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# Brownfields in Function Urban Area Ostrava

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**Abstract.** Function urban area Ostrava (FUA), is situated in the northern east part of the Czech Republic consisting of more than 1 million of inhabitants. Project Implementation of Sustainable Land Use in Integrated Environmental Management of Functional Urban Areas – LUMAT- CE89 supported from Interreg CENTRAL EUROPE Programme identifies environmental threats in sustainable development in this region. Important examples of them are brownfields sites and loss of agricultural soil. Brownfields pose an opportunity for new utilization instead of building up farmland. But brownfields as such cannot fully compensate for greenfield construction. The main reason is various limitations that these sites bring with them. The paper focuses on the results of the analysis and the subsequent evaluation of the major brownfields in the area of Functional urban area Ostrava. In this region there are brownfields of industrial, mining, agricultural, transport or social nature. The analysis focused on the realistic use of the selected groups of areas. The reality of the use or temporary use was assessed both from the point of view of legislative constraints and from the point of view of ownership structures, and also from the perspective of their physical state and location. An expert estimate of the time needed for temporary or permanent based on similar examples was performed within the assessment. The evaluation respected the future use option that was the most realistic for each particular site. The assessment is supplemented by the information on the change of the built-up area in FUA Ostrava in the last decade, which documents the gradually increasing share of the built-up area. The objective of the evaluation provided in this article is to demonstrate the realistic use of brownfields as an equivalent of newly built up territories and to identify those brownfields that can be revived in the short term horizon. The approach and type of interventions is described for these site, that would accelerate the regeneration process. Suggested intervention options are implemented in the Brownfield Management Strategy Action Plan, which was also developed within the LUMAT project.

## 1. Introduction

Brownfields as we understand them today, are a remnant after changes in the economy and in society in the last 40 years. As [1] stated, the roots of industrial brownfields in Western Europe we must seek in the 70s. These are often called the first generation brownfields. As [2] stated - their existence was at first associated with unemployment, and it was accompanied by many rapid changes in society. In majority the old brownfields are rather large units often in urban areas. Their regeneration is primarily associated with the need for significant investments, which however are not available in this way



affected regions during ongoing changes in society. As a last generation of brownfield sites [3] mentions places linked rather with changes in the demographic structure, resulting in the emergence of abandoned housing units and subsequently of objects related to services (sometimes named as brownfields possibly second generation "social brownfields"). Their regeneration is not only associated with investments but also with the implementation of significant social programs and with applying of development policies. Brownfields cannot be considered merely as a problem associated with the surrounding land, but as [4] or [5] point out, it is necessary to consider many different phenomena extending beyond the boundaries of the affected area. These sites offer great potential, as, on a relatively small area, there are several smaller premises, which present right now a burden, but which are nevertheless well located and ready to perform a new function, which would otherwise be assigned to sites built on greenfield land (i.e. outside the municipality, on agricultural land). This leads to situation that brownfields got closer to the people, they are just around them and citizens themselves are often involved in solving their negative impacts. The term brownfields lost its notion of ruin and nightmare for sustainable development. In the Czech Republic we can date this change in attitude towards brownfields to the period between 2000 - 2005 [6], [7].

Brownfields can therefore be considered as an opportunity to protect farmland from building up. According to [8], the built-up area in the Czech Republic is approximately 10.6% of the total area of the whole country. When we calculate the speed of growth of the built-up areas, we find that the trend of the last approximately 13 years is an average of 6 hectares of new built-up area per day. Trend mentioned only for period of 2000-2008 [9], was that the daily claiming and the subsequent construction on agricultural land in the Czech Republic amounted to 16 ha per day.

## **2. What is FUA and delimitation of FUA Ostrava**

Cities nowadays cease to be independent and self-sufficient in terms of workforce, and it is possible to trace the daily rhythm - daily commuting between work and housing. The problems of these suburban areas were addressed already in the 1970s by, for example, Brian J. L. Berry a professor at the University of Texas – from all his works we can mention for example [10]. In the works of Peter Hall - a British urban and geographer, the term Functional urban area (FUA) appears. From all his works we can pick [11]. Here the basis for identifying functional urban areas was defined, according to which the boundaries of functional urban areas are defined by intensive daily flows between places of work and living. From newer foreign sources we can mention for example, [12] or [13].

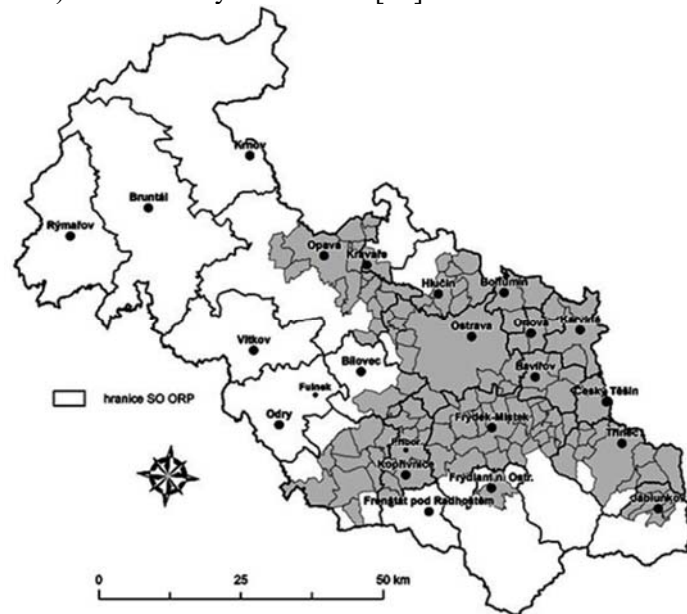
The concept of FUA or Functional Urban Area has a rather extensive methodological basis. The actual application often encounters the unavailability or non-homogeneity of the data and the specifics specific to the particular region. The work [14], for example, mentions the effects of the Second World War on the creation of significant changes in the background of the cities. In the work [15], other indicators, such as the number of employees in agriculture and so on, can be found in defining Functional Urban Areas.

In the Czech Republic, with regard to the definition of FUA, their concepts have stabilized as the territory with 25% of the commuters. The application of these spatial arrangements can be found in Integrated Territorial Investment (ITI), which is an investment planning tool for heavily urbanized territories. In the Czech Republic, seven large metropolitan areas and agglomerations can use this tool.

The definition of the territory is not always uniform and respects the specifics of individual agglomerations.

One of the ITI's is the agglomeration of Ostrava in the Moravian-Silesian region. This agglomeration represents a compact territory with very high daily mutual interaction between the municipalities in the hinterland and the core of the agglomeration, moreover, this territory is intrinsically relatively closed. It also represents the area with the highest growth potential in the region, as illustrated by the analysis of selected quality indicators and it complies with strategic development documents of the Moravian-Silesian region.

FUA Ostrava see figure 1- Ostrava agglomeration – as it is defined - consists of 119 municipalities and has population of 965 338 inhabitants. It concentrates 86 % of the population of Larger Urban Zone Ostrava (Eurostat) and 79 % of the population of Moravian-Silesian region (on 35 % of its territory). The population density of the region is 225 inhabitants per km<sup>2</sup>, while the population density of the agglomeration reaches to 509 inhabitants per km<sup>2</sup> (by 31<sup>st</sup> of December 2014). Such defined territory also includes Functional Urban Areas CZ003 Ostrava (Metropolitan zone) and CZ017 Karvina (small urban area) as defined by the OECD. [16].



**Figure 1.** FUA Ostrava [17]

Area differences and increase of buildings between 2006 and 2016 have been calculated using the GIS analysis performed by the author with use to CÚZK data (© ZABAGED) - specifically the layer "Building, block of buildings". The result of the calculation is the fact that, during this period, in the more precise delimitation of the Ostrava agglomeration (124 municipalities) there was an increase of buildings with total area of approximately 202.8 ha, which, for better notion, is the size of about 290 football pitches.

### **3. State of Brownfields in FUA Ostrava - Analysis of real utilizability**

In FUA Ostrava, a total of 238 locations have been identified to have brownfield features. The information comes from the Regional Development Agency internal database. These are formerly used or underused areas which for their future development need an intervention for their future development, they need intervention. These are, therefore, seemingly easily accessible and usable sites. A number of regenerations of brownfields took place in FUA Ostrava in the last decade, and yet, as mentioned in the previous chapter, more than 200 ha of agricultural land were consumed. Brownfields within FUA Ostrava represent 665 hectares of land (information recalculated from the Regional Development Agency internal database). The analysis conducted, focused on assessing how many areas are actually available for construction. This means that they do not have any property that would make their use impossible in the short term.

Because brownfields do not form a homogeneous group, the analysis was made according to the following groups:

- previous function was housing, administration or civic amenities
- heaps and dumps
- industrial brownfields

- transport related brownfields
- military brownfields
- other

For the purposes of this article, an analysis of the first three groups is described. The first group is the most numerous group. The second group has the largest area pertaining to one location while industrial brownfields are the group with the most hectares.

Excluding criteria:

- master plan problem
- number of owners
- need for extensive remediation (sites have been analyzed as a whole, partial usability have not been examined)
- other excluding reasons, found during a field survey

### *3.1. Analysis approach – sites of housing, administration or civic amenities*

The group of sites with former function of housing, administration or civic amenities comprises sites which are similar in their attributes but they were further divided anyway. In total it includes 110 sites with cumulative size of 9 hectares.

These objects have been divided into 4 groups.

- Objects that were used for housing (blocks of flats, individual housing).
- Objects of former elementary schools.
- Other objects – a diverse group of e.g. a former gymnasium or a chateau.
- Special objects.

Each group has been analyzed separately - because a group contains objects of similar properties and their constraints are specific to the object type. Rating A-B-C according to Cabernet methodic was applied for comparison between objects.

Criteria such as number of owners, state of objects and attractiveness in the area were assessed with considering possibility of site's future use for a most important criterion. The state of the building - the site – thus entered the evaluation thus entered only as a secondary indicator. If the state of a building was so bad that the building would have to be demolished - and there was a realistic assumption of possible consent of the Building Authority, the criteria about state were evaluated as positive. The state of a building assessment was based on a field survey and subsequent expert evaluation.

The group of residential buildings - a total of 15 buildings. In the master plan, they are kept as mixed or storage areas (very appropriate with regard to the position of the locality). The master plan does not represent a major barrier. In this group, a total of 6 objects are evaluated as B and the rest are sites of rating A. In these localities there is a realistic assumption of their possible future use (0.5 ha of such sites in total).

The group of elementary schools represented 6 objects in FUA Ostrava. All localities are designated for civic amenities in the master plan. Therefore, it is not possible to use them in near time for housing, for administration or for other purposes. Due to this fact and state of individual objects, just one is evaluated as A – because of two already existing demands. Others are either of rating B or C.

The group of other objects - this group comprises a total of 43 sites with a total area of 38 hectares. Among the sites there are former recreational resorts, chateaux, administrative buildings or garages. Each locality has been assessed individually in terms of the master plan and its designation of future function. In this group also location was also important. Contrary to residential buildings where demolition of former apartment buildings was supposed, in this group a possibility of buildings to be reconstructed was also evaluated. The final evaluation gave 18 sites a value of A – altogether representing area of 10 ha. They are areas with great potential without major development barrier. On

the other hand, 6 sites were assessed as very problematic with very low potential for future use in a near time horizon.

A group of special locations was represented by 5 localities in total. Two are objects protected by heritage preservation. Currently both are undergoing gradual reconstruction and their state is monitored by the authorities of heritage care. It is therefore possible to assume their utilization in a short time horizon. Two sites after former apartment buildings have already undergone demolition and are ready for new use, and the master plan designates them as areas for business and manufacturing. These 4 hectares have a great potential to be used in the short term. The last location belongs rather to industrial ones, but it is officially among civic amenities. It is the site of a former gas station. This site is potentially dangerous and risky for its surroundings, remediation will be necessary.

Summary of assessment of brownfield group with former non-commercial or non-industrial use: Of the whole group of 110 the group of 30 objects and areas a group that has a great potential to be utilized in a short period of time, thus contributing to mitigating the negative trend of claiming additional land for construction. Other sites have some feature that represents a major barrier to development. Removal or mitigation of these barriers should be addressed.

### *3.2. Analysis approach – heaps and dumps*

Heaps and dumps are quite specific group of territories and they are not normally recorded among brownfields. There are dozens of heaps and heap complexes in FUA Ostrava, but only three heaps and two dumps are included in the brownfield database.

The smallest of the recorded heaps has area of 12.5 ha. It is an area partially impounded by a chemical landfill. There is a future plan of either remediation or preservation of the state of the landfill. Other two heaps have area of 23ha and 83ha. The first one, although having a very unique position in the transport infrastructure, is designated by master plan as a landscape greenery and cannot be used for any other purpose and especially in terms of analysis, it cannot serve to prevent building-up of green areas. The second one is the site designated by the master plan for recreation. In addition, the regeneration process was heading to building a golf course.

The situation of dumps similar. Only two are registered in the brownfield database. Both are unused today but have not yet completed their remediation. Both are then included in the master plan as elements of landscape greenery without the possibility of use for building. The total area of dumps is 20 ha.

### *3.3. Analysis approach – former industrial sites*

A total of 75 sites with a total area of 410 hectares are registered in the industrial brownfields group. Locations were evaluated using A-B-C-D rating according to Cabernet methodic. Indicators for determining if the site is potentially appropriate have been adjusted. Further description of the indicators is provided by individual categories.

Sites marked as D are areas with high levels of contamination. Their use is not possible without remediation and they are therefore unusable in the short term as a replacement for agricultural land use. In the internal database of brownfields there are 5 such localities with a total area of 125 ha. All sites are covered by an environmental contract with the state which provides funds for future remediation. By the end of 2018 remediation of two sites is likely to commence. Despite the fact that these areas are not usable nowadays, it is realistic to take them into account, because of existence of funds for their remediation.

Sites labeled with C are those that are relatively unlikely to be used in the near horizon. One of the major barriers is either the necessity of a spatial study, or they are designated by the master plan as a landscape greenery. Changing the master plan is a long-term issue. Sites with multiple owners are also in this group sites. The inclusion might also be outcome of a field survey. As part of field work, it was assessed that the condition of the site is so bad and unattractive that without massive support from public funds the realization of regeneration would be impossible. There are 18 sites in this group with total area of 100 hectares.

Areas classified in Group B are those where there is a quite solid potential and they should be taken into account in future. However, at this point there exists some obstacle for their new building up or use. A total of 19 locations is included in this group. The total area of all localities is 90 ha.

Locations included in Group A are those that are the real equivalent to greenfield construction. In the sense that as far as their attributes are concerned they are immediately ready for further use or they are already beginning to be used. A total of 31 locations is included in this group. The total area of all localities is 88 ha. Out of them, only one site has area of 10 hectares and another four are over 5 hectares.

#### 4. Conclusions

Summary of assessment for brownfield group with original non-commercial or non-industrial use: Of the 110 sites, 30 buildings and sites represent a group that has a great potential to be utilized in a short period of time, thus contributing to mitigating the negative trend of claiming additional land for construction. The area of plots is 11 hectares. Due to the expected use for housing or administration, where space requirements are significantly lower than for an industry, this figure is promising. Other sites have some feature that represents a major barrier to development. Removal or mitigation of these barriers should be addressed.

Summary of heaps and dumps sites: Although only five sites are registered in the database, their area is more than 134 hectares. Unfortunately, due to the designation of the master plan, change of which is very difficult, these areas are blocked for long periods of time therefore they cannot be counted as a possible replacement of the agricultural land for the construction.

Industrial brownfields have the greatest potential. For the protection of agricultural land against construction, it is possible to take into account 88 ha of localities that are currently ready for future development. Promising are also the sites currently undergoing a remediation process from state budget funds, which represent additional 125 hectares.

In total, about 100 hectares of brownfields are available for use in a relatively short time (the total is slightly higher if we include other brownfield groups not mentioned in the article). This figure represents approximately half of the area newly built up over the last ten years. With targeting at this issue, the area available for use could even increase.

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