

Kharkiv Masterplan

Science Neighbourhood

Interim Report

June 2024

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1. Introduction



1.1 The Kharkiv Masterplan

Kharkiv is the second largest city in Ukraine, and it stands out as an important industrial, historical, and cultural beacon for the country. Due to its proximity to Russia, at just 30 km from the city's centre, it has suffered immeasurable damages and losses as a consequence of the conflict.

In this context, during the United Nation's Second Forum of Mayors celebrated in April 2022, Kharkiv Mayor Ihor Terekhov reached out to Norman Foster, Advocate for the Forum, seeking his help to create the new masterplan for Kharkiv. Since then, the Norman Foster Foundation (NFF), a UN Centre of Excellence, together with UNECE, the Kharkiv City Council, Arup, the Kharkiv Architects Group, and numerous international and local stakeholders have been working on the concept masterplan for the future Kharkiv.

The concept masterplan is based on the initial premise of promoting a forward-looking Kharkiv, using this terrible historical moment as a moment to rethink the city. Considering that Kharkiv is already a consolidated city, with a very important history, high-quality urban spaces, a strong network of universities and iconic buildings from various architectural styles, the

masterplan focuses on key areas that can be improved thanks to the local-international collaboration that has been established since the beginning of the project in April 2022.

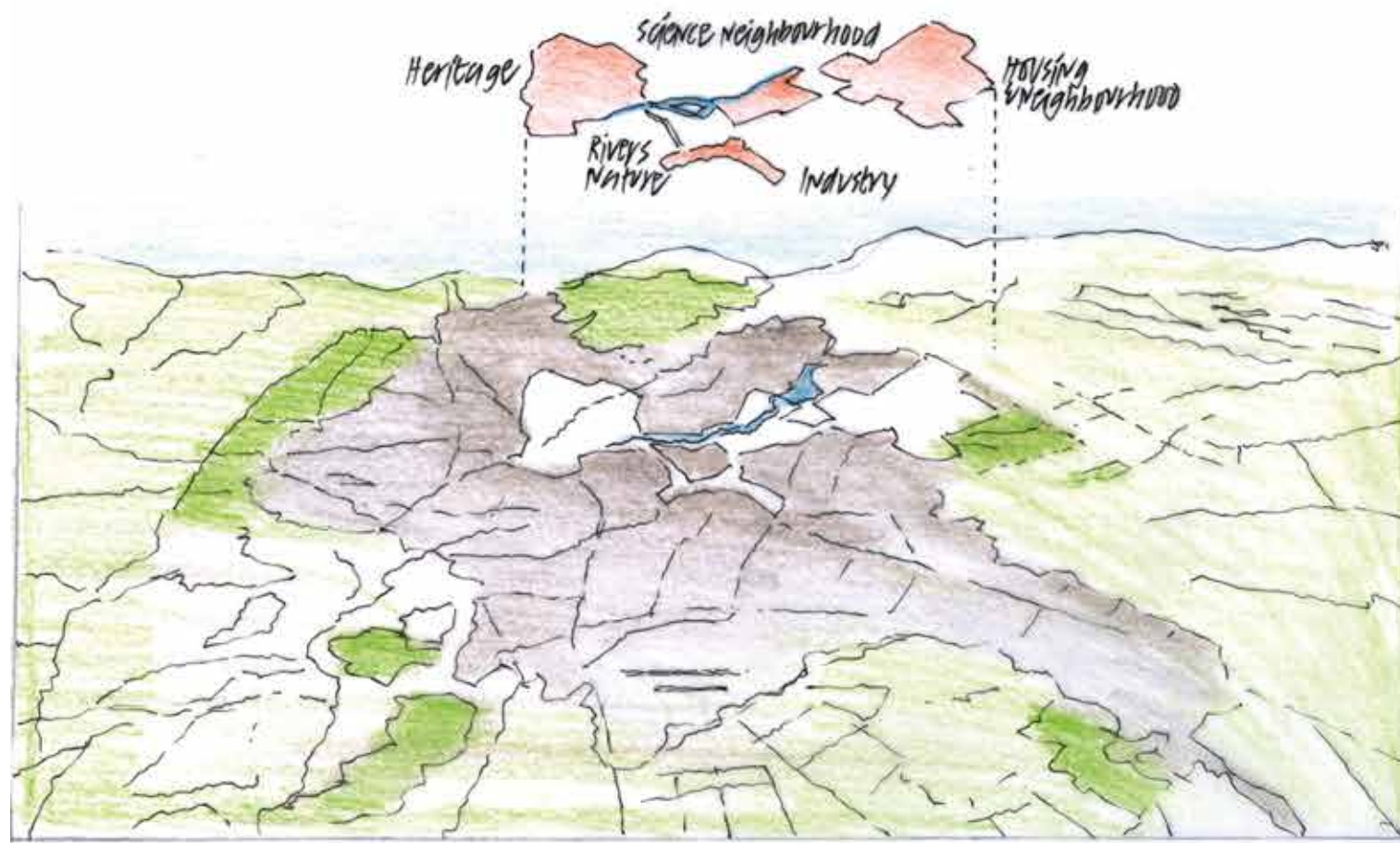
Since then, more than 160 working meetings have taken place, generating interactions with over 800 people, including citizens of Kharkiv, for which a questionnaire was delivered that gathered more than 16,000 replies. This questionnaire was essential to understand the needs of Kharkiv citizens in topics such as housing, public spaces or transportation.

It is worth mentioning that the team of local architects and the City Council have not only been the eyes of the international team on the ground, but they have shared their vast knowledge on Kharkiv, spread their optimism for its future and have laid out the ambitious basic principles to develop the new masterplan for the city.

As a result of this collaborative work in which all the team has worked on a pro-bono basis from April 2022 to December 2023, the vision for the concept masterplan has been established. The aim is to create a vision that can not only work as a strategy for Kharkiv, but as a blueprint for other cities in Ukraine.



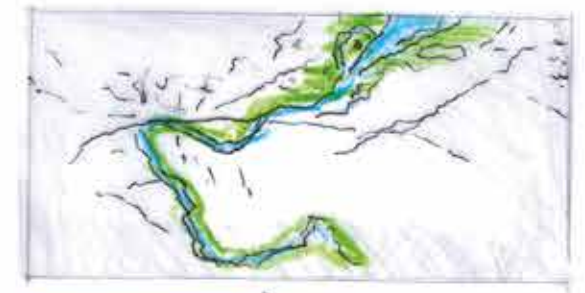
KHARKIV PLAN FOR RECONSTRUCTION AND REGENERATION



HERITAGE The importance of recovering the historic monuments



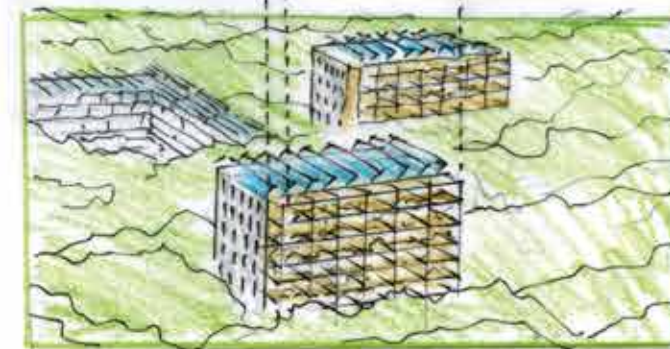
RIVERS connecting neighbourhoods by green corridors - biking & walking



INDUSTRY The transition to clean and green - new approach to zoning



HOUSING & NEIGHBOURHOODS replace destroyed repair damaged - upgrade the existing.



NEW SCIENCE NEIGHBOURHOOD new tech start-ups and universities with residential, schools, shopping, parks and leisure



FIVE PILOT PROJECTS - SEPARATE BUT LINKED TOGETHER

1.2 The Pilot Project Approach

Traditional masterplans are mainly focused on establishing an overarching approach to the development of a city. This is achieved through a drawing plan that defines the uses of parts of a city, and a series of associated regulations that define each use. Although the new Kharkiv masterplan will address these issues by updating the existing 2019 masterplan, the current challenges and ambitions of the city require a new approach. We are naming this the 'pilot project approach'.

The pilot project approach identifies a series of specific projects in the city, in topics such as housing, heritage or industry; develops them with architects, engineers and international consultants; and learns from the development of these projects to apply in the city. This means selecting specific sites in Kharkiv, creating briefs, and developing ideas, drawings, calculations and imagery for each of these projects to promote its implementation and replication across the city.

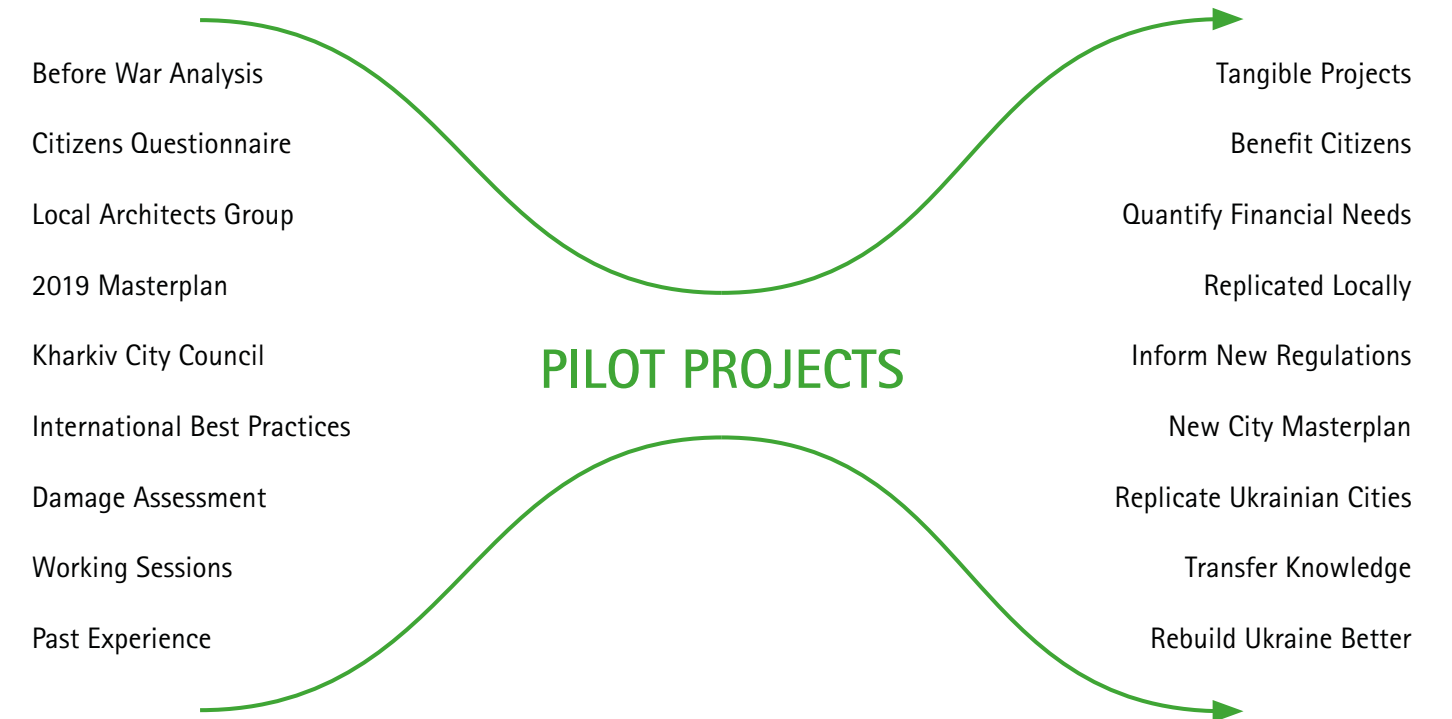
This approach has a series of benefits:

- Real projects that offer specific solutions to the problems of the citizens are developed.
- The process of developing these pilot projects will inform local capacities for implementation, local policies and the specific amount of resources required for their implementation.
- Will connect local and international professionals on a project development level, promoting capacity building for Kharkiv's long-term professional resiliency, and ensuring a successful build back better approach.

Five architectural pilot projects will be developed as part of this approach:

1. Heritage
2. Rivers
3. Industry
4. Housing
5. Science Neighbourhood

This report focuses on the Science Neighbourhood pilot project. The introduction shows the work that was carried out from April 2022 to December 2023.



1.3 Start of the Project

The project started during the first meeting with the Mayor in April 2022.

Apart from discussing the general masterplan project, Mayor Terekhov specifically mentioned his vision of creating a new, forward-looking science park in Kharkiv, conceived to promote innovation within the city. He mentioned that this new development should follow best international standards, with good quality buildings for innovative institutions and public spaces, so that it would help modernize Kharkiv's economy. This request was quickly adopted by the new masterplan team.

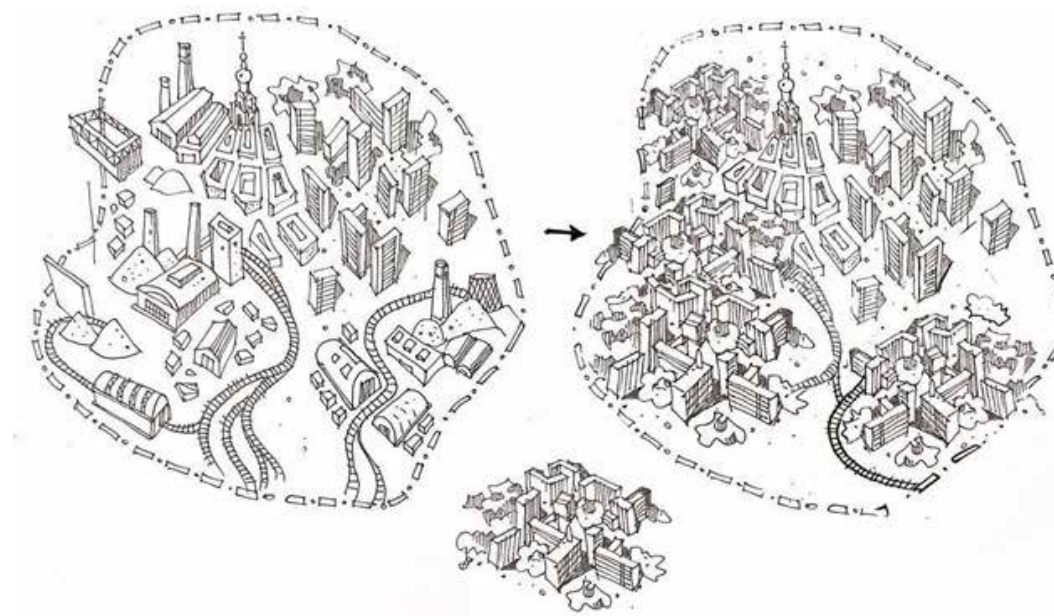
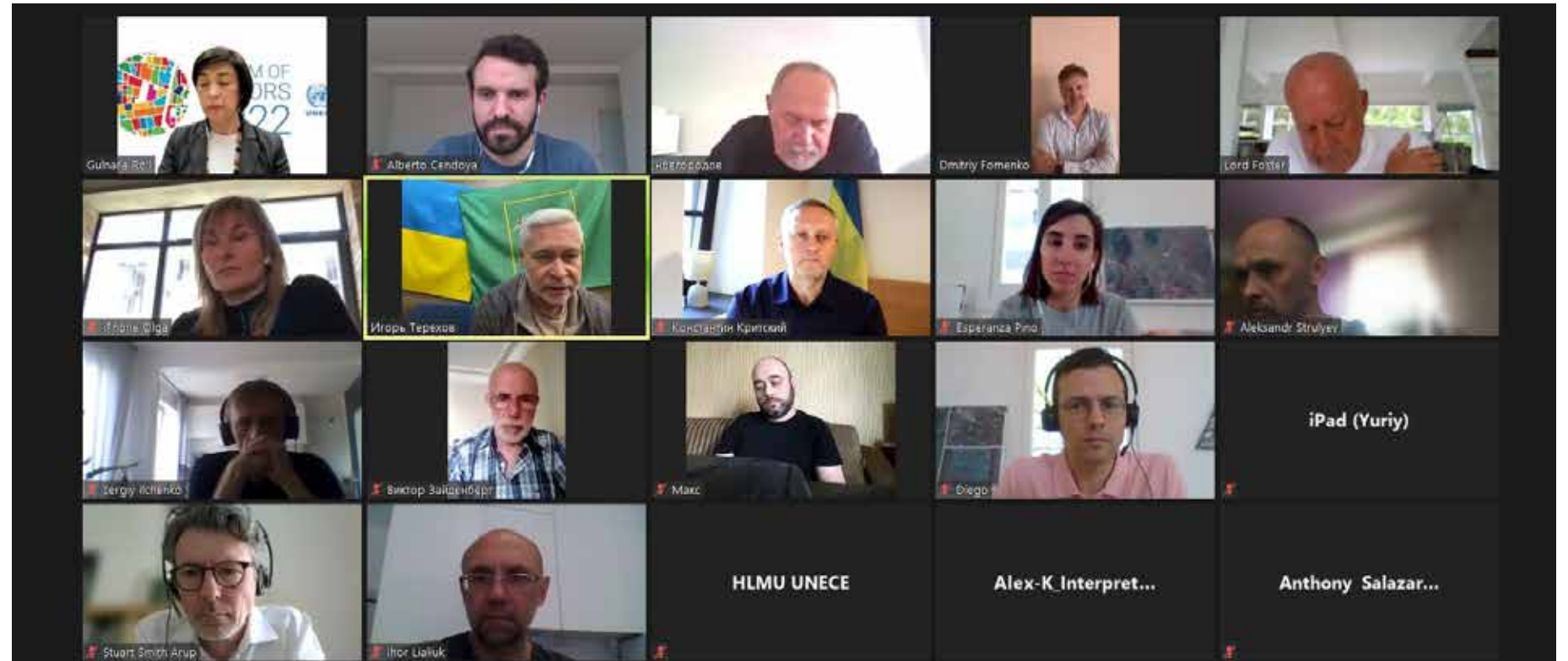


1.4 Kharkiv Architects Group

The input of the Kharkiv Architects Group, with whom weekly meetings were carried out, was essential to frame the Science Neighbourhood project.

This group (consisting of architects, urban planners and historians from Kharkiv) helped guide the work of the overall masterplan and established the general guidelines for the future masterplan of Kharkiv. One of these guidelines was to promote new developments inside the city's boundaries, keeping the city limits, and densifying it, rather than promoting its sprawl (see drawings below).

The group also suggested a few key projects that they considered essential for the city. One of these proposals was to create a dense and modern business park, following the examples of other European cities. They even suggested potential sites for the new development.

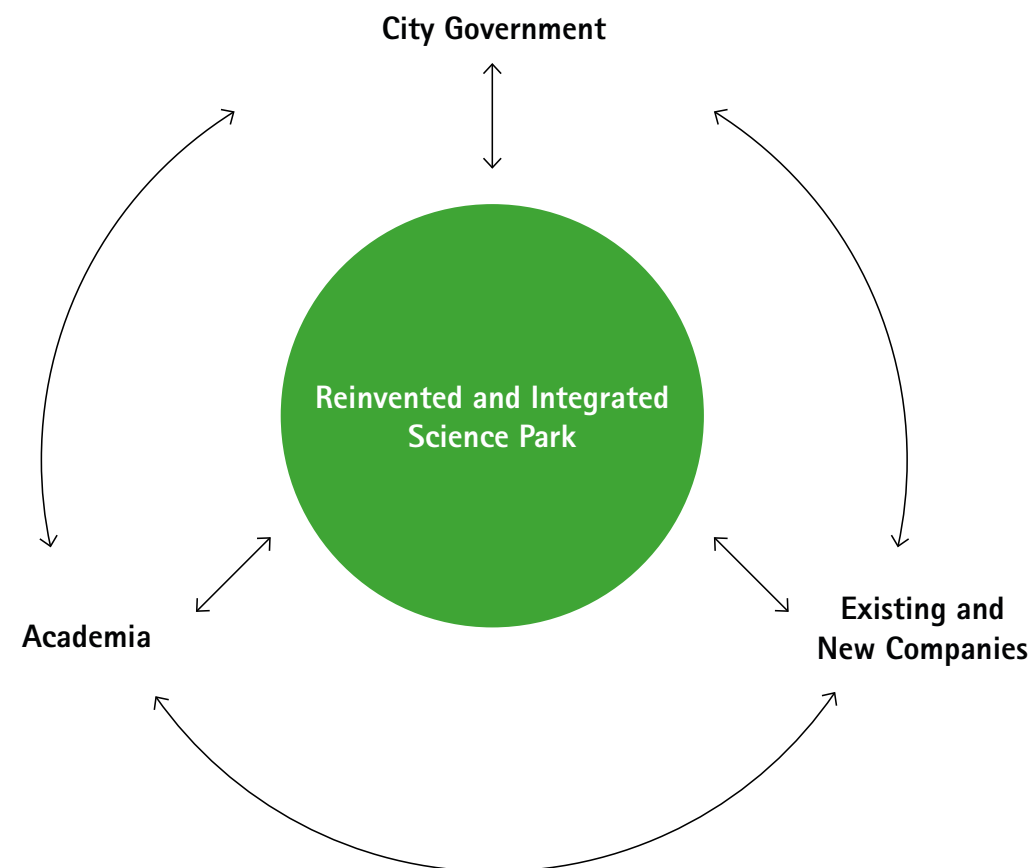


1.5 Advisory Board

The first steps were to understand how science parks work, how to create one, and how they generate innovation and economic development for cities. Norman Foster was also keen to learn what their strengths and weaknesses are, to consider the possibility of reinventing the concept of a science park in Kharkiv.

For this purpose, Norman Foster invited Manuel Cendoya, an advisor to cities, governments and international institutions on science parks and innovation policies, to become part of the project's Advisory Board.

Apart from sharing his experience creating and managing science parks, he put together a research to analyse the evolution of science parks and the required ingredients for them to fulfil their goals. By carefully analysing the presence of essential actors in Kharkiv (academia, city government, existing and new companies), it was concluded that the city features the main components to develop an innovation generation park that promotes socioeconomic development.



1.6 Science Parks

The first science park in the world was Stanford Research Park, launched in 1951 as a collaboration between Stanford University and the City of Palo Alto in the United States. It has been widely regarded as a crucial component for the formation of Silicon Valley, with tenants including Hewlett-Packard, Xerox's Palo Alto Research Centre and Steve Jobs' NeXT Computers. Since then, science parks have been exported to different regions of the world and have undergone a series of transformations in their characteristics.

Three main generations can be identified:

First Generation: Associated with one university to broaden its outreach and economic opportunities. Well-landscaped site with good quality buildings for offices. Close to university.

Second Generation: Associated with a business organisation, sector or cluster to increase competitiveness. Supports innovation and start-ups (mentoring, seed funds, and other services).

Third Generation: Associated with a city or region, following a public and/or private scheme. Promotes stimulation and welfare of the local and regional economy. Physical collaboration spaces for creative interactions between private, public, and academic institutions.

However, apart from the successful example of science parks across the world in promoting socioeconomic development and generating innovation, a series of drawbacks can be identified. These are mainly urban isolation from cities, scattered building district designs, and a lack of mixed-use approaches.

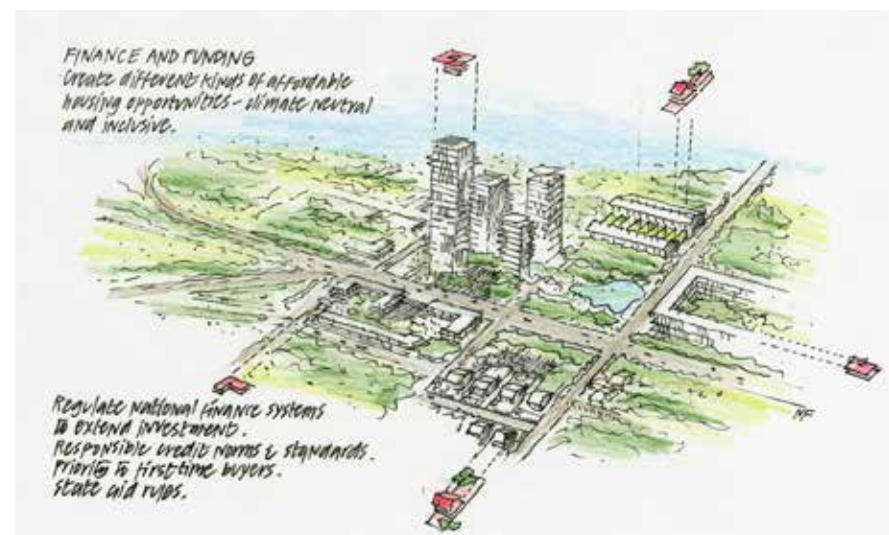
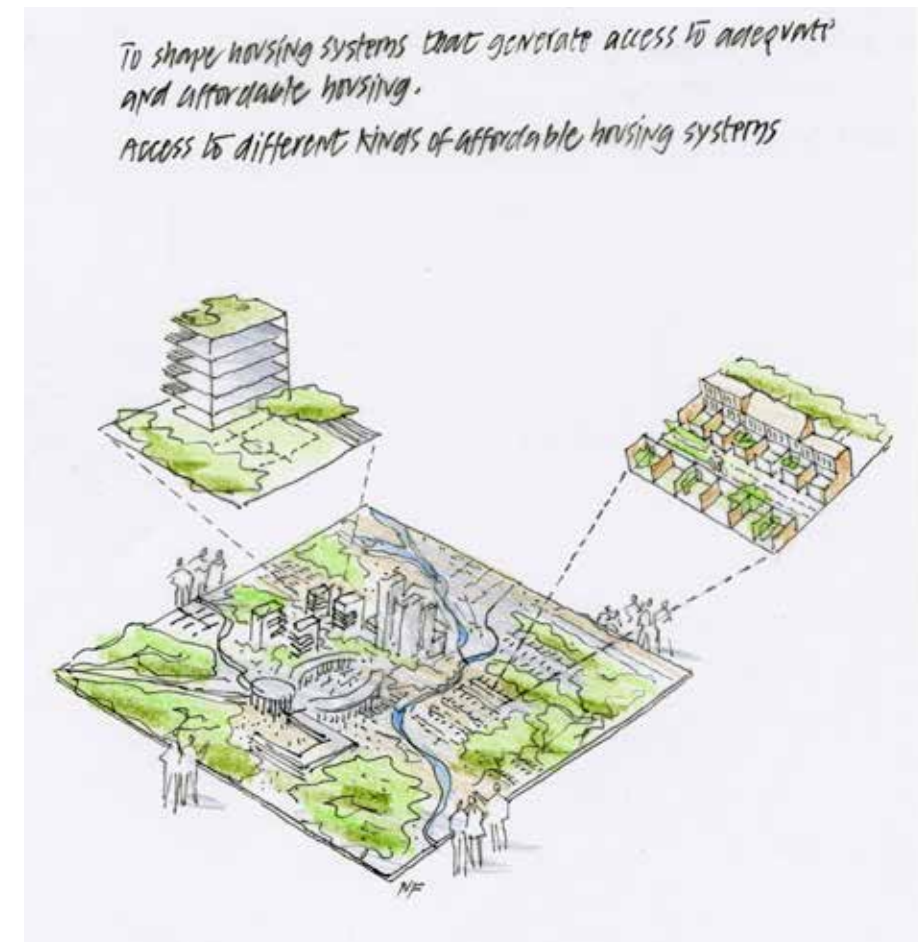
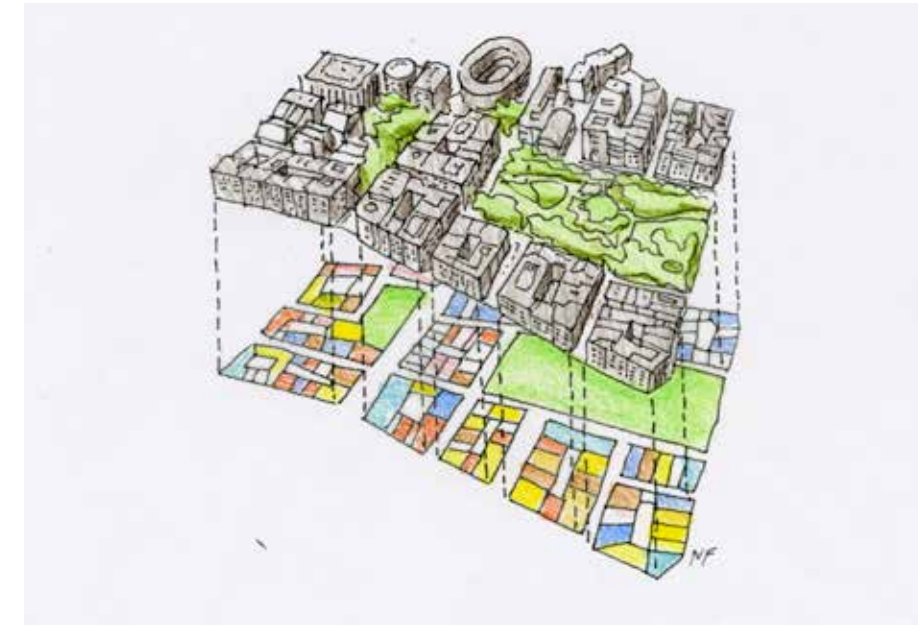
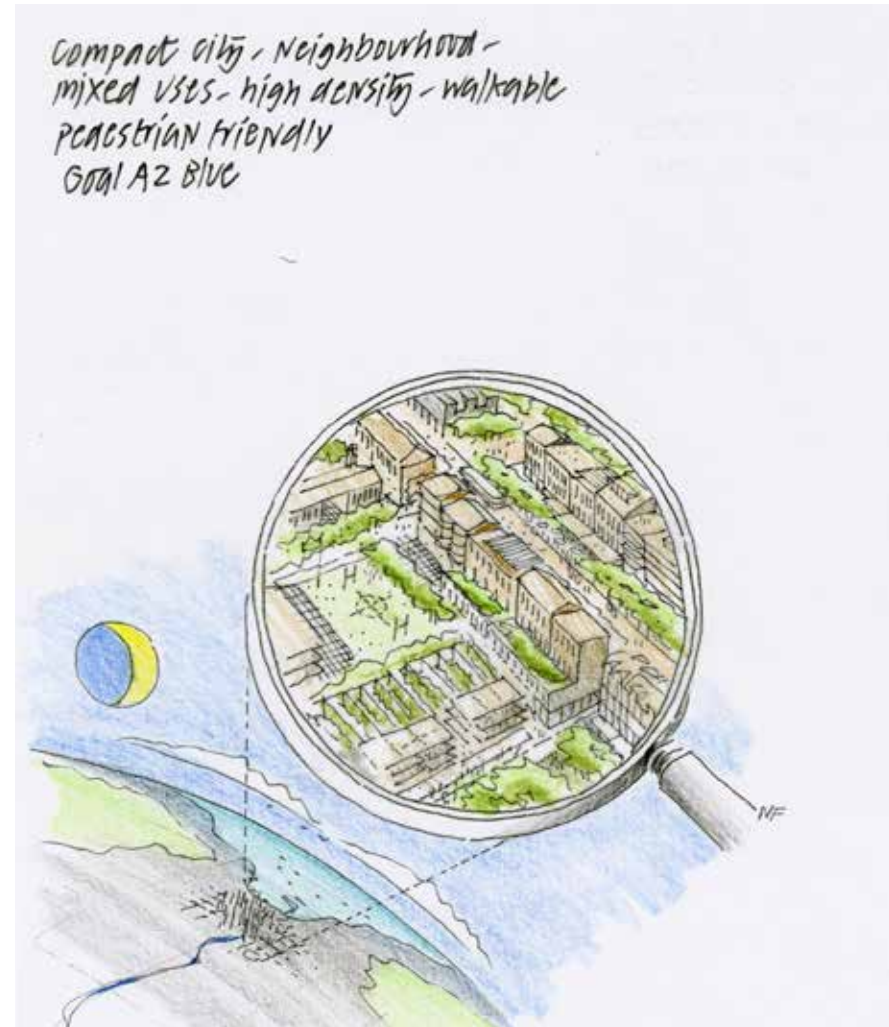


1.7 A New Neighbourhood for Kharkiv

Learning from the benefits and drawbacks of Science Parks, a new urban typology is proposed for Kharkiv: a Science Neighbourhood.

The project will incorporate the benefits of traditional Science Parks (high quality buildings, innovative companies, universities, research centres, startups, economic growth), but at the same time, will feature the benefits of a compact, walkable, green, lively, safe and sustainable mixed-use neighbourhood.

To fulfil this purpose, apart from the work and university related uses, housing, commerce, leisure, and cultural activities will be introduced. Between these uses, high quality public spaces will be introduced, which will be activated with ground floor commercial uses. Green infrastructures and vegetation will ensure a healthy and liveable neighbourhood.



1.8 Arup



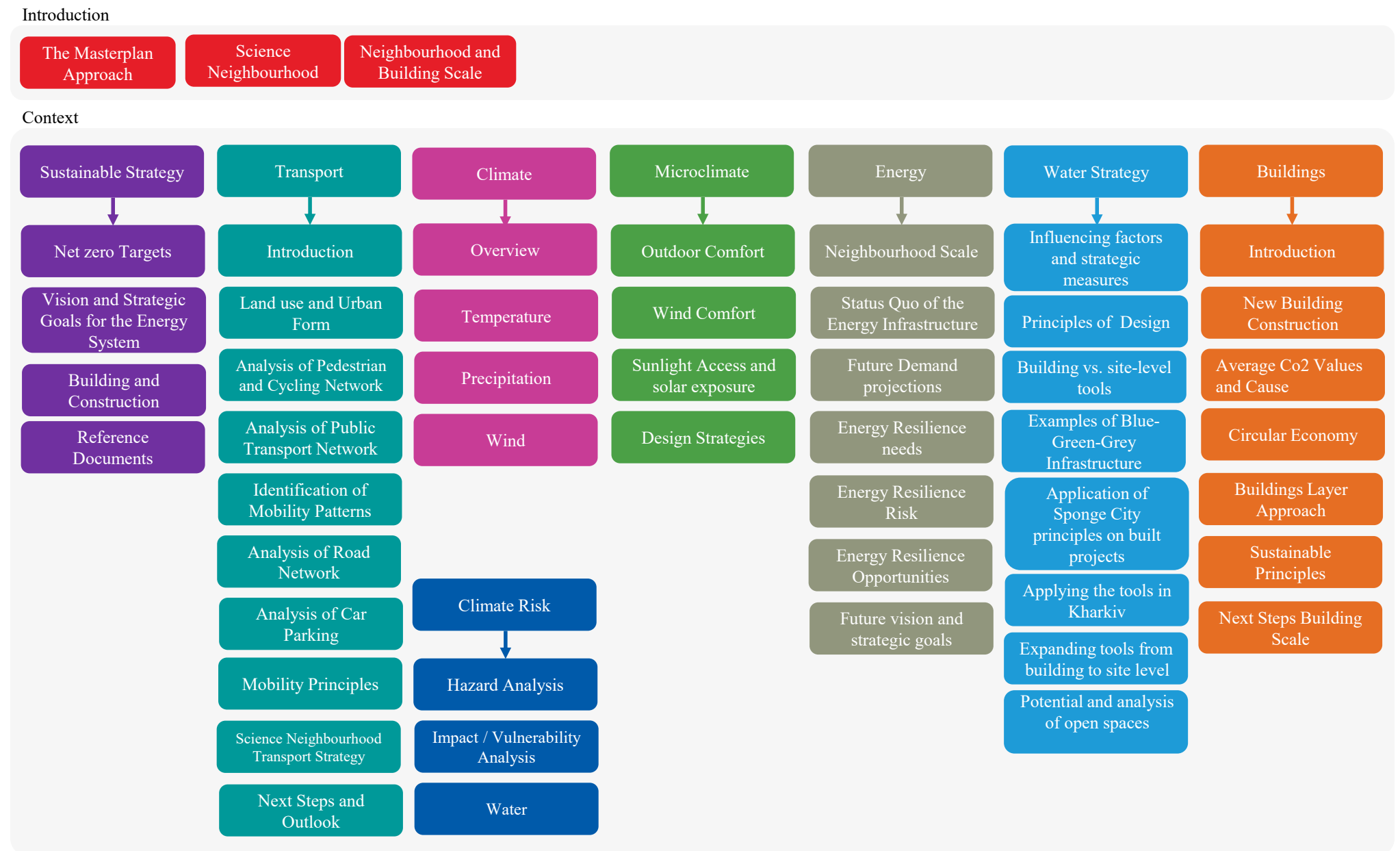
To ensure that the new Science Neighbourhood functions properly, a series of urban strategies need to be established.

Transport will be a key one, to ensure that the interior mobility scheme and the connection to the rest of the city is properly dimensioned, and that the selected transport mode split promotes a sustainable and high quality system.

Energy will also be key, to ensure a semi-autonomous neighbourhood that could even provide electricity and heat to other areas in the city. More importantly, the neighbourhood should be powered with clean sources, for which different energy generation alternatives should be considered.

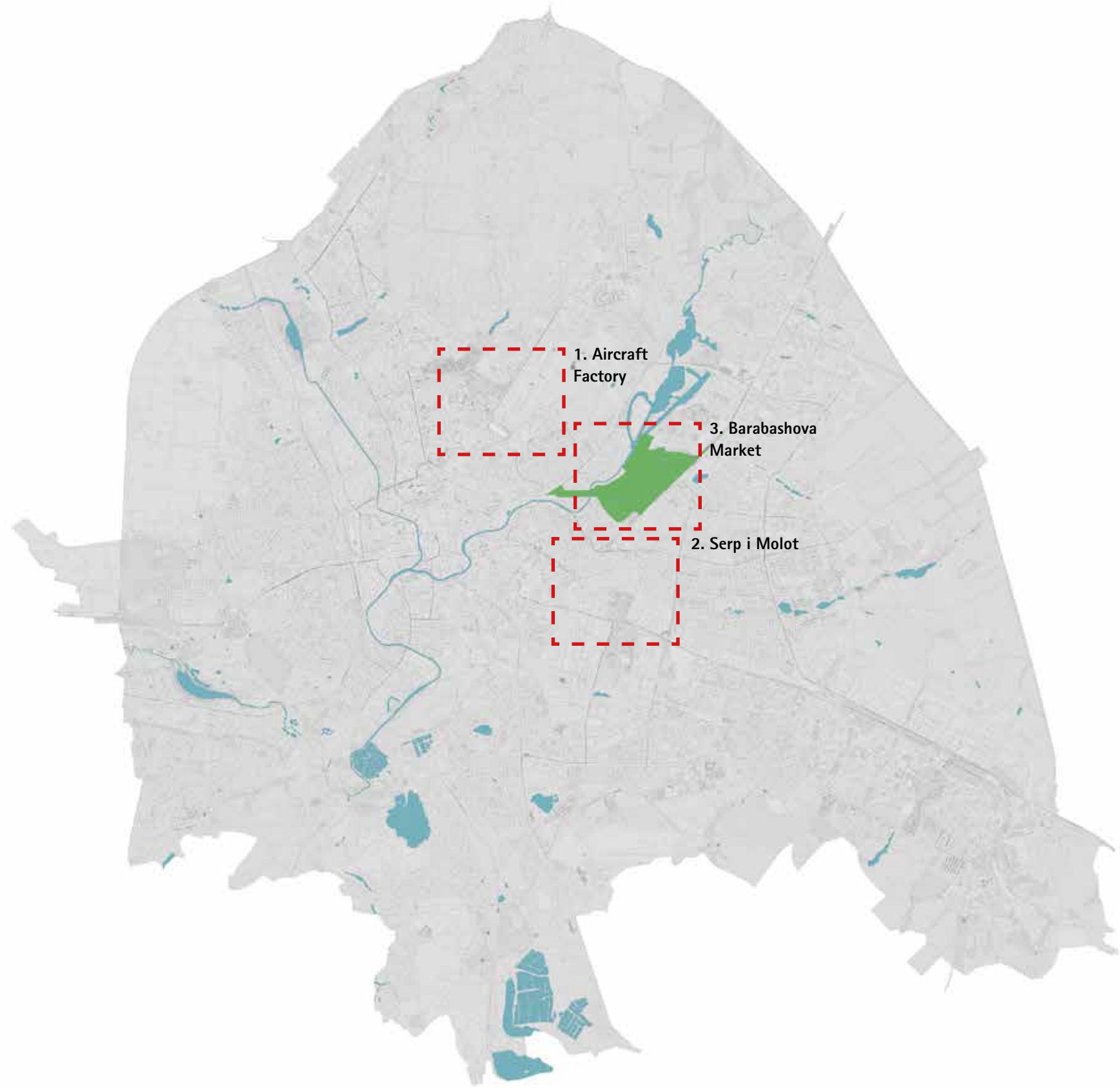
Additional strategies, such as climate, water and buildings, will complement the previous strategies to ensure an environmentally respectful neighbourhood that can become a global reference.

To undertake this ambitious and multi-disciplinary work, as well as to undertake the engineering scope of the Kharkiv masterplan, Norman Foster invited leading global engineering practice Arup, which has been part of the project and the core team from the very beginning.



1.9 Site Selection

Building upon the Advisory Board's experience, an initial size requirement of approximately 100ha was established for the Science Neighbourhood site. Three potential locations were short-listed and analysed for this pilot project before the final decision was made by the City Council, the Kharkiv Architects Group and the Core team to use the Barabashova Market as the site for Kharkiv's future Science Neighbourhood.



1. Aircraft Factory



- Flexibility to grow
- Close proximity to the city centre
- State-owned and strategic
- No metro station

2. Serp i Molot Industrial Site



- Available land
- Very generous spot
- No metro station
- No flexibility to grow

3. Barabashova Market

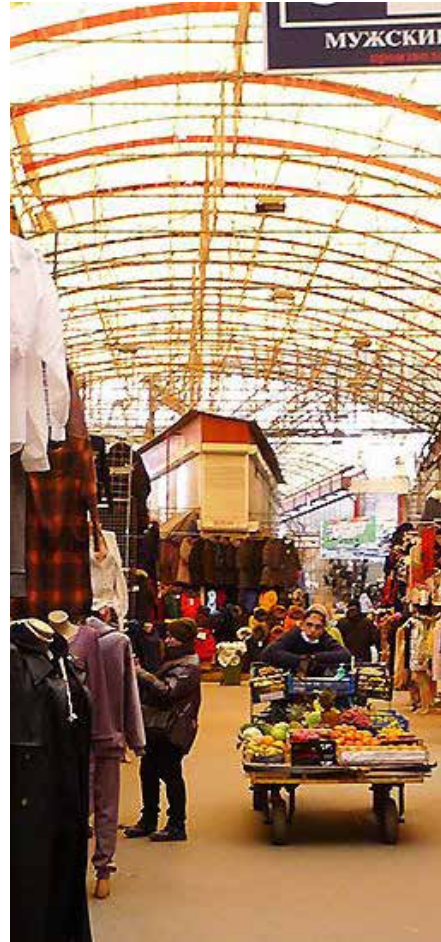


- Available land
- Flexibility to grow
- Close to a metro station
- Proximity to water and nature

1.10 The Barabashova Site



The most important landmark in the site is the Barabashova Market. Partially open and partially covered, the market spans approximately 50 hectares. It is the largest market in eastern Ukraine and the fourteenth largest in the world. It attracted customers from many regions in Ukraine and it was extremely popular for people in nearby Russia. It also features multi-modal transport infrastructures that connect the site to the rest of the city and the region. These include the metro, tram, bus and parking for private vehicles.



The market features street-like covered galleries, around which two storey buildings generate an urban-like environment. Inside, the market offers visitors possibilities to buy everything from groceries, to clothing, to car parts, or even construction materials.



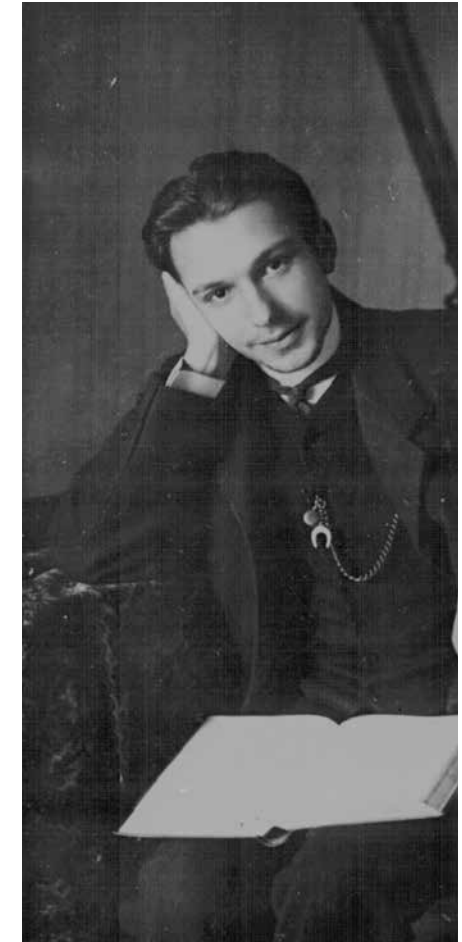
Due to the war, considerable parts of the market have been heavily damaged. Additionally, parts of the market were built using poor quality materials. Although the Science Neighbourhood will be partially located in the area, the market will be kept on site, through a smaller, more condensed, version (as a smaller turnover of customers is expected due to the war and fewer consumers from Russia), while also modernising its structural form.



Around the market, a series of stand-alone commercial buildings, storage areas and single family homes can be found. Together, they create the urban environment of the Barabashova Market. Some streets feature a strong urban life and are paved, while others are surrounded by single family homes and unpaved roads.

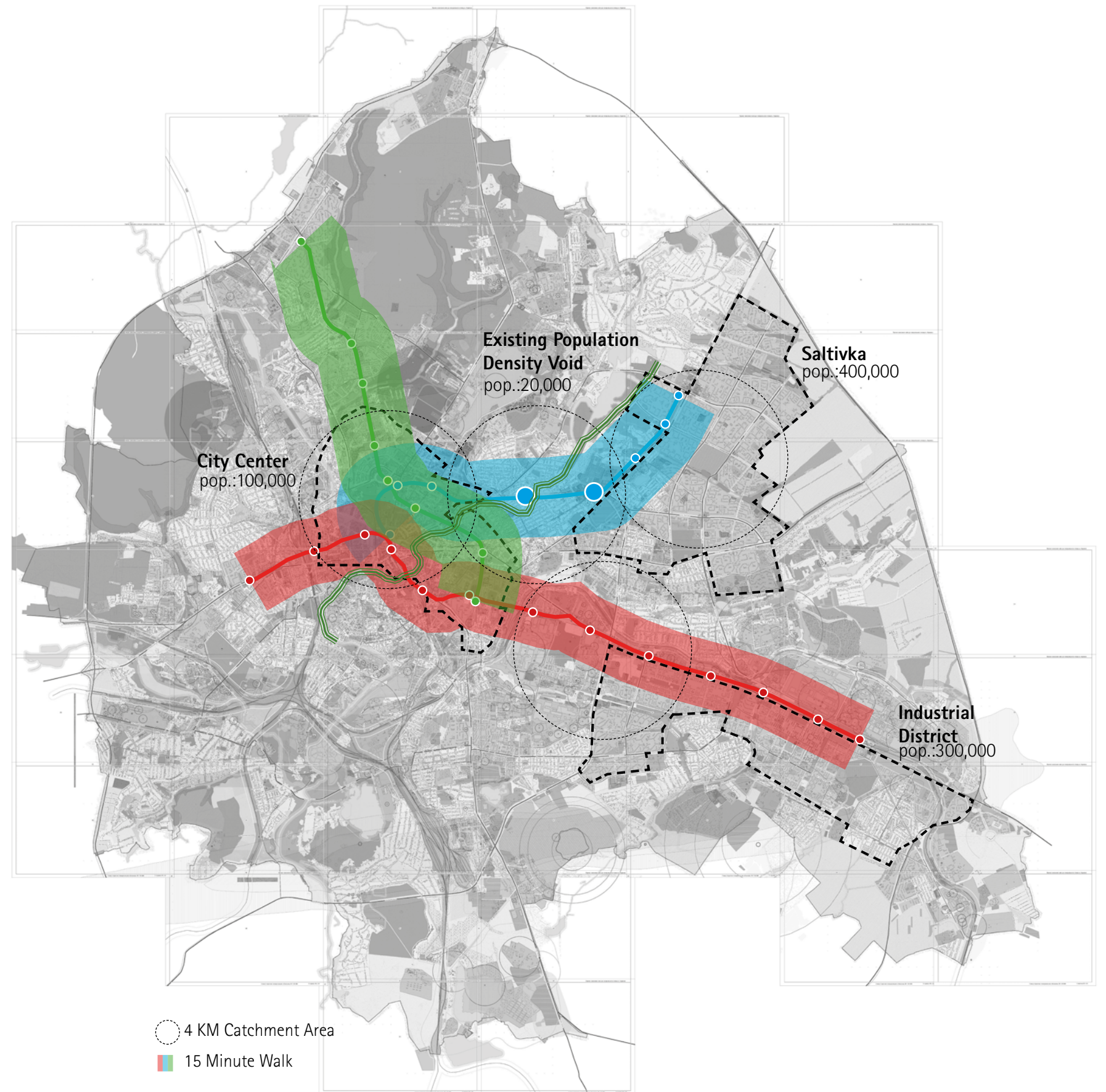


The site is bordered by the Kharkiv River, which runs from the Northeast of the city to the city centre. Some of the streets in the Barabashova Market area lead to the river, a resource that is currently underutilised. Due to the presence of a small dam, a large water reservoir surrounded by generous green areas is accessible from the site. This is an important feature to create a new high quality neighbourhood with an access to natural areas for sports, events and leisure.



Nikolai Barabashova, whom the market is named after, was a Ukrainian astronomer from the city of Kharkiv. He was the director of the Kharkiv Observatory and a professor at the University of Kharkiv where his research focused on properties of the Moon as well as the atmosphere and surfaces of other planets. He received many awards and medals for his accomplishments. It is especially symbolic that this neighbourhood will be devoted to science: a tribute to the renowned astronomer whose legacy continues to inspire scientific pursuits throughout Kharkiv and Ukraine.

From an urban perspective, the Science Neighbourhood will help bind three key areas of Kharkiv that are now separated by a significant population and density void: the City Centre, Saltivka and the Industrial District. It will combine many aspects that encourage positive interaction, including public transport, restaurants/café and green spaces such as public parks with river access. For a successful development of the Science Neighbourhood's activity, it will incorporate buildings destined to innovation generation, such as universities, state-of-the-art research labs and modern workspaces, while simultaneously combining housing, commerce and a condensed, modernised, market-promoting public use of the space. The presence of the metro, tram, bus station, the river and its strategic location in the city will ensure that the benefits of the Science Neighbourhood are extrapolated across the entire city.



1.11 MIT City Science Summit

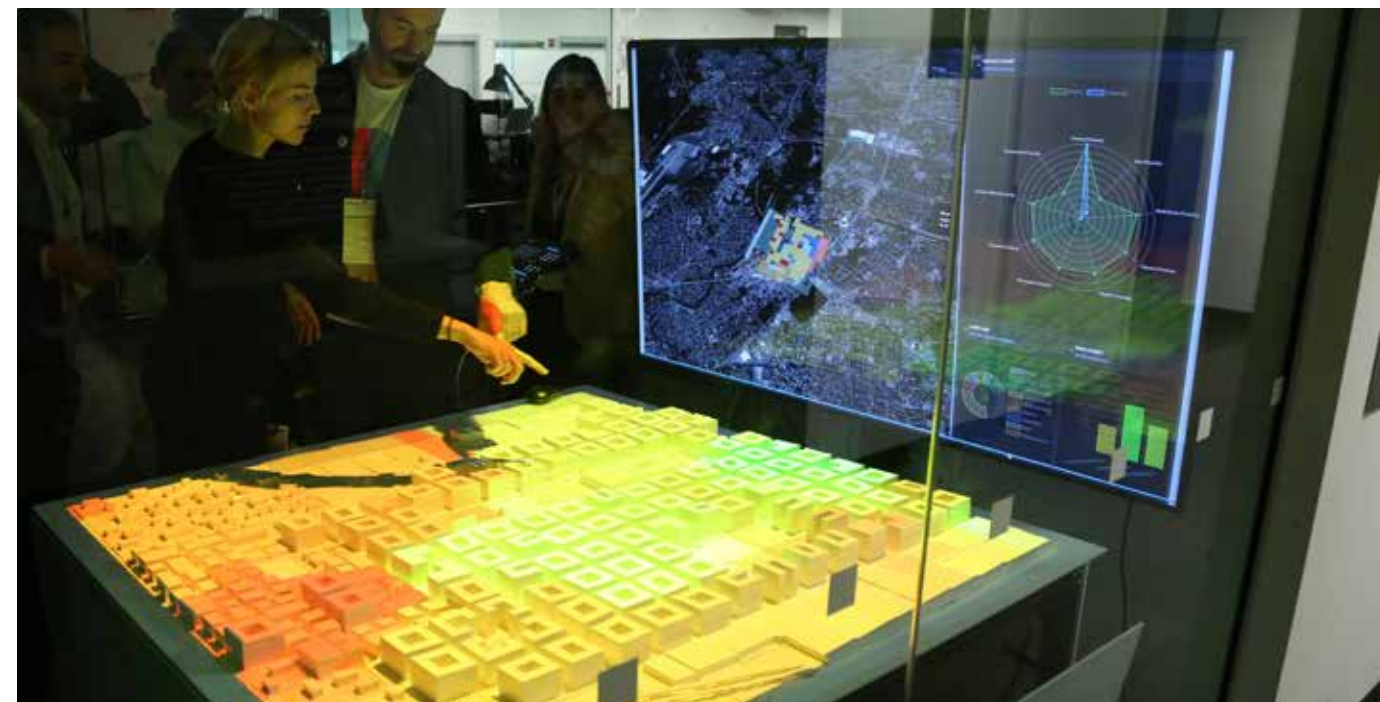
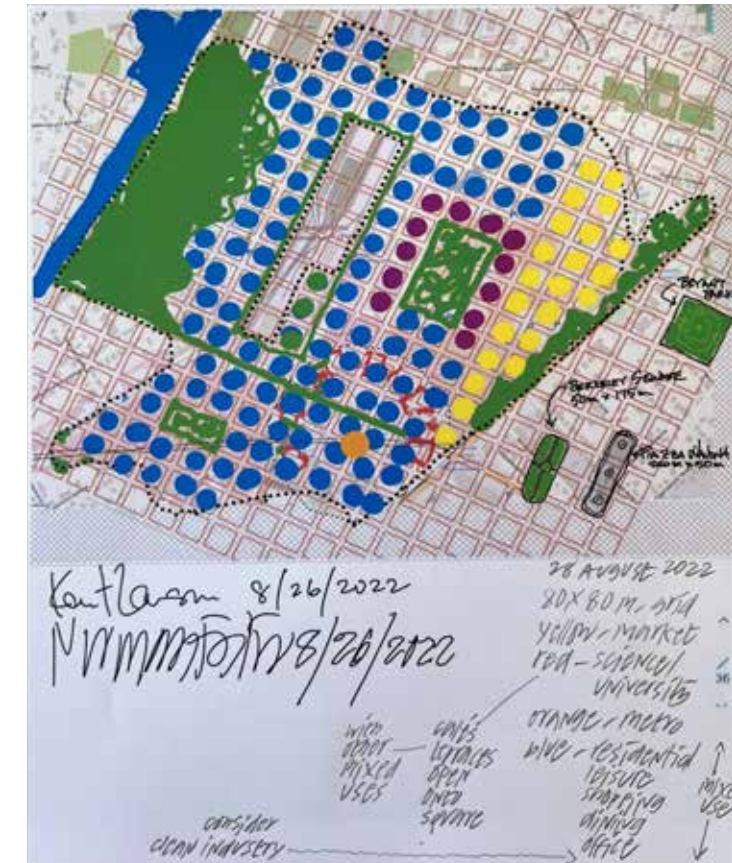
The Science Neighbourhood was at the core of the 2022 MIT City Science Summit, which took place at the MIT Media Lab in October 2022.

The Norman Foster Foundation co-hosted the event with the MIT City Science team, which brought together international collaborators and leaders in the fields of urban science, planning, computer science, policy and decision-making, social sciences and rapid urbanisation. The research event, aimed to enable more liveable, equitable and resilient communities.

The teams presented a data-driven model for cities that could limit emissions to two tons per person while improving the quality of life and economic opportunities for residents. As part of this line of research, the MIT City Science team offered scenarios to dramatically reduce emissions while improving the liveability and economic potential of urban areas. This research examined conventional 'green' solutions, net-zero commuting and amenities, hyper-efficient housing and hybrid work, local production of resources and zero-carbon, high-density distributed energy.

Together with the Kendall Square case study, which was presented by the MIT City Science team, Kharkiv and its new masterplan were the focus of the event. The Mayor of Kharkiv, Olga Demianenko and the citizens opened the session, with compelling online and in-person interventions on the situation of the city and its optimism for a bright future.

During his intervention, the Mayor specifically shared the objective of creating a forward-looking, modern science park that would promote a clean and innovative urban economy; a vision that was not only endorsed by Norman Foster during his Kharkiv masterplan presentation but that was complemented with the objective of merging the benefits of science parks and mixed-used communities into a revolutionary new Science Neighbourhood. Advisory Board member Manuel Cendoya shared the innovation generation strategies that could be applied to the new Science Neighbourhood to fulfil the city's goals, and Diego Lopez, Co-Head of the Architecture and Technology Unit of the Norman Foster Foundation, presented the initial ideas on how the future Kharkiv Science Neighbourhood could be shaped.



CITY SCIENCE SUMMIT 2022



NFF
NORMAN FISHER
FOUNDATION

CITY SU



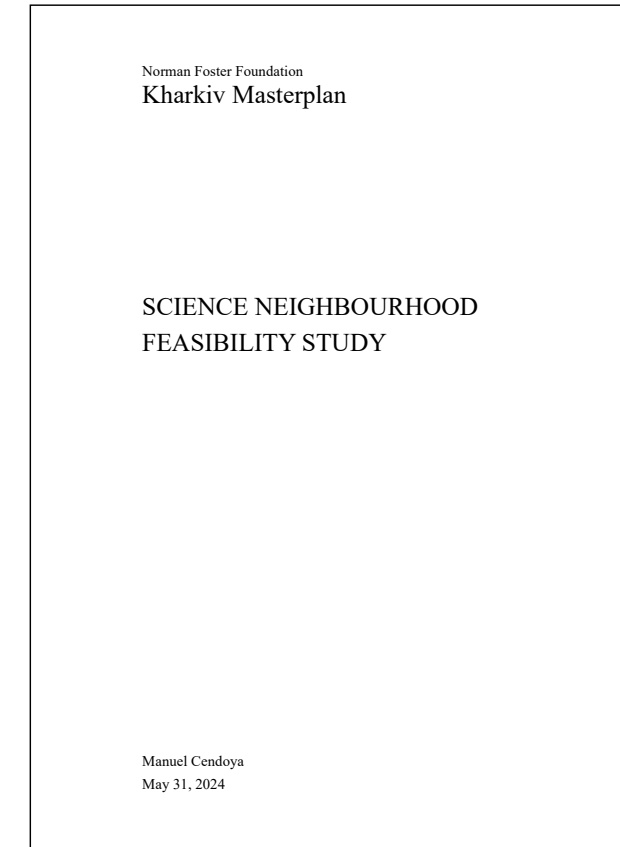
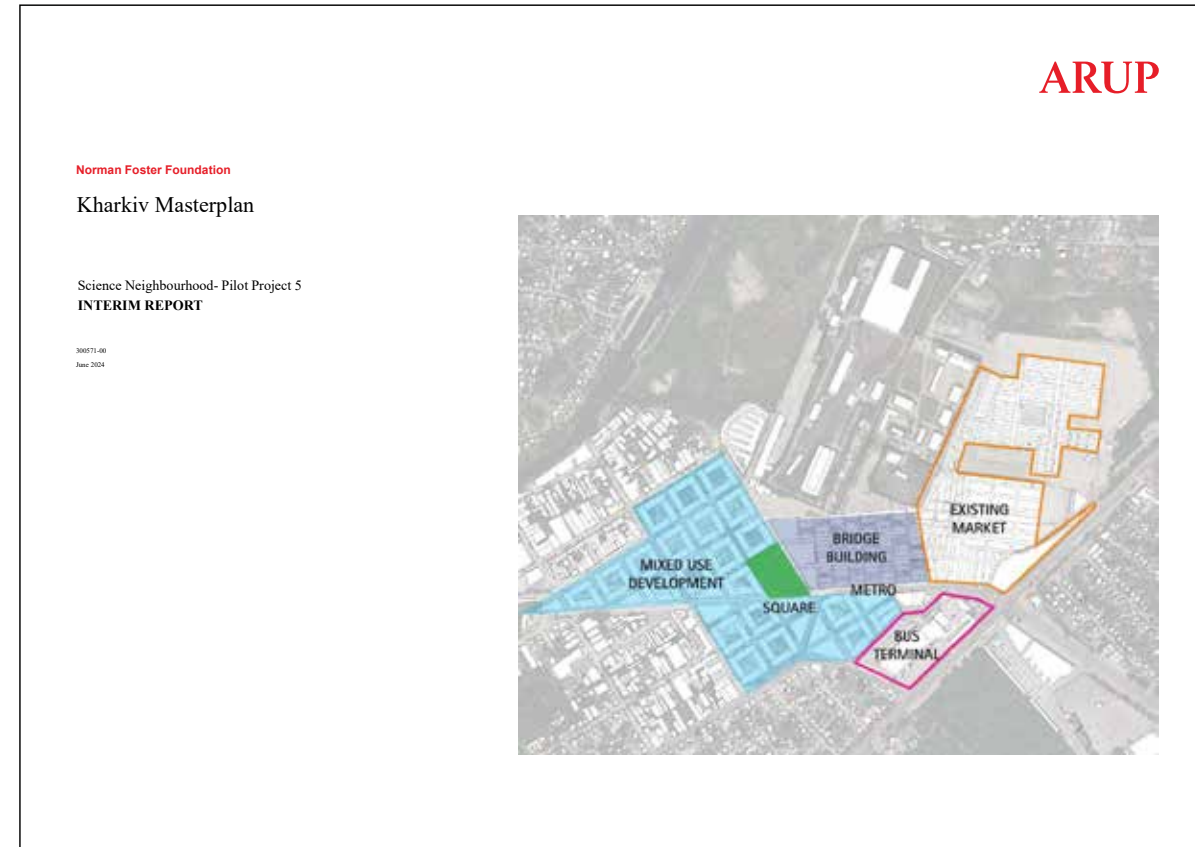
1.12 Report and Annexes

The following chapters summarise the work that has been undertaken since January 2024, as part of the project's funded scope. Two annexes accompany this report.

The first one is a report by Arup that covers the key engineering disciplines to generate a well working neighbourhood. It includes preliminary strategies and basic quantitative analysis regarding climate, transportation, energy, sustainability, water and the natural environment.

The second one is the Science Neighbourhood's feasibility study, developed by Manuel Cendoya from the Advisory Board. The document analyses Kharkiv's innovation ecosystem and sets the ground for the project. It includes the neighbourhood's guidelines to generate innovation and socioeconomic development in Kharkiv.

The work shown in the following chapter and the two annex has been developed within the UN4UkrainianCities Project framework, funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.





An international and local talent magnet that will position Kharkiv in the frontline of innovation, technology, and urbanism.

2. Site Analysis

2.1 Strategic location in Kharkiv

The Science Neighbourhood will help bind three key areas of Kharkiv that are now separated by a significant population and density void: the City Centre, Saltivka, and the Industrial District. It will combine many aspects that encourage positive interactions, including public transport, restaurants/café and green spaces such as public parks with river access.

For a sustainable use of the science neighbourhood, it will incorporate other forms of urban infrastructure vital to innovation generation, such as universities, state-of-the-art research labs, and modern work spaces, while simultaneously combining housing and a condensed, modernised, market promoting public use of the space. The presence of the metro, trams, bus stations, the river, and its strategic location in the city will ensure that the benefits of the Science Neighbourhood are extrapolated across the entire city.



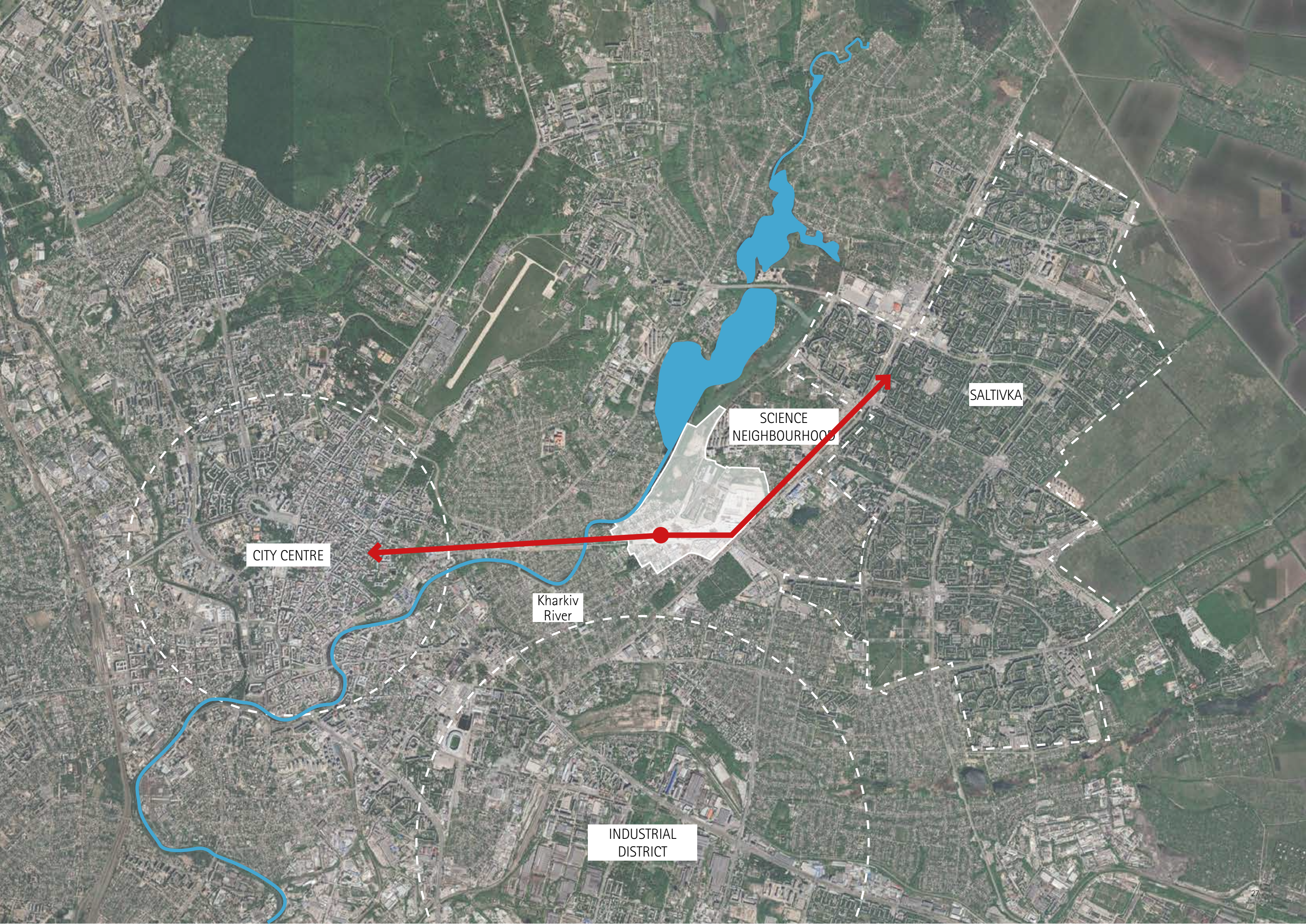
Saltivka



Industrial District



City Centre



CITY CENTRE

Kharkiv
River

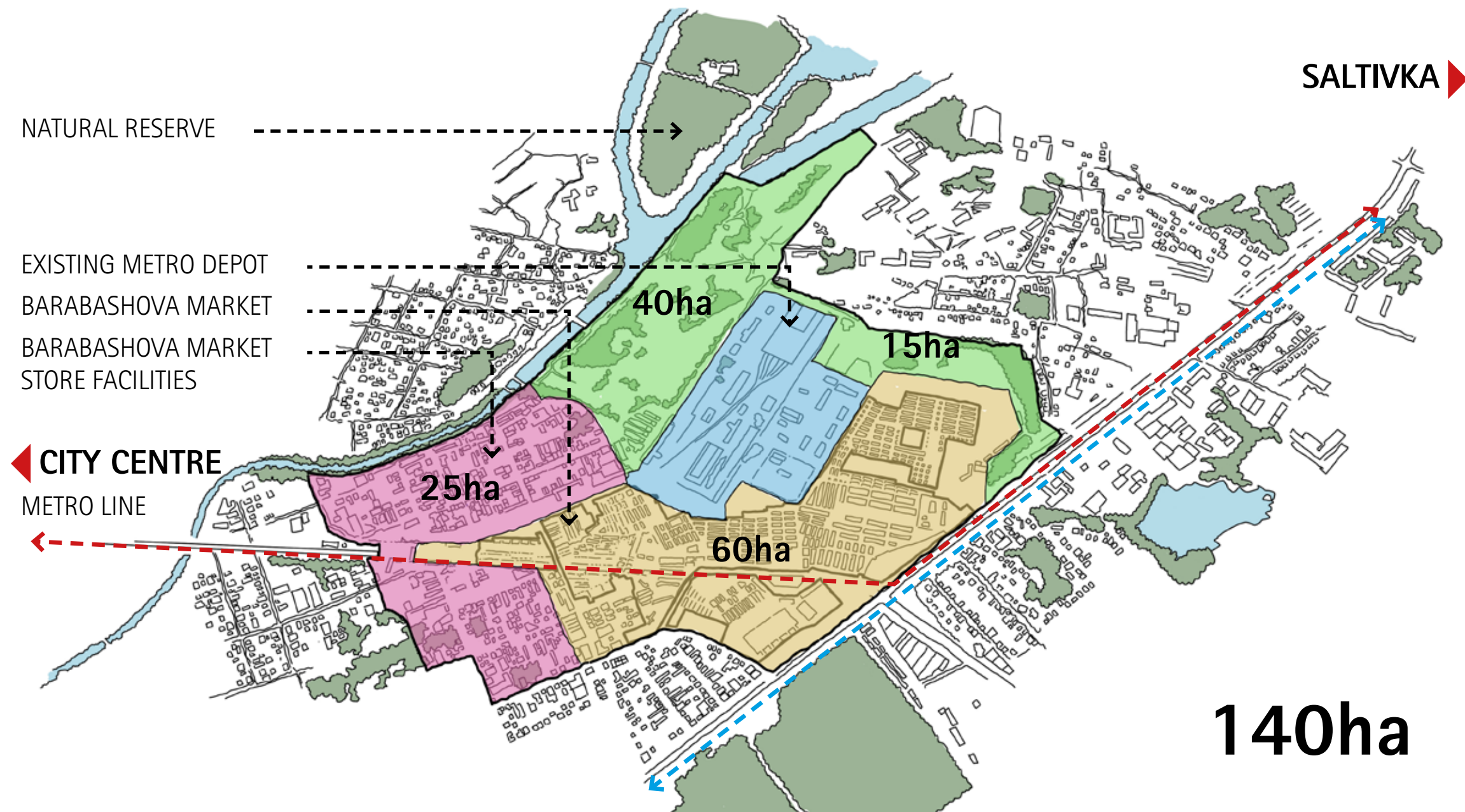
SCIENCE
NEIGHBOURHOODS

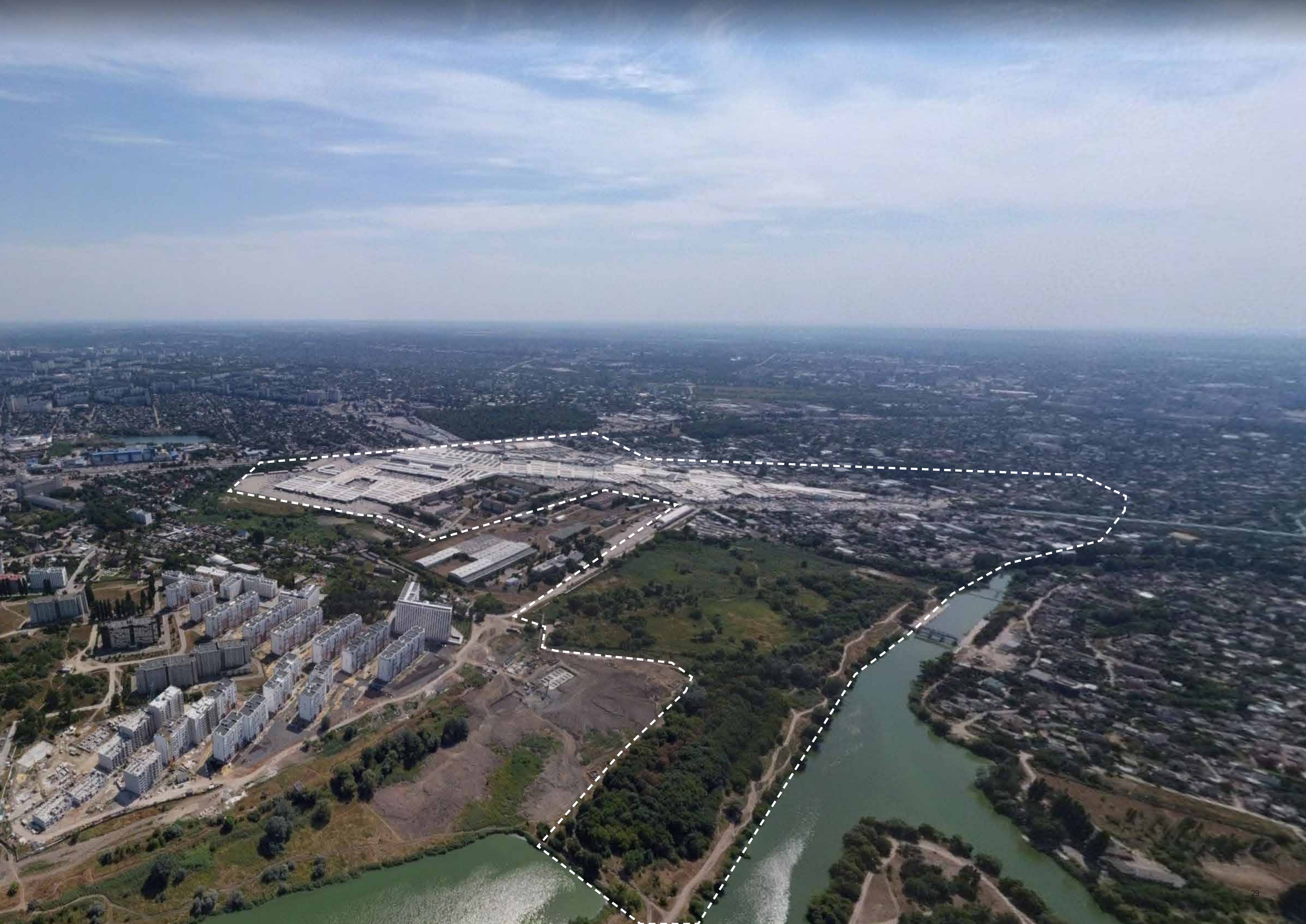
SALTIVKA

INDUSTRIAL
DISTRICT

2.2 Existing site

Spanning 140 hectares, the site is divided into several zones: a natural reserve area, the existing Metro Depot, the Barabashova Market, storage facilities and single-family houses. This area is connected by a metro line linking it to both the City Centre and Saltivka.

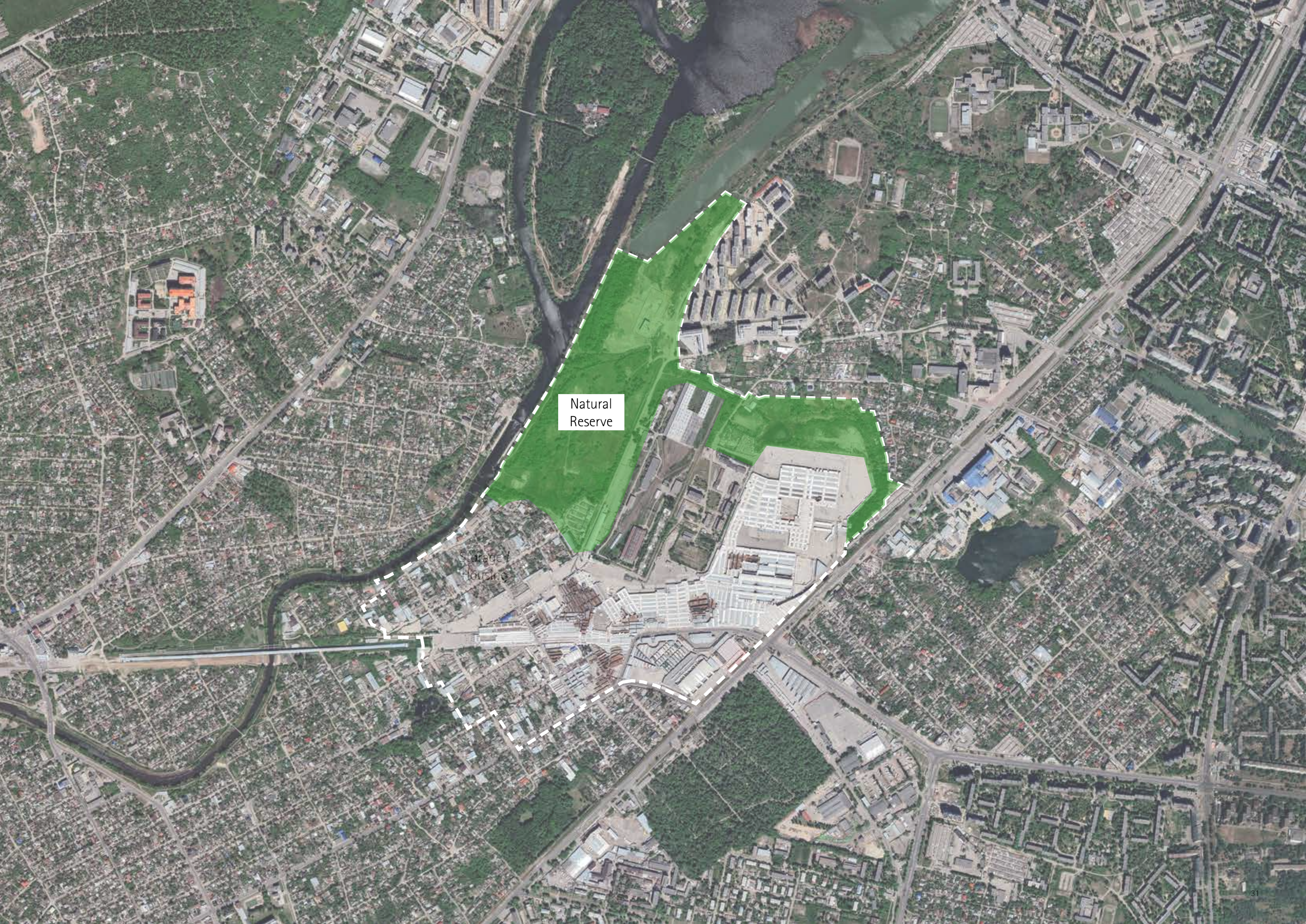




2.3 Natural Reserve

The Natural Reserve spans approximately 55 hectares along the Kharkiv riverfront. This vacant land offers an opportunity for environmental integration and connectivity with nature, making it ideal for linking with the River Pilot Project aimed at enhancing the riverbank's ecological and recreational potential.





Natural Reserve

Storage / Housing

2.4 Metro Depot, Existing Hospital and Electric Network

Occupied by existing infrastructure such as the metro, a hospital, and an electric network, this area represents a limit for new development.



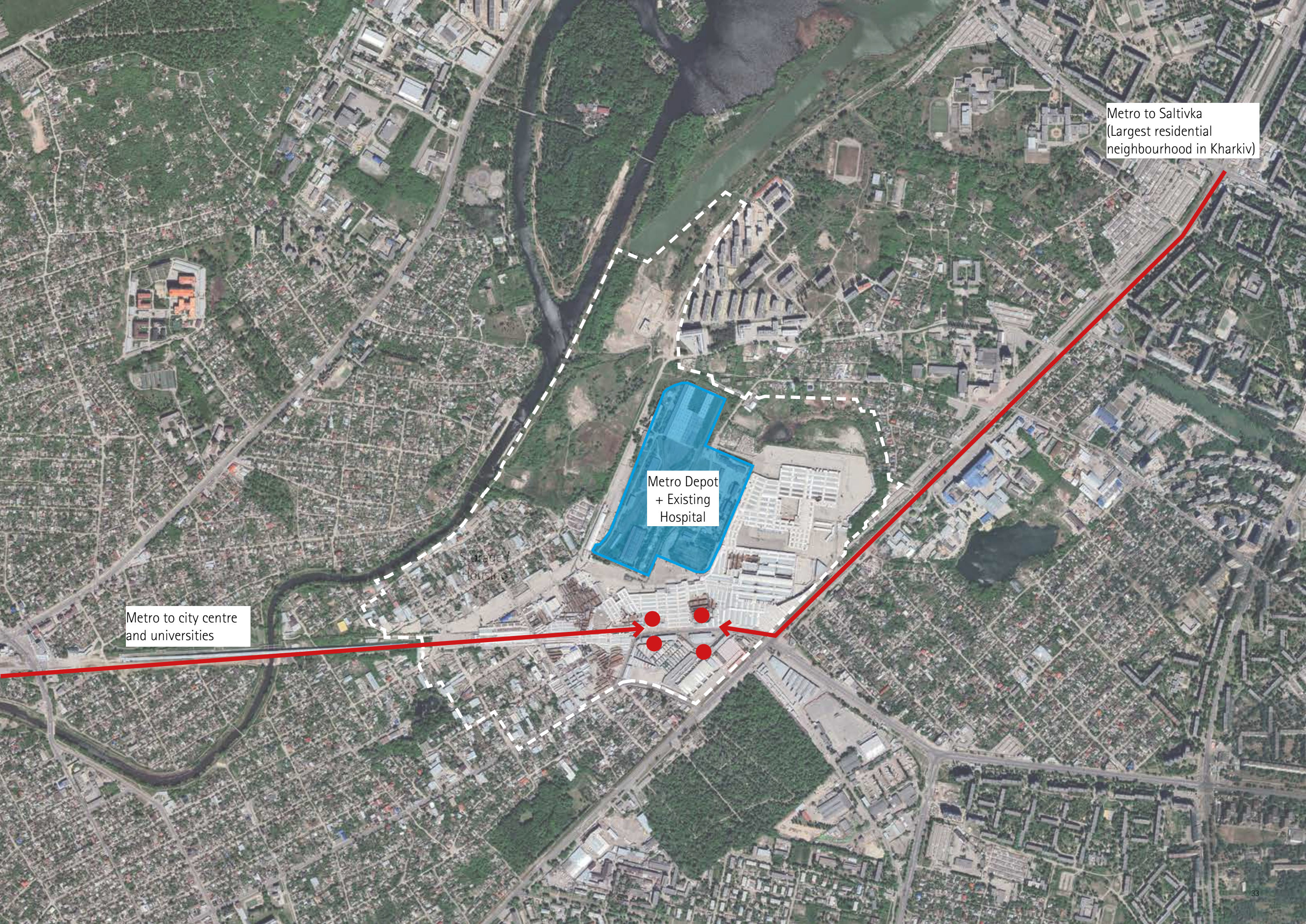
Electric Network



Hospital



Metro Infrastructure



Metro to Saltivka
(Largest residential
neighbourhood in Kharkiv)

Metro Depot
+ Existing
Hospital

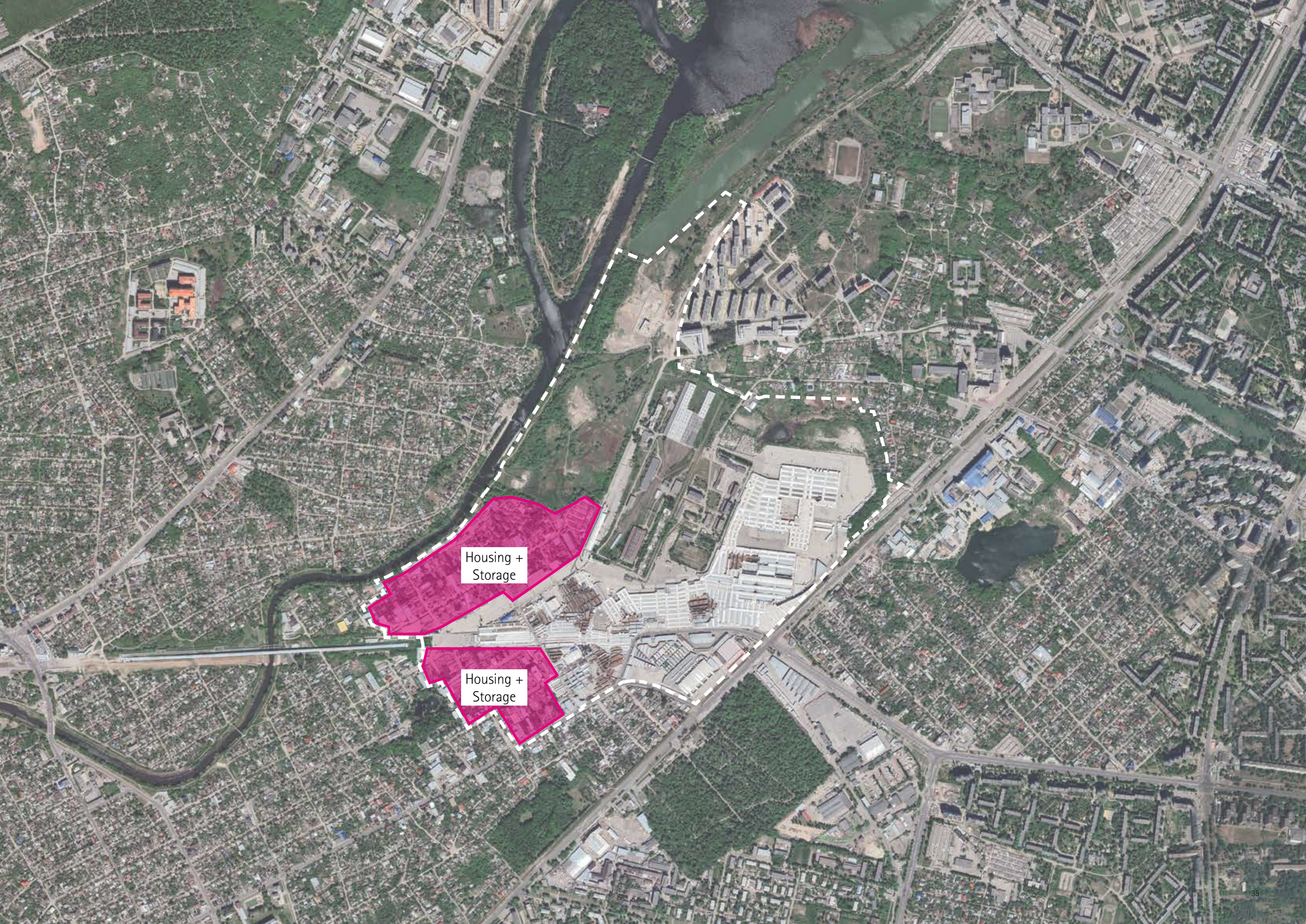
Storage /
Housing

Metro to city centre
and universities

2.5 Single Family Homes and Store Facilities

The area currently designated for low-density single-family houses and store facilities, primarily used for market activities, is proposed for the implementation of the Science Neighbourhood. This space offers the flexibility needed for future growth.





Housing +
Storage

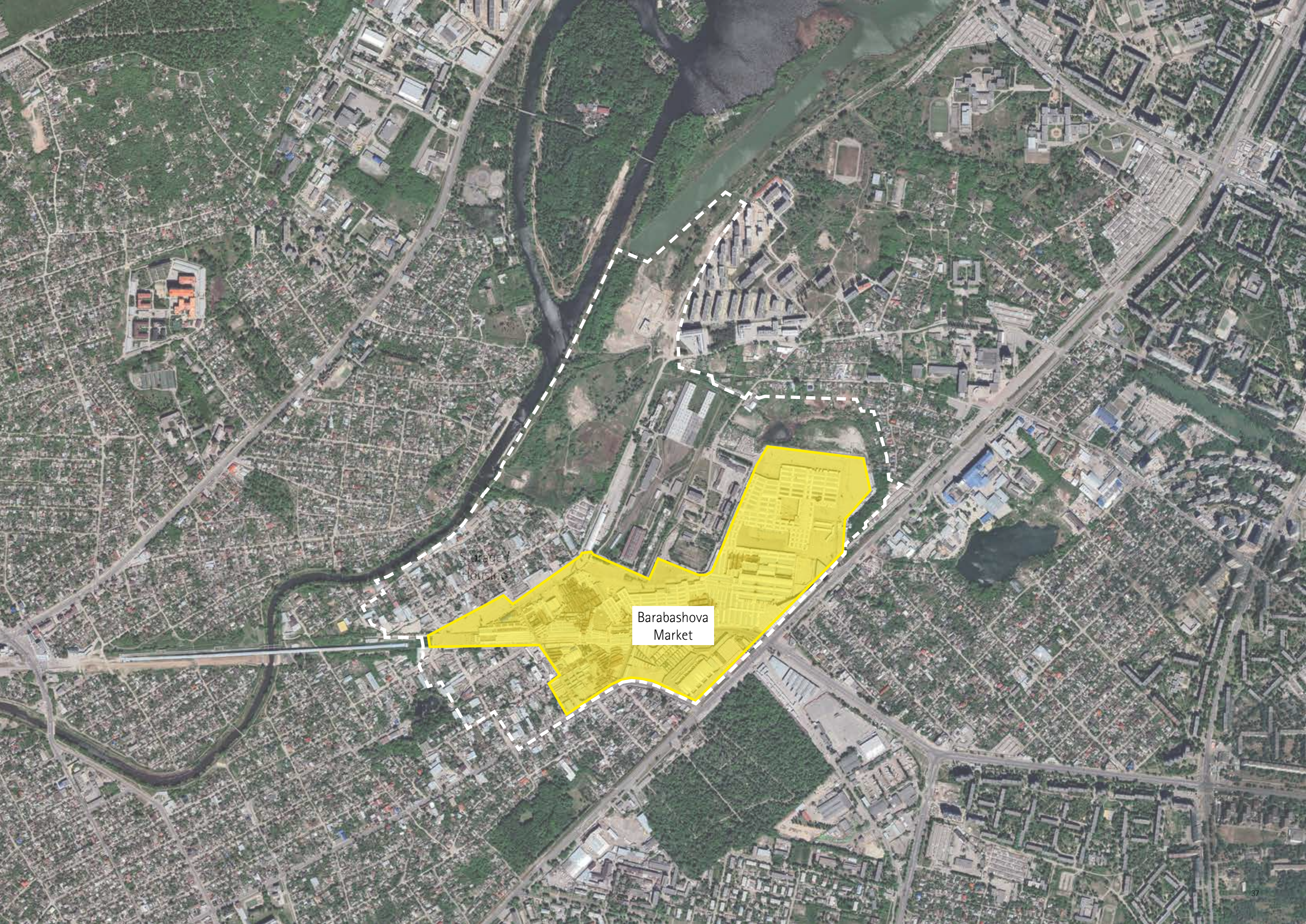
Housing +
Storage

2.6 Barabashova Market

The Barabashova Market was, prior to the war, the largest market in Eastern Ukraine and the 14th largest in the world. It attracted customers from many regions in Ukraine and it was extremely popular for people in nearby Russia, with stores selling a massive variety of goods.

The Science Neighbourhood project will maintain a smaller, more condensed version of the market (as a smaller turnover of customers are expected due to the war and less consumers from Russia), while also modernizing its structural form.





Storage/
Housing

Barabashova
Market

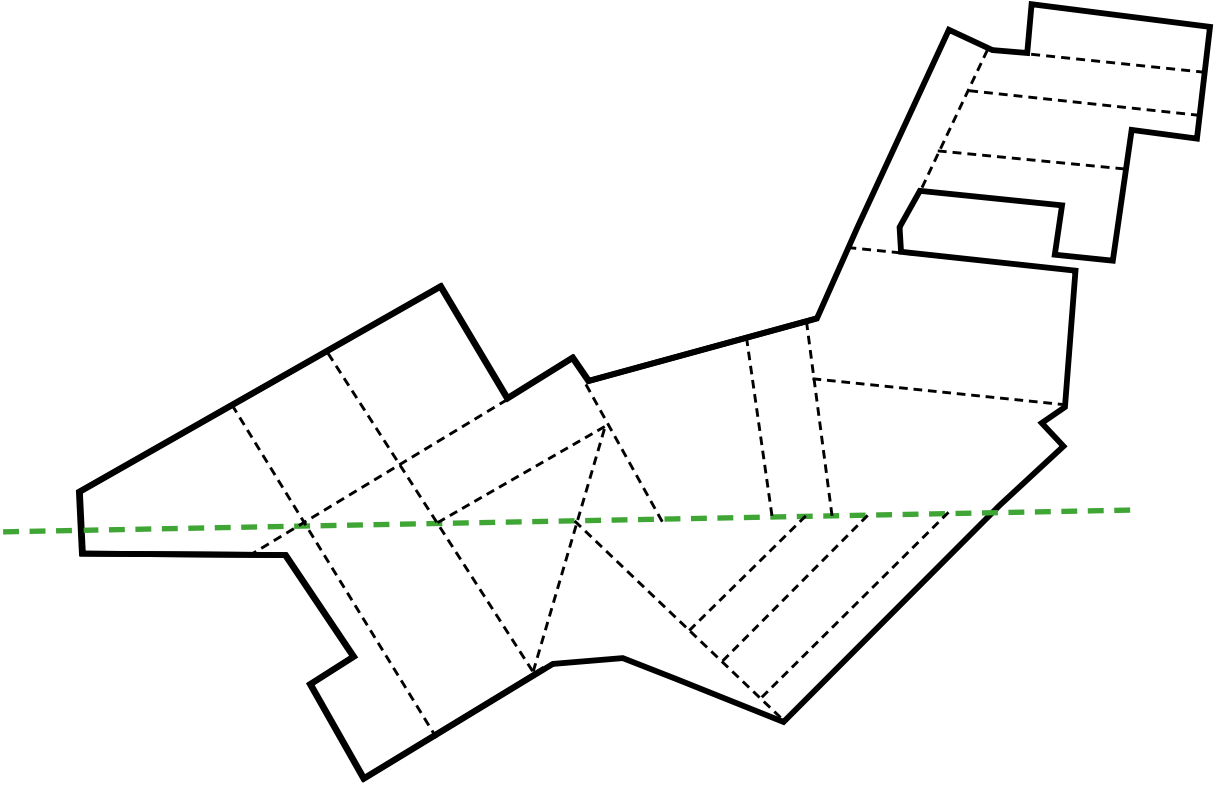
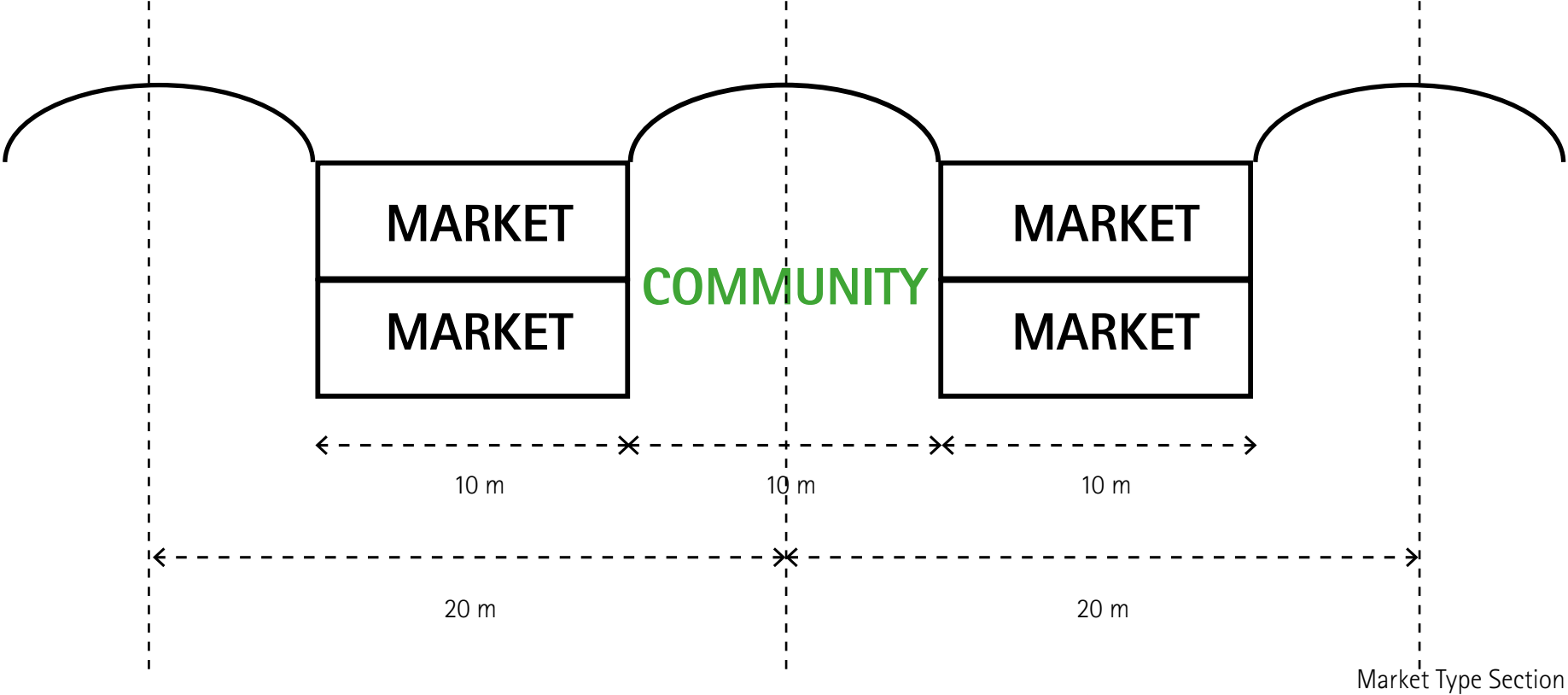
LARGEST MARKET IN
EASTERN UKRAINE
14TH LARGEST IN THE WORLD
REGIONAL TRADE HUB
GLOBAL SIGNIFICANCE





2.6 Barabashova Market

The market is structured around modules of market space and covered vaulted galleries, each spanning 10 to 20 metres in width. This grid layout forms a complex and organized environment, like a self-contained city on its own.



Market Type Section

Market Grid Layout



● Metro Entrances

2.6 Barabashova Market

In the market, a diverse array of goods such as household equipment, clothes, toys, shoes, auto parts, hunting and fishing gear, and building materials are available. Beyond commerce, it also functions as a communal hub in Kharkiv, hosting cultural activities and events that enrich the city's social fabric. Sensitively integrating the Science Neighbourhood with the market is essential to preserve its vibrant spirit and uphold its crucial role in Kharkiv's community life.



HOUSEHOLD EQUIPMENT



BICYCLES AND MOTOCYCLES



BUILDING MATERIALS



HUNTING AND FISHING



CURTAINS AND CARPETS



OUTWEAR



GROCERIES



COSMETICS AND PERFUMERY



CLOTHES



SHOES



TOYS



AUTO PARTS



FABRICS AND ACCESSORIES



LEATHER AND FUR



HOUSEHOLD GOODS



WALLPAPER



2.7 Available land

The physical development guidelines emphasize selecting a site with suitable land characteristics integrated into the urban fabric and close to the city's knowledge base, including universities and research centers, to foster interactions. The site should be accessible through various transport links and offer high environmental quality with landscaping potential. It must be large enough to accommodate a complex and varied program of uses, encouraging interaction while remaining attractive, with flexibility for growth to meet changing needs.

As a conclusion, a total area of up to 100 hectares may be required. Additionally, the site should be well-connected to the city and locally rooted to benefit Kharkiv's wider population, featuring good connectivity via metro, tram, and buses, and environmental attractiveness due to its proximity to the Kharkiv River.

URBAN FABRIC INTEGRATION
KNOWLEDGE PROXIMITY
TRANSPORT LINKS
GROWTH FLEXIBILITY
NATURE CONNECTION
LARGE AVAILABLE SITE



Area for possible future expansion.

Not available area.

Existing Market.

Riverbank:
Connection to nature.

Existing Housing:
Rooted in the city grid with possibilities for growth.

Transport Hub:
Good connection to city center and Saltivka.

140 HA
AVAILABLE AREA

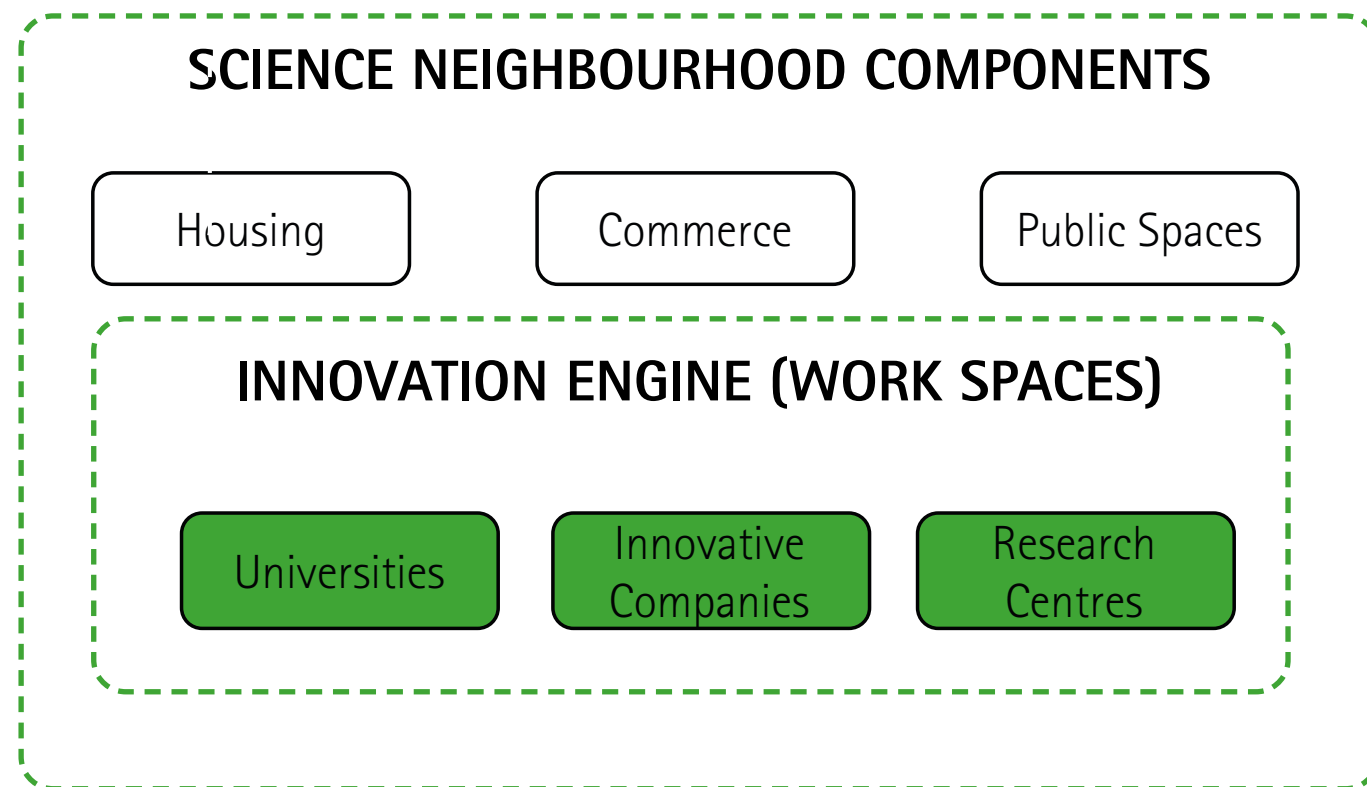
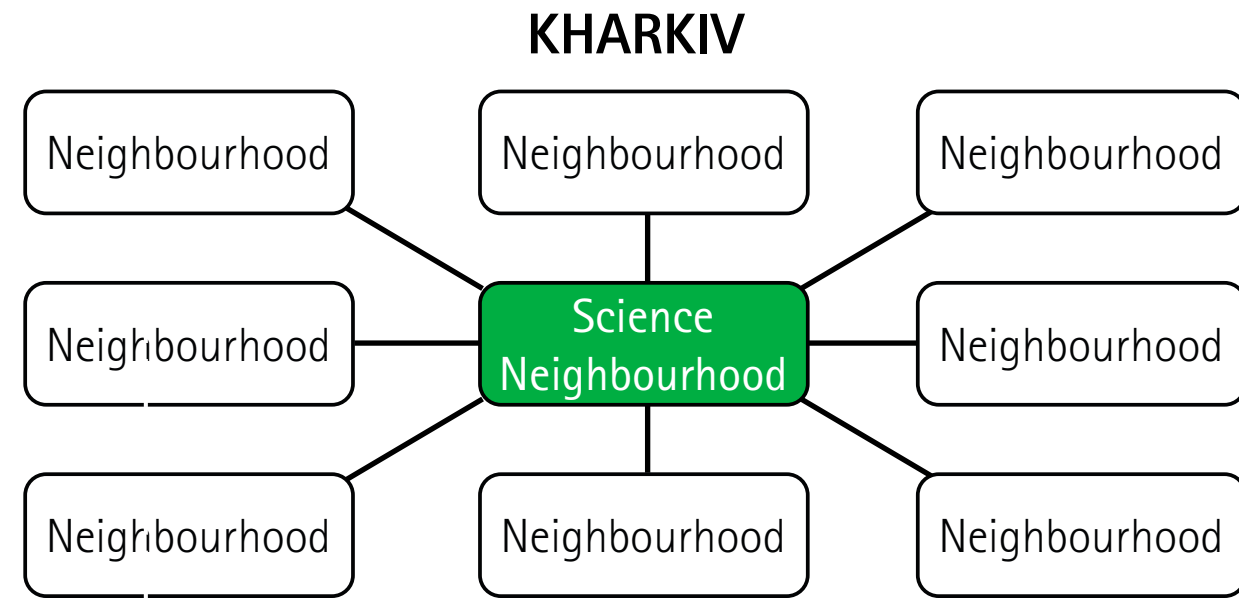
3. Brief

3.1 Science Neighbourhood vs. Traditional Science Park

The concept of a Science Neighbourhood combines the advantages of traditional science parks with those of dense, mixed-use urban environments, addressing drawbacks such as urban isolation and single-use designs typical of conventional science parks. This innovative approach integrates diverse urban functions like transportation and synergistic interactions within a high-density neighbourhood setting. It combines the innovation-driven environments of science parks with flexible, high-quality buildings, fostering collaboration among innovative companies and universities while promoting productive working environments.

The Science Neighbourhood strives to maximize innovation while spreading its benefits citywide. To prevent it from merely becoming a well-designed neighbourhood and to continually foster innovation and curated interactions among companies, public institutions, and universities, it incorporates an "Innovation Engine." This concept blends the attributes of a high-density, reinvented science park with the urban fabric, ensuring its unique role in driving ongoing innovation.

The Innovation Engine plays a critical role in maximizing innovation within urban settings. It serves as a necessary mechanism beyond universities, research centers, and companies, linking these entities together. This connectivity prevents knowledge and resources from remaining isolated within their respective institutions, thereby enhancing their collective capacity for innovation generation.



COMBINED BENEFITS:

SCIENCE PARK

INNOVATION

ECONOMIC DEVELOPMENT

MODERN WORKSPACES



NEIGHBOURHOOD

DENSE MIXED USES

PUBLIC TRANSPORTATION

URBAN SYNERGIES

3.2 Innovation District Typologies

Innovation districts are characterized by several key models and success factors that drive their development:

- Anchor Plus: Typically linked to research universities, medical centres, or major corporations.

- Urbanized Science Park: Designed for living, working, and recreation to foster inclusivity and cross-industry relationships.

- Re-Imagined Urban Area: Often reclaimed from old warehouses or underdeveloped waterfront areas for economic revitalization.

In the case of Kharkiv's science neighbourhood, the Re-Imagined Urban Area model is the one to follow. When analysing the districts, we must consider the specific model each one represents to draw accurate conclusions.



ANCHOR PLUS
KENDALL SQUARE - MIT SCIENCE PARK

Norman Foster Foundation



URBANIZED SCIENCE PARK
INNOVATION ARC - LEEDS

**KHARKIV SCIENCE
NEIGHBOURHOOD MODEL**



RE-IMAGINED URBAN AREAS
22@ - BARCELONA

3.3 Innovation Engine Size

To define the spaces in the Innovation Engine, two fundamental parameters must be established: the total site area and its floor space capacity.

Drawing from a comparative analysis of international innovation districts and science parks, insights have been gathered to estimate suitable parameters tailored to Kharkiv's characteristics and potential. Despite current uncertainties stemming from regional economic challenges and the aftermath of conflict, historical context must guide a realistic yet ambitious proposal for the Science Neighbourhood. This initiative aims to align with Kharkiv's socioeconomic landscape and drive future development. Selected international examples of successful innovation districts in cities comparable to Kharkiv provide valuable insights and benchmarks for the project's definition and implementation.

To optimize resource utilization and ensure financial viability, it is recommended to phase the development of the Innovation Engine. This approach entails prioritizing the urbanization of the area initially and constructing buildings based on current demand as it arises.

| RELEVANT INNOVATION DISTRICTS | | | | | |
|---|-----------------------|-------------------------------|---------------------|-----------------|-------------------|
| INNOVATION DISTRICT | CITY / COUNTRY | CITY POPULATION MET. AREA | GDP per capita (\$) | TOTAL AREA (Ha) | WORK SPACES (sqm) |
| 22@ Barcelona | Barcelona Spain | 1,660,435 3,338,800 | 35,380 | 198 | 2,659,859 |
| Wake-Forest Innovation Quarter | California USA | 249,545 676,966 | 54,330 | 133 | 320,000 |
| White City Innovation District | London UK | 8,799,800 14,900,000 | 76,054 | 56 | 400,000 |
| Amsterdam Zuidas | Amsterdam Netherlands | 905,000 1,500,000 | 66,239 | 245 | 870,000 |
| Melbourne City North Innovation District | Melbourne Australia | 4,875,400 5,316,000 | 51,300 | 224 | N.A. |
| Milan Innovation District (MIND) | Milan Italy | 1,371,000 3,220,000 | 53,804 | 100 | 356,000 |
| Innovation Arc | Leeds UK | 812,000 1,700,000 | 43,798 | 132 | 400,000 |
| Isla Zorrotzaurre | Bilbao Spain | 342,484 980,523 | 36,346 | 84 | 133,000 |
| Kharkiv Science Neighbourhood | Kharkiv Ukraine | 1,420,000 (2022) 2,658,000 | 3,615 (Regional) | 50 | 300,000 |

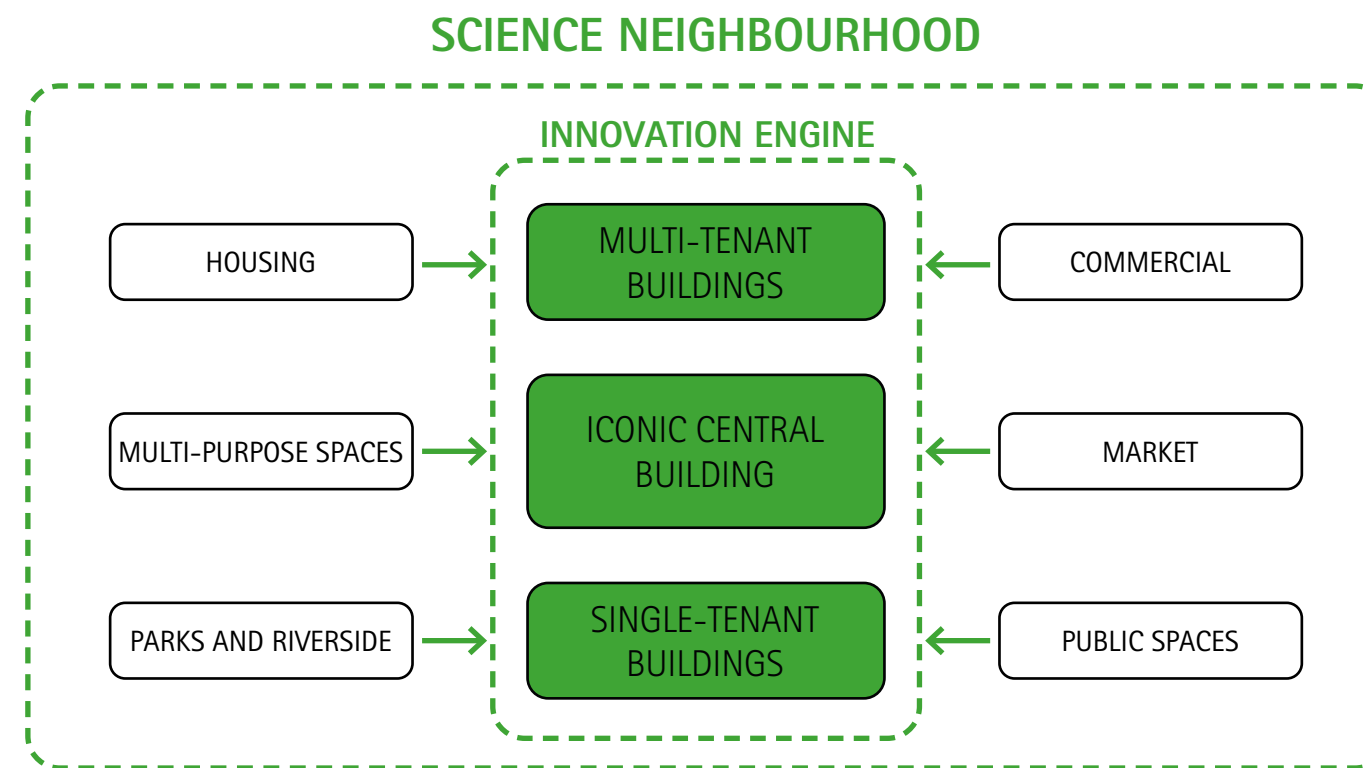
| INNOVATION ENGINE DEVELOPMENT PHASES | | | | |
|--------------------------------------|--------------------------|-----------------|--|-----------------------|
| PHASE | DEVELOPMENT TIME (years) | TOTAL AREA (Ha) | OFFICE/UNIVERSITY/LABS Building Footprint (Ha) Floor Space (sqm) | OPEN SPACES Land (Ha) |
| 1 | 10 | 25 | 15 150,000 | 10 |
| 2 | 10 | 25 | 15 150,000 | 10 |
| Total | 20 | 50 | 30 300,000 | 20 |

3.4 Innovation Engine Components

Buildings are critical to the Innovation Engine, as they house innovation-oriented activities and foster communities, collaboration, and serendipitous encounters. Open and transparent spaces are essential to enhance interactions and communication.

Three building categories are proposed: multi-tenant buildings for small and medium-sized organizations, an iconic central building with shared facilities for key activities, and single-tenant buildings for large users like corporations or universities.

The Science Neighbourhood is formed not only by the Innovation Engine but is also activated by other uses such as housing, commerce, public spaces, and multipurpose buildings.



MULTI-TENANT BUILDINGS
Imperial College White City Campus
London, United Kingdom



ICONIC CENTRAL BUILDING
San Sebastian Science Park
San Sebastián, Spain



SINGLE-TENANT BUILDINGS
Novartis building at Kendall Square
Cambridge, Massachusetts, United States

3.5 Neighbourhood Components

HOUSING



COMMERCIAL



MARKET



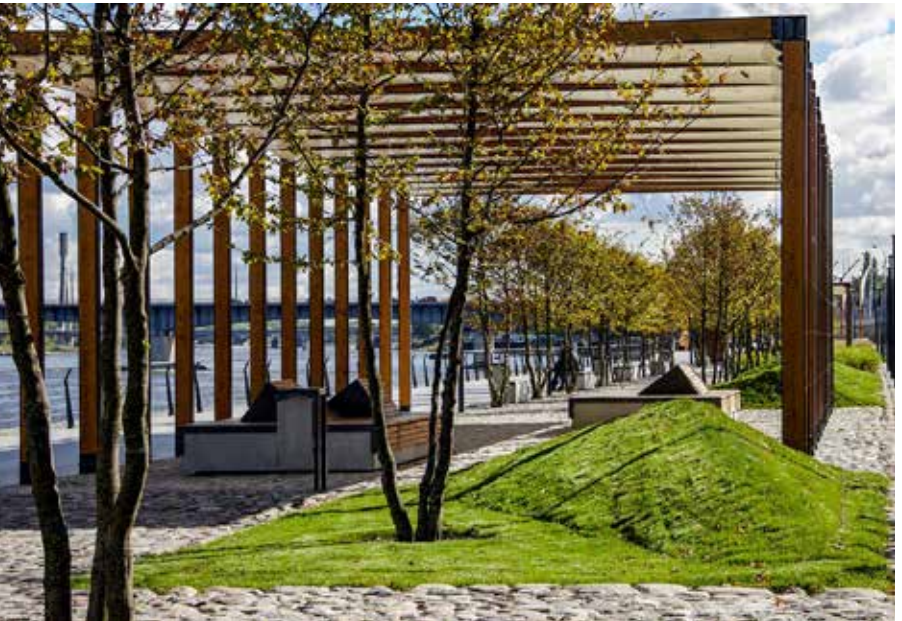
MULTI-PURPOSE SPACES



PARKS AND RIVERSIDE



PUBLIC SPACES



INNOVATION ENGINE

300,000 sqm

PHASE 1 (10 YEARS): 150,000 sqm

PHASE 2 (10 YEARS): 150,000 sqm

BUILDINGS

MULTI-TENANT BUILDINGS

SINGLE-TENANT BUILDINGS

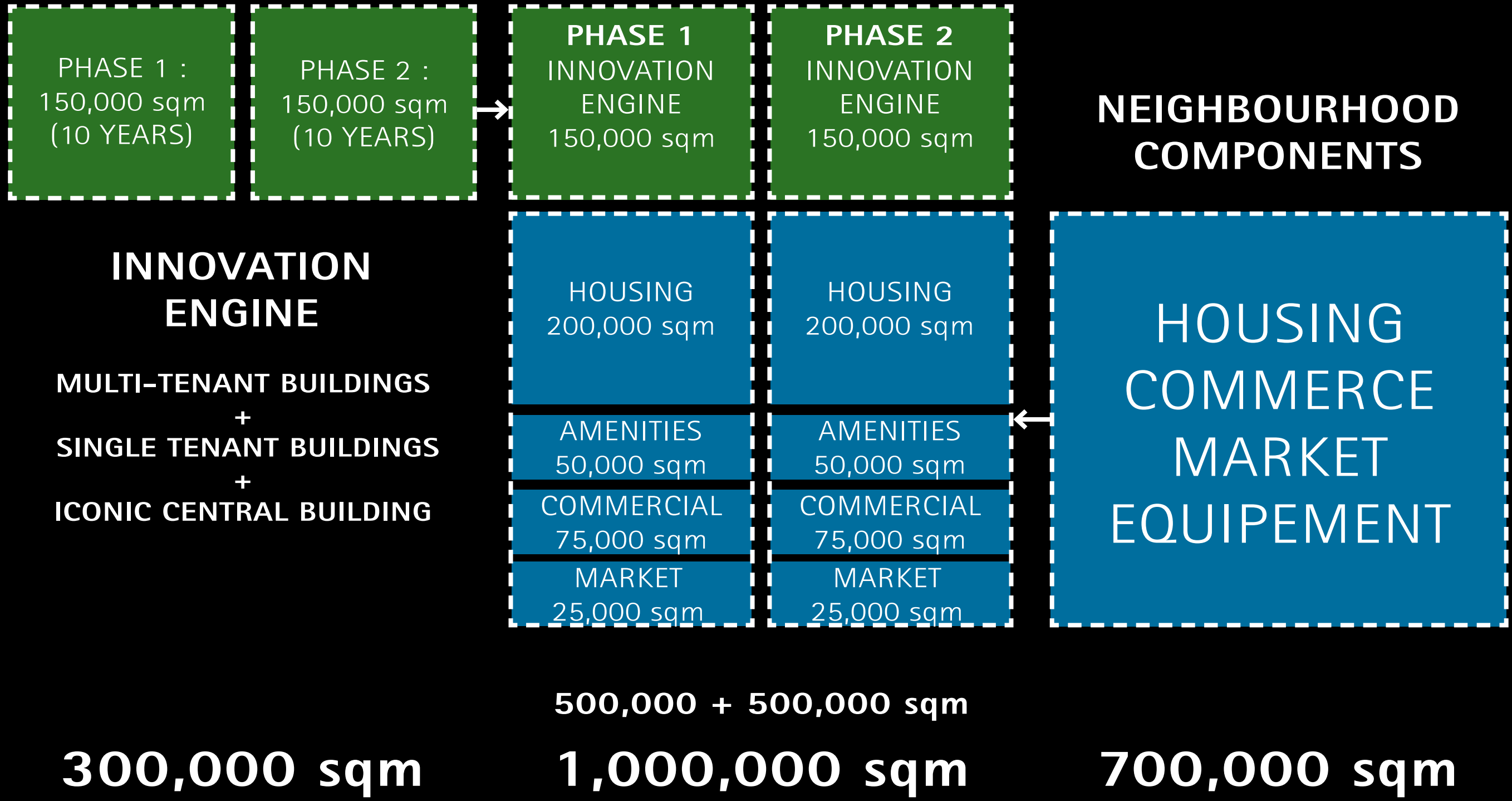
ICONIC CENTRAL BUILDING

FLEXIBILITY WILL BE KEY

(War, future economic growth)

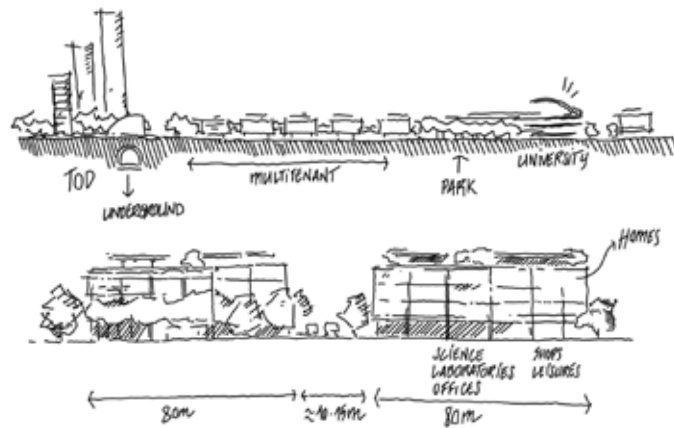
3.7 Science Neighbourhood Brief

SN



3.8 Initial Neighbourhood Approach

Initial concepts for the Science Neighbourhood





4. Implementation

4.1 Barabashova Market Damages

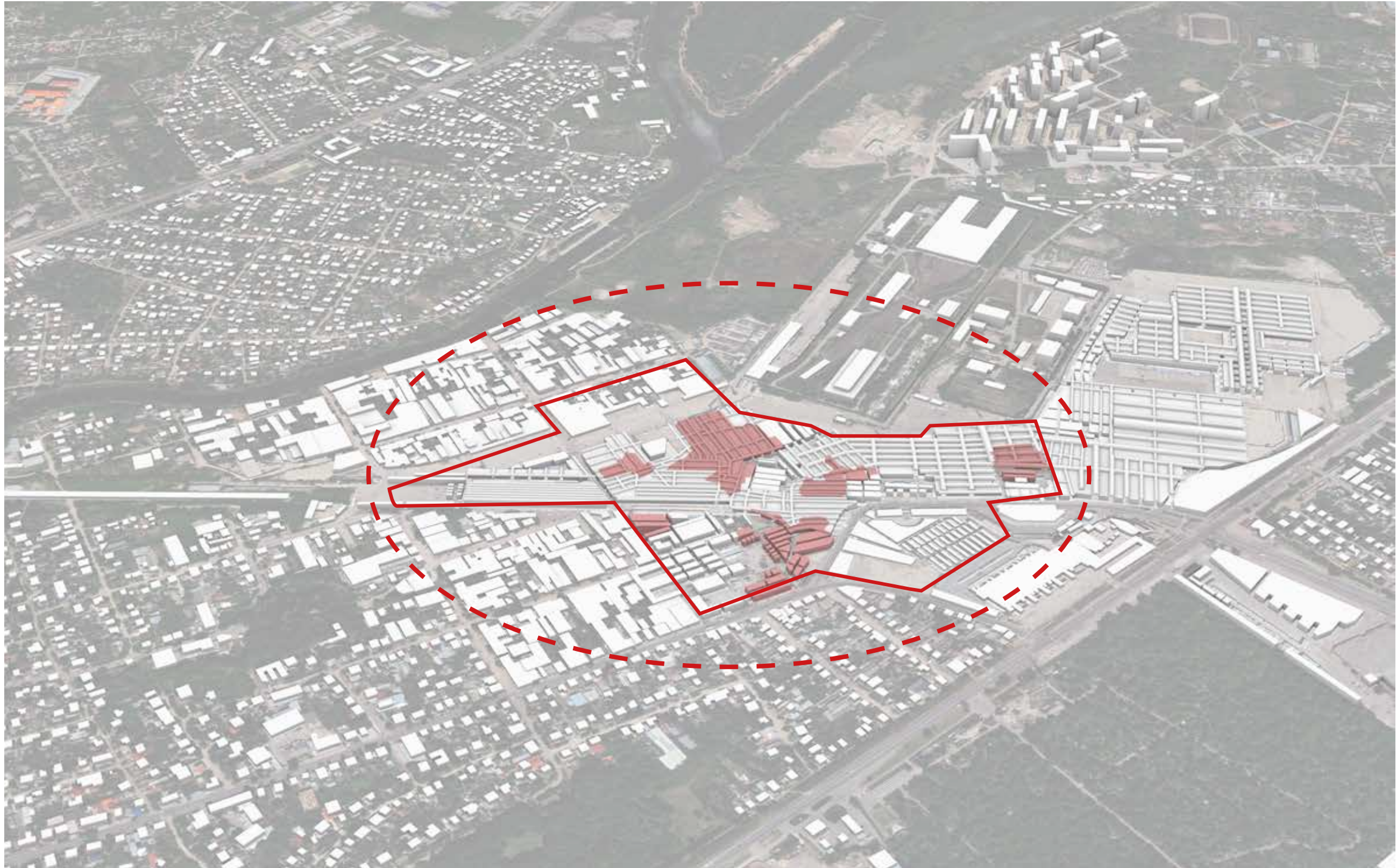
To justify the implementation of the Science Neighbourhood in this part of the market, we begin with a thorough analysis of the current conditions and strategic opportunities:

Firstly, we have identified damaged areas within the market that require attention, either through repair or demolition.

Secondly, we have recognized that the market's extensive size was originally due to cross-border Russian trade, a demand that will not exist post-war. Therefore, the market does not need to be as large as it once was.

Thirdly, we have observed that parts of the market are informal and constructed with poor-quality materials. This presents an opportunity to improve these lower-quality sections.

In conclusion, by pinpointing the exact damaged areas and acknowledging that this is the nearest urban area slated for transformation, we have decided to implement the Science Neighbourhood here. This decision supports the local community, preserves the functional parts of the market near roads and logistics, and addresses the damaged areas that need redevelopment.

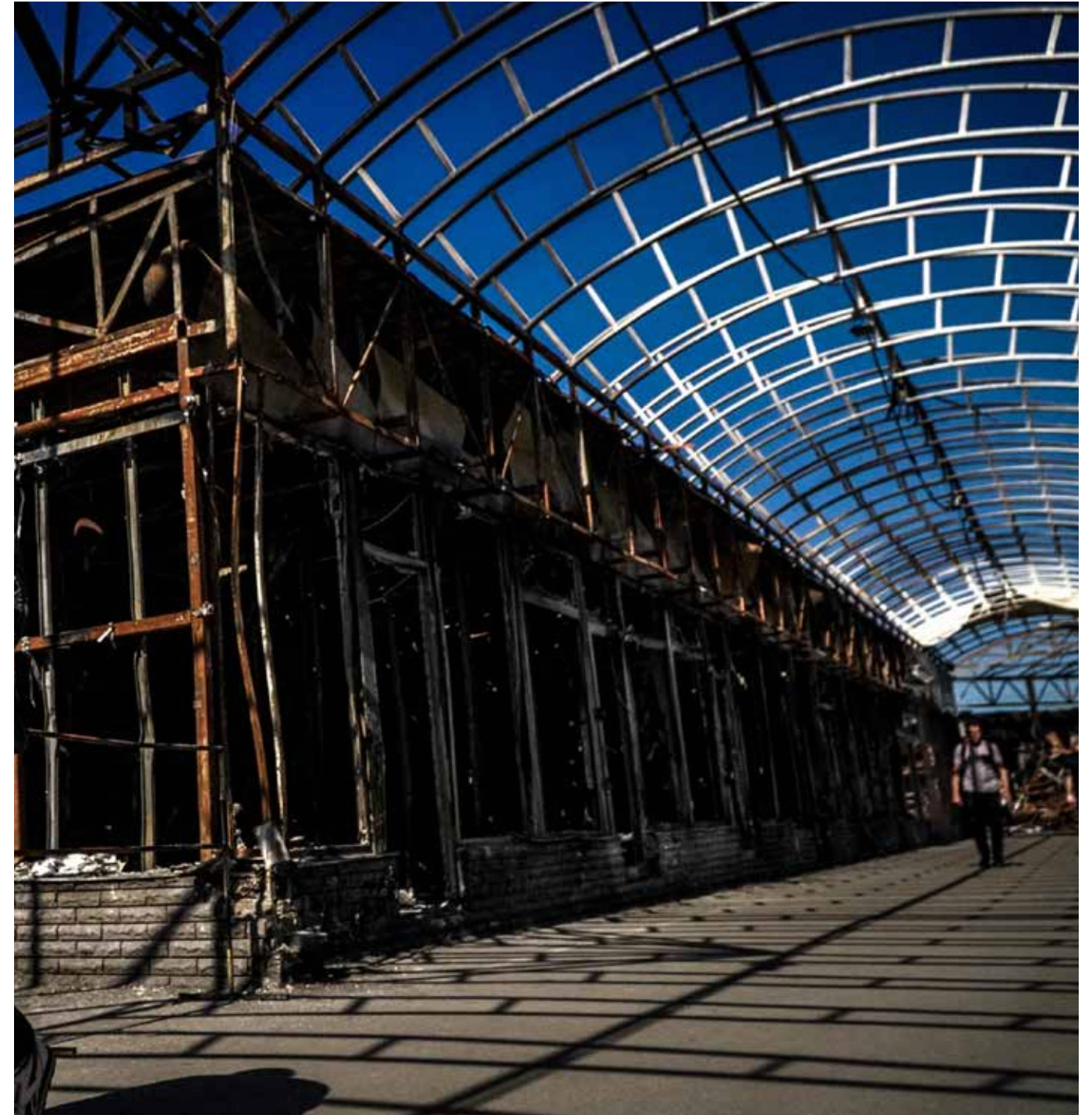


■ Damaged areas of the market

— Removed area for the new development



Interior image of the damages at Barabashova Market



Interior image of the damages at Barabashova Market





4.2 Expand Existing Grid

To create a neighbourhood deeply rooted in its surroundings, we aim to enhance and improve the existing urban character of the area. Instead of creating a new grid and urban typology, we plan to analyse, expand, and improve the existing grid on the site so that the Science Neighbourhood is seamlessly integrated into the city.

We have identified specific pathways connecting the river with the inner part of the Barabashova Market. These pathways, spaced 270 meters apart, are already established and bustling with activity, as seen in the images on the right. Our goal is to improve the quality and functionality of these streets while maintaining the current commercial businesses in the area. This approach ensures that the Science Neighbourhood has access to natural areas and is well-positioned within the existing urban fabric.





Rajevskoj Steet



Rajevskoj Steet



Karynskoj Steet



Naryns'ka Steet

4.3 Grid Proposal

After analysing dense, walkable, and sustainable city grids across Europe, from Barcelona to London, Rome to Paris, and taking into account the existing 270-meter grid between the main axes, we have subdivided this grid into 90-meter blocks. This subdivision aligns well with creating walkable quarters, inspired by successful urban layouts in European cities.

In addition to considering the aforementioned European grids, we are also taking into account the existing grids within the city. By introducing a secondary 90-meter grid, we also ensure compatibility with the existing site grid. The Science Neighbourhood is situated between the city centre, characterized by compact blocks often with more organized European-style layouts, and the Saltivka area, which features a more orthogonal, systematic layout that is permeable to nature.

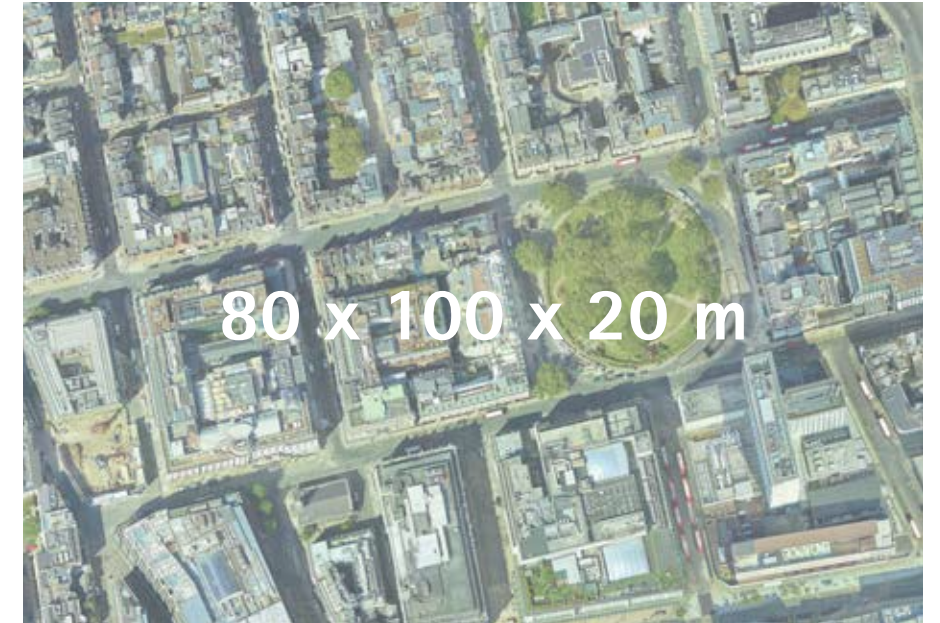




Barcelona



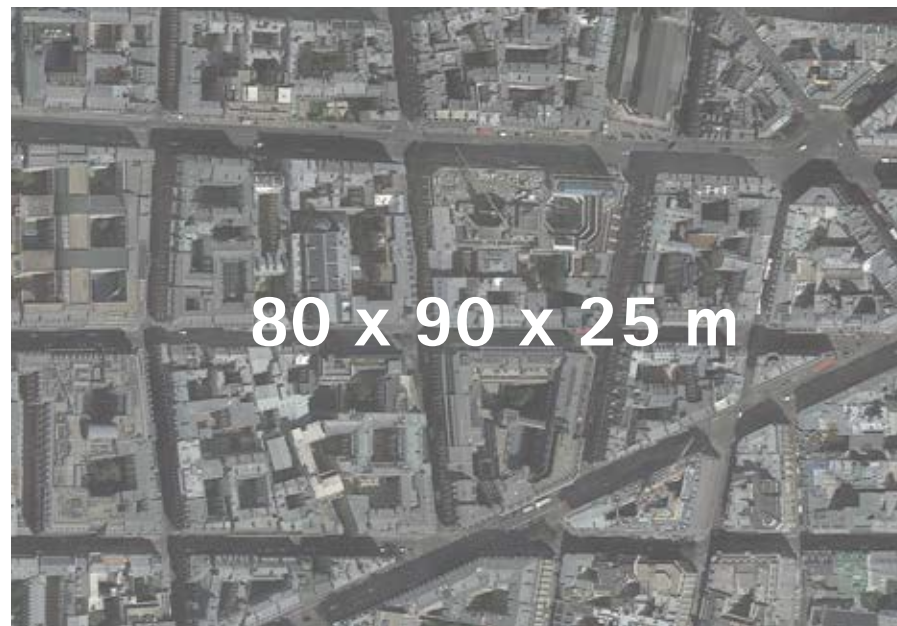
Madrid



London



Berlin



Paris



Rome

CITY CENTRE



SCIENCE NEIGH



HOUSING



SALTIVKA



4.4 Create Main Boulevard

Once the grid was established, the next move was to create the main avenue of the new neighbourhood. This avenue will directly connect the two most important adjacent neighbourhoods: the city centre, where universities, businesses, and other uses are located, and Saltivka, which is the most populated neighbourhood in Kharkiv. There are two existing elements on the site with a strong directional alignment:

Towards the city centre, there is the metro bridge, which elevates above ground to cross the Kharkiv River. This bridge marks a direct line along which a new street has been planned to connect this neighbourhood area with the city centre.

In the other direction, there is an existing street between the market entrance and Akademika Pavlova Avenue. The idea is to extend this street to connect with the metro bridge area, creating this diagonal.

This diagonal intervention is a common occurrence in various European cities, where a disruption to the grid serves as a main transport corridor and creates unique spaces around the avenue.

The proposal for this route is also being reconsidered. Instead of the previously proposed project (as shown in the bottom right image) for an overpass to connect with a rapidway between the centre and Saltivka, we propose a ground-level avenue. This will accommodate public transport, and separate lanes for bicycles and pedestrians, and traffic.



● Metro Entrances



Metro bridge, which elevates above ground to cross the Kharkiv River.



Aerial view of the entrance to Barabashova Market



Reevaluation of the Proposed Route for Connecting the Centre and Saltivka

4.5 Connection to Nature

Once the main diagonal thoroughfare is established, several existing secondary roads have been identified to connect the entire new development area with the river and natural zones. Emphasis is placed on enhancing three specific streets: the first two are already in place, and the third (Naryns'ka Street) would be extended to link the Kharkiv River natural reserve with the main boulevard and communities to the south.

Naryns'ka Street will have a unique pedestrian character and will effectively connect the new development with the main diagonal, which serves as the primary thoroughfare. Not only will it link to the natural area, but also potentially to green spaces suitable for sports and leisure activities towards the natural park to the north. This will also connect the Science Neighbourhood with the pilot rivers project, promoting integration with the industrial district.





Aerial Kharkiv River



The selected site for the rivers pilot project, a 6km long strip along the Kharkiv and Nemyshlya rivers.

4.6 Main Square

The intersection of the main diagonal avenue, which connects Saltivka with the city centre, and one of the primary secondary streets (the one closest to the metro) will host the main public square of the new development. This square has been strategically placed where the only open square of the Barabashova Market used to be, with similar dimensions that fit the 90-meter grid. The square allows for connection with the diagonal avenue and with nature through the secondary street. It has a trapezoidal shape that opens towards the avenue and measures 100 x 160 meters.

This square has also been strategically placed adjacent to the existing metro, ensuring good daily communication for those who live or work in the rest of the city.

This new public space will form the anchor of the neighbourhood.





Brabashova Market Square



The Kharkiv Metro Line



Brabashova Market Square

4.7 Mixed Use Development

Following the previously established 90-meter grid, with the main street and secondary streets separated by 270 meters, we will create dense streets with medium-density buildings. The proposal is to develop a mixed-use area where residential spaces coexist with high-tech workspaces, universities and other uses. The blocks are designed with appropriate heights and courtyards to foster a vibrant and active community. This urban layout is reminiscent of the city centre.





4.8 Bridge Building

The presence of the market on the site is essential, and we aim to preserve a portion of it while ensuring a seamless integration into the new development. To achieve this, we are proposing a new market typology that meets the demands of both the Kharkiv IT Cluster and the city of Kharkiv, incorporating an exhibition centre while remaining compatible with other market uses.

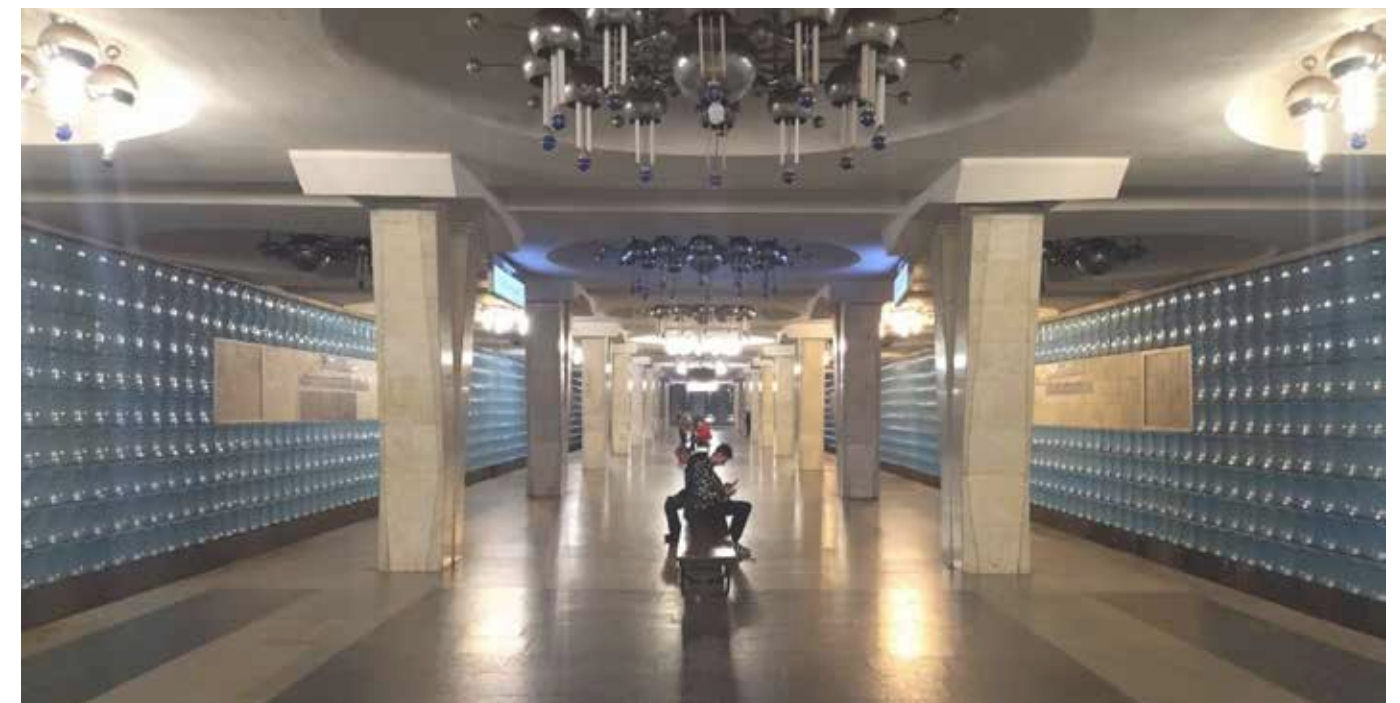
We required a large area, approximately 30,000 to 40,000 sqm. Given that part of the market in this area is currently demolished, it presents a valuable opportunity to redesign this section of the market to serve as a bridge between the new development and the existing market, respecting its original layout. Similar to the square, the bridge building will be situated near the metro station. With expectations of significant foot traffic for exhibitions, this location is highly suitable for such an intersection.



● Metro Entrances



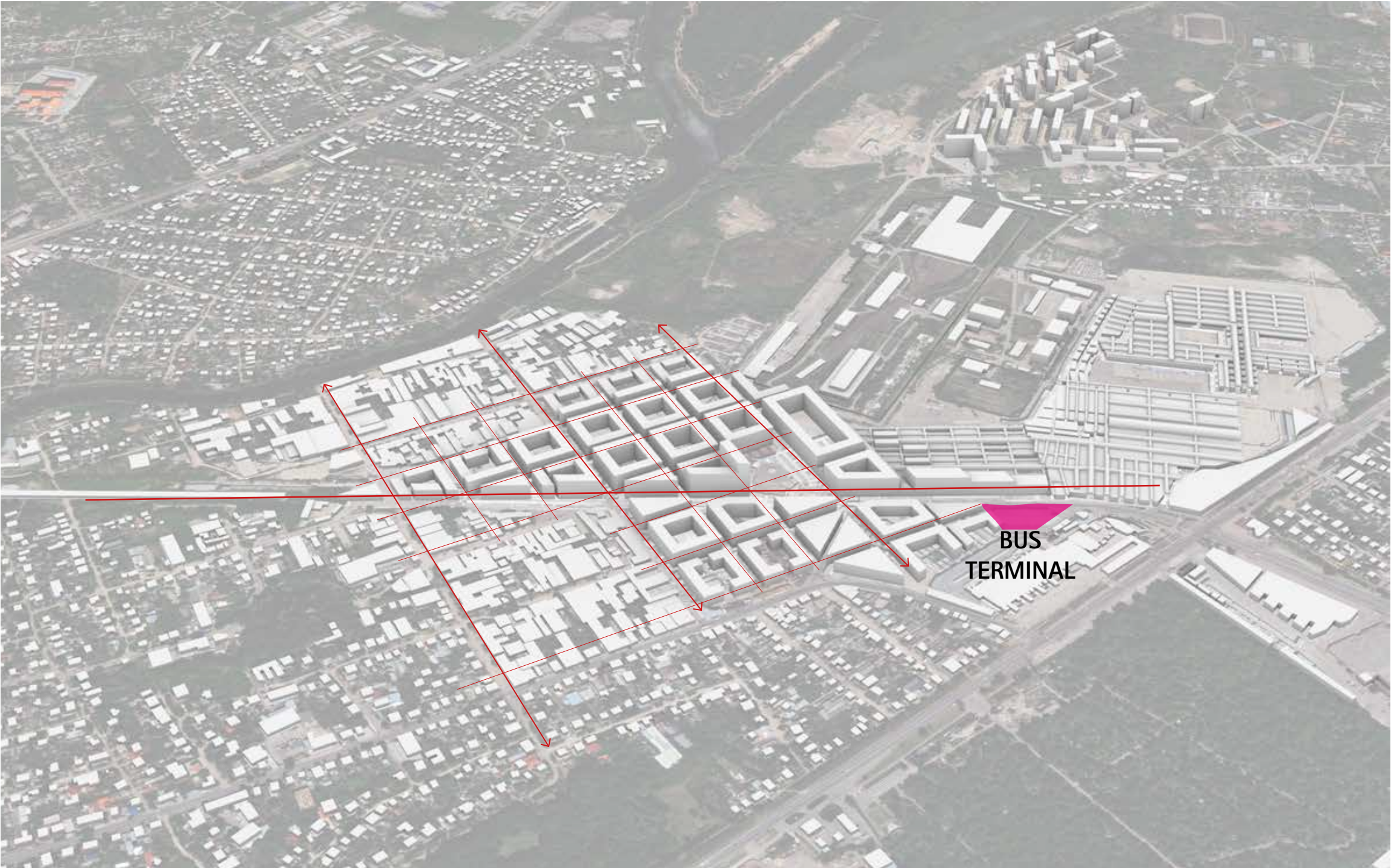
New use as an exhibition center



Existing Metro

4.9 Bus Terminal

We propose to retain the Akademia Barabashova Station as a key element of the Science Neighbourhood infrastructure, enabling residents from other areas of the city and region to easily access it. The terminal will be retained to serve the ongoing market activity. There is a potential to redesign the station in future phases, creating a modern intermodal station that connects the metro, buses, and trams.





Existing Bus Terminal

4.10 Existing Market

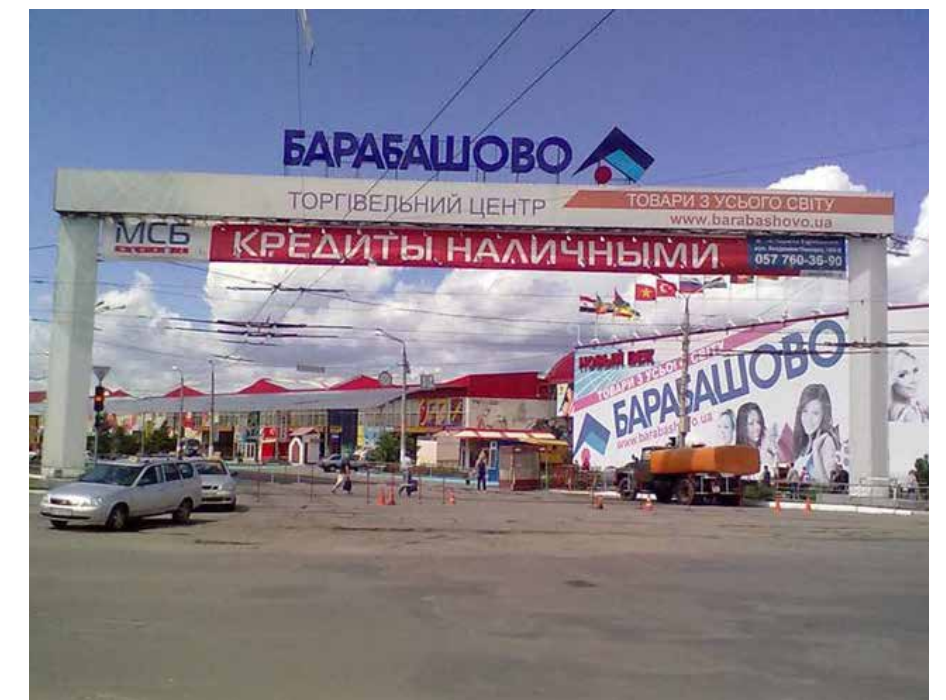
It is crucial to preserve a significant part of the Barabashova Market, particularly the undamaged area near the main Akademika Pavlova Avenue, which allows easy access for trucks and other vehicles.

This area provides private parking and direct access from the main road. It is the most organized part of the market and sits between the hospital and the road, making it a vital part of the urban layout. We propose to keep this area intact because of its strategic importance and its connections to the metro entrance, bus station, and the main entrance of the Barabashova Market.





Brabashova Market



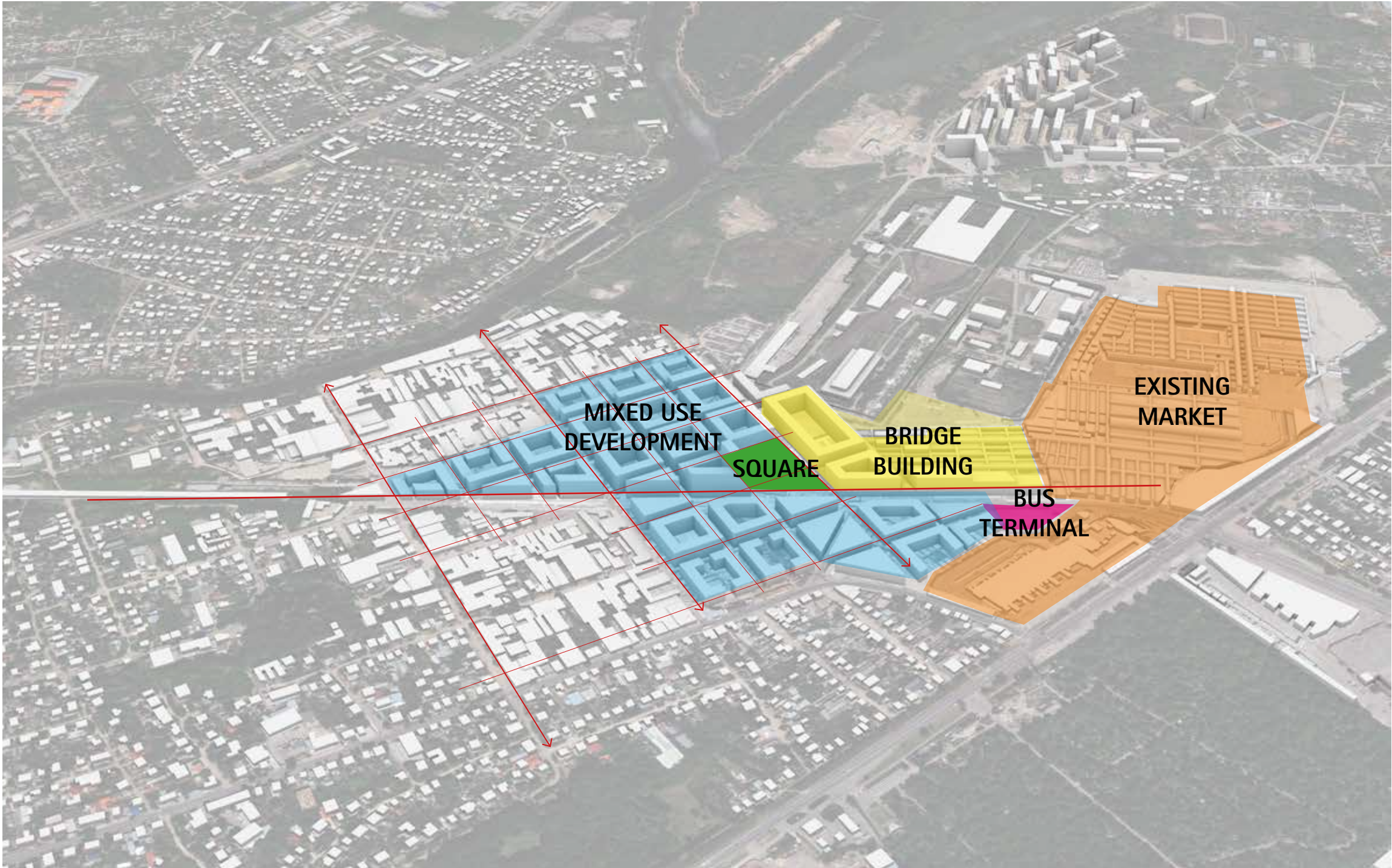
Main Acces to Brabashova Market

4.11 Implementation

The implementation is therefore summarized in these 5 areas:

- Mixed Use Development: 230,000 sqm
- Square: 9,000 sqm
- Bus Terminal: 5,000 sqm
- Bridge Building: 60,000 sqm
- Market: 250,000 sqm

These areas refer to the ground floor area on which each component will be built. The total footprint is 554,000 sqm.



MIXED USE DEVELOPMENT: 230,000 M2

SQUARE: 9,000 M2

BUS TERMINAL: 5,000 M2

BRIDGE BUILDING : 60,000 M2

MARKET: 250,000 M2

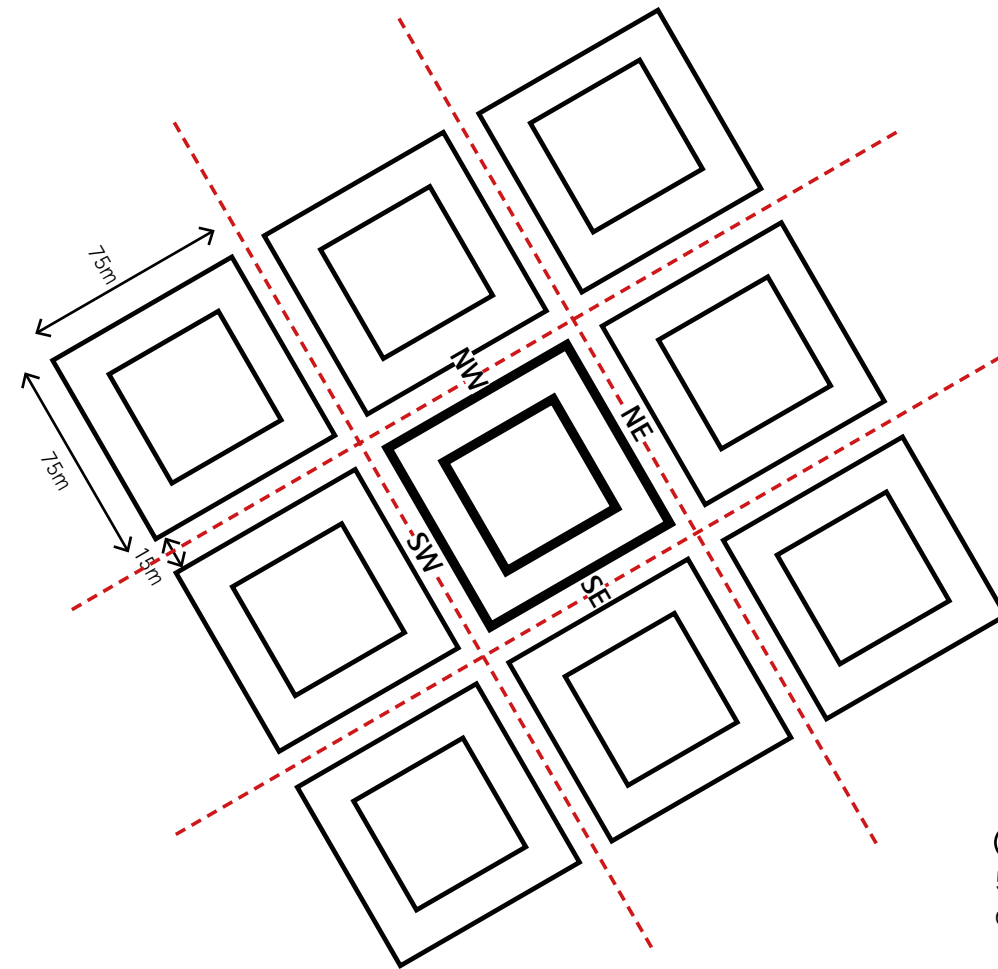
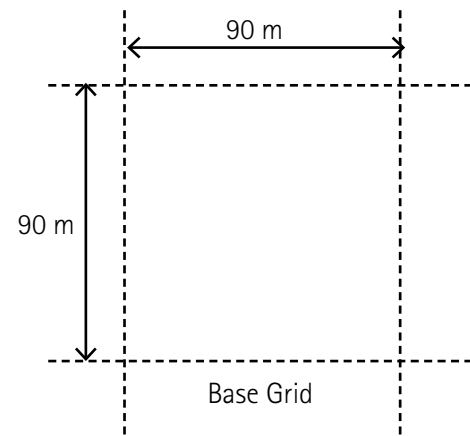
5. Science Neighbourhood

5.1 Grid orientation

As mentioned in the Implementation chapter, we have defined a grid deeply integrated with the surrounding urban fabric.

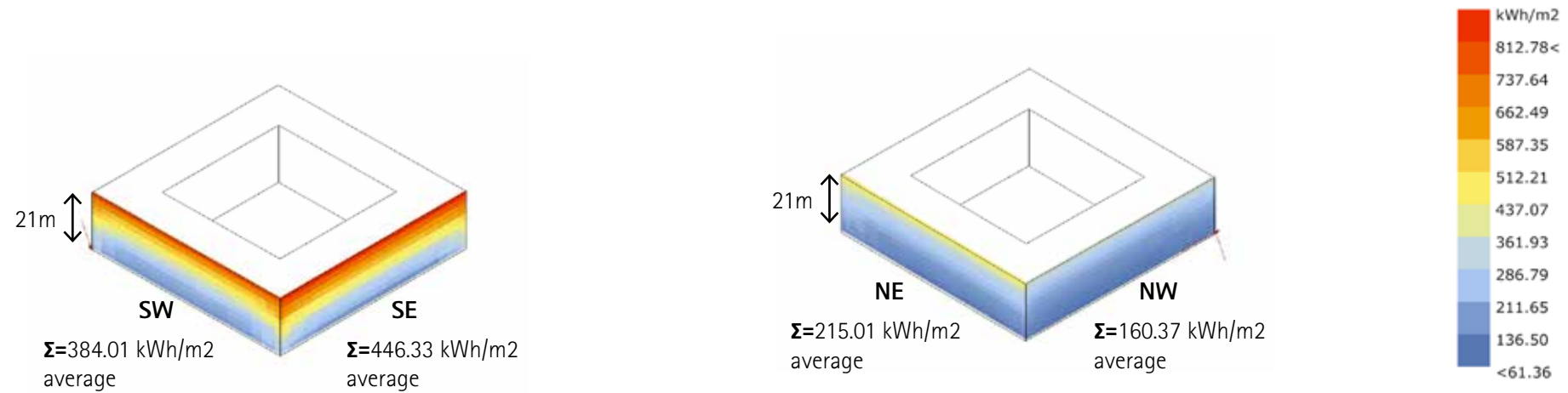
This grid is based on 90 by 90 meter dimensions and is rotated 56° to align with the existing urban grid.

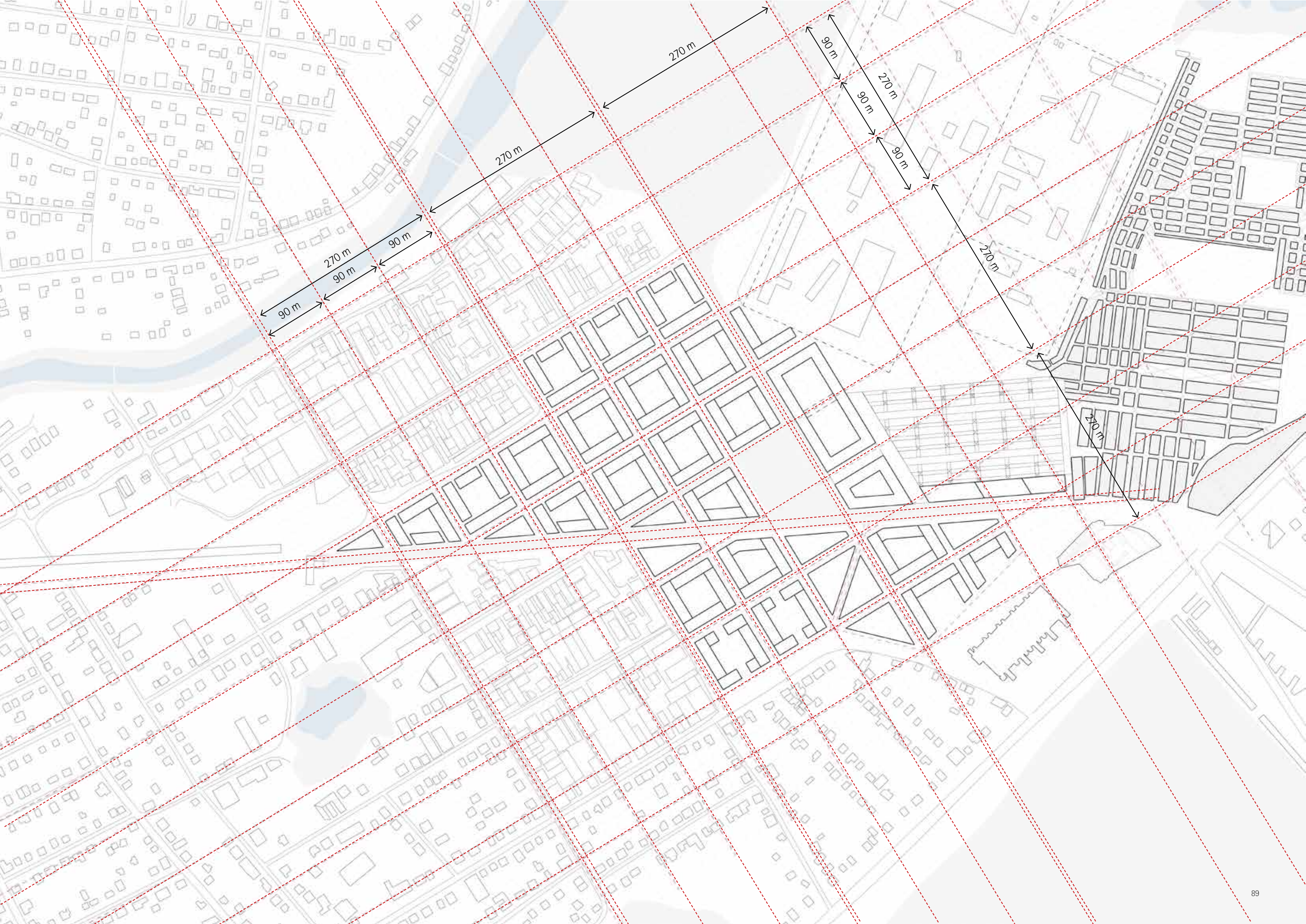
By analysing the solar radiation, we found that this rotation is beneficial not only for potential growth but also for increasing solar exposure compared to a north-south orientation.



N
57 degrees rotation to follow the existing adjacent grid

Solar Radiation Preliminary Analysis (January to December)





90 m

270 m

90 m

270 m

270 m

90 m

270 m

90 m

90 m

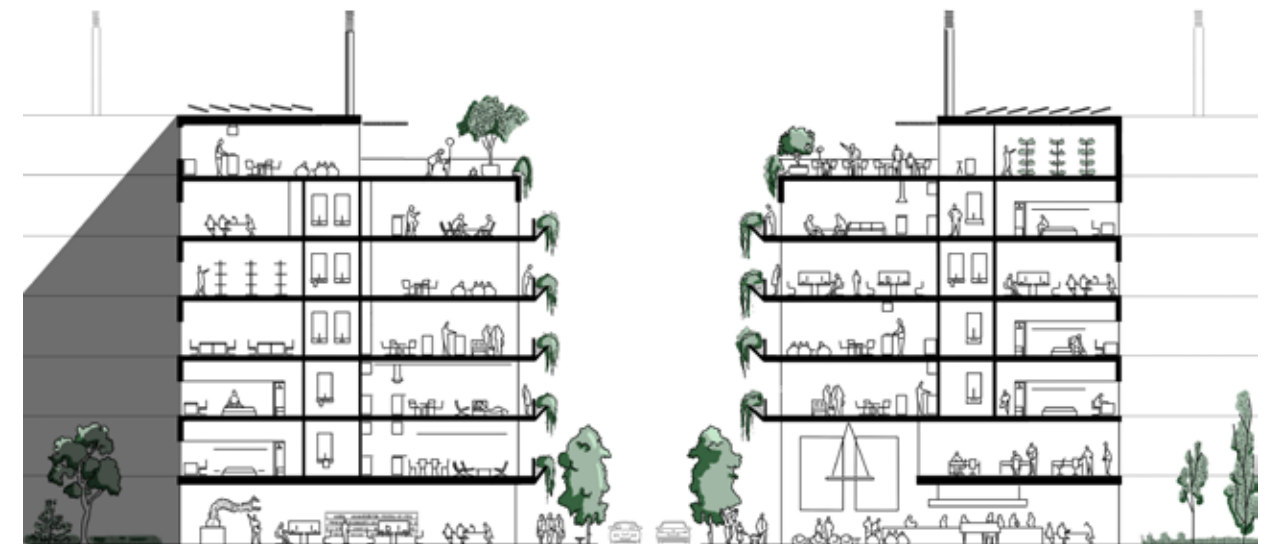
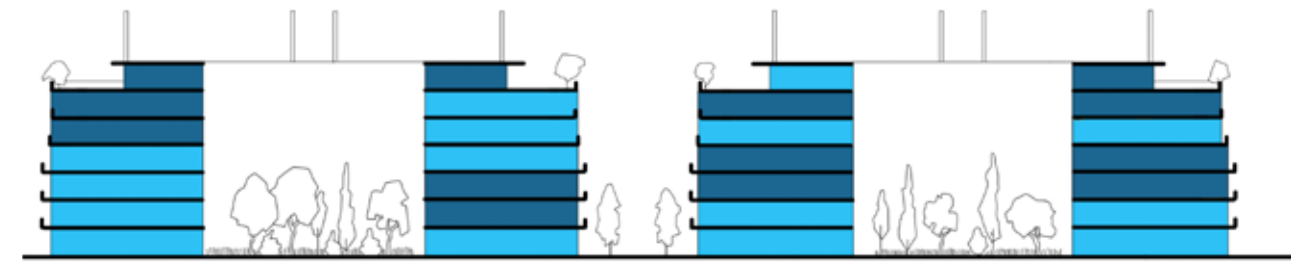
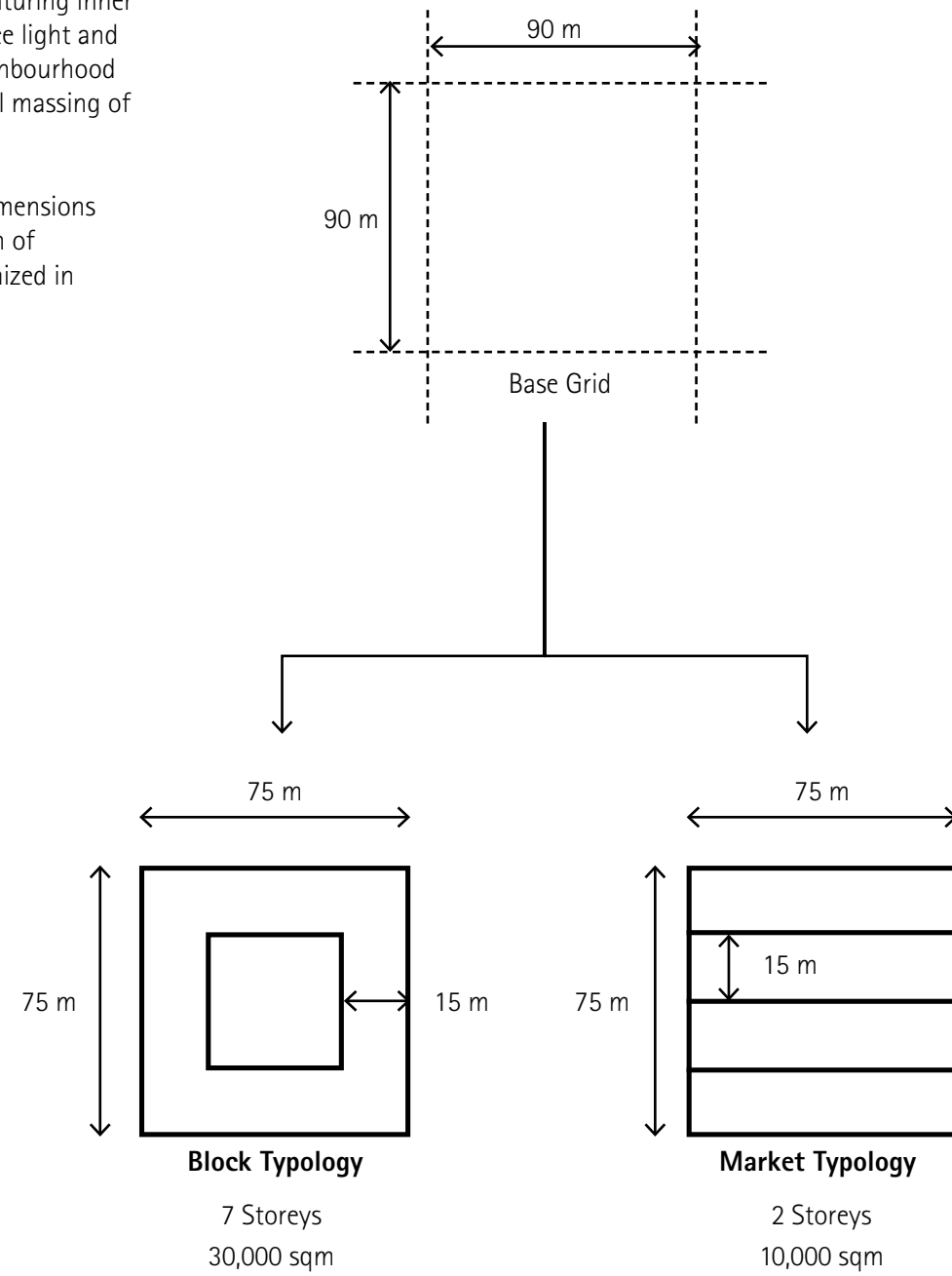
270 m

270 m

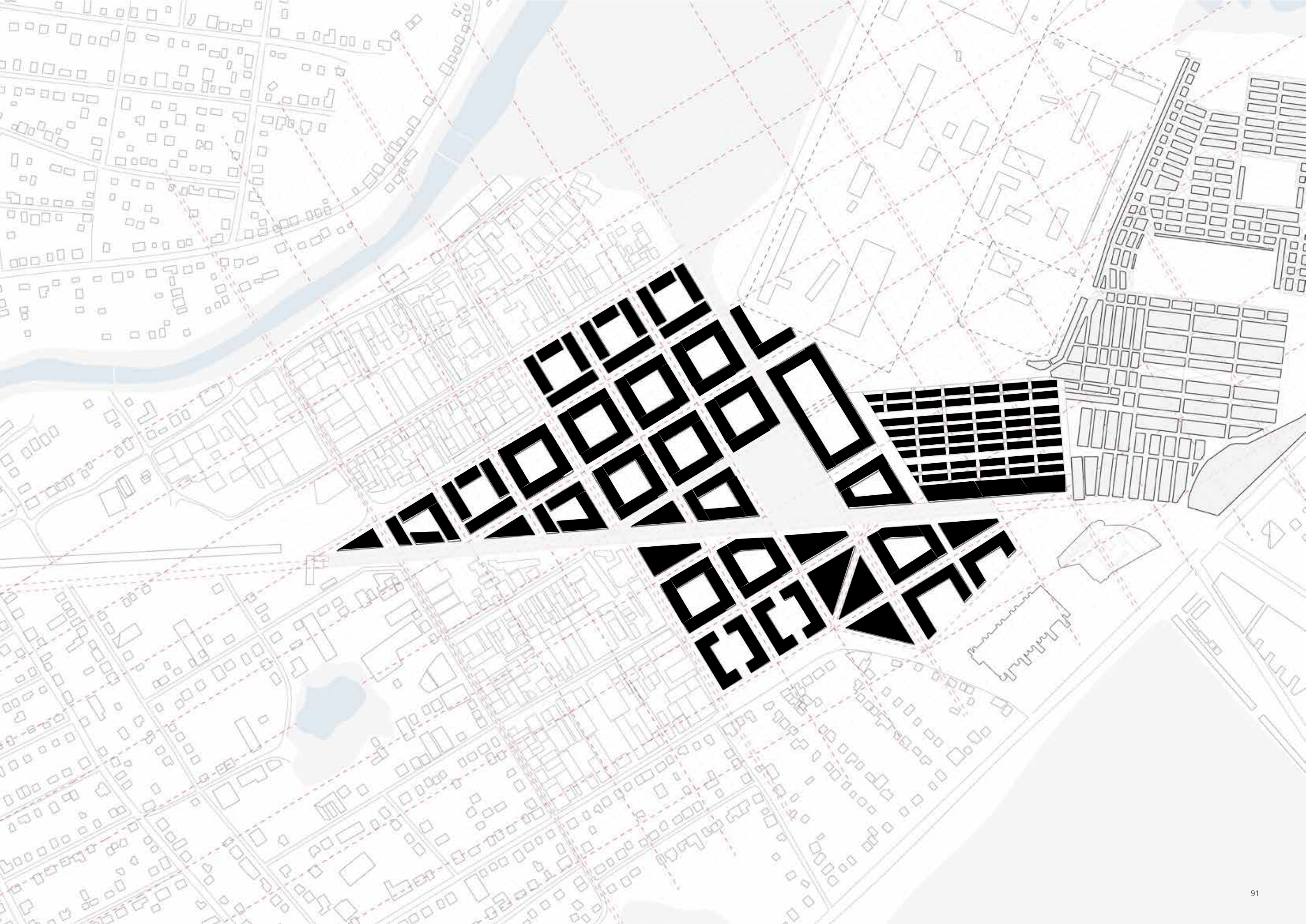
5.2 Block dimensions

Based on a base grid of 90 meters, with streets typically 15 meters wide, we established a block size of 75 by 75 meters, incorporating 15 meters for internal courtyards. This design forms a block structure featuring inner courtyards, which introduce light and green spaces into the neighbourhood while maintaining a typical massing of approximately 7 stories.

Furthermore, these grid dimensions allow for a reinterpretation of the market typology, organized in 15-meter-wide bands.



Block Typology Section

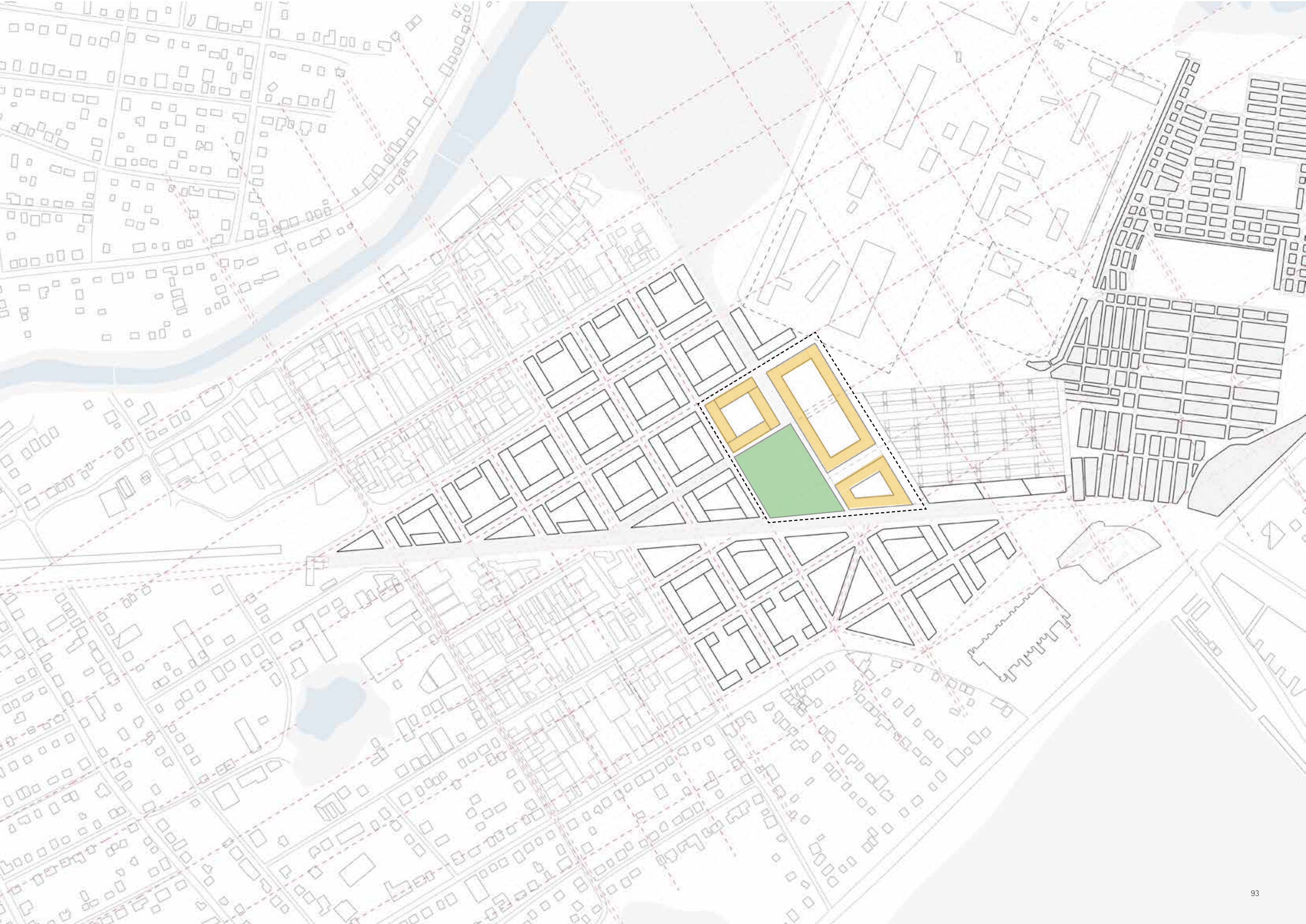


5.3 The Heart of the Science Neighbourhood

The main square of the Science Neighbourhood is surrounded by three types of buildings: the Central Building, the Multi-Tenant Building, and two mixed-use development blocks.

These mixed uses, along with the boulevard connecting Saltivka and the city centre, and the green corridor leading to the Kharkiv river, ensure the activation of the square and transform it into the heart of the Science Neighbourhood.

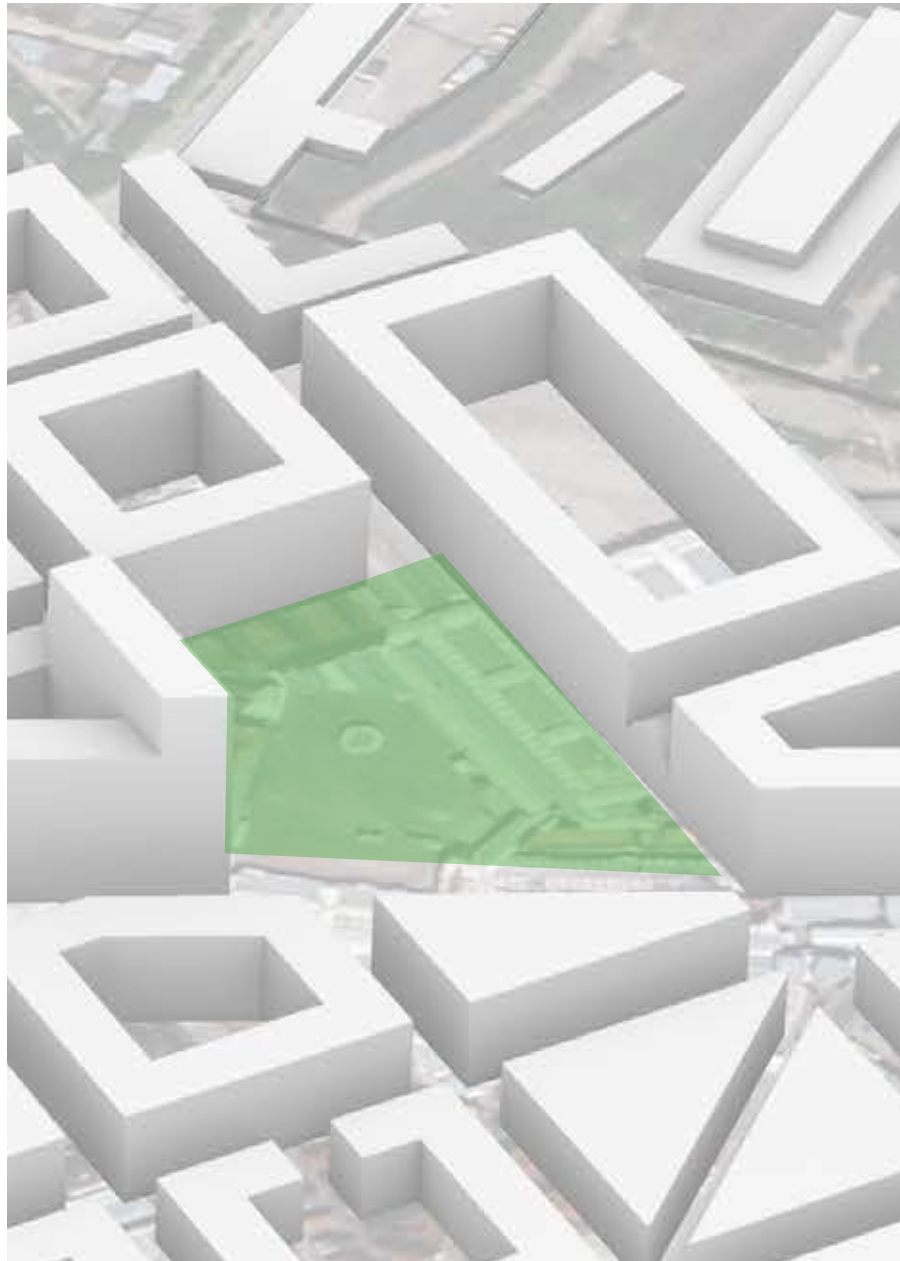




5.4 The Square

The proposed square, set to be the heart of the Science Neighbourhood, will offer an inviting, enclosed public space that mirrors the dimensions of other iconic European squares such as Trafalgar Square in London. It will feature lush vegetation, vibrant cafes, and captivating public art, creating a dynamic environment for both

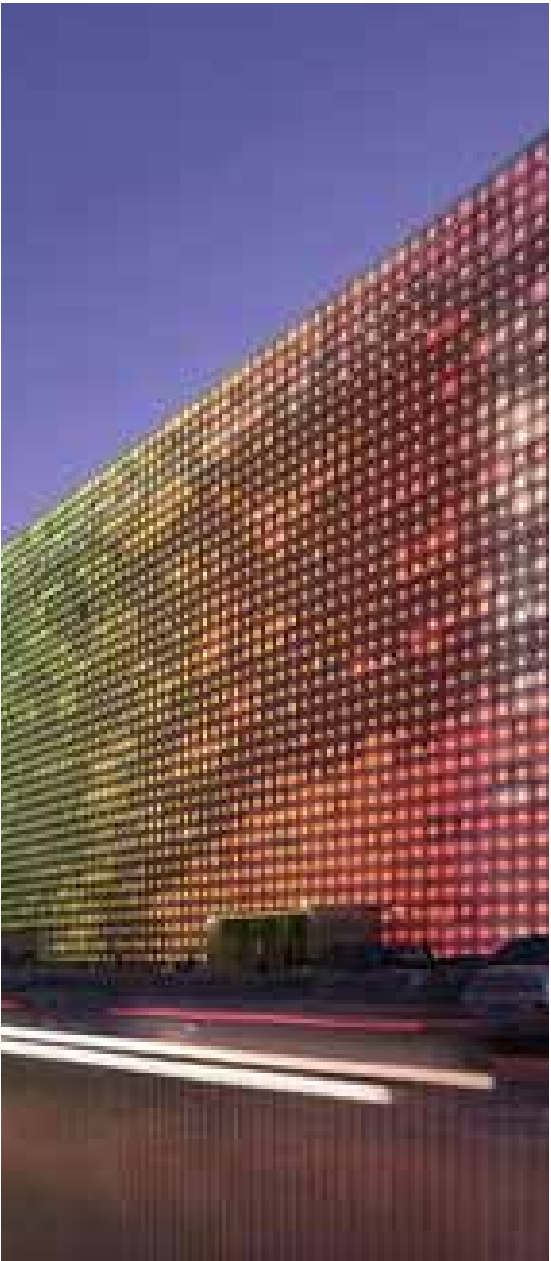
relaxation and inspiration. The hard surfaces will provide versatile areas perfect for events and gatherings, fostering a sense of community and encouraging public engagement within this innovative urban hub.



5.5 Central Building

Framing one side of the proposed square, the Central Building will serve as the headquarters of the Science Neighbourhood and its primary social hub. This iconic structure will boast a visually striking design, housing a state-of-the-art auditorium, versatile event areas, conference rooms, and the offices of the management team.

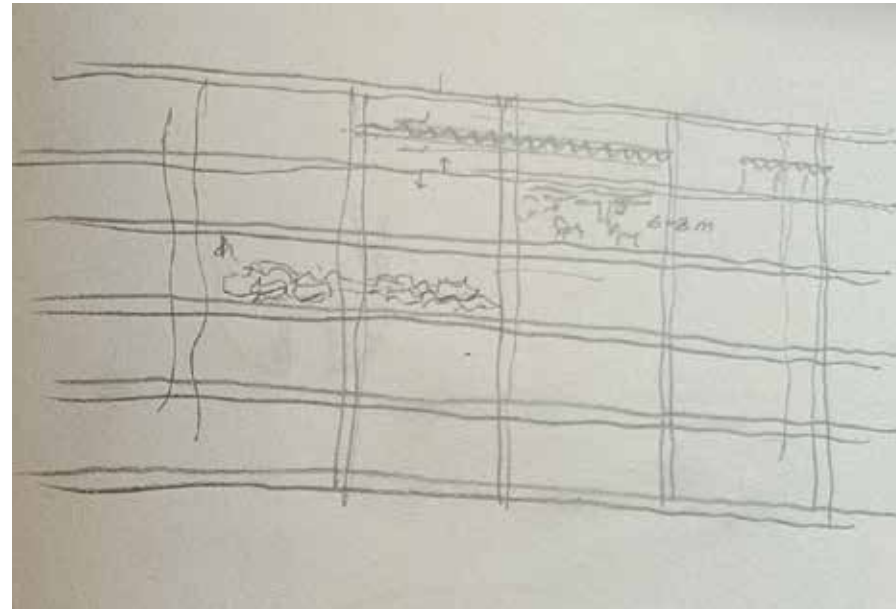
As the focal point of the square, the Central Building will seamlessly integrate with the surrounding space, fostering innovation, collaboration, and community within this vibrant, science-driven district.



5.6 Multi-Tenant Building

The multi-tenant building will feature a flexible, modular design tailored for offices, labs, and prototyping spaces. Tenants will have the option to configure their spaces as single-story or double-story units, catering to diverse needs. The building's transparent facade will showcase the cutting-edge science and

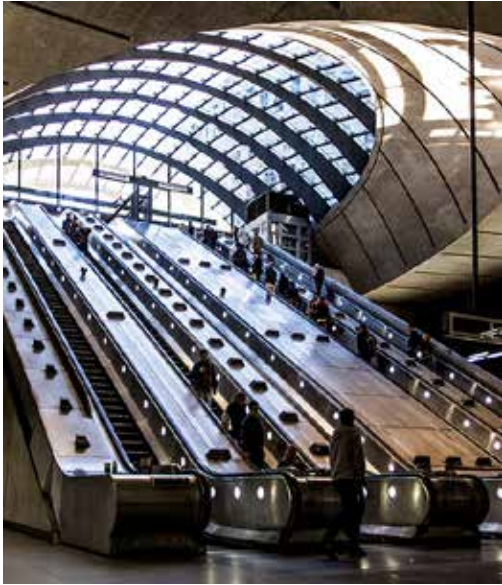
technology activities happening inside, creating a dynamic canvas that engages and inspires those in the square. This innovative structure will foster collaboration and visibility, highlighting the vibrant activity within the Science Neighbourhood.



5.7 Vault on Square

The vaulted gallery, a grand pedestrian thoroughfare, will seamlessly connect the bustling square at the heart of the Science Neighbourhood with the new market facilities. This monumental commercial gallery will serve as a vibrant entrance to the market, teeming with activity and energy. It will provide convenient access to the

metro and the underground shelters system, ensuring both connectivity and safety. With its impressive architecture and lively atmosphere, the gallery will become a central artery of commerce and social interaction, enhancing the overall dynamism of the neighbourhood.



The Heart of the Science Neighbourhood



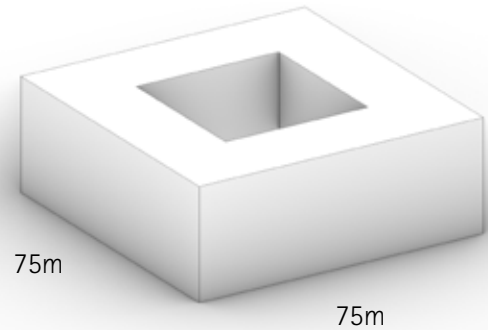


5.8 Edges Fragmentation

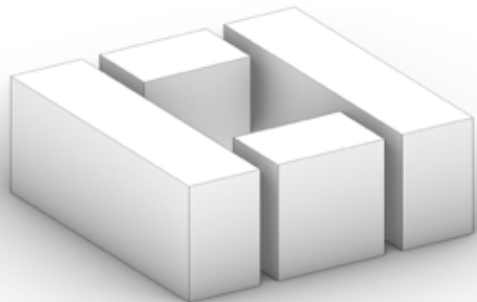
In order to help integrate with the existing surrounding context, responding to diverse contexts such as single-family homes and storage areas, the riverside and the transport hub, a strategy of block typology fragmentation has been developed.

This approach allows for varying building heights suited to each specific context and supports a flexible growth strategy, which will be further developed in subsequent project phases.

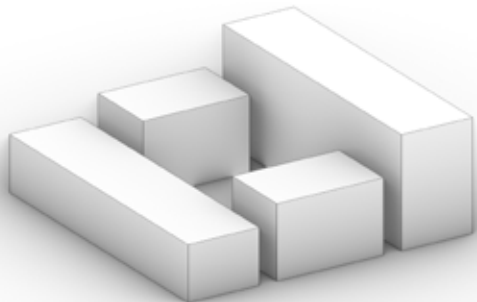
Typology 00



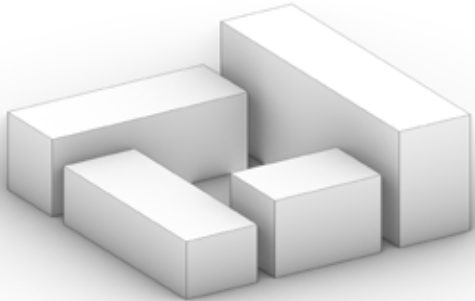
Typology 01



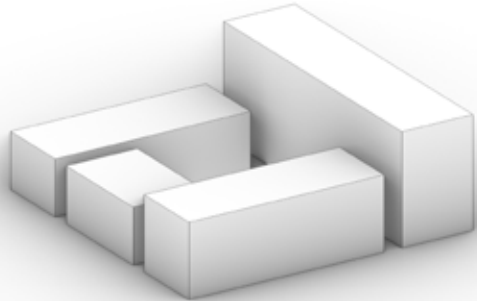
Typology 02



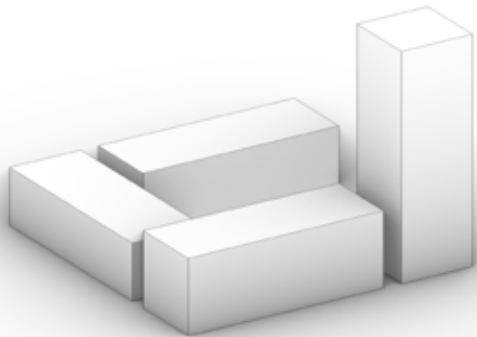
Typology 03

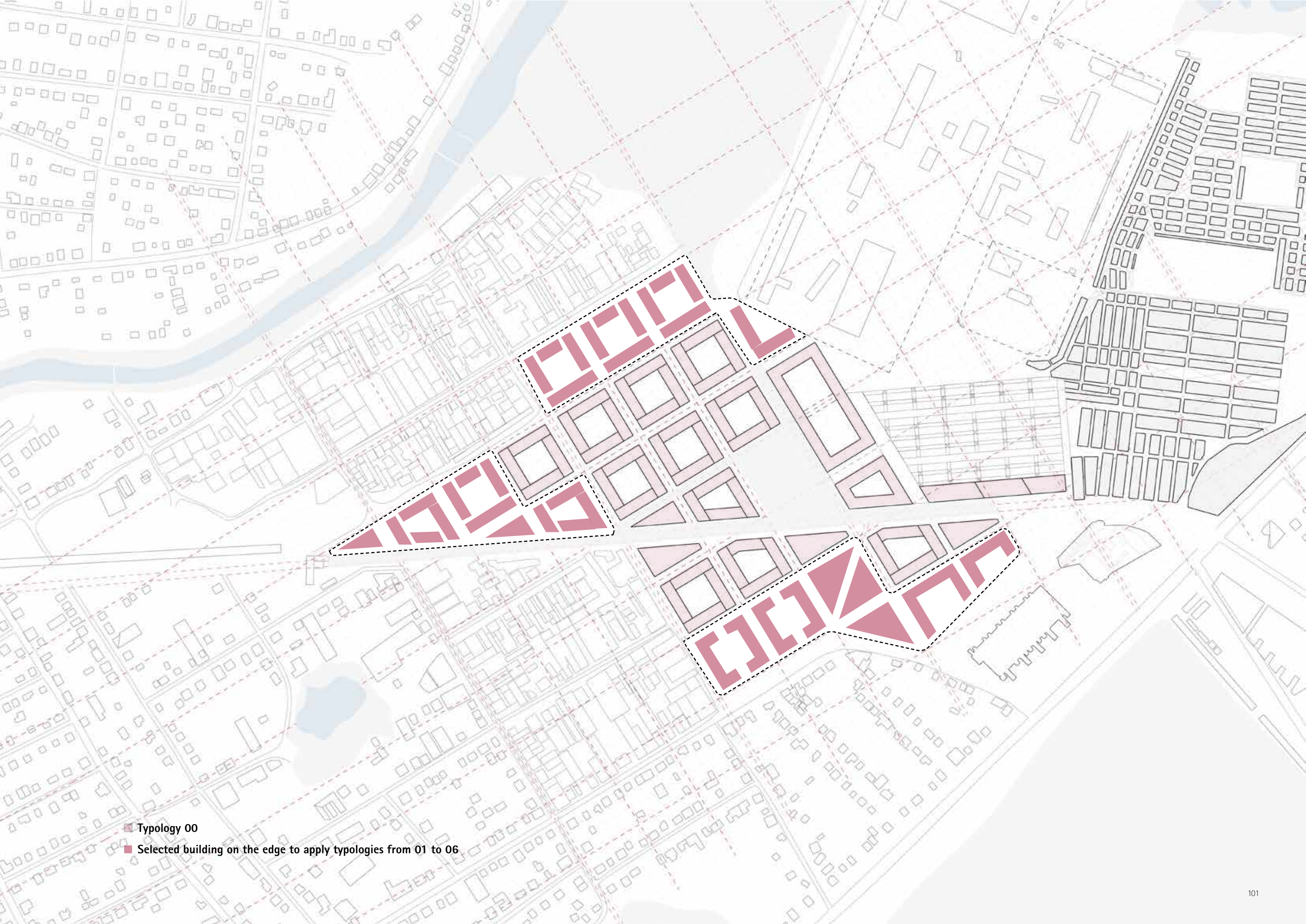


Typology 04



Typology 05





■ Typology 00

■ Selected building on the edge to apply typologies from 01 to 06



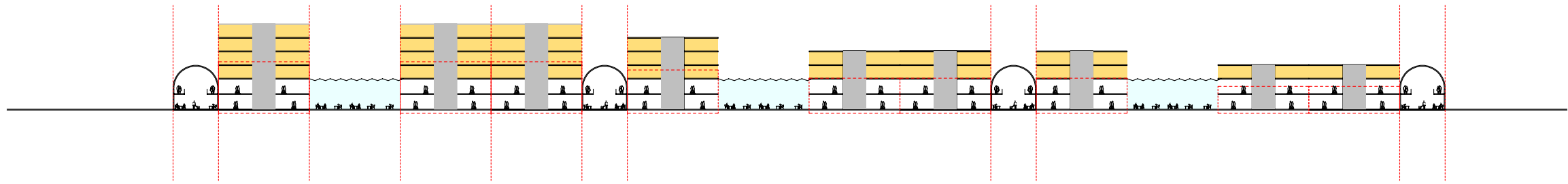


5.9 Bridge Building

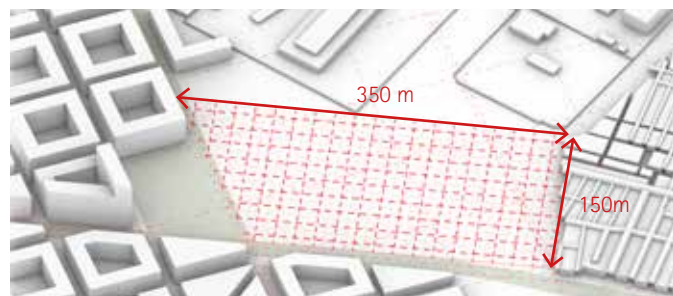
The schematic layout and section of the bridge building connect the existing market to the proposed main square, spanning an area of 350 by 150 meters and based on a 15-meter grid. Two connections from the market lead to the main square, featuring vaulted galleries that echo the architectural language of the market.

This grid accommodates low and mid-rise volumes, with higher density on the side facing the main boulevard and block typology buildings on the side facing the square.

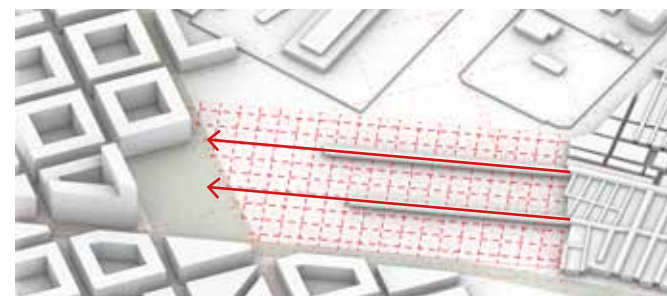
The Bridge Building will feature mixed uses, such as an expo space, multipurpose areas, and a reinterpretation of the market.



BRIDGE BUILDING DIAGRAMATIC SECTION



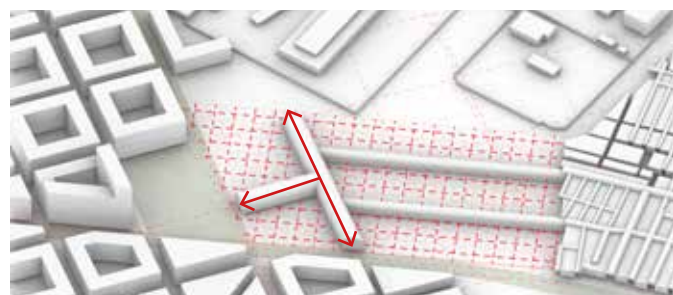
GRID BASED ON EXISTING MARKET



CONNECTION FROM EXISTING MARKET



REINTERPRETATION OF EXISTING MARKET



CONNECTION TO THE MAIN SQUARE



MID AND LOW DENSITY VOLUMES



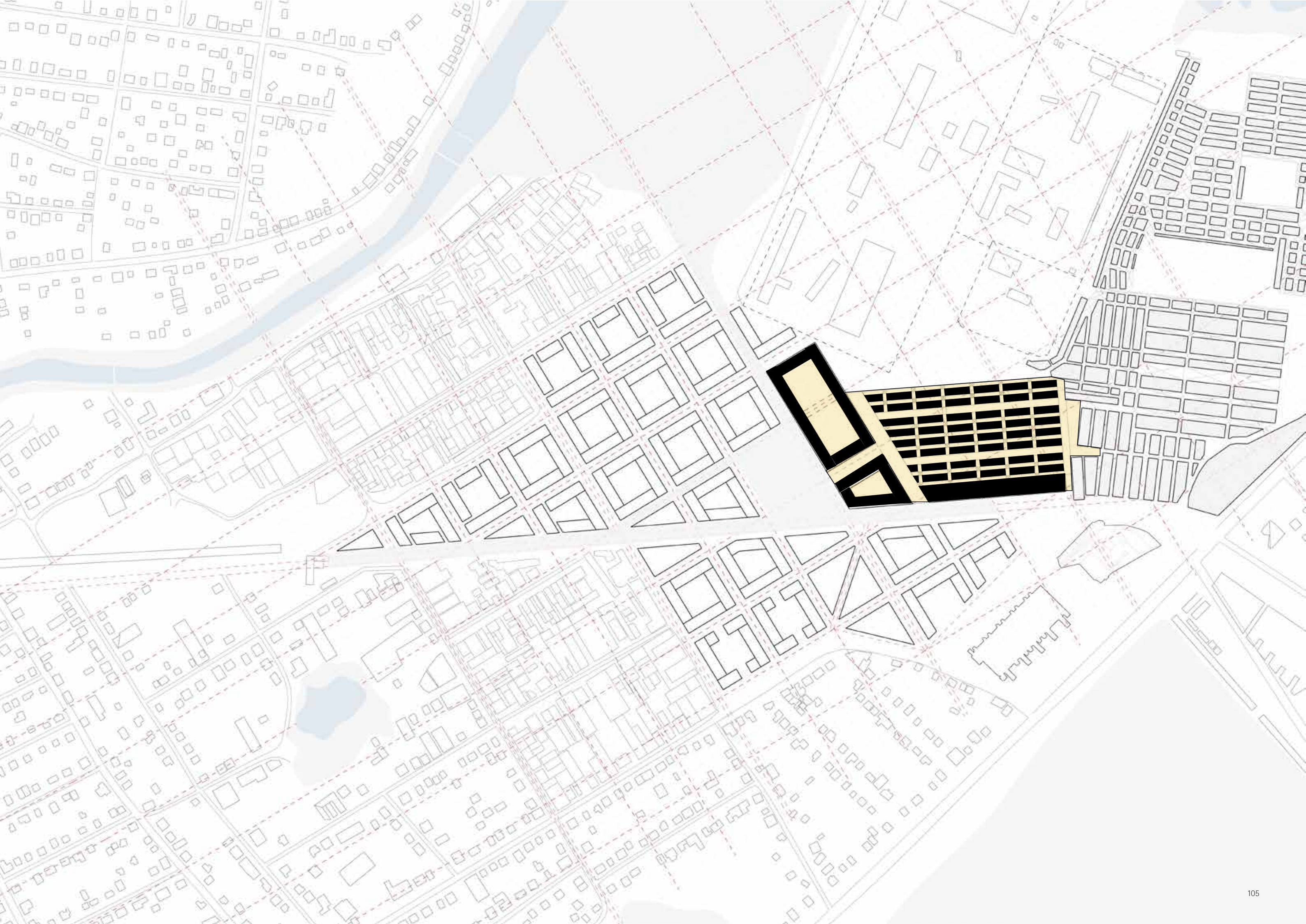
EXPO SPACE



HIGH DENSITY VOLUMES FACING MAIN BOULEVARD



BLOCK TYPOLOGY FACING MAIN SQUARE

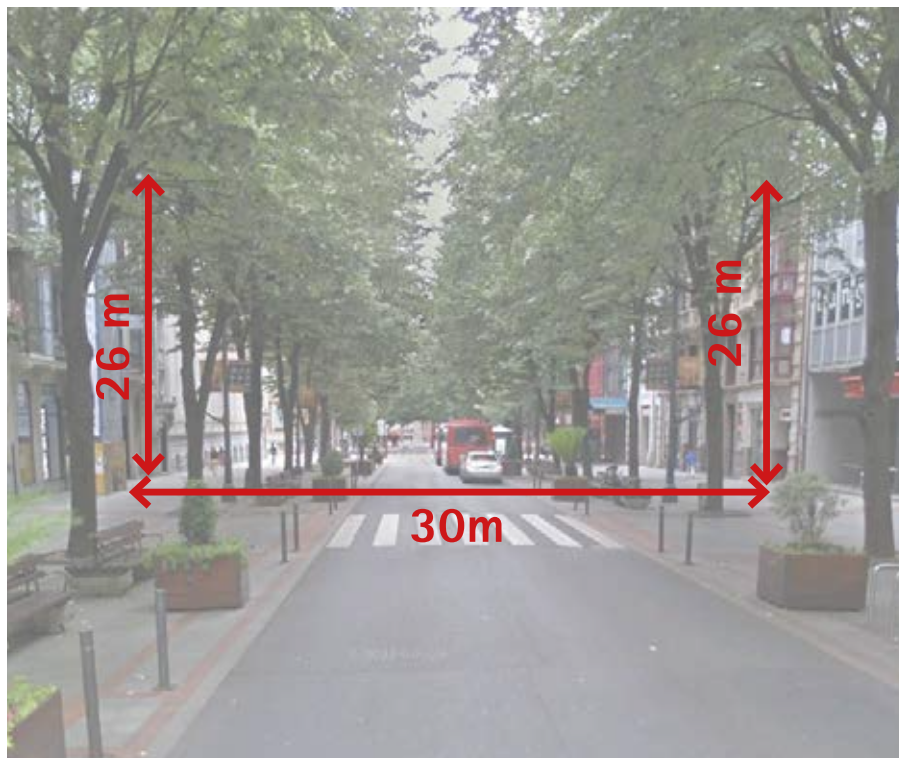


5.10 Streets

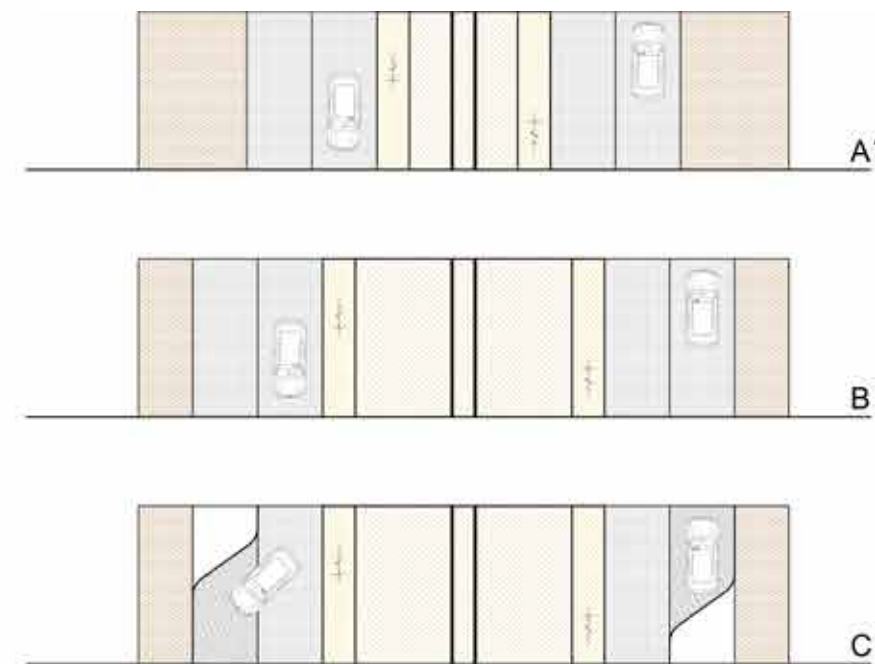
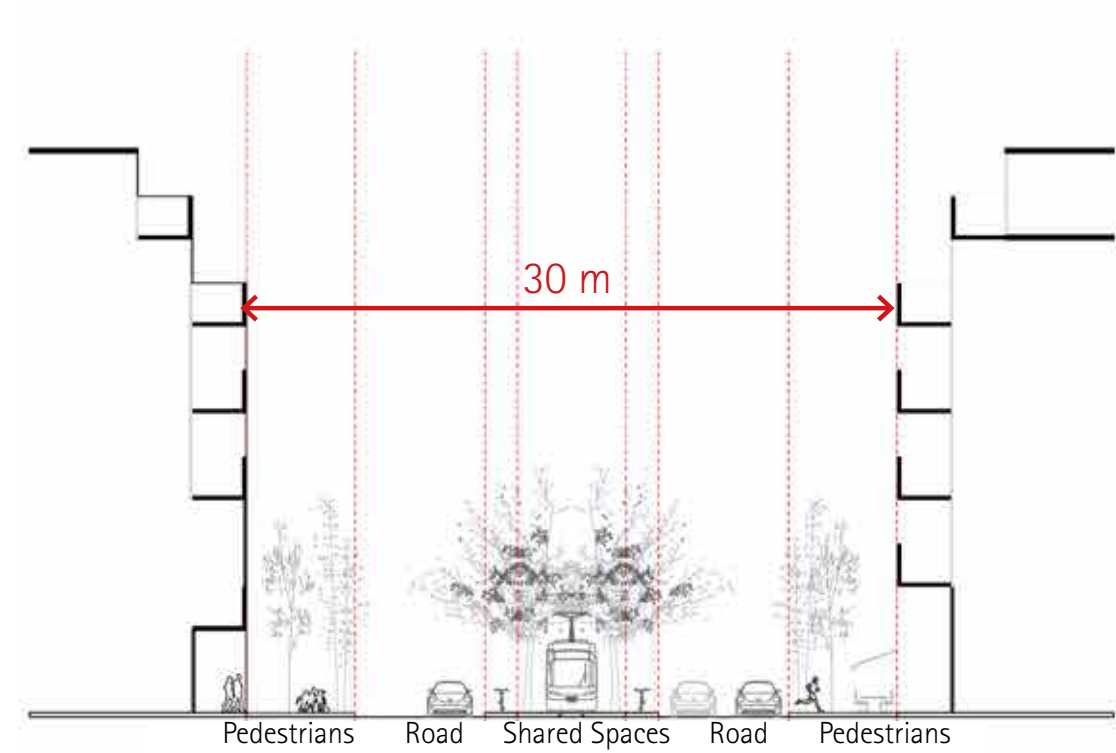
Main Boulevard

The main boulevard, 30 meters wide, serves as the primary artery connecting Saltivka to the city centre, structuring the entire area of the Science Neighbourhood.

It is lined with vegetation and designed to be pedestrian-friendly, with shops, cafés, and other establishments opening onto wide sidewalks and promenades. The distance between buildings allows vegetation to flourish and ensures good sunlight exposure, particularly important during Kharkiv's winter. The central part of the boulevard is designated for public transport (tram or bus) and limited private (electric) traffic. The southern facade is intended for pedestrians, promoting an asymmetrical urbanism that optimizes sunlight exposure.



Calle de la Diputación, Bilbao



5.10 Streets

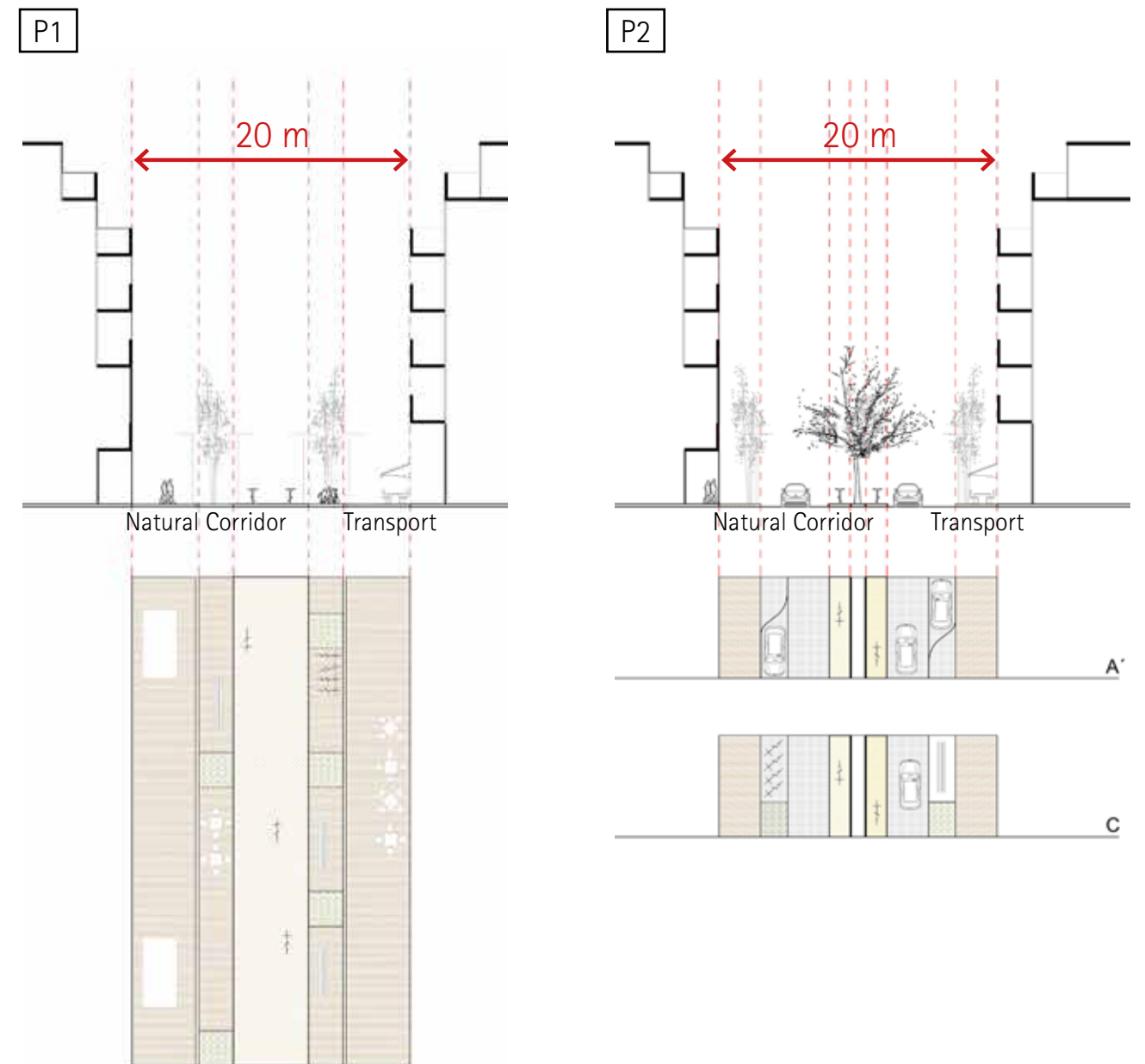
Primary Streets

Secondary streets maintain two existing routes connecting to the riverbank and intersecting with the main boulevard. One is a 20-meter-wide pedestrian platform for pedestrians, cyclists, and soft mobility, along with service vehicles for loading and unloading. This green corridor aims to integrate nature into the neighbourhood and enhance the square.

The other street, also 20 meters wide, supports two-way vehicular traffic. It includes infrastructure for bicycle lanes, parking, and spaces designated for hospitality and commerce activities.



Calle de Concell de Cent, Barcelona



5.10 Streets

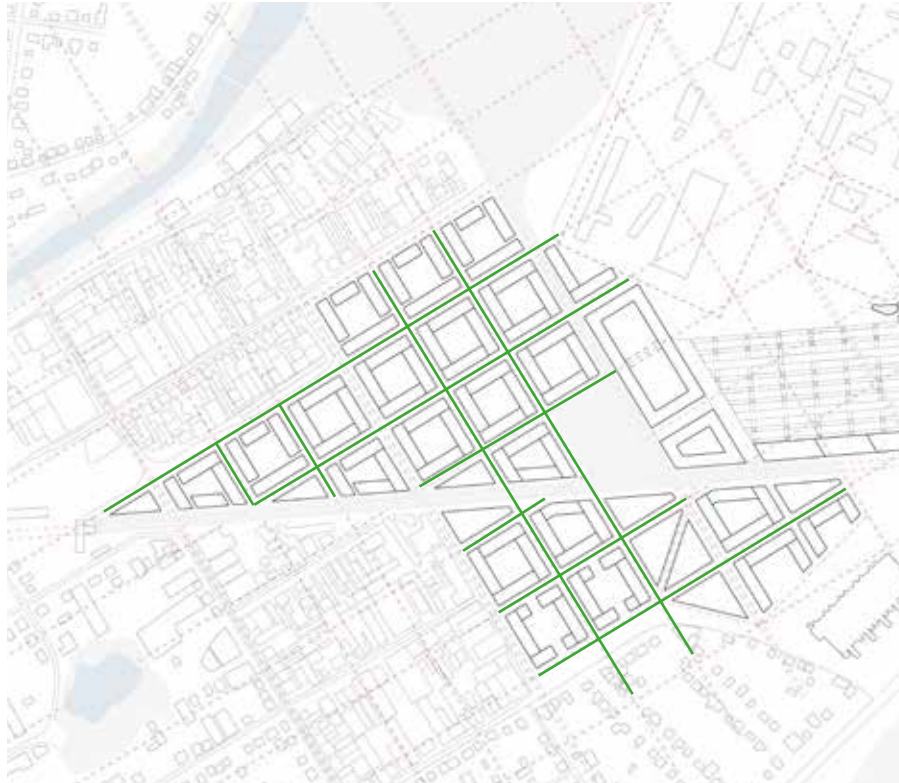
Secondary Streets

Most streets within the Science Neighbourhood are 15 meters wide, marking them as the third tier within the urban fabric.

These streets feature a unified platform with segregated lanes for vehicular traffic, separate from other uses. Speed limits are reduced to enhance safety within the urban environment. The design incorporates distinct usage bands: alongside the traffic lanes, there are designated areas for parking bicycles, scooters, and other forms of electric mobility. Additionally, there are spaces allocated for terraces, resting spots, and pedestrian leisure activities.

At specific points along the street, the section widens with setbacks, allowing for ground-floor commercial spaces or extensions of indoor activities outward onto the street.

Integrated vegetation on both sides of the street enhances thermal and acoustic comfort while contributing to improved air quality throughout the neighbourhood.



Calle Monte Esquinza, Madrid

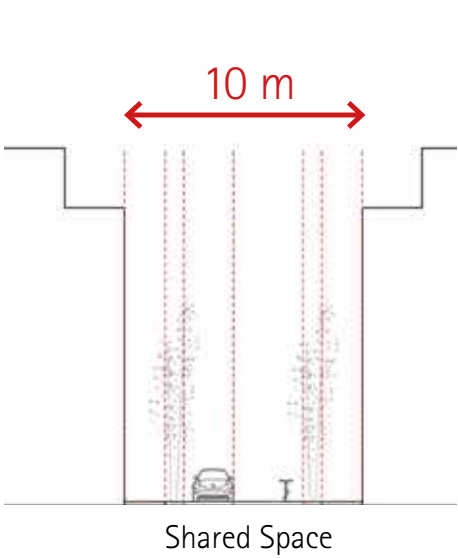


5.10 Streets

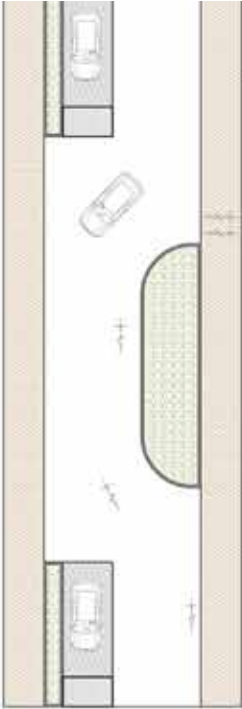
Tertiary Streets

A narrower street typology, 10 meters wide, is proposed as exclusively pedestrian-oriented, deviating from the current urban layout. It is designed to improve residential areas by encouraging social gatherings, relaxation, and organized activities.

To maintain an open feel and maximize sunlight, low vegetation such as shrubs and flowerbeds will be integrated into the streetscape.



Calle Sant Pere, Barcelona



5.11 Heights

Pedestrian comfort and safety are heavily influenced by environmental wind effects, which can be caused by the design of an individual building or a cluster of buildings. The optimal time to mitigate adverse wind microclimate impacts is in the early stages of design, before the main factors such as massing, orientation, and grouping are set. While minor wind problems can often be addressed later with local solutions like trees, porous screens, or canopies, the windiness caused by the overall massing layout typically requires early intervention. The current proposal follows this principles by integrating variation of heights in the urban fabric, from 9 floors around the centre area to a minimum of 3 floors dedicated to the edge buildings.

Buildings that are significantly taller (e.g., over 50%) than their upwind neighbours can alter local wind conditions, potentially creating excessive windiness. This can greatly affect pedestrian comfort and safety, making it crucial to address environmental wind issues from the outset. Failing to do so can reduce the usability of outdoor public spaces and building entrances.

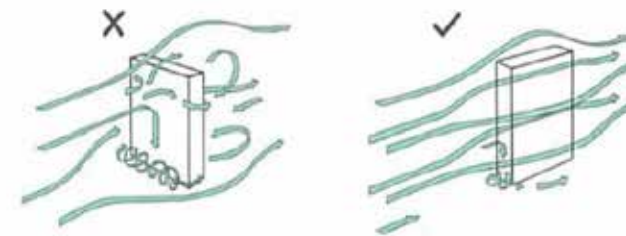
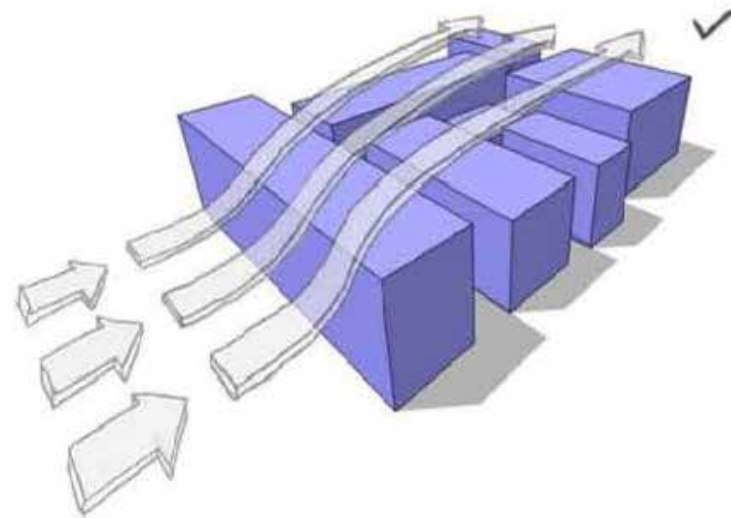
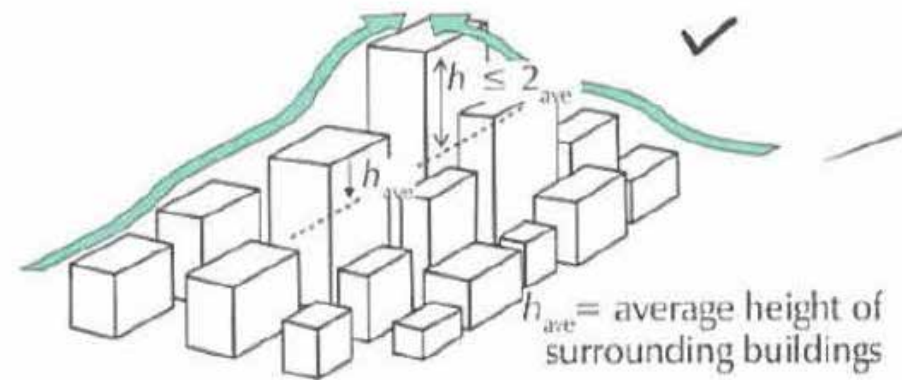


Figure d

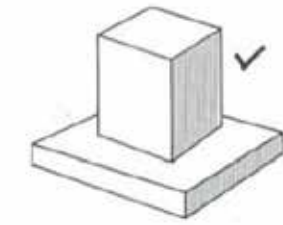
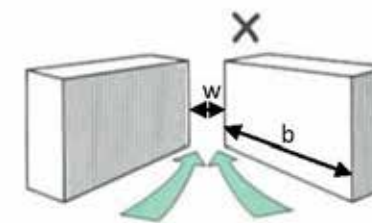
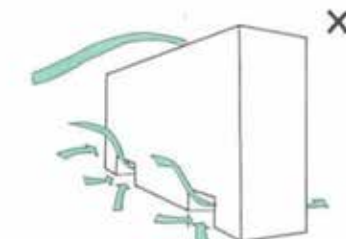


Figure e



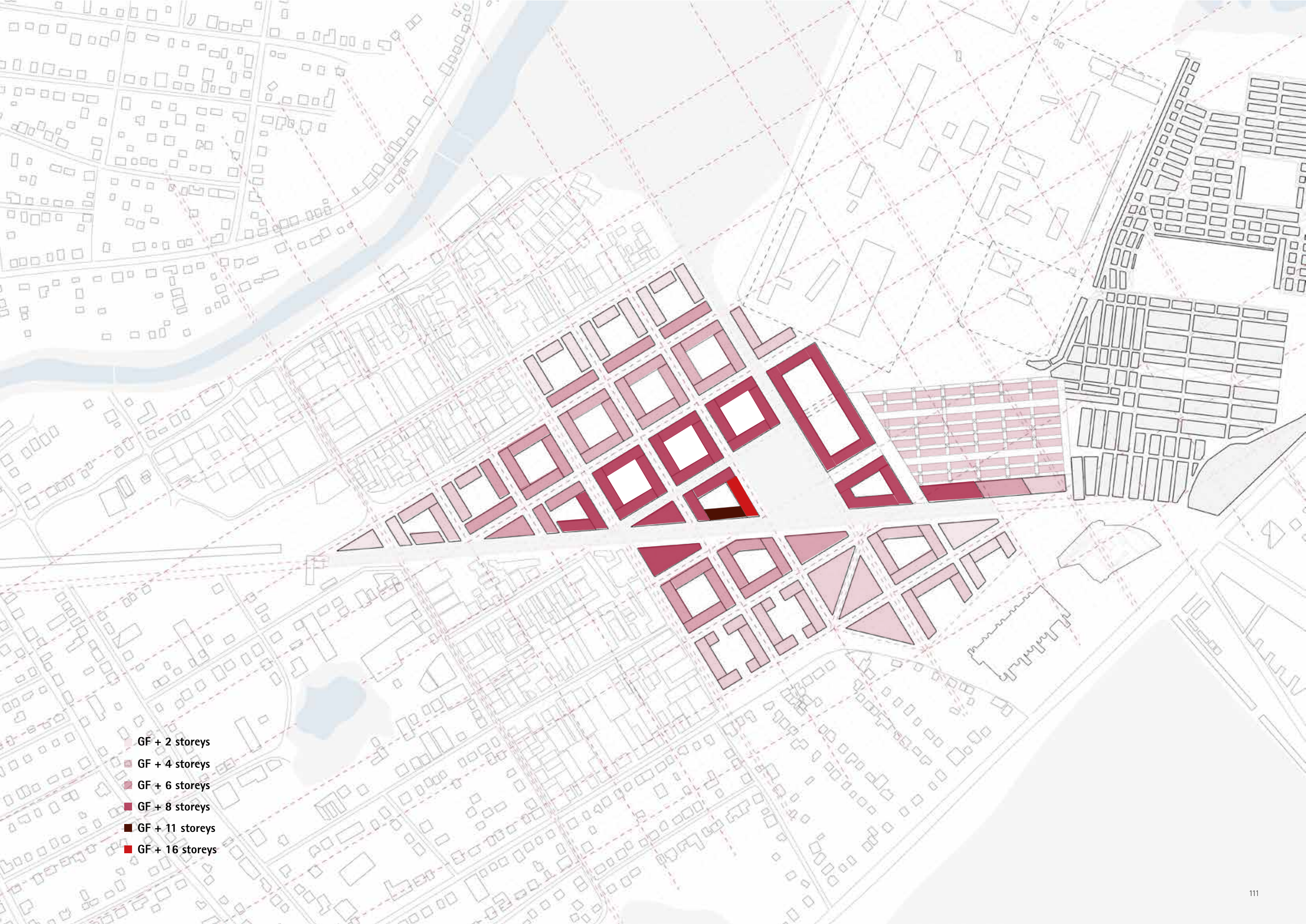
Avoid funnel-like gaps between buildings

Figure g



Avoid passageways beneath buildings at ground level

Figure h



- GF + 2 storeys
- GF + 4 storeys
- GF + 6 storeys
- GF + 8 storeys
- GF + 11 storeys
- GF + 16 storeys





6. Next Steps

6. Next Steps

The next steps for the Science Neighbourhood project will include the definition of three main building typologies: a new market building, a multi-tenant building, and a housing complex.

Further design development will include determining uses for both ground and upper floors, planning the phasing strategy, integrating bomb shelters and underground spaces and designing the public realm.

The process will be supported by the use and implementation of interactive tools that help achieving a holistic design proposal.

DEFINE MAIN BUILDING TYPOLOGIES
USES DEFINITION
PHASING STRATEGY
BOMB SHELTER INTEGRATION
+ UNDERGROUND PLANNING
PUBLIC REALM DESIGN



