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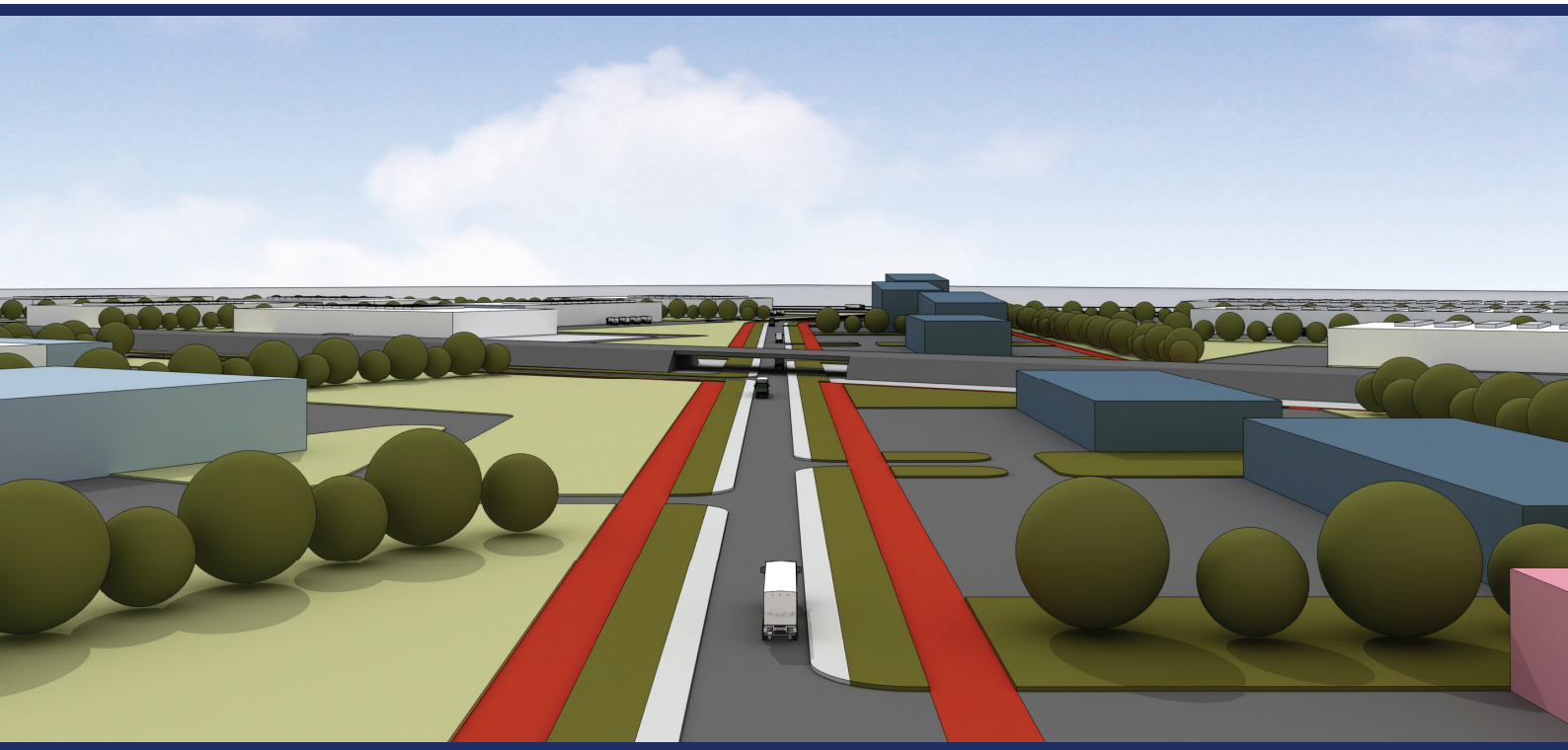

INDUSTRIAL PARK STAKHANOV: DUE-DILIGENCE & CONCEPTUAL DESIGN REPORTS

June 2011

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INDUSTRIAL PARK STAKHANOV: DUE-DILIGENCE & CONCEPTUAL DESIGN REPORTS

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CONTENTS

LIST OF ATTACHMENTS:

1. Spatial analysis of Czech cities and industrial sites

LIST OF DRAWINGS:

1. Wider relations 1:5 00 000
2. Site analysis 1:5000
3. Site plan 1:5000
4. Perspective view (camera 01)
5. Perspective view (camera 02)

DUE-DILIGENCE REPORT

1. INTRODUCTION

This due-diligence report has been prepared in the framework of USAID LINC Project, Ukraine as an input for conceptual design of the potential development of the industrial site in Stakhanov. As a source of information has been used discussion with following City of Stakhanov officials:

- Mrs. Kharchenko Natalia Hryhoriivna - Deputy Mayor of the city of Stakhanov
- Mrs. Kunitska Lyudmyla Oleksandrivna - Head of the Department on Economic of the Stakhanov City Council
- Mrs. Moroz Halyna Petrivna – Chief Architect of the Stakhanov City Council

Discussion with city utilities providers' representatives:

- Vodopyanov Vadym Viktotovych – Chief engineer of the Stakhanov department of "Luhanskvoda", LTD.
- Cherednyk Yakov Serheevych - Chief engineer of the Stakhanov electric power administration
- Pyskunova Tetyana Mykhailivna – Head of the Production and technical department of the CityGas
- Various maps and text sources describing the city (city master-plan, strategic plan, others….)
- Visit of the potential site (March 31, 2011, 12° C, semi-cloudy)
- Maps with indicative drawings of the infrastructure on site

The group of experts of the LINC project Ukraine has executed the site visit. The participants present during the interview and the site visit:

- Karel Barinka – architect
- Tetyana Pasichnyk – investment promotion specialist
- Roman Proskurenko – translator and interpreter
- Radim Gill – project manager

2. LOCATION OF THE CITY FROM NATIONAL AND REGIONAL PERSPECTIVE

The city of Stakhanov belongs to Luhansk region. Stakhanov is situated in the western part of Luhansk region about 63 km by highway and 91 km by railway from City of Luhansk – regional metropolis. Main industries of Stakhanov are mining, mechanical engineering, rail car building, ferro-concrete items production. The railway station "Stakhanov" is located about 7 km from the city border (in the city of Almazna). Stakhanov city population is about 83,000 (2010).

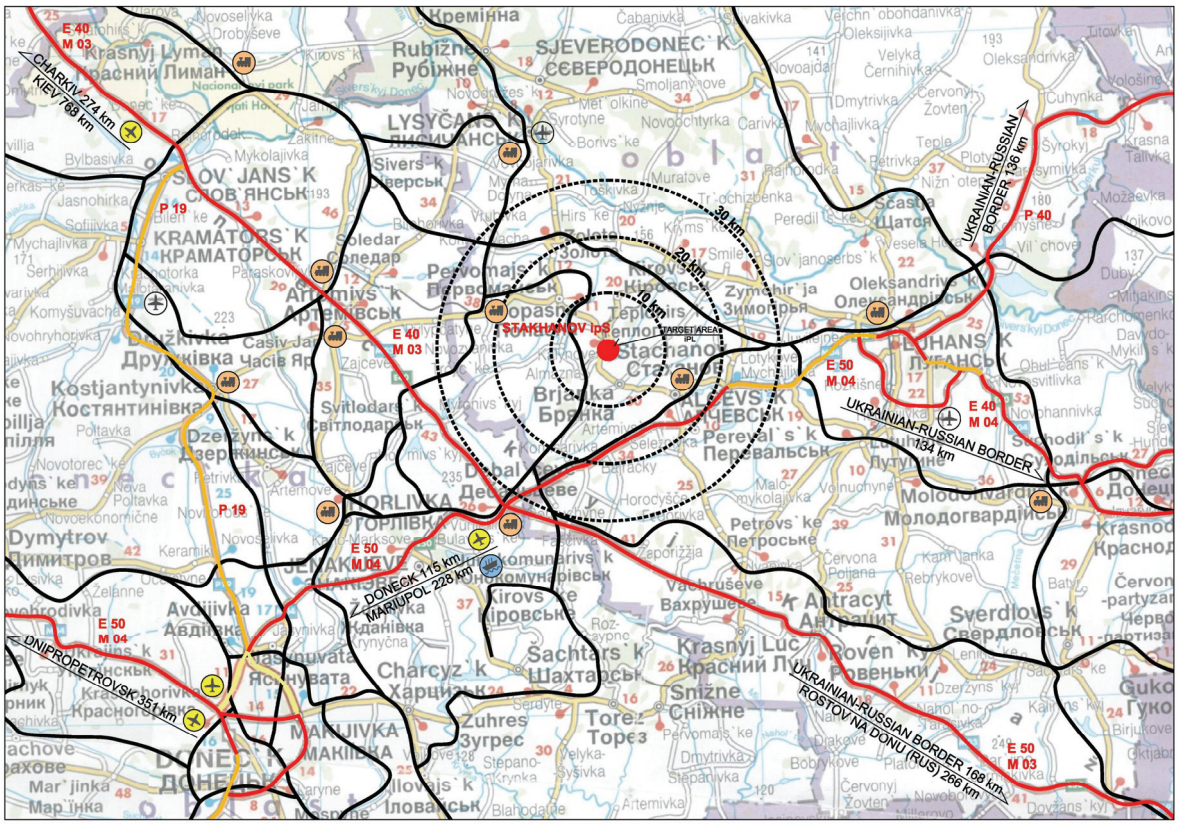
Taking into account the circle with radius of 30km with the center in Stakhanov, important cities of Donbas region are located inside the catchement area: Pervomajsk, Alchevsk, Brjanka. From regional point of view those cities, their industrial tradition and qualified inhabitants represent sufficient pool of labor forces for the development of industrial park of mezzo/regional type. It is expected that all communities of sub-region – many of them are participants of the LINC project - will benefit from that kind of development due to immediate proximity and good interregional accessibility.

From national point of view Stakhanov lies quite far to the East of the country. Thus regular air transport between the regional airports (Donetsk, Luhansk) and central national airport in Kiev/or airports in EU is important assumption of successful industrial park development not only in Stakhanov but in overall Luhansk region. Approx. road distances[1] are listed bellow:

- to Kiev: 768 km (main international airport in the country, EU and overseas flights)
- to Luhansk: 120 km (the nearest regional international airport)
- to Ukrainian-Russian border: 130-170 km (according to crossing point selected)
- to Donetsk: 115 km (the nearest regional international airport with flights to EU)

[1] Source: Freytag and Berndt, 1:1 000 000, Ukraine-Moldova

The nearest international airport with regular direct flights from/to the countries of EU or Europe and to various international destinations (Moscow, Vienna, Prague, Warsaw, St. Petersburg, Athens, Istanbul, Abu-Dhabi, Tel Aviv and many others….) is Donetsk from which also flights to Kiev are run on daily basis. Due to unfavorable road conditions it takes approx. 2,5 – 3,0 hours by car to reach the airport in Donetsk from Stakhanov. Donetsk airport is under intensive construction just now to be ready for the purpose of air-transport within the European football Championship in 2012. Wider relation of Stakhanov city are shown in following map:



Wider relations: Stakhanov

In the following analysis the main reasons to select the site in Stakhanov are identified:

Strong points:

- Located within industrial zone in the outskirts of the city
- Linked to the infrastructure of the existing industrial facilities
- Good access on municipal road network
- Clustering with the existing productions of black metallurgy and carbon blacks
- Availability of the majority of infrastructure
- Relevant site size to the city size

Weak points:

- No municipal sewage network and WWTP
- Uncertainties mainly in the parts of the old mine – geology and hydrogeology
- Old master-plan of the city from 1976
- No clean production in immediate neighborhood (black metallurgy, carbon black production)

Conclusions:

Due to prevailing strong points it was recommended to work with the city of Stakhanov with the site introduced in the outskirt of the city which allows the development of various industrial productions even those with higher demand for lower environmental limits around the site.

3. LOCATION OF THE SITE FROM MUNICIPAL PERSPECTIVE

At the territory of former coal mine a site for the development of industrial park has been identified in the South-West corner of the City of Stakhanov. The site is located at the land which is - according to the City Master Plan - allocated to industrial land sources (however, the Master Plan requires updating and adjusting as it was developed back in 1976). There are no boundaries on site and the cadastral number is not assigned. The plot (site) is a free territory. The nearest dwelling building is in 3 km from the site. With the exception of identified infrastructure there is not any underground construction on site hidden.

In 70s of the last century, there was a mine construction at the specified site, but in 1995 during the restructuring of the coal industry, when all mines in the city were eliminated , the mine construction works were stopped as well; the bores were flooded, all ground facilities were dismantled (except air shaft tower). The transformer substation with the capacity of 110 kW built that time on the site is preserved by now. The decision to build the mine at the site was taken in view of the industrial scale coal reserves (the balance reserves are 154 mln. MT).

In 2000, Kharkiv Institute "Yuzhhiproshakht" developed the project of renovation of construction of the mine "Myronivska", but up to date no funds were allocated for implementation and the project should be adjusted. At the Soviet time it was planned also to build a coke and chemistry plant near the mine (considering the availability of coking coal), but the plans never been implemented.

There were no FDI attraction cases in the city economy so far.

Top four biggest employers of City of Stakhanov is shown in following table:

Name	*Branch (type of production)*	*Number of employees*
STAKHANOV CARRIAGE WORKS	Machine building (cargo rail carriages)	4,000
STAKHANOV FERROALLOY PLANT	Iron and steel metallurgy	1,000
STAKHANOV TECHNICAL CARBON PLANT	Chemical industry	700
STAKHANOV MACHINE BUILDING PLANT	Machine building	200

4. SIZE AND VISUAL CHARACTERISTICS OF THE SITE

The site which was investigated during the due-diligence phase has overall size of 52,98ha. It could be structured into three parts (25,32+20,41+7,25 ha).

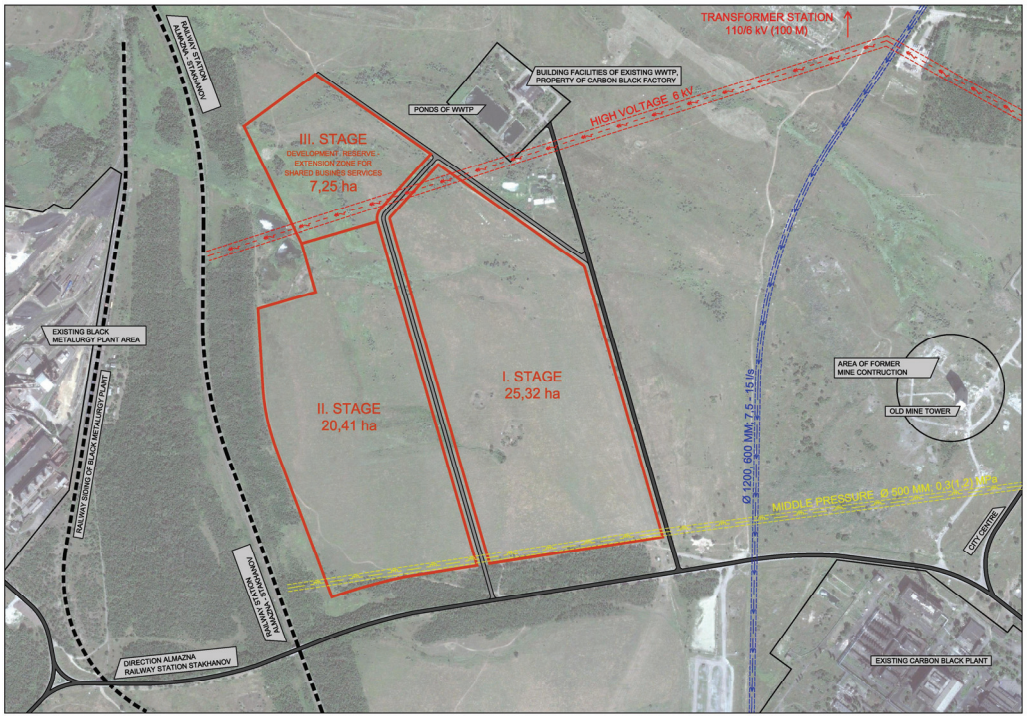
It should be noted that some discrepancy (4%) between the size indicated by city (51 ha) and measurement done using CAD tools (52,98 ha) has been found by LINC experts. Due to requests of conceptual design CAD measured size was taken as a basic platform.

The site is sloped from south to north and from east to west. Not having altitudes in maps, the LINC experts estimate that south-north sloping is prevailing which is proved among other also by the position of WWTP of carbon black plant quite close to northern parts of the investigated site. An altitude difference in south-north direction was estimated by experts approx. 10-15 m.

The site is flat and without any trees and agricultural production on it. During the site visit there was no evidence of underground water on site, however, March period for the DD visit and generally wet land should be taken into account. With the exception of southern border influenced by middle pressure gas pipe marginally there are no infrastructure objects' protection areas that would determine the shape and use of the site.

Flat surface of the site with the black metallurgy plant in the background

Results of the overall site analysis can be found at following picture. It is clear that the site can be structured into 3 main parts, all together with total size 52,98 ha.



Results of site analysis, Stakhanov, 52,98 ha

5. TRANSPORT INFRASTRUCTURE

5.1. ROADS

The site is served only by local/municipal road network. The site is well accessible from city centre within less than 15 minutes. All access roads are paved and of relatively good duality. The closest regional road is No.: T 0504 connecting the Stakhanov with Brjanka.

The nearest important road junction point of international/national importance is the crossing of E50 (Charkiv–Rostov) and E40 (Horlivka-Alchevsk-Luhansk) is located in approx. 60 km distance from the city of Stakhanov. Regional metropolis of Luhansk is accessible by car within 50 minutes. Anyway, as in majority of Luhansk region territory road network is in very poor shape and requires immediate maintenance.

5.2. RAILWAYS

The railway station Stakhanov is in the city of Almazivka, approx. 7 km from the site to the South. It is connecting Stakhanov with Horlivka (on the South-East) and with the Pervomajsk (on the North). This rail-line is leading adjacently the site itself and from that rail-line also railway sidings are leading to black metallurgy plant and carbon black plan in Stakhanov.

6. TECHNICAL INFRASTRUCTURE

6.1. GAS – CAPACITY AND NETWORK

There is middle pressured gas pipe leading through the site. It has been designed for the pressure P = 1.2 MPa, however today is operated at P=0,3 MP. Its protection area is 10 m on both sides of the pipeline (of Ø 500 mm). According to city officials the connection point can be placed at existing pipe in approx. distance of 300 m from the site boundary to the East. According to city representatives the available volume of gas that can be delivered/sold for the purposes of industrial park development is 2.500.000 m3/year.

6.2. ELECTRIC ENERGY – CAPACITY AND NETWORK

There is transformer station TS 110/6 KV identified approx. 500 m from the site which can be used as a connection point of electric energy.

According to city specialist the full capacity of that TS is 16 MW, while approx. 10 MW can be delivered/sold for the purposes of industrial park development – new ciustomers.

6.3. WATER – CAPACITY AND NETWORK

The water supply and sewerage systems were laid during the mine construction, however, given the considerable time from the construction conservation, the availability of these communications needs to be clarified and corrected if necessary.

Anyway, according to city officials there are 3 water mains leading in close proximity of the site (up to 300 m): 2 x Dn 600 mm and 1 x Dn 1200 mm. The volume of consumed water is rather unlimited, according to city specialist 7,5-15 l/s for the beginning of the development is absolutely confirmed.

6.4. SEWAGE NETWORK AND WWTP

Sewage network does not exist on site. The nearest gravitation sewage network is in the inner city of Stakhanov in approx. 3,5 km distance from the site. To get this network, the pumped sewage line is needed due to altitude differences. Municipal sewage network is collected the sewage water from the city and leads it to WWTP with the overall treatment capacity of 35.000 m3/day of which is only 50% used/loaded; thus approx. 17.500 m3/day is WWTP capacity reserve.

There is also another privately owned WWTP very close to the site. According to result of DD visit it belongs to carbon black plant and it is in operation today. It consists of building facilities and two pounds. The overall capacity and its loading have not been disclosed.

7. OTHER SIGNIFICANT FINDINGS ON SITE

It is obvious that the site is located in immediate proximity of old underground mine construction. Based on experts estimation no specific protection areas need to be applied when take into account existing condition. Anyway more detailed measurement is strongly recommended. Moreover following additional studies have to be executed to make the investors entry on site as smooth as possible:

- detailed cadastral and topography mapping with the measurement of altitudes and facilities on site
- detailed investigation/mapping and passportization of the old facilities/conditions hidden underground with special focus at mine impacts (mainly: methane, mine water, unexpected decline of foundation soil, others….)
- technical study to verify the capacities and connection points of the all kind of required technical infrastructure
- outputs of all studies (graphical parts) must be in digital .dwg or .dgn format which are internationally recognized

It can be expected that this process will take 10-12 months but for successful future development of the industrial park it is essential.

CONCEPTUAL DESIGN REPORT

8. DEVELOPMENT MOTTO AND VISION

8.1. GLOBAL TRENDS AND ASSUMPTIONS

From a long-term perspective, the expected continuing growth of the Ukrainian national economy will generate a higher demand for more advanced business locations. It will also lead to the development of a more sophisticated production infrastructure that will benefit both domestic Ukrainian producers and international investors (FDI). It is estimated that this domestic demand for advanced business accommodation will be larger in industrialized agglomerations and important transport nodes, where both indigenous and international businesses are already established. This could be the case for Stakhanov, given its location in the heavy industrialized Donbas agglomeration and given its good accessibility in the framework of various cities in western/central parts of Luhansk region.

The proposed development plan, of which this conceptual design report is one step, also aims to attract FDI-companies to the city. It is assumed that FDI-companies (especially investments in production facilities) will continue to move some of their operations from Western or Central Europe to the East. Last months of 2011 also showed higher activities of Asian investors, mainly those ones from China, Singapore and Tchai-wan.

This is due to their mobility and the permanent need to seek the most cost-effective conditions to compete at global markets. It is assumed that this move will take place within the next 10-15 years and that Ukraine has the potential of playing a significant role as one of the "hot spots" in Eastern Europe. Parts of the country will be able to accommodate the spatial requirements for the expected FDI influx. It is obvious that the best prepared sites will have the focus of foreign investors first.

Experience from the development of Central Europe shows that, for the location of foreign direct investments, the number of inhabitants of the city itself is relatively unimportant. Of larger significance are the infrastructural / logistical relations, accessibility and connectivity of the site (or city), the structure and strength of the regional economy, and the size of the site in relation to the economical strength of the city. This relation has been analyzed in the framework of this project and the outputs of the analysis are included in attachment No.1.

8.2. LOCAL DEVELOPMENT SPECIFICS AND PRE-CONDITIONS

From a local perspective, a specific location of the site in Stakhanov should be the main driver of the development of a new industrial park. The site is located in a very industrialized part of the city, where two major industrial plants already exist and are fully operated (carbon black and black metallurgy production). Since the site is located out of the residential districts of the city, it is expected less environmental sensitivity regarding the location of the new productions here.

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In 2000, Kharkiv Institute "Yuzhhiproshakht" developed the project of renovation of construction of the mine "Myronivska", but up to date no funds were allocated for implementation and the project should be adjusted. At the Soviet time it was planned also to build a coke and chemistry plant near the mine (considering the availability of coking coal), but the plans never been implemented. There were no FDI attraction cases in the city economy so far. The municipal economy is supported by following largest enterprises:

Name	*Branch (type of production)*	*Number of employees*
STAKHANOV CARRIAGE WORKS	Machine building (cargo rail carriages)	4,000
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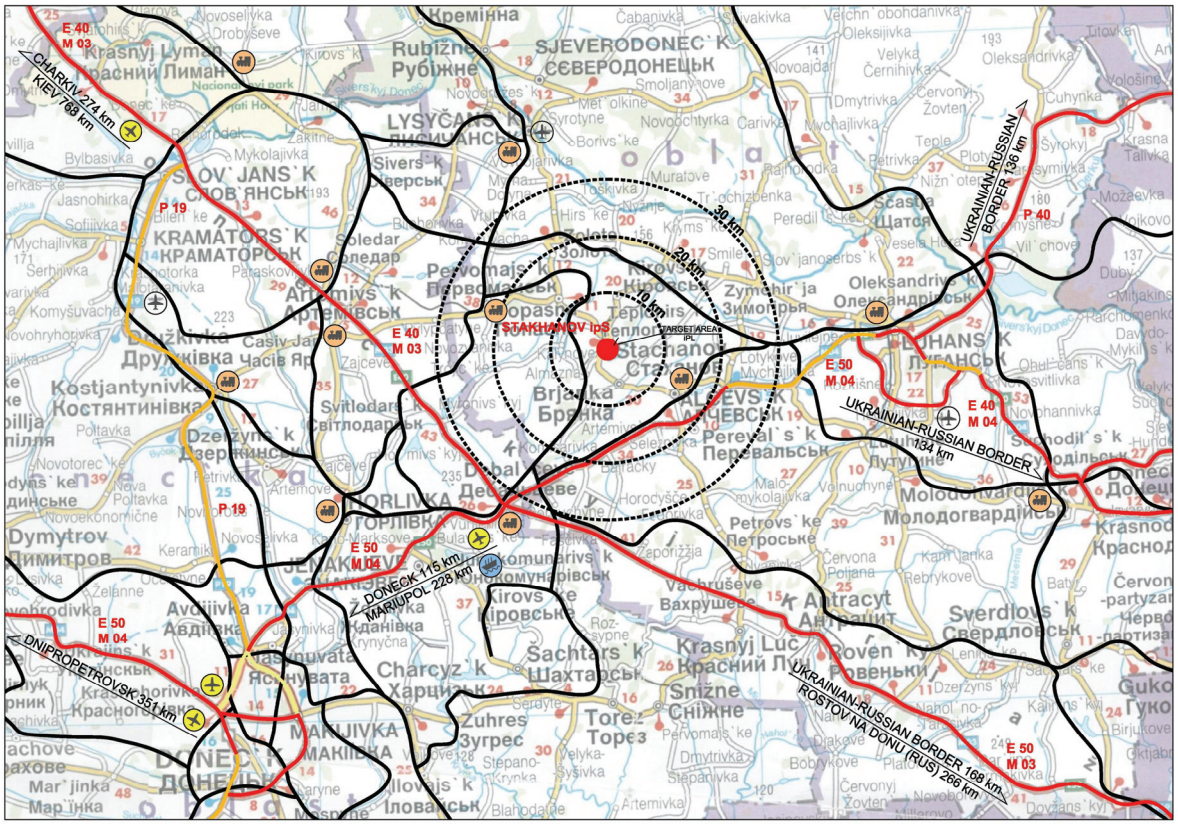
STAKHANOV MACHINE BUILDING PLANT	*Machine building*	*200*



Stakhanov in the middle of catchement area in western/central parts of Luhansk region

The municipal government in Stakhanov intends to diversify its economic base by attracting more companies, both FDI and indigenous. It wants to offer both types of companies a higher-than-so-far quality industrial park for establishment, expanding or relocating their businesses. The main drivers are as follows:

- the city is actively promoting industrial development;
- industrial site of 50 ha is available in the city;
- excellent location of selected site in city industrial part
- available infrastructure;

For comparison: a typical industrial park of local/regional importance in Central Europe has the following spatial parameters:

- a site with 15-40ha of flat land, without any physical barriers or historical pollution;
- at least 50.000 inhabitants in the catchment area (up to 40-45min. accessibility by car/bus);
- no legal-ownership obstacles;
- the site offers flexibility, allowing a division into sub-sites/plots (0,5-3,5ha) for different owners;
- the plots accommodate industrial productive halls of various sizes (from 800 – 8.000 sq.m), or flexible spatial combinations of these;
- all business premises in the industrial park are free standing buildings/halls;
- a concrete plot offered to an investor should be able to accommodate future extensions of the investor's production facility - this means that the initial development shouldn't be too intensive;

- a step-by-step development ensuring the flexibility and opportunities to adapt to changing demands;
- a maximum distance of ten kilometers to the national and regional road network;
- the possibility of having special services on site (a multifunctional centre with some potentially shared services as a minimum: copying, legal services, catering, retail);
- the availability of infrastructure for an adequate accessibility of both the entire site and the individual building plots;
- a decentralized Park Management Unit (PMU) is recommended but not necessary; this can also be provided for by a city official from a centralized basis (e.g. city hall).

Concluding, the site in Stakhanov has almost all of the above features that are essential for a successful local/regional industrial park.

8.3. DEVELOPMENT VISION

The development vision is to create an industrial park that will play a significant role in accommodating the needs of both indigenous and FDI industries coming to Stakhanov to search for advanced business infrastructure. Industrial park should also attract the labor force from neighboring cities in Luhansk region..

This includes the development of a flexible and attractive local/regional industrial park with the working title Industrial Park Stakhanov (abbreviation ipS) with a total size of 52,98 ha. The ipS should attract companies seeking good conditions for the establishment of their production/logistic base, including a stable and committed local government.

It is important to note: at this moment it is unknown what companies will locate in Stakhanov´s industrial park. Therefore the development concept needs to be flexible, meanwhile taking into account the general types of industries that can be expected on this location.

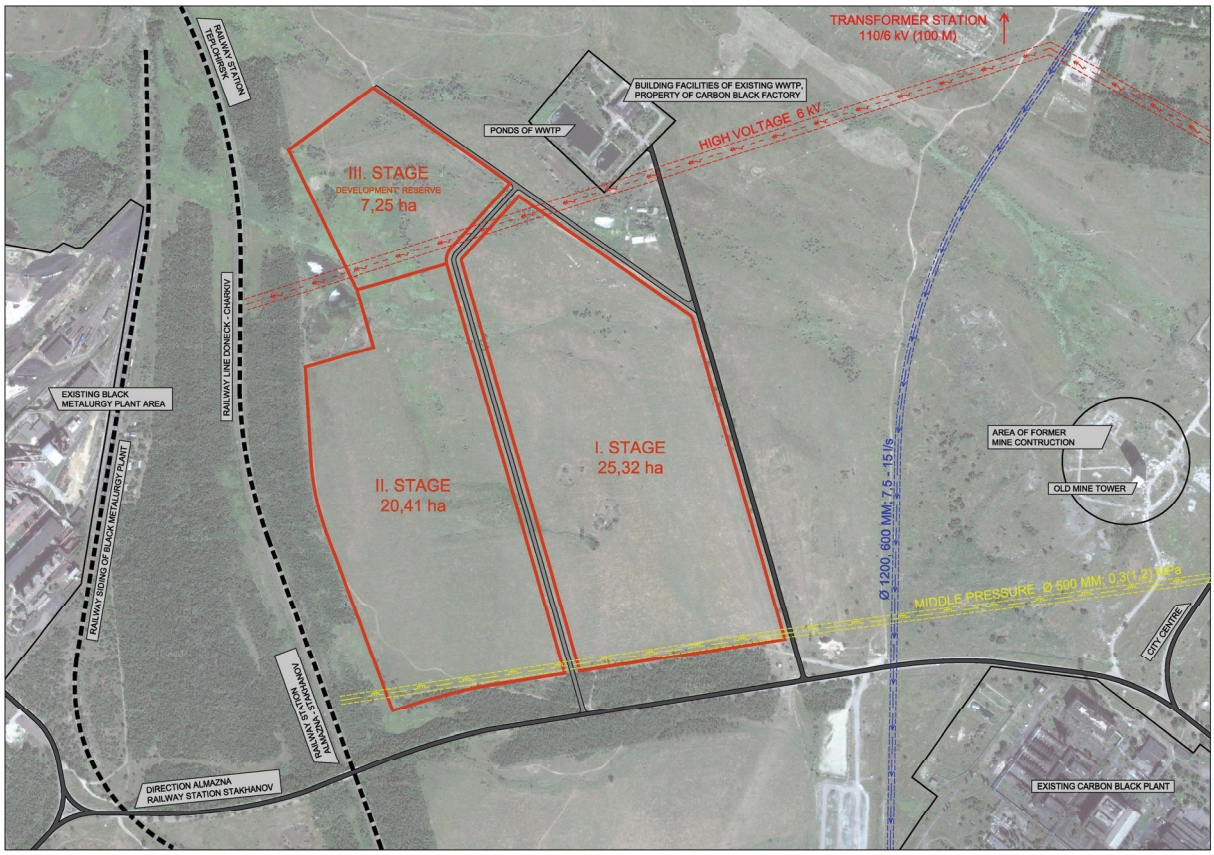
Due to the local specifics (good access from the south on existing paved roads, already industrialized area located out of the city, infrastructure on site, low sloping of the site, sufficient labor sources in catchments area, difficult start-up phases) it seems to be realistic to develop two phases of the site with the aim to attract rather medium sized industries which can not be located in the areas closer to the cities and which have higher than low energetic demand. So called phase III is kept unplanned as a development reserve if the concept is extremely successful. This translates to a spatial concept that can be described as follows:

- **Phase I**: total area of 25,32 ha where mixture of spaces/functions is offered, industrial/manufacturing/warehousing halls have from 3.000 - 9.000 sq.m. with a lot of spatial flexibility for future extensions, spatial needs of rather productive investment are planned.

- **Phase II:** total area of 20,41 ha where monofunctionality prevails, halls are bigger than in phase I having sizes from 5.000 sq.m up to 10.000 sq.m. Flexibility for future extension is kept.

- **Phase III:** total area of 7,25 ha is kept as a development reserve. It is located in lowest part of the site in close proximity of existing WWTP of carbon plcak production factory. It should be planned and developed according to results of phases I and II.

There is also some reserve on sites of phases I or II for the development of a "shared business services center". Optionally, this could be an investment by the city itself. A fully occupied industrial park will usually generate demand for the following services and functions: office accommodation, retail, catering, legal services, accounting services, reprography, and other commercial services that are not being developed with the industrial premises. If the development of the ipS is managed by the city itself as a project, then this would also be a suitable location for the Project Management Unit (PMU).



Situation on site

9. DEVELOPMENT PHASES

A site with a total area of about 45,73ha[2] has been divided in phases to accommodate step-by-step development. At this stage, (with data currently available) we assume that the development will start at the eastern part of the site – at the plots of phase I and will be followed by development of western part – phase II.

Phase	*Area (ha)*	*Proposed general function*	*Not recommended*
Phase I	25,32	Medium sized industrial productions with higher energetic demand – manufacturing industries, processing of metal parts, machinery, reparation of heavier machines, assembly of bigger parts, similar	Electronic industries, clean productions, food processing
Phase II	20,41	At least medium sized logistic and warehousing facilities	Food warehousing
Total area	**45,73 ha**		

The proposed layout of each part, as well as its position in the overall framework of the site, is shown in the following scheme. Due to the mining history of the site there is still an uncertainty about the location and/or functionality of the potential underground facilities. It is strongly recommended to make a detailed measurement and mapping of all underground infrastructure before starting the development process.

[2] Without development reserve of 7,25 ha

Plots available in Stakhanov

10. SPATIAL DEVELOPMENT FRAMEWORK

The development framework of the site aims to provide a flexible spatial layout, while making optimal use of the available land. When developing and zoning the site, a number of parameters have to be taken into account. The conceptual design has thus taken into account the following key points:

- good accessibility from the south and east on existing well paved roads
- existing industrial facilities in immediate neighborhood
- accessibility from the north is difficult even in the future and can not be easily improved
- northern border is in immediate contact with the biological cleaning ponds and WWTP in private ownership the parameters of which are unknown
- southern border clear (road) and can't be moved
- medium pressured gas-pipe leading just on southern border – location to be identified properly
- electricity (transformer station) and gas (gas reduction station) in proximity to the site
- a spatial plan that can be developed flexible in time
- sloping of the site from south to north
- no residential zones in the proximity of the site

A key factor of success for each industrial park is the attraction of a so called 'anchor investor' to either phase I or phase II. This 'anchor investor' is a strong enterprise with a sound brand, being either an indigenous or a foreign company. Usually other investors will then be attracted to the site as well. The profile of the 'anchor investor' often determines the profile of the park as a whole. Thus, it will function as a promoter for the future development of the entire park.

Phase I: description of the spatial development framework

Plots of phase I can satisfy the spatial needs of max. 10 investors which are seeking the plots with sizes from 5-10 ha in order to built the halls or other industrial facilities with approx. 3.000 – 5.000 sq.m. of gross floor area. As higher flexibility will be required regarding the future extension of the industrial facilities as lower number of final investors can be welcomed.

Phase II: description of the spatial development framework

Plots of phase II can satisfy the spatial needs of max. 6 investors which are seeking the plots with sizes from 5-15 ha in order to built rather larger storage and warehousing facilities with approx. 5.000 – 10.000 sq.m. of gross floor area. As higher flexibility will be required regarding the future extension of the warehousing facilities as lower number of final investors can be welcomed.

It is assumed that the plots of phase II will be developed after the completion of phase I. This allows for the reinvestment of the revenues from phase I, thus decreasing the need to rely on external funding sources.

Phase III: description of the spatial development framework

Reserve of 7,25 is kept as unplanned. To be planned according to results of phase I and II.

Spatial analysis of sites in Czech cities

A thorough spatial analysis of more than 40 industrial sites in Czech Republic has been made in the framework of this study in order to bring comparative spatial platform for design of the site in Stakhanov.

To have comparable outputs, this study focused at rather smaller and medium sized sites. The results of this analysis are shown in attachment No. 1 to this report, including unique mapping material. Our consultancy found the following conclusions as a result of this analysis, which can be used as an argument for the development of ipS:

- there is a direct relation between the economical strength of a city and its opportunities to properly develop and maintain an industrial park. Although some exceptions exist, larger cities are stronger economically, and will therefore be able to develop larger parks.
- for the category of cities with 20.000 – 25.000 inhabitants[3], in Central Europe a typical industrial park has a size of between 12,0 and 25,0 ha., which represents approximately 2%-9% of the total city area
- for the category of 50.000 – 80.000 inhabitants cities industrial parks are generally larger but lot of exceptions exits
- however the map inputs are not showing the current situation, it is known to the consultant that some of the Czech sites developed at the beginning of the 21st century are not yet fully occupied in 2011.

Conclusion

Taking into account the economical status and differences of central European and Eastern Ukrainian cities it can be concluded that the site in Stakhanov with phases I and II (plus potential development reserve of phase III) which gives totally more than 50 ha of free industrial land is adequate enough for the development of an industrial park for the city of Stakhanov with broader than just local ambitious. Reasons for this are seen in the the good location of Stakhanov towards Alchevsk, Brjanka, Pervomajsk and Kirovsk, the flexibility of the plots in the draft plan and the available regional labor force.

11. INFRASTRUCTURE DEVELOPMENT NEEDS, REQUIREMENTS AND ASSUMPTIONS

The energy demand and consumption has been calculated for following development stages and parameters:

Phase	*Size (ha)*	*GFA/site size (%)*	*Gross floor area of production and business facilities and storage halls (sq.m.)*	*Estimation of people employed[4] (person)*
Phase I	25,32	21%	53.300	500-510
Phase II	20,41	24%	49.700	300-310
Total	**45,72**		**103.000**	**800-820**

[3] It should be take into account that medium sized city in Czech Republic is probably smaller than 40.000 inhabitant while the cities with approx. 80.000 inhabitants and more are regional metropolis. In this sense the city of Stakhanov would belong to major cities of Czech Republlic, while at Ukraine is considered medium-or even- small sized city. Thus, as a typical comparable representants consultant considers examples of the cities of Vyskov, Blansko, Havlickuv Brod, Zdarn. Sazavou, Krnov, Louny – for details pls refer to attachment No.1. Of course there is also exceptional example of the city of Koprivnice with industrial site with more than 80 ha or village Nosovice where Hyundai developed its own factory at the site with more 100 ha. These exceptional examples had not been taken into account.

[4] rounded-off

Other technical assumptions accepted for phases 1-3:

- according to city officials the water sources are almost unlimited
- production industries that are mainly "water-based" can be recommended, on the other hand the situation with sewage network is unclear therefore it is assumed semi-wet character of the coming industries
- production industries can have from medium to higher ddemand for gas and electric energy
- all municipal sewage water of the developed ipS will be properly treated in the existing WWTP which is located away from the site (or in the existing WWTP which belongs to black carbon plant based on business agreement)
- if one of the production facilities will emit industrially polluted water, a special industrial WWTP will have to be located at the ipS or at the investor's own site.
- based on experience from Central Europe logistic, warehousing and less labor intensive productions: 15 person employed/ha while assembly, electronic, light machinery, processing, manufacturing: 20 persons employed/ha
- total number of jobs which can be created on site of ipS is approx. 800 working places

11.1. GAS

Demand for gas

Formula	*Qmax= size (ha) x average relative consumption in m3/hour*					
	ha	*avg estimated consumption m3/hour, ha*	*number of working hours*	*number of working days*	*flexibility adjustment factor*	*approx. estimated total demand for gas m3/year5*
Phase I	25,32	80	8	260	1,1	4.636.000
Phase II	20,41	40	8	260	1,1	1.868.000
Total	45,72					6.504.000

Conclusion

The demand for gas at the fully developed ipR is expected to be about 6,5 million m3 / year for the phases I – II. This equals to approximately 2.842 m3 / hour. Due diligence has shown that, according to city officials and utility providers, a gas quantity of 2,5 mil. m3/year can be delivered. This means that sufficient gas will be available for the development of approx. 50% of phase I (up to 15 ha). Due to the concept implemented the expected consumption of gas is quite high at phase I (industry) and very low at phase II (warehousing).

A potential gas connection point has to be built on existing pipe (new gas reduction station) in approx. distance from the south site border (300 m). A new gas distribution system incl. sub-stations to deliver the gas within the area of both phases will have to be made between this connection point and the proposed sites of phases I – II.

11.2. ELECTRIC ENERGY

Demand for electric energy

Formula	*Qmax= size (ha) x average relative consumption in KW/ha*					
	ha	*avg consumption KW/ha*	*number of working hours*	*number of working days*	*flexibility adjustment*	*total demand for electricity MW*[6]
Phase I	*25,32*	*160*			*1,1*	*4,45*
Phase II	*20,41*	*80*			*1,1*	*1,80*
Total	*45,72*					*6,25*

[5] rounded-off

[6] rounded-off

Conclusion

The total demand for electricity at the ipS is expected to be more than 6,2 MW for the phases I – II. Due diligence has shown that, according to city officials and utility providers, an electrical power of 10 MW can be delivered and sold for the industrial park. This means that enough electrical power will be available for the overall development of phases I – II without any upgrades of existing network and transformer stations.

A potential electrical connection point is the existing transformer station TS 110/6 KV located 500 m to the north of the proposed site. A new connection and sub-TS will have to be made between this point and the proposed sites of phases I – II.

11.3. WATER

Demand for water (not industrial)

Formula	*Qmax= size (ha) x average relative consumption in l/s, ha*					
	ha	*avg consumption l/s, ha*	*number of working hours*	*number of working days*	*Flexibility adjustment*	*total demand for water l/s*[7]
Phase I	25,32	0,9			1,1	25,06
Phase II	20,41	0,4			1,1	8,09
Total	**45,72**					**33,15**

Conclusion

The expected demand for water at the ipS is expected to be more than 33 l/s for the phases I – II. This equals to approximately 119 m3/hour. Due diligence has shown that, according to city officials and utility providers, a water supply is rather unlimited due to 3 x water pipes of big Dn leading almost on site. As a conclusion and based on that indication it can be stated that sufficient water will be available for phases I-II.

A potential water connection point has not been specified during the due diligence phase, anyway it is expected that new water distribution network of ipS will be directly connected to one of 3 pipes available in approx. distance of 200 m from the site.

Depending on the distance from an existing city fire station to the proposed site, a reserve for fire water may be needed. When a fire station is within 2 km. distance, no provisions have to be made. When the fire station is further away, a reserve for fire water of 6,0 l/s has to be made. In this case, the overall capacity of the park is approx. 39 l/s which is still in the framework of existing capacities in the city which is considered and declared to be "unlimited".

Anyway a final technical solution for delivering fire water to the site still has to be discussed carefully.

11.4. SEWAGE WATER

Demand for water (not industrial)

Formula	*Qmax= size (ha) x average relative consumption in l/s, ha*					
	ha	*avg consumption l/s, ha*	*number of working hours*	*number of working days*	*Flexibility adjustment*	*total demand for water l/s*[8]
Phase I	25,32	0,9			1,1	25,06
Phase II	20,41	0,4			1,1	8,09
Total	**45,72**					**33,15**

Conclusion

The assumption behind the sewage water calculation is that all water that is being brought into the site will be used, and should thereafter be treated properly by a sewage system and a waste water treatment plant (WWTP). The expected amount of sewage water from ipS approximately 119 m3/hour of waste which gives approx. 1.000 m3/day.

[7] rounded-off

[8] rounded-off

Due diligence has shown that, according to city officials and utility providers, the municipal WWTP is available with the daily reserve bigger than 17.000m3/day. So, the capacity of WWTP is sufficient for phase I and II.

Another issue is absence of the sewage network in site area. To connect the site with WWTP approx. 3,5 km of new pumped sewage line has to be built. Another option is to investigate the opportunity to build gravitation sewage line and to connect ipS with the existing WWTP on the north of the site which requires business negotiation with its owner. Anyway if the capacity reserve is there, second option would be extremely cost-effective solution.

Also, it is assumed that no industrially polluted water is included in the total amount calculated. This water has to be treated properly by companies themselves.

11.5. SURFACE WATER

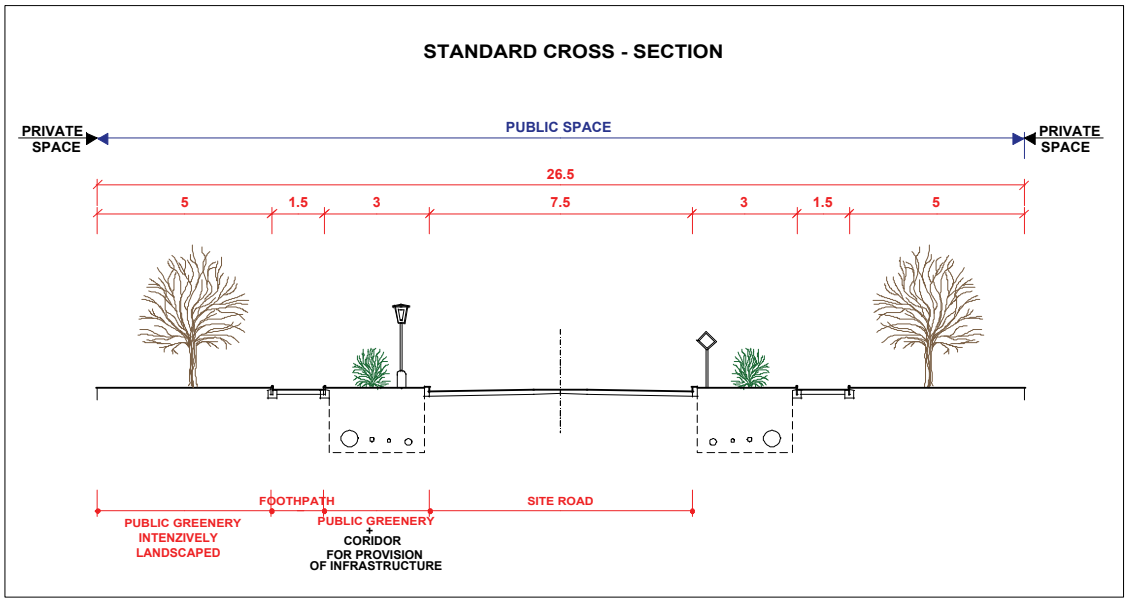
Calculation of surface water for phases I-IIII

Qmax= size[9] phase I-II (ha) x 0,6 x 60l/s = 45,72 x 0,6 x 60 = 1.645 l/s

Conclusion

The paved and built up areas within the ipS will be large, meaning that the needed discharge of surface water after heavy rainfall will also be sizeable. This water should be treated properly. A partial retention (up to 5.000 m3) is recommended for the lowest part of the site on the north in the form of a retention lake, which will also help to enhance the environmental qualities of working space. This retention facility should be designed in such a way to be able to collect approx. 80% of rain-fall water from sites I-III created by 60 min of heavy rainfall (which equals approx. to 4.700 m3/hour). Secondly, a part of the surface water in amount of 20% (which equals approx. to 1.200 m3/hour) must be treated by the private companies at their own sites or discharged by rain-water sewage line of at least DN 600mm out of the site.

11.6. STANDARD CROSS-SECTION



Conclusion:

A spatial configuration of a cross section is proposed to be able to maintain the public space of the industrial park in the future. Good maintenance is needed to preserve the quality of the park and thus keep it attractive for future investors. The layout (e.g. width) of the road and the footpath can be adjusted to local road standards, safety regulations or other local rules. If the road crosses through the ipS, a footpath is recommended on both sides of the road. If it's at the edge of the park, a single-sided footpath is sufficient. The so called "public

[9] Size of the paved parking places + paved roads + paved footpaths + total size of the roofs of the production facilities and other buildings, approx 60% of the size of site is considered as a built-up area

space" usually remains in public ownership and is maintained by the city itself (highlighted in blue on the picture above).

12. BILL OF DEVELOPMENT QUANTITIES

The table below roughly and provisionally shows the public investments that will be needed to realize phases I-II of ipS, based on the calculation of the development quantities. The breakdown of quantities into the phases is done according to expected approx. ratio 55/45 taking into account the sizes of the different phases. The assumption is made that the public sector will be responsible only for back-bone infrastructure and public spaces development; the investments in building plots will be the matter of private investment.

The breakdown of quantities is an estimation that will turn out to be different in reality. Yet, it is sufficient for the conceptual thinking in the current stage of development; it provides the city with a clear picture of the investments that are needed for the initial development. The calculation also shows how the initial costs could be divided among the investors or tenants of different phases. Final remark: additional investment actions realised outside of the development site of ipS are not included in the bill of quantities[10].

Bill of quantities

Item No.:	*Item*	*Unit*	*phase I*	*phase II*		*Total*
			25,32 ha	*20,41 ha*		*45,32 ha*
			55%	*45%*		*100%*
1.	Purchase of the land	ha	0	0		0
2.	Public paved site roads w. 7,6 m incl. road signs	sq.m	4.180	3.420		7.600
3.	Public parking places incl. road signs	sq.m	n.a.			
4.	Public footpaths w. 1,5m incl. orientation system	sq.m	825	675		1.500
5.	Public green strips w. 3,0m incl. landscaping	sq.m	3.300	2.700		6.000
6.	Public green barriers with landscaping	sq.m.	n.a.			
7.	Backbone infrastructure - gas network incl. sub-connection points, Dn 150-200 mm	m	550	450		1.000
8.	Backbone infrastructure - water network inc. sub-connection points, Dn 300mm	m	550	450		1.000
9.	Backbone infrastructure - electric network incl. sub-transformer station	m	550	450		1.000
10.	Backbone infrastructure - sewage network incl. sub-connection points, Dn up to 600 mm	m	550	450		1.000
11.	Backbone infrastructure - surface water network/drainage incl. sub-connection points, Dn up to 800 mm	m	550	450		1.000

[10] E.g. mainly: road crossing, roundabouts, bridges, necessary upgrade of the existing WWTP, necessary upgrade of the existing transformer station, necessary upgrade of the existing gas reduction station , necessary upgrade of the existing water sources and other similar additional investment projects caused by development out of site territory. To assess and to quantify this investment seriously a more detailed study is needed.

The table below shows the bill of quantities regarding the land to be sold to investors and the land alongside the back-bone infrastructure which should remain in public ownership.

Bill of quantities – land for sale v. land to remain in public ownership

Item No.:	*Item*	*Unit*	*phase I*	*phase II*		*Total*
			25,32 ha	*20.41 ha*		*45,32 ha*
1.	Land for sale to investors	ha	24,42	19,39		43,81
2.	Land to remain in public ownership (public space: roads, foothpaths, greenery areas within the site)	ha	n.a.	n.a.		1,51

13. DEVELOPMENT COSTS

The table below shows the approximate initial investments that have to be done by the public sector to meet the standard requirements of the investors coming to the park[11].

Bill of quantities - initial public investment

Item No.:	*Item*	*Unit*	*Units needed with all plots fully developed*	*unit price[12] (EUR)*	*total price (EUR)*
1.	Purchase of the land	ha	0		0
2.	Public paved site roads incl. road signs	sq.m	7.600	60	456.000
3.	Public parking places incl. road signs	sq.m			
4.	Public footpaths incl. orientation system	sq.m	1.500	30	45.000
5.	Public green areas incl. Landscaping	sq.m	6.000	15	90.000
6.	Public green barriers	sq.m.	0	5	0
7.	Backbone infrastructure - gas network incl. sub-connection points, Dn 150-200 mm	m	1.000	120	120.000
8.	Backbone infrastructure - water network inc. sub-connection points, Dn 300mm	m	1.000	210	210.000
9.	Backbone infrastructure - electric network incl. sub-transformer station[2]	m	1.000	150	150.000
10.	Backbone infrastructure - sewage network incl. sub-connection points, Dn up to 600 mm	m	1.000	250	250.000
11.	Backbone infrastructure - surface water network/drainage incl. sub-connection points, Dn up to 800 mm	m	1.000	250	250.000
	total EUR				**1.571.000**

[11] The cost of a new artesian well and the retention lake are not yet taken into account

[12] Based on approx. Central European unit prices, approx. price level 2009-2011. To be recalculated according to local price level with inclusion of all additional investment specified in the text above.

It is estimated that due to specific layout more than 80 % of the total cost should be spent to open the sites of phase I. This represents an investment of more than 1.25 mil. EUR, not taking into account additional investments that will be needed around the site as well as the cost of the necessary connection/access rights to infrastructural property of second parties. This investment will produce a fully serviced industrial site with more than 40 ha square meters that can be sold/leased to investors in order to develop there the industrial facilities with total size more than 100.000 sq.m. of gross floor area and to create approx. 800 working places in the city.

14. FEASIBILITY REPORT, RISK ANALYSIS AND FOLLOW UP ACTIONS IDENTIFICATION

The aim of this chapter is to identify the potential risks of possible development and propose a combination of measures to minimise them. The risks are evaluated only from the point of view of the technical and environmental aspect. There are certainly other risk portfolios at business, political, institutional and organisational level, but these are not managed in this concept.

No. :	*Specification of risk*	*Level*[13]	*Proposed measures*
1.	Old mines impacts	A	Detailed study of potential old mines impacts
2.	Uncertainty/unstability of the gas, el. energy and water supply	C	Evaluate / measure the use of energies when phase I is halfway finished. Include additional investments in the budget if necessary. Discuss total consumption of the park and possible methods of upgrading the network with administrator of utility providers in the city
3.	Insufficient information about the underground infrastructure on site.	B	Perform a technical study on on-site infrastructure before the start of the development
4.	Air/Noise pollution in relation to the existing housing/gardening.	B	Heavy industry should be avoided at the site. For specific types of lighter industry, an air and noise spread study might be required to avoid negative impact on the nearby housing area. To develop the green barriers. The prevailing direction of the wind should be taken into account
5.	Pollution of surface water	B	Surface water should be treated in a waste water treatment plant before being discharged in a river. Industrially polluted water has to be cleaned by companies themselves, this should be regularly checked and enforced by city officials
6.	Soil contamination	C	Any possibility of local soil contamination must be eliminated by organisational regulations and construction alterations in the industrial areas. Companies must adhere to the system for handling waste; this should be enforced by city officials
7.	Potential risk of contamination of groundwater (by production facilities).	B	Foundations should correspond to hydrogeological conditions. All the functional areas of the industrial site must have paved surfaces. Substances harmful to water should be stored in special purpose areas only in the necessary amounts.
8.	Industrial accidents	B	Prepare accident measures plan for the park management and require accident planning from all investors entering the ipR

[13] Level A: highest risk category (project as whole is jeopardized if proposed measure is not taking into account properly)

Level B: risk still important, but lower than level A

Level C: lowest risk