



# UKRAINE TEAM



United Nations  
Educational, Scientific and  
Cultural Organization



Junior Academy of Sciences  
of Ukraine

## Ilona Tylevna SOFTWARE FOR SITE PLANS DESIGN

### INTRODUCTION

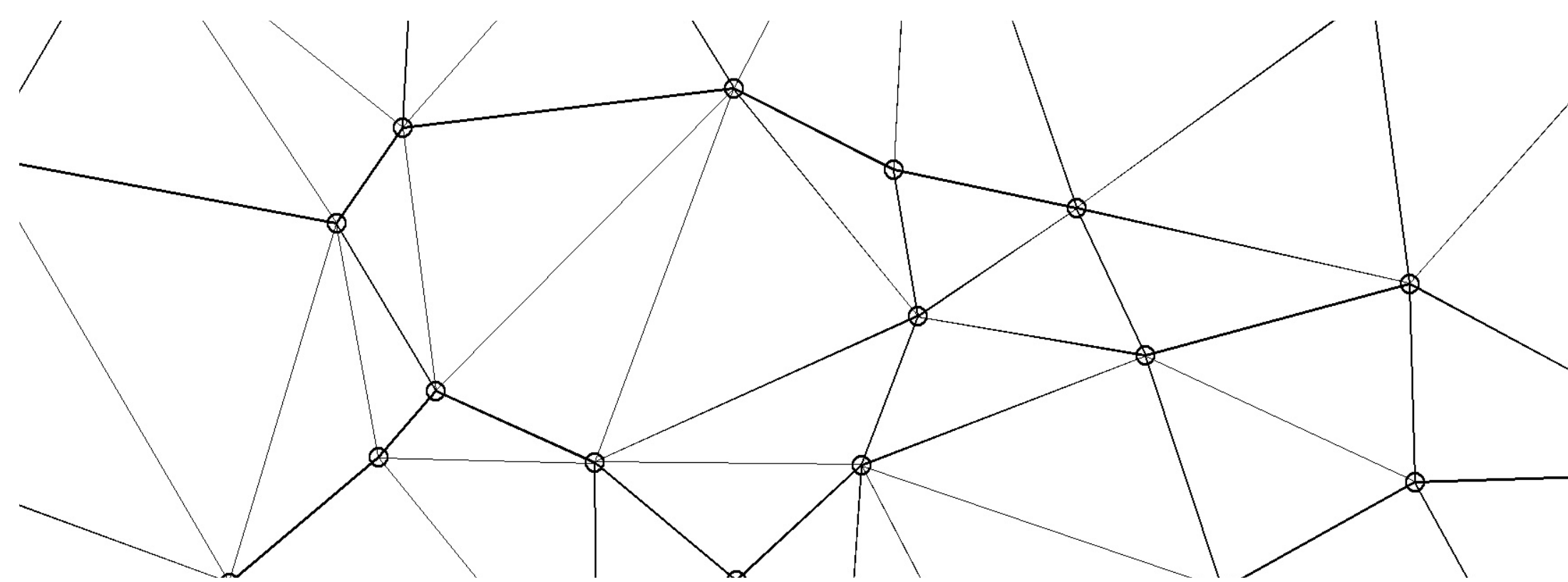
The problems of chaotic building positioning and undeveloped infrastructure are acute worldwide.

Every building project starts from the site plan. It has to consider a large number of criteria, which take difficult and long calculations. That is why it is necessary to find a universal method that can provide a modern approach to the creation of site plans, taking into account all building requirements and other important aspects.



#### GOAL

to develop unified method of site plans design, that satisfies all needs and requirements.



Delone triangulation

### INSTRUMENTS

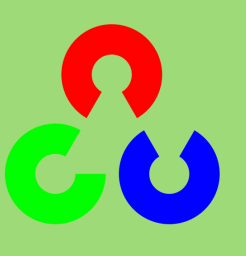
- Archimedean tilings
- Voronoi diagram
- Delone triangulation



Python



C++



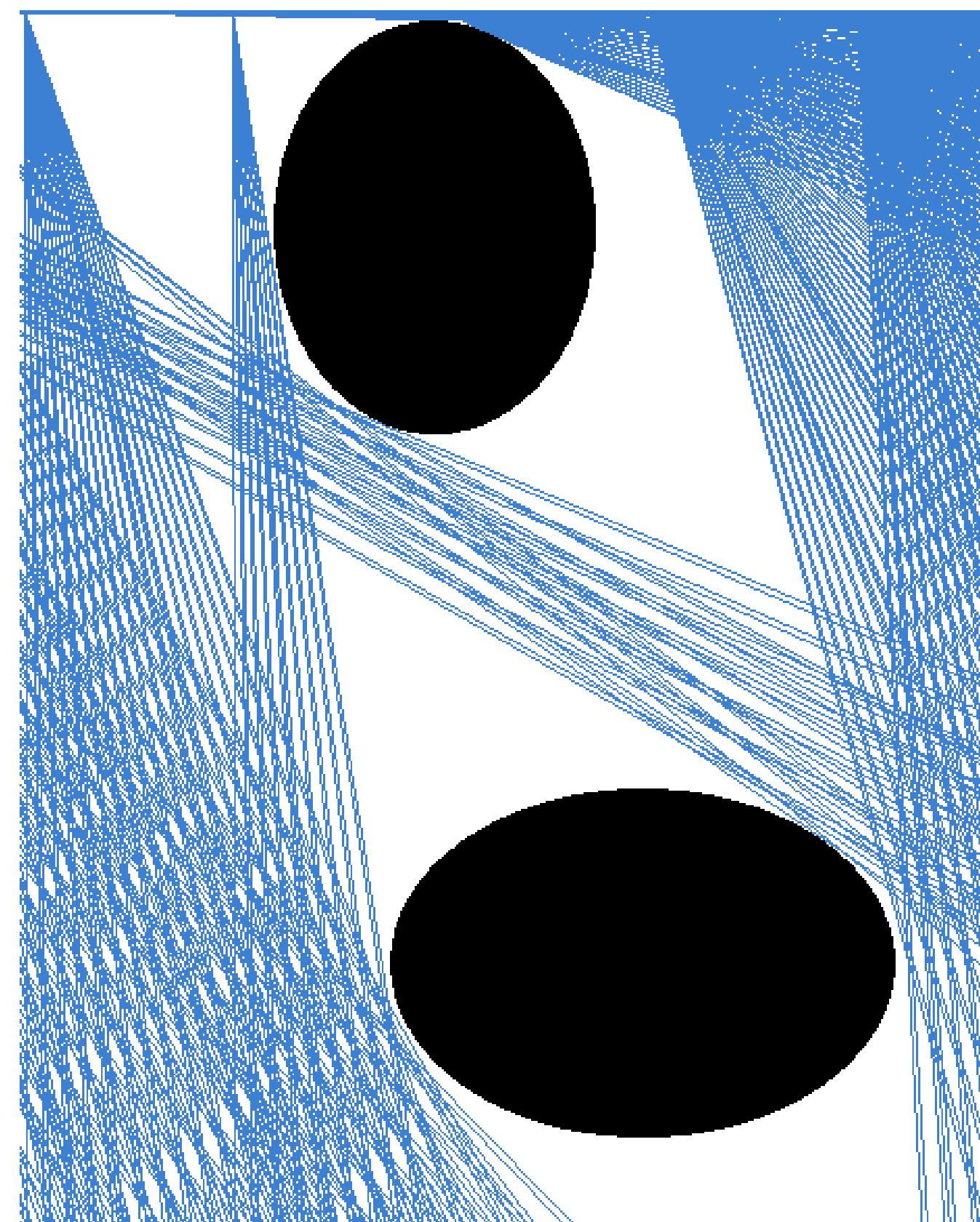
OpenCV



NumPy

### TASKS

- Systematize basic theory
- Analyze existing software for designing master plans and the possibility of using tessellations for the creation of site plans
- Create methods for generation and visualization of building arrangement and infrastructure planning
- Develop the software, which consists of these methods
- Generate a site plan of residential complex



Method of checking for drafts (optimality)

### RESULTS

The software for site plans design was developed:

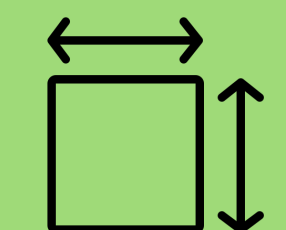
- methods of generation and visualization of building arrangement
- procedure of checking for drafts
- procedures of the Voronoi diagrams and Delaunay triangulation construction for designing infrastructure

#### Residential complex

- 10 residential buildings
- 5 elements of soft infrastructure
- 5 green zones



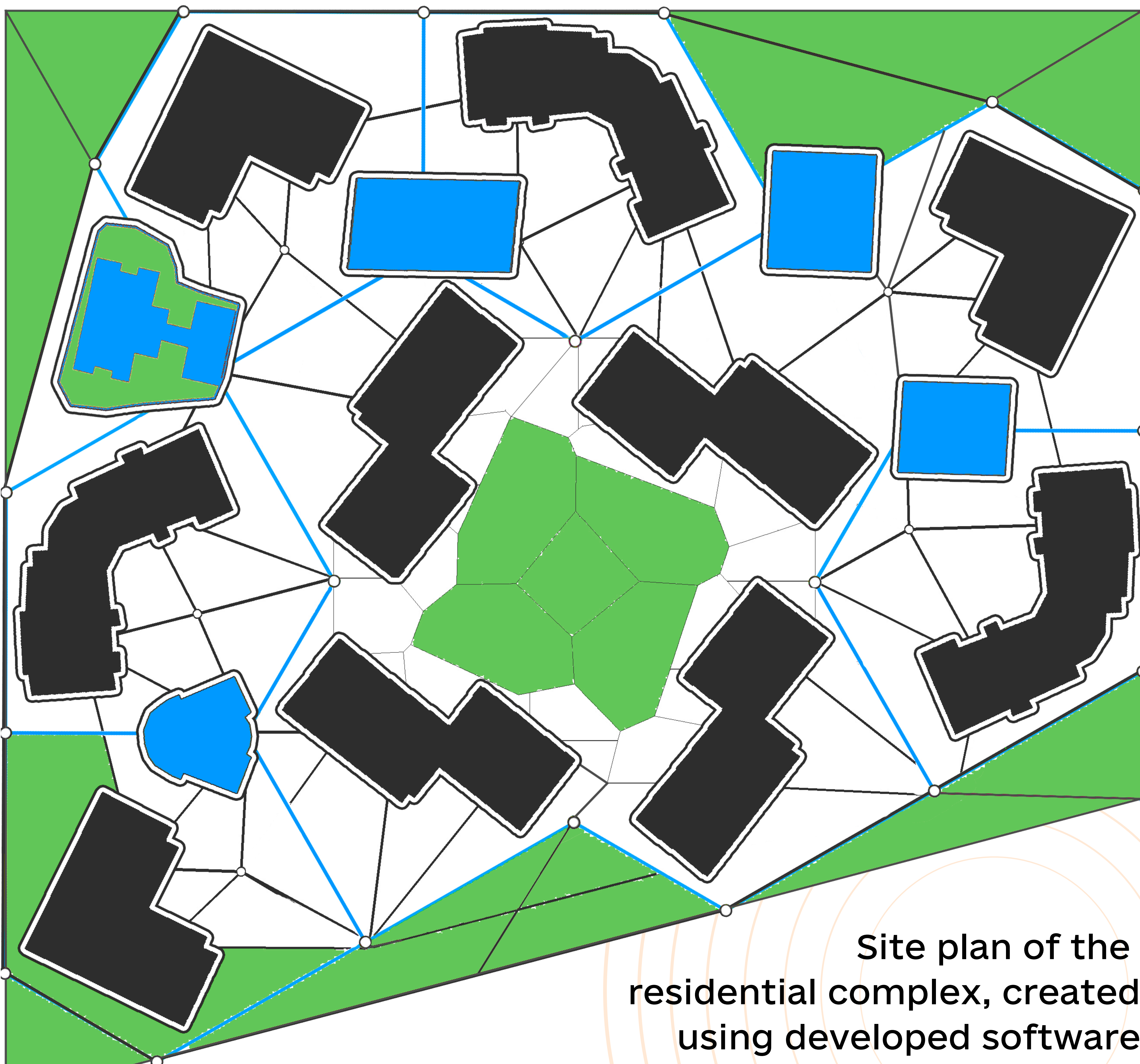
2000 residents



3,5 ha

### CONCLUSIONS

The software can be applied to areas of different sizes. It makes it possible to create a smart city that will be comprehensively developed in all aspects and functional for its residents, avoiding many problems of them. Methods are environmentally friendly and, after development can be interpreted for other tasks and goals.



Site plan of the residential complex, created using developed software