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FEATURES OF LANDSCAPE AND URBANOF OIL AND GAS FACTORIES OF THE WESTERN REGION OF UKRAINE

KRAJOBRAZOWE I URBANISTYCZNE CECHY PRZEDSIĘBIORSTW NAFTOWYCH I GAZOWYCH ZACHODNIEGO REGIONU UKRAINY

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ABSTRACT

The main purpose of the article is to identify the features of landscape and urban of oil and gas companies in the Western region of Ukraine. Twenty-two enterprises which are located in Ivano-Frankivsk, Lviv and Ternopil regions were analyzed. The analysis includes: localization of objects and their grouping by functional types taking into account the territorial and historical context; formation of methodical tools, determination of criteria for assessment of landscape and urban properties; the obtained research results are summarized according to the defined evaluation criteria. It is an attempt to find new approaches to the reorganization of facilities, taking into account their condition and functioning.

Key words: Features of landscape and urban; location of objects; oil and gas complex objects; shape of the site of enterprises; terrain of objects.

1. INTRODUCTION

The development of industrial architecture, which occurred at the end XIX century, with different dynamics continues today. There are periods of prosperity and decline, which are caused by military events, technological developments, changes in the administrative system, forms of ownership and methods of management. A large number of enterprises, having preserved almost two hundred years of history of the oil and gas industry in the Western regions of Ukraine (historically – Eastern Galicia (Mukha, 2006), still function today. They often occupy large areas, act as town-forming elements of the settlement system, form architectural and landscape dominants. Accordingly, there is a need to study the landscape and urban features of such enterprises and their functioning, outline the main problems and develop practical recommendations for their reorganization and use in the new socio-economic conditions of the region.

Many researches of urban and landscape aspects of the formation, development and transformation of industrial areas are presented in the scientific literature. In particular, we should highlight the work of S. P. Biriuk, A. M. Pleshkanovska, S. P. Tsyhychko, H. P. Petryshyn, V. I. Vershynin, N. Dzh. Kirkvud, A. Gil, N. Juzwa, A. Sulimowska-Ociepka, A. Witeczek.

Historical aspects of the development of the oil and gas industry in Western Ukraine are presented in the works of K. Lorenz, J. Szwed-Lorenz, S. Slusarczyk, T. Filozof, T. A. Olszanski. The principles and formation of landscape and urban organization were covered in their research by Ya. T. Senkovska, O. S. Bezliubchenko, O. V. Zavalnyi, A. Świtalska T. O. Chernonosova, I. D. Rodichkin, Yu. O. Bondar, A. P. Verhunov, D. K. Leikina.

The territory of Western Ukraine is one of the world's oldest oil production areas. Oil was used for medical and economic purposes in Galicia in the thirteenth century. The first written mention of oil was found in the Carpathians in the chronicles of historian Yan Dluhosh in the XV century. Ukraine has been and remains an economic partner of the oil and gas industry in Europe and many other countries. Close cooperation began in the middle of the XIX century, when in the territory of Western Ukraine there was an industrial extraction and processing of oil brine. This led to the construction of oil refineries and refineries (in Pechenizhyn, Bolekhiv, Drohobych, Nadvirna). Austro-German, Belgian, Polish, Dutch and French firms operated at the beginning. XX century on the territory of Eastern Galicia. It has become a leading sector of the economy with the beginning of gas production. The first interstate gas supplies in the world were made from the territory of Ukraine. Large deposits of oil and gas are located in the Carpathian oil and gas province. The Bilche-Volytsko-Uherske Underground Gas Storage is the second largest in Europe and the largest in Ukraine. At present, Ukraine is a world leader in oil and gas transit. Favorable geographical location, the presence of a developed system of pipelines and natural resources allows Ukraine to be a leading link in the oil and gas industry.

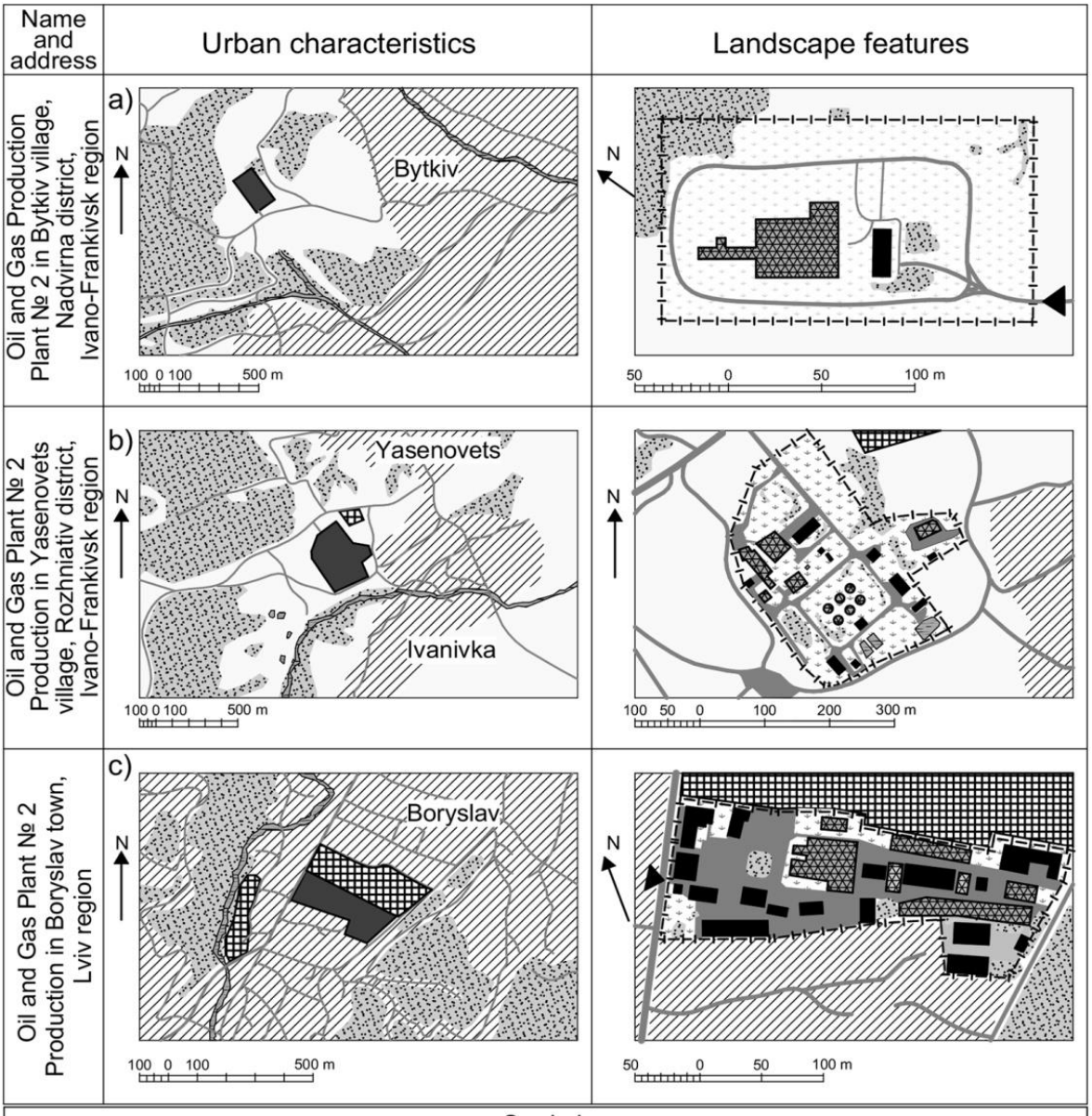
Since exploration of oil and gas fields as a complex of geological and industrial researches, geodetic developments, does not include, as a rule, in the territory of capital buildings and constructions – their research was not carried out by authors.

2. EXTRACTION ENTERPRISES

The Pre-Carpathian oil and gas region, which is located within the territories of the former Eastern Galicia, has a large number of oil and gas fields (Bilchevolytske, Oparske, Rudkivske, Boryslavske, Bohorodchanske, etc.). The territory that is marked (fenced) within the allotted land plot, with industrial, warehouse and administrative buildings, structures, open technological sites and technological equipment located on it is an object of oil and gas industry (Legislation of Ukraine, 2008). Drilling rigs – drilling rigs are structural units of oil and gas fields. Rocking machine is one of the most common mining facilities, which, like the drilling rig, is the dominant medium. Wells are located both within and outside the settlements. Oil and gas production plants are included in this area.

The study was carried out on three objects (Fig. 1): Oil and Gas Production Plant № 2 in the urban-type settlement of Bytkiv, Nadvirna district; Oil and Gas Production Plant № 2 in the village of

Yasenovets, Rozhniativ district, Ivano-Frankivsk region; Oil and Gas production Plant № 1 in Boryslav town, Lviv region.



Symbols:					
marking	*name*	*marking*	*name*	*marking*	*name*
	– modern site boundaries		– habitable territory		– ruined buildings
	– initial site boundaries		– buildings		– roads
	– approximate object location		– buildings built before 1939		– railway line
					– rivers, reservoirs
	– main entrance		– facilities		– grass
	– objects of oil and gas complex		– other industrial objects		– greenery

Fig. 1. Scheme of landscape and urban analysis of enterprises in the field of extraction. Source: author's drawing. Symbols are relevant for all tables.

Oil and gas production facilities take different forms and occupy different locations. Rectangular plots are common, located mainly outside the settlement area (Oil and Gas Production Plant № 2

in the urban-type settlement of Bytkiv, Nadvirna district, Ivano-Frankivsk region; Oil and Gas Production Plant № 1 in the town of Dolyna, Ivano-Frankivsk region). There are also areas of irregular shape, which are located within the settlement or on the periphery (Oil and Gas production Plant № 2 in the village of Yasenovets, Rozhnyativ district, Ivano-Frankivsk region; Oil and Gas Production Plant № 1 in the town of Boryslav, Lviv region). It is obvious that the shape of the territory of such enterprises is determined by their location, especially within the settlement, where it is necessary to proceed from the conditions that dictate not only the natural but also the urban environment.

We characterize **the Oil and Gas Production Plant № 1 in Boryslav town, Lviv region** (Fig. 3). It is located on the southern outskirts of the village, in the structure of the settlement area. The height above sea level is 400 m (Public cadastral map of Ukraine, 2020). The plant borders on the industrial territory on the north and south-east side, on the west and south-west – with residential, in the south-west it is limited by the highway and the green zone of the city. The Tysmenytsia River flows at a distance of 200 m. The company has a good relationship with the city, as it is limited on both sides by highways. The territory is flat, has a shape close to a rectangular size of 120 by 340 m with an area of 3.4 hectares (Public cadastral map of Ukraine, 2020). The road network has an asphalt surface and a regular planning system. Greenery is in the form of group and linear plantings of trees and shrubs. There are no artificial or natural reservoirs on the site. The south-eastern part of the enterprise is abandoned and overgrown with bushes. The facility is partially operational.

3. TRANSPORTATION FACILITIES AND STRUCTURES

Pipelines are the main mode of oil and gas transportation, compressor and oil pumping stations are an integral part of them. Refineries belonged to the field of transportation in the late XIX – early XX century.

A compressor station is used to increase the energy of the gas and its pumping by the linear part of the pipeline (Biletskyi, 2004). An oil pumping station is a set of structures and equipment that carry out and provide the process of oil transportation by main oil pipelines (Legislation of Ukraine, 2007). Characteristics and analysis are covered (Fig. 2): Bogorodchany Compressor Station in the urban-type settlement of Bogorodchany, Ivano-Frankivsk region; Ternopil Compressor Station in the city of Ternopil; Kurovichi Oil Pumping Station in the village of Kurovychi, Zolochiv district, Lviv region; Zhulyn Oil Pumping Station in the village of Zhulyn, Stryi district, Lviv region; Bolekhiv Refinery in the town of Bolekhiv, Ivano-Frankivsk region (Kucher, Skvorii, Synenko & Yasinskyi, 2011; Stanislavsky District Mining Administration, 1934-1937), as well as refinery in the urban-type settlement of Pechenizhyn, Kolomyia district, Ivano-Frankivsk region.

Transportation enterprises are located outside residential areas (Bogorodchany Compressor Station in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region, Dolyna Compressor Station in the town of Dolyna, Ivano-Frankivsk region) and on the border with them in the industrial zone of the settlement (Ternopil Compressor Station in the city of Ternopil). The construction of refineries was originally carried out outside the settlements. They fall into its structure due to the expansion of settlements. The plots have a shape close to a rectangular one (Bohorodchany Compressor Station in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region). In most cases, they are limited to greenery.

Bohorodchany Compressor Station in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region (Fig. 3): the history of this facility dates back to the last century, when large-scale construction of main gas pipelines and compressor stations began in the 1970s and 1980s. In 1975, a detachment of Hungarian builders arrived in the urban-type settlement of Bohorodchany, who built a powerful compressor station on the Soyuz gas pipeline (Stepiuk & Slobodian, 2012). The gas compressor station is located in the eastern part of the settlement, the distance to the settlement is 1.3 km, to the neighboring village of Pokhivka – 700 m. The height above sea level is 340 m (Public cadastral map of Ukraine, 2020). The plot borders on the Bohorodchany greenhouse on the south-western side, on the other – it is partially surrounded by forested agricultural lands. Reservoirs are located on both

sides of the site at a distance of 350 and 430 m. The facility is located next to a local highway and has good transport links with the village. The territory has a flat relief, in plan close to a rectangle with ledges.

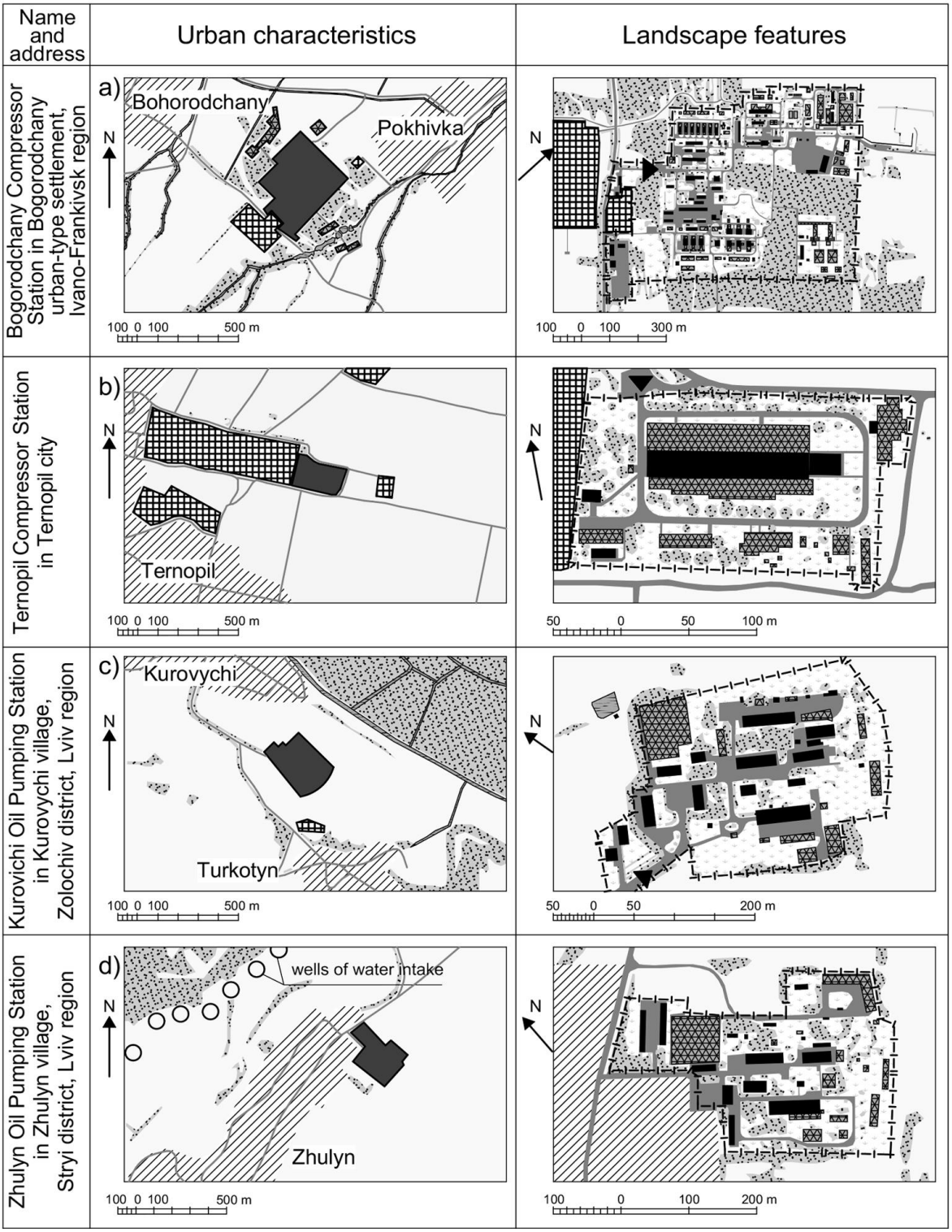


Fig. 2.1. Scheme of landscape and urban analysis of enterprises in the field of transportation. Source: author's drawing.

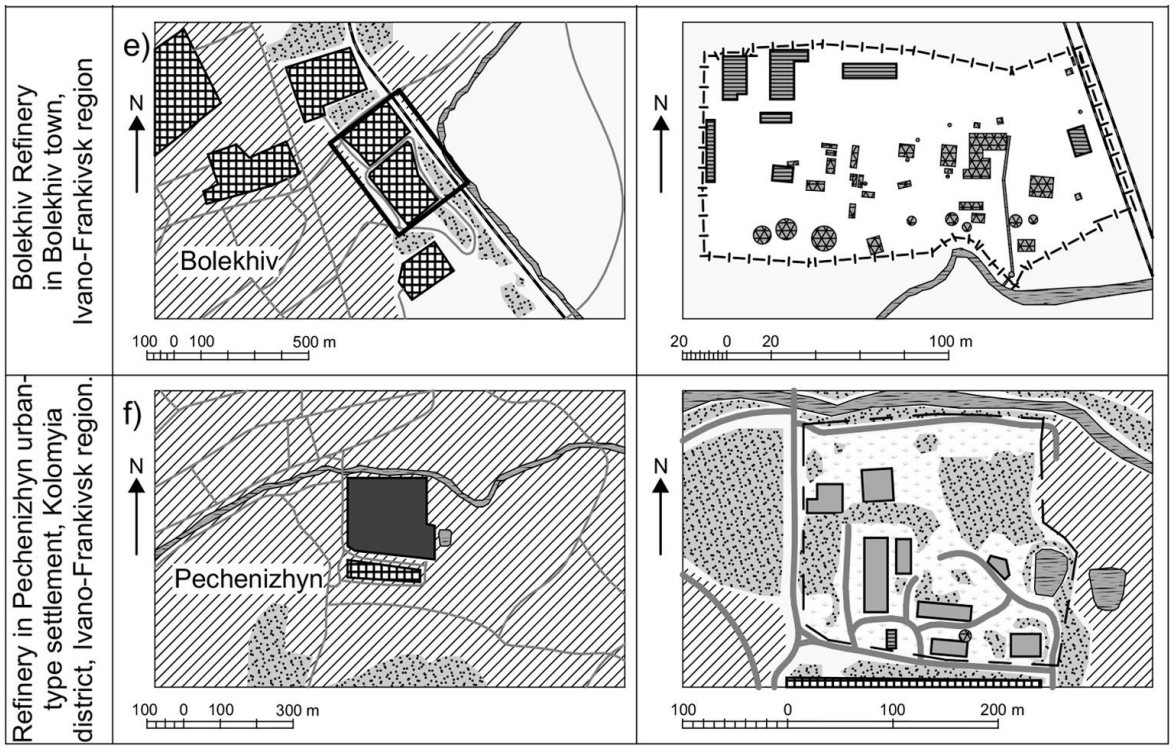


Fig. 2.2. (continued). Scheme of landscape and urban analysis of enterprises in the field of transportation. Source: author's drawing.

The total size is 900 × 1300 m, the area is about 75 hectares (Public cadastral map of Ukraine, 2020). The regular system of internal highways with an asphalt covering allows to get access to all buildings and constructions without restrictions. Arrays of protective forest belts are concentrated in the central part and partly in the eastern part. Greenery in the form of group and linear plantings of trees and shrubs. Three rectangular reservoirs measuring 15 × 30 m are located on the site. The enterprise is functioning, but part of the territory is not used.

Consider in more detail **the refinery in the urban-type settlement of Pechenizhyn** (Fig. 3), which was built in 1882. About 500 workers and employees worked at the plant. At that time it was one of the largest refineries in Austria-Hungary (Hakh, 1994), the idea of its construction belonged to the engineer Stanislav Shchepanovsky. The plant operated until 1928 (Ruzhytska, 2018). The territory of the enterprise is located in the central part of the settlement. Its height above sea level is 330 m (Public cadastral map of Ukraine, 2020). A specially built road leads to the enterprise. The plant is surrounded on all sides by residential area. Its northern part is limited by the Sopivka River, and the building of the former furniture factory is located on the southern part. The plot is close to a square measuring about 250×300 m, with an area of 7.5 hectares (Public cadastral map of Ukraine, 2020). The buildings and structures of the former plant are now partially or completely destroyed. The area is overgrown with shrubs, asphalt paths lead to the ruins. The railway (now destroyed) was previously laid to the plant. The almost dried-up reservoir is located in the eastern part measuring 45×45 m (another reservoir is located outside and it is a private property). The furniture factory was located here during the Soviet period, now it is privately owned.

4. STORAGE ENTERPRISES

The development of the oil and gas industry and the demand for the consumption of its products have led to the emergence of oil and gas storage facilities: oil depots and underground gas storage facilities. The analysis covers (Fig. 4): Bohorodchany Underground Gas Storage in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region; underground gas storage in the village of Letnia,

Drohobych district, Lviv region; OKKO Oil Depot in the town of Halych, Ivano-Frankivsk region; oil depot on the Vokzalna Street in the town of Yavoriv, Lviv region; oil depot in the town of Stryj, Lviv region.

Fig. 3. 1: Oil and Gas Production Plant № 1 in the town of Boryslav, Lviv region. Source: photo by Google. 2: Bohorodchany Compressor Station in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region. Source: Stepiuk & Slobodian, 2000. 3: The refinery in the urban-type settlement of Pechenizhyn, Ivano-Frankivsk region. Source: author's photo. 4: Bohorodchany Underground Gas Storage in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region. Source: Serediuk & Savkiv, 2015

Underground gas storage facilities are mainly built on the site of depleted oil and gas fields. They are located near the main gas pipeline and in the areas with the largest number of gas consumption facilities. The facilities are located outside the settlements, most of the plots have a shape close to a rectangle. UGS are connected to highways by special access roads, which were built simultaneously with the facilities. Sanitary protection zones are landscaped, rivers and reservoirs are located near enterprises.

Such enterprises often have a significant impact on the economic and social development of settlements. The location of oil depots is observed on the border with the settlement territory, mainly in the industrial zone (OKKO Oil Depot in the town of Halych, Ivano-Frankivsk region) and in the structure of the settlement (oil depot in the town of Stryj, Lviv region). Favorable location creates a well-developed road connection, the railway leads to almost all facilities, it is branched from the main railway network.

The plots usually have a shape close to a rectangle with ledges. Rivers and reservoirs are nearby. Green plantings in the areas of storage facilities are in the form of group and linear plantings of trees and bushes. A fire reservoir is provided at each site. The system of roads and padestrian areas with asphalt is well-formed.

As an example, we cite ***the Bohorodchany Underground Gas Storage in the urban-type settlement of Bohorodchany, Ivano-Frankivsk region*** (Fig. 3). It is located in the area of the Soyuz gas pipeline to ensure the reliability of gas exports to Central European countries. The storage was created on the basis of the self-titled gas field, which was discovered in 1967 and was in operation during 1969 – 1979 (Serediuk & Savkiv, 2015). Polish specialists have arranged the Bohorodchany underground gas storage, built a gas treatment plant, a compressor station of the gas pipeline Kremenchuh – Ananiv – Chernivtsi – Bohorodchany. Bohorodchany Production Department of Underground Gas Storage provides regulation of interseasonal unevenness of gas supply for export through Soiuz, Urenhoi – Pomary – Uzhhorod and Prohres pipelines, as well as to consumers of Ukraine (Stepiuk & Slobodian, 2012).

The underground gas storage is located at a distance of about 1.6 km from the settlement zone of Bohorodchany urban-type settlement, 1 km to the settlement territory of Stari Bohorodchany village and 600 m – to the village of Sadzhava. About 150 wells are located around the plant. The forest is located within a radius of 700 m on the north-western and north-eastern sides, the reservoir is at the same distance from the south-western part. The Bystritsa Solotvynska River flows at a distance of 1.4 km. A specially paved road leads to the site, it originates from the main highway of local importance. The site is limited by a «ring road» road network, from which roads branch to each of the wells.

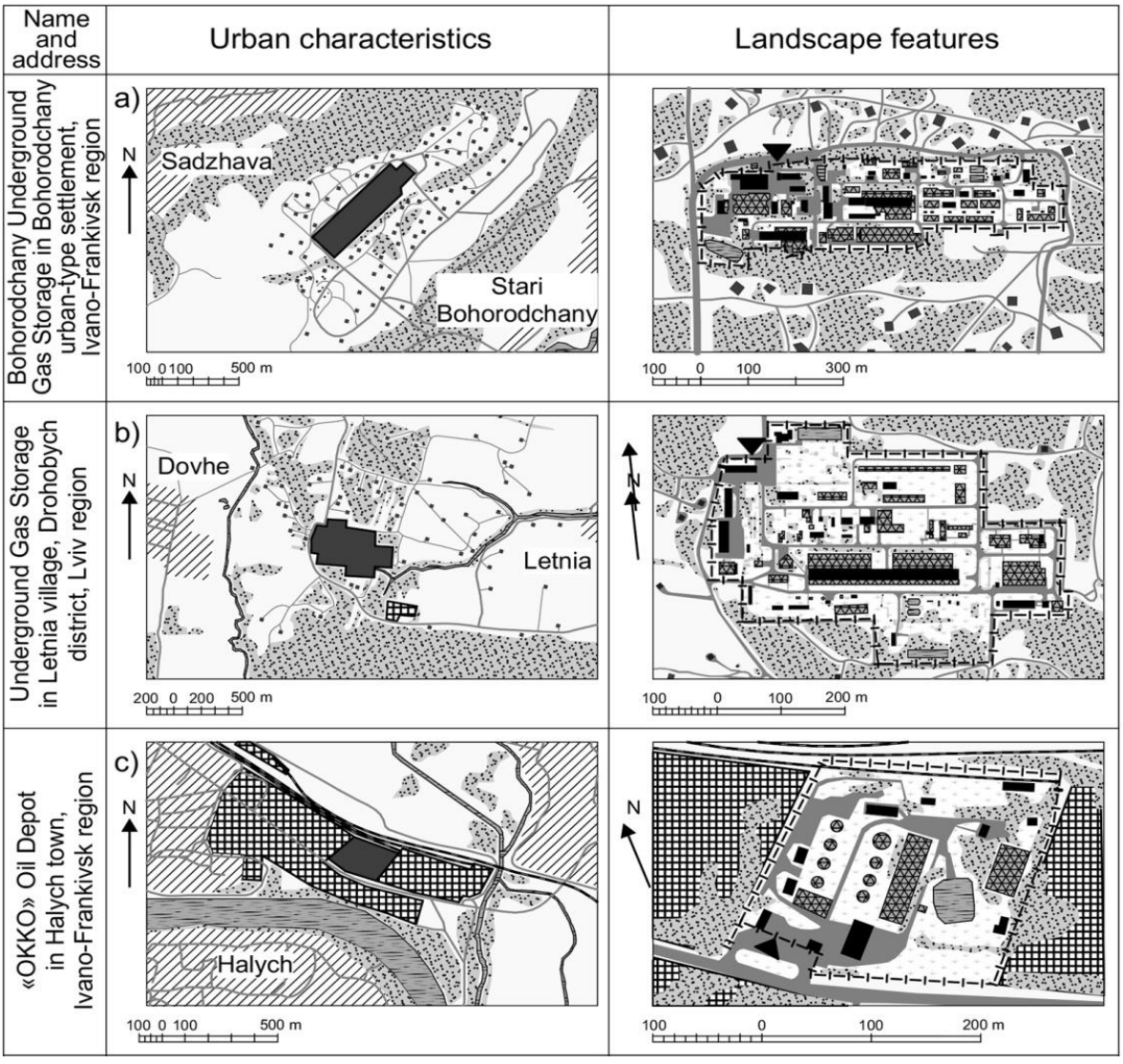


Fig. 4.1. Scheme of landscape and urban analysis of storage enterprises. Source: author's drawing

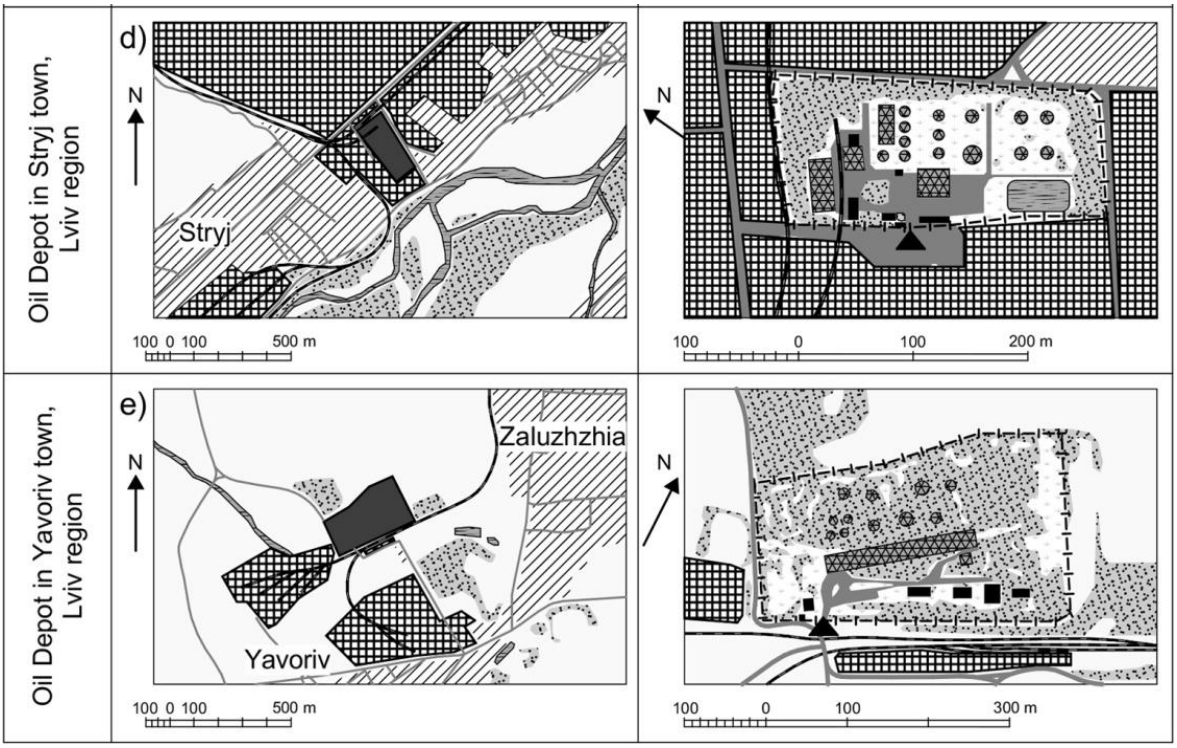


Fig. 4.2. (continued). Scheme of landscape and urban analysis of storage enterprises. Source: author's drawing

The territory is flat, has a shape close to an elongated rectangle with ledges measuring 250×800 m (Public cadastral map of Ukraine, 2020). The main entrance is arranged on the north-west side. The regular road network system allows access to all buildings and structures. Greenery has group and linear planting of trees and shrubs. The largest number of them is concentrated in the entrance area and along the perimeter of the site. The reservoir is located on the south-eastern side of an oval shape measuring 30×80 m and a small stream flowing into the river Sadzhavka. The plant is fully operational.

5. REFINING ENTERPRISES

The extraction of large quantities of raw materials led to the construction of oil and gas refineries. The first enterprises were built in the cities of Drohobych, Lviv, Nadvirna, Stanislav (Ivano-Frankivsk), Pechenizhyn urban-type settlement. Construction was carried out initially on the outskirts of settlements, with the opening of the railway – near the railways (Haber Brothers refinery in the city of Stanislav) (Stanislavsky district mining administration, 1934-1939). This location is due to the delivery of raw materials and export of finished products more advanced at that time mode of transport. The railway network gradually expanded. Due to the expansion of the structure of settlements, many enterprises, which were originally outside the settlements, are now an integral part of them (Gas Plant in the city of Ivano-Frankivsk). The authors are characterized (Fig. 5): Boryslav Gas Processing Plant in the town of Boryslav, Lviv region (Melko, 2019); PJSC Naftokhimik of Prykarpattia in the town of Nadvirna, Ivano-Frankivsk region; PJSC Oil Refining Complex – Galychyna in the city of Drohobych, Lviv region (Urban Media Archive, 1935); Gas Plant in the city of Ivano-Frankivsk on the street Lenkavskyi.

Initially, the enterprises were built on the plains, fenced with a high fence made of non-combustible materials. It is also known from archival materials that in the late XIX – early XX centuries the plants were surrounded by a wooden fence 2 m high (Haber Brothers Refinery in the city of Ivano- Frankivsk

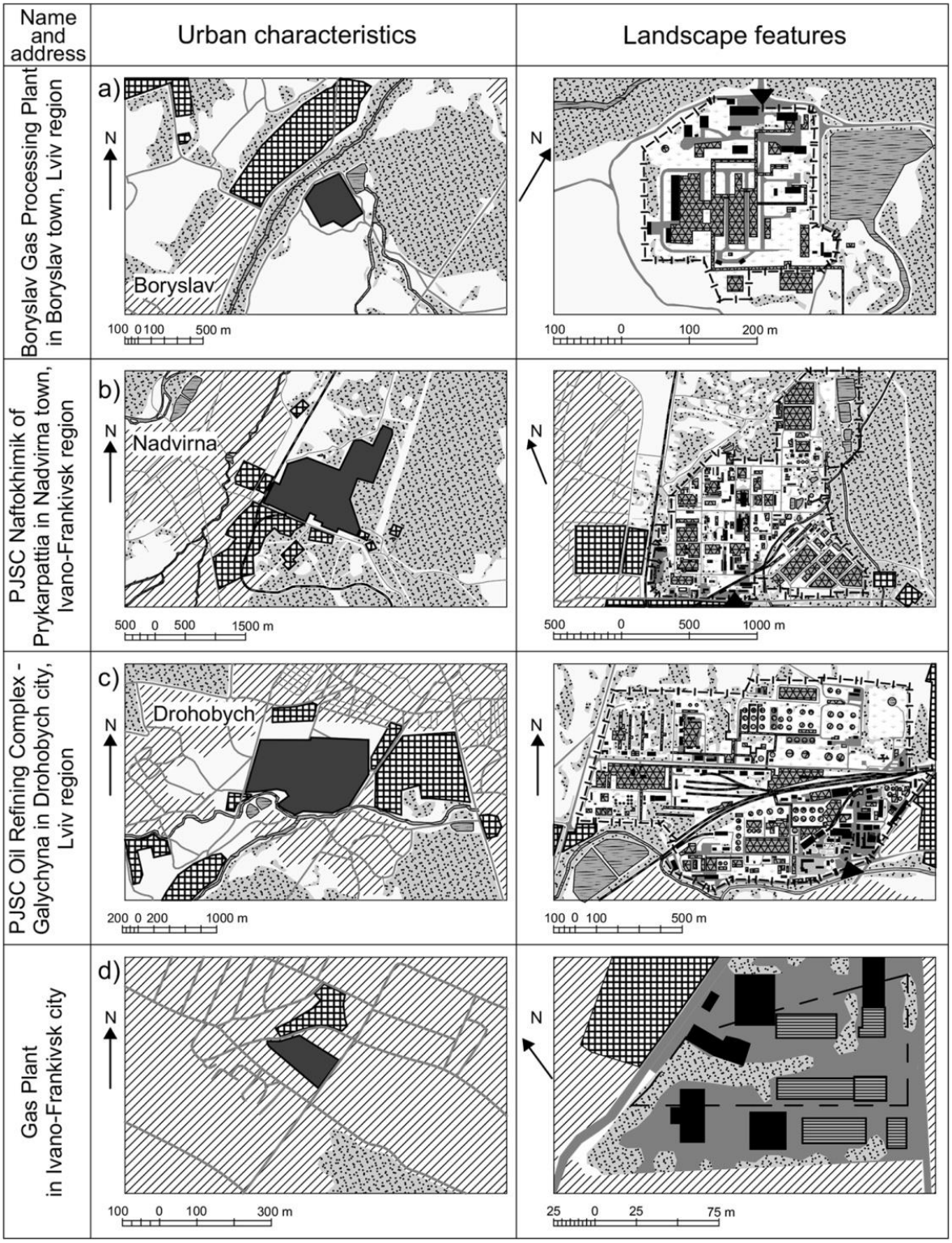


Fig. 5. Scheme of landscape and urban analysis of processing enterprises. Source: author's drawing.

(Stanislavsky district mining administration, 1934-1939), Nadvirna Oil and Paraffin Factory in the city of Nadvirna (Stanislavsky District Mining Administration, 1934-1938). The plots of plants have different

shapes – from the simplest, close to a rectangular shape (Boryslav Gas Refinery in Lviv region), to a polygonal irregular shape (PJSC Oil Refining Complex – Galychyna in the city of Drohobych, Lviv region); PJSC Naftokhimik of Prykarpattia in the town of Nadvirna, Ivano-Frankivsk region). Clearly planned system of roads and pedestrian zones. Greenery is in the form of group, single and linear plantings of trees and shrubs. Abandoned, overgrown with shrubs areas are on facilities.

Fig. 6. Nadvirna Oil and Paraffin Factory: 6.1. Residential building. Source: author's photo. 6.2. Situational plan. Source: Stanislavsky District Mining Administration, 1934-1938. 6.3. PJSC Naftokhimik of Prykarpattia. Source: Aleksandrovych, Dutchak, Boichuk, Stelmakh, Holych & Honcharuk, 2007

We describe in more detail ***PJSC Naftokhimik of Prykarpattia in the town of Nadvirna, Ivano-Frankivsk region*** (Fig. 6) – one of the oldest enterprises of the oil refining industry not only in Ukraine but also in Europe. The plant was founded in the late XIX century. It was designed to distill oil from local fields. It was partially disabled and did not work during the German occupation of the western regions of Ukraine. The plant resumed operations after the war (Aleksandrovych, Dutchak, Boichuk, Stelmakh, Holych & Honcharuk, 2007). The factory was originally located at a distance of about 500 m southwest of the present. This is evidenced by archival data. The plot is trapezoidal in plan, it has an area of 3.04 hectares. The plant is surrounded by a wooden fence 2 m high. The

entrance gate was located on the south-western side, above it was the inscription of the company Nadvirna Oil and Paraffin Factory (Stanislavsky District Mining Administration, 1934-1938). The enterprise does not function now, the territory is overgrown with bushes, buildings and constructions in the destroyed kind. One residential building remained in the Art Nouveau style. The plant was reconstructed in 1954 – 1955. Stanislavsky soviet economy approved the terms of reference for the expansion of the Nadvirna refinery on February 23, 1960 (OJSC Naftokhimik of Prykarpattia, 2020). Thus began the construction of the current plant of PJSC Naftokhimik of Prykarpattia.

The enterprise is located in the industrial eastern part of the settlement. The distance to the settlement zone is about 400 m. The height above sea level is 450 m (Public cadastral map of Ukraine, 2020). The area is surrounded by forest on the north, east and south-east sides, on the south – by other industrial facilities. The railway is laid on the western side, from which a track branches off, which leads to the plant. The territory is flat, it has an irregular shape with a length from west to east of about 2 km, from north to south – 1.8 km. The area is 171.5 hectares (Public cadastral map of Ukraine, 2020). The entrance to the site is from Maidanska Street, on the south side of the enterprise. The internal road network has an evenly branched regular planning system and it divides the site into separate rectangular parts. Greenery are in the form of group, single and linear plantings of coniferous and deciduous trees and shrubs. The river Vorona flows through the territory, there are also about ten artificial reservoirs. The plant operates in part.

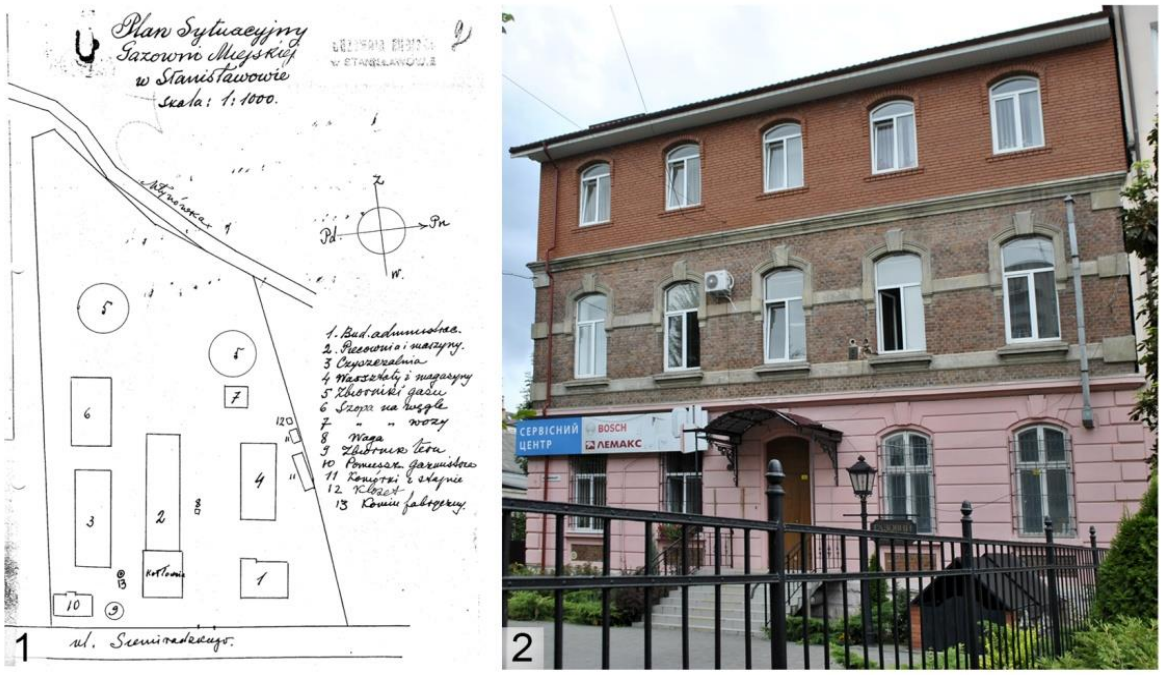


Fig. 7. Gas Plant in the city of Ivano-Frankivsk on Lenkavskoho Street: 7.1. Situational plan. Source: Stanislavsky Regional State Archive from a real storage unit, 1952). 7.2. Administrative building. Source: author's photo.

Gas Plant in Ivano-Frankivsk on Lenkavskoho Street (Fig. 7), according to archival sources (Deichakivska, 2015). It was first launched in 1876, designed by a German engineer. Its construction lasted three years. The plant was located on the site of a shopping center on the current Dnistrovska Street (the street was called Gazova in the Austrian and Polish periods) – the fixation plan of Stanyslavova (Plan Stanisławowa, 1886) is a confirmation of this (Fedunkiv, 2014). In 1900, a decision was made to build a new plant on the site of Lan za Belvederom in village of Kniahynyn (it is now part of the city of Ivano-Frankivsk), which belonged to the city. Because the gas plant on Gazova Street, which has existed since 1873, has ceased to meet the city's needs.

Entrepreneurs H. Shloss and L. Pfeffer won the right to implement the project on a competitive basis. The project was developed in the technical office of the magistrate (Holovatyi & Author, 2014). Construction of the production building, warehouses and administrative building was planned.

The plant is located in the western part of the village. The height above sea level is 250 m (Public cadastral map of Ukraine, 2020). The plot is surrounded by residential area, only on the northern side it borders with PJSC Lasoshchi. The Bystrytsia-Solotvynska River flows at a distance of 650 m, the city lake is at a distance of 350 m. At the beginning of the XX century the site of the plant was limited from the east by Semyradskoho Street (now Lenkavskoho Street) (Holovatyi & Bondarev, 2013), from the west the border passed in the form of the Mlynivka stream (now a road is built here between PJSC Lasoshchi and the Gas Company Ivano-Frankivskhaz) (Public cadastral map of Ukraine, 2020). It was approximately 85×150 m in size. There were no buildings from the north and south at the time the plant was built (Urban Media Archive, 1904). The plant included: administrative building (originally two-storey, now the third floor was added), production building, building of workshops, warehouses and boiler rooms (still preserved), gasholder construction (now non-existent) and a factory chimney (now non-existent). Archival documents for 1952 record the expansion of the plant from west to east about 220 m, from north to south – 110 m. Other buildings and structures are being completed, in particular: the house to the left of the production building, where the cleaner was (still preserved), gasholder (non-existent now), residential building (partially rebuilt) and other ancillary facilities (non-existent now). The plant today does not fulfill its original function; the former administrative building and behind it the building of workshops and warehouses belong to JSC Ivano-Frankivskhaz, the rest of the buildings are privately owned.

6. OBJECTS OF SALE OF OIL AND GAS PRODUCTS

The oil and gas industry is quite profitable and today – one of the most economically promising. A large number of sales of oil and gas are carried out at gas stations. The number of gas stations is growing due to the increase in the size of urban areas, their population density and the number of cars.

Gas stations are concentrated in the areas that are most profitable for the sale of gasoline, diesel and gas, in the area of heavy traffic (ANP Gas Station in the village of Pidhiria, Bohorodchany district, Ivano-Frankivsk region), near the settlements territories (Avias Gas Station in the town of Kalush, Ivano-Frankivsk region), in the structure of settlements (OKKO Gas Station in the town of Monastyryska, Ternopil region), as well as near other oil and gas companies Dolynanaftohaz Gas Stations № 4 in the village of Yasenovets, Rozhniativ district, Ivano-Frankivsk region) (Fig. 8). A large list of goods and services is presented at the gas station in addition to the sale of oil and gas refining products: sales of products and fast food area, bathrooms, parking lots, self-service cars. The plots have a varied but compact shape. Gas stations that are located outside the settlements are surrounded by greenery, and the shape of the site is close to rectangular. Since the external fire water supply of gas stations should be provided primarily from reservoirs, most facilities are at a reasonable distance from them (Legislation of Ukraine, 2005). The gas stations are surrounded by a low fence, the part for entry and exit of cars is unfenced. The carriageway is covered with a solid waterproof coating. Greenery is planted alone in small quantities, mostly conifers.

The ANP Gas Station in the village of Pidhirya, Ivano-Frankivsk region is located in the village, in its eastern part. The height above sea level is 350 m (Public cadastral map of Ukraine, 2020). The section from the west is limited by the highway N-09, the road of regional significance R-38 passes at a distance of 50 m. The intensive movement of cars determines the demand for products of sale. The gas station is considered to have a favorable location. The territory borders on agricultural lands. The reclamation canal is located on the eastern and southern sides at a distance of 250 m, a small stream flows from the south-western side. The area is surrounded by a low fence, the part for entry and exit of cars remains unfenced. It is surrounded on the outer perimeter by greenery. The territory is flat, close to a rectangular shape, measuring about 65×100 m, the

area is 0.5 hectares (Public cadastral map of Ukraine, 2020). Internal road network in the form of a «ring road» road with asphalt pavement around the filling station. A small number of single green plantations of conifers are concentrated on the inner perimeter of the object and in the western part of the area, which is lined with lawn on the side of the main road N-09. There are no artificial or natural reservoirs detected. The gas station is fully operational.

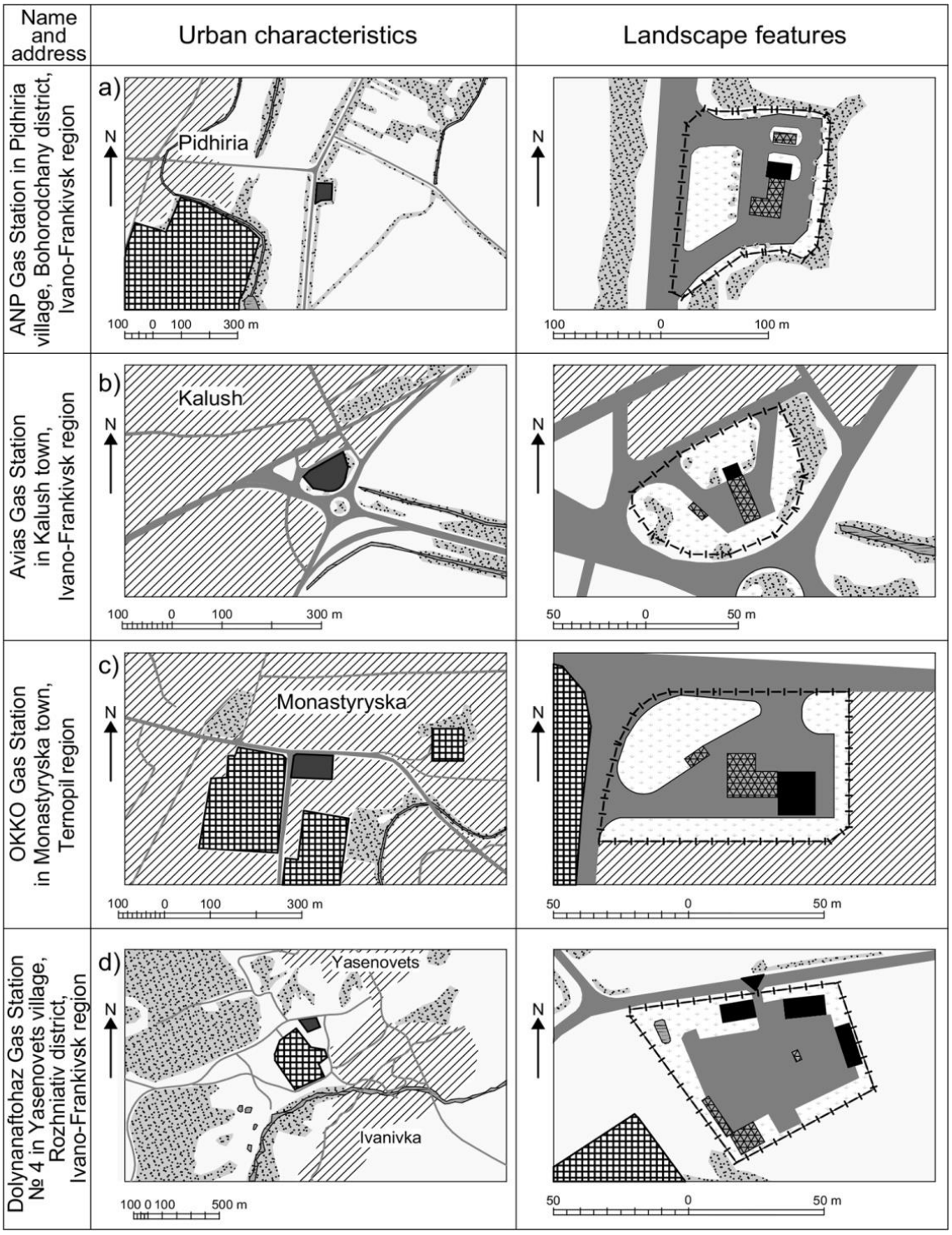


Fig. 8. Scheme of landscape and urban analysis of enterprises in the field of sales. Source: author's drawing.

7. CONCLUSION

The authors have studied the landscape and urban features of the oil and gas complex of the Western region of Ukraine. 22 facilities of the complex are analyzed. They are divided into enterprises for extraction, transportation, storage, processing and sale of products. The analysis revealed the following features in accordance with a sound methodology:

1) **By location in the structure of the settlement**:

- outside the settlement territory – the enterprises are located at a certain distance from the settlement territory and they are separated by a sanitary protection zone;
- on the border with the settlement territory – the objects border mainly with residential buildings or other industrial enterprises that are part of the industrial zone of the settlement;
- within the settlement territory – the enterprises are in the structure of the settlement territory, they border on housing construction or other industrial objects.

2) **By the nature of the terrain.** The relief of the territory of the enterprises is flat. They are located: in hilly terrain; on the plains.

3) **By method and type of service of transport communications**: specially built roads; railways; highways of international, national, territorial or local significance pass near the objects. The internal road network of facilities mainly has regularly planned and ring road structures.

4) **The shape of the enterprise**: close to the square; close to the rectangle; close to the oval; trapezoidal shape; incorrect configuration.

5) **Areas of enterprises are divided by size** into: small – up to 10 hectares; medium – up to 100 hectares; large – more than 200 hectares.

6) **In the presence of greenery**. Deciduous and coniferous trees and shrubs are concentrated in the areas of enterprises. At most gas stations there are only coniferous trees or they are absent at all.

7) **Green plantings are characterized by plantings on compositional structure**: group, linear and single; group and linear; group and individual; single and linear; single. There are no greenery at all.

8) **In the presence of rivers or reservoirs**: not far from enterprises; they are available on site; no water bodies.

9) Enterprises of the oil and gas industry have been one of the main sources of state income for many years. They underwent changes not only in the architecture of buildings, technological equipment, but over time there was a change in the function of some plants under the influence of various factors. Enterprises are distinguished by the degree of functioning and safety of the architectural ensemble, buildings and structures: functioning; partially functioning; non-functioning; partially destroyed, completely destroyed.

Recommendations are substantiated landscape and urban reorganization of oil and gas facilities and their use in the new conditions of the state and the region. Summarizing the results of the study and classifying the objects of the oil and gas complex, the conditions for finding ways to reorganize the territories. A set of general practical recommendations should be developed in accordance with the degree of functioning of the objects to solve the tasks.

Partially functioning – part of the enterprise is out of order; such facilities will be characterized by: preservation and restoration of function with the use of the latest equipment, conservation of non-functioning parts of facilities and territory, which will protect them from destruction; change of function in accordance with the needs of production, restoration of the historical and development of new landscaping.

Non-functioning facilities are in good condition. The area is often overgrown with bushes, but all buildings, structures and the road network are preserved. Recommended measures for this type of enterprise can be: full or partial restoration of functional purpose with the use of the latest

technologies, preservation and conservation of facilities; functional and landscape reorganization of the territory with different degree of transformation, including planning structure and functional purpose; complete reorganization and complex transformations. The steel plant in Bethlehem, Pensylvania is an example of restoration of a non-functioning object. Revitalization contributed to the transformation of the plant into an attractive multifunctional space. [Dudek M., 2019].

Partially destroyed – enterprises that have lost their original function, but on their territory is a small number of buildings and structures, mostly in a dilapidated condition. The area is overgrown with bushes, fragments of the road network are preserved. Characteristic of these enterprises will be: preservation of existing buildings and structures, their conservation, reconstruction of existing buildings and structures, restoration of landscaping, reorganization of the territory with varying degrees of transformation, including planning structure and functional purpose (complete reorganization, partial reorganization, combined reorganization).

Completely destroyed – we learn about the existence of these enterprises from archival documents. Other industrial facilities are often located in their place. They will be characterized by: installation of memorial signs on the site of the former location of the enterprise, restoration and installation of the layout of the object, marking the territory.

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