a shaded comfort landscape; Zone 4 combines open meadow, mixed canopy, and flexible vegetated ground; and Zone 6 forms the strongest water-related cooling landscape through moisture-tolerant planting and seasonal blue elements. By contrast, Zones 3, 5, and 8 contain larger proportions of retained buildings and paved surfaces and therefore require more intensive heat-mitigation measures. In these areas, vegetation is used to reduce solar exposure, soften hard surfaces, and create localised comfort pockets. In this way, planting

is directly linked to the climatic logic of the project and not only to visual or landscape quality.

Zone 2 is defined as one of the main comfort landscapes of the project. This zone combines clustered canopy, shaded groves, rain-garden planting, and open airflow gaps rather than forming a continuous dense woodland condition. The aim is to create a cooler and more protected landscape condition, where shade, soil moisture, and water-sensitive planting work together to improve everyday comfort. Trees with strong canopy value are concentrated strategically in this zone to reduce heat exposure and support local shade, reduced solar exposure, and thermal comfort. At the same time, rain-garden and bioswale species are introduced in the lower planted areas, where they can tolerate temporary wet conditions during rainfall events and drier conditions during the summer.

Zone 4 has a different vegetation structure. Since it functions as a flexible green landscape and cultural-event open field, it cannot be covered by dense vegetation. Its planting typology combines mixed canopy with open meadow, low-water grassland, and flexible planted surfaces. Trees are placed strategically along edges, gathering points, and shaded resting areas, while larger open surfaces are kept available for events, informal use, and temporary activities. This balance allows Zone 4 to contribute to the wider landscape-based cooling strategy without losing its openness, flexibility and potential airflow continuity through the central part of the site.

Zone 6 forms the primary water-based landscape anchor of the project and therefore requires a more water-related planting typology. Vegetation in this zone is organised around water gardens, retention areas, planted water edges, and moisture-tolerant landscape systems. Species are selected to support seasonally wet conditions, soil stabilization, runoff filtration, and thermal mitigation. The planting character of Zone 6 is more visibly connected to water than in the other zones, but it is still understood as an adaptive landscape rather than a permanently wet ornamental system. Its vegetation must therefore tolerate both periods of water availability and periods of reduced moisture during the dry season.

The preserved runway requires a selective vegetation and surface strategy that balances infrastructural memory with public comfort. Continuous dense canopy is avoided where it would obscure the runway's alignment and long views, but shade is distributed directly along the principal pedestrian, cycling, seating, and activity areas through spaced tree groups and lightweight shade structures. Low planting, meadow strips, bioswales, and potential infiltration bands are introduced along the edges and within selected surface openings to collect runoff, support permeability, and reduce the thermal impact of retained paving. The objective is to preserve the runway's recognisable geometry while reducing solar exposure and heat accumulation, not to maintain a deliberate thermal contrast.

The transversal corridors use a more linear vegetation typology. Their role is to connect the site laterally while also supporting green-blue continuity. For this reason, they include linear tree planting, shaded edges, bioswale vegetation, planted drainage corridors, and permeable ground treatment. However, tree density in these corridors is carefully controlled. The aim is not to create dense woodland corridors, but to combine shade, runoff management, and spatial connection while maintaining wind porosity. This is particularly important because the corridors also contribute to air movement through the site and should not block prevailing wind flows.

In the adaptive reuse zones, vegetation is used to soften and transform built-heavy and hardscape conditions. Zones 5 and 8 contain the reused terminal buildings and surrounding former apron surfaces, and therefore require tree pockets, planted edges, courtyard planting, and permeable apron edges to reduce heat accumulation and improve comfort around reused structures. These planted elements are particularly important because Zones 5 and 8 operate as heat-mitigation areas within the microclimatic network. Their vegetation does not eliminate the hardscape character of these zones, but moderates it through shade, evapotranspiration, and permeable surface treatment.

Zone 3 requires a more modest approach. Because it is the smallest zone and is mainly composed of reused existing structures, vegetation is limited to small planted pockets, permeable thresholds, narrow planted edges, and minor courtyard spaces where spatially possible. The aim is not to create a large canopy system or a major landscape field, but to reduce the hardness of the reused built fabric and connect the zone gently to the wider green-blue network. In this way, Zone 3 remains consistent with its compact character while still contributing to localised comfort and permeability.

Zones 1 and 7 require a more open and porous vegetation structure. In Zone 1, new low-density buildings are combined with planted courtyards, scattered trees, and small landscape pockets. These elements support shade and permeability while preserving the porous character of the live-work environment and its role as a porous northern threshold. In Zone 7, vegetation is arranged around sports fields, recreational grounds, shaded resting areas, and buffer edges. Trees are placed to provide shade for users and define outdoor spaces, but dense canopy is avoided over the main active fields in order to preserve openness, visibility, recreational flexibility, and wind movement toward the southern part of the site.

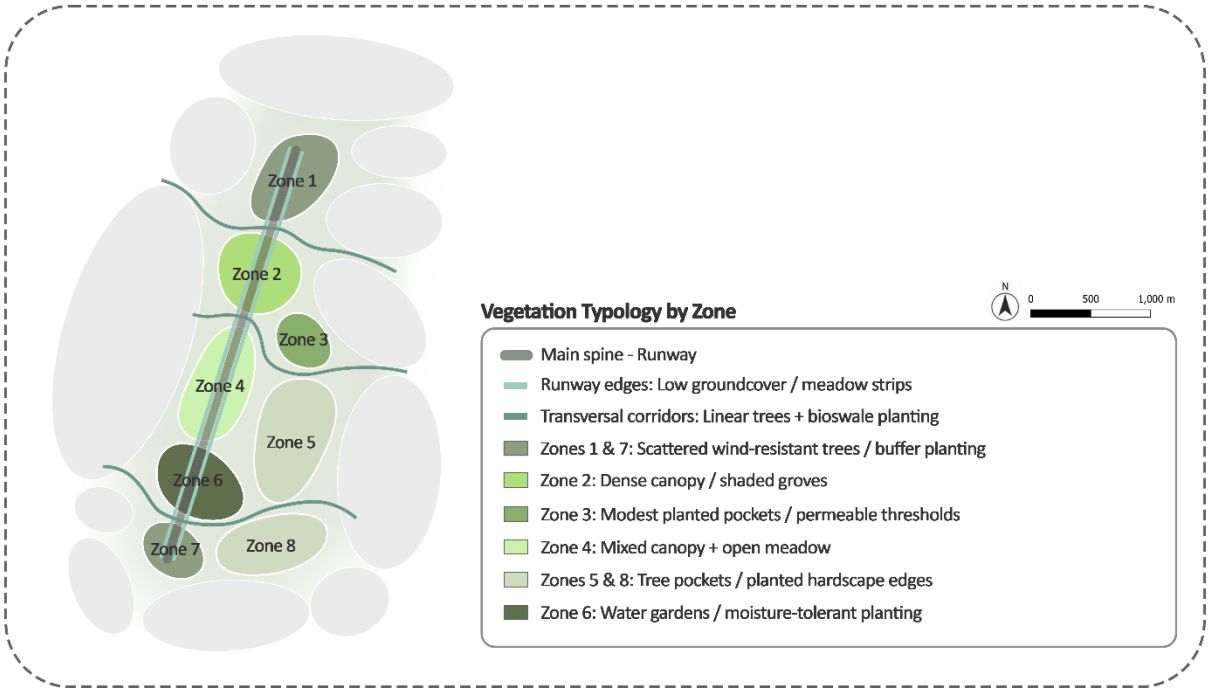


Diagram 4.9: *Vegetation Typology by Zone. Source: Author, 2026*

Species selection

Species selection is guided by the Mediterranean climatic context of Lisbon and by the seasonal behaviour of the green-blue system. Priority is given to native or well-adapted Mediterranean species that are drought-tolerant, low-maintenance, and able to survive with low irrigation demand. This is essential because the project cannot depend on constant rainfall or high water consumption, especially during dry summer periods. In the comfort and cooling zones, species with strong canopy value are prioritised in order to provide shade and reduce heat exposure. Around former hardscapes, apron edges, and reused buildings, species must also tolerate heat, reflected radiation, compacted urban soils, and pollution stress.

Wind resistance is also an important selection criterion, especially in zones that support the wind strategy of the project. In Zone 1, where air enters the site from the northern edge, and in Zone 7, where openness and air movement are preserved toward the southern part of the site, trees and shrubs should have stable root systems, resilient branching structures, and forms that can tolerate prevailing wind exposure. This does not mean eliminating trees from these areas, but selecting and placing them carefully so that vegetation supports comfort and shade without creating safety risks or obstructing airflow.

In rain gardens, bioswales, planted depressions, and the water-related landscapes of Zone 6, planting is selected according to a different set of criteria. Species must be able to tolerate intermittent wet and dry conditions, support runoff filtration, stabilize soil, and improve infiltration. Where appropriate, phytoremediation capacity is also considered, particularly in planted drainage corridors and filtration areas that receive runoff from

paved surfaces. Deep or stabilizing root systems are preferred where soil structure, erosion control, and infiltration capacity are important. At the same time, the planting palette should provide seasonal variation, texture, and visual quality without requiring intensive maintenance.

The following table summarizes the main criteria used for species selection. These criteria define how vegetation should respond to the climatic, spatial, and water-sensitive roles of each part of the project.

Table 4.2: *Summary of the main criteria used for species selection. Source: Author, 2026*

Selection criterion	Main application	Design purpose
Drought tolerance and low irrigation demand	All zones, especially dry meadows, runway edges, and open landscapes	To reduce dependence on constant rainfall or intensive irrigation during dry summer periods
Shade and canopy performance	Zone 2, Zone 4 edges, Zones 5 and 8 public spaces, selected areas of Zones 1 and 7	To improve thermal comfort, reduce heat exposure, and support evapotranspiration
Wind resistance and root stability	Zones 1 and 7, runway edges, transversal corridors	To support the wind strategy without creating safety risks or obstructing airflow
Wet/dry tolerance	Zone 2 rain gardens, bioswales, Zone 6 water-edge landscapes	To allow planting to function during both rainfall events and dry periods
Filtration and phytoremediation capacity	Rain gardens, bioswales, planted drainage corridors, Zone 6	To support runoff filtration, pollutant reduction, and soil-water interaction
Heat, pollution, and compacted-soil tolerance	Zones 3, 5, and 8, apron edges, reused hardscape areas	To adapt planting to former airport surfaces and built-heavy conditions
Low maintenance and seasonal diversity	Across the project	To provide visual quality and ecological value without requiring intensive maintenance

The following table translates these criteria into an indicative planting palette for the main vegetation typologies of the project. The species are not intended as a final planting schedule, but as examples of species groups that are consistent with the spatial, climatic, and water-sensitive roles assigned to each zone.

Table 4.3: *Indicative planting palette for the main vegetation typologies of the project. Source: Author, 2026*

Vegetation typology	Zone(s)	Indicative species / species groups	Main criteria
Dense canopy / shaded grove	Zone 2	*Celtis australis*, *Quercus ilex*, selected shade trees adapted to Mediterranean urban conditions	Shade, evapotranspiration, comfort, heat reduction
Rain-garden / planted depression	Zone 2	*Juncus* spp., *Carex* spp., *Iris* spp., moisture-tolerant grasses and perennials	Intermittent wet/dry tolerance, runoff filtration, soil stabilization
Mixed canopy / open meadow	Zone 4	*Quercus ilex* along edges, native meadow and low-water grassland mixes	Shade at edges, flexible open ground, low irrigation demand
Water-edge / moisture-tolerant planting	Zone 6	*Juncus* spp., *Carex* spp., *Iris* spp., controlled use of *Phragmites australis* where appropriate	Moisture tolerance, phytoremediation, filtration, seasonal water fluctuation
Low groundcover / meadow strips	Runway edges	Mediterranean grassland mixes, *Lavandula* spp., *Cistus* spp., *Santolina* spp., *Salvia rosmarinus*	Low height, drought tolerance, low maintenance, visual openness
Linear trees and bioswale planting	Transversal corridors	Wind-permeable rows of Mediterranean-adapted trees combined with bioswale grasses and perennials	Shade, runoff management, wind porosity, spatial continuity
Wind-resistant scattered trees / buffer planting	Zones 1 and 7	*Quercus ilex*, *Olea europaea*, *Arbutus unedo*, carefully placed *Pinus pinea* where soil depth allows	Wind resistance, root stability, shade, low water demand
Tree pockets / planted hardscape edges	Zones 5 and 8	*Celtis australis*, *Quercus ilex*, *Jacaranda mimosifolia* in selected public or courtyard areas	Heat tolerance, shade, thermal mitigation, hardscape softening
Modest planted pockets / permeable thresholds	Zone 3	Mediterranean shrubs and groundcovers such as *Lavandula* spp., *Myrtus communis*, *Cistus* spp., and small shade planting where spatially possible	Limited space, low maintenance, permeability, localised comfort

The species listed above are illustrative examples consistent with the Mediterranean climate of Lisbon. Final species selection would require detailed soil analysis,

microclimatic assessment, maintenance planning, water availability evaluation, and local ecological validation beyond the scope of this design proposal.

4.6. Climatic System

The climatic system explains how the proposal's spatial and green-blue frameworks support environmental performance across the former airport site. Rather than treating wind, water, and heat as separate layers, the project coordinates the preserved runway, island-like zones, open voids, transversal corridors, porous secondary paths, vegetation, and water-sensitive landscapes as a climate-responsive network. This section therefore examines the design intentions for airflow continuity, rainfall management, thermal moderation, and local microclimatic exchange. These strategies are developed at the masterplan level and would require later microclimatic simulation, soil investigation, hydraulic sizing, and detailed design to verify their precise performance.

4.6.1. Wind Strategy

Airflow Permeability at the Northern Threshold

The existing airport is highly exposed to prevailing northern and north-western winds because of its extensive open surfaces. However, exposure to wind does not by itself produce a comfortable public microclimate. The existing combination of mineral surfaces, solar exposure, limited vegetation, and lack of shade can reduce the potential comfort associated with air movement.

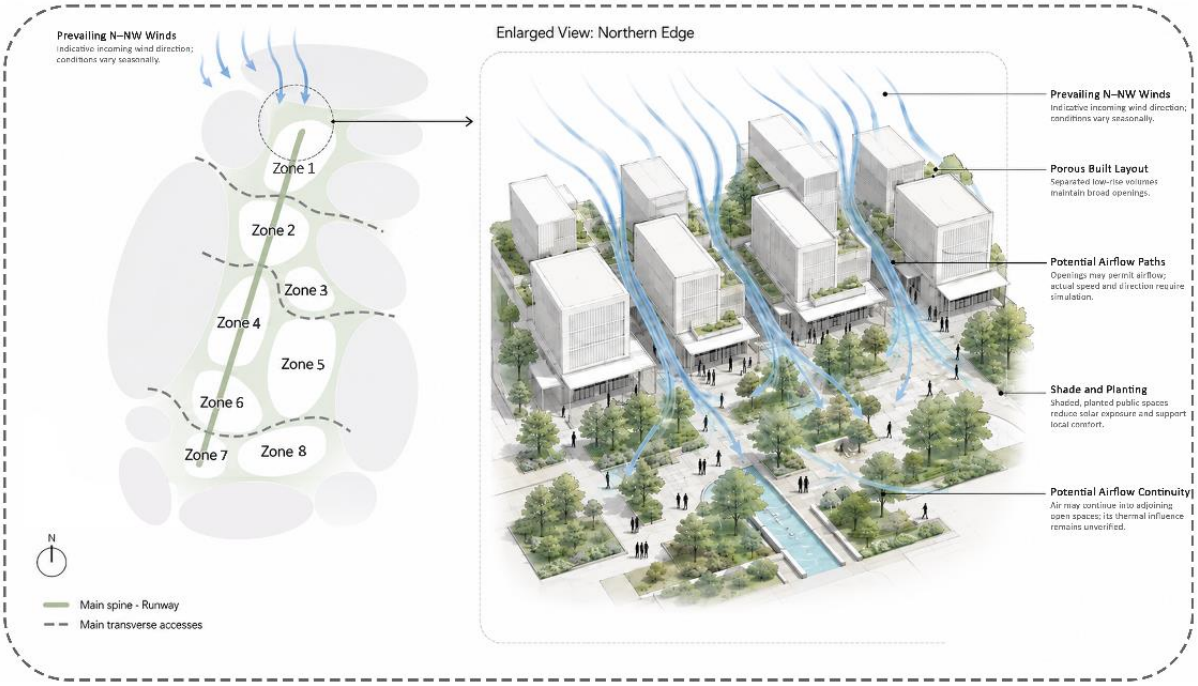


Diagram 4.10: *Porous northern threshold and indicative airflow paths. Source: Author, 2026*

The northern edge of the proposal is therefore configured as a porous spatial threshold. In Zone 1, low-rise and separated building volumes maintain broad openings between the built elements and avoid the formation of a continuous barrier. This arrangement is

intended to preserve the possibility of airflow penetration towards the interior landscape rather than to produce a predetermined acceleration effect. The actual direction, speed, and pedestrian-level comfort of airflow would depend on building height, orientation, spacing, surrounding urban morphology, vegetation, and seasonal wind conditions. These relationships cannot be confirmed at the masterplan scale and would require CFD or equivalent pedestrian-level microclimatic simulation. The proposal therefore claims spatial permeability and reduced obstruction to airflow, not a verified Venturi effect.

Landscape Support for Local Thermal Moderation

Where airflow passes through the site, it encounters planted, shaded, permeable, and water-sensitive landscapes. Vegetation, shade, soil moisture, and evapotranspiration may support local thermal moderation and reduce radiant heat along public routes. These measures improve the climatic condition of the landscape itself; they do not guarantee that a defined volume of "conditioned air" will be transported across the project.

Zone 2 forms the first major shaded landscape after the northern threshold. Its clustered canopy, rain gardens, planted depressions, and permeable surfaces reduce solar exposure and support local comfort. Any interaction between these landscape conditions and passing airflow remains dependent on weather, vegetation maturity, and detailed spatial design.

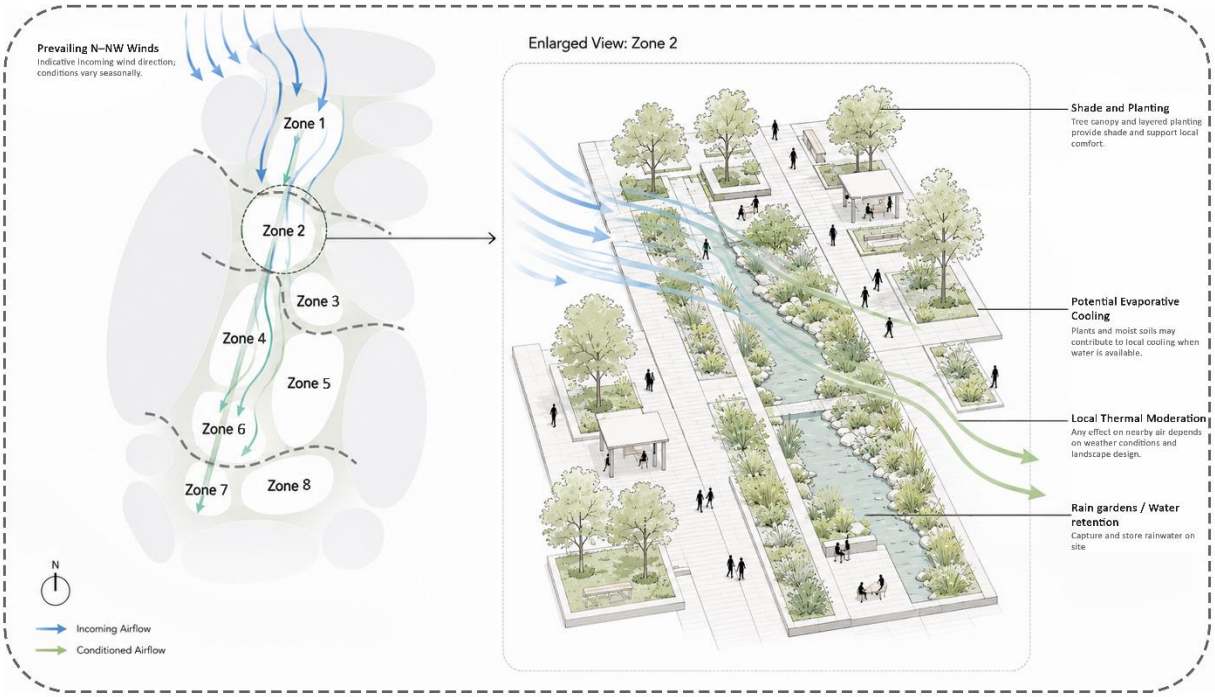


Diagram 4.11: *Landscape measures supporting local thermal moderation along potential airflow paths. Source: Author, 2026*

Potential Airflow Continuity Through the Sponge Network

At the masterplan scale, the runway, transversal corridors, open voids, and discontinuous built areas establish a broadly open spatial network. Their principal wind-related role is

to avoid the formation of continuous built or vegetated barriers. This spatial structure preserves several possible paths through which air may move, but it does not establish a fixed direction, speed, or uniformly comfortable pedestrian breeze.

The runway remains a broad longitudinal public and memory axis. Its alignment helps preserve an open spatial condition, but it is not maintained as an exposed hard surface for aerodynamic or thermal purposes. Distributed shade, lower-heat surface treatments, permeable inserts, and planted drainage edges are introduced along its principal public-use areas while retaining long views and spatial continuity. The transversal corridors and open voids provide additional lateral openings across the site. Their planting is arranged to combine shade, drainage, and public-space quality while avoiding continuous dense barriers. The actual interaction between these spaces and prevailing winds would require later simulation.

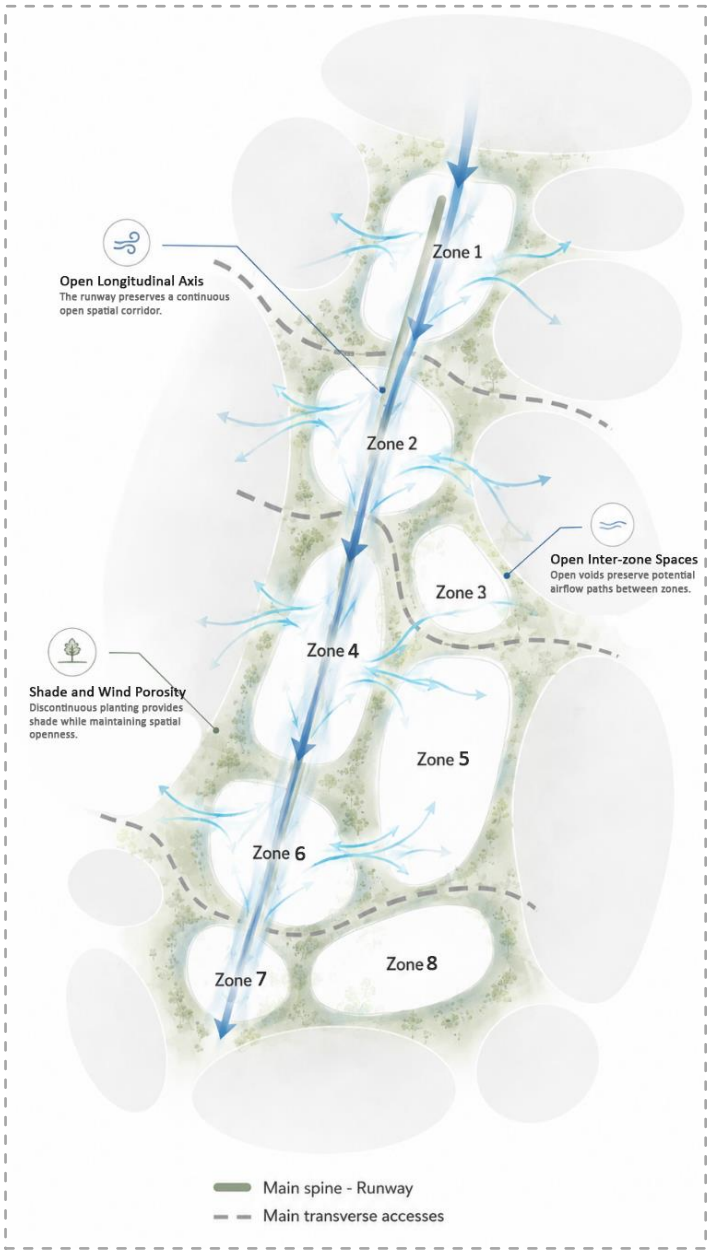


Diagram 4.12: *Indicative airflow continuity through the open-space network. Source: Author, 2026*

Potential Extension of Local Cooling

Air movement may help extend some of the local cooling influence generated by shaded, planted, and water-sensitive landscapes towards adjacent public spaces. However, the direction, magnitude, and duration of this influence cannot be established through the present masterplan. It is therefore treated as a possible secondary interaction requiring verification, rather than as a guaranteed climatic performance.

Southern Airflow Continuity

Zone 7 maintains a predominantly open sport and recreation landscape at the southern edge. Its limited support buildings remain low-rise and discontinuous, avoiding the formation of a continuous southern barrier. This open condition may support airflow continuity beyond the project, but Zone 7 is not assigned a specific acceleration or wind-release performance.

Overall, the wind strategy is based on spatial openness, reduced obstruction, local shade, and landscape-based thermal moderation. It represents a masterplan-level design intention rather than a verified airflow result. Detailed performance would depend on building geometry, vegetation density and maturity, seasonal weather conditions, surrounding urban morphology, and pedestrian-level wind simulation.

4.6.2. Water Strategy

The water strategy of the project is based on transforming the former airport from an impermeable runoff-producing surface into a water-retaining and climate-regulating landscape. In its existing condition, the site is dominated by extensive hard surfaces, including the runway, aprons, taxiways, terminal roofs, and paved operational areas. These surfaces limit infiltration and accelerate the movement of rainfall across the site, turning rainwater into surface runoff rather than allowing it to be absorbed where it falls. In response, the project treats water not as a problem to be removed rapidly, but as a resource to be collected, slowed, filtered, temporarily retained, reused, and infiltrated where soil, groundwater, and environmental conditions permit. This approach follows the sponge logic of the project and allows the former airport to operate as a distributed hydrological system. At this stage, the water strategy is understood as a design-level hydrological framework rather than a final engineering design. Its implementation would require detailed soil investigation, contamination assessment, groundwater-depth analysis, infiltration testing, and hydraulic sizing.

Water Collection and Conveyance

The first stage of the water strategy is the collection and movement of rainwater across the site. The main source of water is the direct rainfall falling on the airport's large impervious surfaces. Rather than ignoring these surfaces, the proposal reinterprets them as catchment areas. Terminal roofs, former apron surfaces, paved platforms, and the preserved runway surface all contribute to the collection of runoff, but they do not

produce water of the same quality. Roof runoff from Terminal 1 and Terminal 2 is generally expected to be cleaner than runoff from former apron surfaces, but its storage and non-potable reuse would still require roof-material assessment, water-quality monitoring, and appropriate treatment. By contrast, runoff from ground-level hard surfaces, especially former apron areas, requires further treatment before it can be infiltrated, stored, or reused, since these surfaces may carry sediments, dust, or residual traces from former airport operations. At the urban-design scale, planted edges, permeable strips, and vegetated swales are proposed as landscape-based pre-treatment measures to slow runoff and help remove sediments and some pollutants. Depending on contamination levels and the intended use of the water, additional engineered treatment, water-quality monitoring, or controlled discharge may be required before infiltration, storage, or reuse. In areas where contamination risk may be higher, such as former apron surfaces, infiltration is treated as conditional rather than automatic, to be confirmed through later environmental and soil assessment.

The available topographic analysis suggests a slight tendency for surface runoff to move away from the central part of the site toward northern and southern collection areas. This tendency informs the positioning of Zone 2 and Zone 6 as principal water-sensitive landscapes. At this stage, these directions represent a design hypothesis based on the available terrain model rather than a final drainage configuration; detailed grading and hydraulic modelling would be required to confirm the catchment boundaries, flow routes, and storage capacities. In this way, the water-sensitive spatial allocation described in the green-blue infrastructure section is supported by a physical, gravity-driven logic rather than by Programmatic assignment alone.

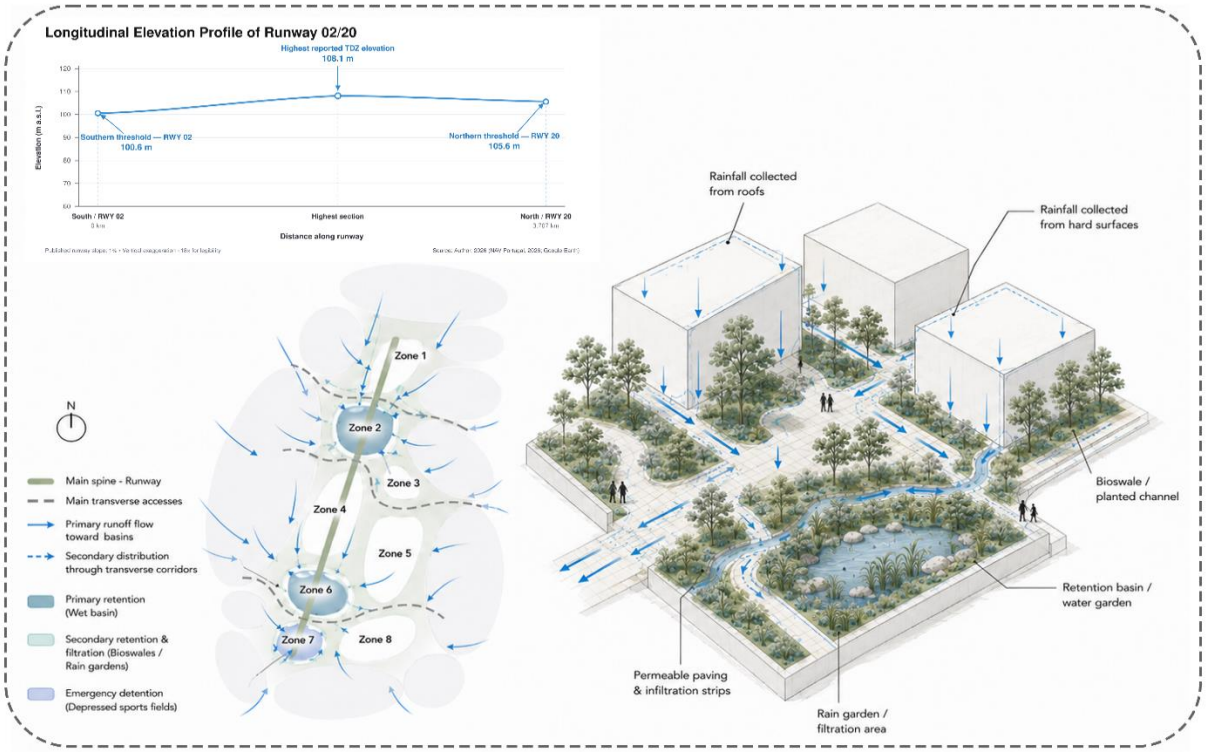


Diagram 4.13: *Water Collection and Conveyance. Source: Author, 2026*

Water is not conveyed only through hidden drainage infrastructure. Instead, it is guided through visible and landscape-based elements such as bioswales, shallow planted channels, permeable strips, rain gardens, planted depressions, and the edges of the preserved runway. The edges of the runway become linear water-guiding and filtering elements, while selected retained paving, permeable inserts, planted drainage edges, and shaded public-use areas maintain the runway as a legible longitudinal public axis. The transversal corridors and the open spaces between the island-like zones complement this system by allowing water to move laterally and gradually enter retention areas rather than being concentrated in a single drainage line.

Water Retention

Retention is the central operation of the water strategy. Instead of moving rainwater out of the site as quickly as possible, the project delays and stores it within the landscape. This reduces runoff pressure on the surrounding urban fabric and creates the conditions for vegetation growth, soil moisture, and evaporative cooling.

Building on the water-sensitive roles assigned to Zone 2, Zone 6, and Zone 7 in Section 4.5.2, retention operates at different levels of intensity within the project. In Zone 2, retention is soft, shallow, and closely connected to everyday comfort. Water is held temporarily in rain gardens, planted depressions, and permeable ground before slowly releasing into the soil or continuing through the wider system. Its role is not to store large volumes of water for long periods, but to slow, filter, and condition runoff while supporting shade, humidity, and local comfort.

In Zone 6, retention is more visible and spatially dominant, but it is not conceived as a permanently wet condition. Variable water-level basins, water gardens, planted depressions, and moisture-tolerant edges can hold water temporarily during wetter periods and remain dry or planted during periods of limited rainfall. This zone provides the principal storage and visible blue-landscape capacity of the project, subject to later hydraulic sizing and seasonal water availability.

Zone 7 operates differently again. Rather than functioning as a permanent retention landscape, it provides secondary and occasional detention capacity during intense rainfall events. Some sports fields and recreational surfaces can be slightly depressed so that they temporarily hold excess water during heavy rain, while remaining dry and active public spaces under normal conditions. Across these three zones, the value of retention lies not only in where water is held, but also in how long it is held, how visible it becomes, and when it re-enters the wider cycle of reuse and infiltration. These depressed sport fields are conceived for occasional stormwater detention only, with controlled overflow and a rapid drawdown time to protect everyday recreational use and avoid long-term waterlogging.



Diagram 4.14: *Distributed water retention and controlled reuse. Public-contact water features use separately treated and monitored water. Source: Author, 2026*

The final storage depth, overflow routes, and drawdown time of these retention areas would need to be defined through later hydrological sizing, but at this design stage they are used to establish the spatial logic of distributed water retention across the project.

Water Reuse and Evaporative Cooling

Collected and retained water is reused as a climatic resource. Once stored, water can support irrigation, landscape maintenance, controlled misting, fountains, interactive water features, and evaporative cooling systems. This is particularly important in a former airport landscape where hard surfaces previously contributed to high surface temperatures and outdoor thermal discomfort.

In Zone 6, reuse becomes most visible. Rainwater retained in the southern basin can be stored in underground tanks, cisterns, or shallow landscape reservoirs and reused in water gardens, low-flow fountains, splash pads, misting devices, and planted water-edge landscapes. Where technically feasible, these elements may operate through a recirculating system in which appropriately treated water is collected, stored, reused, monitored, and selectively returned to the landscape. As water evaporates from planted surfaces, shallow water elements, and controlled misting systems, it can lower perceived heat stress and contribute to more comfortable public spaces. However, these features are not conceived as permanently high-consumption water systems. Their operation depends on seasonal water availability, water quality, and selective activation during periods of higher thermal stress. Any misting system, splash pad, or interactive water feature would require appropriately treated, filtered, and monitored water, especially where direct public contact or aerosol exposure is involved.

In Zone 2, reuse operates more quietly. The moisture retained within planted depressions, rain gardens, and shaded soils may support local evaporative cooling and contribute to the thermal moderation of airflow passing through the northern part of the site. Rather than becoming a highly visible water landscape, Zone 2 uses moisture, planting, and shade to improve the quality of airflow before it moves deeper into the site.

The reuse strategy also applies to the major existing buildings. Roof runoff from Terminal 1 in Zone 5 and Terminal 2 in Zone 8 can be harvested separately (subject to roof-material assessment, water-quality monitoring, and appropriate treatment) and redirected toward nearby public spaces, planted edges, or underground storage systems. This water can support irrigation, shaded plazas, controlled misting, or landscape maintenance, allowing the reused terminal buildings to participate in the climatic system. By contrast, runoff from former apron surfaces is not stored directly without treatment. It first passes through permeable paving, planted edges, filtration strips, or other treatment systems, because ground-level runoff can carry sediments, dust, urban pollutants, or residual traces from former airport use.

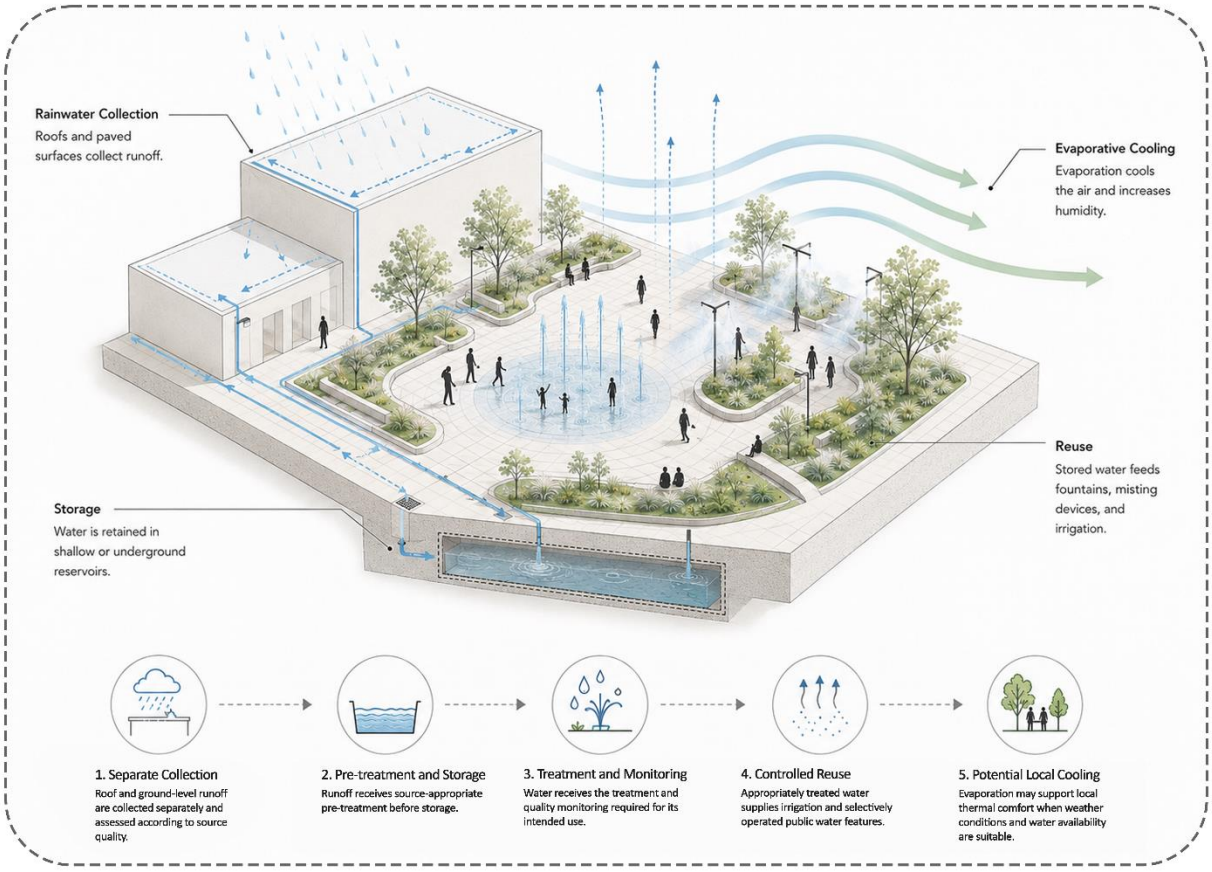


Diagram 4.15: *Rainwater collection, treatment, and controlled reuse, with potential local evaporative cooling. Source: Author, 2026*

Dry-Season Operation

The water strategy is designed to operate across seasonal conditions. During rainfall periods, the system receives, slows, filters, retains, and stores runoff. During dry summer

periods, when rainfall may be limited or absent, the system shifts from active runoff management to water conservation, passive cooling, and selective reuse. Stored rainwater from underground cisterns or retention tanks can support priority irrigation, limited misting, and selected public water features, but it is treated as a supplementary seasonal resource rather than as a fully self-sufficient water supply.

In extended dry periods, the project relies more strongly on the drought-tolerant planting palette established in Section 4.5.3, alongside shaded surfaces, conservation of residual soil moisture, permeable ground, and reduced water demand. Rain gardens and bioswales may not contain visible water during these periods, but they continue to function as planted, permeable, and shaded landscape spaces. Where technically feasible, treated non-potable water, such as locally treated greywater or reclaimed water, may provide an additional backup source for irrigation and landscape maintenance. Misting and interactive water features should only be activated when appropriate water quality and seasonal availability can be ensured. In this way, the water strategy remains functional even when rainfall is absent, without depending on continuous water consumption.

Water Infiltration

The final stage of the water strategy is infiltration. After water has been collected, conveyed, retained, and reused, part of it can gradually return to the ground through permeable surfaces and planted landscape systems. This process reduces surface runoff, supports soil moisture, improves growing conditions for vegetation, and helps recover part of the hydrological capacity lost through the airport's former impermeable condition.

However, infiltration is not assumed to occur uniformly across the entire site. In a former airport landscape, the ground may include compacted sub-base layers, sealed construction surfaces, and areas where environmental conditions require further assessment. For this reason, infiltration is proposed as a selective and site-adapted strategy rather than as a universal solution. It would be prioritised in areas where soil conditions, permeability, and environmental safety allow water to enter the ground without creating risks for groundwater or soil quality. Where infiltration is feasible, it can be supported through permeable paving, rain gardens, bioswales, tree pits, planted soils, infiltration strips, and landscape basins. These elements are distributed across the zones, corridors, and open voids rather than concentrated in a single location. In the main landscape areas, the removal of impermeable surfaces would need to be accompanied by soil improvement, decompaction, and reconstructed planting layers so that the sponge logic becomes physically operational and not only a surface treatment. Where direct infiltration is not appropriate, water would instead be managed through retention, planted filtration, reuse, or controlled discharge. In this way, the project does not depend on the assumption that all collected water can infiltrate everywhere. Instead, it establishes a flexible water-sensitive landscape framework in which water can be

absorbed, slowed, filtered, reused, or safely released according to the technical conditions of each area.

The runway edges and the open spaces between the island-like zones are especially important within this process. While selected parts of the runway are retained to preserve infrastructural memory, its edges and principal public-use areas are combined with permeable inserts, lower-heat surface treatments, planted drainage strips, and shaded routes where technically feasible. Porous secondary paths and inter-island open spaces provide additional opportunities for runoff conveyance, filtration, and infiltration, subject to soil and environmental assessment. By replacing selected hard surfaces with porous and planted systems, the project turns former infrastructural surfaces into active hydrological landscape systems. The secondary paths can support this logic through permeable or semi-permeable materials, such as stabilized gravel, decomposed granite, spaced paving, planted joints, or permeable paving systems, where soil and environmental conditions allow. Where direct infiltration is not appropriate, these paths can still guide runoff toward adjacent planted strips, rain gardens, bioswales, or retention landscapes. This final stage completes the water cycle of the proposal while acknowledging that the exact balance between infiltration, storage, reuse, and discharge would need to be refined through later technical studies.

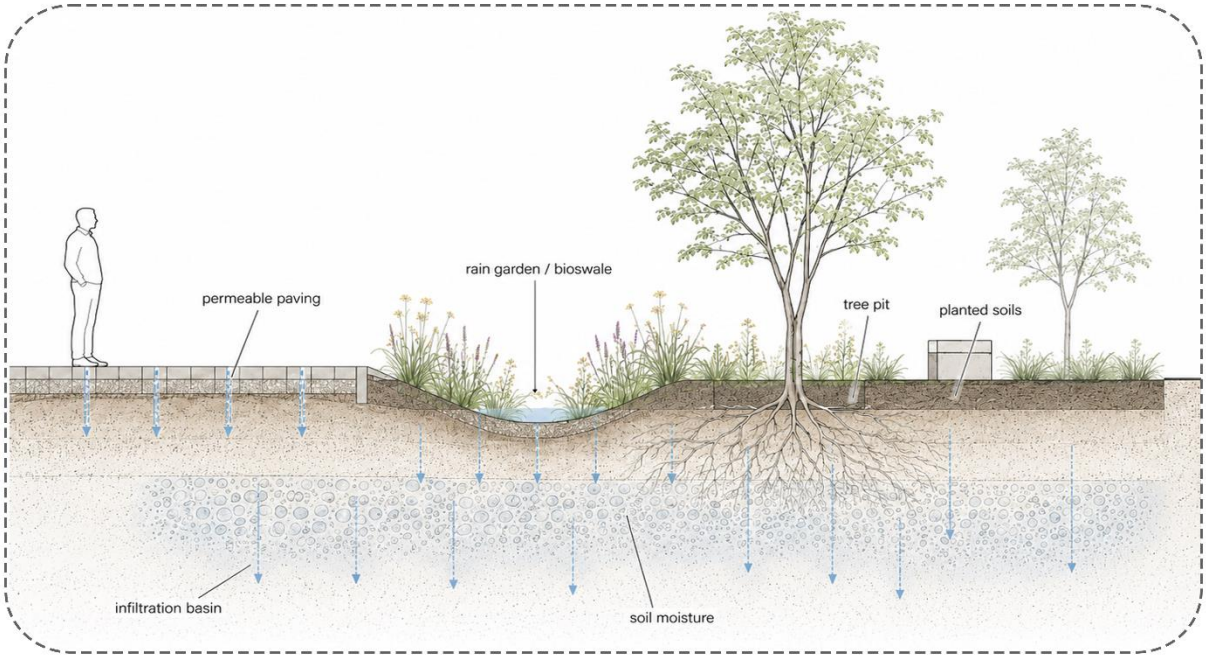


Diagram 4.16: *Water Infiltration. Source: Author, 2026*

4.6.3. Thermal Differentiation and Heat Mitigation

The thermal strategy of the proposal is based primarily on reducing solar exposure, surface heat accumulation, and pedestrian heat stress across the former airport site. The project combines selective depaving, lower-heat and permeable surface treatments,

vegetation, shade, soil-moisture retention, water-sensitive landscapes, and an open spatial structure to improve local environmental conditions.

Differentiated Thermal Conditions

Different parts of the site will continue to experience different surface and near-ground thermal conditions because they contain different combinations of retained paving, reused buildings, vegetation, shade, soil moisture, and water-sensitive elements. These differences are understood as an unavoidable consequence of the site's varied material and spatial conditions rather than as a thermal gradient intentionally created to drive air movement.

Zones 3, 5, and 8 retain larger proportions of existing buildings, former apron surfaces, and other mineral materials. These areas may therefore remain more exposed to solar radiation and surface heat than the principal landscape zones. The design priority is to mitigate these conditions through tree pockets, planted edges, shaded courtyards, lightweight shade structures, permeable surfaces, lower-heat materials, and the reuse of appropriately treated roof runoff for landscape support. The retained hardscape character of these zones is associated with adaptive reuse and infrastructural memory, but it is not assigned a beneficial role as a source of heat.

Zones 2, 4, and 6 provide different forms of landscape-based thermal moderation. Zone 2 operates as a shaded comfort landscape through clustered canopy, rain gardens, planted depressions, permeable ground, and retained soil moisture. These elements reduce direct solar exposure and may support cooler local surface and near-ground conditions. Zone 4 combines mixed canopy, open meadow, low-water grassland, and shaded resting areas. Its planting remains sufficiently open to accommodate cultural events, temporary uses, and everyday recreation. The climatic role of this zone is therefore based on balancing shade and vegetation with programme flexibility and spatial openness rather than creating a dense cooling reservoir.

Zone 6 forms the strongest water-sensitive landscape within the proposal. Retention areas, water gardens, moisture-tolerant planting, shaded seating, and controlled water reuse may support local thermal comfort during warmer periods. However, its performance remains seasonal. During wetter periods, retained water and higher soil moisture may strengthen evaporative cooling. During prolonged dry periods, the zone relies more strongly on shade, drought-tolerant vegetation, residual soil moisture, permeable ground, and the selective use of stored or appropriately treated non-potable water.

Runway Heat Mitigation and Infrastructural Memory

The runway remains the principal longitudinal public and memory axis of the project, but it is not maintained as an exposed thermal generator. Its infrastructural identity is preserved through its width, alignment, markings, long views, material character, and

selected fragments of original paving rather than through the retention of an entirely exposed mineral surface.

Distributed tree groups and lightweight shade structures are introduced along the principal walking, cycling, seating, and activity areas. Lower-heat surface treatments, permeable inserts, selectively depaved areas, and planted drainage edges further reduce solar exposure, surface heat accumulation, and runoff. These interventions are positioned to improve public comfort while retaining the recognisable geometry and visual continuity of the former runway. A continuous dense canopy is not required across the full width or length of the runway. Instead, shade is concentrated where people are most likely to walk, cycle, pause, sit, gather, or participate in temporary activities. This approach allows the runway to remain visually open and flexible without leaving its principal public-use areas unnecessarily exposed.

Potential Secondary Thermal Exchange

Local differences in surface temperature may still occur between shaded and vegetated landscapes, reused buildings, and areas of retained paving. Under particular meteorological conditions, these differences could contribute to small-scale buoyancy-driven air exchange. However, the direction, intensity, duration, and spatial influence of this process cannot be established through the present masterplan.

Such behaviour would depend on the magnitude of the temperature difference, prevailing wind speed and direction, building geometry, vegetation density, surface materials, atmospheric stability, time of day, and seasonal conditions. The proposal therefore does not assume that warmer surfaces create a reliable low-pressure condition, draw cooler air from adjoining landscapes, or produce a beneficial convection cycle across the site.

Possible local convection is acknowledged only as a secondary effect requiring CFD, ENVI-met, field measurement, or equivalent microclimatic verification. It is not used as a design premise, and the climatic success of the project does not depend on its occurrence.

Relationship with the Climatic Sponge

Within the climatic sponge, different environmental measures operate through distinct but coordinated mechanisms. Shade and vegetation reduce solar and radiant heat exposure; water-sensitive landscapes support runoff management, soil moisture, and seasonal evaporative cooling; permeable and lower-heat surfaces reduce the impact of retained hardscape; and open spaces and discontinuous built forms avoid the creation of continuous spatial barriers. The sponge structure therefore connects a distributed set of heat-mitigation and water-management measures rather than functioning as a self-operating climatic machine. Its performance is based on the cumulative contribution of these direct interventions, while any wider interaction between local thermal conditions and airflow remains conditional and subject to later verification.

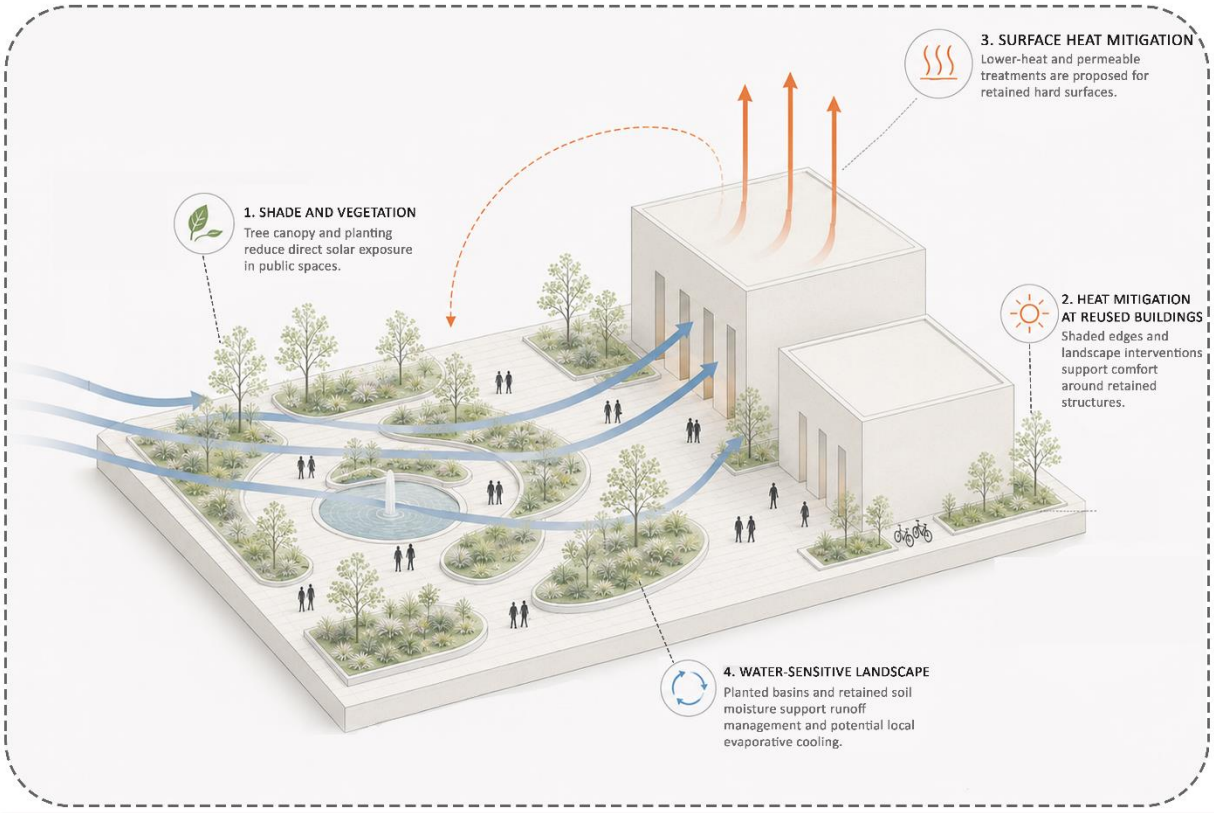


Diagram 4.17: *Heat-mitigation measures across landscape and reused built areas. Source: Author, 2026*

4.6.4. Microclimatic Roles and Spatial Connectivity

The wind, water, vegetation, shade, and surface strategies establish differentiated microclimatic conditions across the former airport site. This section translates these design measures into a spatial reading of the proposal, identifying shaded cooling landscapes, hardscape areas requiring heat mitigation, porous spatial thresholds, and connective open spaces. These roles represent design intentions rather than verified aerodynamic or thermal outcomes.

Zones 2, 4, and 6 form the principal cooling landscapes of the proposal. Zone 2 provides a shaded comfort landscape through clustered canopy, rain gardens, and soil moisture. Zone 4 combines open meadow, mixed canopy, and shaded edges while retaining flexibility for cultural and temporary uses. Zone 6 forms the strongest water-sensitive cooling landscape through seasonal retention areas, moisture-tolerant planting, shade, and controlled water reuse. Zones 3, 5, and 8 retain larger proportions of buildings, apron surfaces, and other hard materials. They are therefore identified as heat-mitigation areas rather than thermal nodes. Their design priority is to reduce solar exposure and surface heat through tree pockets, shade structures, planted edges, permeable treatments, and appropriately treated roof-runoff reuse. Zones 1 and 7 function as porous northern and southern thresholds. Their low-rise, separated buildings and open landscapes avoid the formation of continuous barriers. These conditions preserve the possibility of airflow continuity, but their actual wind performance would require detailed simulation. The

preserved runway functions primarily as a linear public and memory axis. Its identity is maintained through its width, alignment, markings, long views, material character, and selected retained paving. Distributed shade, lower-heat surfaces, permeable inserts, and planted drainage edges reduce its thermal and hydrological impact.

Table 4.4: *Microclimatic roles by zone and main climatic function. Source: Author, 2026*

Zone / element	Microclimatic role	Main climatic function
Zone 1	Porous northern threshold	Avoids a continuous built barrier and preserves openings for potential airflow; actual wind behaviour requires simulation
Zone 2	Shaded comfort landscape	Provides shade, rain gardens, soil moisture, permeable ground, and local thermal moderation
Zone 3	Adaptive-reuse heat-mitigation area	Reduces heat around retained buildings through planted pockets, shade, and permeable thresholds
Zone 4	Open climatic landscape	Combines mixed canopy, meadow, flexible open ground, and shaded edges
Zone 5	Terminal and apron heat-mitigation area	Reduces solar exposure through shade, planting, permeable surfaces, and treated roof-runoff reuse
Zone 6	Seasonal water-sensitive cooling landscape	Supports shade, moisture retention, seasonal water-based cooling, and public comfort
Zone 7	Open southern threshold	Avoids a continuous southern barrier and provides secondary stormwater detention
Zone 8	Terminal and apron heat-mitigation area	Reduces heat around retained structures while supporting active public uses
Preserved runway	Linear public and memory axis	Preserves airport identity while introducing distributed shade, lower-heat surfaces, permeable inserts, and drainage edges
Transversal corridors and open voids	Landscape and access links	Support cross-site movement, shade, planted drainage, and spatial openness

Spatial Connectivity Between Microclimatic Areas

The different microclimatic areas are connected through the preserved runway, transversal corridors, and open voids between the island-like zones. The runway provides longitudinal public continuity, while the transversal corridors combine east–west access with shade, permeable ground, planted drainage, and opportunities for rest. Open voids and discontinuous built forms avoid creating continuous spatial barriers. Local cooling effects generated by shade, vegetation, and water-sensitive landscapes may influence nearby public spaces. However, the reach and intensity of these effects depend on weather conditions, surface materials, vegetation maturity, and detailed geometry. They should therefore be understood as potential local influences rather than as a verified site-wide exchange system.

Climatic Mosaic

The microclimatic network represents the spatial outcome of the project's climatic strategies. Wind provides movement, water and vegetation provide cooling and the sponge morphology connects these processes into a coherent environmental system. The result is a climatic mosaic in which differentiated environmental conditions coexist and interact rather than being homogenized. This mosaic provides the basis for evaluating the expected climatic performance of the proposal. The following section therefore builds on this microclimatic network to estimate how vegetation, water, surface transformation, and airflow may reduce heat accumulation and improve air-temperature conditions across the site.

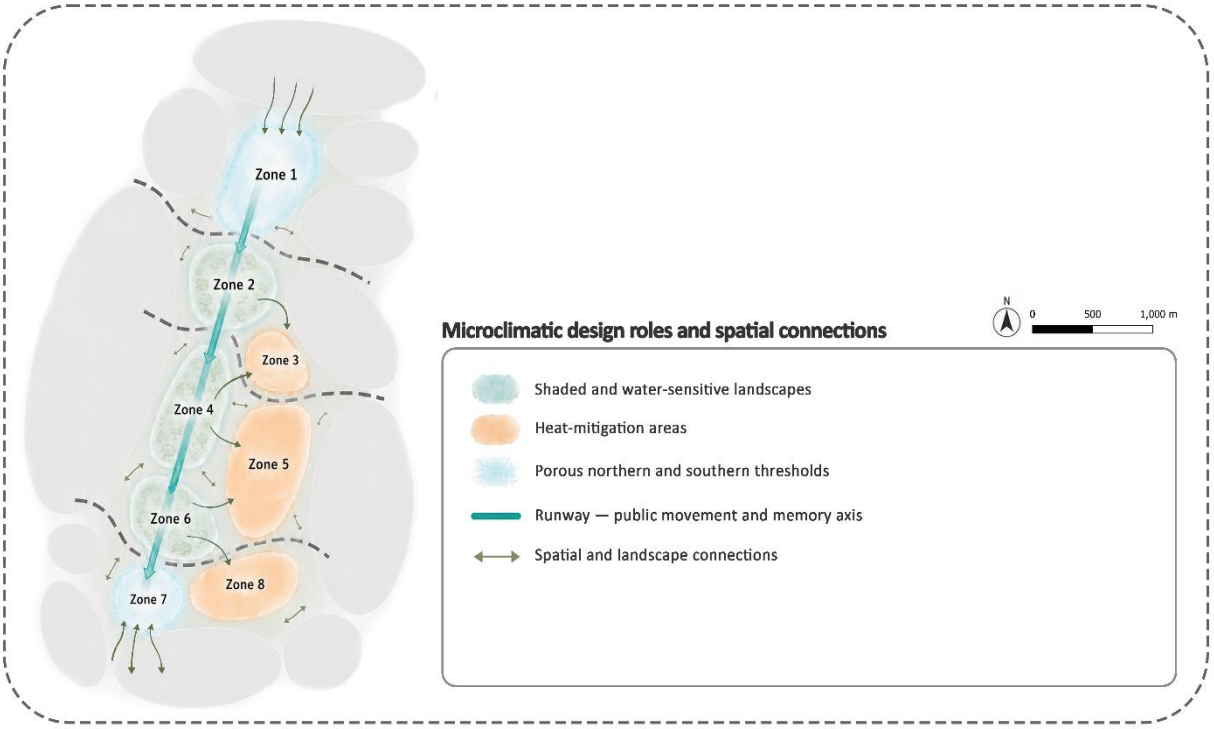


Diagram 4.18: *Indicative microclimatic design roles and spatial connections across the site. Source: Author, 2026*

4.6.5. Indicative Climatic Performance Estimation

This section provides an indicative assessment of the potential climatic performance of the proposal. The values presented here are not measured or simulated results for the project. Instead, they are benchmark-informed ranges based on two complementary sources of evidence: first, the site-specific climatic analysis developed in the previous chapter, and second, findings from studies on urban green spaces, vegetation, water-sensitive design, and nature-based cooling in Lisbon, the Lisbon Metropolitan Area, and comparable Mediterranean contexts.

The site analysis confirms that the existing airport operates as a heat-retaining landscape. As shown in Map 3.25, the Land Surface Temperature analysis records a wide thermal range across the study area, from approximately 19.27°C to 46.40°C, with the airport and its surrounding urban fabric largely positioned within the warmer surface-temperature conditions. This does not represent pedestrian-level air temperature directly, but it clearly indicates the heat-storage behaviour of exposed hard surfaces. The Potential Daily Solar Irradiation map further supports this reading, showing high solar exposure across the airport area, with values reaching approximately 8.08 $kWh/m^2/day$. Together, these two maps demonstrate that the existing runway, apron areas, paved platforms, and exposed airport surfaces receive high solar input and have limited capacity for shade, evapotranspiration, and surface cooling.

For the purpose of this indicative comparison, the baseline condition is expressed as T0. This symbol represents the local pedestrian-level air temperature that would occur in the existing airport landscape at a given location under a defined hot-summer reference condition. It is not a single uniform temperature assigned to the entire site, nor is it calculated directly from the Land Surface Temperature map. Instead, it functions as a symbolic local baseline against which benchmark-informed temperature differences can be expressed. The post-intervention condition can therefore be written conceptually as $T_{after} = T0 - \Delta T$ where ΔT represents a plausible local air-temperature reduction under comparable meteorological conditions. The Land Surface Temperature and solar-irradiation analyses are used to identify the relative heat exposure of the existing site, while the magnitude of ΔT is informed by published air-temperature benchmarks rather than derived directly from those maps.

The estimation is based on three main types of evidence. First, Grilo et al. (2020), in a study of Mediterranean urban green spaces in the Lisbon Metropolitan Area, show that even relatively small green spaces can reduce local air temperature by approximately 1–3°C and increase relative humidity by 2–8%, with tree-canopy influence extending up to about 60 metres from park boundaries. Second, Reis and Lopes (2019) provide a Lisbon-specific benchmark linking vegetated surface area with local air-temperature reduction, suggesting that vegetation density can be used as an indicator of cooling potential. This is used here as an indicative reference, not as a fixed calculation rule. Third, Oliveira et al. (2011), studying a small green space in Lisbon, found median air-temperature reductions

of around 1.6°C in sun-exposed conditions and 0.7°C in shaded conditions between the garden and surrounding streets. These values are useful for estimating localised cooling near planted strips, shaded edges, and small green pockets.

Evidence from comparable Mediterranean contexts also supports the expected effect of larger-scale greening. Kalogeri et al. (2025) show that urban greening strategies in Greater Athens can reduce near-surface air temperature, with green roofs producing daytime reductions of approximately 0.5–1.5°C in dense urban areas and a metropolitan park scenario producing localised daytime reductions of around 1.5°C under specific heatwave conditions. This evidence is used cautiously, because the effect was modelled for Athens and was strongly affected by local wind regimes, sea-breeze dynamics, and meteorological conditions.

In addition to air-temperature reduction, thermal comfort studies show that the perceived improvement in outdoor conditions can be stronger than the change in air temperature alone. Reis et al. (2023) found that densely wooded areas in Lisbon had lower Universal Thermal Climate Index (UTCI) values than compact urban zones during hot summer conditions, mainly due to the combined effect of shade, wind, and reduced radiation exposure. Similarly, Tousi et al. (2025) show that mature trees and water features in a Mediterranean urban context can substantially reduce Physiologically Equivalent Temperature (PET) during peak afternoon heat. These findings are used only as evidence of thermal comfort improvement, not as direct air-temperature reduction.

The following table translates these published benchmarks into a comparative assessment of plausible local air-temperature differences across the proposal. The values do not represent predicted temperatures for entire zones. They indicate broad ranges of potential local reduction relative to T0 within treated areas and under favourable hot-summer conditions. The ranges are assigned according to the dominant climatic intervention, degree of shade, vegetation structure, moisture availability, retained hardscape, and spatial openness of each zone.

Table 4.5: *Comparative assessment of plausible local air-temperature differences across the proposal. Source: Author, 2026*

Zone / element	Main climatic intervention	Indicative local condition relative to T0	Interpretation
Zone 1 – Porous northern threshold	Porous built edge, scattered trees, planted courtyards, wind penetration	Approximately 0–0.5°C below T0	Cooling is expected to remain limited and localised; the primary climatic role is to maintain openings for airflow at the northern threshold.
Zone 2 – Shaded comfort landscape	Clustered canopy, shaded groves, rain gardens, planted depressions, permeable	Approximately 1–3°C below T0 within treated comfort areas	Strong local cooling potential based mainly on Lisbon Metropolitan Area green-space air-temperature benchmarks. The

	ground, and open airflow gaps		range applies to shaded and planted pockets rather than uniformly across the entire zone.
Zone 3 – Adaptive-reuse heat-mitigation area	Small planted pockets, permeable thresholds, reused structures	Approximately 0.5–1°C below T0 within treated areas	Localised mitigation is possible, although the zone is expected to remain comparatively hard and heat-retaining.
Zone 4 – Open climatic landscape	Open meadow, mixed canopy, wind-permeable vegetation, and shaded edges	Approximately 0.5–1.5°C below T0 within selected areas	Moderate local cooling is plausible while preserving landscape and airflow permeability.
Zone 5 – Terminal and apron heat-mitigation area	Reused terminal and apron area, planted edges, tree pockets, shade, permeable surfaces, and treated roof-runoff reuse	Approximately 0.5–1°C below T0 within treated areas	Heat exposure may be moderated locally around shaded, planted, and permeable parts of the terminal and apron landscape.
Zone 6 – Seasonal water-sensitive cooling landscape	Water-sensitive landscapes, retention areas, planted water edges, moisture-tolerant vegetation, shade, and controlled water reuse	Approximately 1–3°C below T0 within activated comfort areas	Strong local cooling potential is plausible. Water, shade, and moisture may produce additional improvements in perceived thermal comfort, although not necessarily a greater air-temperature reduction than in Zone 2.
Zone 7 – Open southern threshold	Open sport landscape, scattered shade trees, permeable surfaces, and occasional detention	Approximately 0–0.5°C below T0 across open areas, with greater reduction in shaded pockets	The principal climatic role is airflow continuity toward the southern edge; cooling remains secondary and localised.
Zone 8 – Terminal and apron heat-mitigation area	Reused terminal and apron area, planted edges, shade trees, permeable thresholds, and treated roof-runoff reuse	Approximately 0.5–1°C below T0 within treated areas	Localised mitigation of terminal and apron heat is possible without removing the zone's active urban character.
Runway public axis	Selected retained paving and markings, lower-heat resurfacing, permeable inserts, distributed shade, and planted drainage edges	No uniform site-wide estimate; local reductions may occur within shaded and treated areas	The priority is to reduce solar exposure and surface heat while preserving its spatial identity
Runway edges	Drainage, filtration, and potential infiltration strips, linear planting, and shaded resting pockets	Approximately 0.5–1.5°C below T0 locally	Selected planted and shaded pockets may provide localised cooling, but the effect should not be assumed along the full length of the runway.

Overall, the proposal is expected to produce a differentiated climatic performance rather than a uniform reduction in air temperature across the entire site. The strongest local cooling potential is associated with treated comfort areas in Zones 2 and 6, where shade, vegetation, soil moisture, and water-sensitive landscapes work together. Based on published evidence from Lisbon and comparable Mediterranean contexts, local air temperatures within these areas may plausibly be approximately 1–3°C below the corresponding baseline condition T0 under favourable hot-summer conditions. This range should not be interpreted as an average reduction across the full area of either zone.

These values should be read as indicative design-level estimates. They do not replace detailed microclimatic simulation, field monitoring, or post-occupancy measurement. Final climatic performance would depend on vegetation maturity, canopy density, seasonal water availability, soil moisture, material albedo, wind conditions, maintenance, and the detailed spatial design of each zone. Nevertheless, by connecting the site-specific evidence from the Land Surface Temperature and solar-radiation analyses with published cooling benchmarks, the proposal demonstrates a reasonable expectation that transforming the airport from an impermeable hardscape into a sponge-like green-blue landscape can reduce local air temperatures, moderate surface heat accumulation, and improve outdoor thermal comfort across the site.

4.7. Public Space System

The public space system translates the sponge logic of the project into the scale of human experience, everyday use, and collective activity. While the previous sections defined the spatial, landscape, and climatic structure of the proposal, this section explains how these layers are occupied, activated, and experienced as public space. Section 4.4 established the Programmatic and spatial identity of the zones; Section 4.5 defined the green-blue landscape framework; and section 4.6 explained how this framework supports climatic performance through shade, vegetation, water-sensitive design, surface transformation, and the preservation of spatial openness for potential airflow. Section 4.7 builds on these layers by describing how people connect to, move through, pause within, and use the former airport site as a continuous public landscape.

The public role of each zone is not understood as a direct one-to-one translation of its climatic role. Instead, it emerges from the combination of Programmatic identity, spatial position, reuse potential, accessibility, landscape structure, and microclimatic condition. In this sense, the climatic system does not determine public life, but it shapes the comfort, intensity, and seasonal adaptability of public use across the site. Some zones, such as the comfort landscapes and water-based areas, have a close relationship between climatic performance and public experience, while others derive their public identity more directly from adaptive reuse, cultural programming, knowledge production, sport, or entertainment. Through this approach, public space becomes the social activation of the

sponge landscape. The project absorbs flows of people from the surrounding neighbourhoods, distributes them through the preserved runway and transversal corridors and porous secondary paths, and retains them within a differentiated network of public rooms, comfort gardens, event fields, water landscapes, sport areas, terminal plazas, and shaded pause spaces. In public-space terms, absorption and retention refer not only to movement, but also to the capacity of the site to hold activities, extend the duration of stay, and support different rhythms of occupation over the day, week, and season. The former airport is therefore transformed from an inaccessible infrastructural barrier into an adaptive public landscape where climatic comfort and urban life operate through the same spatial system.

4.7.1. Public Flow Absorption and Urban Attractors

The first role of the public space system is to absorb different forms of urban life from the surrounding city. The former airport previously acted as a large infrastructural barrier, interrupting pedestrian continuity, limiting public access, and separating neighbouring urban fabrics from one another. Through the design proposal, this closed condition is reversed. The former closed boundary is replaced by a distributed system of pedestrian connections, transversal corridors, and permeable urban interfaces. Public flows can therefore connect to the former airport from different directions without being organised through a single formal entrance or access hierarchy. These public flows are diverse and operate at different rhythms. They include daily neighbourhood movements, commuting flows, work-related and educational flows, recreational and leisure flows, cultural and event-based flows, sport and health-related flows, family and intergenerational use, visitors, and weekend or evening activities. Rather than addressing one specific user group, the project is designed to receive multiple patterns of public life and distribute them across the site according to different intensities, destinations, and times of use.

The sponge structure supports this absorption by creating a porous public framework. The northern interface is associated mainly with everyday residential, work-related, and local-service movements. The western side, which is more directly related to dense residential neighbourhoods, is expected to support stronger daily pedestrian and community use. Connections along the eastern side are more selective because of the presence of industrial, military, and infrastructural land uses, although the transversal corridors still improve potential cross-site relationships. The southern part of the project is activated by the sport, recreation, retail, leisure, and entertainment functions of Zones 7 and 8. Public movement is therefore multidirectional, but its intensity and character vary according to the surrounding land-use condition rather than being distributed equally along all edges.

Within this system, the preserved runway plays a double role. It acts both as the main distributor of public flows and as a linear public attractor, where movement, memory, events, and everyday promenade activities overlap. As a distributor, it connects flows arriving through different urban interfaces and supports longitudinal movement in both

directions. As an attractor, it becomes a civic promenade and memory axis, supporting walking, cycling, temporary events, linear exhibitions, informal gathering, and everyday movement across the site. The runway remains legible through its width, alignment, markings, long views, and selected retained paving, while distributed tree groups, lightweight shade structures, lower-heat surfaces, permeable inserts, and planted drainage edges improve comfort along its principal public-use areas.

Public absorption is therefore not only a question of access. It also depends on the capacity of the project to offer reasons to enter, stop, and stay. Each part of the site contributes to this process through a different type of urban attractor. Zones 1 and 2 operate as everyday attractors, supporting daily life, work, cafés, local services, shade, and rest. Zone 3 functions as a knowledge and production attractor, where reused structures and open courtyards support learning, workshops, research, collaboration, and innovation. Zone 5 acts as a civic and cultural attractor through the reuse of the terminal area, public plazas, museums, services, food, and cultural activities. Zone 4 provides a flexible event attractor for markets, performances, festivals, temporary exhibitions, and public gatherings. Zone 6 functions as a water-comfort attractor, where shaded seating, water gardens, seasonal water play, and cooling spaces create a destination for families, visitors, and everyday users. Zone 7 operates as a sport and recreation attractor, supporting running, outdoor fitness, sport fields, cycling, and flexible play. Zone 8 becomes an evening and weekend attractor, concentrating entertainment, food, retail, leisure and evening public activity.

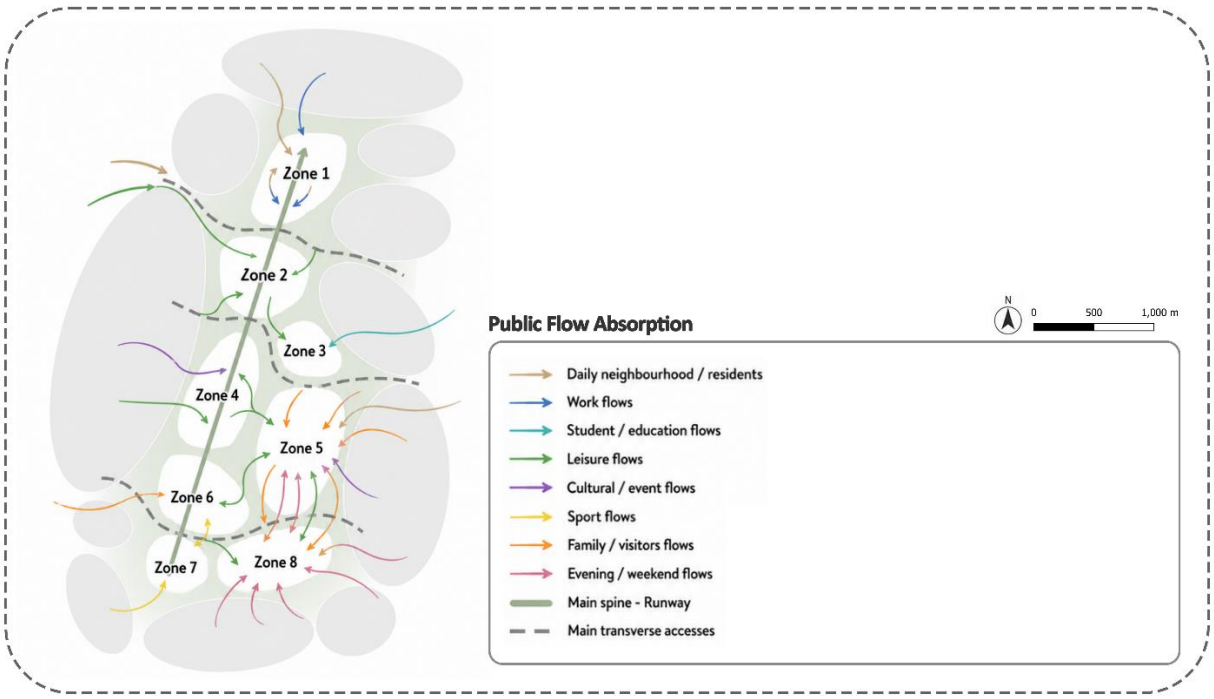


Diagram 4.19: *Public Flow Absorption. Source: Author, 2026*

In this way, the project converts movement into occupation. Public flows are received through differentiated urban interfaces, redistributed through the runway, transversal

corridors, and secondary paths, and retained within a network of public destinations. The former airport is therefore transformed from an inaccessible infrastructural void into a field of distributed public intensity, where everyday life, climatic comfort, culture, recreation, entertainment, and urban memory coexist.

4.7.2. Public-Space Typologies and Zone Characters

After public flows are absorbed into the site, they are organised and retained through a differentiated system of public-space typologies. The zones are not conceived as isolated Programmatic areas, but as complementary public islands within the larger sponge landscape. Each zone offers a different public character, receives different rhythms of use, and contributes to the continuity of public life across the former airport.

This section does not simply repeat the Programmatic structure defined in Section 4.4. Instead, it translates the spatial and Programmatic identity of each zone into a public-space typology. Each typology is defined by its public role, typical activities, and relationship to the sponge and climatic systems. These relationships are not understood as direct one-to-one translations of climatic roles into public functions. Rather, the public character of each zone emerges from the combination of programme, reuse potential, accessibility, spatial position, landscape structure, and microclimatic condition.

In the table, sponge logic is understood in public-space terms: the capacity of each zone to absorb, slow down, mix, retain, or redistribute people, activities, and rhythms of use. Climatic support refers to the way shade, vegetation, water, airflow, permeable surfaces, or moderated hardscape conditions improve the usability and comfort of these public spaces.

Table 4.6: *Public-Space Typologies and Zone Characters. Source: Author, 2026*

Zone / element	Public-space typology	Main public role	Typical activities	Public sponge logic and climatic support
Zone 1 – Live + Work	Urban threshold / semi-public live-work edge	Daily occupation, residential life, and northern activation	Living, working, local services, coworking	Absorbs daily residential and work-related flows at the northern edge; porous urban form supports potential wind penetration and requires a clear public–semi-public–private gradient
Zone 2 – Comfort + Rest	Comfort garden / shaded everyday landscape	Pause, rest, cooling, everyday exchange	Seating, informal outdoor work, kiosks, shaded paths, rain gardens	Slows, mixes, and temporarily retains daily flows between adjacent zones; shade, planting, and rain gardens support comfort and cooling
Zone 3 – Knowledge + Innovation	Knowledge courtyard / productive public campus	Learning, collaboration, experimentation	Workshops, laboratories, co-working, exhibitions, talks	Retains knowledge-based users through courtyards, workshops, and productive public spaces; planted pockets and permeable

				thresholds moderate harder surfaces
Zone 4 – Culture + Events	Flexible event field	Temporary collective intensity	Markets, festivals, outdoor cinema, performances, exhibitions	Allows temporary intensification and exchange during events; open and wind-permeable landscape supports climatic moderation
Zone 5 – Urban Core	Civic terminal plaza / public anchor	Main gathering and civic destination	Museum, galleries, food, services, public square	Absorbs diverse public groups and concentrates civic, cultural, and commercial flows as a main public anchor; planted edges, shade, and roof-runoff reuse moderate thermal stress
Zone 6 – Water + Leisure	Water-comfort landscape	Cooling, leisure, family use, water experience	Water gardens, shallow play, misting, seating, shaded water edges	Absorbs and retains people through water-based comfort, leisure, and family use; water-sensitive landscapes, shade, and seasonally moist planted edges support local cooling and public experience
Zone 7 – Sport + Recreation	Sport and recreation field	Everyday physical activity and open-air recreation	Sport fields, running, cycling, outdoor fitness, flexible play	Absorbs sport and recreation users from the surrounding southern urban fabric and redistributes movement inward through running, cycling, fitness, and open-air recreation; open landscape maintains airflow continuity, while occasional detention remains secondary
Zone 8 – Entertainment + Economy	Entertainment and evening economy edge	Weekend, night-time, and economic activation	Food hall, cinema, events, retail and leisure spaces	Acts as a strong southern public anchor, absorbing shopping, leisure, evening, weekend, and entertainment flows; planted edges and reuse strategies soften the thermal condition of an active hardscape area
Runway	Civic promenade / memory axis with shaded pause edges	Longitudinal public movement, identity, rest, and linear events	Walking, cycling, temporary markets, exhibitions, seasonal events, seating, viewing, informal meeting	Distributes public flows longitudinally while retaining movement, memory, events, and pause spaces; airport identity is preserved through alignment, markings, and selected paving, while distributed shade and lower-heat and permeable treatments improve comfort.

Zone 1 operates as the northern urban threshold of the project. Its public character is not that of a fully open civic space, because housing and live-work functions require a careful balance between public access and residential privacy. Public activity is therefore concentrated along the more active edges of the zone, including ground-floor services, coworking spaces, local facilities, and shared open spaces. Residential buildings and quieter living areas are placed behind these active edges, with semi-public courtyards providing outdoor spaces for residents without exposing them directly to all public flows entering the site. At the same time, the relatively porous arrangement of buildings avoids a continuous northern barrier and preserves broad openings between the built volumes. This configuration may support airflow continuity, although its pedestrian-level wind performance would require detailed simulation.

Zone 2 functions as a comfort garden and shaded everyday landscape. Its public role is based on pause, rest, informal outdoor work, and daily use rather than large-scale events. Shaded paths, seating areas, kiosks, rain gardens, and planted depressions create a softer transition between the northern edge and the interior of the project. This zone can be used by residents, workers, students, researchers, and visitors coming from Zone 1 and Zone 3, offering them a place to rest, meet, work outdoors, or spend time between daily activities. In this sense, Zone 2 supports the exchange logic of the sponge: flows are not only moving through the site, but are slowed down, mixed, and temporarily retained within a comfortable public landscape. Although water-sensitive elements are present, Zone 2 is not conceived as the main water destination of the project. Its identity remains that of a comfort landscape where shade, vegetation, soil moisture, and small rain-garden systems support everyday public occupation.

Zone 3 is defined as a knowledge courtyard and productive public campus. Its public identity comes primarily from the reuse of existing structures and the introduction of learning, research, innovation, and production-related activities. Workshops, laboratories, flexible workspaces, co-working areas, exhibitions, talks, and outdoor courtyards allow knowledge-based activities to become visible and accessible within the wider public network. Climatically, the retained structures and harder surfaces require local heat-mitigation measures, including planted pockets, permeable thresholds, and shaded courtyards.

Zone 4 acts as a flexible event field. Rather than becoming a heavily built cultural district, it remains an open and adaptable public landscape capable of hosting temporary collective intensity. Markets, festivals, performances, outdoor cinema, concerts, exhibitions, and public gatherings can occupy the field at different times of day or season. Its openness is important not only for flexibility, but also for the climatic logic of the project: as a central climatic moderator, Zone 4 combines mixed canopy, meadow surfaces, and open ground while preserving wind permeability across the site.

Zone 5 forms the main civic terminal plaza and public anchor of the project. Its public role is strongly connected to the adaptive reuse of Terminal 1 and the surrounding apron

spaces. Possible activities include an aviation museum, galleries, cultural facilities, restaurants, public services, commercial programmes, and a large civic square. This zone receives cultural, touristic, commercial, and civic flows, acting as one of the strongest public destinations within the project. At the same time, the retained terminal and apron surfaces require heat-mitigation measures, including planted edges, shade, tree pockets, permeable surfaces, and appropriately treated roof-runoff reuse.

Zone 6 is the main water-comfort landscape of the project. Here, the water strategy becomes a public experience rather than only an environmental infrastructure. Water gardens, shaded planted water edges, shallow interactive water elements, seasonal misting, seating areas, and family-oriented play spaces create a cooling destination in the southern part of the site. This zone supports leisure, relaxation, intergenerational use, and comfort-seeking public flows, especially during warm periods. These water-based public elements are understood as controlled, treated, and seasonally activated systems, rather than permanently high-consumption water features. In this way, Zone 6 translates the blue cooling anchor of the climatic system into a visible and experiential public landscape.

Zone 7 functions primarily as an open sport and recreation landscape. Its everyday public identity is based on physical activity, open-air recreation, movement, and flexible play. Sports fields, running and cycling paths, outdoor fitness areas, open lawns, and small support facilities accommodate both organised and informal activities. Selected lowered fields may temporarily provide dry detention during intense rainfall, but this capacity remains secondary and does not define the everyday identity of the zone. From a public-space perspective, Zone 7 operates as a southern public attractor and open urban interface, drawing users from the surrounding fabric through sport and recreation. Its predominantly open structure also maintains visual permeability and supports airflow continuity toward the southern edge.

Zone 8 completes the southern public sequence as an entertainment and evening-economy destination. Its identity is linked to the adaptive reuse of Terminal 2 and associated apron surfaces, which can support food halls, cinema, retail, leisure, temporary events, creative-economy activities, and evening uses. The zone attracts weekend, commercial, entertainment, and night-time flows from the surrounding southern urban fabric. Because of its strong attraction capacity, it operates as a major southern public anchor and redistributes users toward Zone 7, Zone 6, the runway, and the central public spaces. Its harder surfaces are moderated through planted edges, shaded pockets, permeable thresholds, and landscape buffers without removing its active urban character.

The preserved runway is treated as a public-space typology in its own right. It functions as a civic promenade and memory axis, supporting walking, cycling, informal gathering, linear exhibitions, temporary markets, and seasonal public events. At the same time, it is not conceived as a dense green corridor or a fully shaded park axis. The runway remains

a hard, continuous, and relatively open public spine that preserves the spatial memory of the airport while structuring movement through the site. Public comfort is provided through planted edges, shaded pause pockets, seating areas, small kiosks, viewing points, and adjacent landscape zones. In this way, the runway can remain legible as an infrastructural memory while becoming usable as a public promenade.

Together, these typologies create a differentiated but continuous public landscape. Daily life, work, knowledge, comfort, culture, water, sport, entertainment, movement, and memory are not distributed randomly across the site; they are organised through a network of public characters that absorb and retain different forms of urban life. In this way, the public-space system becomes the social and experiential layer of the sponge landscape, transforming the former airport into a sequence of public rooms, active edges, comfort pockets, civic anchors, and adaptive open fields.

4.7.3. Activity Network and Temporal Use Scenarios

The activity network explains how public flows are transferred, distributed, slowed down, and exchanged between the different zones. If the previous sections define what types of flows enter the site and where they are retained, this section explains how these flows move through the sponge structure and how public life changes over time. The project relies on a hierarchy of public routes composed of the preserved runway, three transversal corridors, secondary paths between the islands, and open voids that allow movement to become part of the public-space experience.

Within this network, the preserved runway acts not only as a circulation spine, but also as a public experience platform. It connects the different zones along the north–south axis in both directions and transforms the former infrastructural axis into a continuous public promenade. Rather than operating as a one-way movement channel, the runway receives public flows from the northern, central, southern, eastern, and western access points and redistributes them across the site. Walking, cycling, resting, gathering, informal activities, linear exhibitions, and temporary events can take place along this space. In this way, the runway is not only a distributor of flows, but also a place where movement, memory, and public life overlap. Its role remains consistent with the overall climatic strategy: the runway retains its alignment, width, markings, and selected paving as an identifiable public axis, while distributed shade, lower-heat surfaces, permeable inserts, and planted drainage edges improve comfort.

The three transversal corridors play a key role in overcoming the former barrier condition of the airport. They reconnect the eastern and western neighbourhoods and bring public flows into the interior of the project. These corridors are not conceived as conventional traffic routes, because the objective is not to introduce new vehicular barriers into the site. Instead, they are designed as slow, public, and human-oriented connections that support walking, cycling, shade, vegetation, seating, and everyday social use. These corridors also operate as climate-sensitive public routes, combining shade,

planting, ventilation, and resting areas to make pedestrian movement more comfortable throughout the year.

The central corridor provides the strongest east–west pedestrian connection across the former airport site and links the central public zones with the surrounding urban fabric on both sides. By excluding public motor traffic from this central connection, the project creates a continuous pedestrian public space that can accommodate markets, events, informal gathering, and direct access to the central zones. The central corridor therefore functions not only as a crossing route, but also as a shared civic space where different users, activities, and public rhythms meet.

The Northern and Southern Corridors share the same pedestrian-priority street profile. Both accommodate low-speed local motor traffic, with one lane in each direction, a dedicated cycle path, and wide pedestrian pavements on both sides. Pedestrian priority is expressed through the greater combined width allocated to walking, supported by planting, seating, and coordinated crossings. This hierarchy makes the network more flexible without weakening the pedestrian character of the project. The northern corridor supports daily flows related to housing, work, comfort, and local services. The southern corridor, by contrast, connects the water-based landscapes, sport and recreation areas, and entertainment programmes of the southern part of the site. It also receives flows generated by Zone 7 and Zone 8, allowing users entering from the southern edge to move inward toward the runway, the water landscape, the urban core, and the central public spaces. In this way, the public network does not operate as a one-directional north-to-south sequence, but as a multidirectional system of entry, distribution, and exchange.

In addition to the runway and the three transversal corridors, the spaces between the islands form a finer network of porous secondary paths and open voids. These routes are not conceived as formal streets or vehicular routes, but as soft pedestrian and cycling connections that allow people to move laterally, choose alternative paths, wander slowly, and experience the site as a porous field rather than as a set of fixed destinations. In this section, their porosity is understood primarily as a social and spatial condition: they slow down movement, create opportunities for pause, encounter, informal occupation, and unexpected exchange, and allow public life to disperse between the island-like zones. In public-space terms, these secondary paths transform circulation from a purely functional movement system into a social and experiential layer of the sponge landscape.

Through this network, public life is not concentrated in one point but distributed across the site. Flows are absorbed from the surrounding city, transferred through pedestrian-oriented and climate-sensitive corridors, retained within the public-space typologies of the zones, and exchanged through secondary paths and open voids. The public space system therefore translates the sponge concept into social and spatial terms: the site absorbs people from the city, slows and distributes their movement, retains activities within differentiated public rooms, and enables exchange between users, programmes, and urban contexts.

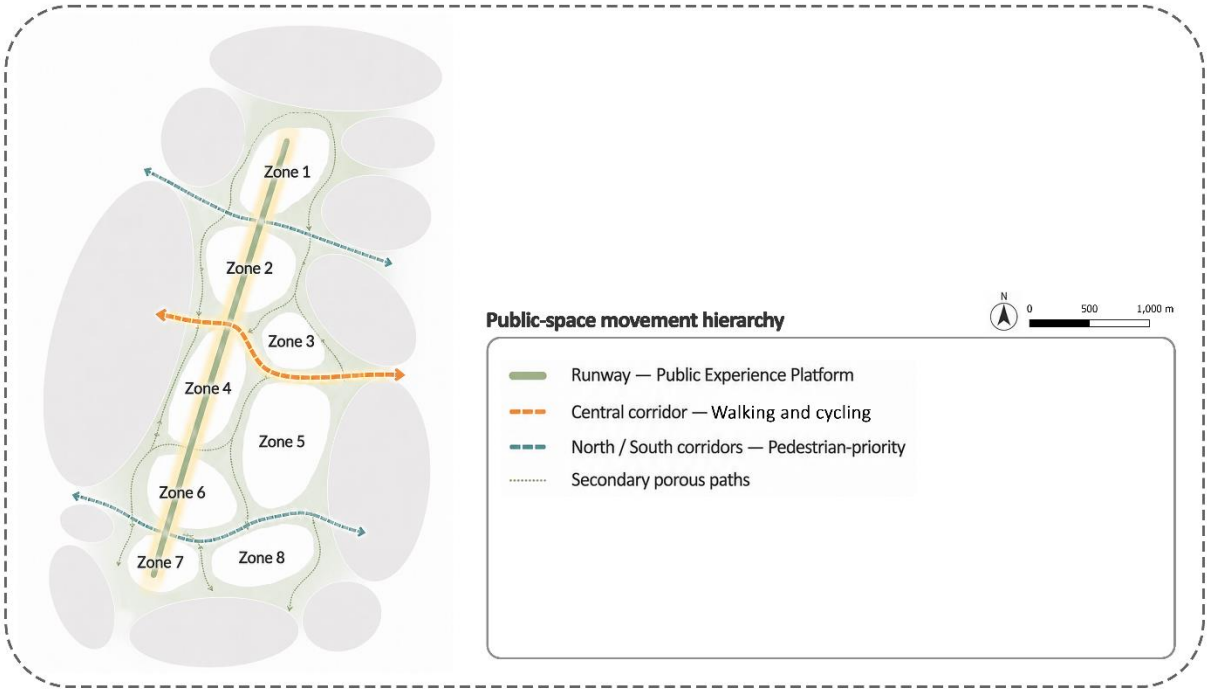


Diagram 4.20: *Public-space movement hierarchy. Source: Author, 2026*

However, the activity network is not only spatial; it is also temporal. Public spaces are used differently during the morning, afternoon, evening, weekend, seasonal events, and rainfall conditions. This temporal dimension is important because the sponge landscape does not operate as a fixed composition. It adapts to different rhythms of occupation, different climatic conditions, and different levels of public intensity. A shaded garden may support quiet rest during a weekday afternoon, while the same network may channel visitors toward cultural events in the evening or toward water-based comfort areas during hot periods.

The table does not present fixed programmes for each zone, but possible temporal scenarios of use. The column "Public use" describes how people may occupy the site in each condition, while "Public sponge logic" explains how the same public-space system absorbs, slows down, redistributes, intensifies, or temporarily adapts public life over time.

Table 4.7: *Possible temporal scenarios of use for each zone. Source: Author, 2026*

Scenario	Main zones / elements	Public use	Public sponge logic
Morning / weekday use	Zone 1, Zone 2, Zone 3, Zone 7 & the runway	Commuting, work, study, cafés, walking, cycling, sport activities	Daily absorption and distribution of local flows
Hot afternoon	Zone 2, Zone 6, runway edges,	Shaded rest, cooling, informal outdoor work, water play, misting, slow movement	Retention of people in comfort pockets and cooling landscapes

	shaded corridors		
Evening use	Zone 5, Zone 7, Zone 8, runway	Sport, promenade, food, culture, entertainment, informal gathering	Redistribution of public intensity toward civic, recreation, and entertainment areas
Weekend / event day	Zone 4, Zone 5, Zone 7, Zone 8, and the runway	Markets, festivals, exhibitions, performances, temporary events, shopping	Temporary intensification and exchange between different user groups
Heavy rain / Stormwater event	Zone 5, Zone 6, Zone 7, Zone 8	Public life shifts toward indoor spaces and sheltered terminal areas in Zones 5 and 8, while activities in selected lowered sport fields are temporarily suspended.	Selected water-sensitive landscapes temporarily retain stormwater and gradually return to ordinary public use after drawdown.

These scenarios show that the project is not based on a single fixed pattern of use. Instead, public life expands, contracts, intensifies, and slows down according to time, climate, events, and everyday needs. During ordinary weekdays, the network mainly absorbs and distributes daily flows between housing, work, comfort, and knowledge spaces. During hot afternoons, public life is drawn toward shaded and water-sensitive landscapes. During evenings and weekends, intensity shifts toward the runway, the civic core, sport areas, culture, and entertainment. The activity network therefore completes the public-space system by connecting movement, programme, comfort, and time. It demonstrates how the former airport can support changing patterns of occupation rather than a single fixed pattern of use. The sponge logic is expressed not only through the reception of people from the surrounding city, but also through the way activities are redistributed, retained, exchanged, adapted, and reactivated under different daily, weekly, seasonal, and climatic conditions.

Social Inclusion and Management Principles

Building on the critical discussion in Sections 2.4.3 and 2.7.3, the proposal recognises that physical openness does not automatically produce social inclusion. Public access can still become limited if open spaces are dominated by commercial activities, housing becomes unaffordable, temporary uses exclude local communities, or public squares are gradually controlled by private operators. The spatial proposal is therefore supported by the following design and management principles.

Table 4.8: *Social inclusion and public-space management principles. Source: Author, 2026*

Principle	Application within the proposal
Non-commercial public space	The majority of the principal public spaces must remain free to use without payment, ticketing, or any requirement to purchase. Cafés, shops, concessions, and ticketed events are allowed only within limited and clearly defined areas.
Permanent public access	The preserved runway and the three transversal corridors must remain publicly accessible. Temporary events may occupy parts of these spaces, but they must not block continuous movement across the site.
Affordable housing in Zone 1	A defined share of the housing in Zone 1 must be affordable and integrated with the other residential units. The exact proportion should be established later through municipal housing policy and planning agreements.
Local management	Selected community rooms and open spaces should be managed or co-managed by local associations and non-profit organisations through transparent agreements with the responsible public authority.
Community-led uses in Zone 4	Zone 4 should reserve space and time for community events, local markets, workshops, informal activities, and non-profit cultural uses. Commercial events should not dominate the entire zone or remove its everyday public use.
Protection of terminal squares	The public squares around Terminal 1 and Terminal 2 must remain civic spaces. Café terraces, commercial concessions, security areas, and temporary event enclosures should remain limited and must not create permanent barriers, compulsory consumption, or restricted public access.

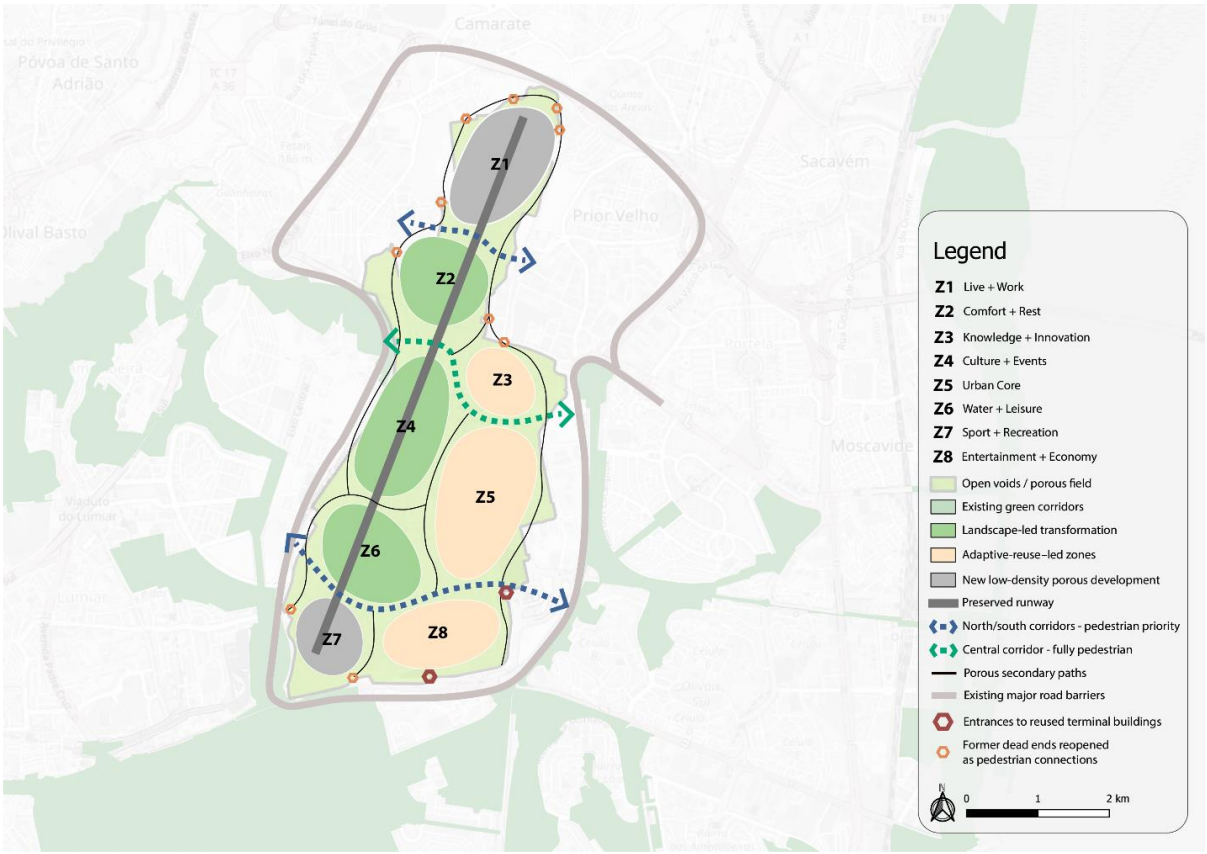
These principles do not assume that social inclusion can be achieved through spatial design alone. Their implementation would require municipal agreements, participation by surrounding communities, and continued monitoring. However, they ensure that the proposal responds to the political and social findings of Chapter 2 as well as to its spatial strategies.

4.8. Masterplan, Urban Integration and Detailed Design

This section presents the final masterplan through four complementary parts. Section 4.8.1 introduces the integrated masterplan, while Section 4.8.2 examines its relationship with surrounding land uses. Section 4.8.3 explains edge accessibility and external connections, and Section 4.8.4 develops the central-southern focus area at a closer urban-design scale.

4.8.1. Integrated Masterplan

The integrated masterplan presents the final synthesis of the project as a sponge-based urban system. The proposal is organised through the relationship between a continuous infrastructural spine, a series of island-like zones, and a porous field of open spaces and connections between them.



Map 4.2: *Integrated masterplan of the project. Source: Author, 2026*

Within this system, the preserved runway provides continuity, orientation, and collective memory. It acts as the stable spine around which the softer and more adaptable parts of the masterplan are organised. The runway does not contain all movement or activity by itself; instead, it distributes people between the different zones and provides a common spatial reference across the site. The three transversal corridors overcome the former east–west severance created by the airport and connect this longitudinal structure to the surrounding urban fabric. The Central Corridor, dedicated to walking and cycling, creates the strongest public exchange across the site, while the northern and southern pedestrian-priority corridors support more flexible forms of movement across the site.

The zones operate as the main absorbing and retaining elements of the sponge structure. Each island receives a different combination of programmes, users, landscape conditions, and rhythms of occupation. Some zones absorb everyday residential, working, and educational activities, while others retain civic, cultural, recreational, water-based, or entertainment uses. Their different forms of transformation—new porous development, adaptive reuse, or landscape-led intervention—respond to the existing physical conditions of each part of the former airport. The zones are therefore not isolated objects, but differentiated reservoirs of activity that collectively support a varied and continuous urban life.

The open voids and porous secondary paths form the connective tissue between these islands. They allow movement and activity to disperse gradually rather than being

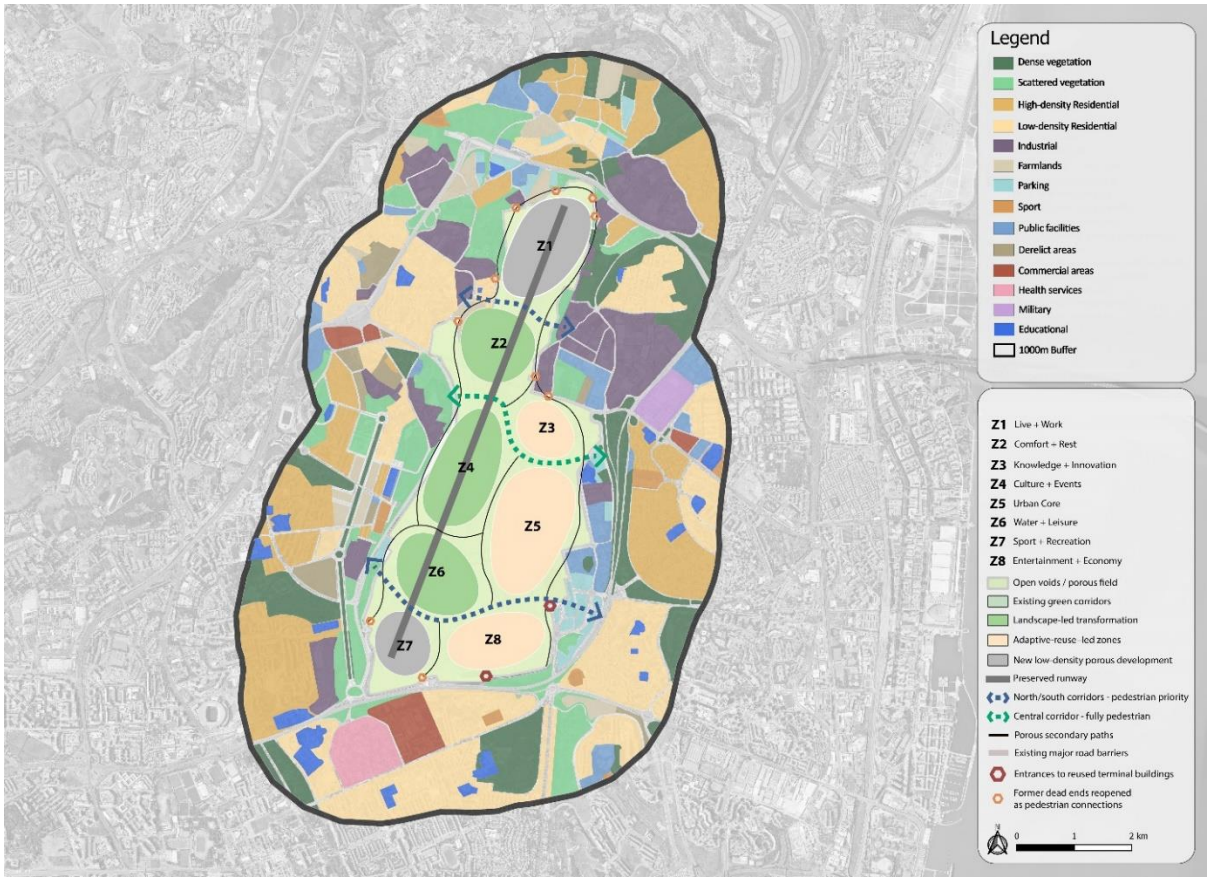
concentrated only along the runway and the main corridors. These spaces support slower movement, informal occupation, climatic exchange, landscape continuity, and water-sensitive ground conditions. The masterplan therefore works through a balance between concentration and openness: the zones provide recognisable destinations and Programmatic intensity, while the spaces between them maintain permeability, flexibility, and exchange. Beyond this connective function, activity in one zone can support the attractiveness and vitality of neighbouring spaces. Local cooling associated with shaded, planted, and water-sensitive landscapes may also influence nearby public areas, depending on weather conditions and detailed spatial design. Connectivity establishes the links between elements; exchange is what allows these links to remain active over time.

The sponge logic also operates across different environmental and social processes. Rainwater can be slowed, retained, filtered, reused, or redirected through the landscape structure; air can move through the open voids and porous built arrangements; and public flows can enter the site, disperse across the network, pause within the zones, and move between different activities. These processes do not function as separate technical systems. They overlap spatially, allowing the same landscapes, paths, edges, and open spaces to support environmental performance and public life at the same time. This overlap is not incidental: it is the direct spatial expression of the project's founding ambition to treat climatic performance and public space quality not as parallel agendas, but as a single integrated objective. Where a zone provides shade, manages runoff, or supports local thermal comfort, it does so through the same spaces where people gather, rest, and move, integrating environmental strategies and public life within a shared spatial structure.

The reopening of former dead ends as pedestrian connections further extends this sponge logic toward the surrounding city. Instead of functioning as a closed boundary, the former airport edge becomes more permeable and connected to neighbouring urban areas. The existing green corridors provide a wider environmental framework, while the internal zones and open spaces introduce new social and Programmatic relationships within the site.

4.8.2. Contextual Land Use and Urban Integration

This map situates the integrated master plan within the same 1,000-metre contextual area examined in the site analysis chapter. Its purpose is not to repeat the earlier land-use survey or to introduce a different version of the proposal. Instead, it allows the final masterplan to be read against the four contrasting contact conditions surrounding the former airport. The map therefore examines whether the proposed zone structure, landscape transitions, and cross-site connections respond appropriately to the residential, productive, institutional, commercial, and green environments located around the site.



Map 4.3: *Contextual Land Use and Urban Integration. Source: Author, 2026*

As identified in the previous analysis, the airport is surrounded by a fragmented context rather than by a uniform urban condition. High-density residential areas are concentrated mainly along the western edge, while industrial, military, and infrastructural uses more strongly influence the eastern side. The southern edge contains a more diverse combination of residential areas, commercial uses, educational facilities, health services, and other public functions. By contrast, the northern edge is generally less dense and includes low-density residential areas, scattered vegetation, and more open or undeveloped land. The masterplan consequently does not apply the same spatial response to every side of the site; each edge develops a different degree of public activity, landscape continuity, buffering, and urban permeability.

Along the northern edge, the placement of Zones 1 and 2 responds to the relatively open and heterogeneous character of the surrounding context. The low-density and porous structure of Zone 1 avoids creating an abrupt built boundary against the existing low-density residential areas and open land. Zone 2 reinforces this gradual transition through a predominantly landscape-based condition that connects the new development to the scattered vegetation and green structures visible around the northern contact zone. Together, these zones establish a softer urban threshold in which new occupation can be introduced without replacing the spatial openness of the existing northern edge with a continuous built mass.

The western edge requires a different response because of its close relationship with high-density residential neighbourhoods. Here, the landscape-led character of Zones 2, 4 and 6, together with the open voids and pedestrian connections between them, creates a more community-oriented and environmentally moderated interface. Instead of extending intensive construction toward the residential boundary, the masterplan places accessible open landscapes, cultural and recreational spaces, and green-blue elements along this side. This provides nearby residents with new public-space opportunities while also introducing a spatial buffer between the denser neighbourhoods and the more active areas inside the project. The reopening of selected former dead ends further improves the relationship with these neighbourhoods by converting previously interrupted streets into pedestrian connections to the internal public network.

The eastern edge remains more constrained by industrial areas, military land, major infrastructure, and large-scale non-residential uses. The relationship with this side is therefore less dependent on continuous neighbourhood access and more strongly based on selective connections, adaptive reuse, and larger Programmatic anchors. The locations of Zones 3 and 5 are compatible with this more robust urban condition, where knowledge, employment, civic, and institutional activities can coexist with larger building footprints and existing infrastructure. At the same time, the transversal corridors create opportunities to overcome parts of the east–west severance without assuming that the entire eastern boundary can become equally open or publicly accessible. Where rigid or restricted uses remain, landscape structure and open space continue to provide separation and environmental buffering.

The southern edge presents the most functionally diverse contact condition. Residential areas, commercial activities, educational facilities, health services, public facilities, and transport-related uses create the potential for a more active and multifunctional urban interface. Within the proposal, Zones 6 and 7 provide a softer transition through water-based landscape, open-space recreation, and sport, while Zone 8 establishes a stronger urban destination associated with leisure, commerce, entertainment, and the reuse of the southern terminal area. This sequence responds to the mixed character of the surrounding context: the landscape-led zones accommodate daily and recreational use, while the more active southern anchor can attract users from a wider urban area. Because residential, educational, and health-related uses are also present nearby, the intensity of evening activities, traffic, noise, and lighting would require careful management through landscape buffers, controlled access arrangements, and appropriate operating times.

The central zones are not positioned as direct extensions of one specific surrounding land use. Their location close to the runway and the main transversal connections allows them to serve several parts of the city rather than only the immediately adjacent neighbourhoods. This is particularly important for Zones 4 and 5, whose central position enables cultural, civic, and event-related activities to be reached from the western residential areas, the eastern employment and industrial context, and the proposal's

northern and southern parts. Their role demonstrates that contextual integration does not require every zone to copy the land use beside it; it can also occur through complementary programmes that address wider urban needs.

The contextual reading therefore shows that the surrounding land uses influence the masterplan without directly determining it. Existing buildings, the runway, environmental conditions, landscape continuity, and the internal sponge structure remain important design factors. However, the context affects the appropriate density, degree of openness, public intensity, and edge treatment of each zone. Residential edges require greater permeability, daily accessibility, and environmental moderation; industrial and military edges require more selective connections and buffering; open northern areas allow ecological continuity and lower-density development; and the mixed southern context supports a combination of recreational landscapes and stronger urban destinations.

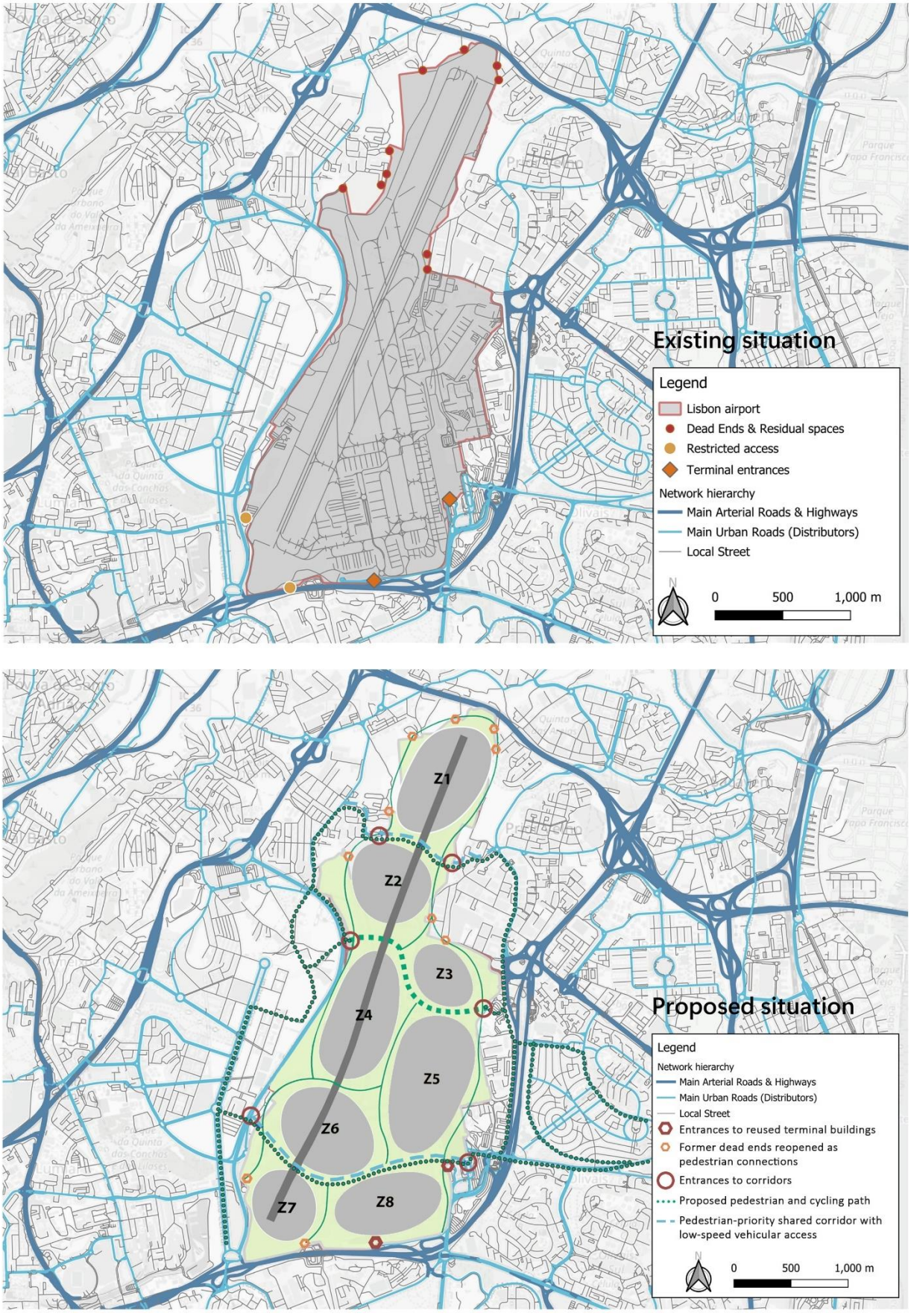
4.8.3. Edge Accessibility and External Connections

Opening the airport boundary is only one part of improving accessibility. As identified in Chapter 3, surrounding arterial roads, disconnected local streets and limited crossing opportunities also separate the site from neighbouring areas. The proposal therefore combines new entrances with external walking and cycling links, pedestrian-priority streets and improved road crossings. The aim is to create continuous connections from the surrounding neighbourhoods into the park, rather than opening gates without addressing the routes leading to them.

Existing and Proposed Connections

The existing network directs access towards the airport terminals and restricted entrances, while several local streets end at the boundary. The proposal retains the surrounding road hierarchy but introduces new connections through and around the site. External pedestrian and cycling links connect neighbouring streets to the transversal corridors and reopened entrances.

The Northern and Southern Corridors provide controlled, low-speed vehicular connections alongside walking and cycling routes. The Central Corridor remains free from public motor traffic. Reopened former dead ends provide additional neighbourhood entrances without becoming new vehicular through-routes.



Map 4.4: *Comparison of existing barriers and proposed pedestrian, cycling and low-speed vehicular connections around the former airport. Source: Author, 2026.*

Northern and Southern Corridors

The Northern and Southern Corridors share a pedestrian-priority street profile. Each combines a 6 m carriageway, with one traffic lane in each direction, a 3 m two-way cycle path, two 2 m planting strips, and 5 m pedestrian pavements on both sides. Trees and planting separate the walking areas from traffic, while seating and lighting support everyday use. Vehicular access is controlled and speeds are kept low. These corridors provide local cross-site connections rather than additional high-capacity roads. Their junctions with the surrounding street network require coordinated crossings and traffic management.

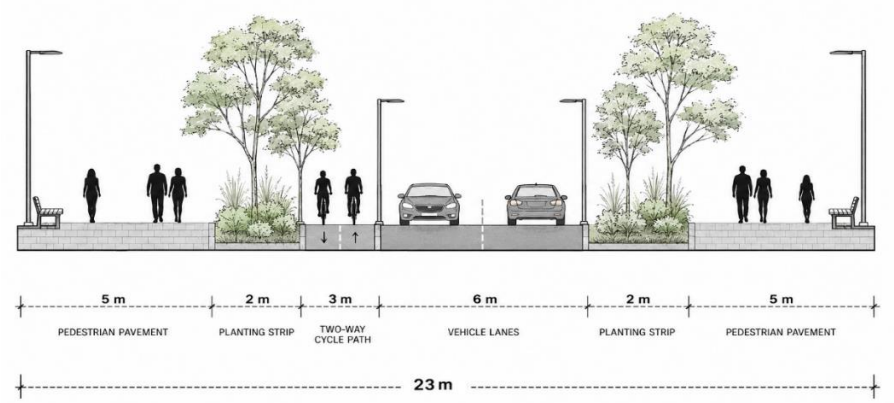


Diagram 4.21: *Indicative cross-section of the Northern and Southern Corridors, combining pedestrian space, planting, cycling and low-speed vehicular access. Source: Author, 2026*

Central Corridor

The Central Corridor provides an east–west connection dedicated to walking and cycling. Two 6 m pedestrian routes are arranged on either side of a central 3 m two-way cycle path, with 3 m planted strips separating the different movement areas. Additional planting defines the outer edges. Trees provide shade, while benches and lighting allow the corridor to support resting and social activity as well as movement. This landscape-led route connects the surrounding pedestrian network with Zones 3 and 4 and the preserved runway, without introducing public motor traffic into the central public spaces.

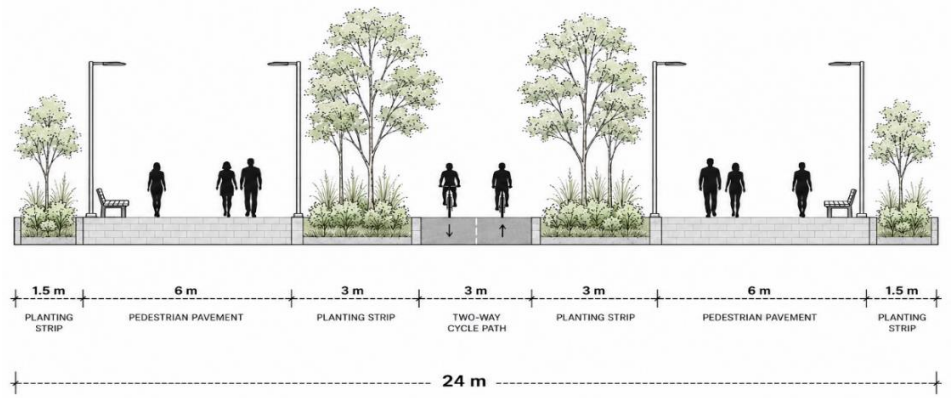


Diagram 4.22: *Indicative cross-section of the Central Corridor, showing pedestrian routes, a central cycle path, planted separation and shaded resting areas. Source: Author, 2026*

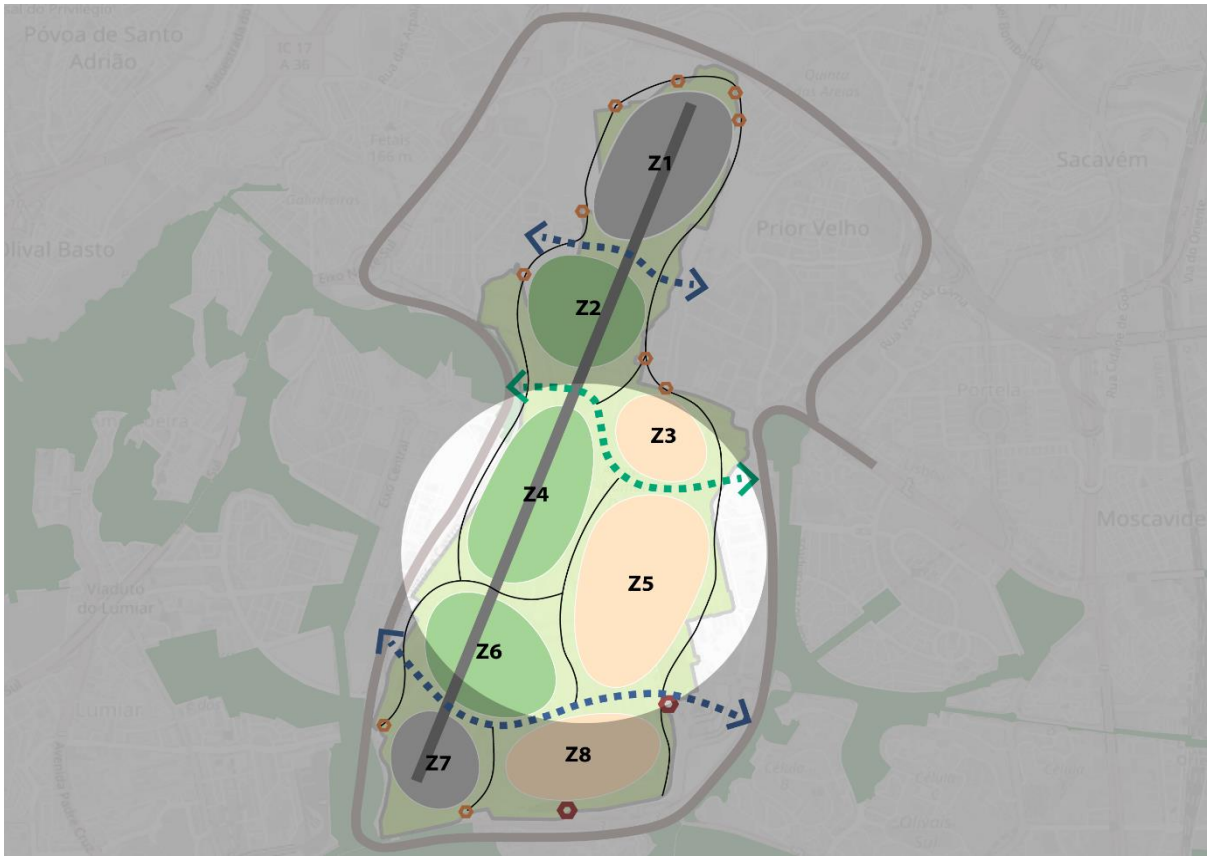
From Dead end to Neighbourhood Entrance

At the neighbourhood scale, selected former dead ends are reopened as pedestrian and cycling entrances. The before-and-after study retains the existing street alignment and surrounding boundary structures, while replacing the closed airport gate with a modest entrance frame and a clear route into the park. The intervention connects the local street to the internal path network without creating a new vehicular through-route.



Figure 4.1: *Existing and proposed views of a former Dead end reopened as a neighbourhood entrance to the park. Existing image: Google Earth / Street View. Proposed image: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI.*

4.8.4. Detailed Urban Design Focus



Map 4.5: *Location and extent of the detailed focus area within the proposed masterplan, including Zones 3–6 and the principal connecting structure. Source: Author, 2026*

Building on the integrated masterplan, this section develops the proposal at a closer urban-design scale through a central-southern focus area comprising Zones 3, 4, 5, and 6. Together, these zones cover approximately 1,365,000 m^2: Zone 3 occupies around 155,000 m^2, Zone 4 around 390,000 m^2, Zone 5 around 500,000 m^2, and Zone 6 around 320,000 m^2. This area was selected because it brings together the project's principal adaptive-reuse structures, civic spaces, flexible cultural landscapes, and water-based public spaces, while also intersecting with the preserved runway and the main transversal corridors.

Focus Area and Design Logic

The four zones are conceived as a continuous sequence of complementary public environments rather than as isolated programme areas. Zone 3 forms a compact Knowledge and Innovation campus based on the reuse of existing buildings and hangars. Zone 4 provides an open and flexible landscape for cultural, community, and event-based activities. Zone 5 acts as the main civic anchor of the area through the adaptive reuse of Terminal 1 and its former apron, while Zone 6 introduces a water-oriented leisure landscape with a more informal and seasonal character.



Map 4.6: *Diagrammatic spatial organisation of the focus area, showing the relationship between existing structures, public-space patches, principal nodes, paths, and entrances. Source: Author, 2026*

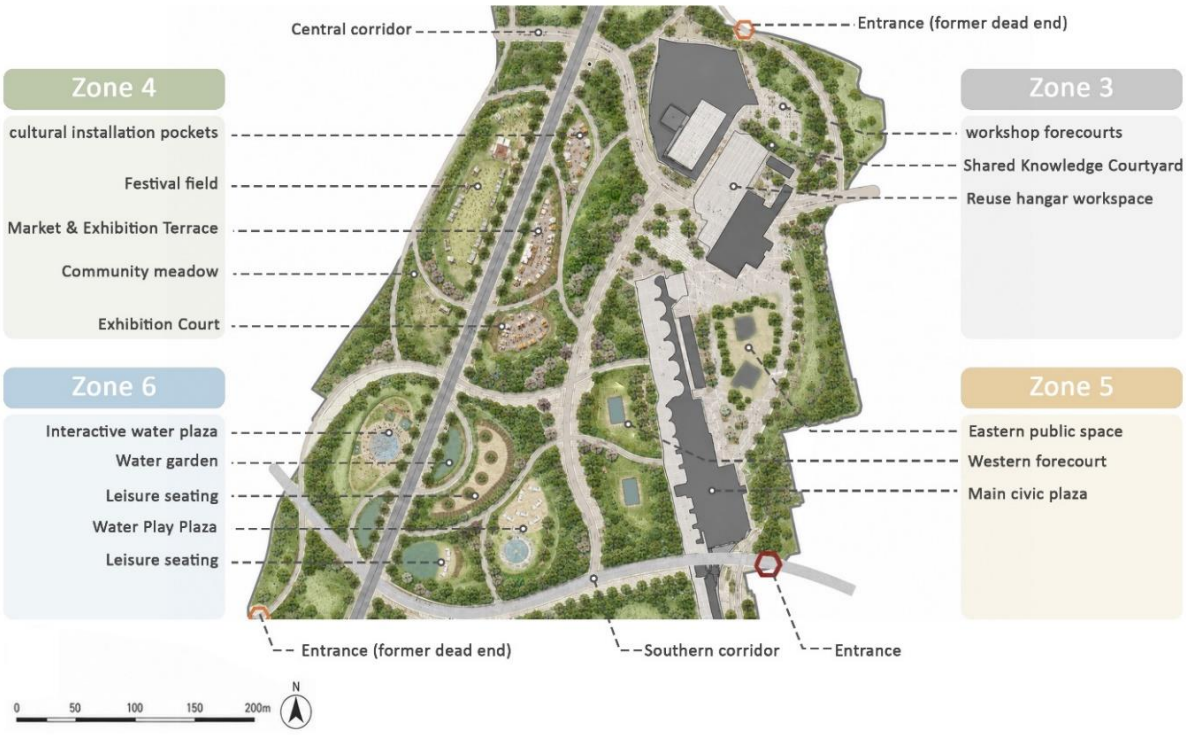
The preserved runway provides the principal longitudinal continuity and remains legible as a hard, linear public promenade that retains the infrastructural identity of the former airport. The Central Corridor, dedicated to walking and cycling, creates the main

transversal connection between Zones 3 and 4, while the Southern Corridor provides a pedestrian-priority link between Zones 5 and 6 and the surrounding urban edges. A finer network of secondary paths connects these major structures, links the individual public spaces, and improves permeability through the reopening of former dead-end access points.

Before developing the detailed plan, a schematic spatial study was prepared using the patch-based representational logic of the Downsview Park reference. The diagram simplifies the proposal into zones, existing buildings, former aprons, movement routes, entrances, and a distributed system of public nodes. This step establishes the main relationships between built structures and open spaces without predetermining their detailed landscape form.

Detailed Urban Design Plan

The detailed urban design plan translates this spatial framework into a coordinated public landscape while preserving the position and identity of the runway, Terminal 1, existing hangars, aprons, and main access structure. The proposal operates primarily through the transformation of the ground: different paving fields, planted edges, tree cover, water elements, and activity surfaces give each zone a distinct spatial character while maintaining continuity across the focus area.



Map 4.7: *Detailed urban design plan for Zones 3–6, showing the principal public spaces, adaptive-reuse structures, water elements, entrances, and corridor connections. Source: Author, 2026*

In Zone 3, the preserved buildings and hangars are organised as a compact adaptive-reuse campus. Workshop forecourts and a shared Knowledge Courtyard extend the

reused workspaces into the public realm and establish an active relationship with the Central Corridor. Hard surfaces required for collective work and flexible activities are combined with planted edges and shaded areas, allowing the zone to retain a clear campus character rather than becoming a conventional park.

Zone 4 is structured as a flexible Culture and Events landscape. Its main elements include a Festival Field, Market and Exhibition Terrace, Exhibition Court, Community Meadow, and smaller cultural installation pockets. The combination of open lawns, harder event surfaces, shaded areas, and secondary paths enables the zone to support both large temporary events and informal everyday use without fixing the landscape to a single programme.

Zone 5 forms the main civic and adaptive-reuse anchor of the focus area. Terminal 1 remains the dominant built element, while the former apron is reinterpreted as a structured public ground containing the Main Civic Plaza, Western Forecourt, and Eastern Public Space. These spaces create a clearer relationship between the terminal, surrounding landscape, entrances, and pedestrian routes while retaining the scale and material memory of the former airport infrastructure.

Zone 6 develops a more landscape-led sequence organised around an Interactive Water Plaza, Water Garden, Water Play Plaza, and different leisure-seating areas. Water operates simultaneously as a recreational, spatial, and cooling element, while paths and planted edges connect the individual water spaces to the runway and Southern Corridor.

Selected Spatial Details

The following sketches develop selected parts of the detailed plan at a closer scale. They show how retained airport structures, paving, planting, shade and public activities come together within the focus area. Particular attention is given to the runway, the western site boundary, the relationship between Terminal 1 and the water landscape, and the flexible cultural spaces of Zone 4.

1- Runway: Public Life, Shade and Drainage

The runway retains its straight alignment and original markings as recognisable traces of the airport. A marked cycle route runs along one side, while the remaining surface supports walking, informal play, small performances and temporary stalls. Trees, lightweight canopies and benches along the edges provide places to pause in shade. The drainage proposal introduces shallow planted strips beside the paved surface to receive and slow rainwater runoff and support filtration. Infiltration into the ground remains subject to soil and contamination assessment.



Figure 4.2: *Perspective of the preserved runway as a public promenade, showing everyday activities, cycling, shaded seating and temporary uses. Lower-heat and permeable surface treatments form part of the design strategy but are not differentiated in this illustrative view. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI.*

2- Southern Corridor: Crossing the Site Boundary



Figure 4.3: *Oblique perspective of the Southern Corridor at the western site boundary, showing the landscaped street and proposed signal-controlled pedestrian crossing. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI*

The Southern Corridor connects the internal public-space network to the western urban edge. A narrow, two-way carriageway is bordered by planted strips and wide pavements with trees and seating. The change in paving distinguishes this low-speed, pedestrian-priority street from the adjoining arterial road. A proposed signal-controlled pedestrian crossing, with a central refuge, extends the connection to the opposite pavement. This addresses the external road barrier as well as the former airport boundary. Step-free transitions, final crossing levels and signal arrangements would be coordinated during detailed design.

3- Terminal 1, Civic Forecourt and Water Landscape

Terminal 1 remains the main built reference, while its adjoining public forecourt opens the reused building towards the park. The broad paved frontage provides space for meeting, walking and gathering. Connecting paths lead through planted gardens and water spaces towards the leisure landscape of Zone 6. Tree groups, seating and shade structures create a gradual transition from the harder terminal surroundings to the planted landscape. Defined basin edges distinguish water from circulation areas, while the water-play space supports family activities. Together, these elements connect building reuse with an accessible sequence of outdoor public spaces.



Figure 4.4: *Oblique perspective of Terminal 1, its public forecourt and the connection to the planted and water-based leisure landscape. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI*

4- Zone 4: Festival Field and Market Terrace

The runway connects two complementary activity settings: the grassed Festival Field on one side and the Market and Exhibition Terrace on the other. The open field

accommodates performances, picnics and informal gatherings, while temporary stalls and displays occupy the paved terrace. Trees, benches and lightweight shade structures provide places to rest without filling the main event space with permanent buildings. This arrangement allows organised events and everyday park use to coexist. Outside event periods, the open field remains available for informal, non-commercial activities, while the runway maintains walking and cycling continuity.



Figure 4.5: *Oblique perspective of Zone 4, showing the Festival Field and Market and Exhibition Terrace connected by the preserved runway. Source: Author, 2026. Basic SketchUp modelling; post-production using Photoshop and AI.*

Together, these interventions distribute public activity across the focus area rather than concentrating it within a single centre. The runway and transversal corridors establish a clear movement hierarchy, while the finer path network connects the principal nodes and new entrances. The detailed proposal therefore demonstrates how the broader masterplan can be translated into a usable and spatially differentiated public realm without erasing the infrastructural identity of the former airport.

4.9. Indicative Phasing and Implementation

A project of this scale could not be implemented across the entire former airport at once. The following phasing presents a possible sequence for gradually opening and developing the site. It is not a fixed construction timetable or financial plan. Instead, it shows how each phase could create a complete and usable public condition while adding new activities, users, and connections.

Enabling Conditions

Before public opening, the site would require land transfer, soil and contamination studies, structural and safety assessments of the terminals and hangars, and the establishment of a publicly led management body. Some planting, soil preparation, and underground infrastructure could begin before the relevant zones are officially opened.

Table 4.9: *Indicative phasing and implementation sequence. Source: Author, 2026*

Phase	Main interventions	Main implementation logic
Phase 1 – Public and Cultural Opening	Zone 4 public spaces with shade, planting, permeable ground and basic facilities; the Central Corridor with safe external connections; and the central runway for walking, informal play and temporary events. Part of a Zone 3 hangar accommodates indoor exhibitions, community art workshops and event equipment storage, subject to safety checks.	This phase creates the first recognisable public destination. It attracts different social groups through cultural, community, temporary, and everyday activities. The interventions are visible, flexible, and less dependent on private or institutional partners. Temporary hangar use supports this opening; the permanent knowledge and innovation programme of Zone 3 remains in Phase 4.
Phase 2 – Southern Sport and Entertainment	Zones 7 and 8, the phased reuse of Terminal 2, the Southern Corridor, and the southern extension of the public runway route.	This phase introduces sport, recreation, food, entertainment, and evening activity. It attracts young people, families, athletes, and weekend visitors. The Southern Corridor opens as a pedestrian-priority local connection, with one vehicular lane in each direction, a dedicated cycle path, and wide pedestrian pavements on both sides. Lease and concession income from Zone 8 could contribute to the maintenance of the first two phases. A clearly marked cycle route is introduced along the connected central and southern runway sections, linking the opened areas and corridors while remaining separated from event spaces and construction areas.
Phase 3 – Civic and Water-Based Consolidation	Zone 5, the adaptive reuse of Terminal 1, the Main Civic Plaza, the terminal forecourts, and Zone 6 as the principal water-sensitive leisure landscape.	After public use has been established, this phase creates the main civic anchor of the project. Zone 6 adds water-based leisure, shade, and local thermal comfort. Together, Zones 5 and 6 increase the range of activities and encourage people to remain on the site for longer periods.

Phase 4 – Northern Knowledge and Comfort	Zones 2 and 3, the Northern Corridor, the northern extension of the runway route, new northern entrances, and the initial infrastructure required for Zone 1.	Zone 3 introduces learning, research, work, and innovation, while Zone 2 provides nearby shade, rest, and everyday outdoor comfort. The Northern Corridor opens with the same pedestrian-priority profile as the Southern Corridor: one vehicular lane in each direction, a dedicated cycle path, and wide pedestrian pavements on both sides. Together, the two corridors provide low-speed local east–west connections without becoming high-capacity traffic routes. The runway cycle route is extended northwards, completing the longitudinal walking and cycling connection through the site.
Phase 5 – Live and Work Completion	Zone 1, including mixed-tenure and affordable housing, live-work spaces, local services, semi-public courtyards, and the completion of the northern public realm.	Housing is introduced only after public space, employment, landscape, access, and local services have been established. This reduces the risk of creating an isolated residential enclave and supports a permanent daily population within the completed project.

The phasing gradually introduces different rhythms of public life. Phase 1 begins with culture, community activity, and everyday park use. Phase 2 adds sport, entertainment, and evening activity. Phase 3 strengthens civic, family, and leisure use. Phase 4 introduces weekday learning and employment, while Phase 5 adds permanent residential life.

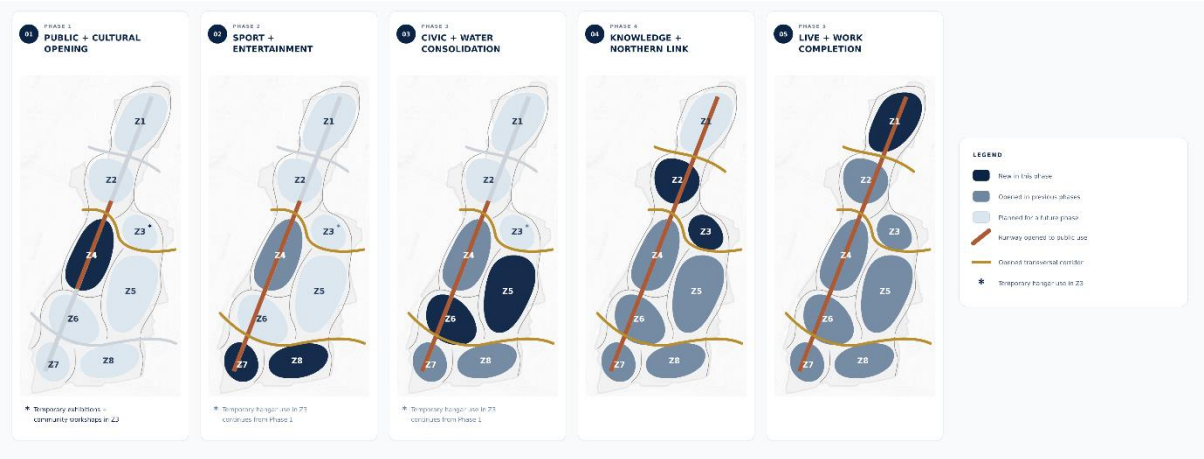


Diagram 4.23: *Indicative phasing sequence for the gradual public activation and development of the former airport site. Source: Author, 2026*

Management and Maintenance

The runway, transversal corridors, principal squares, and green-blue landscapes should remain under the responsibility of a publicly led site-management authority. Local

associations and non-profit organisations could co-manage selected community spaces and temporary activities, particularly in Zone 4. Terminals, hangars, sport facilities, and commercial spaces could be operated through public agreements with cultural, educational, sporting, or commercial organisations.

Lease and concession income from Terminal 2, Terminal 1, and other limited commercial uses could contribute to a shared maintenance fund. However, the principal public spaces must remain freely accessible and should not depend on commercial consumption.

Before moving to the next phase, public use, maintenance costs, safety, landscape performance, and management capacity should be reviewed. This would allow later phases to respond to actual experience rather than following a completely fixed sequence.

4.10. Selected Quantitative Indicators

This section presents a small set of indicators that can be measured directly from the proposed masterplan. The values are approximate and were calculated from the masterplan geometry in QGIS. They describe the scale, connectivity, public access, and adaptive reuse of the proposal.

Table 4.10: *Selected quantitative indicators of the proposed masterplan. Source: Author, 2026*

Indicator	Approximate value	Description
Masterplan intervention area	417.3 ha	Total area included within the masterplan boundary
Combined area of Zones 1–8	245.7 ha (58.9%)	Combined area of the eight main programme zones
Preserved runway public axis	3.7 km length	Main north–south public connection and memory axis
Transversal corridor network	3.55 km length	Includes the Northern Corridor (0.59 km), Central Corridor (1.37 km), and Southern Corridor (1.59 km)
Public access points	2 existing public access nodes; at least 18 proposed access points	Changes the existing terminal-based access condition into a more distributed public-access network
Footprint of retained and reused buildings	340,000 m^2 (34 ha)	Includes existing terminals, hangars, and other airport buildings retained for adaptive reuse
Retained and reprogrammed apron surfaces	211,000 m^2 (21.1 ha)	Includes selected apron areas reused as public grounds, civic squares, event spaces, and outdoor areas around the terminals

The existing access figure refers to the two main public access nodes at Terminals 1 and 2. Operational, service, and emergency gates are not included because they do not provide general public access through the airport site.

Adaptive reuse in the proposal includes both buildings and open airport surfaces. In total, approximately 340,000 m^2 of existing building footprints and 211,000 m^2 of selected apron surfaces are retained and given new uses. Together, they represent approximately 551,000 m^2, or 55.1 hectares, of retained airport fabric.

The building value is presented as a footprint rather than gross floor area because detailed information about the number of floors was not available for all retained structures. Only indicators that could be measured directly from the masterplan geometry are included at this stage.

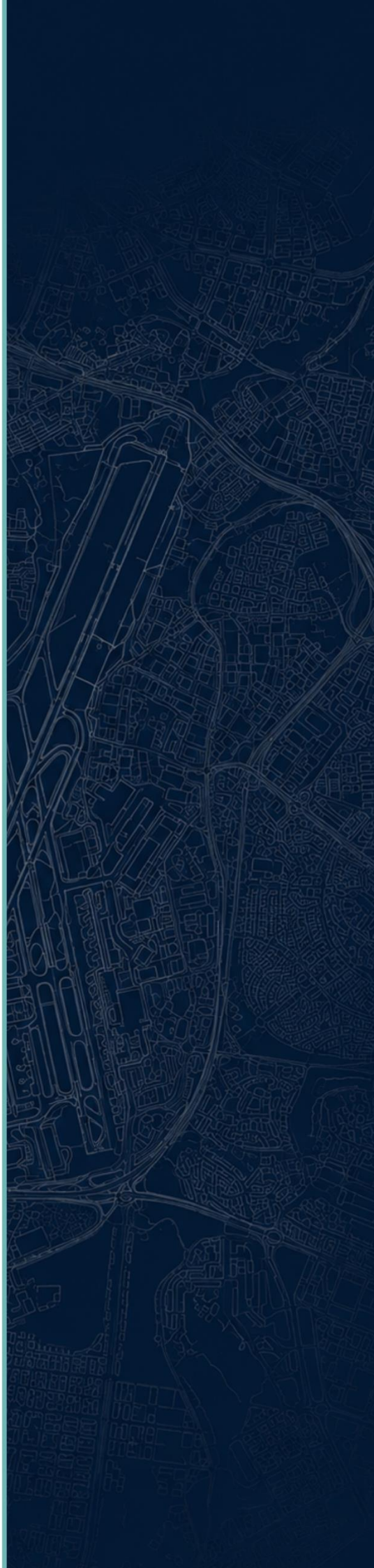
Other possible indicators, including depaved area, changes in permeable surface, vegetation and mature tree-canopy coverage, the length of shaded routes, and water-retention areas or volumes, have not been quantified at this stage. Reliable values would require more detailed surface-material, planting, shading, topographic, and hydraulic plans. These elements remain part of the masterplan strategy, but their exact quantities and performance should be confirmed during later design stages.

CHAPTER

05

The Final View

Conclusion



5.1. Research Synthesis

This thesis investigated the possible long-term transformation of Humberto Delgado Airport after the relocation of aviation activities. It did not seek to predict the timing of closure or to reproduce an official redevelopment plan. Instead, it used a design-led case-study approach that combined theoretical inquiry, comparative case-study analysis, multi-scalar spatial analysis, and research by design.

Across the research, the airport emerged as a contradictory urban condition. At the metropolitan scale, it operates as a major gateway with road and metro access. At the local scale, however, it functions as a restricted superblock that interrupts east-west and north-south connections. Its runways, aprons, and operational surfaces create extensive areas of continuous, heat-exposed, and impervious ground, while the airport boundary separates dense and age-diverse neighbourhoods from a large urban territory. Approximately 142,800 residents live within one kilometre of the site, yet the land remains largely unavailable to everyday public use. At the same time, the airport is not an empty or neutral site. Runway 02/20, the traces of the former airfield, Terminal 1, Terminal 2, the principal hangars, apron surfaces, and the open morphology of the airfield provide spatial resources for orientation, adaptive reuse, public activity, and environmental transformation. The central argument developed through the thesis is therefore that post-aviation regeneration should reverse the airport's exclusionary and heat-intensive performance without erasing the infrastructural identity that makes the site distinct.

5.2. Answering the Research Questions

The research questions are answered through the combined findings of Chapters 2, 3, and 4. Since design was used as a research instrument, the conclusions below describe the spatial capacity and likely direction of the proposal rather than verified future performance.

5.2.1. Climatic and Environmental Performance

How can the transformation of Humberto Delgado Airport improve the climatic and environmental performance of the site and its relationship with the surrounding urban environment?

The site analysis showed that the airport's climatic problem is produced by several connected conditions rather than by one isolated factor. Large continuous paved surfaces, low vegetation cover, high land-surface temperatures, high solar exposure, limited infiltration, and fragmented green-space networks reinforce one another. The thermal-comfort analysis also indicated that direct solar exposure is a major cause of daytime heat stress. At the same time, the site's gentle gradients, identifiable runoff paths, and exposure to prevailing northern and north-western winds provide important opportunities for transformation.

The proposal responds by replacing the uniform hardscape with a distributed green-blue and water-sensitive system. Selective depaving, permeable surfaces, planted drainage strips, rain gardens, retention landscapes, shade trees, and lower-heat surfaces are integrated with the public-space network. Zone 2 acts as the first shaded cooling landscape; Zone 4 provides an open climatic moderator; and Zone 6 forms the main seasonal water and cooling anchor. Zone 7 adds occasional stormwater detention, while roof runoff from Terminal 1 and Terminal 2 can be collected separately and reused after appropriate assessment and treatment. The runway remains a legible public and memory axis through its width, alignment, markings, material character, and selected retained paving, while distributed shade, lower-heat and permeable surface treatments, and planted drainage edges reduce its thermal and hydrological impact.

The strategy avoids applying the same environmental solution to every part of the site. Dense canopy is concentrated where shade and comfort are most necessary, while open vegetation and discontinuous planting preserve airflow through the central and southern areas. Drought-tolerant and Mediterranean-adapted planting, controlled water reuse, and dry-season operation are essential because cooling measures cannot depend on unlimited irrigation during Lisbon's hot and dry summers.

The benchmark-informed assessment developed in Chapter 4 suggests that treated comfort areas in Zones 2 and 6 could plausibly experience local air temperatures around 1–3°C below the equivalent existing condition during favourable hot-summer periods. Smaller local reductions are expected in the adaptive-reuse and hardscape zones. These values are not project predictions and should not be interpreted as uniform cooling across entire zones. They nevertheless indicate that connected interventions in shade, vegetation, water, soil permeability, and airflow can substantially improve the direction of climatic performance. Exact outcomes require later field measurement, microclimatic simulation, hydraulic design, and soil investigation.

5.2.2. Public Space and Urban-Social Performance

How can the former airport become an accessible and socially active public landscape that strengthens its relationship with surrounding neighbourhoods while retaining and reinterpreting its spatial identity?

The analysis showed that the airport's barrier effect is produced at several scales. Major arterial roads make parts of the site difficult to approach, the restricted perimetre limits entry, and the absence of internal pedestrian and cycling routes prevents cross-site movement. Numerous local streets terminate at the boundary, while access remains concentrated around the southern terminal area. Removing the fence alone would therefore be insufficient; the site also requires distributed entrances, safe thresholds, internal routes, and destinations that make everyday access meaningful.

The masterplan responds through three transversal corridors, reopened pedestrian connections, the preserved runway as a north-south promenade, and a finer network of

secondary paths. The Central Corridor is dedicated to walking and cycling and forms the strongest east–west civic connection. The Northern and Southern Corridors remain pedestrian-priority routes with limited controlled access for service, management, and emergency needs. Together, these elements increase route choice, reconnect selected parts of the surrounding street network, and replace the former single-purpose access system with a multidirectional public structure.

Accessibility is supported by a differentiated programme rather than by circulation alone. The eight zones accommodate live-work uses, comfort landscapes, knowledge and innovation, culture and events, a civic urban core, water-based leisure, sport and recreation, and entertainment. These uses create different reasons to enter and remain in the site throughout the day, week, and year. The detailed central-southern focus area tests this framework at a closer scale through the adaptive-reuse campus of Zone 3, the flexible event landscape of Zone 4, the civic terminal spaces of Zone 5, and the water-comfort landscape of Zone 6.

The proposal also treats airport identity as an active spatial resource rather than as a decorative reference. Runway 02/20 becomes the main public and memory axis; Terminal 1 becomes the principal civic anchor; Terminal 2 supports a southern entertainment and economic destination; the hangars accommodate learning, production, and innovation; and selected apron surfaces become public grounds that retain the scale and material character of aviation infrastructure. Preservation is therefore combined with functional change, selective depaving, and new public use.

The answer to the second sub-question is therefore that the airport can become more accessible and socially active when movement, public destinations, thermal comfort, temporal use, and adaptive reuse are developed as one system. However, spatial openness does not automatically guarantee social inclusion. Long-term public value will also depend on governance, maintenance, affordability, safety, operating rules, and participatory validation with surrounding communities.

5.2.3. Answer to the Main Research Question

How can Humberto Delgado Airport be transformed into a climate-responsive and publicly accessible urban landscape that strengthens its relationship with the surrounding city while preserving and reinterpreting its spatial identity?

This thesis answers the main question through the proposal of a sponge-based urban system. The spine is the preserved runway, which provides longitudinal continuity, orientation, public movement, and infrastructural memory. The sponge is the surrounding field of island-like zones, open voids, transversal corridors, secondary paths, planted ground, and water-sensitive landscapes. Together, these components allow the site to absorb, distribute, retain, and exchange environmental flows, public movement, and urban activity.

This structure connects climatic and public-space objectives instead of treating them as separate design layers. Shaded and water-sensitive landscapes become public destinations; transversal corridors support both urban permeability and green-blue continuity; reused airport buildings become anchors for civic, educational, cultural, and economic activity; and the spaces between the zones allow airflow, water management, slow movement, and informal use. The same spatial elements therefore contribute to environmental performance and everyday public life.

The proposed answer is neither a conventional metropolitan park nor a continuous new urban district. It is a hybrid and differentiated landscape in which development, adaptive reuse, open space, and environmental systems are combined according to the conditions of each part of the site. In this way, the airport's identity is preserved through transformation rather than through complete conservation or complete erasure.

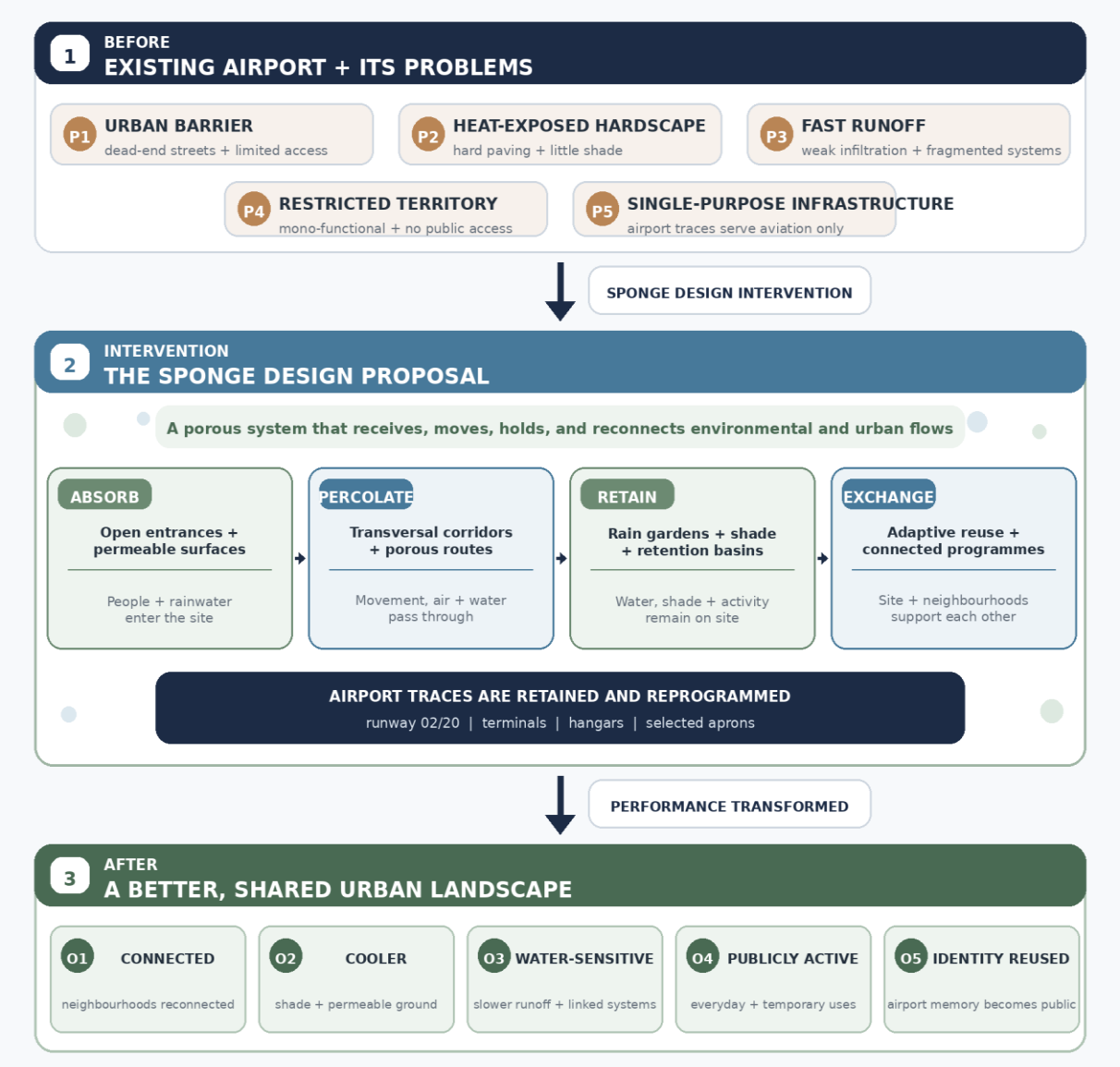


Diagram 5.1: *Transformation of Humberto Delgado Airport through the sponge concept. Source: Author, 2026.*

5.3. Main Findings and Contribution

The comparative review demonstrated that there is no single transferable model for former-airport regeneration. The Lisbon proposal draws selectively on the edge activation explored at Kai Tak, the distributed and archipelago-like programme structure of The Ellinikon, the preservation of openness and infrastructural memory at Tempelhofer Feld, and the longitudinal sequencing proposed and partially implemented at Parque Bicentenario. It also responds to the limitations revealed by these cases, including market-led exclusivity, apparent spatial openness without social inclusion, weak intermediate-scale design, and fragmented long-term implementation.

Four broader findings emerge from the research. First, environmental performance and public-space quality are most effective when they are produced through the same spatial framework. Shade, water retention, planted ground, and ventilation have greater urban value when they also support walking, resting, play, learning, and collective activity. Second, permeability is more than the creation of new paths. It also requires safe thresholds, route choice, comfortable movement, active destinations, and connections that respond differently to residential, productive, institutional, and restricted edges.

Third, infrastructural identity can remain legible without freezing the airport in its former condition. The runway, terminals, hangars, and aprons can continue to organise space while accepting new functions and selective physical change. Fourth, a site of this scale should not be treated uniformly. Distinct programme areas, temporary uses, open voids, adaptive-reuse anchors, and landscape-led zones allow different parts of the site to change at different speeds while remaining connected through a common framework.

The main contribution of the thesis is therefore a site-specific urban-design framework that connects theoretical discourse, comparative evidence, spatial analysis, and design testing. It translates the sponge metaphor into an operational model based on absorption, percolation and distribution, retention, and exchange rather than using it as a visual form. The result is not a finished blueprint or a verified engineering solution, but a coherent way of organising priorities, relationships, and future decisions for the post-aviation transformation of Humberto Delgado Airport.

5.4. Limitations and Directions for Future Research

The findings of this thesis should be read within the scope established at the beginning of the research. The study assumes a long-term post-aviation scenario in which the airport territory becomes available for transformation. It does not determine the timing or process of closure, a detailed implementation programme, construction timetable, or financial plan. Section 4.9 presents only an indicative phasing sequence showing how public access and different programme areas could gradually be introduced. The proposal is therefore an academic urban-design investigation rather than an adopted redevelopment plan.

The environmental conclusions also remain indicative. The analysis combines remote-sensing data, climatic records, terrain models, and published benchmarks, but it does not include site-wide field measurements, pedestrian-level CFD or ENVI-met simulation, hydraulic sizing, groundwater assessment, infiltration testing, or soil and contamination studies. Land-surface temperature is not equivalent to pedestrian-level air temperature, and the benchmark-informed cooling ranges used in Chapter 4 are not predictions. The location and design of infiltration, storage, water reuse, planting, and ventilation measures must therefore be tested and adjusted through detailed technical studies.

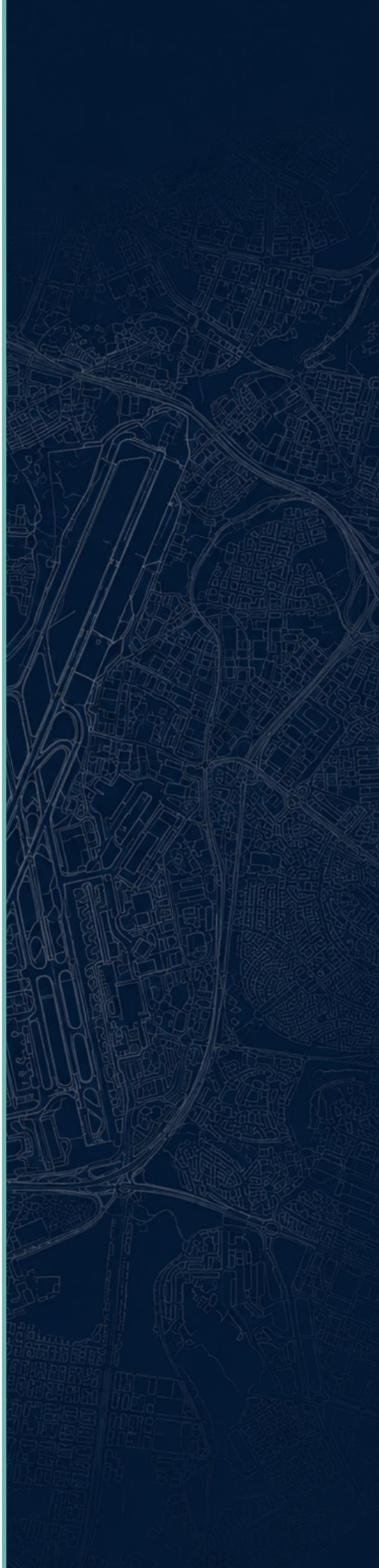
The social and mobility dimensions require further validation as well. Demographic data, land use, public-transport coverage, and network structure identify important needs and opportunities, but the research did not include resident surveys, interviews, stakeholder workshops conducted specifically for the thesis, travel-time modelling, traffic analysis, or post-occupancy evidence. Similarly, the proposed reuse of terminals, hangars, and other structures requires architectural, structural, fire-safety, accessibility, contamination, ownership, and economic assessment before programmes can be confirmed.

Future research should therefore combine technical verification with participatory development. Priority steps include detailed soil and building surveys; hydrological and microclimatic modelling; pedestrian, cycling, and public-transport accessibility analysis; and co-design with surrounding residents, institutions, workers, and vulnerable age groups. The indicative phasing and governance framework proposed in Chapter 4 should be tested and refined through technical studies, stakeholder participation, financial assessment, and continued monitoring. Continuous monitoring would then allow the design to be adjusted according to measured climatic performance, patterns of use, maintenance capacity, and changing public needs.

5.5. Final Reflection

The future significance of Humberto Delgado Airport lies not only in the amount of land that may become available after aviation activities leave the site. Its greater value lies in the possibility of reversing a long-standing urban relationship: a territory built for separation, speed, control, and technical efficiency can become an infrastructure for access, environmental regulation, and public life. This thesis does not argue that the airport should be completely urbanised, completely preserved, or transformed into one continuous park. Instead, it proposes that its strongest spatial traces should remain while their performance and meaning change. The final view is therefore of a former airport moving from barrier to connector, from heat-intensive hardscape to climate-responsive landscape, and from restricted infrastructure to a shared urban territory. Its identity is not erased; it becomes the framework through which a different future can be built.

References



- ASLA (American Society of Landscape Architects). (2023). Carbon-first design: The Ellinikon Metropolitan Park in Athens. ASLA. https://www.asla.org/
- Asprogerakas, E. (2018). Hellinikon... Passion: The development of the former Hellinikon airport. Sakkoulas Publications.
- Asprogerakas, E. (2024). Strategic dilemmas for the redevelopment of a former airport in Athens, Greece. *Planning Practice & Research*. Advance online publication. https://doi.org/10.1080/02697459.2024.2379096
- Azmeer, A., Tahir, F., & Al-Ghamdi, S. G. (2024). Progress on green infrastructure for urban cooling. Urban Climate, 56, Article 102077. https://doi.org/10.1016/j.uclim.2024.102077
- Barber, A., Haase, D., & Wolff, M. (2021). Permeability of the city—Physical barriers of and in urban green spaces in the city of Halle, Germany. *Ecological Indicators, 125*, 107555. https://doi.org/10.1016/j.ecolind.2021.107555
- Bartesaghi Koc, C., Osmond, P., & Peters, A. (2018). Evaluating the cooling effects of green infrastructure: A systematic review of methods, indicators and data sources. Solar Energy, 166, 486–508. https://doi.org/10.1016/j.solener.2018.03.018
- Balon, N., Hrdalo, I., Mrđa, A., Kamenečki, M., Tomić Reljić, D., & Pereković, P. (2023). Landscape urbanism—Retrospective on development, basic principles and application. *Architecture, 3*(4), 739–752. https://doi.org/10.3390/architecture3040040
- Bélanger, P. (2009). Landscape as infrastructure. Landscape Journal, 28(1), 79–95. https://doi.org/10.3368/lj.28.1.79
- Bentley, I., Alcock, A., Murrain, P., McGlynn, S., & Smith, G. (1985). Responsive environments: A manual for designers. Architectural Press.
- Berger, A. (2006). Drosscape: Wasting land in urban America. Princeton Architectural Press.
- Betti, G., Tartarini, F., Nguyen, C., & Schiavon, S. (2024). CBE Clima Tool: A free and open-source web application for climate analysis tailored to sustainable building design. *Building Simulation, 17*(3), 493–508. https://doi.org/10.1007/s12273-023-1090-5
- Bilbao, E., & Sproull, R., Jr. (2009). Parque del Lago: International ideas competition for the urban development of the former Mariscal Sucre airport. Municipio del Distrito Metropolitano de Quito.
- Câmara Municipal de Lisboa. (n.d.). Lisboa Aberta [Open-data portal]. https://lisboaaberta.cm-lisboa.pt/index.php/pt/

- Castel'Branco, R., & da Costa, A. R. (2024). From maximum urban porosity to city's disaggregation: Evidence from the Portuguese case. Cities, 148, Article 104836. https://doi.org/10.1016/j.cities.2024.104836
- Civil Engineering and Development Department [CEDD]. (2006). Kai Tak Development: Environmental impact assessment study (EIA-138/2007). HKSAR Government.
- Civil Engineering and Development Department [CEDD]. (2012). Kai Tak Development: Outline Zoning Plan (S/K22/4). HKSAR Government.
- Copernicus Land Monitoring Service. (n.d.-a). Imperviousness density 2024 (raster 10 m and 100 m), Europe, 3-yearly [Data set]. https://land.copernicus.eu/en/products/high-resolution-layer-imperviousness/imperviousness-density-2024
- Copernicus Land Monitoring Service. (n.d.-b). Urban Atlas land cover/land use 2021 (vector), Europe, 3-yearly (Version 1) [Data set]. https://doi.org/10.2909/05ae1ee1-e550-4e66-b74d-4926322d981a
- Couto, J., & Baltazar, M. E. (2025). Sustainable airport development: A literature review based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses methodology, using OpenAlex database. Sustainability, 17(9), 4184. https://doi.org/10.3390/su17094184
- Delang, C. O., & Ng, S. W. (2009). Urban regeneration and heritage preservation with public participation: The case of the Kai Tak Runway. The Open Geography Journal, 2(1), 121–131. https://doi.org/10.2174/1874923200902010121
- Detering, K., & Beesley, S. (2018). Accentuate the positive… In S. Wolfrum, H. Stengel, F. Kurbasik, N. Kling, S. Dona, I. Mumm, & C. Zöhrer (Eds.), *Porous city: From metaphor to urban agenda* (pp. 296–301). Birkhäuser. https://doi.org/10.1515/9783035615784
- Direção-Geral do Território. (2025, June 25). Levantamento LiDAR de Portugal Continental. https://www.dgterritorio.gov.pt/levantamento-lidar-de-portugal-continental-0
- Dovey, K., & Polakit, K. (2007). Urban slippage: Smooth and striated streetscapes in Bangkok. In K. A. Franck & Q. Stevens (Eds.), Loose space: Possibility and diversity in urban life (pp. 113–131). Routledge.
- Dümpelmann, S. (2014). Flights of imagination: Aviation, landscape, design. University of Virginia Press.
- Dümpelmann, S., & Waldheim, C. (Eds.). (2016). Airport landscape: Urban ecologies in the aerial age. Harvard Design Studies.

- Earth Resources Observation and Science (EROS) Center. (2020). Landsat 8–9 Operational Land Imager / Thermal Infrared Sensor Level-1, Collection 2 [Data set]. U.S. Geological Survey. https://doi.org/10.5066/P975CC9B
- Enright, T., & Olmstead, N. (2023). The potential politics of the porous city. *Environment and Planning D: Society and Space, 41*(2), 295–309. https://doi.org/10.1177/02637758231170635
- Favargiotti, S. (2018). Renewed landscapes: Obsolete airfields as landscape reserves for adaptive reuse. Journal of Landscape Architecture, 13(1), 38–51. https://doi.org/10.1080/18626033.2018.1589147
- Franck, K. A., & Stevens, Q. (Eds.). (2007). Loose space: Possibility and diversity in urban life. Routledge.
- Franck, K. A., & Huang, T.-S. (Eds.). (2023). Routledge handbook of urban public space: Use, design, and management. Routledge.
- Freestone, R., & Baker, D. (2011). Spatial planning models of airport-driven urban development. Journal of Planning Literature, 26(3), 263–279. https://doi.org/10.1177/0885412211401341
- Freestone, R. (2009). Planning, sustainability and airport-led urban development. International Planning Studies, 14(2), 161–176. https://doi.org/10.1080/13563470903021217
- Gehl, J. (2011). Life between buildings: Using public space (J. Koch, Trans.). Island Press. (Original work published 1971).
- Geuna, A. (2014). The city in the city: Berlin as a green archipelago (Master's thesis). Politecnico di Torino.
- Graça, M., Cruz, S., Monteiro, A., & Neset, T.-S. (2022). Designing urban green spaces for climate adaptation. Urban Climate, 42, Article 101126. https://doi.org/10.1016/j.uclim.2022.101126
- Grilo, F., Pinho, P., Aleixo, C., Catry, F. X., Lopes, A., & Branquinho, C. (2020). Using green to cool the grey: Modelling the cooling effect of green spaces with a high spatial resolution. Science of The Total Environment, 724, Article 138182. https://doi.org/10.1016/j.scitotenv.2020.138182
- Grün Berlin GmbH. (2016). Development and maintenance plan (EPP) Tempelhofer Feld. Grün Berlin GmbH.
- Hellinikon SA. (2012). The Hellinikon urban development model. Hellinikon SA.
- Hirsh, M. (2016). Airport urbanism: Infrastructure and mobility in Asia. University of Minnesota Press. https://doi.org/10.5749/j.ctt1bhkpf8

- Instituto Nacional de Estatística. (n.d.). Censos 2021: Importação dos principais dados alfanuméricos e geográficos (BGRI, GRID e Lugares) [Data portal]. https://mapas.ine.pt/download/index2021Grid.phtml
- Kalogeri, C., Koukoula, M., Saviolakis, P. M., Batsios, P., Spyrou, C., & Katsafados, P. (2025). Assessing urban greening strategies to mitigate heatwave impacts in Greater Athens Metropolitan Area, Greece. Environmental Earth Sciences Proceedings, 35, Article 32. https://doi.org/10.3390/eesp2025035032
- Kasarda, J. D., & Lindsay, G. (2011). Aerotropolis: The way we'll live next. Farrar, Straus and Giroux.
- Kumar, P., Debele, S. E., Khalili, S., Halios, C. H., Sahani, J., Aghamohammadi, N., Andrade, M. F., Athanassiadou, M., Bhui, K., Calvillo, N., Cao, S.-J., Coulon, F., Edmondson, J. L., Fletcher, D., de Freitas, E. D., Guo, H., Hort, M. C., Katti, M., Kjeldsen, T. R., ... & Jones, L. (2024). Urban heat mitigation by green and blue infrastructure. The Innovation, 5(2), Article 100588. https://doi.org/10.1016/j.xinn.2024.100588
- LAMDA Development. (2020). Project Hellinikon: Sustainable energy planning, technologies, and policies. LAMDA Development.
- LAMDA Development. (2023). The Ellinikon Metropolitan Park: Carbon-first design brochure. LAMDA Development.
- Lara-Hernandez, J. A., Melis, A., & Lehmann, S. (2019). Temporary appropriation of public space as an emergence assemblage for the future urban landscape: The case of Mexico City. *Future Cities and Environment, 5*(1), Article 5. https://doi.org/10.5334/fce.53
- Ma, Y., Roosli, R., Cao, Z., Zhang, X., Gai, Y., & Ma, Z. (2025). A methodological review of adaptive reuse in industrial heritage buildings. Energy and Buildings, 320, Article 116474. https://doi.org/10.1016/j.enbuild.2025.116474
- Macrury, I. (2008). The airport next door: London City Airport—Regeneration, communities and networks. In P. Cohen & M. J. Rustin (Eds.), London's turning: The making of Thames Gateway (pp. 239–260). Ashgate.
- Markova, M., & Stola, D. (2023). The historical development of Latvian aviation and airfield territories. *Landscape Architecture and Art, 22*(22), 129–138. https://doi.org/10.22616/j.landarchart.2023.22.13
- Martins Pereira, G., Brito, J., Oliveira, M. J., & Oliveira, P. (2021). Urban Noise Exposure and Cardiometabolic Diseases: An Exploratory Cross-Sectional Study in Lisbon. Revista Portuguesa de Saúde Pública, 39(2), 95–102. https://doi.org/10.1159/000520263

- Municipality of Quito. (2012). Resolution C-408: Special development regulations for the Bicentenario District. Municipio del Distrito Metropolitano de Quito.
- Municipality of Quito. (2013). Ordinance 0352: Plan Especial Bicentenario land-use regulations. Municipio del Distrito Metropolitano de Quito.
- NAV Portugal. (2026). AIP Portugal: AD 2—LPPT, Lisboa/Humberto Delgado [Aeronautical information publication]. https://ais.nav.pt/wp-content/uploads/AIS_Files/eAIP_Current/eAIP_Online/eAIP/html/eAIP/LP-AD-2.LPPT-en-PT.html
- Németh, J., & Langhorst, J. (2014). Rethinking urban transformation: Temporary uses for vacant land. Cities, 40, 143–150. https://doi.org/10.1016/j.cities.2014.03.012
- Ng, E., Wong, H.-H., & Han, M. (2006, September 6–8). Permeability, porosity and better ventilated design for high density cities [Conference paper]. PLEA 2006: 23rd Conference on Passive and Low Energy Architecture, Geneva, Switzerland. https://citeseerx.ist.psu.edu/document?doi=de477f46236d8921af99786e7ac90e8491038125&repid=rep1&type=pdf
- Norton, B. A., Coutts, A. M., Livesley, S. J., Harris, R. J., Hunter, A. M., & Williams, N. S. G. (2015). Planning for cooler cities: A framework to prioritise green infrastructure to mitigate high temperatures in urban landscapes. Landscape and Urban Planning, 134, 127–138. https://doi.org/10.1016/j.landurbplan.2014.10.018
- Oke, T. R., Mills, G., Christen, A., & Voogt, J. A. (2017). Urban climates. Cambridge University Press. https://doi.org/10.1017/9781139016476
- Oliveira, S., Andrade, H., & Vaz, T. (2011). The cooling effect of green spaces as a contribution to the mitigation of urban heat: A case study in Lisbon. Building and Environment, 46(11), 2186–2194. https://doi.org/10.1016/j.buildenv.2011.04.034
- OpenStreetMap contributors. (n.d.). OpenStreetMap [Data set]. https://www.openstreetmap.org
- Oswalt, P., Overmeyer, K., & Misselwitz, P. (2013). Urban catalyst: The power of temporary use. DOM Publishers.
- Oudes, D., & Stremke, S. (2018). Climate adaptation, urban regeneration and brownfield reclamation: A literature review on landscape quality in large-scale transformation projects. Land Use Policy, 79, 239–251. https://doi.org/10.1016/j.landusepol.2018.08.016
- Pedrycz, P., Bromboszcz, M., Kaczmarek-Pękalska, A., Matysiak, K., & Zujewicz, J. (2025). From suburban airport to sustainable urban district—25 years of Oslo

Fornebu redevelopment. *Sustainability, 17*(7), 2881. https://doi.org/10.3390/su17072881

- Pijet-Migoń, E. (2025). Aviation heritage in the urban landscape—Concept and examples from Berlin. Heritage, 8(6), Article 225. https://doi.org/10.3390/heritage8060225
- Plevoets, B., & Van Cleempoel, K. (2019). Adaptive reuse of the built heritage: Concepts and cases of an emerging discipline. Routledge.
- Qi, J., Mazumdar, S., & Vasconcelos, A. C. (2024). Understanding the relationship between urban public space and social cohesion: A systematic review. International Journal of Community Well-Being, 7, 155–212. https://doi.org/10.1007/s42413-024-00204-5
- Raffa, A., & Moscatelli, M. (2026). From airfield morphologies to nature-based regeneration: A proto-ontological framework for an AI-assisted, design-oriented analysis of post-airfield projects. Land, 15(7), 1113. https://doi.org/10.3390/land15071113
- Reis, C., & Lopes, A. (2019). Evaluating the cooling potential of urban green spaces to tackle urban climate change in Lisbon. Sustainability, 11(9), 2480. https://doi.org/10.3390/su11092480
- Reis, C., Nouri, A. S., & Lopes, A. (2023). Human thermo-physiological comfort assessment in Lisbon: A SkyHelios-based UTCI evaluation. Frontiers in Earth Science, 11*, Article 1099045. https://doi.org/10.3389/feart.2023.1099045
- Salvador, A. J. (2022). Parque Bicentenario: Un gran vacío en la construcción del proyecto urbano [Parque Bicentenario: A great void in the construction of the urban project]. Dearq, (33), 48–61. https://doi.org/10.18389/dearq33.2022.04
- Schwarz, N., & von Kolpinski, C. (2025). The potential of regenerated airports to evolve into innovation ecosystems. Sustainable Futures, 10, Article 101190. https://doi.org/10.1016/j.sftr.2025.101190
- Senate Department for Urban Development, Building and Housing [SenStadt]. (2024). International ideas competition: Tempelhofer Feld peripheral development. SenStadt.
- Spanaki, A. (Ed.). (2021). Elliniko: A trip through time from prehistory to the present. Lamda Development.
- Szuta, A. F. (2019). Abandoned heritage—The first European airports. *Technical Transactions, 116*(3), 105–118. https://doi.org/10.4467/2353737XCT.19.035.10209

- Tzoulas, K., Korpela, K., Venn, S., Yli-Pelkonen, V., Kaźmierczak, A., Niemelä, J., & James, P. (2007). Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. Landscape and Urban Planning, 81(3), 167–178. https://doi.org/10.1016/j.landurbplan.2007.02.001
- Tousi, E., Mela, A., & Tseliou, A. (2025). Nature-based urbanism for enhancing senior citizens' outdoor thermal comfort in high-density Mediterranean cities: ENVI-met findings. *Urban Science, 9*(5), 152. https://doi.org/10.3390/urbansci9050152
- URBIS / Civil Engineering and Development Department. (2012). Kai Tak Development: Streetscape and urban design guidelines. URBIS Ltd / CEDD.
- Vafaie, F., Remoy, H., & Gruis, V. (2023). Success factors for the adaptive reuse of built heritage: A systematic literature review. Habitat International, 142, Article 102926. https://doi.org/10.1016/j.habitatint.2023.102926
- Waldheim, C. (2016). Landscape as urbanism: A general theory. Princeton University Press.
- Waldheim, C., & Favargiotti, S. (2017). Airfield manual: Field guide to the transformation of abandoned airports. Harvard University Graduate School of Design Office for Urbanization.
- Wolfrum, S., Stengel, H., Kurbasik, F., Kling, N., Dona, S., Mumm, I., & Zöhrer, C. (Eds.). (2018). *Porous city: From metaphor to urban agenda*. Birkhäuser. https://doi.org/10.1515/9783035615784