19.04.2023

PRESENTATION

MASTER PLAN

NEW BALANCE TROSTIANETS

with kind support of:

Mr. Hannes Horvath
Mr. Peter Blaschke
Mr. Madis Maddison

Modul5 ces CLEAN ENERGY SOLUTIONS iC tbw RESEARCH

NEW BALANCE TROSTIANETS

Disclamer

The Master Plan “New Balance Trostianets” has been prepared for the Trostianets city council (Sumy region, Ukraine) by CES clean energy solutions GesmbH (Austria), iC consulenten LLC (Ukraine), tbw research (Austria) and Modul5 (Austria) with in-kind contributions by independent experts: Mr. Peter Blaschke, Mr. Hannes Horvath, Mr. Madis Maddison.

This work is the result of volunteer effort from these companies and independent experts which emerged after start of Russia’s war against Ukraine in February 2022. The Master Plan was developed between June 2022 and February 2023, with the consecutive public presentation introduced on April 19th, 2023.

The document serves the Municipality of Trostianets as a guideline to support urban development and investment planning. The Masterplan does not fulfil the requirements for publicly required documentation according to Ukrainian or international law or guidelines. The Masterplan Trostianets and its content are owned by the city and the above-named authors and should not be further processed, used or changed without the agreement of the authors.

Before making any decision, or taking any further action, consultation or qualified professional advise may be required. No representations, warranties, or undertakings (express or implied) are given as to the accuracy or completeness of the information in this document, and none of the authors shall be liable or responsible for any loss or damage whatsoever arising directly, or indirectly, in connection with any person or entity relying on this document.

For information contact:

Trostianets City Council: mail@trostyanets-miskrada.gov.ua
CES clean energy solutions Gesmbh: office@ic-ces.at
iC consulenten LLC: ukraine@ic-group.org

NEW BALANCE TROSTIANETS

TEAM

iC Ukraine Team management

Olena Rybak

CES Team Management

Andreas Helbl

Project Management

Iryna Omelianenko

Urban Planning / Marketing

Josef Lueger

Sustainable Urban Development Trends and Visions

Hannes Horvath

Environment and Social management

Albrecht Malcherek

Gender / Equality

Olena Rybak

Waste Expert

Peter Blacshke

Building and Structures

Leonid Bakal

Energy Generation and Distribution / RE

Daniel Fleischmann

Energy Efficiency

Zlatko Bacelic

Water&waste water

Madis Maddison

Building modeling and EE expert

Iryna Sukhodub

Energy Generation and Efficiency

Valentin Kapferer

Energy Generation and Efficiency

Iryna Ocheretiana

Transport & Waste

Valeriy Vyshniakov

POOL OF LOCAL EXPERTS

POOL OF INTERNATIONAL EXPERTS

NEW BALANCE TROSTIANETS

WE BELIEVE

in the positive economic, social and sustainable development of Ukraine

in the requirement of strengthening smaller Cities in their initiatives to respond to a new reality and their future needs

in the need to strengthen the border regions to Russia by creating prosperity, welfare and an attractive living environment

that investments will come soon and that smaller Cities have to be ready to attract them…. every cent invested is for the future of Europe

that now is the time for change, for re-thinking and the start-up for building the future urban environment

NEW BALANCE TROSTIANETS

THEREFORE

1

we moved at a time when no one was ready to think about it

2

we want to set first acupunctural stitches as a best practice example for other urban developments in Ukraine

3

we want to strengthen rural areas and eastern regions of Ukraine having the highest needs for development support

4

we chose Trostianets because the city matches perfectly with our vision, is close to border regions to Russia and is motivated to focus their developments towards a sustainable future

BASE LINE

Supported by GIZ

MUNICIPAL DEVELOPMENT STRATEGY 2030 (AS OF 2019)

- Food production and food processing
- Forestry, Wood processing
- Development of small and medium enterprises
- Tourism, Cultural Events, Sport events
- Agriculture

Supported by GoM

SUSTAINABLE ENVIRONMENTAL ACTION PLAN (AS OF 2021)

TOPICS: ENERGY, TRANSPORT, WATER/WASTE WATER, WASTE, ETC.

RESULTS

VISION…. AS DEVELOPED IN 2019

Trostianets city amalgamated community is the leader of chocolate and biscuit production in Europe, with a developed **export-oriented cluster of food, woodworking and agriculture.**

Safe, environmentally friendly, energy-efficient community with **comfortable living conditions, recovery and rest.**

Tourist, ecological and youth centre of **innovative cultural, educational and sports spaces** with developed infrastructure.

Gender-oriented community of friendly governance and active responsible citizens.

INTERVIEWING - FIRST RESULTS:

Is it comfortable to live in Trostianets?

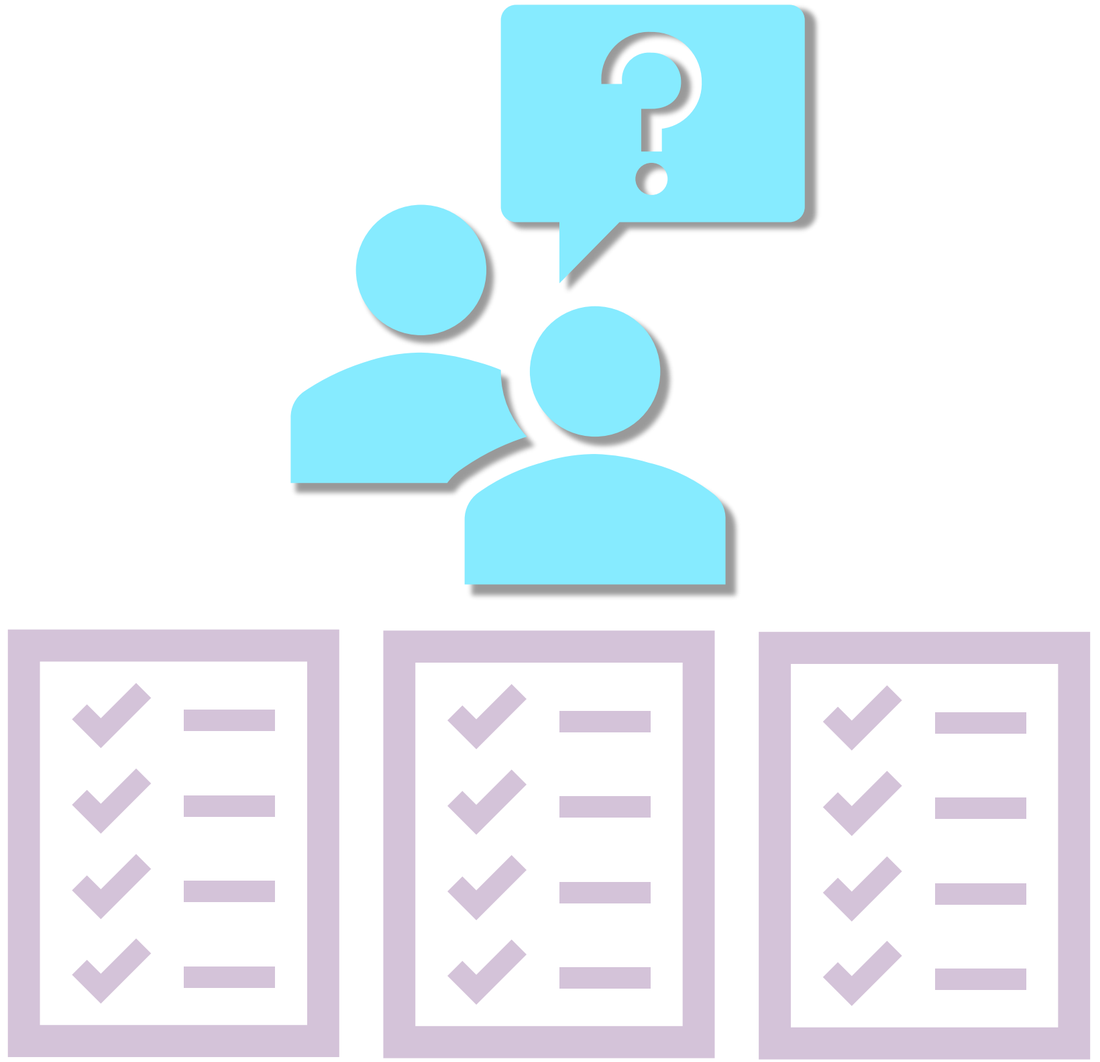
- 99% of responders answered „yes“

What is your favourite place for spending time in the city:

- 80% responded City Central Park

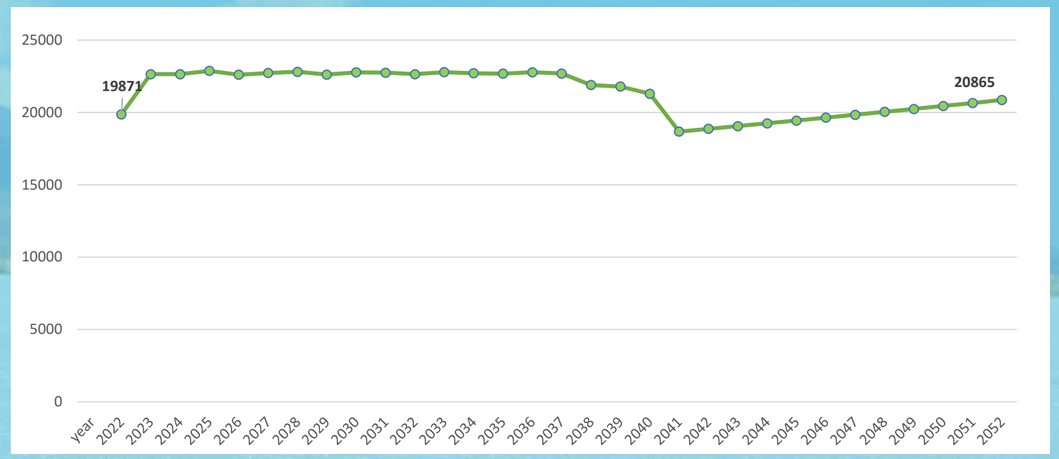
What would be your ideas for international investors to improve the city? What do you miss?

- Sport centres
- Shopping and entertaining centre
- Water pool
- Skate park
- Infrastructure for handicapped people
- Coffee Shops and caffe
- Waste Treatment Plant
- Co-working areas
- Colleges with modern specialities

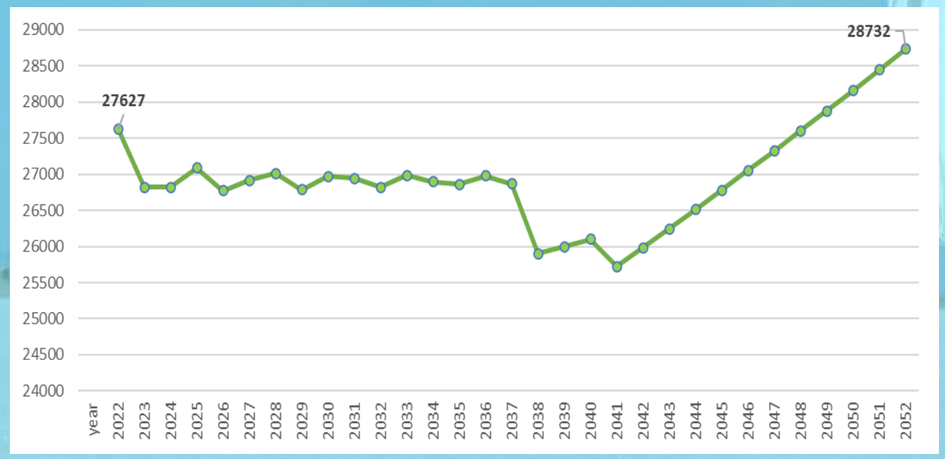


PEOPLE CREATING FUTURE – PROGRESSIVE DEVELOPMENT

- An increase in-migration (coming back and internal displaced people) with the end of the war in the coming year,
- Stronger movement of the working-age population to Trostianets due to its active development
- The population of UTC is expected to grow by up to 4% in the coming 30 years
- The scenario considers the “average age of UTC citizen” (41 years) and the average life expectancy in Ukraine.



City

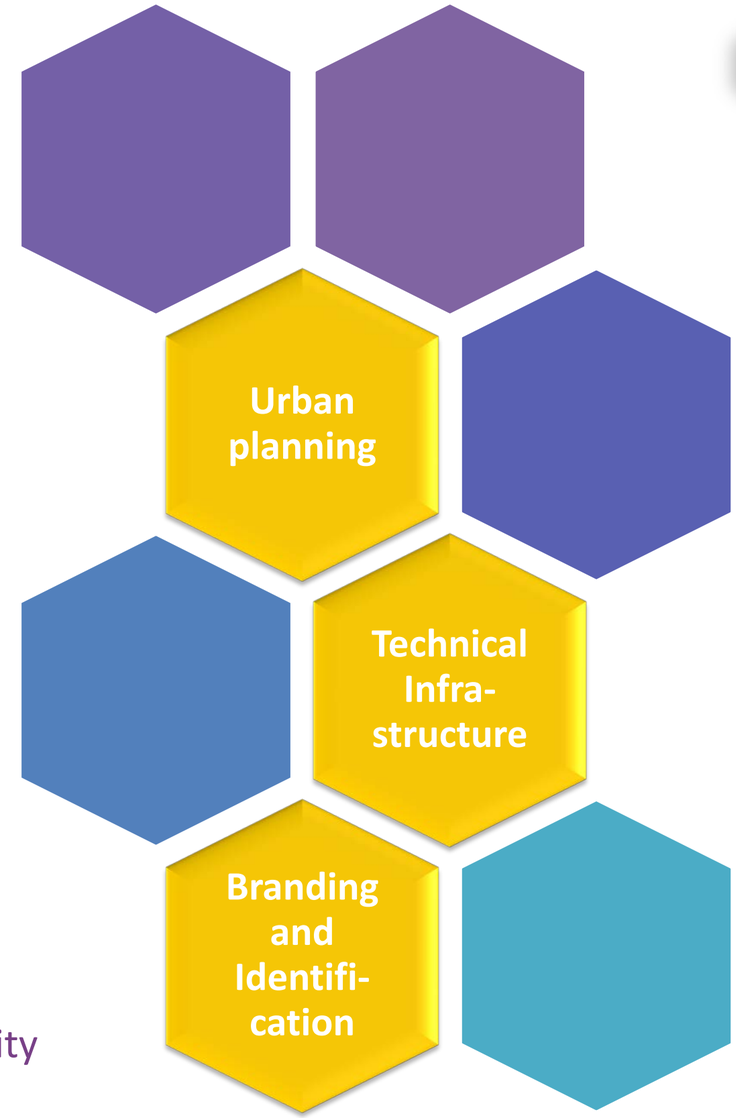


UTC

NEW BALANCE TROSTIANETS

WHAT TO STRENGTHEN?

- Future of the children
- Culture
- Attractive areas for socialising
- Economic prosperity
- Social infrastructure
- Leisure / Fun / Culinary
- Daily needs and retail
- Transport & mobility



- Quality of Life
- Sustainability
- Energy
- Water / Waste water
- Future of Young / Education
- Waste

NEW BALANCE TROSTIANETS

BRANDING - FIRST IDEAS

Basis of various positive developments and connections

No negative association, esp. with the present situation

UNIQUE

Positive image and impressions – today and in the future

Easy to remember

SWEET

“Trostianets, the sweetest town in Ukraine”

Start-up

- Connect existing and future Trostianets key features (tourism, festivals, music, culture, etc.) to the branding
- Sweets are served (as a must) at every meeting concerning Trostianets
- Identify and Create the typical Trostianets Sweet through a competition
- Introduce people to the production of sweets via video from the best sweet-makers in the world
- Create an educational program for young Chocolatiers and Confectioners
- Open a branch of a famous European pastry shop/café
- Support production/work – private, small up to great factories

CITY PLANING

NEW BALANCE TROSTIANETS

with kind support of:
Mr. Hannes Horvath
Mr. Josef Lueger

Modul5 iC ces CLEAN ENERGY SOLUTIONS tbw RESEARCH

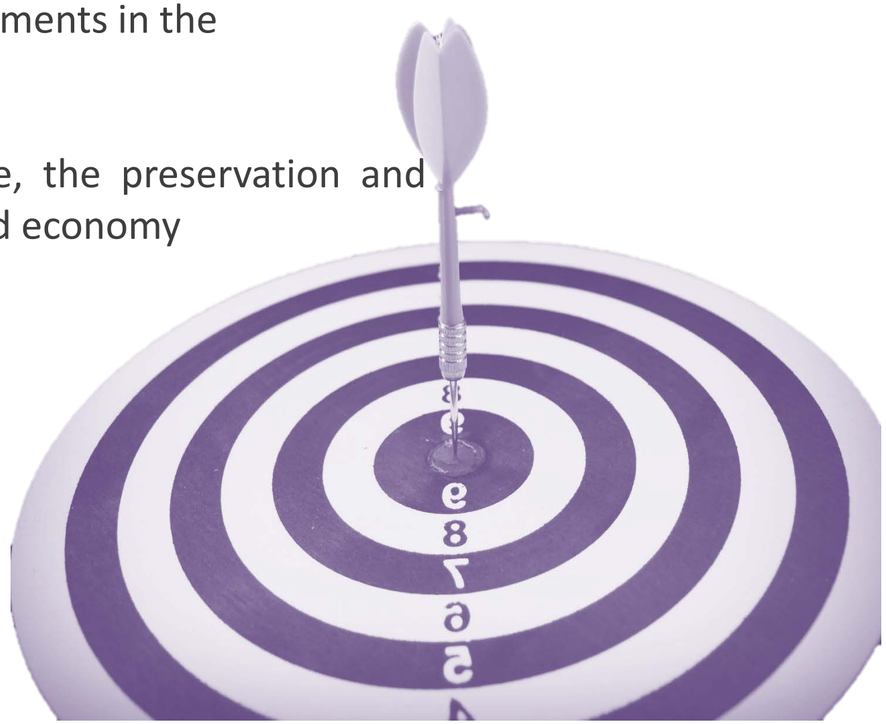
GOALS - PREAMBLE

Although we are many kilometres away, the city has given us an overall picture of the different neighbourhoods of the city through feedback, data and videos on city walks.

The destruction and incisions of the war force us to look into the future and make adjustments in the city structures.

The important issues for modern cities today are the adaptation to climate change, the preservation and promotion of the diversity of functions in the centres, the mobility of the inhabitants and economy and the return of production to the city.

All our considerations take into account the specific pressures and challenges.
The master plan is based on the guiding idea of a resilient and self-determined city.



GOALS

Guiding goals targeted by the master plan (what is the spatial vision oriented to?)

- The city will grow through sustainably operating lead businesses and as a liveable full-service provider (health, education, commerce).
- Trostianets spatial development favours "inside" over "outside".
- The concept of "equal opportunity mobility" connects neighbourhoods to their downtown.
- The master plan values the existing and develops it into a vibrant centre through bold interventions.

Objectives of the document (what should be triggered by the master plan?)

- The City Centre Master Plan provides guidance and supports the city in development, promotion and attracting investments.
- A master plan identifies the spatial vision and the next steps for its realization.
- The interventions become concrete in a cost estimate.

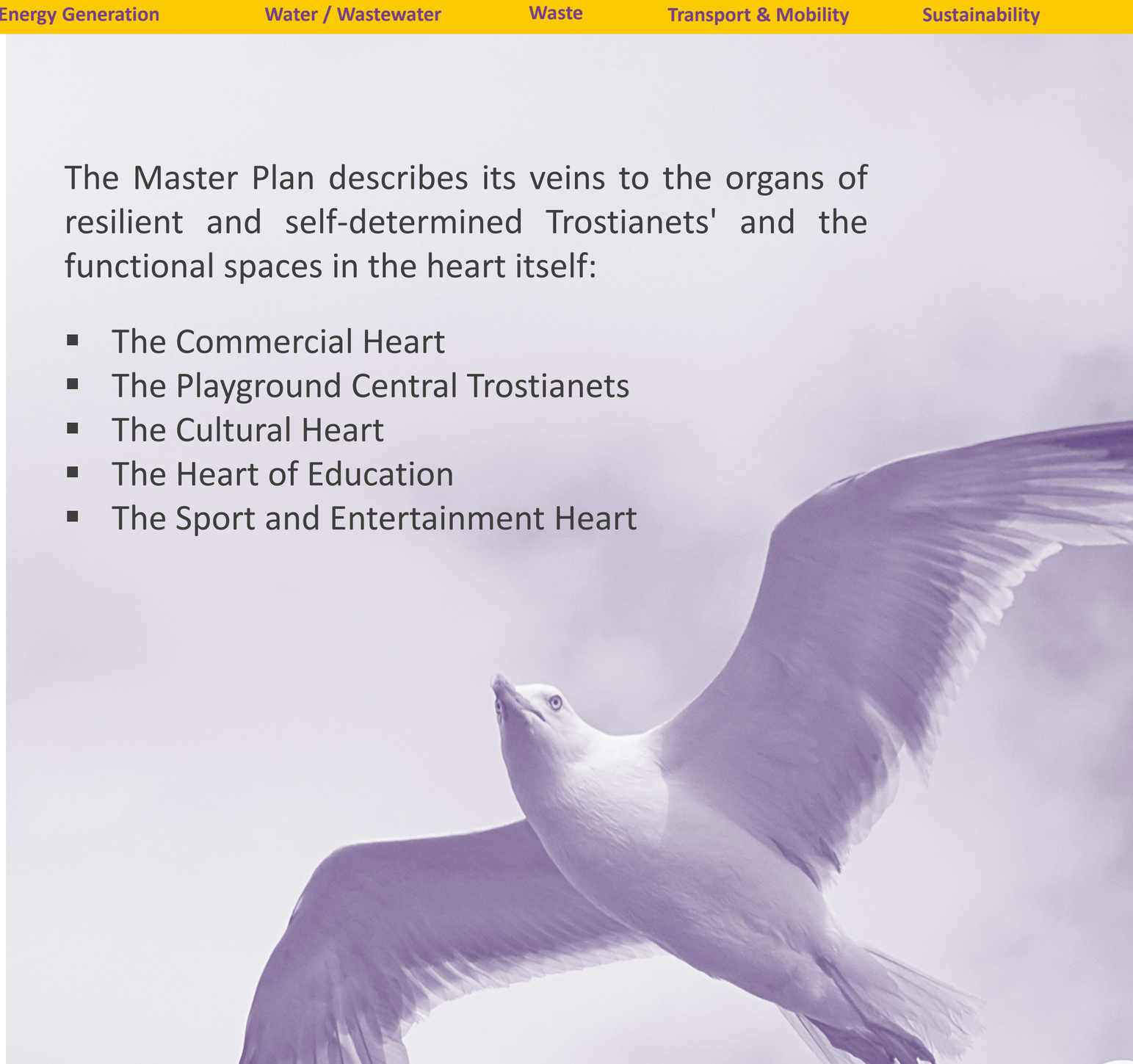
CORE STRATEGY - VISION

The city centre of Trostianets is a lively and multifunctional centre for the city and the city region. In it the functions of commerce, administration, culture, education and leisure are concentrated. Life in the streets, new squares and buildings does not stop.

The city centre is the heart of Trostianets with a radius of around 600 meters.

The Master Plan describes its veins to the organs of resilient and self-determined Trostianets' and the functional spaces in the heart itself:

- The Commercial Heart
- The Playground Central Trostianets
- The Cultural Heart
- The Heart of Education
- The Sport and Entertainment Heart



CORE STRATEGY SPATIAL ZONING

Develop an urban platform through higher usage density.

- Higher buildings with urban gardening
- Conversion of industrial zones into mixed-use quarters
- Concentration of public uses
- Integration of sports, festivals and events
- Diversify usage of green zone

Urban Factory for Creative Ideas (Co-working / Hub)

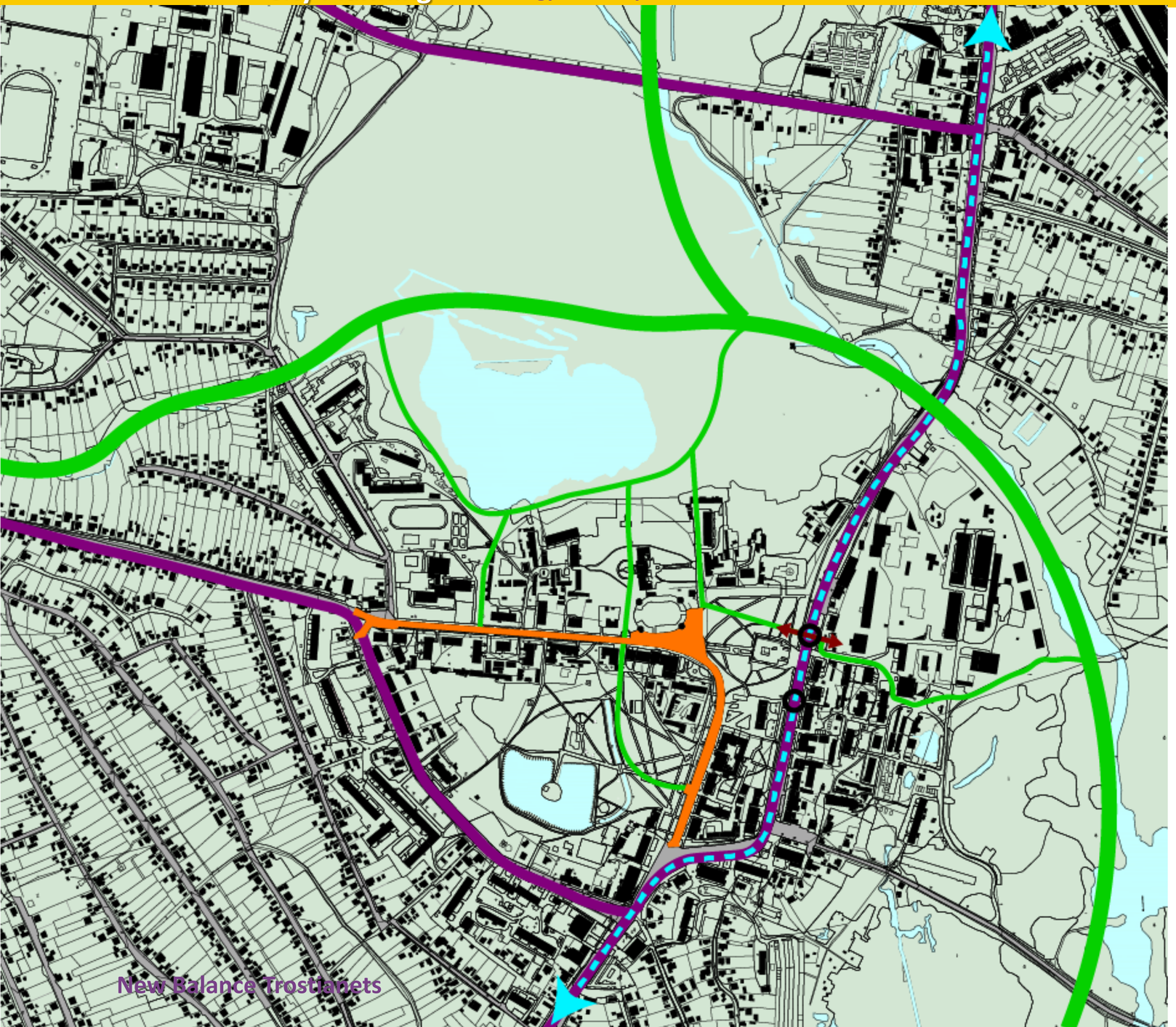
TOWN PLAZA

City Market (“Naschmarkt” style) / Farmers or handmade products market

Encounter zone for mixed traffic (car, bike and pedestrian)

GREEN ZONES

- Stable framework of green zones (respond to climate change)
  - city cooling
  - city ventilation
  - urban ecology
  - Veins for sports, leisure and tourism
- Create buildable ground
- Encounter zone



MOBILITY

Create stroke veins for:

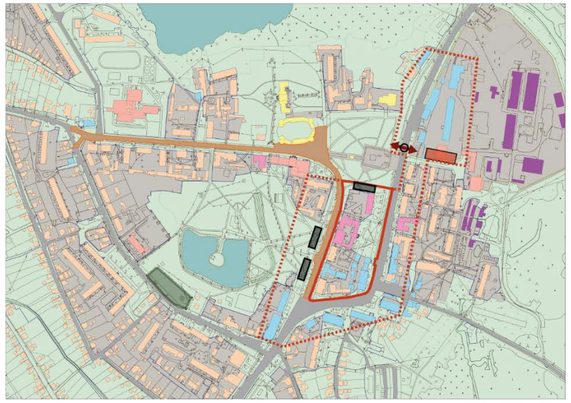
- Motorized traffic
- Pedestrian traffic
- Bicycle highway
- Public transport

And liveable space for citizens to meet and live together

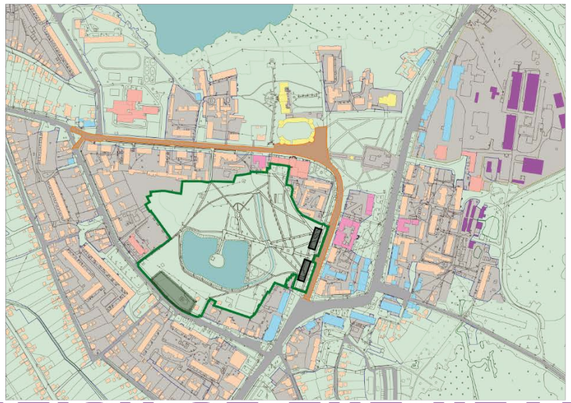
Legend:

- Main road
- Pedestrian and bicycle highway
- Encounter zone
- Public transport station
- Strong vein for sports and leisure time

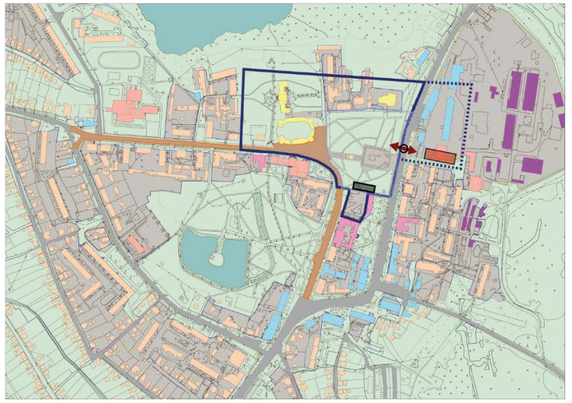
1. The Commercial Heart of Trostianets



2. The Playground in Central Trostianets

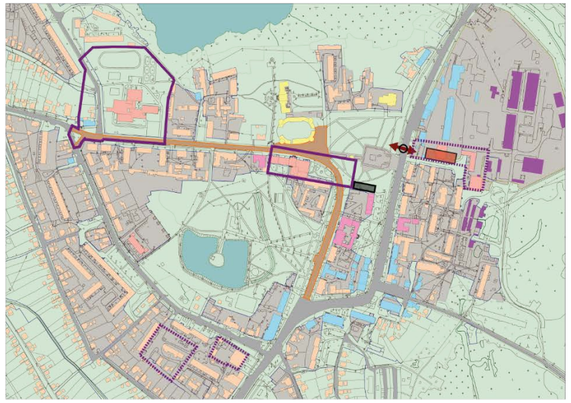


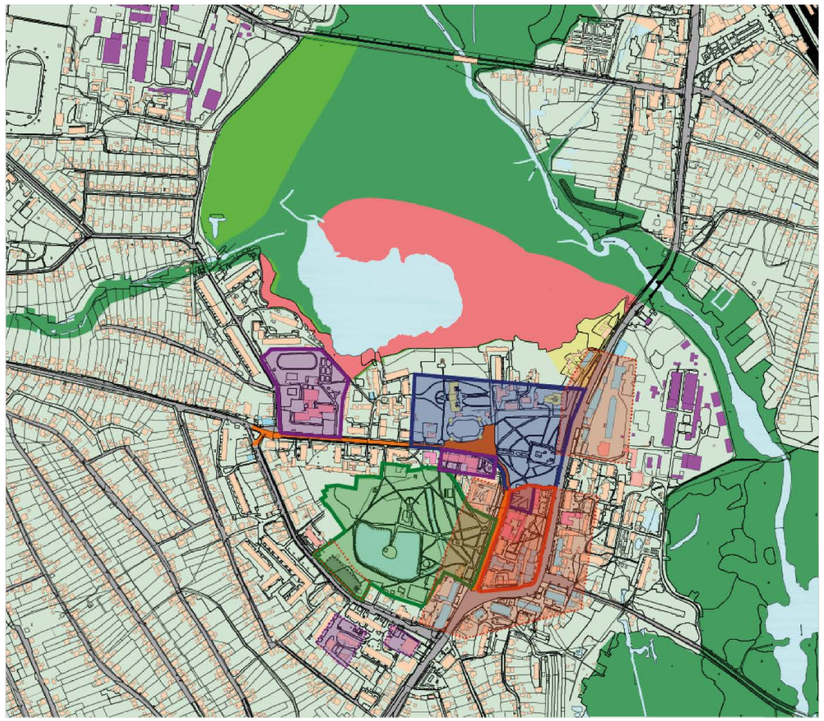
3. The Cultural Heart of Trostianets



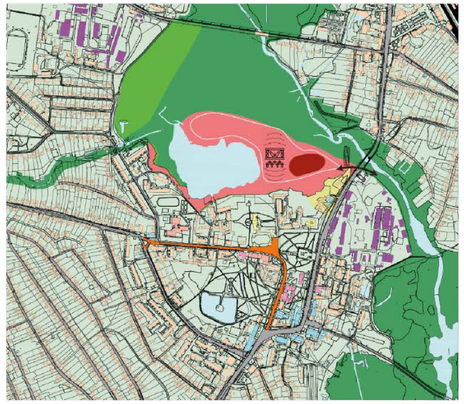
COMBINATION OF THE HEARTS

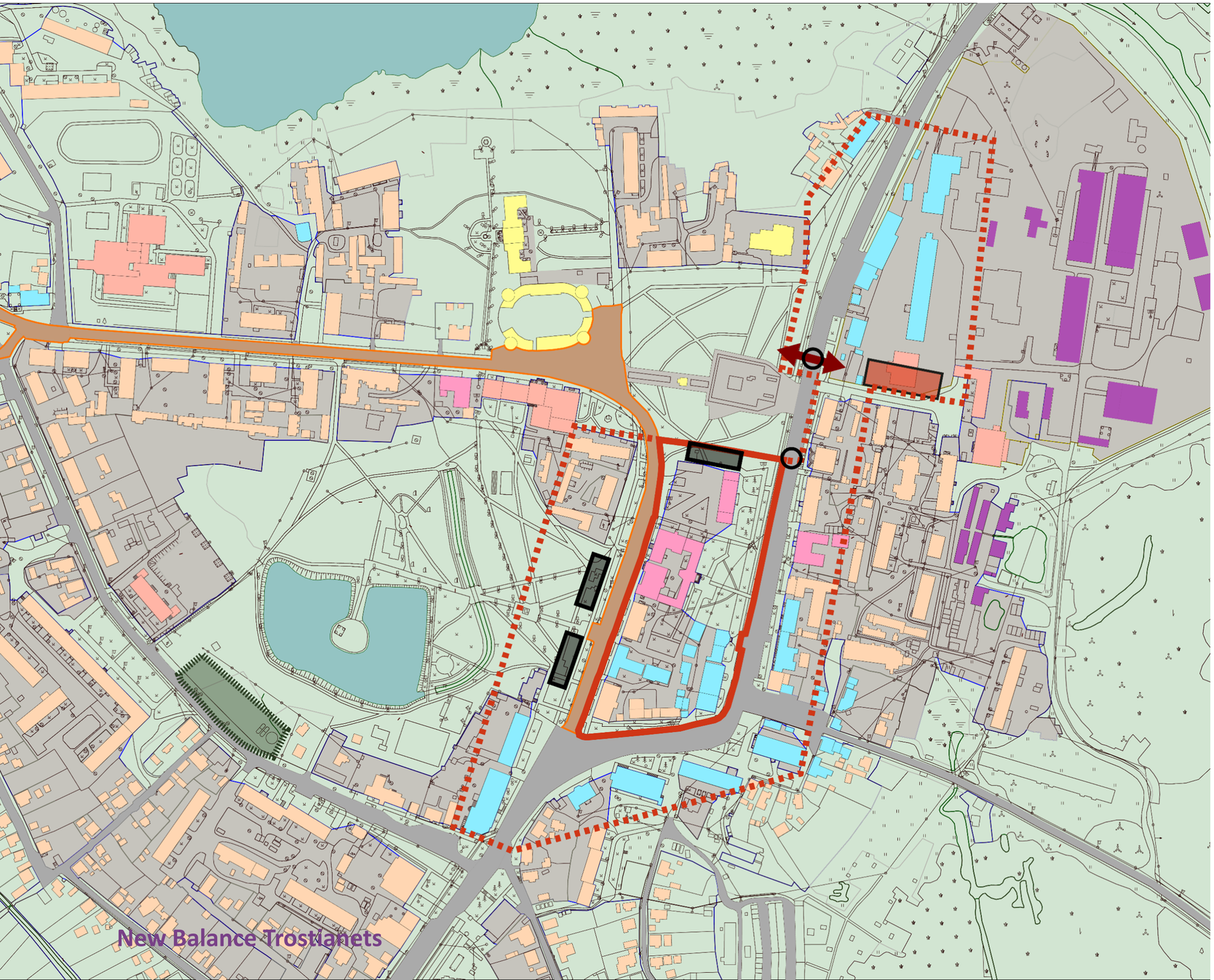
4. The Educational Heart of Trostianets





5. The Sports and Entertainment Heart of Trostianets





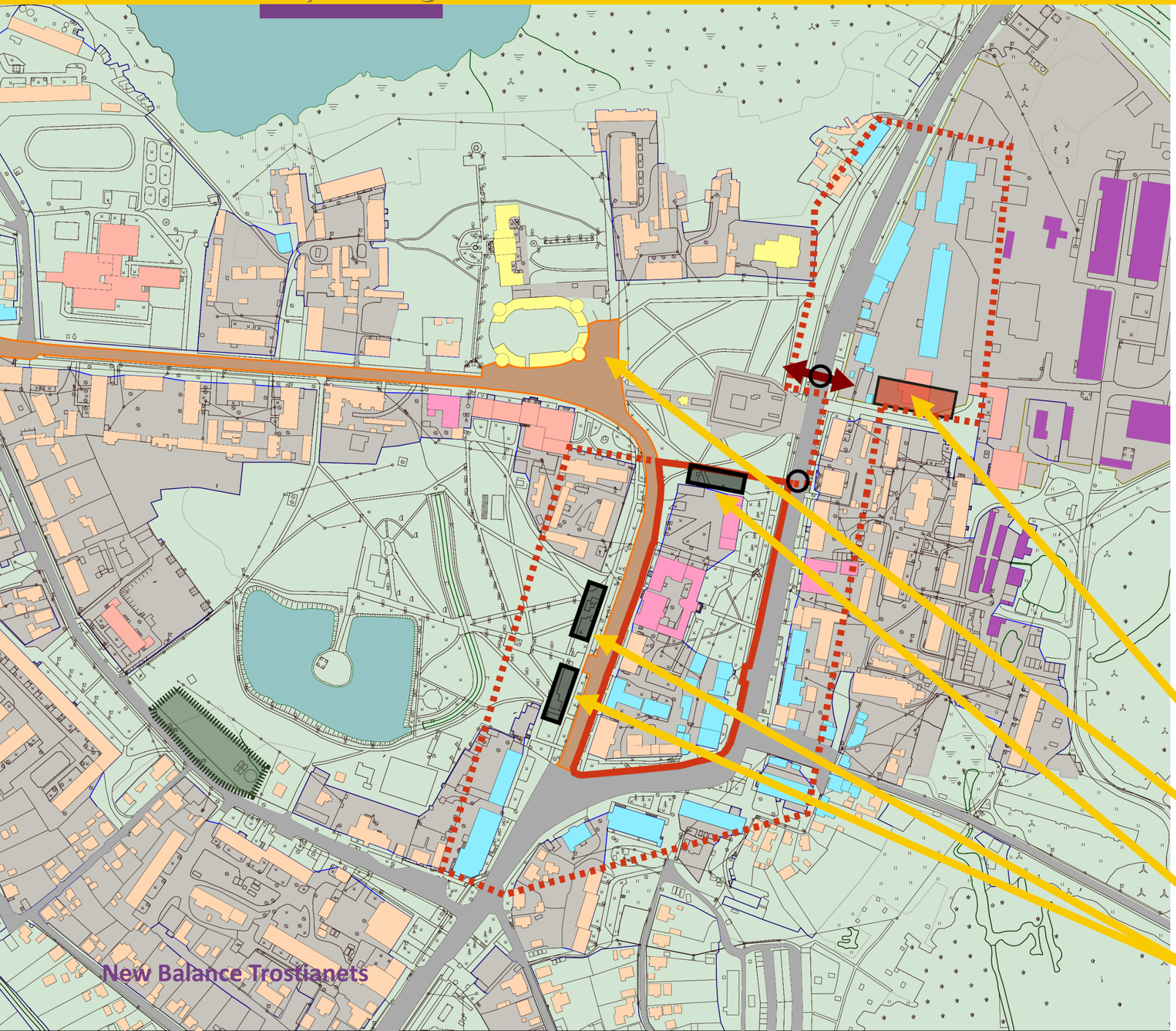
THE COMMERCIAL HEART

1st Step:
Cooperative planning process for the detalisation of the urban concept, including the spatial transitions to the Playground, Cultural Heart and Urban Factory for Creative Ideas (Co-working / Hub).

The dominant uses are **administration, retail and gastronomy.**

We recommend the complete reorganization of the central quarter for the development of a **shopping mall** that opens up to **a market square** and **a town square.**

The marketplace is bounded on the west by two signal buildings. These mark the entrance to the Playground. A **Farmers or handmade products market** uses the street, a **encounter zone**, and offers the products of farmers and self-suppliers.



THE COMMERCIAL HEART

A car-free city square will be marked by the city administration and a multifunctional new building, **the “House of the future”.**

The **public transport station** is moved to the House of the future, where an **overpass** optimizes the connection across the main traffic axis to the eastern part of the city.

The interventions **City Farm** with kitchen and store, the **training confectionery**, as well as the House of the Future are explained in the further section.

Urban Factory for Creative Ideas (Co-working / Hub)
Encounter Zone. Accessible by car only for residents and suppliers / Pedestrian area “Alley of peace”
“House of the future”
City Market (Naschmarkt style) / Farmers or handmade products market

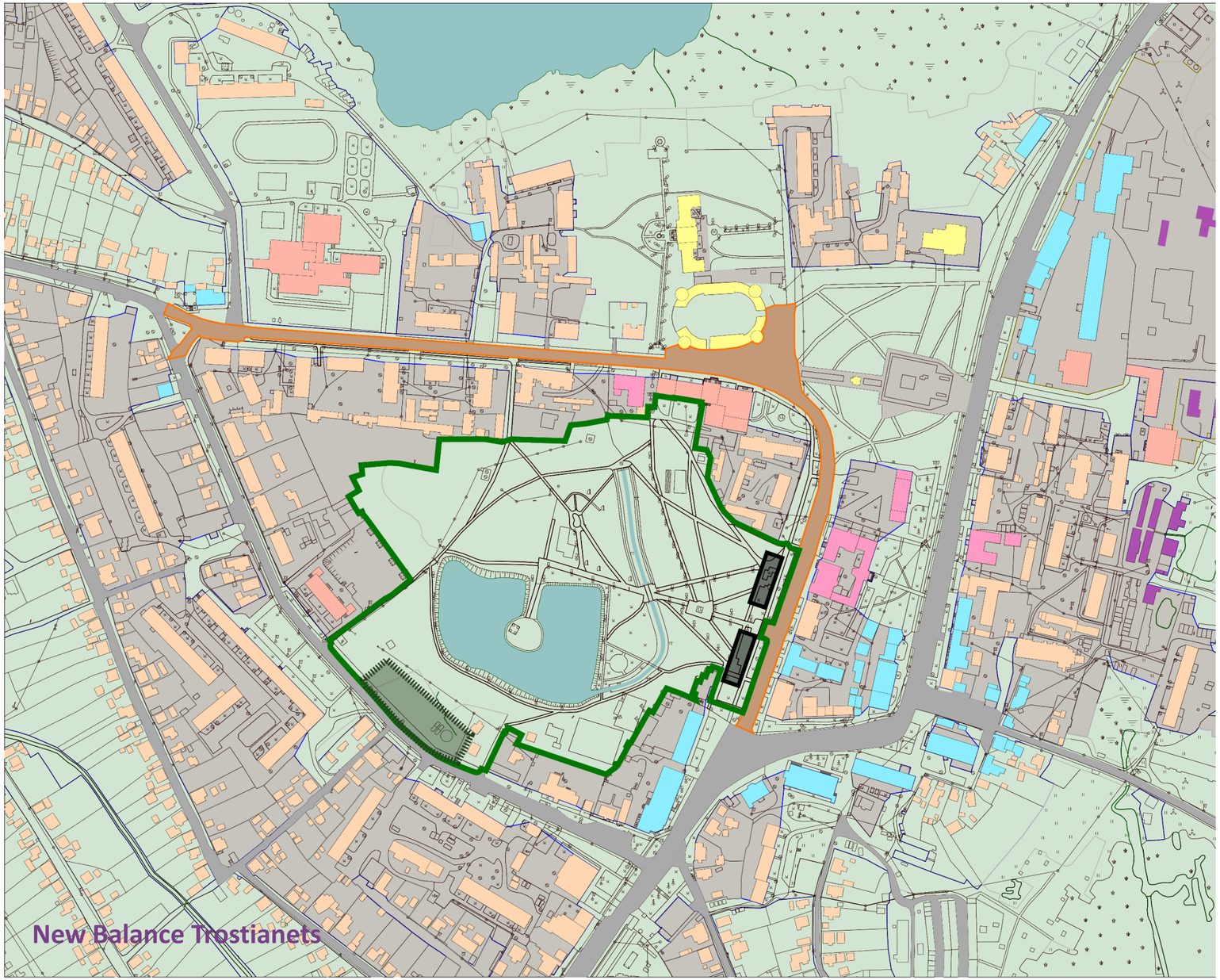
THE COMMERCIAL HEART OF TROSTIANETS

The current status of the master plan provides a direction of development for the commercial centre. For sustainable spatial solutions that are sufficiently linked to the other areas of the centre, we recommend that the city undertake more concrete spatial and utilization studies with an interdisciplinary planning team. In a **cooperative process**, the following criteria should be worked through:

- Urban density
- Maximum heights
- Development options
- Uses and quantity structure

In the following step, **competitions** can and should be held for sections and construction projects.

THE PLAYGROUND IN CENTRAL TROSTIANETS



1st Step:
Design competition for the open space "Playground in Central Trostianets" incl. interface to the new buildings City farm and training confectionery.

Dominant uses are play and fun areas for children from 0 to 15 years.

We recommend an **overall concept** that proposes selective improvements in furniture, equipment and routing and, above all, specifies the access from the Commercial Heart.

The signal buildings the **Farmers or handmade products market** with kitchen and store as well as **the training confectionery** with pastry store mark the access and on the other side the market place.

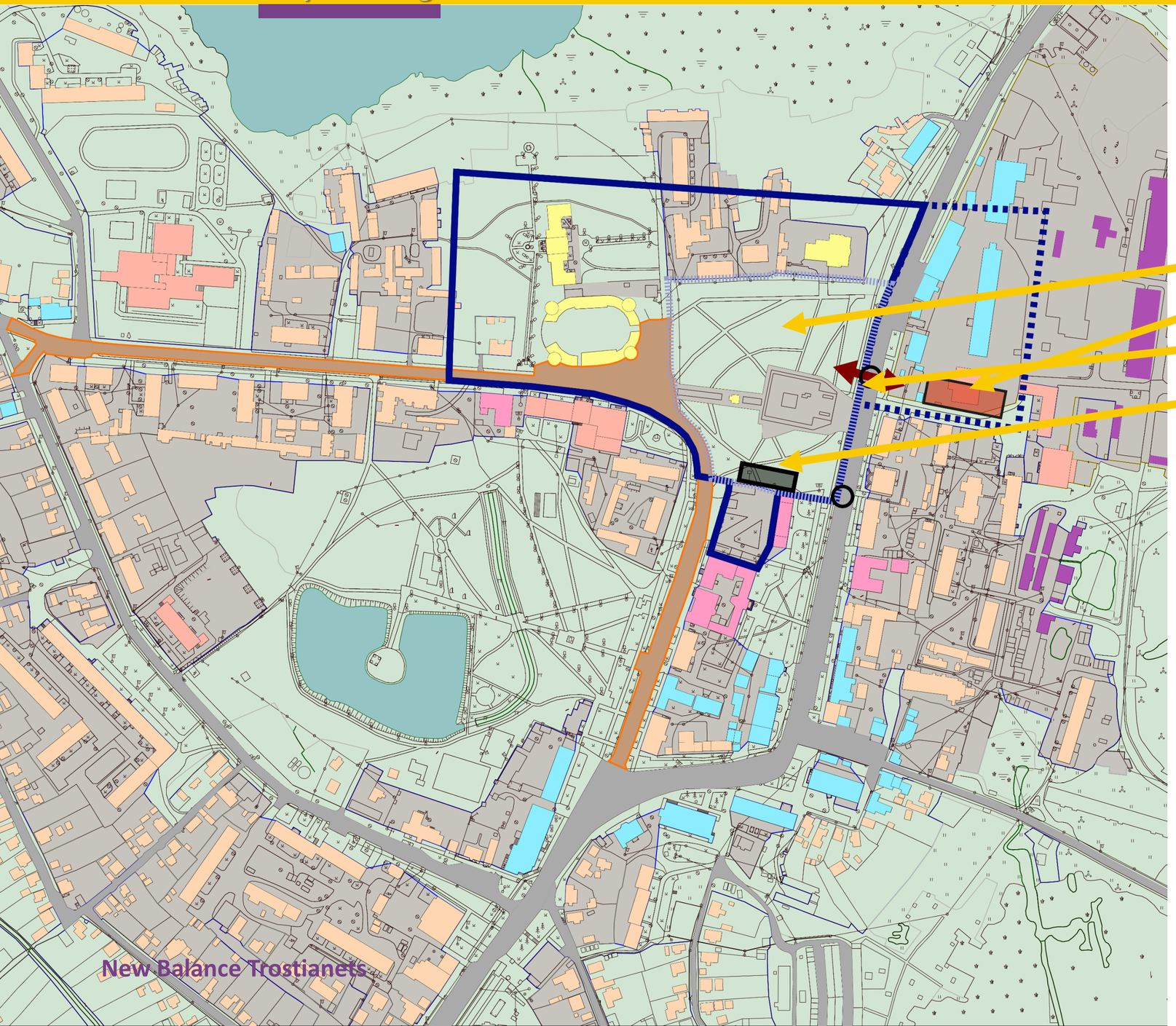
The design of the new buildings should be light and transparent. Reference images are greenhouses made of steel and glass. They open to both sides.

ENTRANCE TO THE PLAYGROUND IN CENTRAL TROSTIANETS, REFERENCES

© https://www.rollingpin.at/konzepte-openings/inspiration/detail/wurstelprater-cafe.at


© http://www.glashaus-cafe.at

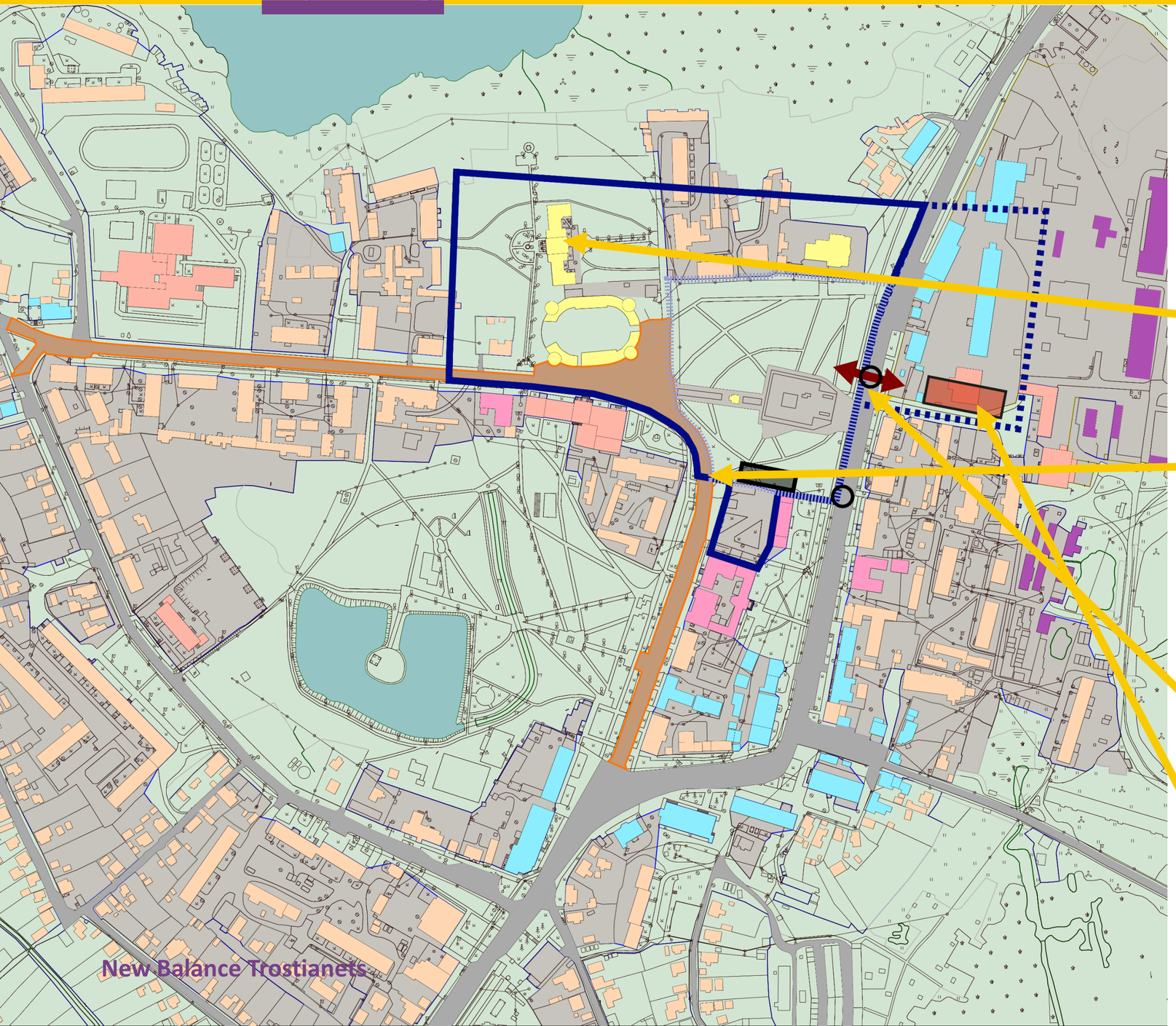
New Balance Trostianets



THE CULTURAL HEART

- Town Plaza
- Urban Factory for Creative Ideas (Hub)
- Public transport transition
- House of the Future

Trostianets cultural heart is open on all sides with a core for inspiration and high quality of stay.
The plaza is to be developed into a 3rd Place, in that a multi-use plaza with urban furniture and spatial enclosure will encourage active use. People will meet, read, listen to and make music here in the future. The design respects the existing buildings and embraces the central axis. A competition will decide on the framing of the plaza.
Additional pathways connect the plaza to the Promenade and Urban Factory (Hub).



THE CULTURAL HEART

The **museum** will be further developed into the **House of Memories** by incorporating the events and fates of the war.

The other end of the quarter is marked by the **House of the Future**. Joy and liveliness are promoted here, traumatic memories are transformed into confidence. Low-threshold art of styling oneself, expressing oneself and form and music can unfold in a house open to use.

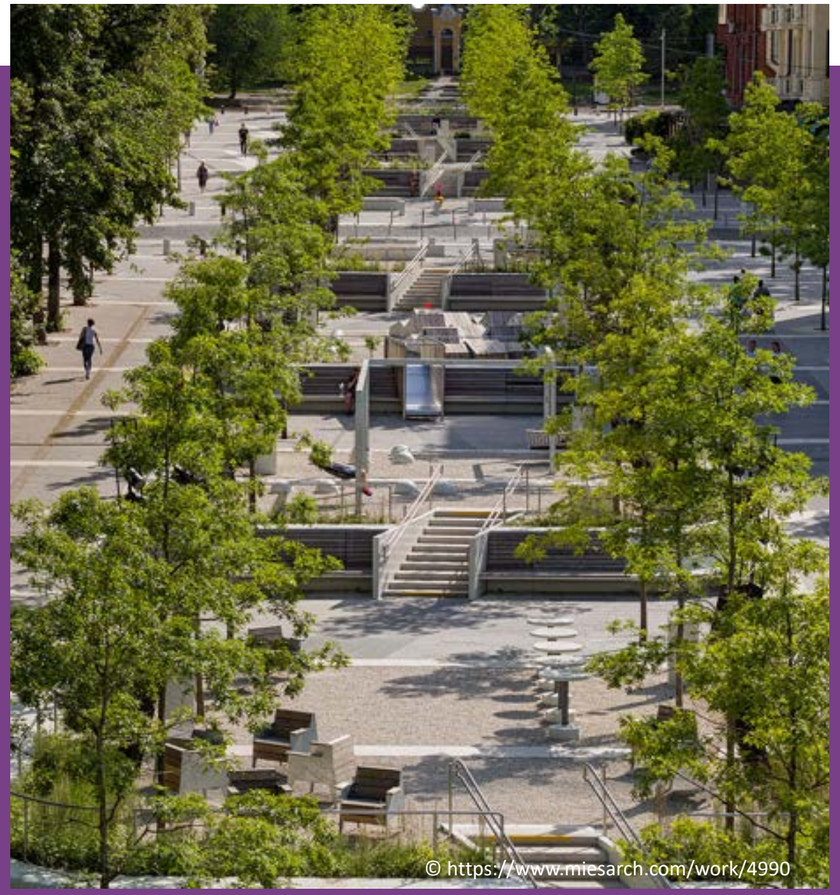
The **public transport station** with an **overpass** strengthen the connection with the city.

The **Urban Factory** is an anchor use adjacent to the industrial park. Economic opportunities are created in the workshops for craft techniques.

THE CULTURAL HEART OF TROSTIANETS REFERENCES FOR THE PLAZA, FRAMING

© https://landezine.com/wp-content/uploads/2016/03/Cultural-Plaza-Park-13.jpg

New Balance Trostianets



© https://www.miesarch.com/work/4990

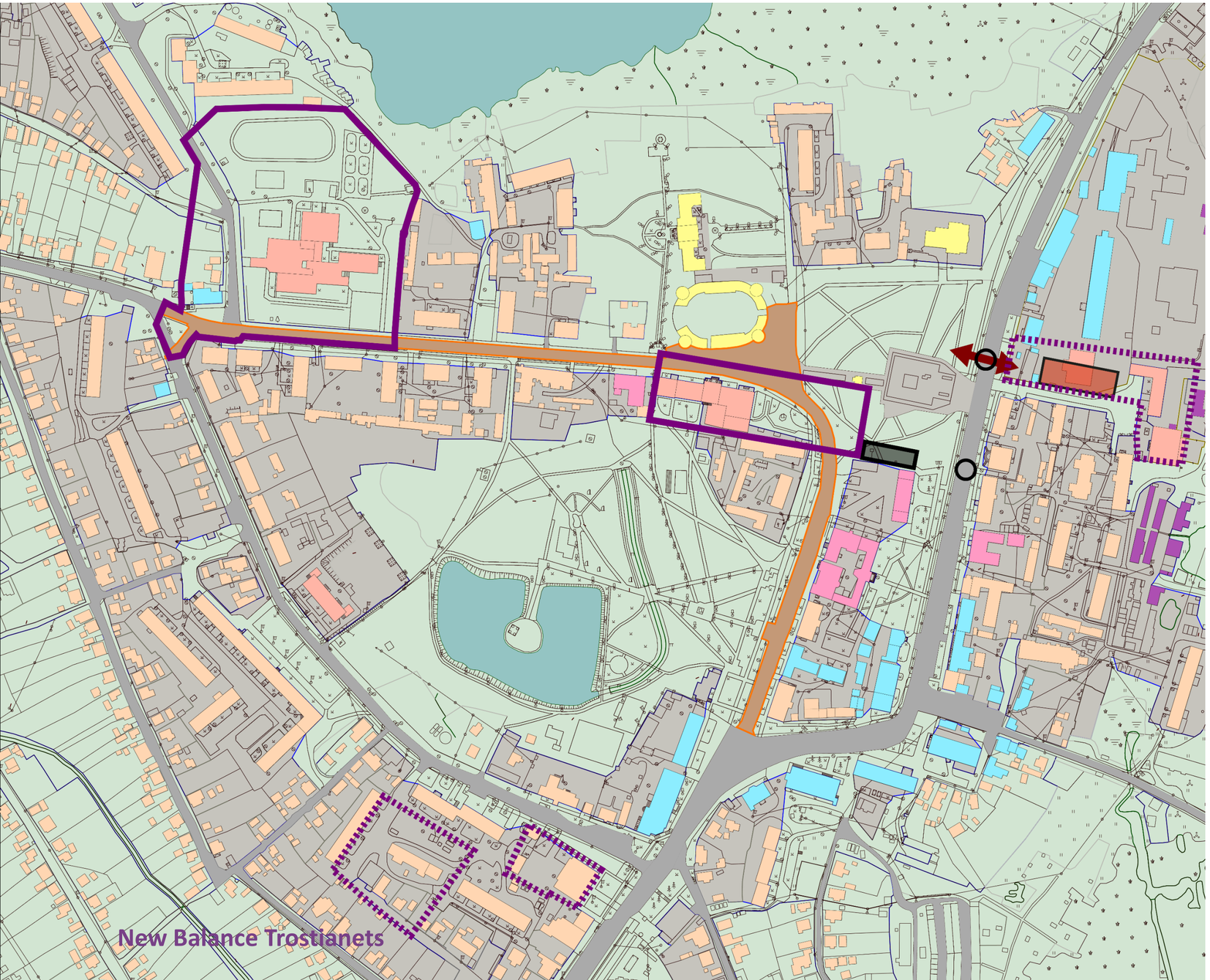
THE CULTURAL HEART OF TROSTIANETS REFERENCES FOR THE HOUSE OF THE FUTURE

Modal units for different uses

© https://www.istockphoto.com/de/foto/design-ihres-traumhauses-mischtechnik-gm636775074-113176345

New Balance Trostianets

© https://www.bossimmobilien.at/

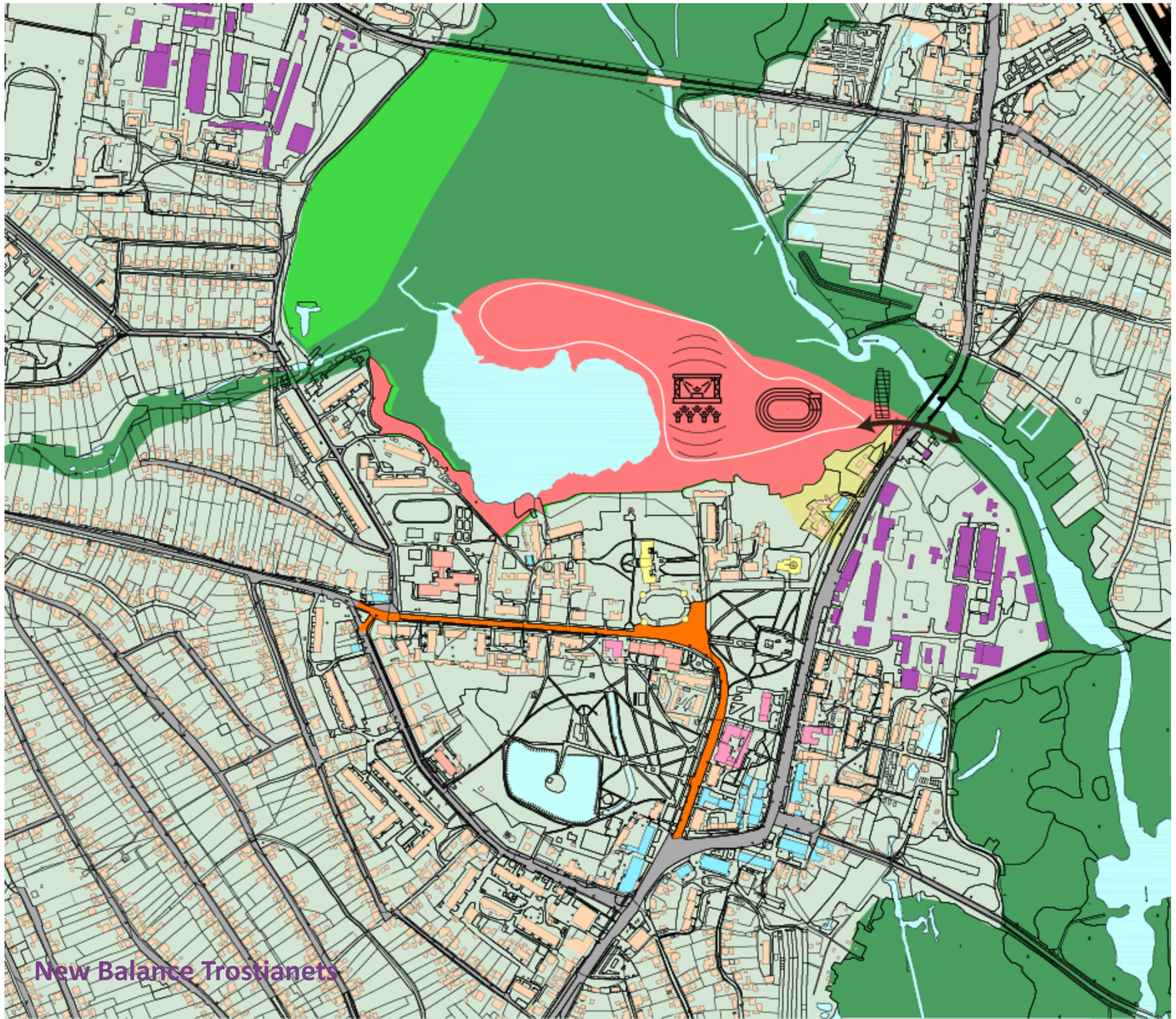


THE EDUCATIONAL HEART

The educational institutions in the centre are connected by an encounter zone. The school route leads to the new station public transport and revitalizes the adjacent city quarters.

In the future, the educational facilities are to be forced and if possible be expanded.

THE SPORTS AND ENTERTAINMENT HEART



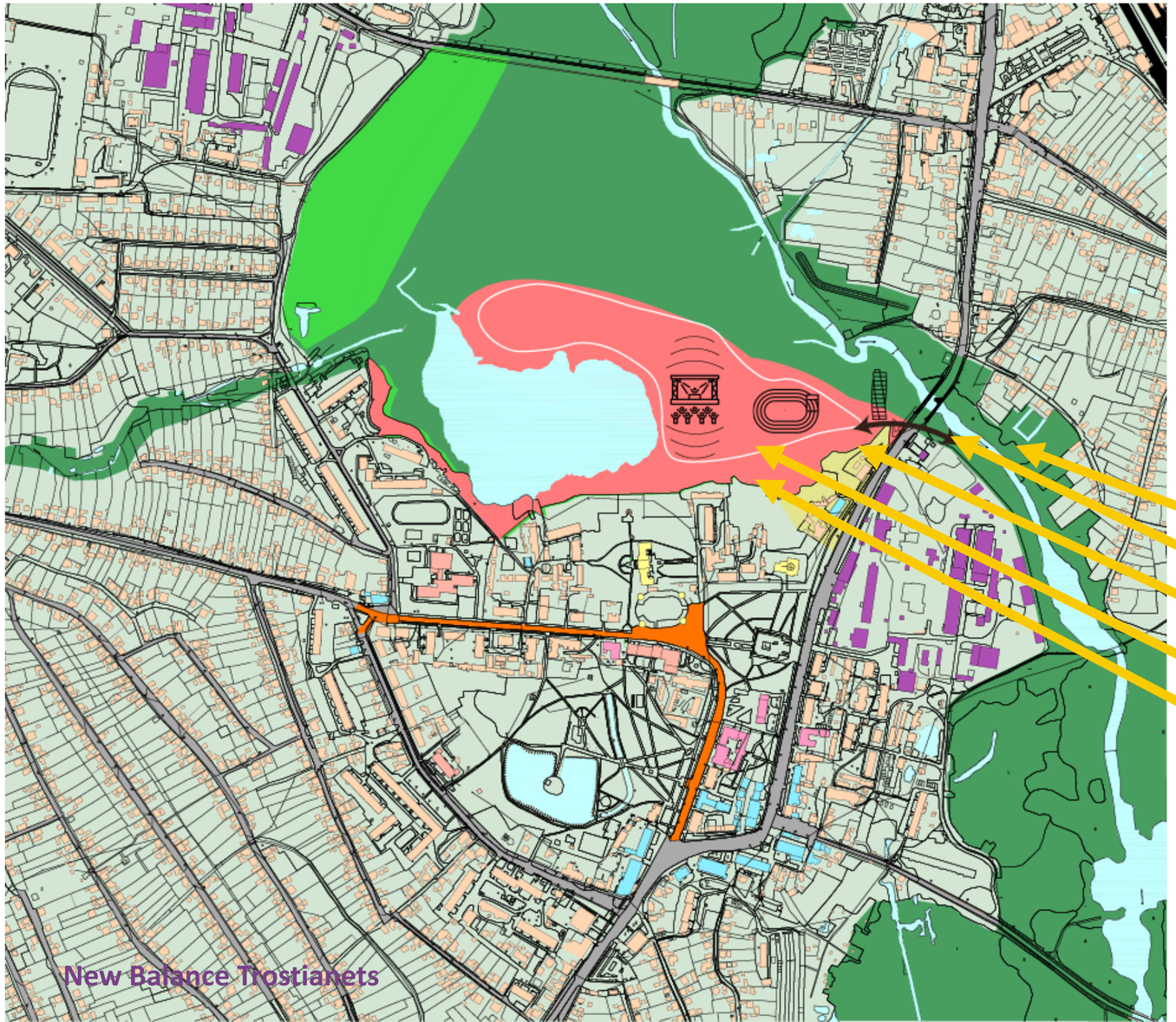
1st Step:
Creation of a detailed concept for the year-round use of a multifunctional arena. (for concerts and sports)

Four heart functions of the city is located on the city terrace. To the north, the site slopes down to a central green space. This is the site of a nationally significant **entertainment and sports arena.**

Standing and seating terraces are oriented towards **the stage.** Towards the city, medium-sized events with 5-10,000 visitors can be held here. Concerts with up to 50,000 visitors and more can be staged to the north.

Infrastructures for sports and hotels can be built along the main road in the future.

THE SPORTS AND ENTERTAINMENT HEART



The entrance to the stadium leads across the street via a **wooden construction**. In summer, this construction can be used for cyclists and pedestrians to change sides without danger. Optionally, **a wooden city tower** could become a landmark for the city.

Entrance to the stadium
Wooden city tower
Sports stadium
Festival area
Seating terrace

SPORTS AND ENTERTAINMENT HEART OF TROSTIANETS

© https://www.ferienmax.at/fileadmin/images-ausflugsziele-museen/kaernten/aussichtsturm-pyramidenkogel-woerthersee/aussichtsturm-pyramidenkogel-06.jpg P.30

© https://tirol.orf.at/v2/static/oekastatic_orf_at/static/images/site/oeka/2017027/stadionhochfilzen.5572079.jpg

© https://bestinspain.net/wp-content//2016/11/San-Pedro-de-Alcantara-Marbella-View-to-La-Concha1.jpguploads

MAKE THE CITY ATTRACTIVE TO LOST RESIDENTS AND POTENTIAL MIGRANTS

House of Future / Future Garden

Releasing the trauma of children, women and men. By appreciating people, by being able to express yourself. A low-threshold house and a garden/space for

- hair styling and nail design
- music, painting, dance and artistic experiments
- celebrating, barbecuing, cooking and baking together

With

- a multifunctional stage inside and outside and

Embedded in a house that transforms and can change with the needs. For housing and offices, for services and community spaces – like Future Garden.

House of Memories

Collect memories of the people who had to leave the city during the war, of the people who are moving to the city now and in the future. Document the demolitions, changes, and items needed to rebuild the destroyed museum.

INVESTMENT ACTIVITIES

Commercial Heart
- Shopping Mall
- Marketplace
- Town Square
- Pedestrian zone
- Public transport station
- Overpass
- House of the Future /Future Garden
- Cooperative planning procedure Commercial Heart

Playground Heart
- Additional equipment for playgrounds and fun
- Farmers or handmade products market
- Learning Café
- Overall detailed planning Playground Ground Heart

Cultural Heart
- Plaza usability and furniture
- Plaza enclosure (competition and implementation)
- House of Memories
- Future Garden
- Urban Factory for Creative Ideas (HUB)
- Overall detailed planning Cultural Heart

Sports- and Entertainment Heart
- Arena (Seating terraces)
- Arena (Two-sided stage, double stage)
- Hotel and sports infrastructure
- Wooden structure city tower, crossing
- Promenade
- Overall detailed planning Cultural Heart

DEVELOPMENT STRATEGY 2024 - 2050
URBAN PLANNING

PROGRAM / INVESTMENT ITEMS	2024 (€)	2025 (€)	2026 (€)	2027 (€)	2028 (€)	2029 (€)	2030 (€)	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
URBAN PLANNING										
Commercial Heart										
TA: Overall planning Commercial Heart / Competition, Tendering, Supervision										
Shopping Mall										
Market Place										
Town Square										
Pedestrian Zone ("The Walk of Peace")										
Public transport station										
Overpass										
House of the Future / Future Garden										
Playground Heart										
TA: Overall planning Playground Heart / Competition, Tendering, Supervision										
Equipment playgrounds and fun										
Farmers or handmade products market										
Learning Café										
Cultural Heart										
TA: Overall planning Cultural Heart / Competition, Tendering, Supervision										
Plaza usability and furniture										
Plaza enclosure (competition and implementation)										
House of Memories										
Future Garden										
Urban Factory for Creative Ideas (HUB)										
Sports- and Entertainment Heart										
TA: Overall planning Sports- and Entertainment Heart / Competition, Tendering, Supervision										
Arena (Seating terraces)										
Arena (Two sided stage, double stage)										
Hotel and sports infrastructure										
Wooden structure city tower, crossing										
Promenade										

Development strategy
Urban Planning

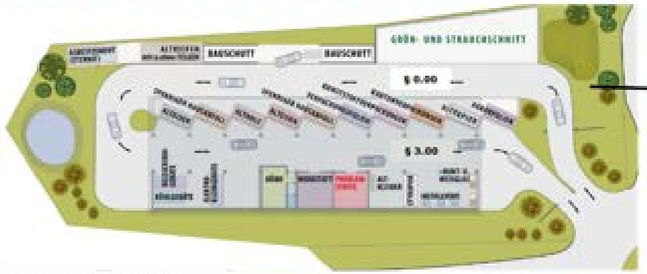
Infrastructure & Buildings

NEW BALANCE TROSTIANETS

Modul5 iC ces CLEAN ENERGY SOLUTIONS tbw RESEARCH

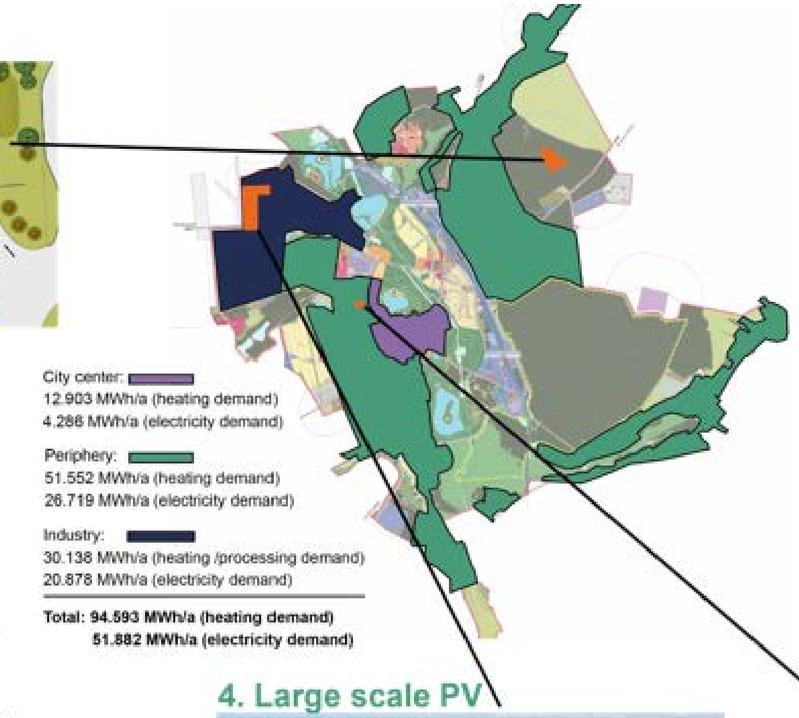
INFRASTRUCTURE REHABILITATION

1.Landfill territory (Recycling area)



Landfill consisting of:
1. Landfill and monitoring area
2. Reception and operational area

Recycling Centre: at the site of the new landfill, the population shall have the possibility to deposit other waste fractions than already separated at their households, namely:
- Garden Waste
- Construction/ Demolition Waste -
- Bulky Waste (e.g. mattresses, furniture)
- Electronics (e.g. non functioning computers, screens, TV-Sets, refrigerators)
- Polystyrene / Packaging remaining
- Any kind of waste fraction identified to be accumulated as per the results of a local social study



City center:
12.903 MWh/a (heating demand)
4.288 MWh/a (electricity demand)

Periphery:
51.552 MWh/a (heating demand)
26.719 MWh/a (electricity demand)

Industry:
30.138 MWh/a (heating /processing demand)
20.878 MWh/a (electricity demand)

Total: 94.593 MWh/a (heating demand)
51.882 MWh/a (electricity demand)

3. District Heating Network

Heat generation:
DH **city center** powered by:
- *Biomass (HoB)*

Peripherie:
- *Individual Heat pumps integration*

Electricity generation:
- *PV plants stage 1 (already installed)*
- *PV plants stage 2*
- *PV roof installation*

2. Water / Wastewater

Meeting EU Directives:
(potable water quality, WW and sludge treatment etc.)

100% service coverage for WS and WW

Introducing of full thrid level SCADA (monitooring and automated control)

Allocation of new WWTP a the site of existing „railway station" reconstruction of „industrial WWTP"

4. Large scale PV

Available land: **13,5 ha**

Both PV plants (stage 1 & 2) can cover 77% of the annual electricity demand

3. Biomass plant (1.5 ha)

Recommendation arguments:
- Reasonable Capex
- Installation in the city (no long connection pipes)
- No implementation of a completly new foresting management system required
- State of the art technology with longtime experience
- Reasonable plant site area demand max. 1.5 ha

Development strategy 2024 - 2050
Water / Waste Water

PROGRAM / INVESTMENT ITEMS	TOTAL estimated Investment (€) 2024 - 2050	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
WATER AND WASTE WATER INFRASTRUCTURE				
GRAND TOTAL	**105,930,000**	**52,940,000**	**29,040,000**	**23,950,000**
TA: Feasibility study / ESIA (Int. / Local)	950,000	600,000	300,000	50,000
TA: Survey, Design, Tendering, Supervision	8,000,000	5,000,000	1,500,000	1,500,000
Water supply	**28,830,000**	**14,070,000**	**7,630,000**	**7,130,000**
Reconstruction / replacement of existing bore wells; installation of local treatment facilities	5,560,000	2,780,000	1,390,000	1,390,000
Booster pumping stations	120,000	60,000	60,000	-
Reconstruction of WS distribution network	4,400,000	3,960,000	440,000	-
Interconnection of WS distribution network	1,000,000	1,000,000		
Extension of WS distribution network	16,400,000	4,920,000	5,740,000	5,740,000
Distant reading water meters	1,350,000	1,350,000		
Wastewater collection and treatment	**68,150,000**	**33,270,000**	**19,610,000**	**15,270,000**
Reconstruction of WW gravity sewers	1,800,000	1,600,000	200,000	-
Reconstruction of WW pressure sewers	800,000	800,000	-	-
Reconstruction of WWPS	2,000,000	2,000,000	-	-
Extension of WW gravity network	22,800,000	6,840,000	7,000,000	8,960,000
Extension of WW pressure sewers	3,000,000	900,000	1,100,000	1,000,000
Construction of new WWPSs	5,550,000	3,330,000	1,110,000	1,110,000
Construction of new municipal WWTP	16,000,000	10,000,000	6,000,000	-
Reconstruction of industrial WWTP	5,000,000	5,000,000	-	-
Storm water sewer system	9,200,000	1,800,000	3,700,000	3,700,000
SCADA	2,000,000	1,000,000	500,000	500,000

Investment Strategy Water / Waste Water

Development strategy 2024 - 2050
Waste management / infrastructure

PROGRAM / INVESTMENT ITEMS	TOTAL estimated Investment (€) 2024 - 2050	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
WASTE MANAGEMENT / INFRASTRUCTURE				
GRAND TOTAL	**19,600,000**	**13,300,000**	**6,300,000**	**-**
TA: Corporate Development / Awareness Campaign / Operational Assistance	2,300,000	2,300,000		
TA: Feasibility study / ESIA (Int. / Local)	750,000	750,000		
TA: Survey, Design, Tendering, Supervision	1,300,000	500,000	800,000	
Infrastructure		**9,750,000**	**5,500,000**	-
Fencing and Installation of a Groundwater Monitoring System of the existing Landfill	250,000	250,000		
Supply of Waste Containers and Waste Collection Vehicles for separated waste	2,000,000	2,000,000		
Works for Extension of the existing Landfill in Trostianets and Remediation Measures	3,500,000	3,500,000		
Supply of Machinery for Operation and Maintenance of Waste Treatment for Trostianets	2,000,000	2,000,000		
Works for a new Landfill in Trostianets	4,200,000	-	4,200,000	
Contingency	3,300,000	2,000,000	1,300,000	

Investment Strategy Waste

Development strategy 2024 - 2050
Energy generation – heating and domestic hotwater supply

PROGRAM / INVESTMENT ITEMS	TOTAL estimated Investment (€) 2024 - 2050	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
ENERGY GENERATION HEATING AND DOMESTIC HOT WATER SUPPLY - RECOMMENDED SCENARIO				
GRAND TOTAL	**16,872,000**	**16,872,000**	**-**	**-**
TA: Feasibility study / ESIA (Int. / Local)	167,000	167,000		
TA: Survey, Design, Tendering, Supervision	1,280,000	1,280,000		
City Center	**15,425,000**	**15,425,000**	**-**	**-**
Biomass HoB Alternative (Capex biomass plant incl. DH network)	14,850,000	14,850,000		
Solar Thermal Heating to support Summer Loads	575,000	575,000		
	-			
Periphery: covered within the Building Rehabilitation Program				
ENERGY GENERATION ELECTRICITY - RECOMMENDED SCENARIO				
GRAND TOTAL	**11,125,000**	**11,125,000**	**-**	**-**
Large Scale PV options - Extension Phase 2 (Private Investment)	11,125,000	11,125,000		
	-			

Investment Strategy Energy Generation

Development strategy 2024 - 2050 Transport and Mobility

PROGRAM / INVESTMENT ITEMS	TOTAL estimated Investment (€) 2024 - 2050	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
TRANSPORT AND MOBILITY				
GRAND TOTAL	**26,470,000**	**3,270,000**	**23,200,000**	**-**
TA: Feasibility study / Traffic and Policy analysis / Detailed Mobility concept / ESIA (Int. / Local)	270,000	70,000	200,000	
TA: Survey, Design, Tendering, Supervision	2,250,000	250,000	2,000,000	
Infrastructure	**23,950,000**	**2,950,000**	**21,000,000**	**-**
Restoration of Public Transport Fleet (7 - 10 Busses)	1,300,000	1,300,000		
Rehabilitation of Road infrastructure - fit for alternative mobility (scooter, bicycle, etc.)	750,000	750,000		
Rehabilitation of Neuralgic junctions	900,000	900,000		
Replacement of fossil Public Transport Fleet: **not estimated at this stage**	-			
Development of EV/AV Infrastructure: **not estimated at this stage**	-			
	-			
Freight Traffic Reduction City Center / Bypass Trostianets (North-West/West-South - approx. 7km)	21,000,000		21,000,000.0	

Investment Strategy Transport/Mobility

BUILDINGS, STREET LIGHTING

The EU Energy Efficiency directive is the baseline for future developments

All existing buildings receive energetic rehabilitation with a target of 40% energy savings

Phasing out from gas

All new developments have to achieve a Zero Energy or Plus Energy label

Modern Street lighting is developed in all City/UTC areas to increase safety and to create an attractive living environment

Industrial developments are bound to highest EE standards – EU Best Practice shall apply

BUILDINGS

Building rehabilitation program for single family houses and Multi family houses applied in the peripherie

Measures:

Energetic rehabilitation (EE)
Ventilation with Energy Recovery (ERV)
Air Source Heat Pump (ASHP)
Photovoltaic (PV)

Building rehabilitation program for public buildings

Measures:

Energetic rehabilitation (EE)
Ventilation with Energy Recovery (ERV)
Rehabilitation of DH Heat Exchanger (ITP)
Photovoltaic (PV) on 4-6 selected demonstration buildings

Building rehabilitation program for the City Center

Measures:

Energetic rehabilitation (EE)
Ventilation with Energy Recovery (ERV)
Rehabilitation of DH Heat Exchanger (ITP)
Photovoltaic (PV)

BUILDINGS

Single family house

Standard building parameters:

Heated area: approx. 70 m²
Number of Floors: 1
Total Number of buildings: 5300

Investment Strategy:

Till 2030: Energy Efficiency + Ventilation + Heat Pump + PV: 1041 buildings
Energy Efficiency + Ventilation + District Heating: 259 buildings
Till 2040: Energy Efficiency+Ventilation+Heat Pump + PV: 4000 buildings

Scenarios	Heating load [kW]	Cooling load [kW]	Final energy, heating, [kWh]	Final energy, cooling, [kWh]	Final energy lighting, [kWh]	Final energy equipment [kWh]	Final energy DHW [kWh]	Natural gas [kWh]	Electricity, [kWh]	Energy generation, [kWh]	Primary energy consumption [kWh]	CAPEX [EUR]
Better U-values 20%, ERV, gas heating	2,8	6,8	2.723,2	828,9	824,1	824,1	1.244,1	3.967,3	2.477,2	0,0	10.061,5	26 500
Better U-values 20%, ERV, ASHP	2,8	6,8	837,9	828,9	824,1	824,1	1.244,1	0,0	4.559,2	0,0	10.486,1	30 500
Better U-values 20%, ERV, ASHP, PV	2,8	6,8	837,9	828,9	824,1	824,1	1.244,1	0,0	4.559,2	2.741,6	4.180,4	33 000
Better U-values 20%, ERV, connection to the DH network												26 500

BUILDINGS

Multi family house

Standard building parameters:

Heated area: approx. 825 m²
Number of Floors: 2
Total Number of buildings: 112

Investment Strategy:

Till 2030: Energy Efficiency + Ventilation + DH + PV: 64 buildings
Till 2040: Energy Efficiency + Ventilation + Heat Pump + PV: 48 buildings

Scenarios	Heat load [kW]	Cooling load [kW]	Final energy, heating, [kWh]	Final energy, cooling, [kWh]	Final energy lighting, [kWh]	Final energy equipment [kWh]	Final energy DHW, [kWh]	District heating, [kWh]	Electricity, [kWh]	Energy generation, [kWh]	Primary energy consumption [kWh]	CAPEX [EUR]
Existing, DH, nat vent	62,9	61,1	113.068,2	2.248,2	9.904,6	9.904,6	10.117,6	123.185,9	22.057,5	0,0	210.873,8	0,0
Better U-values 20%, ERV, DH, PV	**21,9**	**51,6**	**16.615,6**	**4.535,5**	**9.904,6**	**9.904,6**	**10.117,6**	**26.733,3**	**24.344,7**	**13.708,0**	**59.217,7**	**173 000**
Better U-values 20%, ERV, ASHP	21,9	51,6	5.112,5	4.535,5	9.904,6	9.904,6	10.117,6	0,0	39.574,9	0,0	91.022,2	186 000
Better U-values 20%, ERV, ASHP, PV	**21,9**	**51,6**	**5.112,5**	**4.535,5**	**9.904,6**	**9.904,6**	**10.117,6**	**0,0**	**39.574,9**	**13.708,0**	**59.493,7**	**203 000**

BUILDINGS

Standard building parameters:	Investment Strategy::
Schools & Kindergartens & Sport: Average heated area: 1530 m² Number of buildings: 15	EE + Ventilation + DH Connection: EUR 321 000 per building 4 school buildings with PV installation: EUR 76 000 per building
Health Institutions: Average heated area: 400 m² (does not include main hospital) Number of buildings: 8	EE + Ventilation + DH Connection: EUR 84 000 per building
Administration buildings: Average heated area: 500 m² Number of buildings: 5	EE + Ventilation + DH Connection: EUR 105 000 per building
Culture and Tourism: Average heated area: 1300 m² Number of buildings: 11	EE + Ventilation + DH Connection: EUR 273 000 per building

Total Number of buildings: 39

STREET LIGHTING

Baseline

Light type	Energy saving
Length of electric lighting network [km]	160
Number of lighting points [pcs]	3.763
Energy saving [%]	100
Estimated energy use, [kWh]	486.847
Estimated energy use, [kWh]	531.995
Power, [W]	37
Operational hours per year	3.854
With sodium lamps 70 W	268
With sodium lamps 250 W	6
LED 30 W	165
with LED lamps 20 W	170
with fluorescent lamps 30 W	939
Total	1.548
Number of missing fixtures [pcs]	1200-1800
Annual energy consumption, [kWh/a]	430.376

Proposal

Number of lighting fixtures (incl. missing lighting fixtures) [pcs]	5.563
Baseline energy consumption (incl. missing lighting fixtures) [kWh/a]	786.471
Proposed energy consumption (incl. missing lighting fixtures) - fixtures replacement LED without dimming [kWh/a]	524.737
Proposed energy consumption (incl. missing lighting fixtures) - fixtures replacement LED + dimming [kWh/a]	415.824
Dimming 70%, [hours]	1.000
Dimming 50%, [hours]	1.000
Replacement/modernization of electrical cabinets [pcs]	45
Dispatching system installation [pc]	1
Replacement of lighting fixtures (including works) [pcs]	5.563
Cable (missing), [km]	80
Lighting poles replacement, [pcs]	20

DEVELOPMENT STRATEGY 2024 - 2050
BUILDING, STREET LIGHTING

PROGRAM / INVESTMENT ITEMS		TOTAL estimated Investment (€) 2024 - 2050	TOTAL Investment till 2030 (€)	2030-2040 (€)	2040-2050 (€)
BUILDING REHABILITATION PROGRAM					
GRAND TOTAL		**216 977 500**	**61 562 500**	**86 357 500**	**73 561 500**
TA: Feasibility study / ESIA (Int. / Local)		2 000 000	530 000	800 000	670 000
TA: Survey, Design, Tendering, Supervision		16 130 000	4 240 000	6 500 000	5 390 000
Residential: Single family housing	**No of Buildings**	**173 216 500**	**41 216 500**	**66 000 000**	**66 000 000**
The single family housing program / EE + Ventilation + Heat Pump + PV / 80 % grant	1041	34 353 000	34 353 000		
The single family housing program / EE + Ventilation + Heat Pump + PV / 50 % grant	4000	132 000 000		66 000 000	66 000 000
The single family housing program / EE + Ventilation / connection to DH / 50 % grant	259	6 863 500	6 863 500		
Residential: Multi family housing	**No of Buildings**	**20 816 000**	**11 072 000**	**9 744 000**	-
The multi family housing program / EE + Ventilation + PV / connection to DH / 50 % grant	64	11 072 000	11 072 000		
The multi family housing program / EE + Ventilation + PV + Heat Pump / 50 % grant	48	9 744 000		9 744 000	
Public Buiildings	**No of Buildings**	**4 815 000**	**4 504 000**	**3 313 500**	**1 501 500**
Public buildings rehabilitation program / EE + Ventilation + DH / Schools & Kindergartens & Sport	15	4 815 000	3 370 500	1 444 500	
Public buildings rehabilitation program / EE + Ventilation / Health Institutions	8	672 000	672 000		
Public buildings rehabilitation program / EE + Ventilation / Administration	5	525 000	157 500	367 500	
Public buildings rehabilitation program / EE + Ventilation / Culture and Tourism	11	3 003 000		1 501 500	1 501 500
Public buildings rehabilitation program / additional PV / Schools	4	304 000	304 000		
STREET LIGHTING REHABILITATION PROGRAM					
GRAND TOTAL		**2 922 500**	**1 461 250**	**1 461 250**	-
Complete rehabilitation		2 922 500	1 461 250	1 461 250	

Investment Strategy Building Rehab. / Street lighting

UNITED NATIONS SUSTAINABILITY GOALS

- The SDG´s can help think, plan and act in a systemic manner and allow to identify / manage synergies across different policy areas.
- The city of Trostianets should use the SDG´s as an engine / opportunity to further improve and add value to the on-going work off the city.
- Trostianets could become a leader city for SDG´s implementation and inspire other cities and regions in Ukraine.

Together for Future

New Balance Trostianets

With kind support of:

Mr. Hannes Horvath
Mr. Peter Blaschke
Mr. Madis Madison

Modul5 iC ces CLEAN ENERGY SOLUTIONS tbw RESEARCH