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Warsaw, Poland

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The use of spatial data to identify land reserves for minimising the negative effects of COVID–19 pandemic on the example of selected districts of Warsaw

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Task 1
Land management using land reserves to prevent emergencies and the effects of pandemics

The research results presented here are part of a research project carried out at the Faculty of Geodesy and Cartography of the Warsaw University of Technology, entitled „Innovative spatial solutions to minimise the negative impacts of the COVID-19 pandemic under conditions of limited social mobility"
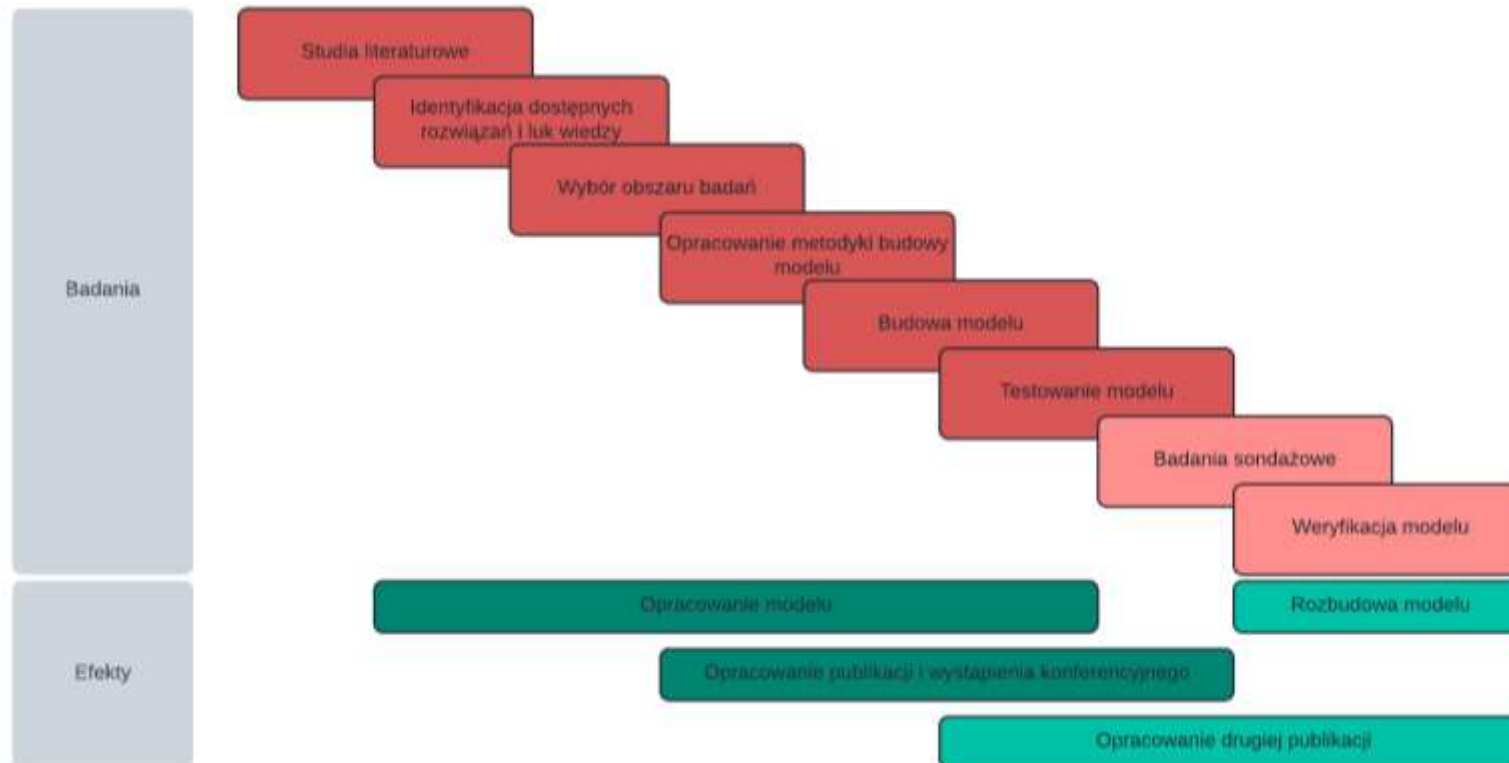
Project Objective:

develop land-use planning solutions to combat the effects of the prevailing pandemic by making immediate and optimal use of available space, but also to guard against the occurrence of another crisis situation in the future - a new wave of disease, a natural disaster, etc.

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Purpose and scope of the study

- Preventing the effects of pandemics and other emergencies using the decision-making model of field reserve management;

- Supporting the decision-making process for selecting the location of investments related to reducing the negative effects of pandemics and other emergencies on the lives of city residents

- Creation of recommendations and guidelines for municipalities to effectively manage land reserves under conditions of limited social mobility

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Research process

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Study area

- Two districts of the capital city of Warsaw were selected for the study - one typically urbanised - Mokotów, the other with a background of large undeveloped spaces for building development - Białołęka.
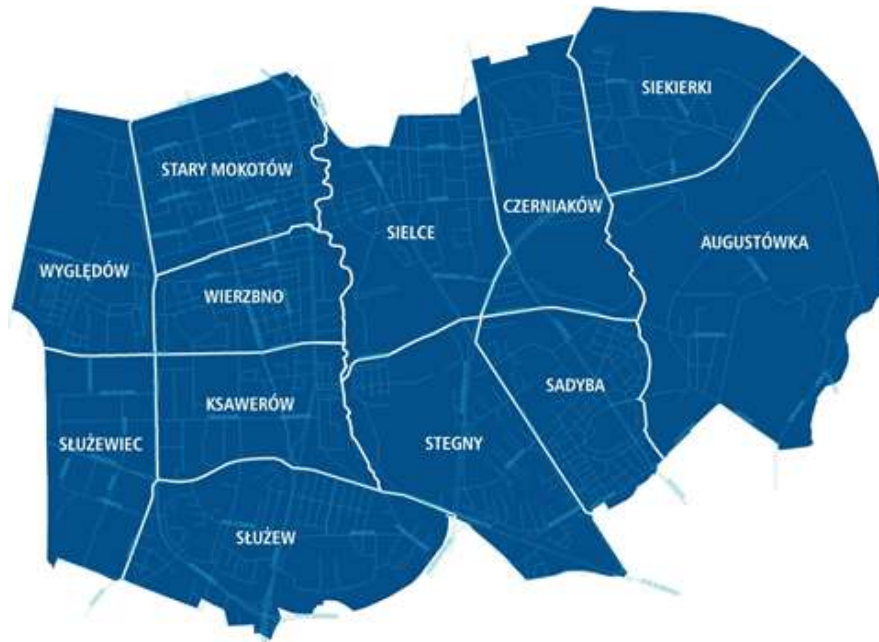
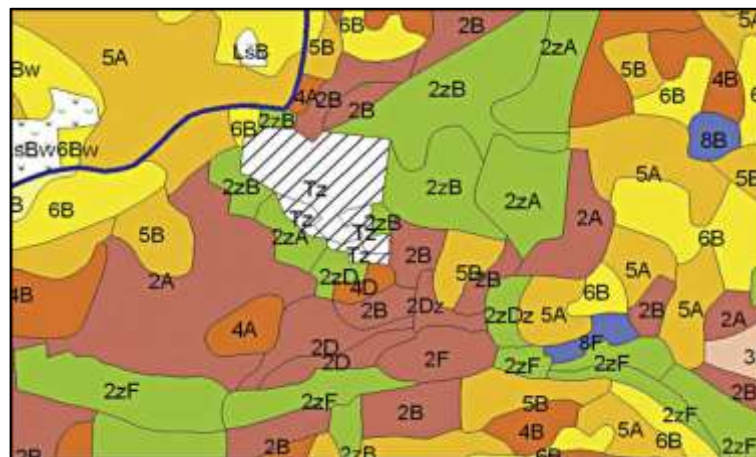Autorem siatki ulic jest Biuro Planowania Rozwoju Warszawy S.A.

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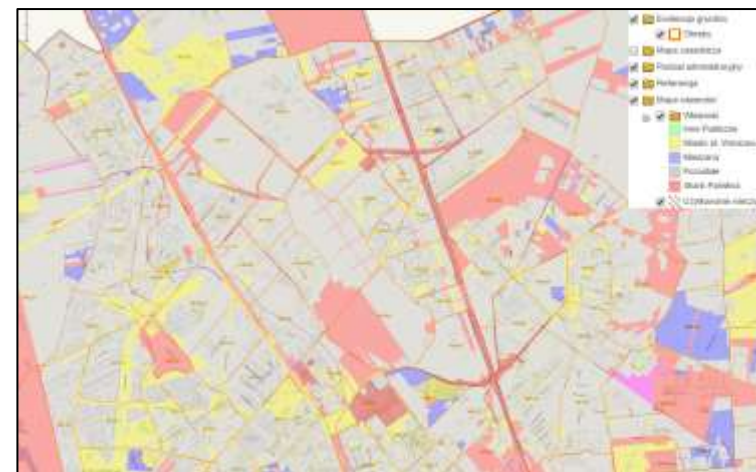for a better living

Data sources

BDOT10K

Planning documents

Soil and agricultural map

Geoportal Infrastruktury Informacji Przestrzennej

geoportal.gov.pl

Geoportal 2
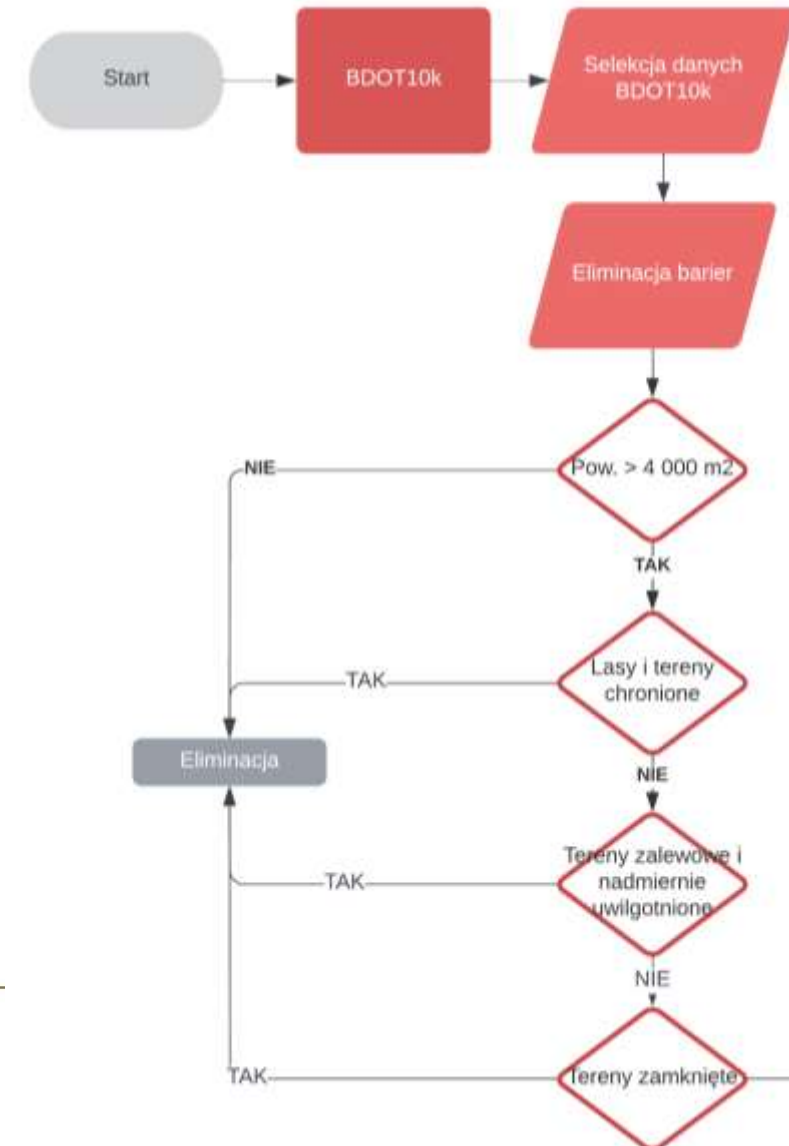

Property maps

HZPZ register

Model construction

BDOT10k object selection:

- PTLZ - woodland and wooded area,
- PTRK - shrub vegetation,
- PTTR - grassy vegetation,
- PTGN - unused land,
- PTNZ - remaining undeveloped land,
- KUPG - industrial and economic complex,
- KUSK - sports and leisure complex.
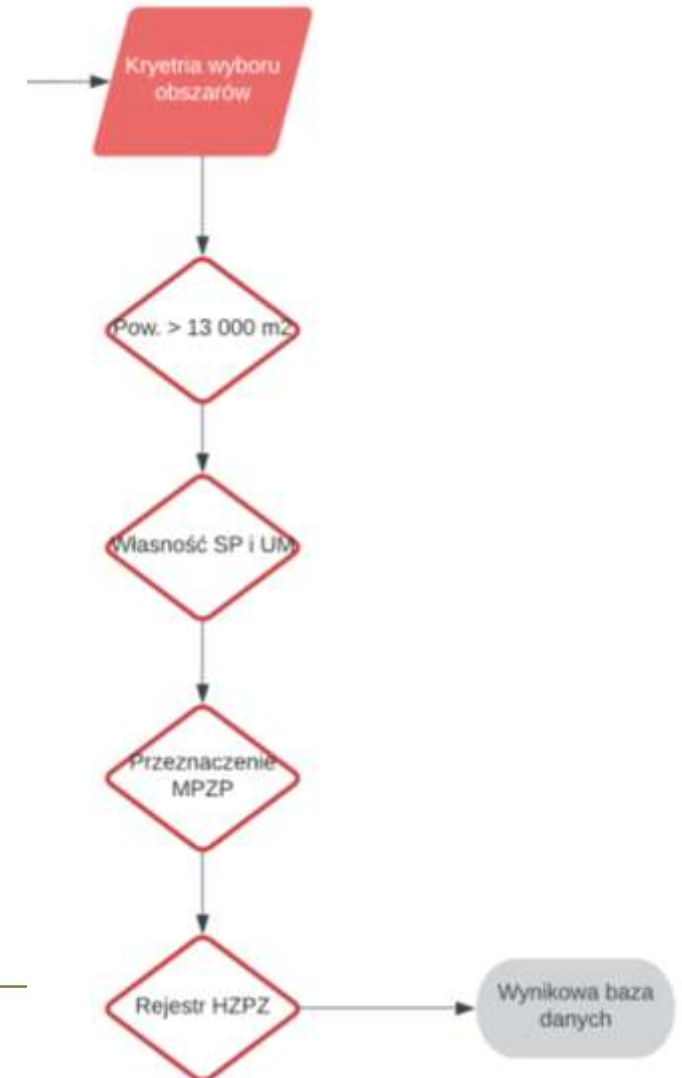
Elimination of barriers:

- Area < 4000m2
- Forests (as defined in the Forestry Act)
- Protected areas (Natura 2000 sites, nature reserves, landscape parks)
- Areas at risk of flooding
- Areas unsuitable for development due to load bearing and moisture criteria
- Restricted areas
- Service areas located in the immediate vicinity of GP, G and Z roads

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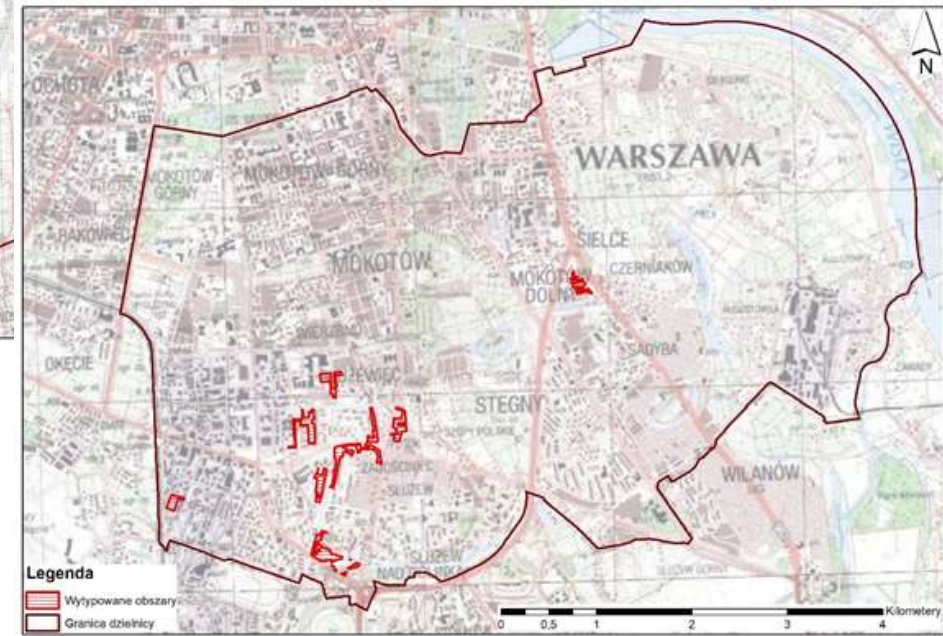Geospatial excellence
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Selection of areas

Selection criteria for major infrastructure investments (e.g.: field hospitals, single-named hospitals, temporary housing):

- an area of not less than 13,000 m2 (the average area of a single development quarter in Warsaw);

- owned by the City of Warsaw or the State Treasury

- designation in local development plans as residential, commercial, industrial or a combination of the above

- sites that are not on the historical land contamination register

Kryetria wyboru obszarów

Pow. > 13 000 m2

Własność SP i UM

Przeznaczenie MPZP

Rejestr HZPZ → Wynikowa baza danych

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Findings

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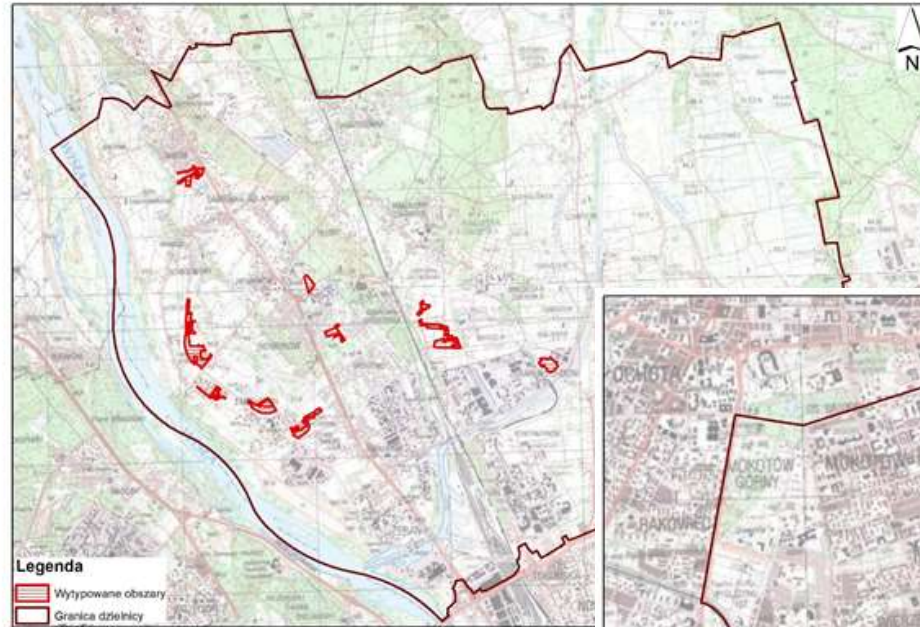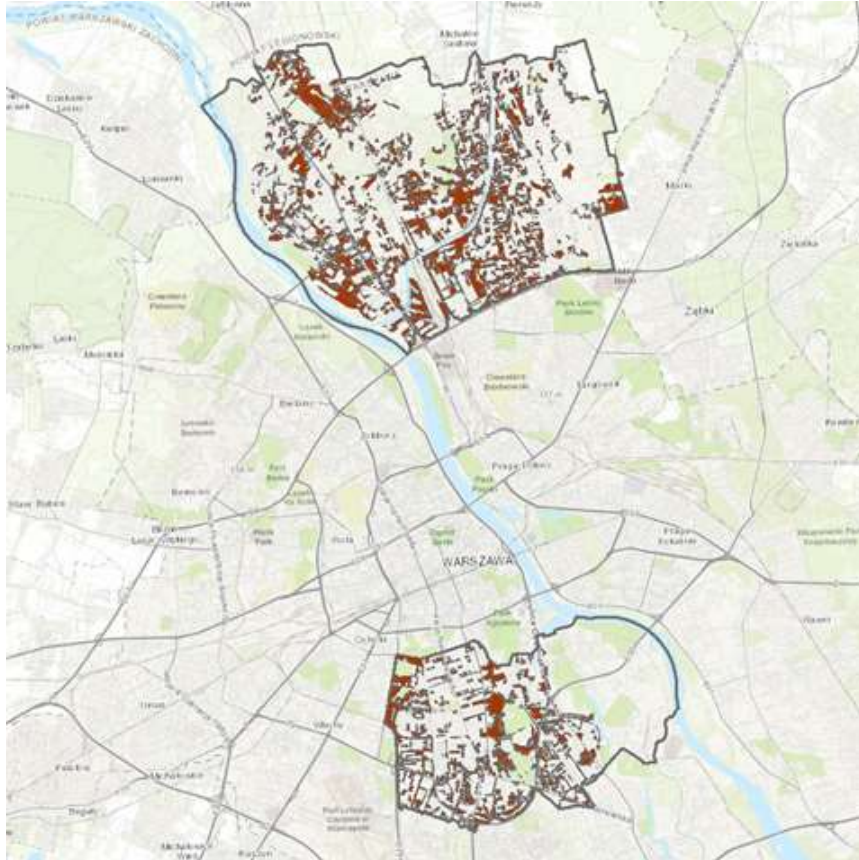
Findings - example areas selected by the model
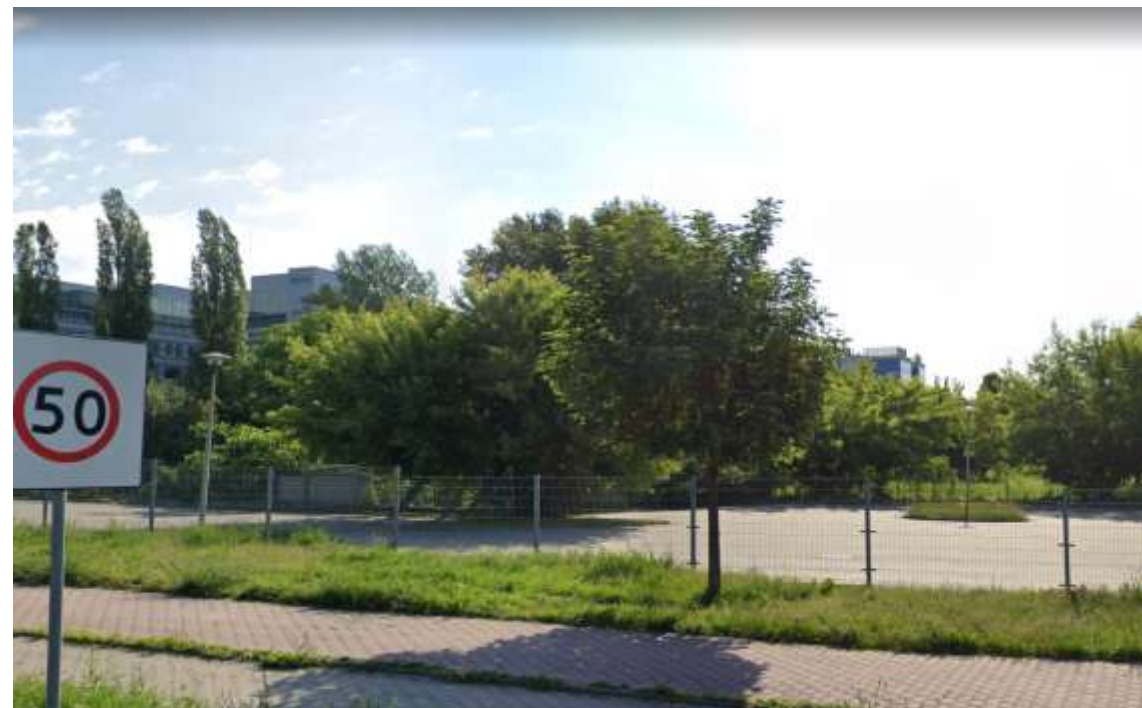

Undeveloped area - Bialoleka

Parking and storage area - Mokotów

Ultimately, as set out in the local plans, residential or commercial development is planned to be located in these areas.

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Conclusions

- As part of the task, a decision-making model was built based on a multi-criteria analysis of the suitability of the site for immediate development

- The areas identified as a result of the analysis, due to their nature and accompanying conditions, can be successfully developed for the construction of infrastructure needed in emergency situations

- As a result, it is expected that effective management of land reserves will clearly contribute to improved preventive action in the event of an emergency such as a pandemic, as well as influencing a higher standard of living and health of the population

Model extensions

- Survey
- Extension of the list of criteria to include transport and accessibility criteria
- Weighting of criteria according to survey results
- Comparison of survey results in Poland and France

Zone Tarchomin - Count of buildings per 200m x 200m square, with PuT

Zone Tarchomin - Count of buildings per 200m x 200m square, with roads

ensity (%) of buildings per 100m x 100m square, with roads

eate heatmaps
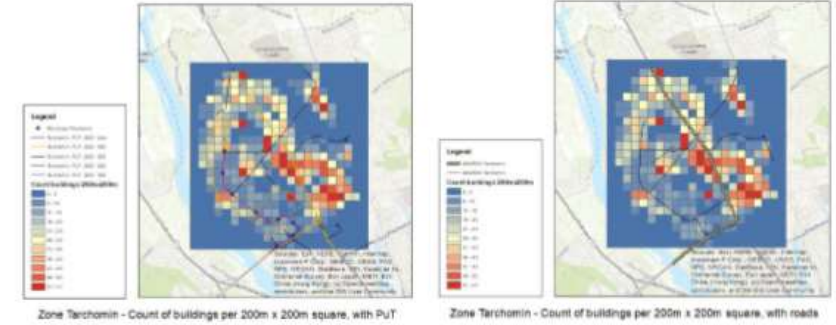
Housing type	Construction period	PuT network	Daytime bus lines, tram + rail stops			
			Derby	Rembertów	Mokotów	Tarchomin
BUBD01	2001	2000	147,42	198,86	115,61	312,52
	2005	2000	293,55	200,29		329,95
	2006-2011	2005	386,73	236,26	217,62	356,32
	2012-2017	2011	378,94	292,29	239,49	310,83
	2018-2020	2017	192,10			463,61
BUBD02	2001	2000	102,54	131,45	84,13	431,16
	2005	2000	297,33			
	2006-2011	2005	245,30	225,86		433,31
	2012-2017	2011	156,98	126,02		
	2018-2020	2017	459,03	195,11		150,13
BUBD03	2001	2000	223,46	247,81	90,60	200,89
	2005	2000	327,00	83,98	82,77	298,31
	2006-2011	2005	429,98	86,08	125,67	227,05
	2012-2017	2011	173,62	92,03	314,69	138,47
	2018-2020	2017	91,73	57,41	87,82	228,40

Survey

Imagine having knowledge of all the undeveloped land in the city. You have the opportunity to allocate them for any purpose. What will be decisive for you when choosing a location

- essential services (e.g.; pharmacy, shop)
- large infrastructural investments (e.g. field hospitals, mono hospitals, temporary housing)
- recreational areas and public open spaces (e.g. parks, town squares, parks)

Please evaluate the following statements:

Statement	Rating
I had enough previous knowledge for the lecture	3.7
The lecture was interesting	3.7
I feel that I understand the subject	3.3
I feel confident answering questions about the subject	3.3

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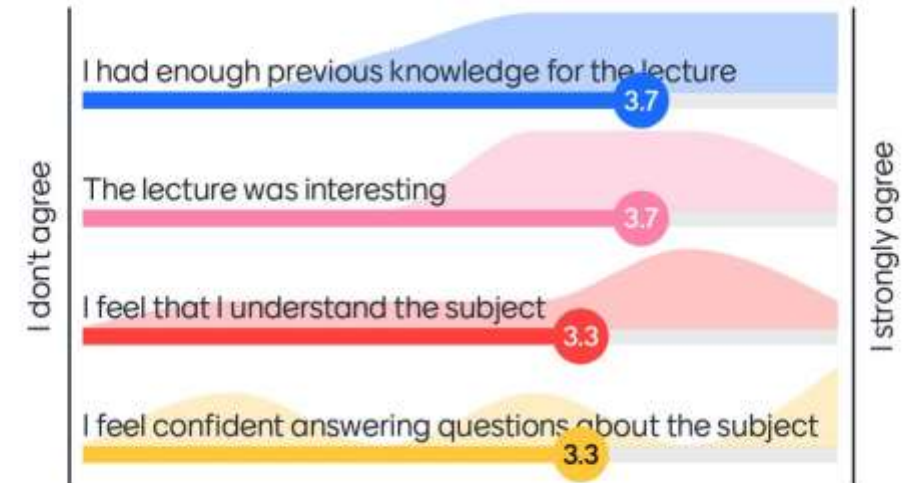
Additional parameters for effective selection
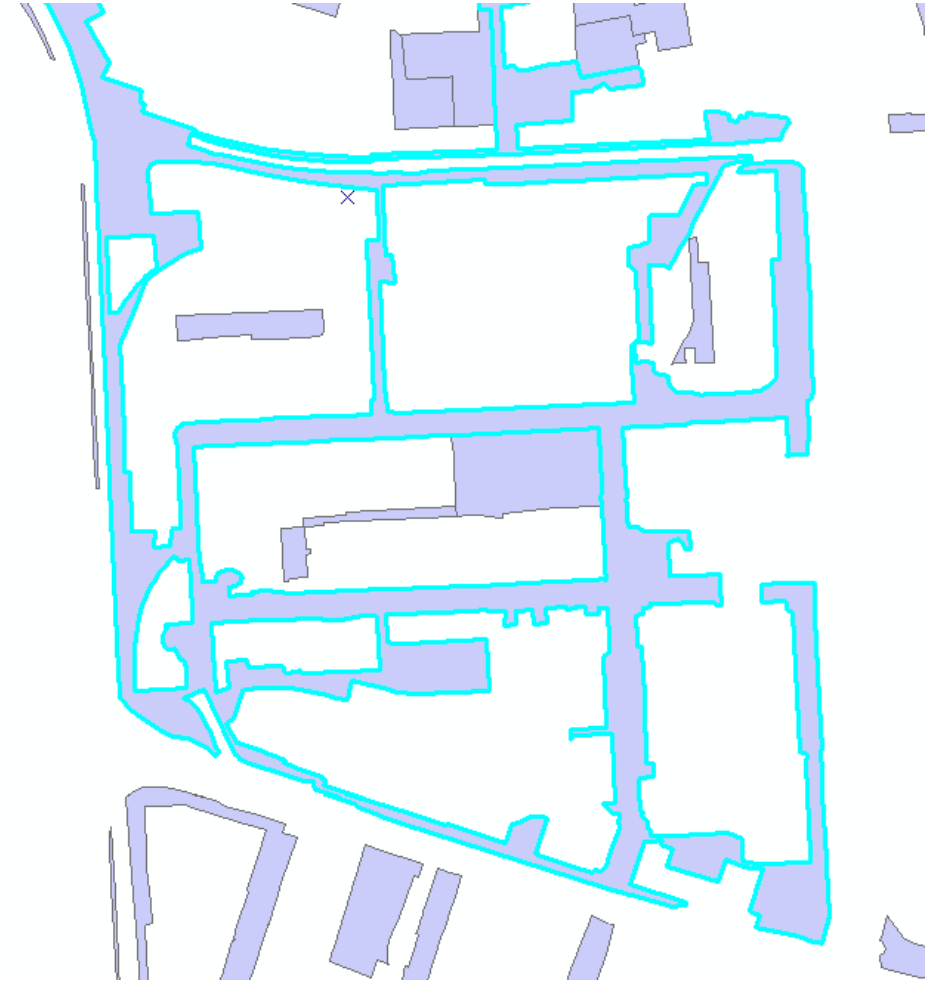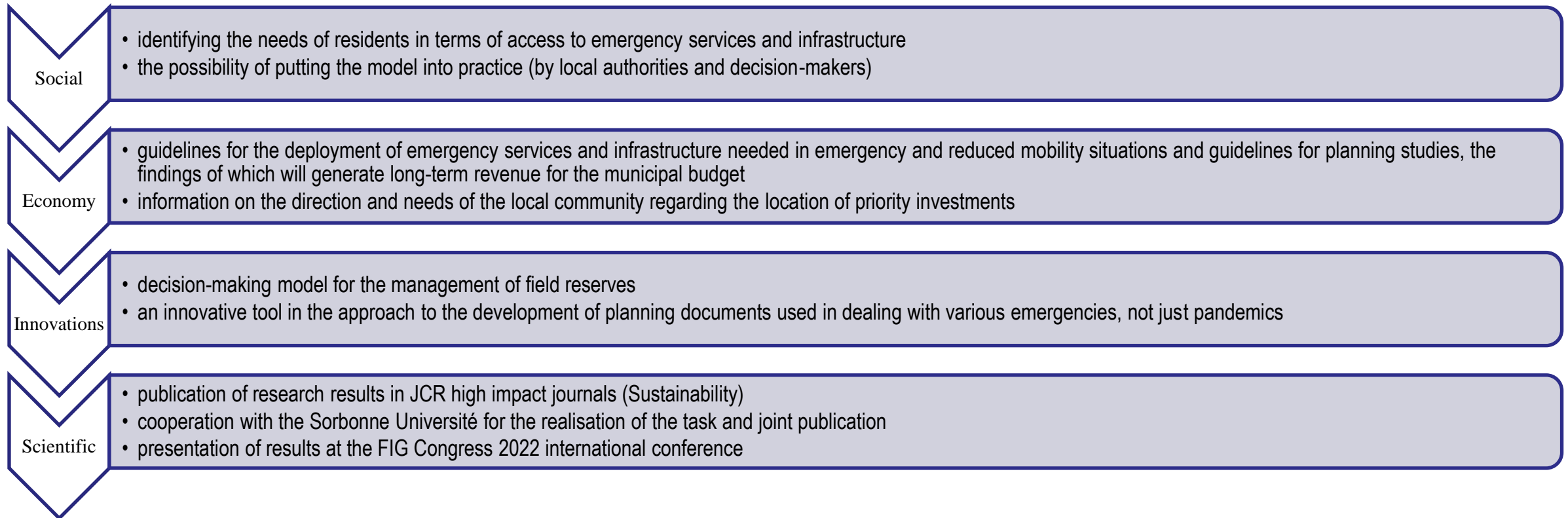
The following parameters were introduced in order to remove, at the time of data selection by the model, areas of large territorial extent, but very elongated, related to traffic routes and their surroundings:

- ratio of perimeter to area,

- the ratio of the area to the perimeter of the area,

- the ratio of the square of the perimeter to the area,

- extension of plots

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Effects

Social
- identifying the needs of residents in terms of access to emergency services and infrastructure
- the possibility of putting the model into practice (by local authorities and decision-makers)

Economy
- guidelines for the deployment of emergency services and infrastructure needed in emergency and reduced mobility situations and guidelines for planning studies, the findings of which will generate long-term revenue for the municipal budget
- information on the direction and needs of the local community regarding the location of priority investments

Innovations
- decision-making model for the management of field reserves
- an innovative tool in the approach to the development of planning documents used in dealing with various emergencies, not just pandemics

Scientific
- publication of research results in JCR high impact journals (Sustainability)
- cooperation with the Sorbonne Université for the realisation of the task and joint publication
- presentation of results at the FIG Congress 2022 international conference

Compatibility with the project objective - effective spatial management of Polish cities in crisis situations

Thank you for your attention!

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