Technical Infrastructure of the Area in the Brownfield Cataloguing Process

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Abstract. The issue of brownfields is currently one of the frequently discussed topics both in the sphere of spatial planning and in related areas such as building construction, data models of buildings, or environment. This issue is not local in character, but is tied to human civilization on a global scale. Of course, brownfield issues can be divided into several separate sub-areas. These are, above all, the area of identification and cataloguing, the area of exploration and rehabilitation of particular localities, especially in terms of remediation of ecological contamination, as well as the area of actual revitalization of individual localities and consequently further monitoring after revitalization. Parallel to these components is the implementation of the issue into the legislative framework of a particular state. The Legislative Base of the Czech Republic was dealt with as part of the contribution to the WMCEAUP Symposium in 2016. It was followed by a series of expert papers focusing on the cataloguing of brownfield sites from various points of view - building technical condition, fire safety design of buildings, transport infrastructure and others. This article is a further continuation and deals with brownfield databases in terms of monitored phenomena of the technical infrastructure. Within the legislation of the Czech Republic, the cataloguing is solved both by means of territorial analytical documents of municipalities and by means of territorial studies. In the case of municipalities’ territorial analyses, brownfields are classified as the observed phenomenon No.: 4a. However, it is not yet specified which data will be tracked (except location). In spatial studies, content is defined very freely, as it is a very general tool for spatial planning. Since, apart from the building law, the issue of brownfields in the Czech Republic is not legislatively treated, there is no uniform methodology for the identification and cataloguing of brownfields. Therefore, the content of individual databases is always compiled solely according to the requirements of the submitter of the study. However, the areas of information that appear regularly in databases can be traced. One of these is information about the technical infrastructure. This information is initially divided into two sub-areas - information on the possibilities of connecting particular site and the area of inner structure of existing distributions.

1. Introduction

The brownfields’ issue is currently one of the frequently discussed topics both in the sphere of spatial planning and in related areas such as construction, buildings’ data models or nature conservation. Considering that it is closely related to the human living space - its origin is the direct consequence of human activity in both free and urban landscape - it means a global issue, but with mainly local impacts. From the point of view of global action, it can be said that all advanced states in the world are concerned at a certain level. For developing countries where other, more fundamental issues such as sufficient clean drinking water and food, population literacy or war conditions are primarily addressed, it cannot
be assumed that this issue will be addressed in the near future - just like energy saving requirements. On the contrary, for advanced and medium-developed countries, especially in Europe and North America, this issue has been discussed for many years.

One of the fundamental problems in seeking a global solution is the fact that there is no uniform definition. Here it is necessary to point out the absence of a uniform definition not only globally (the definition used in the US differs in fundamental terms from the definitions used in the European Union states), but variations [1] - Kramářová can be observed in many countries. This situation is due existing links of the issue to legislation, and because in every state there is a unique legislative base, as well as a way of approaching the brownfields solution is completely individual.

Another factor that supports the above statement is also the different value system within particular society. Based on general knowledge, it can be concluded that the society value system, for example, in the Scandinavian countries and in the countries of southern Europe is different. This is because of differences arising from different environments, population density, historical development, religion, and so on, in particular.

Specific definition, legislation, society value system and thus the priorities of political governmental power are together basis for creation of various subsidy titles, which are aimed at supporting the revitalization defined as brownfields. And only through the view of existence or non-existence of grant titles public perceives the issue as such (its meaning).

From the above, it is necessary to conclude that brownfield issues are not solved identically in different countries. Therefore, the contribution will continue to be covered only by the local area - the Czech Republic.

2. The issue of brownfields in the Czech Republic

Of course, brownfield issues can be divided into several separate sub-areas. These are, above all, the area of identification and cataloguing, the area of exploration and rehabilitation of particular localities, especially in terms of remediation of ecological contamination, as well as the area of actual revitalization of individual localities and consequently further monitoring after revitalization. Parallel to these components is implementation of the issue into the legislative framework of the state.

The legislative base of the Czech Republic was dealt with as part of the contribution to the WMCEAU Symposium in 2016. Until the end of 2017, the only legislative support of the National brownfield regeneration strategy of 2008 was, however, only (and until now only) the government of the Czech Republic taken into account, but not approved. This situation changed after the amendment to the Act No. 183/2006 Coll., On Spatial Planning and the Building Code, or after amendment of its Implementation Decree No. 500/2066 Coll., On Territorial Analytical Documents, Territorial Planning Documents and Records of Territorial Planning Activities, which entered into force on 29 January 2018. Due to the absence of a legally binding definition in the Czech Republic, many different authors use different definitions Jackson [2], Jankových [3].

From the amendment of the Decree, in the Czech Republic's legislation, the cataloguing is dealt with either in the form of territorial analytical documents of municipalities or in the form of territorial studies, which are covered by the aforementioned Decree. In the case of municipalities' territorial analyzes, brownfields are classified as the observed phenomenon 4a. However, it is a special feature that the concept of brownfield is not defined in the decree or in the building law. Furthermore, it is also not specified in the Decree which data will be monitored - except for the position that results from the drawing in map data.

In spatial studies, content is defined very freely, as it is a very general tool for spatial planning. Since, apart from the building law, the issue of brownfields in the Czech Republic is not legislatively treated, there is no uniform methodology for the identification and cataloguing of brownfields. Therefore, the content of individual databases is always compiled solely according to the requirements of the investor. However, the areas of information that appear regularly in databases - information on location, size (area, number of objects, ...), ownership relations, building technical state of objects, transport infrastructure, and so on can be traced. One of these is just information about the technical infrastructure.
3. Generally, brownfield databases
The contribution follows on from a series of expert contributions dealing primarily with the cataloguing of brownfield sites from various points of view - building technical condition, fire safety design of buildings, transport infrastructure and others [1, 2, 4]. In these papers, the issue of database creation has been described in general level in detail, so it will be mentioned in the minimum extent.

As mentioned above, studies of brownfields are most often processed in the form of a spatial study. It has no legislative or methodical content, since it is not a special tool for this area but a very general tool for spatial planning. Its aid can be used to process the spatial arrangement of settlements, to solve the transport or technical infrastructure of a particular site or to a wider area, to position observation points with the designation of exposed areas, and so on. In the field of brownfields, most often these are identification studies or brownfield localization studies. Both variants are usually based on maps and databases / catalogs. The map captures the location of the brownfields found. The database then collects information about each brownfield site. Such a study serves not only for primary records, but also first of all as a "offer catalog" suitable for potential investors and developers. If brownfields are used mainly for investment purposes in the territory, the agricultural and forest land will be protected to a greater extent from conquest and devastation. This solution leads to the protection of the land, which is one of the most important, but little-mentioned, irreplaceable sources of our planet.

Practice has shown that the overwhelming majority of investors of such studies are deciding on so-called single-stage databases. It is influenced not only by financial reasons, but contracting authorities often do not know any other form they could imagine. A one-tier database is a database where all collected data about individual locations are summarized on one sheet. This guarantees their cumulation, but at the same time limits their amount and detail - too much data implies a lack of clarity and makes it difficult to understand the basic orientation of the catalog as a whole. This is true for both documentary and electronic forms. In paper form, the limit factor is the paper size, in the electronic screen size. Searching in a multi-page sheet is as obscure as the endless "scrolling" of an extremely long data sheet on the monitor. Another issue is the publication of such studies. Due to the newly introduced legislation within the European Union (European Parliament and Council Regulation 2016/679 of 27 April 2016), the so-called GDPR (General Data Protection Regulation), which will become applicable on 25 May 2018, there will be a considerable complication publishing, as studies may also contain sensitive data that cannot be routinely displayed on the Internet, for example - on the websites of municipalities or other organizations.

In contrast, multi-level databases are not limited in this way. By dividing them into multiple levels / degrees, the data can be separated and in the first stage disclosed only to the extent and detail to avoid user congestion or violation of personal data protection. It seems to be much better to create and maintain these multi-level databases primarily in data form, paper form is less suitable.

From the point of view of the development of the issue as well as of the modern trends and technologies, this article will deal with only in the area of multi-stage databases in data form. For reasons of further practical application, this will be a two-stage database, because other public sector (as the most frequent contracting authority) is not yet able and willing to finance.

4. Technical infrastructure data
Act No. 183/2006 Coll. (Building Law) in § 2 (1) (k) [1] defines the concept of public infrastructure, including the technical infrastructure:

"k) public infrastructure land, buildings, facilities, and that
1. transport infrastructure such as road, rail, waterway, airport and related facilities;
2. technical infrastructure, which is the management and construction and the related equipment of the technical equipment, for example water pipes, reservoirs, sewers, sewage treatment plants, buildings to reduce the threat of natural or other disasters, construction and equipment for waste management, transformer stations, management, communication lines of
the public communications network and electronic communications equipment of public communication networks, pipelines and gas storage;
3. civic amenities, such as buildings, installations and land used for example in education and training, social services and family care, health services, culture, public administration, population protection;
4. public space, established or used in the public interest, "

Under the generic term technical infrastructure, we include all energy systems (electrical energy, thermal energy - hot water pipelines, steam pipelines), mass systems (transport of drinking water, utility and waste, solid municipal waste, gas and flammable gas transfer, telecommunication, radiocommunications, special management) and territorial protection systems (flood protection, protection against other natural disasters - landslides, dips, etc.). It is therefore a very large area of number of types.

From the point of view of our own system, it is necessary to sort, according to the definition of the building law, not only the own management but also the buildings connected with it. The last, in building law not mentioned, are the protective and safety zones of the technical infrastructure. These are always provided by the relevant special law, for example for the distribution and construction of the transmission system of electricity and energy gas by Act No. 458/2000 Coll.

From the point of view of information on technical infrastructure, all of the aforementioned sub-infrastructures should be monitored. The most suitable is their natural tracking by individual species - electricity, gas, water, sewage, waste, telecommunications, heat distribution, flood protection. There are almost identical rules for them, so they will not be discussed specifically, but on a general level.

Just as for transport infrastructure, even in the case of technical infrastructure, the recorded information should be divided into two basic sub-areas - information on the possibilities of connecting the site and the internal structure of the existing distribution.

Within the primary stage of a two-tier brownfield database, it is necessary to see basic information about linking the site to surrounding structures. Due to the large number of sub-infrastructures, this information must be limited. In the overwhelming majority of studies already conducted, these data are limited to the existence of which type of infrastructure (yes / no / can be connected). Unfortunately, this situation is unlikely to satisfy the potential investor. On the basis of practical experience from the implementation of identification and localization studies of brownfields or the collection of data for territorial analytical data, the data presented in Table 1 appear to be the most appropriate. From the point of view of practice, it has proved to be the most advantageous and most useful to merge all types of infrastructures into one table. Here, in practice, a section on contamination is added, which is not appropriate to link with other areas except the technical infrastructure.

Within primary information, it is inappropriate to disassemble information about internal structures because there are too many. Putting them into the first level of databases would be at the expense of clarity and easy orientation.

In the secondary part of brownfield databases, the different types of technical infrastructure need to be separated from each other see Table 2. Combining them into one table would be at the expense of clarity. The breakdown will maintain a clear orientation and quick acquisition of the necessary data.
Despite the considerable variation of the different types of infrastructure, it is appropriate for the data to be recorded by a single system. This will speed up the acquisition of information, especially during the local investigation, as the practitioner will use the same procedure in the cyclical manner.

### Table 1. Primary tracked information of technical infrastructure pages in brownfield databases

| Technical infrastructure | electrical wiring | telecommunication | water supply | wastes (SRW – solid residential waste) | sewage | flood protection measures | gas | contamination | other |
|--------------------------|-------------------|-------------------|--------------|----------------------------------------|--------|--------------------------|-----|---------------|-------|
|                          | not connected / connected to LV, HV, ...; operator: ...; ability to connect to a higher network: ... | radio coverage: yes / no; mobile operator signal coverage: yes / no; connection to fixed telephone lines: yes / possible to connect / not; internet connection: yes / possible connect / no provider; operators: ...; other: ... | the source own ... / connected to the water supply / can be connected to ...; operator: ...; other water resources: ... | collection in the area without sorting / separation (paper, plastic, white glass, colored glass, aluminum, bio, communal, other); operator: ...; liquidation: in the framework of the collection of SRW / own ...; landfill / incineration: ... (location + availability) | connected to public sewerage system / liquidation of own WWTP / unsatisfactory; operator: ...; rain: collection / connection to sewerage system (single, separate) / not solved / other ...; operator: ...; special: description: ... | type of gas: ... connected to low-pressure pipes, medium pressure pipes, high pressure pipes, ultrahigh pressure pipes / connectable to ... / location can not be connected; operator: ...; storage room: yes / no / no need | yes / can be expected / unlikely / not; Survey conducted: ... | type: ...; connected: yes / can be connected; operator: ... |
Table 2. Secondary monitored information of technical infrastructure parties in brownfield databases

| Type of technical infrastructure: | INNER DISTRIBUTION: |
|---------------------------------|---------------------|
| EXTERNAL CONNECTION - CONNECTING| POINT:              |
| Location:                       | material:           |
| designation:                    | capacity / dimension:|
| material:                       | storage:            |
| capacity:                       | state:              |
| state:                          | system description: |
| protection zone:                | protection zone:    |
| safety zone:                    | safety zone:        |
| ADDITIONAL / SPECIAL BUILDINGS: | type:               |
| location:                       | material:           |
| description including capacities:| capacity / dimension:|
| state:                          | storage:            |
| protection zone:                | state:              |
| safety zone:                    | system description: |

Individual tracking parameters are either expressed in a simplified way - single or numeric (e.g. designation, material, capacity, buffer zone, safety band, etc.) or a brief description (e.g. location, status, system description, etc.). Particularly in the assessment of the status should not only be a value from the scale but a verbal description of what is already inadequate or emergent. Overall, the text should be brief, but bearing the basic data on the character of the element.

If the database were run as three-step, the data would be further refined. For example, the inner divorce would be divided into individual segments - branches or areas that would be described / examined in more detail. Also, particular connections of constructions within the brownfield site, or a description of their internal distributions, would be given. Additional buildings would describe input and output points, material and condition of their own construction, way of protection, access, and so on.

5. Conclusions

The creation and updating of brownfield databases in the Czech Republic is still under development phase, ie without a uniform methodology. This situation greatly complicates the possible comparison of data obtained from individual studies, so it would be advisable to introduce a uniform methodology for processing. This is important for the further utilization of these databases (supply catalogs, implementation into data models of the territory, scientific research tasks).

Multi-stage, electronically-managed databases appear to be the best choice since their data can be easily accessed, updated and further processed. Compared to one-stage databases, they contain more detailed information, but they do not run in the primary selection. Last but not least, they also allow the selection according to the criteria and the comparison of the sites.

Quality information of each type of technical infrastructure creates a coherent picture of one major part of the overall character / image of the site and thus the future costs of revitalization. Thanks to them, it is possible to consider in due time the potential investment in the locality. At the same time, they collectively collect data that otherwise a potential investor or developer would have to look for at individual network operators and brownfield owners.
This facilitates the decision-making process of investors, which increases the likelihood of re-use of brownfields. Re-use limits agricultural land and forest land. This contributes to the protection of the soil, and thus to the landscape, as well as to the improvement of the environment.

References

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