



ANALYTICAL RESEARCH

COMPREHENSIVE ASSESSMENT OF THE DEVELOPMENT
POTENTIAL OF THE ASTRAKHAN AGGLOMERATION,
ASTRAKHAN REGION

As part of the Fee-based service Contract No. ASH-I dated December 08, 2020 (hereinafter referred to as the Contract), the Contractor provided services for a comprehensive evaluation of the development potential of the Astrakhan agglomeration in order to develop transport infrastructure and evaluate the potential of the aerodrome environs of the Astrakhan airport.

The obtained results are presented in the form of a Survey Comprehensive Evaluation of the Development Potential of the Astrakhan Agglomeration (hereinafter referred to as Survey).

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(Astrakhan Airport JSC)

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TABLE OF CONTENTS

Introduction	1
Section 1. Brief Description of the Astrakhan region	5
1.1. General Characteristics of the region	6
1.2. Geographical Location	8
1.3. Physical-geographic characteristics	10
1.3.1. Landscape Features	10
1.3.2. Bodies of water	12
1.3.3. Climate	13
1.3.4. Specially Protected Natural Areas	14
1.4. Natural resources potential	17
1.4.1. Mineral resources	17
1.4.2. Fishery resources	18
1.4.3. Agroclimatic resources	19
1.5. Socio-demographics of the Astrakhan region	20
1.6. Socio-economic characteristics of the Astrakhan region	24
1.7. Socio-cultural aspects of development	29
1.7.1. Symbolic capital and elements of identity	29
1.7.2. Cultural capital	33
1.7.3. Tourism potential	37
Section 2. Analysis of the socio-economic situation and the mainstream development of the municipal district City of Astrakhan	44
2.1. Brief description of the Municipal Entity City of Astrakhan and its resource potential	45
2.2. Socio-demographics.....	47
2.3. Socio-economic characteristics.....	50
2.3.1. Evaluation of the level of income and employment of the population of the Municipal Entity City of Astrakhan	50
2.3.2. Evaluation of the retail trade turnover of the Municipal Entity City of Astrakhan	51
2.3.3. Analysis of the state of the small business entities in order to ensure its development in the Municipal Entity City of Astrakhan	51
2.3.4. Analysis of the state of urban finances of the Municipal Entity City of Astrakhan	53



2.4. Sociocultural aspects of development	55
2.4.1. Cultural capital	55
2.4.2. Symbolical Capital	67
2.4.3. Tourists potential	70
2.5. The main urban development paths	81
2.5.1. Analysis of strategic documents, documents of territorial planning and urban planning zoning of the municipal district City of Astrakhan	81
2.5.2. Analysis of the key issues regarding the spatial development	85
2.5.3. Evaluation of the current state of the construction market	91
2.5.4. Evaluation of the quality of the urban environment	96
2.6. Infrastructures	100
2.6.1. Transport infrastructure	100
2.6.2. Utility infrastructure	106
2.6.3. Social infrastructure	109
2.7. Key issues concerning the socio-economic development and their potential solutions	117
2.7.1. The main directions of development of industries of the production and non-production sectors of the economy and the prospects for their development	117
2.7.2. Analysis of the structure of the urban economy of the Municipal Entity City of Astrakhan	118
2.8. Determination of promising areas of spatial development of the city of Astrakhan as a center of agglomeration development....	123
2.8.1. Areas of the spatial development of the agglomeration core	123
2.8.2. Recommendations for identifying priority development zones of the Municipal Entity City of Astrakhan	126
 Section 3. Analysis of the socio-economic development of municipal entities of the agglomeration, the development background of the Astrakhan agglomeration	 141
3.1. Analysis of the existing settlement system of the agglomeration territory, determination of the boundaries of the agglomeration	142
3.1.1. Analysis of ties within agglomeration	143
3.1.2. Determination of the boundaries of the Astrakhan agglomeration	148
3.2. Characteristics of the agglomeration area and municipal entities within the agglomeration, including an evaluation of the demographic situation	153
3.2.1. Brief demographic characteristics of the agglomeration territory	155
3.3. Analysis of the main areas of socio-economic and urban development of the agglomeration territory specified in State programs, strategy planning documents, socio-economic development and territorial planning	157
3.3.1. Strategy documents	157
3.3.2. State-run programs	159
3.3.3. Land planning documents	160
3.4. Assessment of the resource potential of the urban agglomeration territory	164
3.4.1. Potential for fuel complex development	165
3.4.2. Transport and logistics potential	167



3.4.3. Agricultural development potential	169
3.4.4. Potential for the fishing and fish farming development	179
3.4.5. Shipbuilding development potential	181
3.4.6. Scientific and innovative and technological potential	183
3.5. Assessment of the current level of social and economic development of municipal districts included in the urban agglomeration.....	186
3.6. Assessment of the problems of infrastructure availability (transport, engineering, and social infrastructure) in the municipal districts that are a part of the urban agglomeration.....	189
3.7. Assessment of the effectiveness of use of the territories of municipal districts that are a part of the agglomeration from the city development point of view	191
3.8. Assessment of the social and cultural aspects of regional development, including an assessment of tangible and intangible heritage and symbolic capital that contribute to the agglomeration development.....	194
3.8.1. Proposals for points of growth in the sphere of culture and tourism in the Astrakhan agglomeration	196
3.9. Assessment of development of key manufacturing and tertiary industries of the economy, identification of sectors of perspective specialization of the economy of municipal districts that are a part of the agglomeration. Identification of industries the most affected by agglomeration effect	199
3.9.1. Manufacturing: specializations of districts	200
3.9.2. Agro-industrial complex: crop production	202
3.9.3. Fishing and fish farming	204
3.9.4. Machinery-producing industry: shipbuilding	206
3.9.5. Sectors of prospective specialization of the economy of municipal districts included in the agglomeration and the industries most affected by the agglomeration effect	208
3.10. Analysis of intra-agglomeration connections: evaluation of migration flows, intermunicipal transport routes, identification of existing directions of cooperation between representatives of different territories of the agglomeration in the business sector and joint investment projects; identification of social infrastructure facilities most intensively used by residents of different territories of the agglomeration.....	214
3.10.1. Intermunicipal routes analysis	214
3.10.2. Identification of existing directions of cooperation of representatives of different territories of the agglomeration in the business sector and joint investment projects	218
3.10.3. Identification of social infrastructure facilities most intensively used by residents of different territories of the agglomeration	222
Раздел 4. Section 4. Identification of the key directions for the development of the Astrakhan agglomeration and model of the agglomeration	223
4.1. Identification of common problems of spatial development of the agglomeration territory, including the problems of implementation of production, transport, sociocultural and other connections.....	224
4.1.1. Key features and limitations of spatial development of the Astrakhan agglomeration	224



4.1.2. Problems with implementation of production, transport and sociocultural connections	225
4.2. Consolidation of the main problems of the municipal districts included in the agglomeration, which require coordinated solutions, including problems of spatial development	228
4.2.1. SWOT-анализ	228
4.2.2. CROSS SWOT-анализ	230
4.2.3. Consolidated problems of the municipal districts that are a part of the agglomeration	233
4.3. Identification of key goals and objectives for development of the agglomeration	235
4.3.1. Strategic development goals and objectives based on the results of a comprehensive assessment of development potential	235
4.4. Defining the agglomeration model and clarifying boundaries	243
4.5. Identification of the main system-forming factors of the agglomeration development of the territory	247
4.5.1. Key factors of agglomeration development	247
4.6. Identification of promising directions of territorial and economic integration of municipal districts that are a part of the agglomeration	250
4.6.1. Directions for strengthening of the agglomeration core	256

Section 5. Preparation of scenarios for development of the Astrakhan agglomeration, taking into account the identified potential and promising directions of integration **257**

5.1. Preparation of scenarios for the agglomeration development	258
5.1.1. Scenarios for the agglomeration development	258
5.1.2. Time benchmarks for the agglomeration development scenarios	259
5.2. Determination of the main indicators characterizing the goals and objectives of the agglomeration development	263
5.3. Development of measures for implementation of two scenarios of the agglomeration development with selection of the optimal one	267
5.3.1. A broad estimate of expected effects of the agglomeration development	275
5.4. Identification of required resources	280

Conclusion **286**

Appendices **290**

Appendix 1. A brief summary following the results of the survey conducted on OTMETKY service	291
Appendix 2. A brief summary following the results of the survey in Yandex.Forms	296
Appendix 3. Overview of examples of development of areas located in river deltas	310
Appendix 4. Overview of modern engineering technologies to be implemented under special construction conditions	316



Appendix 5. Analysis of main factors of natural territorial complexes (NTC) anthropogenic transformation in the part of Astrakhan agglomeration by means of digital remote sensor equipment	326
Appendix 6. Consolidated list of different events in Astrakhan agglomeration	342
Appendix 7. List of tourist routes recommended by the Ministry of Tourism and Culture of the Astrakhan region	350
Appendix 8. Analysis of the existing cultural heritage protection system in Astrakhan region	358
Appendix 9. Analysis of the typologies of historical build-up area and the principles of the volumetric-spatial arrangement of objects in the historical environment	372
Appendix 10. Proposals for tracing the architectural route in the CITY OF ASTRAKHAN in the 1920s – 1950S	384
Appendix v11. An overview of practices in dealing with cultural heritage and symbolic capital	392
Appendix 12 List of SPNR in Astrakhan Region	411
Appendix 13 Analysis of ties within agglomeration	414
Appendix 14. Estimated parameters of the Astrakhan agglomeration (urban rural)	432
Appendix 15. A brief description of the agglomeration area	433
Appendix 16. Brief characteristics of the urban development of the agglomeration	462
Appendix 17. Brief characteristics of the infrastructure of the agglomeration	467
Appendix 18. Assessment of participation of the region in congresses and exhibitions and sport events	495
Appendix 19. State programs of Astrakhan region	504
Appendix 20. Register of initial data provided by the executive bodies of Astrakhan region, municipal unit “City of Astrakhan” and other municipal units of Astrakhan agglomeration	508
Appendix 21. Graphic materials illustrating the assessment results of the urban planning potential of the MU “City of Astrakhan” and a number of municipal units of the agglomeration	508
Appendix 22. Framework Terms of Reference for development of General Layout of Astrakhan agglomeration, Astrakhan region	562



Introduction

The purpose of this Survey is to evaluate the development potential of the Astrakhan agglomeration to make a task in order to develop a master plan for the Astrakhan agglomeration.


Urban agglomeration is the territory of an urban district, or an urban district with an intraurban division, or a city of federal importance, united with the territories of other municipalities by stable social, business and economic ties.


Draft Federal Law On urban agglomerations (Art.3, p.1)

The main objectives of the Survey included:

- analysis of the background and issues concerning the development of the Astrakhan agglomeration and its center which is the Municipal Entity City of Astrakhan;
- evaluation of the system of intra-agglomeration ties and the importance of Astrakhan as a center of the agglomeration;
- evaluation of the city-planning potential of the Municipal Entity City of Astrakhan and other municipalities of the Astrakhan region;
- determination of a promising model and scenarios for the development of the Astrakhan agglomeration.

Historically, the formation of the settlement system of the Astrakhan region took place with the prevalence of two factors: the population used to be attracted by unique landscapes of the Volga river delta and the Volga-Akhtuba floodplain and specialization of the local economy due to the natural resource potential like fishery, agro-climatic and mineral resources.


The reference frame of the settlements is a system of residential centers, large centers, focuses points of the economic, political and cultural life of the country or the region as well as the highways connecting them, which has developed as a result of the continuous process of distribution all over the territory.


M. Lappo
Urban Geography (M.,1997)



As a result of a thousand-year long history of the development of the region, a predominantly small-settlement system of population clusters has developed, which is characterized by small settlements, mostly build on elevated terrains, more secure from the negative impact of the Caspian Sea transgressions. However, more than half of the region's population (53%) lives in Astrakhan which is a multifunctional regional center, an important administrative and logistic center of the Caspian Sea region.

During the Soviet era, the Astrakhan agglomeration has been characterized as an **industrial and resource base, which settlement system was highly dependant on the territorial differentiation of the resource base**. All the while, the regional center has always been distinguished by a high share of the manufacturing industry and a developed sector of logistics services, primarily as a port city that connected the Caspian Sea region with the internal regions of the country. Nowadays, the ratio of the economy sectors in Astrakhan and in other inhabited localities is close to the historically established one.

Analysis of the existing intermunicipal economic, transport and logistics, scientific and production, socio-cultural ties, the current socio-demographic characteristics of the population and its dynamics, as well as a number of other factors, demonstrated the presence of background for the agglomerative development of the build-up areas in the southern part of the region (the Municipal Entity City of Astrakhan, Privolzhsky, Narimanovsky, Krasnoyarsky, Volodarsky, Kamyzyaksky, Ikryaninsky and Limansky districts), but at the same time revealed the specific features of their development, which predetermines the nature of the spatial development of the entire Astrakhan agglomeration:

- concentration of urban residents in the adjacent to the Astrakhan region areas (Privolzhsky and Narimanovsky districts), which forms a suburban zone, but does not let to expect an agglomeration effect while creating a standard urban agglomeration due to the lack of economic self-sufficiency;
- formation of potential investment-attractive sub-centers of agglomeration significance in settlements in the adjacent territory within the radius of transport accessibility (the nearest regional centers and urban settlements), capable of giving a synergistic effect when integrating in the agglomeration;
- preservation in the near future of the importance of resource-dependent sectors of the economy and strengthening of the transport and logistics sector in potential sub-centers of the agglomeration (Narimanov town, rural community Olya, village settlement Krasnye Barrikady) while strengthening the role of Astrakhan as a multifunctional center with an emerging sector of the post-industrial economy;
- a high proportion of the rural population that ensures the functioning of the resource-dependent sector of the economy, especially the commercial fishing and agro-industrial sector, which remains traditional for the Astrakhan region and one of the prominent component of the economy of the region.

Taking into account the developmental characteristics of the regional economy set forth above, the existing reference framework of the settlements and the medium-term development prospects, the Survey proposes to consider the Astrakhan agglomeration as a **rural urban**, agglomeration, which has an active multifunctional center of agglomeration development and an emerging sector of post-industrial economy.



The development process of the Astrakhan agglomeration is proposed to be considered as an effective mechanism to consolidate available human, economic and other resources, as well as a mechanism that shall encourage the provision of financial resources in order to reap development benefits.

Key principles of the formation of the Astrakhan agglomeration:

- centralized cluster type nature of the agglomeration;
- priority of increasing the intensity of trading, financial and intellectual flows over migration flows;
- mutual positive influence and inter-municipal cooperation, including between urban and rural areas;
- a single information-driven and intellectual space within the Astrakhan agglomeration.

The development of the Astrakhan agglomeration is supposed to be carried out through the vehicle of master planning.

 **The master plan is an effective strategic planning tool that determines the priorities for the development of the territory, takes into account the socio-economic realities, as well as the tasks of spatial development, and offers convenient mechanisms to achieve the planned objectives.**



In order to articulate the development priorities of Astrakhan and other settlements of the agglomeration, the problems of forming a high-quality living environment were identified, the disproportions in socio-economic and infrastructural development were evaluated, and the urban planning potential of the agglomeration core and adjacent areas of districts was analyzed.

A particular attention in the Survey is being paid in order to evaluate the development potential of the city of Astrakhan, which is the center of the Caspian Sea region and has a substantial geostrategic importance throughout the Russian Federation.

Based on the SWOT analysis, the development priorities were identified, geared towards increasing the use of its potential, taking into account the necessity to reduce development risks. As a result, 4 key objectives of agglomeration development were identified, implying the consolidation of available resources to achieve those objectives:

- active locus of power in the Caspian Sea region;
- Astrakhan agglomeration is an area of a dynamic development;
- Astrakhan is a city of opportunities, an active multifunctional center;
- demonstration site of ecosystem interaction technologies.

Based on the provisions defined in the Strategy for the Socio-Economic Development of the Astrakhan Region until 2035, the analysis of existing state programs and the development priorities formulated in the Survey of the development priorities for the period 2022–2032 were proposed 2 scenarios for the further development of the Astrakhan agglomeration: optimization and acceleration, implying the achievement of a new quality living environment with appropriate changes in socio-economic conditions. These scenarios are preliminary and are subject to clarification during the development of the master plan for the Astrakhan agglomeration.



The optimization scenario assumes the achievement of the quality of life in the agglomeration at the level of the relevant regions (Rostov Region, Stavropol region), the rationalization of all the agglomeration resources, the reduction of the existing disparities in development between different areas, the establishment of conditions for their interaction, as well as the formation of an environment for attracting to the agglomeration positive changes agents (like technological companies providing services in the field of agriculture, processing of agricultural products, shipbuilding industry, metal-working manufacturing, production of rubber and plastic products).

The acceleration scenario is crucial in order to achieve a critically new quality of life at the level of the leading regions of the South and North Caucasian Federal Districts (for instance, Krasnodar region) through sustainable development of the post-industrial economy sector, effective implementation of innovations in traditional industries and successful positioning of the agglomeration at the level of the Caspian macroregion.

In the process of preparing the Survey in order to study the public opinion about the potential of the Astrakhan agglomeration, a public inquiry were carried out among the residents of Astrakhan and municipal districts of the agglomeration using online platforms:

- an online survey for residents of Astrakhan, regional centers of agglomeration, and other settlements of the agglomeration using Yandex.Forms;
- online collection of ideas and proposals based on maps and 3D models (collection of proposals and ideas on a resource for participatory design, involving residents in the development and improvement of territories) on the platform <https://otmetky.com>.

Based on the results of a comprehensive study, the following were formed:

- general requirements for agglomeration development;
- basic hypotheses for the development of agglomeration;
- promising avenues and scenarios for the development of the Astrakhan agglomeration;
- a preliminary list of projects that are drivers of development within the Astrakhan area and the municipal districts of the Astrakhan agglomeration, which will be included in the Competition Task for the development of a master plan for the Astrakhan agglomeration.



Section 1. Brief Description of the Astrakhan region



1.1. GENERAL CHARACTERISTICS OF THE REGION

« **Astrakhan not only has a glorious past and unique historical heritage, but also is rich of sufficient amount of resources. Due to this, the city became a regional center that sets the direction of development for other cities and towns.**



Igor Babushkin,
Governor of the Astrakhan region

The Astrakhan region is located in the southeast of the European part of Russia, and is part of the Southern Federal District.

The region borders on the Volgograd region in the north, the Republic of Kalmykia in the west, the eastern border coincides with the state border of Russia with Kazakhstan. The Astrakhan region has direct access to the Caspian Sea and the coastal regions of Azerbaijan, Iran, Kazakhstan, Turkmenistan.

The length of the region from north-west to south-east in the longitudinal direction is 390 km, in the transverse direction - from 35 km (in the Tsagan-Aman region) to 180 km (in the delta region).

According to the Law of the Astrakhan region dated October 4, 2006 No. 67/2006-OZ On the administrative-territorial structure of the Astrakhan region, the region includes 143 municipalities, including 11 municipal districts, 2 urban districts, 119 rural settlements and 11 urban settlements. The administrative center is the Municipal Entity City of Astrakhan, the towns of regional subordination are Akhtubinsk, Znamensk, Kamyzyak, Kharabali and Narimanov (Fig. 1).



In the Astrakhan region will be created a master plan for the development of the urban agglomeration.

The Astrakhan Region is a significant geopolitical and geoculturally important region of the Russian Federation, a major transport and transit hub in the Caspian.



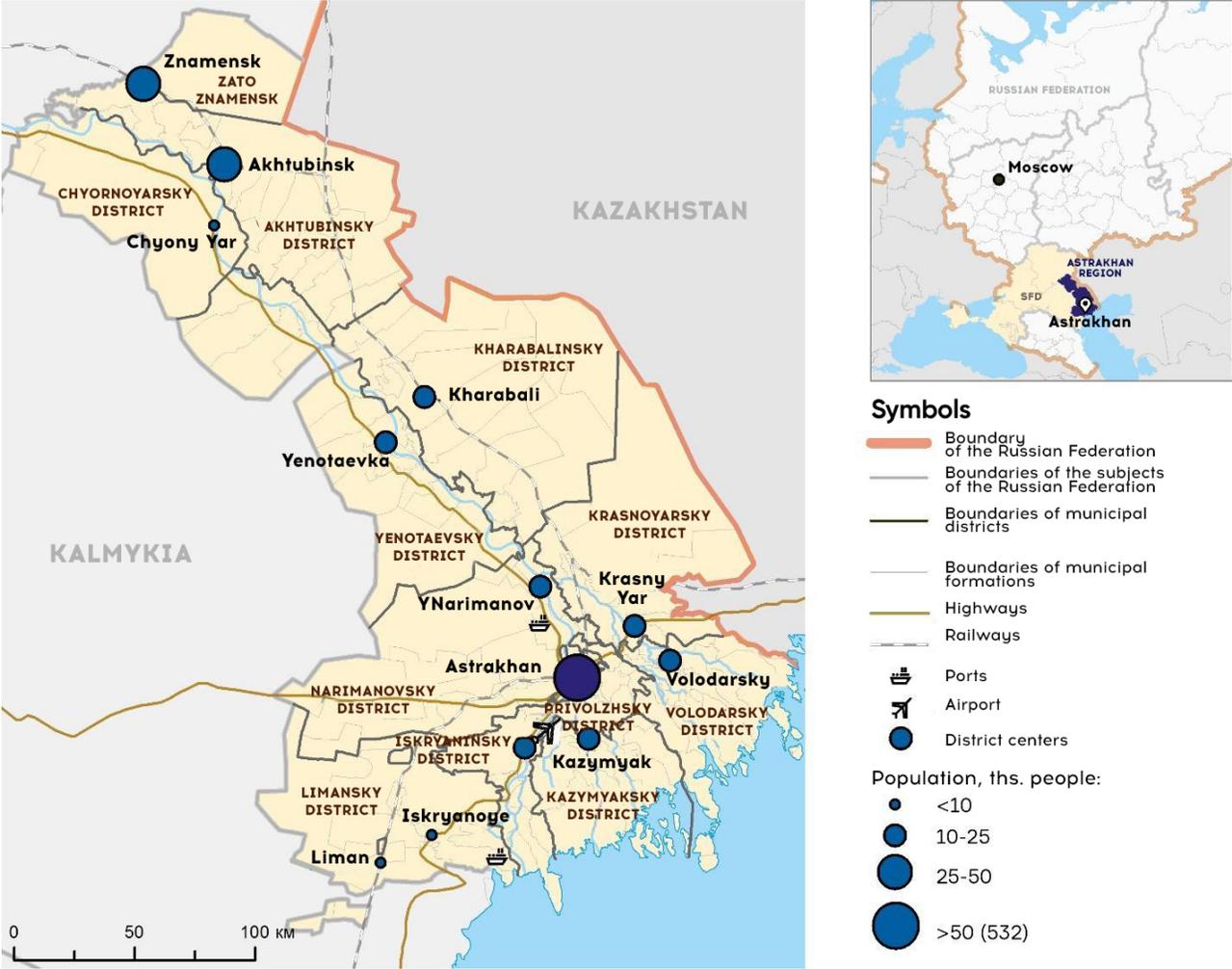


Fig. 1. Location map and administrative division of the Astrakhan region

The region has a finely dispersed settlement system that has a densely populated regional center. 67% of the urban population of the region lives on 1% of the area of the Astrakhan region.



1.2. GEOGRAPHICAL LOCATION

The Geographical Location of the Astrakhan region is quite unusual (Fig. 2):

- location at the junction of Europe and Asia led to the high ethnogeographic and socio-cultural diversity of the region;
- located on the shore of the Caspian Sea, which is an inland water body, the international legal status of which is determined by the Convention on the Legal Status of the Caspian Sea, signed by the heads of the 5 Caspian Sea region States, but so far not ratified by the Islamic Republic of Iran;
- located at the mouth of the largest European river Volga, which connects the Caspian region with inland Russia;
- located at the intersection of international transport corridors, which determine the high transit potential of the region:
 - North-South connecting the countries of Europe with Iran, the countries of the Middle East and India;
 - West-East, which has access to Kazakhstan, China, the countries of Central Asia, as well as to Europe through the Black Sea and Ukraine.

In 1991, after the collapse of the USSR, as a result of the formation of 4 new independent states on the coast of the Caspian Sea, the Astrakhan region became a border region: by land it borders with the Republic of Kazakhstan, by sea with the Republic of Azerbaijan, the Islamic Republic of Iran, the Republic of Kazakhstan and Turkmenistan.

The strategy of spatial development of the Russian Federation for the period up to 2025 classifies the Astrakhan region as a border geostrategic area of the Russian Federation as a constituent entity of the Russian Federation with borders with the countries of the Eurasian Economic Union.

The transboundary Caspian region, which is a crossroads of intercontinental and interethnic transportation roads and communications, provides a link between the Russian Federation and the countries of South-West, South, Central, Central and East Asia, and in this regard, the Caspian Sea region integration of the Astrakhan region is extremely important to implement the strategic priorities of the Russian Federation in this region.



Convention on the Legal Status of the Caspian Sea



International Relations Agency of Astrakhan region





Fig. 2. Location map of the Astrakhan region in the Caspian Sea region

Potential/Opportunity

Favorable geostrategic position.
Prospects for trans-regional and international integration of the Caspian Five.

Issue/Risk/Restriction

Increasing competition from neighboring states.



1.3. PHYSICAL-GEOGRAPHIC CHARACTERISTICS

1.3.1. Landscape Features

The Astrakhan region is located in the area of the Caspian lowland in the lower reaches of the Volga river. Most of the region's territory lies below the level of the World Ocean. The absolute height gradually decreases from 15–20 m above sea level in the north of the region, in the area of the settlement Sasykoli passes the datum level, and at the coast of the Caspian Sea is 28 m below sea level (below datum of Kronshtadt gauge). The highest point is Mount Bolshoye Bogdo - 149.6 m (in the north of the region, in the area of salt-domed uplifts).



The region lies in the zones of semi-deserts and deserts, the landscapes of which are represented by arid drought-afflicted territories with a wide development of poor and salinized soils, with massifs of open, winnowed sands, with a meager, sparse vegetation cover with low primary biological productivity (no more than 4-6 t/ha in year).

The landscapes of the Volga-Akhtuba floodplain and the Volga delta are in sharp contrast with the semi-desert and desert landscapes (Fig. 3). The Volga-Akhtubinskaya floodplain is one of the most productive regions of Russia, where the annual growth of phytomass can reach 30 t/ha per year, within the Volga delta - up to 50 t/ha per year.



The landscapes of the Astrakhan region are experiencing the effects of the human activities. The Volga-Akhtubinskaya floodplain and the delta of the Volga River, provides a pleasant environment for living, managing and resting for humans. However the Western Ilmenno-Bugrovoi and Baskunchak landscapes, delta of the Volga river and Volga-Akhtubinskaya floodplain are subject to the greatest transformation.

The landscape originality of the Astrakhan region have predetermined the features of its settlement system: in the areas of the Volga-Akhtuba floodplain and the Volga river delta, characterized by the most favorable conditions for living and for the economic activities, is concentrated more than 60% of the population.



The Volga Delta differs from the rest of the world's deltas by its extremely dense and variable hydrographic network. In some periods of the life of the Volga river delta, the number of estuaries (outlets) of deltaic streams at the estuary seaside used to reach a thousand.



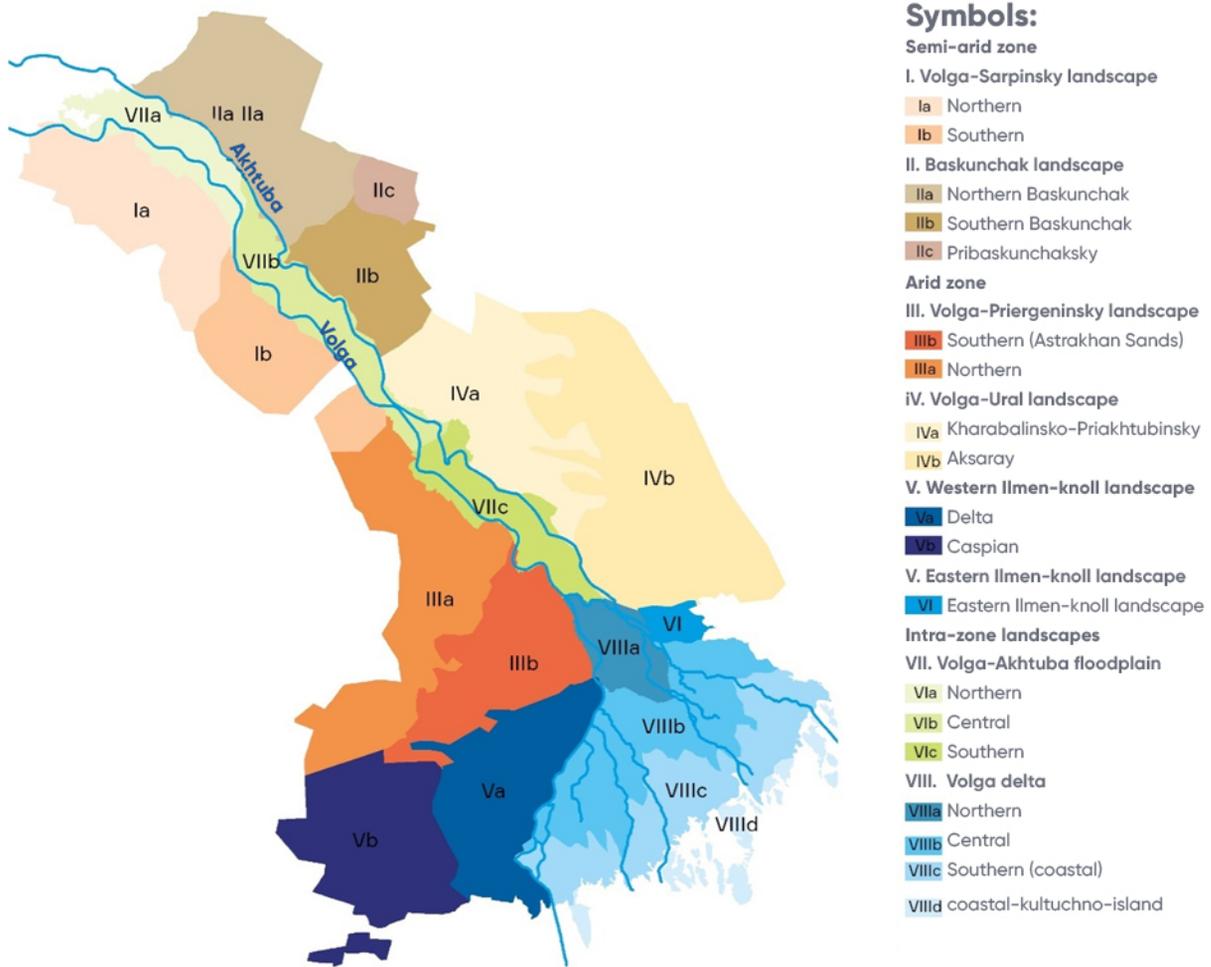


Fig. 3. Landscapes scheme of the Astrakhan region

Volga River Delta

Volga river delta is a unique geosystem with large reserves of natural resources, a rich history of development and research, a diverse combination of natural, cultural and economic features:

- fresh underground and mineral waters;
- unique agroclimatic resources of the Volga-Akhtuba floodplain and the Volga delta;
- biological resources of the water area of the Volga-Caspian fishery basin;
- unique natural and recreational resources due to the landscape diversity and its high fruitfulness.



Volga River Delta



Adverse physical and geographical events in the Astrakhan region

Hydrological events: floodings, river bed deformations, unstable Caspian Sea level.

Climate events: extremely high or low air temperatures, long-term and seasonal variability of atmospheric precipitation.

Exogenic processes: landslides, earthfalls, river lateral and ravine erosion, karst erosion, suffusion-subsidence processes, downstream effect, aeolian processes.

1.3.2. Bodies of water

The water bodies of the Astrakhan region belong to the basin of the seepage flow of the Caspian Sea and a number of lakes in the Caspian drainless area.

The Caspian Sea is an inland body of water, which is characterized by the phenomenon of abnormal prolonged decreases and increases in sea level, which is the main factor in the implementation of economic and other activities within the Caspian Sea region.

The Astrakhan region river network is represented by 935 watercourses with a total length of 13,327 km (the density of the river network is 0.27 km/km²), most of them are represented by arms and channels of the Volga river delta and the Volga-Akhtuba floodplain, located between the Volga and the arm called Akhtuba branching off near Volgograd. The Volga-Akhtuba floodplain and the Volga delta are characterized by a large number of oxbow lakes and many channels (their number is constantly changing), in the southern above-water part of the delta there are many kultuks.

Several sea passage channels and fish by-pass channels have been laid along the Volga delta, the largest of them is **the Volga-Caspian Sea Channel**.



Volga-Caspian Sea Channel



1.3.3. Climate

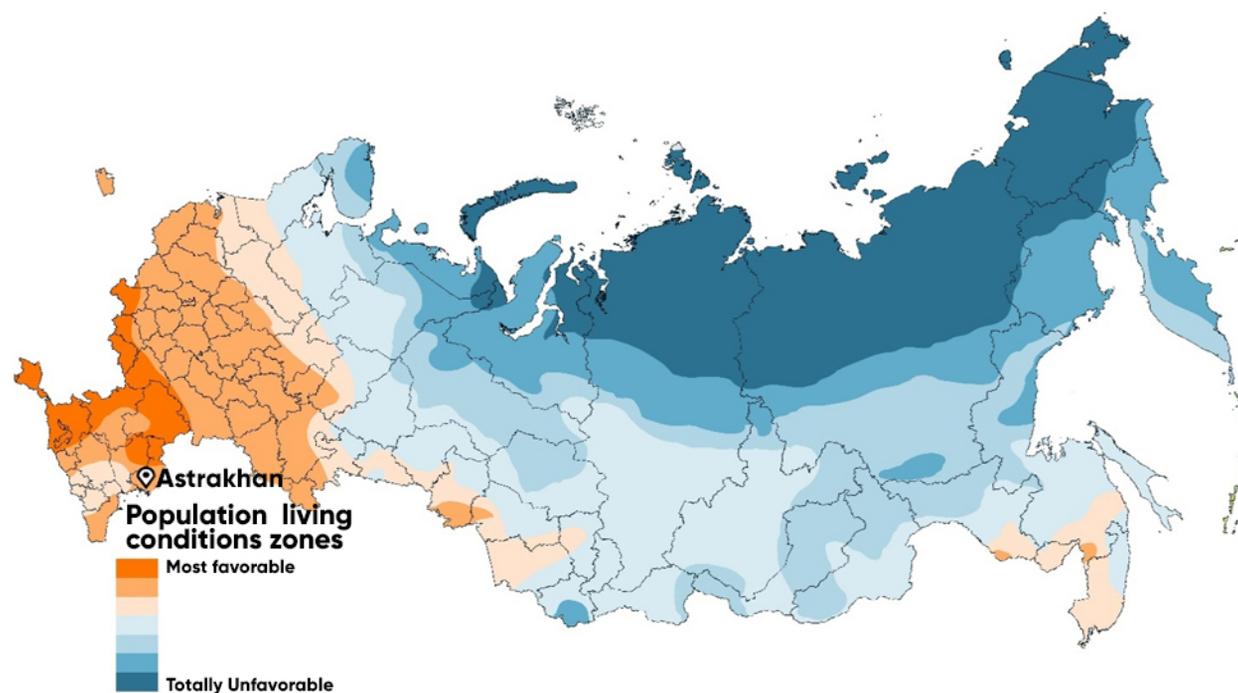


Fig. 4. Geographical demarcation of the territory of Russia according to the natural conditions available for the life of the population¹

Natural conditions of the Astrakhan region are defined as the most favorable in the northern part of the region and favorable in the central and southern parts.

Despite the proximity to the sea, the climate of the Astrakhan region is distinctly continental: with frosty windy winters and hot dry summers, with a large amplitude of annual and daily temperatures. Average temperatures in January are from $-10\text{ }^{\circ}\text{C}$ in the north to $-6\text{ }^{\circ}\text{C}$ in the south, in July the average temperature is about $+25\text{ }^{\circ}\text{C}$. Precipitation is about 200 mm per year. Hot dry wind blows during the spring and the summer. The duration of the growing season (with temperatures above $+5\text{ }^{\circ}\text{C}$) is from 201 to 216 days.

¹ Source: <https://geographyofrussia.com/ocenka-prirodno-geograficheskix-uslovij-dlya-zhizni-naseleniya-i-xozyajstvennoj-deyatelnosti/>



Fig. 5 Climatogram

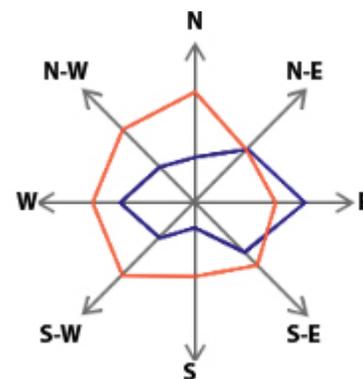
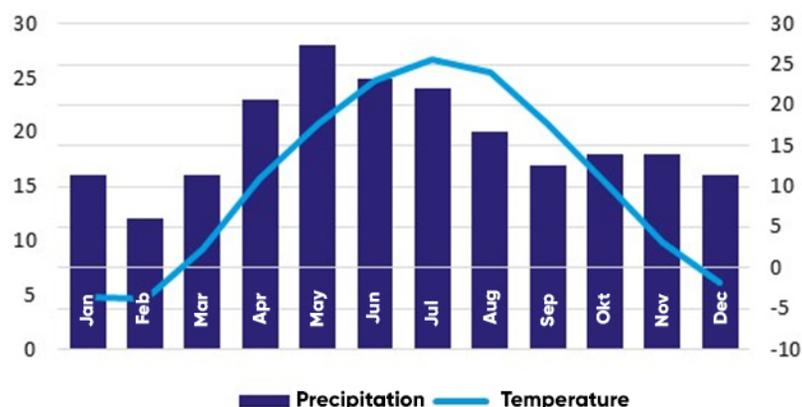


Fig. 6. Astrakhan region Wind Rose

1.3.4. Specially Protected Natural Areas

The area of the Astrakhan region is unique in terms of its biological and landscape diversity. The presence of zonal and azonal components determines a large number of unique natural systems that requires some special protective measures.

At the present time the system of the Specially Protected Natural Areas (SPNA) of the Astrakhan region² consists of (fig.8):

- 3 SPNA of federal importance: Astrakhan State Biosphere Nature Reserve, Bogdo-Baskunchak Nature Reserve, natural sanctuary Island Maliy Zhemchuzny (Small Pearl Island);
- 2 Natural Parks: Volga-Akhtuba interfluvium, Baskunchak;
- 4 State Nature Reserves: Vyazovskaya oak grove, Ilmenno-Bugrovoy, Stepnoy and Peski Berly (Berly Sands);
- 8 State Biological Reserves: Teplushki, Ikryaninsky, Mininsky, Krestovy, Zhirotopka, Bukhovskiy, Kabany, Enotaevskiy;
- 35 Natural Sanctuaries of regional importance;
- 4 Nature Reserves Areas: Wintering Holes in Kamyzyaksky, Ikryaninsky and Volodarsky districts of the Astrakhan region, Wintering Holes No.2, Wintering Holes No. 3, Wintering Holes No. 4.

The total area of the SPNA of regional importance in the Astrakhan region is **420.88 thousand hectares**.

3 SPNA

of federal significance

53 SPNA

of regional importance

30

of fish species

280

of bird species

450

animal species

>1200

higher plant species

Rare landscapes on the territory of the Russian Federation, including which are habitats of the List of Red Book species. Strategic role in the preservation of ecosystems in the Volga delta and the Caspian

² Source: https://nat.astrobl.ru/sites/nat.astrobl.ru/files/perechen_oopt_na_01.01.2018.pdf
Picture source: <https://astrakhanzapoved.ru>





Fig. 7. Astrakhan State Biosphere Nature Reserve

Wetlands of Volga River Delta, including Astrakhan State Biosphere Nature Reserve:

- is a specially designated area of the water zone and the Volga river delta with an area of 1,122.5 thousand hectares with a special regime for the protection and use of the natural resources;
- is of international importance mainly as a habitat for waterfowl;
- included in the list of wetlands of international importance under the Ramsar Convention.

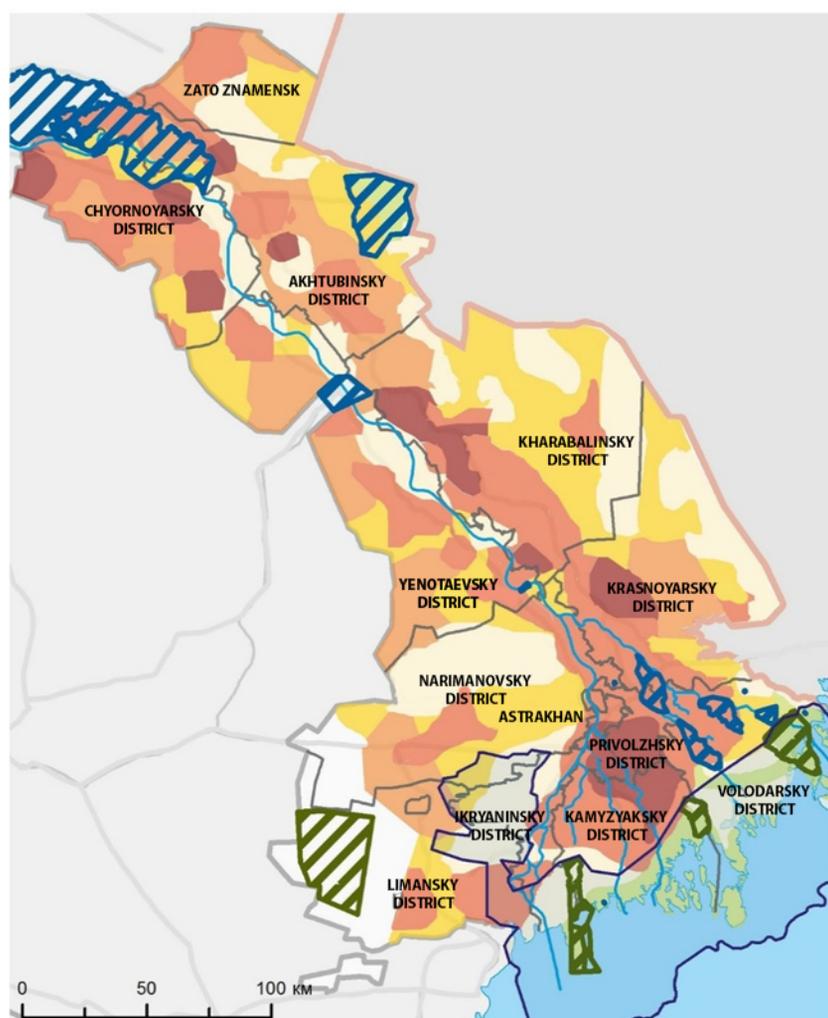


Fig. 8. Location map of the SPNA in Astrakhan region. Differentiation of spreading of the landscape's anthropogenic transformation³

³ Shabanov D.M. Geocological evaluation of landscape's anthropogenic transformation in the Astrakhan region using geoinformation technologies and remote sensing.



Astrakhan State Biosphere Nature Reserve



Ramsar Convention on Wetlands, 1971

Symbols:

RF border

SPNA:

federal

regional

Wetland

"Volga River Delta"

The degree of anthropogenic transformation of landscapes:

total

very high

high

middle

moderate

background



High anthropogenic transformation of vulnerable natural landscapes, provides a pleasant environment for living, managing and resting for man: the Volga-Akhtuba floodplain and the Volga delta, the Western Ilmeno-Bugrovoi and Baskunchak landscapes.

Potential/Opportunity

Availability of a unique outdoor recreational framework.

Availability of mineral, water, fishery and agro-climatic resources and their high concentration.

Potential for the active implementation of alternative energy sources such as wind energy and solar energy.

Issue/Risk/Restriction

Threat of depletion and loss of natural resources, vulnerable natural landscapes under increasing anthropogenic impact.



1.4. NATURAL RESOURCES POTENTIAL

1.4.1. Mineral resources

The main mineral resources of the region are oil, gas and gas condensate, explored in the Astrakhan region and on the continental shelf of the Russian sector of the Caspian Sea, as well as sulfur, salt, gypsum, bromine, iodine-containing waters, fresh underground waters and mineral waters (Fig. 9).

The onshore raw hydrocarbon resources of the Astrakhan region are the largest ones in the European part of the Russian Federation and amount to more than 5.3 trillion m³ of gas and 1.1 billion tons of oil and gas condensate (recoverable).

The region's resource base includes 20 large explored oil, gas and condensate fields, 3 of which are unique in terms of oil and gas reserves:

- Astrakhan gas condensate field;
- Central Astrakhan gas condensate field;
- Velikoe oil field

Lake Baskunchak is the largest salt reservoir in Russia, the commercial development of which has been going on for over 100 years. The lake serves as the main base for the production of edible and industrial salt in the country.

There are large deposits of building materials in the Astrakhan region. The largest are the Nizhne-Baskunchakskoye and Turgayskoye gypsum deposits with a total area of more than 80 hectares.

In the Astrakhan region, reserves of 6 mineral water reservoirs have been explored and protected. Since 1990, the Tinak mineral water reservoir has been in operation, which is located in the Narimanovsky region, north of village Streletskoye, on the area of the Federal State Institution Center for Rehabilitation of the Social Insurance Fund of Russian Federation Tinaki. Iodine-bromine chloride sodium waters of the deposit are used in balneotherapeutics for various diseases. Water reserves of the Tinak category A reservoir are 277 thousand m³/day.

Significant raw hydrocarbons deposits of the Russian Federation (oil, gas and gas condensate) have been explored in the Astrakhan region and on the shelf of the Caspian Sea.

10

raw hydrocarbon deposits in the Astrakhan region with reserves of 1.1 billion tons of oil and gas condensate, 5.3 trillion m³ of gas

10

raw hydrocarbon deposits in the Russian sector of the Caspian Sea with reserves of 0.35 billion tons of oil and gas condensate, 0.65 trillion m³ of gas

90%

gas sulfur of Russian Federation

20%

of condensate reserves of Russia

80%

of common salt of Russian Federation (Lake Baskunchak)



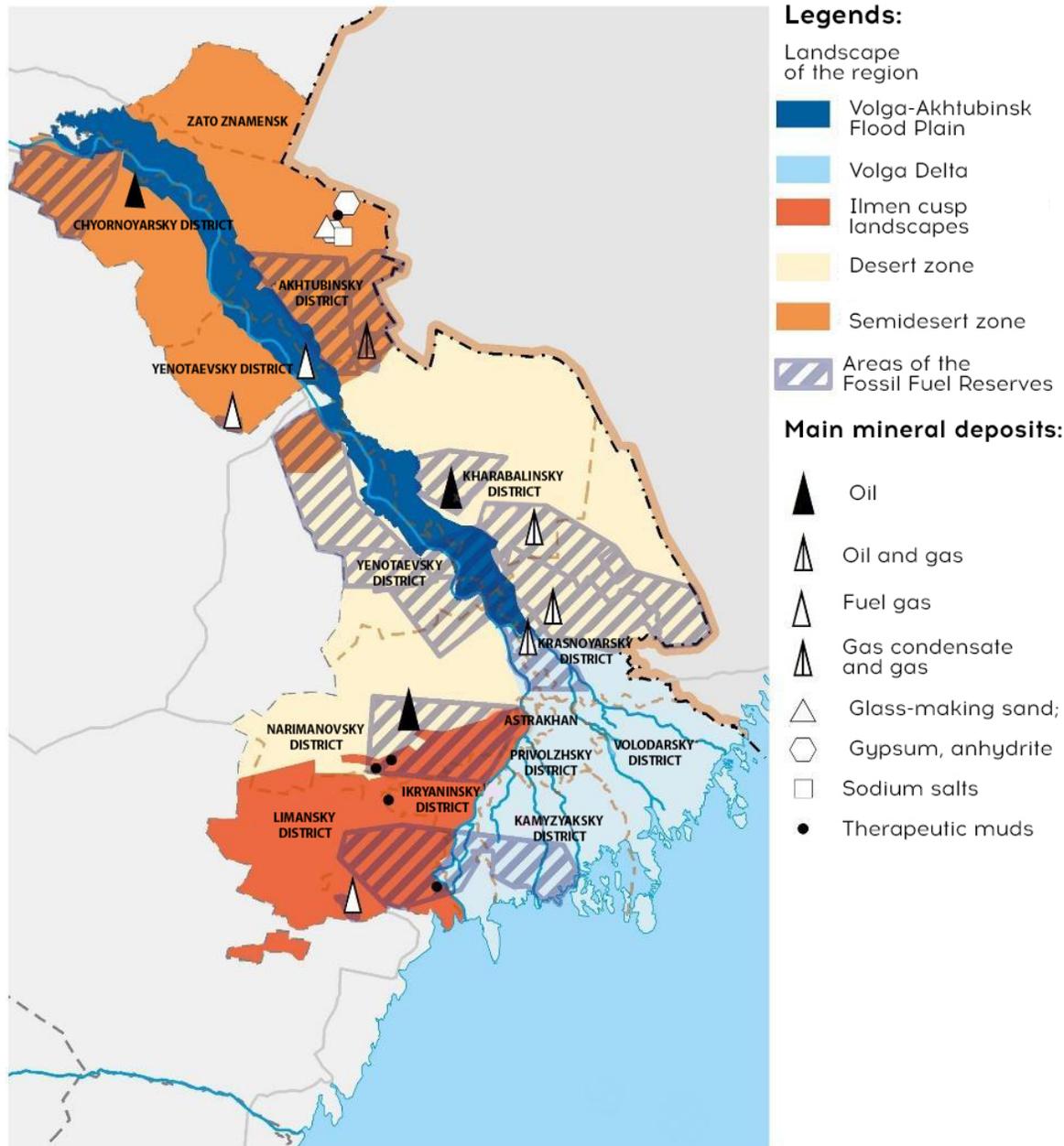


Fig. 9. Location maps of the landscape zones of the Astrakhan region and of its main deposits

1.4.2. Fishery resources

Harvestable stocks of semi-anadromous and fresh-water fish in the Volga-Caspian and North-Caspian fishery subareas, where the majority of their production occurs, is formed due to natural spawning in the Volga river delta and its avandelta.

The main commercial aquatic biological resources of inland water bodies of the southern region of the Volga-Caspian fishery basin are semi-anadromous and fresh-water fish species - no more than 35 species out of 125 species and subspecies noted in the basin.

The Caspian Sea is the richest body of water in the world in terms of the number and quantity of sturgeon species. Of the 26 known species of sturgeon, 6 inhabit here: beluga, Russian sturgeon (osetr), Persian sturgeon, starred surgeon (sevruga), sterlet, thorn sturgeon. The Russian sturgeon, sterlet and beluga are of the greatest commercial

of 35 types of minerals

of commercial fish

of 6 species of

sturgeon



importance. Throughout the history of the Caspian fishery, sturgeon catches have varied significantly depending on reproduction and fishing intensity.

The main types of extracted aquatic biological resources in the Astrakhan region also include roach, bream, carp, catfish, sander, lute, tench and the Others group, which includes crucian carp, rudd, silver carp and other fish species.

The current catastrophic decline in the number of sturgeon in the Caspian Sea due to irrational fishing, reduction of migration routes and natural reproduction determines the need for effective action in order to ensure their protection⁴.



Russian Federal Research Institute
Of Fisheries and Oceanography

1.4.3. Agroclimatic resources

Within the region, a subzone of the northern semi-desert with light chestnut solonchic soils and a subzone of the southern semi-desert with brown soils are distinguished. In the Volga-Akhtuba floodplain and the Volga delta, the soils are alluvial. Due to its natural and climatic conditions, the Astrakhan region was and remains the largest agricultural zone (commercial horticulture, melon cultivation and potato farming).

The crop production is very important to the economy of agriculture which relies on valuable, sometimes unique, natural agro-climatic resources in the lower reaches of the Volga, especially in the Volga-Akhtuba floodplain.

The region has a favorable conditions for the paddy culture. In livestock husbandry, wool-and-meat sheep breeding, meat-and-dairy cattle farming and camel husbandry are distinguished.

Caspian Sea level fluctuations can significantly affect the quality of agricultural land, in particular, the rise of the Caspian Sea creates substantive environmental issues and leads to flooding of the agricultural land.

Potential/Opportunity

Favourable environmental conditions for the life of the population.

High natural resource potential, including availability of unique mineral and biological resources and their high territorial concentration.

Favorable conditions for agriculture.

Issue/Risk/Restriction

Vulnerability of ecosystems of the Volga-Akhtuba floodplain, the Volga delta, semi-desert and desert landscapes.

Caspian Sea level fluctuations is an important factor in life and work in the region.

Insufficient moisture, recurring droughts.

⁴ *Khodorevskaya R.P., Kalmykov V.A., Zhilkin A.A.* Current state of sturgeon stocks in the Caspian basin and measures for their conservation // *Vestnik, Astrakhan State Technical University. Fisheries series.* 2012. No. 1.



1.5. SOCIO-DEMOGRAPHICS OF THE ASTRAKHAN REGION

The population of the region is its human capital, determined by the size, age, level of health and education, professional qualifications of residents, life experience and culture. In order to identify the major issues, risks, restrictions, potential and opportunities for the development of the Astrakhan region associated with the socio-demographic situation, the following were analyzed:

- the size and dynamics of the region's population;
- age and sex structure of the population;
- life expectancy;
- age structure of migration.

Fig. 10 Population dynamics of Astrakhan region 2015-2020, million people

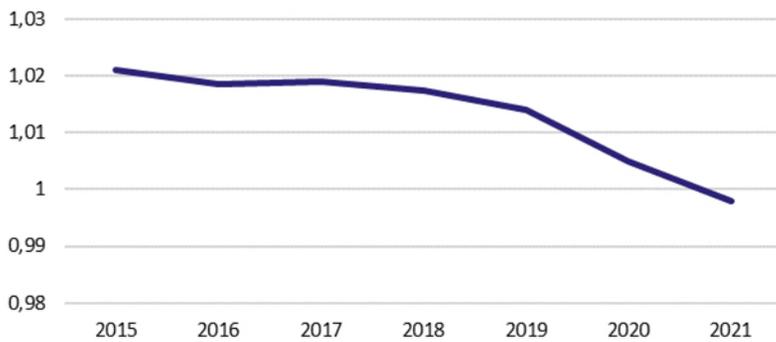
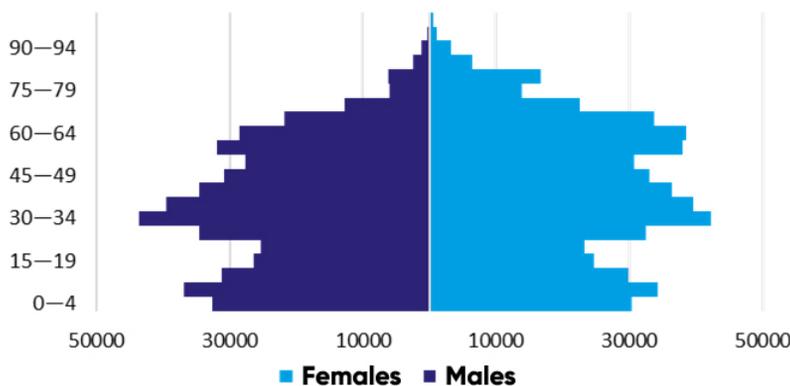


Fig. 11 Structure in terms of age and gender Astrakhan region 2019



998 thousand people

number of inhabitants as of 2021/01/01

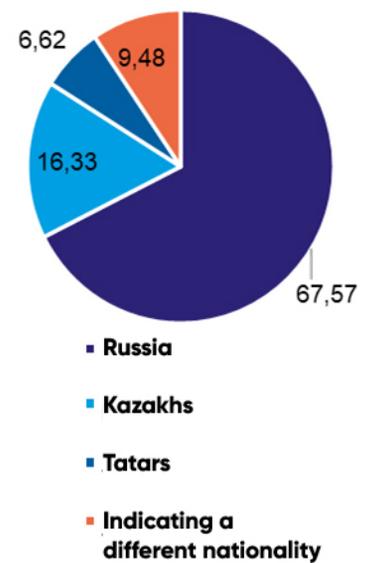
20.36 people/km²

population density

>140

of ethnic origins

Fig. 12 National composition of the population, %



A multi-ethnic and multiconfessional region.

There had been a general downturn in the region in natural population growth with a transition to negative values, an increase in migration outflow and general population loss.

Fig. 13 Dynamics of the general growth (decline) of the population by components in the Astrakhan region

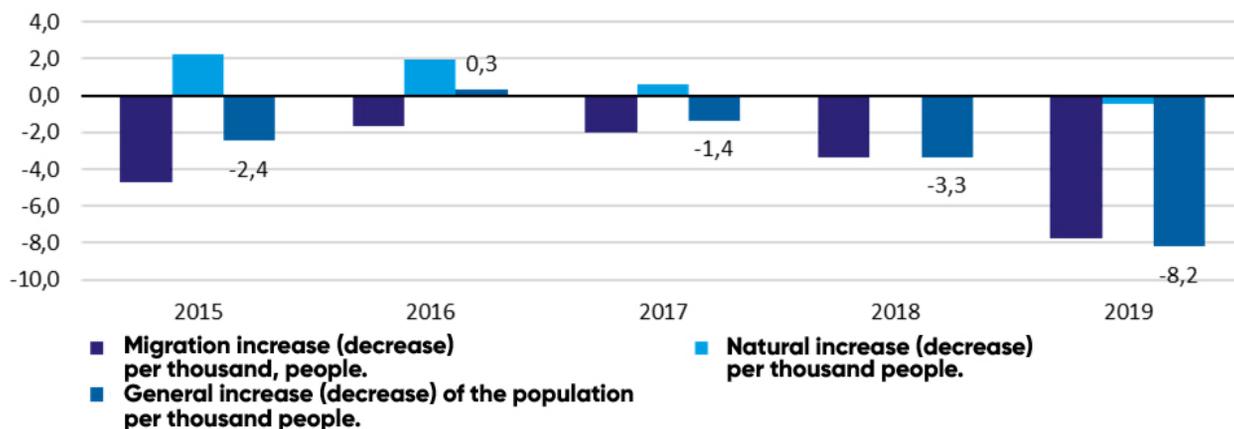
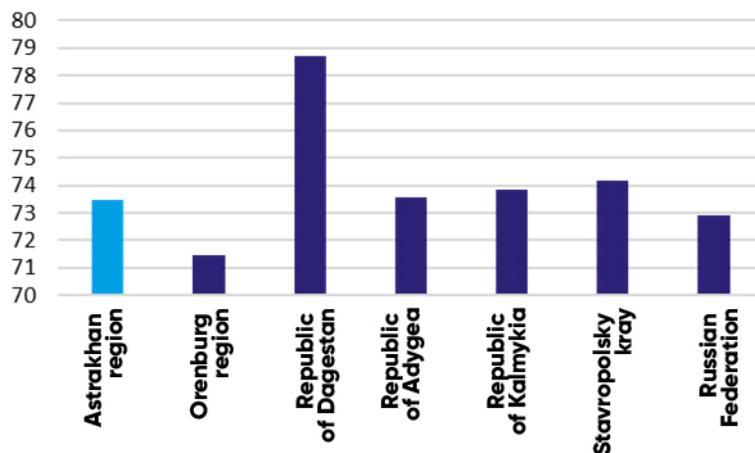


Fig. 14 Life expectancy at birth, 2019



20th

in the Russian Federation by life expectancy

19th

in the Russian Federation by the total fertility rate

55th

by the proportion of the population of senior working age in the Russian Federation

A considerably high life expectancy, above average in Russia.

Fig. 15 Comparative dynamics of fertility rates, 2015–2019

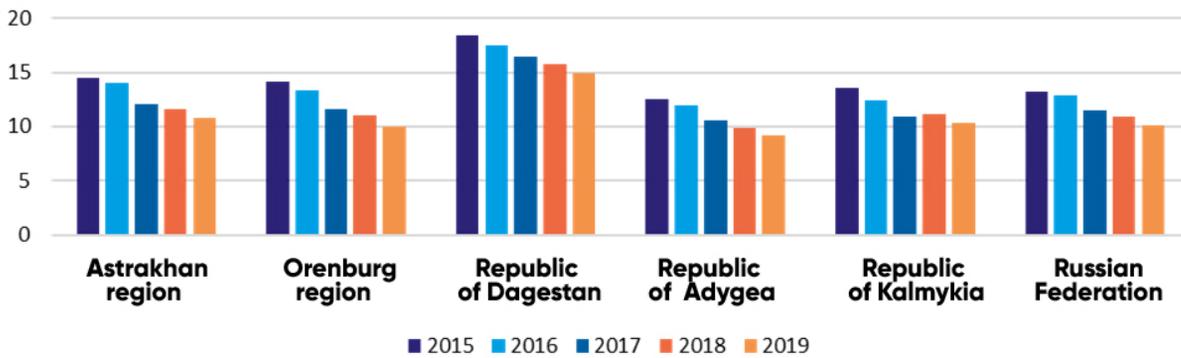


Fig. 16 Comparative dynamics of mortality rates 2015–2019

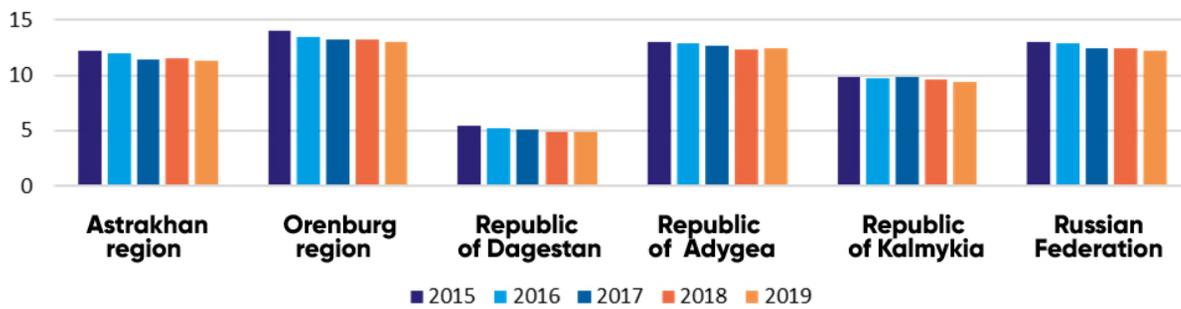


Fig. 17 Age structure of migration in the Astrakhan region, 2019

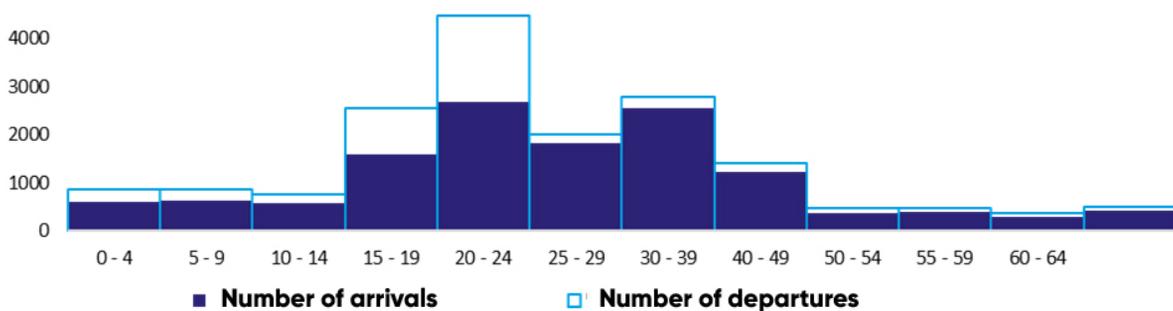
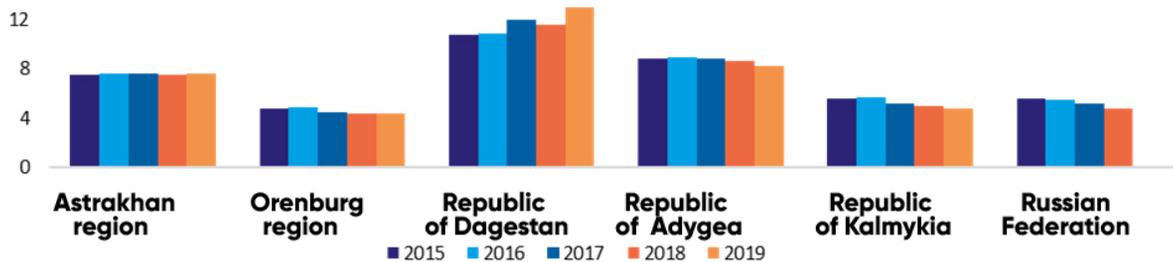


Fig. 18 Comparative dynamics of the unemployment rate, 2015–2019,%

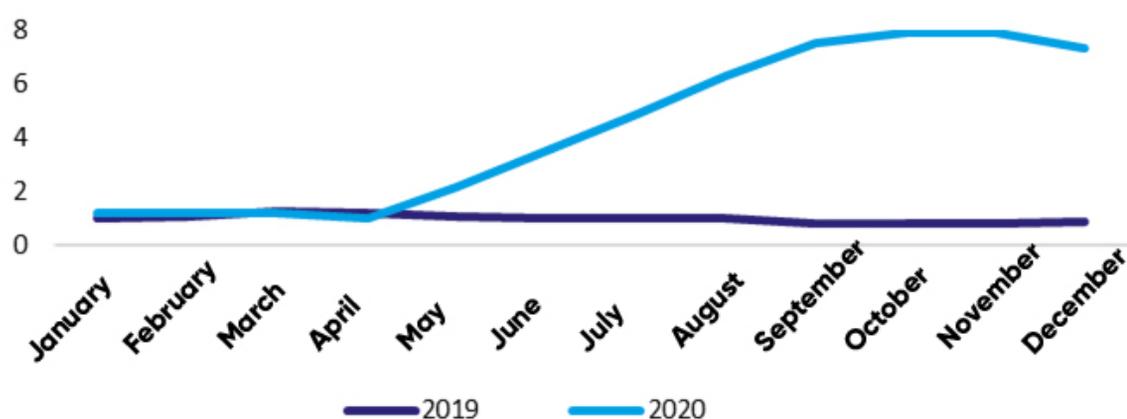


Source: www.gks.ru (Calculation according to the ILO methodology)

The level of unemployment in the region, which has been consistently high over the past 5 years, is higher than the national average, showing a general downward trend.



Fig. 19 Dynamics of the level of registered unemployment in the Astrakhan region in 2019-2020 ..%



The drastic increase in recorded unemployment during the second half of 2020 evidences a concealed unemployment in the Astrakhan region.

Potential/Opportunity

Maintaining the level of natural growth at the current level with a decrease in migration outflow will provide a stable basis for the economic growth in the region with the fastest rates than the national average.

Issue/Risk/Restriction

The risk of an outflow of high-quality labor force of young professionals graduated from universities, as well as highly qualified workers with higher education, to the central cities of Russia and foreign countries.

The risk of a migration outflow of highly qualified specialists in the event of a large drops in output at enterprises and, as a consequence, the risk of a decrease in human capital, i.e. urban population decrease, as well as intellectual and cultural potential.

1.6. SOCIO-ECONOMIC CHARACTERISTICS OF THE ASTRAKHAN REGION

In order to identify the major issues, risks, restrictions, potential and opportunities for the development of the Astrakhan region related to the socio-economic situation, the following were analyzed:

- indicator and structure of the region's GRP;
- income level of the population;
- unemployment rate.

The level of GRP per capita is noticeably higher than in the regions of the reference group⁵, but it does not provide a proportional increase in the indicator of average per capita income, which indicates the lack of mechanisms for converting the region's oil and gas income into the quality of life of the population.

21th

GRP per capita among the territorial entities of the Russian Federation

62th

by average per capita income of the population among the territorial entities of the Russian Federation

19th

by the revenue from taxes, fees and other payments to the budget of the Russian Federation per capita

26th

by investment in fixed capital per capita among the Russian Federation territorial entities

Fig. 20 GRP per capita in 2019, thousands of roubles

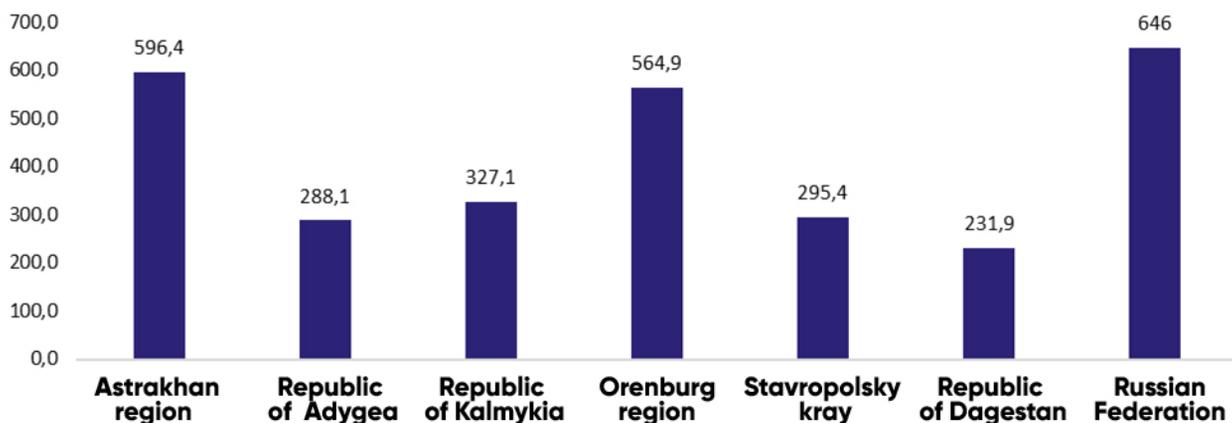
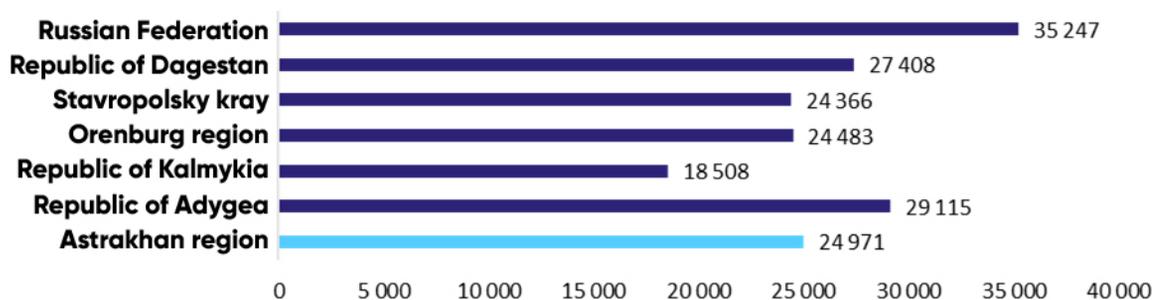


Fig. 21 A monthly average income per capita in 2019, rub



⁵ A group of subjects of the Southern and North Caucasian federal districts of the Russian Federation, as well as the Orenburg region, as a subject of the Russian Federation with an economy dependent on the extractive industries, are considered as a reference group in the framework of this Survey.



The largest part in the region's GRP is the economy extractive industries (47.9%). A significant factor of employment and the formation of incomes of the population of the region is the budgetary services sector (12.4%).

Fig. 22 GRP sectoral composition in Astrakhan region, 2018

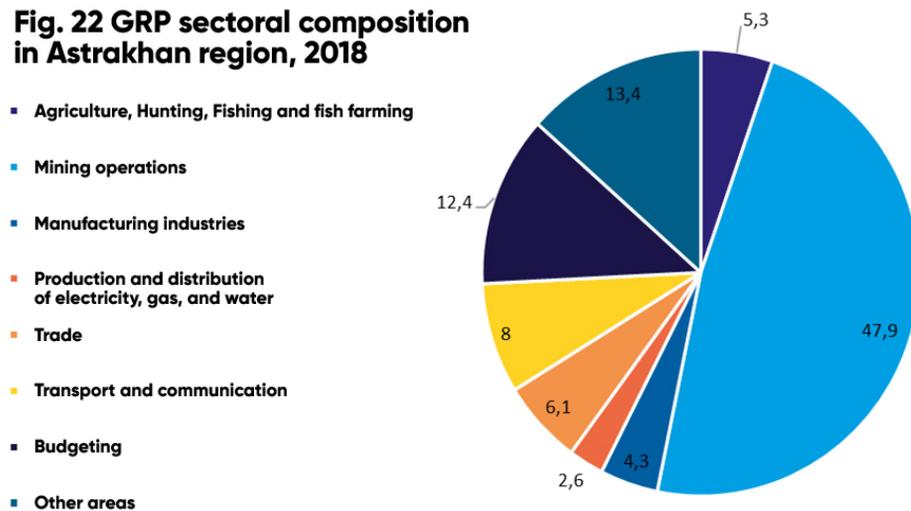


Fig. 23 Basic industries products of Astrakhan district economy, RUB million

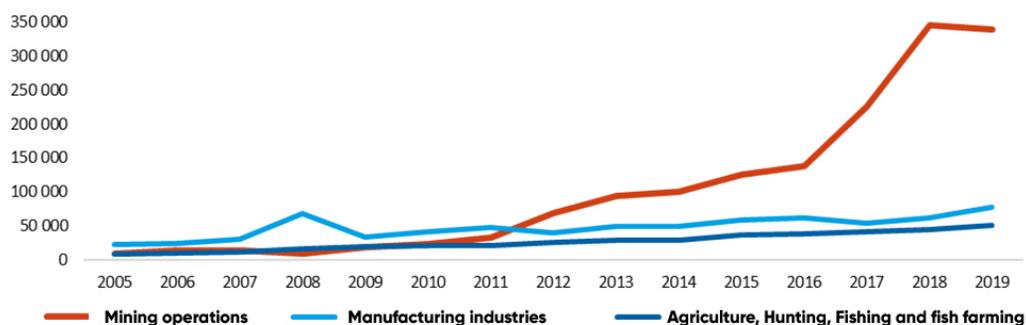


Fig. 24. The volume of investments in fixed assets per capita in 2019, rubles.

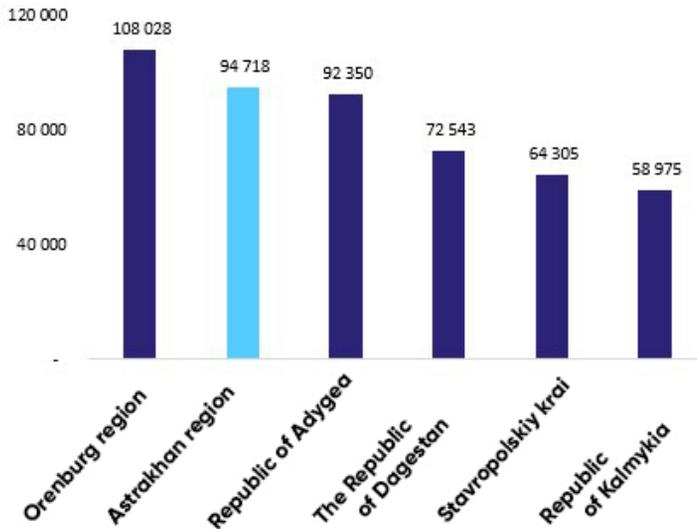
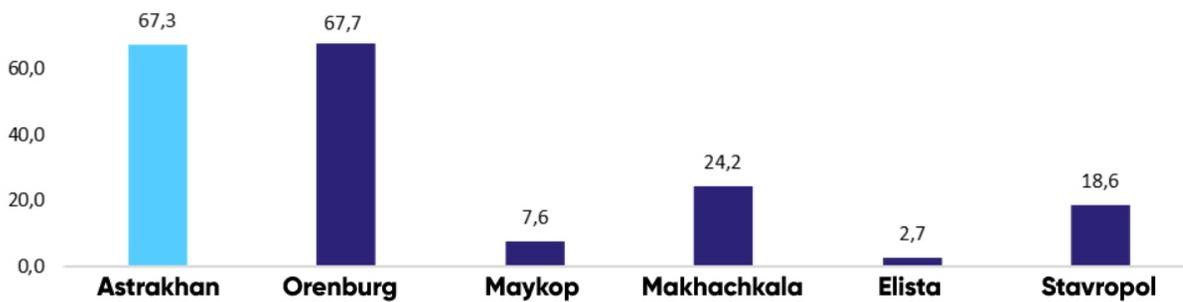
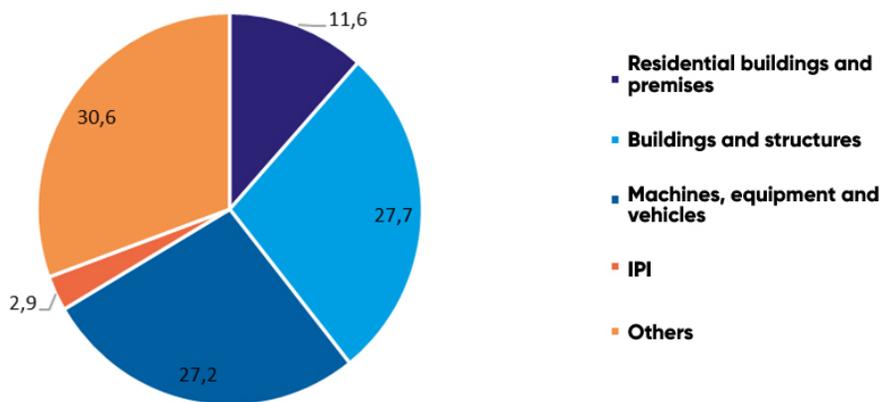


Fig. 25 Investment volume in 2019, bln rubles (except small business)



A high rate of investment in fixed capital in comparison with the regions and cities of the reference group. Substantial quantities of investments are concentrated in the field of mining, as well as in the energy sector, in the agro-industrial complex and in trade.

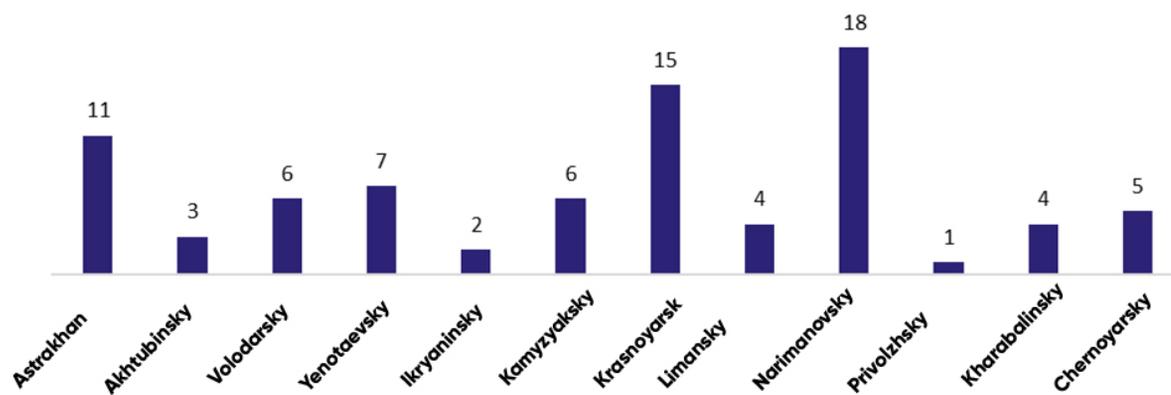
Fig. 26 Fixed investment structure in Astrakhan district, 2019, %



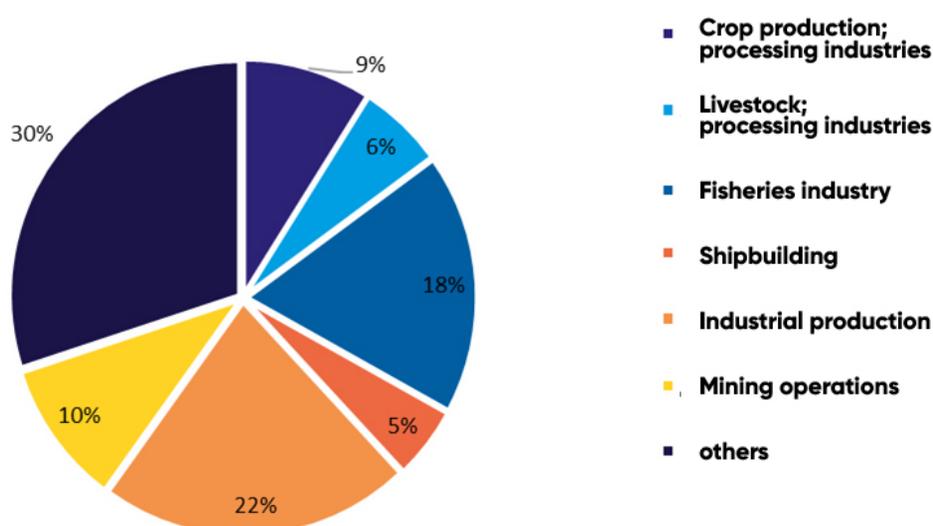
A large share in the structure of investments is occupied by financial transactions and loans, which significantly reduces the potential for modernization of the region.



Fig. 27 The number of investment projects planned for implementation in the context of the territories of the Astrakhan region, units



The largest number of investment projects is planned in the city of Astrakhan, Narimanovsky and Krasnoyarsky districts of the Astrakhan region.

Fig. 28 Distribution of investment projects by industry,%

The largest number of investment projects is planned in the industries which are traditional for the Astrakhan region (industrial production, crop farming, livestock husbandry, fishery).

Potential/Opportunity

Underutilized potential in manufacturing, transportation and storage, etc.

Minimization of potential risks through diversification of industry and development of industries least dependent on fluctuations in world prices for hydrocarbons, development of small business and entrepreneurship.

Issue/Risk/Restriction

Low level of implementation of investment projects (ongoing projects in most areas of the agglomeration make up no more than 30% of those planned for implementation). Risks of further deterioration in investment sentiments.

There is a high risk of mono-dependence in the region, despite the upward trend of manufacturing, agriculture, fishing and fish farming in recent years.

Risks of disruptions in the work of large industrial enterprises in the system of oil and gas production and processing and, as a result, an increase in the level of unemployment and the outflow of qualified personnel.



1.7. SOCIO-CULTURAL ASPECTS OF DEVELOPMENT

1.7.1. Symbolic capital and elements of identity

Here the ancient lotus blooms
 Called Caspian Rose
 Fellahs sacred flower.
 Fishermen send their respect
 For its aroma and beauty
 Country of sails, my blue sky country,
 Since spring washed by sea waters
 And bathed by sun year around,
 Country of fishermen, blessed country!

Boris Filippov,
from the poem The Caspian Rose



Ethno-cultural appearance of the Astrakhan region, XVIII – XXI centuries.



Phases of the ethnic history of the Astrakhan region

The special relevance of the resources of the symbolic capital of the Astrakhan region is due to the competitive field for the attention of tourists, investments, creative potential and adaptability to the dynamic processes of modern times.

Museum of fisheries
Samosdelka settlement
mountain Bolshoe Bogdo Reserve **Russian watermelon**
Tract Kordon Baskunchak **Saray-Batu is the capital of the Golden Horde**
Selitrennoe Hillfort
Kurmangazy Sagyrbaev Cultural Centre

Fig. 29. Popular requests about the identity of the region (Wordstat, Yandex, Federal Agency for Tourism)



Among the competitive advantages in terms of the symbolic capital of the Astrakhan region, which can have a beneficial effect on the socio-economic development of the region, according to the Strategy of socio-economic development for the period up to 2035, are highlighted the following features:

- strategic position in the Caspian region;
- involvement in the ancient trade route The Great Silk Road, whose heritage is considered a world heritage (Fig. 31);
- rich historical and cultural heritage, including traditions of national crafts of peoples living in the Astrakhan region;
- unique tourist and recreational potential, including the sanatorium-and-health-resort areas (Tinaki, Baskunchak);
- ethnocultural traditions;
- natural and historical background for the development of various types of tourism (fishing, hunting, cultural and educational, medical-recreational);
- lessons learned of holding mass cultural and business events of various scales in the region.

The history of each of them is reflected in the multinational composition, lifestyle of the local population, traditional crafts and industries. The coordinating institutions of the region in the field of ethnocultural development are:

- Astrakhan Regional Scientific and Methodological Center of Folk Culture;
- Astrakhan State United Historical, Architectural Museum-Reserve;
- Scientific Center for Ethnopolitical Research at the Astrakhan Branch of the Russian Academy of National Economy and Public Administration.

In the districts of the region there are centers of folk culture, clubs of national cultures, public associations. For instance, the Center for Russian Culture Gorlitsa and the Center for Russian-Kazakh Culture Shamray in the Akhtuba region; District Center of Slavic culture Zhivitsa, District Center of Kazakh culture Zhanaru and District Center of Nogai culture Yedinenie in the Krasnoyarsk region; Folklore and Ethnographic Center Slavyanochka and the Center of Nogai Culture Nogayskoye Podvorye in the Privolzhsky region; Department of National Cultures House of Friendship State Budgetary Institution of Culture AO Astrakhan Regional Scientific and Methodological Center of Folk Culture in Astrakhan.

>200

number of tourist regional routes in the Astrakhan region



Archive of the Intangible Cultural Heritage of the Astrakhan Region



How to distinguish Astrakhan nationalities?

- Traditional economic culture and crafts.
- Performing arts, holidays and ceremonies.
- Oral folk arts.



Concept "Astrakhan - Astrakhanness"



< **The city is inhabited not only by Russians, but also by Persians and Indians, and they all have their own market. Both the Bukhara and Nogai Tatars, as well as the Armenians with all sorts of goods, carry on a lot of trade and crafts here.**
>

German traveler
Adam Olearius

As a whole, the historical heritage of the Astrakhan region, reflecting the vital maxim of "Unity in Diversity" corresponds to the task of preserving a unified cultural space of Russia.

>15

of ethnic groups



Travel of Jan Potocki to Astrakhan and surrounding countries in 1797

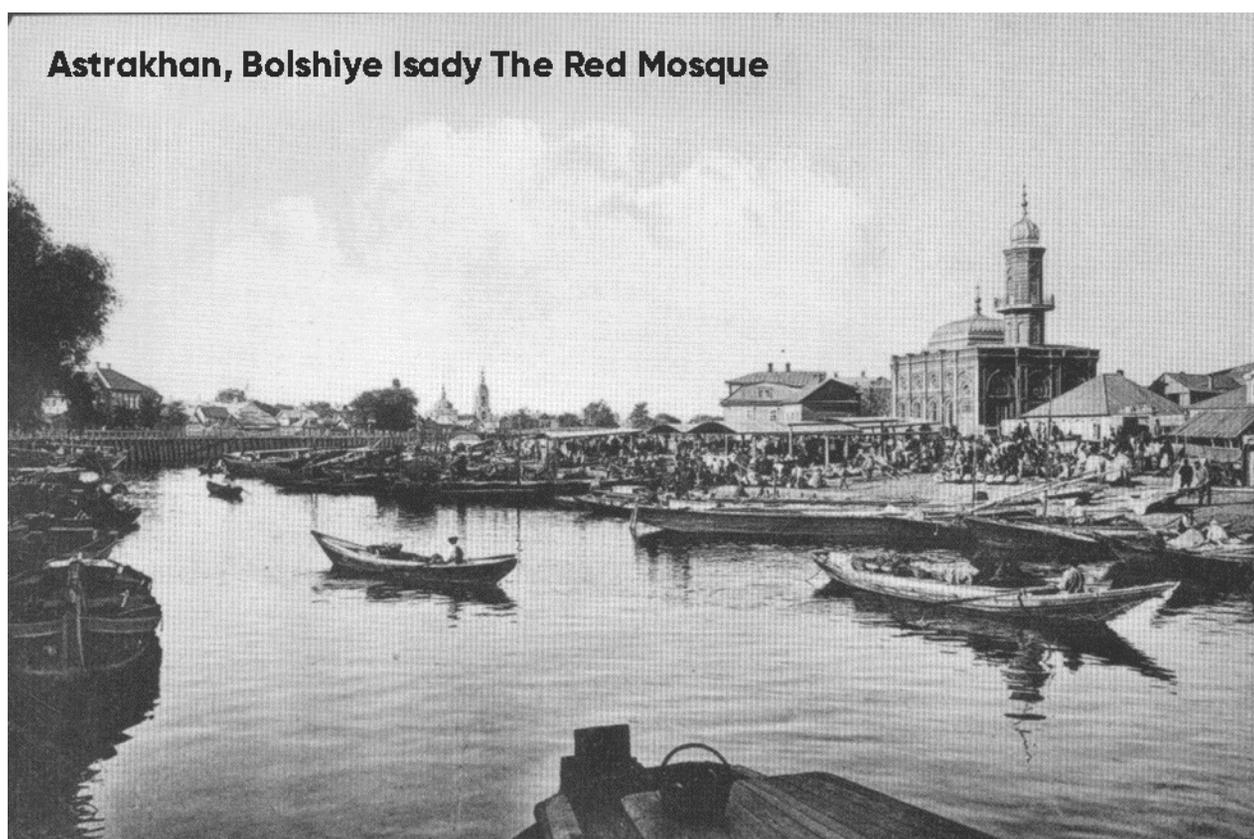


Fig. 30. Conservation area Bazaar Bolshie Issady ⁶

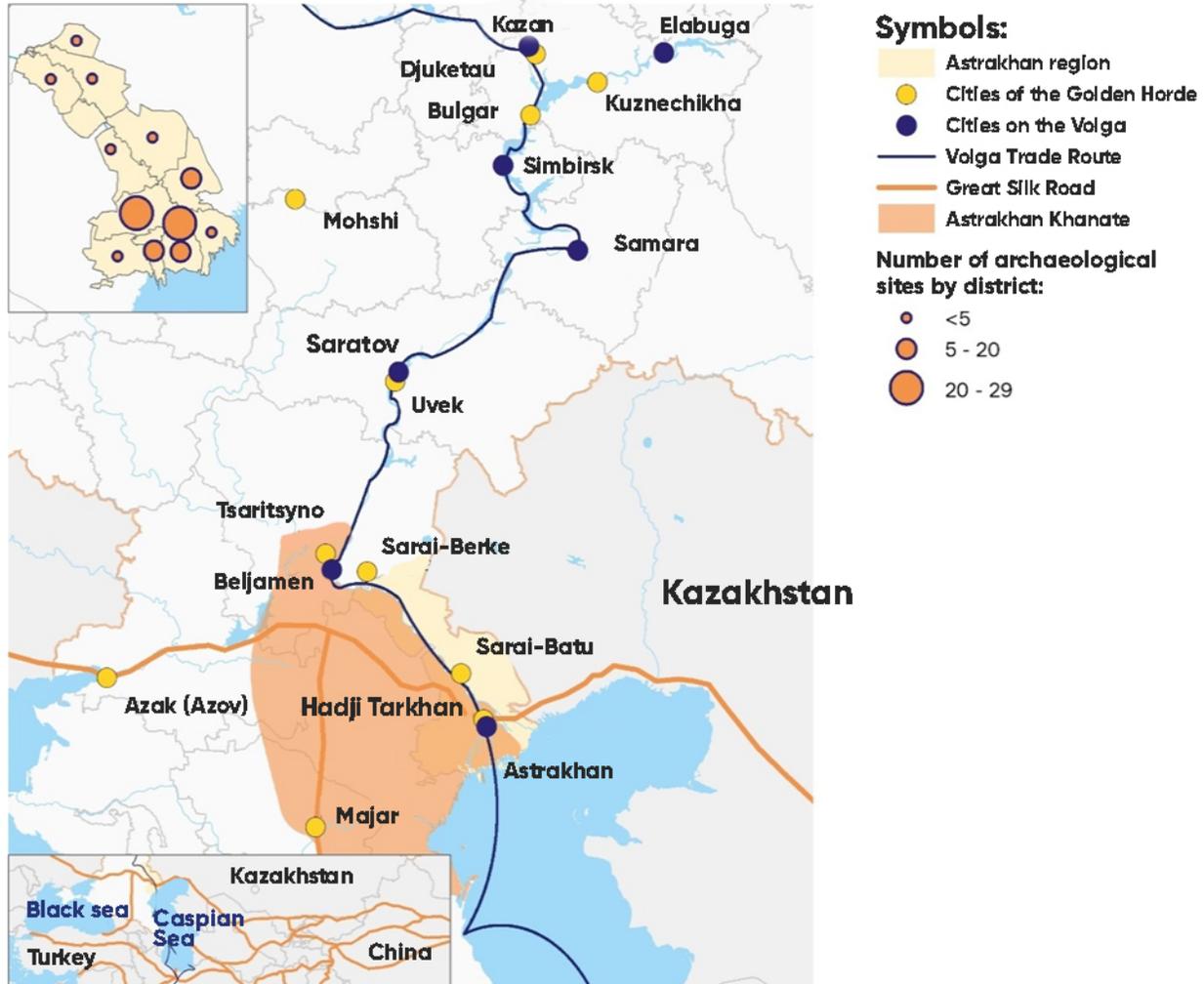


Fig. 31 Trade routes and settlement system along the Volga river

Potential/Opportunity

Creation of a comfortable social and cultural space based on the Astrakhan traditions (the concept of "Astrakhanness").

Development of human capital and public institutions in the region.

Increasing the significance and recognition of the region, the development of its sustainable identification in the external environment.

Achievement of a new strategic vision by 2035 as an innovative platform for the development of human capital in the project Kultura (Culture).

Issue/Risk/Restrictions

Loss of regional intangible features related to the development of the territory.

Underutilized potential of intercultural cooperation with integration into international tourist routes of the tourism organization (UNWTO).

⁶ <https://www.astrobl.ru/news/102908>



1.7.2. Cultural capital



Where Volga rushed as an arrow

Towards the roaring young sea

The Bogdo mountain shows his shadow

That fisherman can see.

Word of nomad's song

Will tell to the traveller again:

How the hill was dropped alive,

But dropped by a holy man

The hill that pierced the pasture!

The name of this holy man,

The country has forgot.

High, blue, steep on its slopes,

Falcon's Shelter spot!

The tumulus stands all covered by the blue grass,

Over the glory of ancestors.

But his feat is still alive,

Sang a nomad boy



Velimir Khlebnikov
From the poem Khadgi Tarkhan

885

of the monuments of architecture,
history and culture in the Astrakhan
region

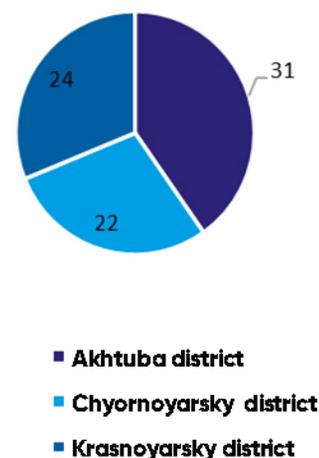
141

of which are of federal importance

3

sights of regional importance:
Kapustin Yar, Cherny Yar, Krasny Yar

Fig. 32 Number of cultural heritage objects on the territory of historical regions of oblast



Municipal districts of the Astrakhan region, due to the climatic and historical features, differ significantly in the quality of the historical and urban planning environment (Fig. 34). This situation is reflected in the register of cultural heritage sites of the Astrakhan region⁷.

Architectural monuments are concentrated mainly in Astrakhan, while monuments of archeology, history and art are located mainly in the area of Privolzhsky, Krasnoyarsky, Ikryaninsky and Kamyzyaksky districts.

⁷ Appendix 8 to the Survey.

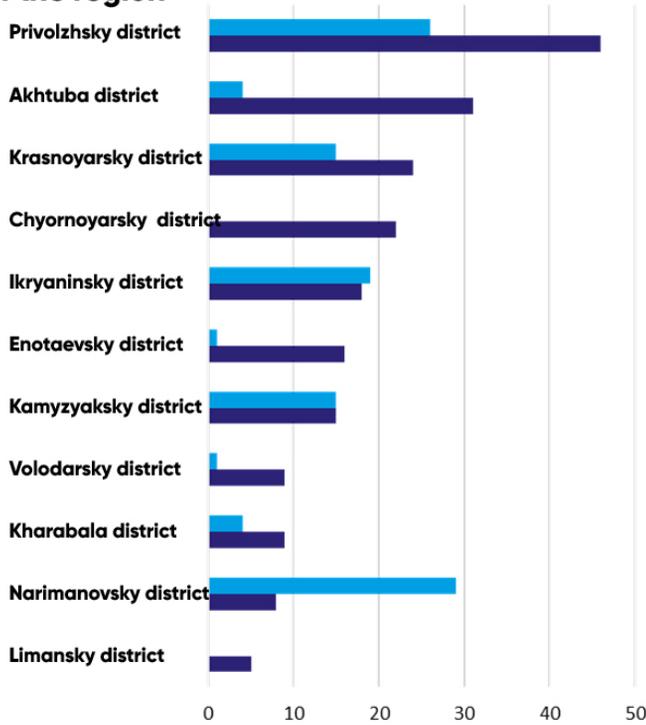


The development of settlements in the Astrakhan region dates back to the 19th - first half of the 20th centuries. Objects of the first half of the 19th century are single temple buildings. The settlements are located along the riverbanks of the Volga and its tributaries, which often changed their channels that caused a loss of significant fragments of architecture. Despite the urban planning instability, the centers of three historical settlements have been placed under state protection of regional importance as tourist attractions: Kapustin Yar (Akhtubinsky district), Cherny Yar (Chernoyarsk district) and Krasny Yar (Krasnoyarsky district).

Among the iconic objects of cultic architecture of the first half of the 19th century there are potential markers of tourist attraction on travelers regional routes:

- Trinity Cathedral, 1832-1840, architect. I.I. Charlemagne, (Yenotayevsky district, rural locality Yenotayevka)
- Kalmyk khurul, 1818 (Kharabalinsky district, rural locality Rechnoye).

Fig. 34 Characteristics of the historical and urban planning environment of the region



- Monuments of the Golden Horde era on the territory of the Astrakhan region
- Cultural heritage site included in The unified National Inventory of the Cultural Goods

Fig. 33. Places of interest of regional importance

Closed administrative-territorial unit Znamensk



- Sights of regional importance
- ▭ Central zone
- ▭ Southern zone
- ▭ Northern zone
- ▭ Conditionally depressed zone
- ▭ Long-term growth zone
- ▭ Current zone



Astrakhan in the creative and scientific heritage of Lev Gumilyov



Nomads gold



Only 120 archeological monuments are under state protection. Among the most iconic sites is the archaeological complex Selitrennoe settlement (rural locality Selitrennoe of the Kharabalinsky district), where during the XIII-XV centuries was located the city of Saray-Batu, the capital of the richest state of the Middle Ages of the Golden Horde; Tchertovo gorodishe (Devil's settlement), XIV century (Ikryaninsky district), Settlement Samosdelka, IX-XIV centuries (Kamyzyaksky district)⁸. Further research of the archaeological heritage is planned within the framework of the Tumulus of Astrakhan program⁹.

In most areas with a high historical and cultural potential, were established a branches of the Astrakhan State United Historical, Architectural Museum-Reserve¹⁰ which is the oldest regional museum in Russia.

14

of branches of the Astrakhan State United Historical, Architectural Museum-Reserve in Astrakhan region.

Fig. 35 Objects of cultural heritage of federal significance.

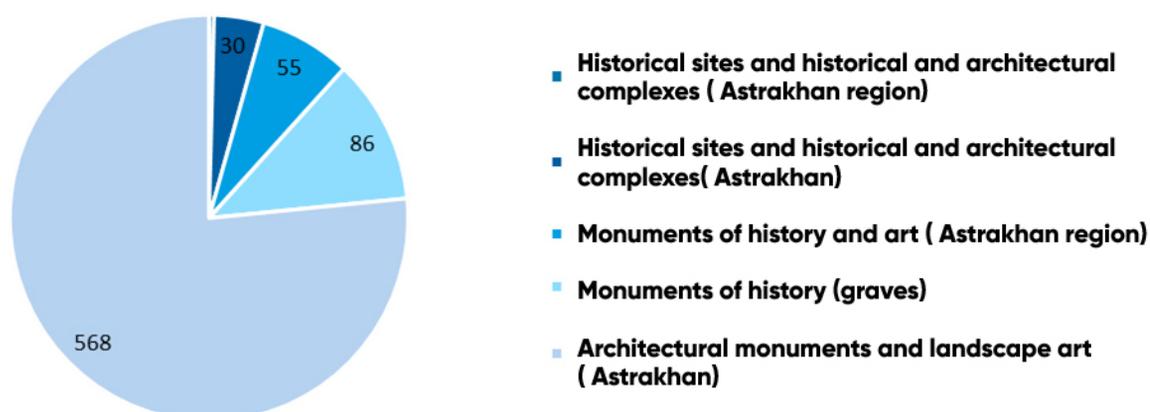
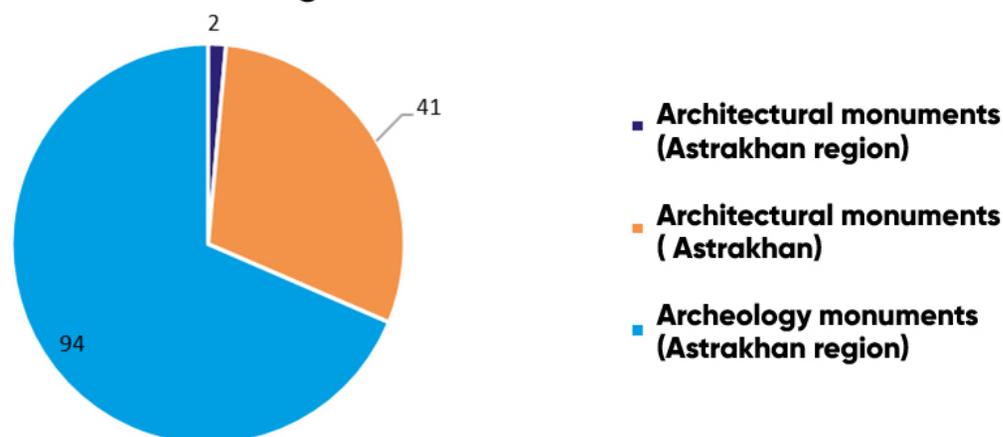


Fig. 36 Cultural heritage sites location



⁸ Sites of the Golden Horde era have been analyzed according to the historical and geographical researches [Genoese Gazaria and Golden Horde / responsible editor S.G. Bocharov; scientific readers: I.L. Kyzlasov and others; Kishinev: Stratum Plus, 2015.

⁹ <https://minkult.astrabl.ru/press-release/astrahanskije-arheologi-nachinayut-masshtabnyje-issledovaniya-kurganov>

¹⁰ <http://astrakhan-musei.ru/folders/folders/get/428>



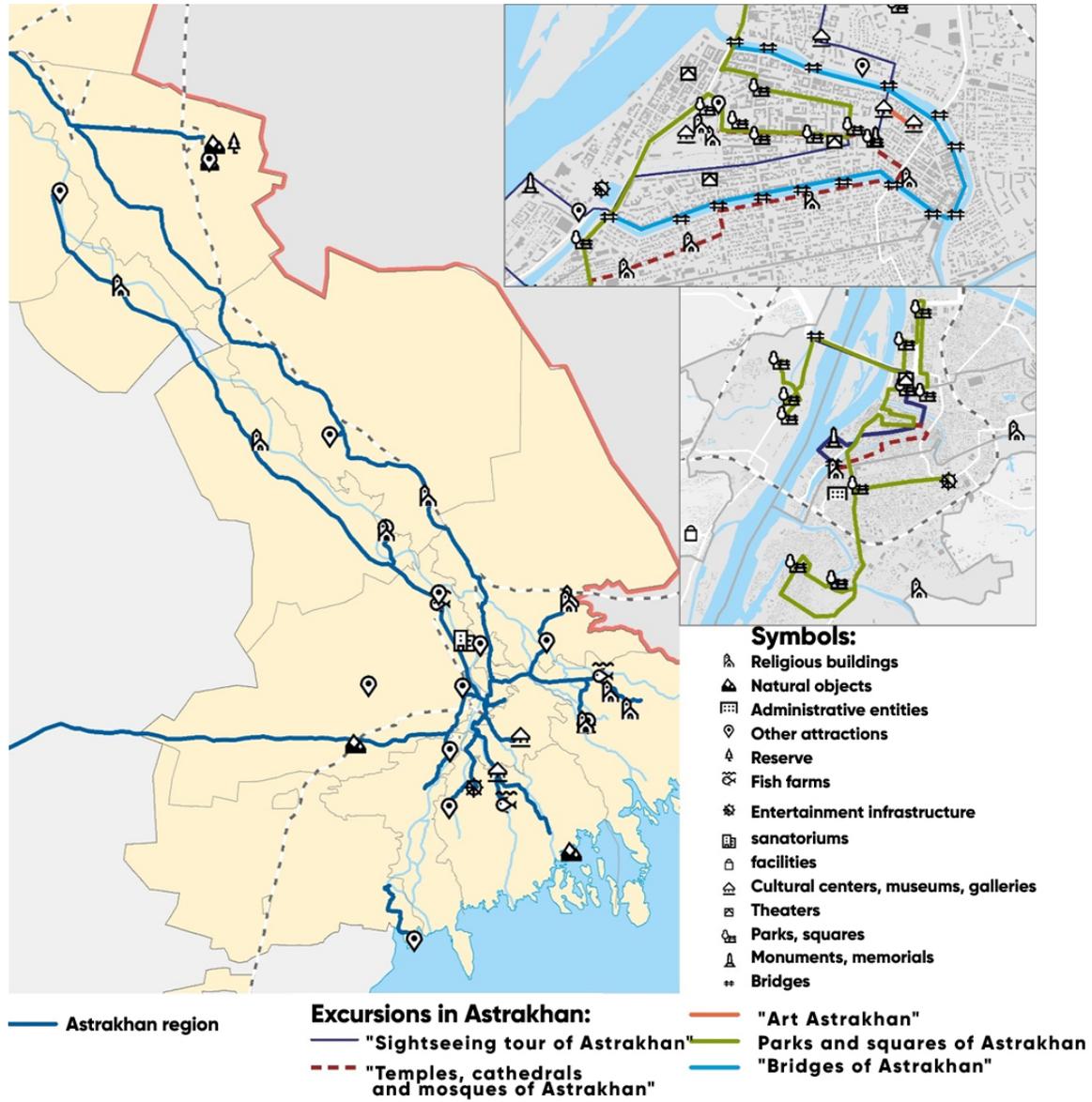


Fig.37. Features of the historical and urban planning environment of the Astrakhan region

Potential/Opportunity

Preserving the integrity and authenticity of the historical environment.

Inclusion of the most iconic objects of the region in ethnographic, cultural and educational regional tourist routes.

Promotion of the diversity of typologies of the heritage of the Astrakhan region.

Issue/Risk/Restrictions

Poor knowledge of the objects of the Golden Horde era in the region.

Uneven distribution of attractions sights (monuments of architecture are located in Astrakhan, while monuments of archeology and history are located in districts).

Lack of approved boundaries of places of interest, valuable building features in the area of historical villages of the region are not highlighted.



1.7.3. Tourism potential

The key factors influencing the formation of the tourist product of the Astrakhan region include:

- peculiar features of the settlement system;
- tourist image (rating indicators);
- variety and logistical connectivity of tourist routes;
- peculiar features of the development of the tourist infrastructure of accommodation.

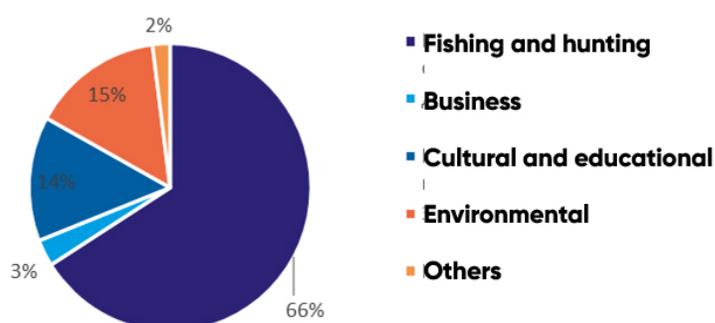
The historical background for the formation of the settlement system of the Astrakhan region include:

- linear structure along the banks of the Volga-Akhtuba floodplain;
- radial fan-shaped structure in the Volga river delta

These peculiar features form the framework of already existing routes: cultural, educational, ethnographic, natural, ecological routes (Fig. 39)¹¹. A promising tourist investment project of the Federal Agency for Tourism is the On The Volga project¹².

Existing plans for the development of cruise routes along the Caspian Sea and river boat excursions along the Volga (Fig. 42), independent media projects¹³ form a comprehensive interregional tourist route that unites 14 territorial entities of the Privolzhsky federal district, which all have a geographical, historical and cultural conjunctiveness, national identity and belong to the main trade and life-supporting waterway - the Volga River.

Fig. 38 Tourist routes and points of interest



¹¹ Appendix 7. List of tourist routes recommended by the Ministry of Tourism and Culture of the Astrakhan region.

¹² <https://tourism.gov.ru/news/16880/>

¹³ <https://onthevolga.ru/>

44th

Group Strong Profs is the place of the Astrakhan region in the National tourism rating, 2020

1.6 million people

tourist flow to the Astrakhan region

242

number of popular attractions



The best regions of Russia for recreation, 2019

83–85%

of visitors coming with fishing and hunting purposes from the total incoming flow to the region



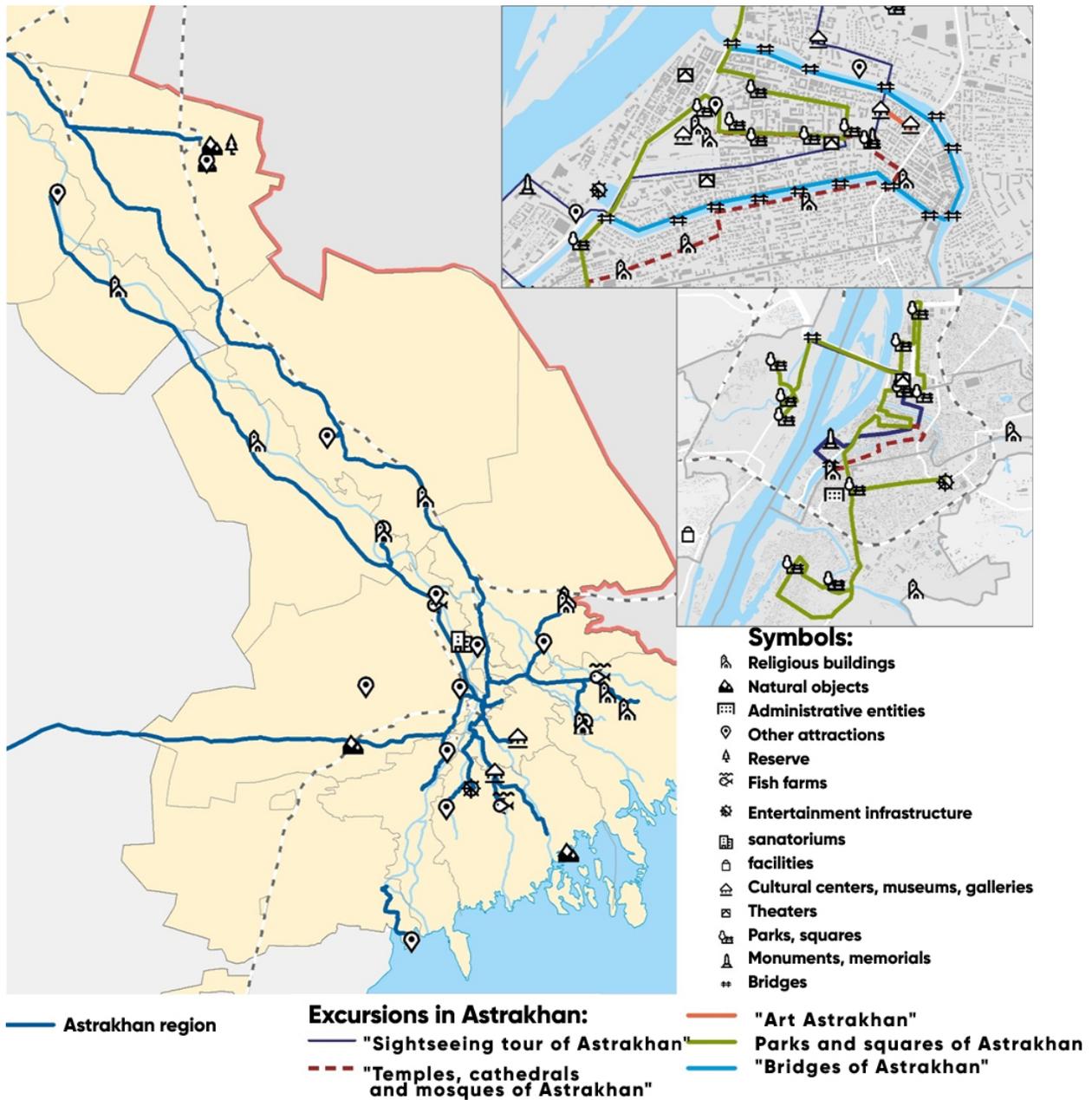


Fig. 39. Excursion routes in the Astrakhan region

In the Astrakhan region is located a State Nature Reserve of federal importance the Astrakhan Biosphere Nature Reserve and Specially Protected Natural Areas of regional importance. There is no Specially Protected Natural Areas (SPNA) of local importance in the Astrakhan region¹⁴.

The attendance data of the SPNA in the northern and southwestern parts of the region, which are under the jurisdiction of the State Budgetary Institution AO Directorate for ensuring the functioning of the northern Specially Protected Natural Areas of the Astrakhan region the growth of the tourist flow and the prospects for diversifying the tourist product through the development of ecotourism and obtaining socio-economic effects in adjacent territories.

¹⁴ <https://nat.astrobl.ru/stranica-sayta/regionalnye-oopt>



Fig. 40. Attendance of protected areas of the Astrakhan region

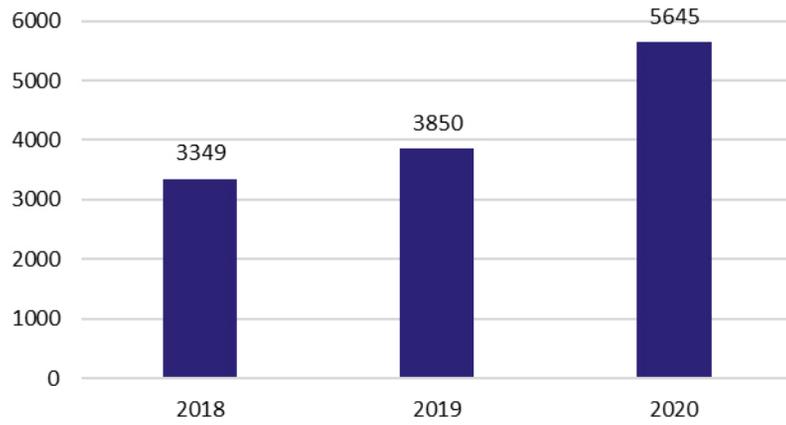


Fig. 42. River and cruise routes in the Caspian Sea



Steppe Ring project

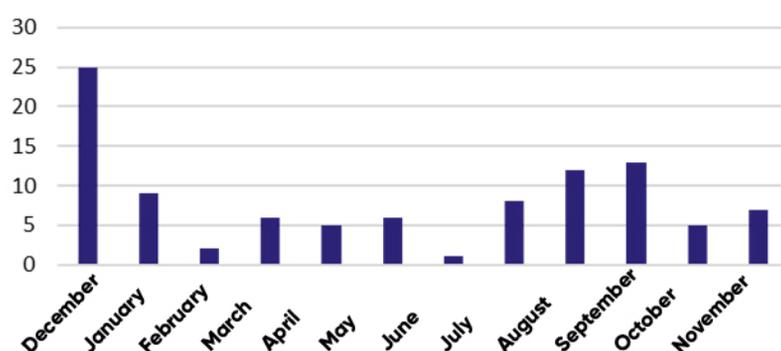


Particularly important in the uniqueness of the cultural landscape of the region is the enterprise for the cultivation of two-humped camels¹⁵. In the region there are 6 agricultural organizations engaged in the livestock breeding¹⁶.

Despite the fact that the Astrakhan region is absent in the list of event regions¹⁷, among the unique events it is necessary to highlight¹⁸:

- Astrakhan Astronomical - «Desert Stars»¹⁹;
- Cross country rally Gold of Khagan
- International Puppet Theatre Festival Caspian Coast;
- International Festival Astrakhan Multinational and other thematic events of the State Budgetary Institution of Culture AO Astrakhan Regional Scientific and Methodological Center of Folk Culture in Astrakhan;
- International educational project for specialists in the field of media industry, PR and advertising Caspian Media School;
- International ethno-tourism project Ethno Fair. Southern Bazaar;
- open-air events Russian Operas in the Astrakhan Kremlin;
- festival of wind orchestras Fanfare of the Caspian.

Fig. 43 Saturation of the regional event calendar



44th

rating of event potential of the regions, 2018

The richness of the event calendar during the winter is formed by educational events organized in Astrakhan, Ikryaninsky and Volodarsky districts (round table discussions, book fairs, interactive sessions, etc.) and thematic entertainment New Year's events, during the off-season and during the summer period - cultural and educational events reflecting the specificities of the region (music, theater festivals, Watermelon Festival, fish broth, etc.).

¹⁵ <https://msh.astrobl.ru/section/verblyudovodstvo>

¹⁶ <https://astragosplem.3dn.ru/index/verblyudovodstvo/0-8>

¹⁷ https://event-live.ru/articles/tsifry-i-fakty/tsifry-i-fakty_946.html

¹⁸ Appendix 6. Summary list of events.

¹⁹ <https://rg.ru/2020/07/02/reg-ufo/v-peskah-astrahanskoj-oblasti-projdet-astronomicheskaja-ekspediciia.html>



123

Russian and international sports competitions in the Astrakhan region

Fig. 44 Comparative characteristics of regions in terms of the volume of paid services to the population, RUB million

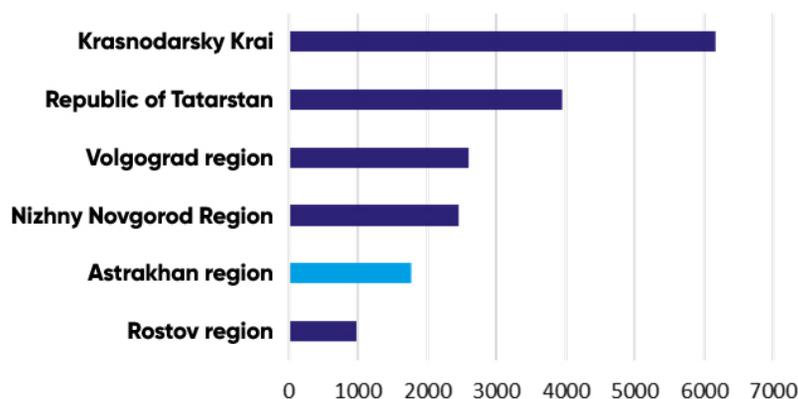
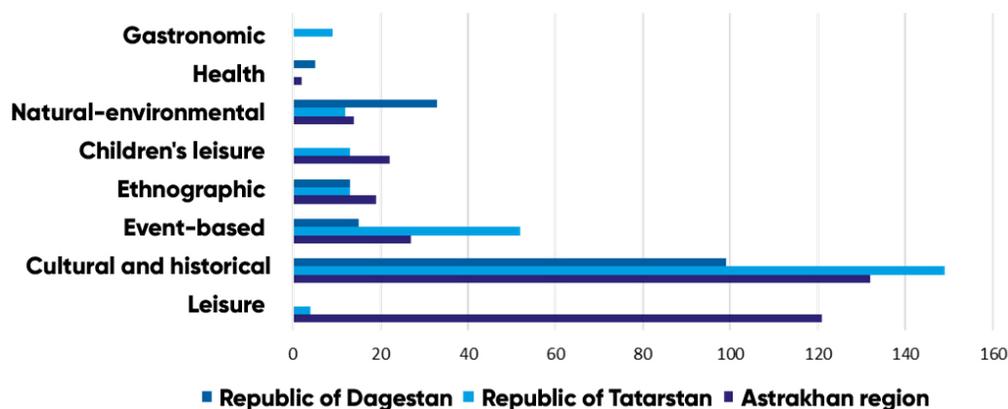


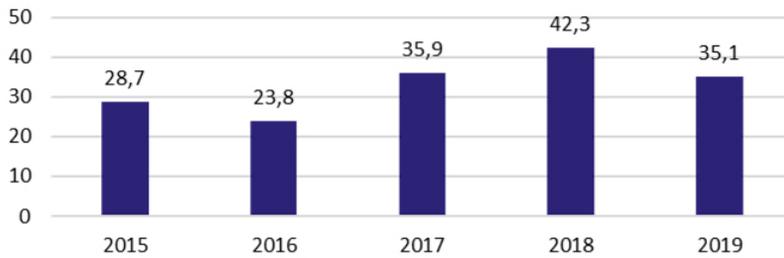
Fig. 45 Comparative characteristics of regions by type of tourism



Source: <http://opendata.russiatourism.ru/7708550300-attractionsregionsstat>

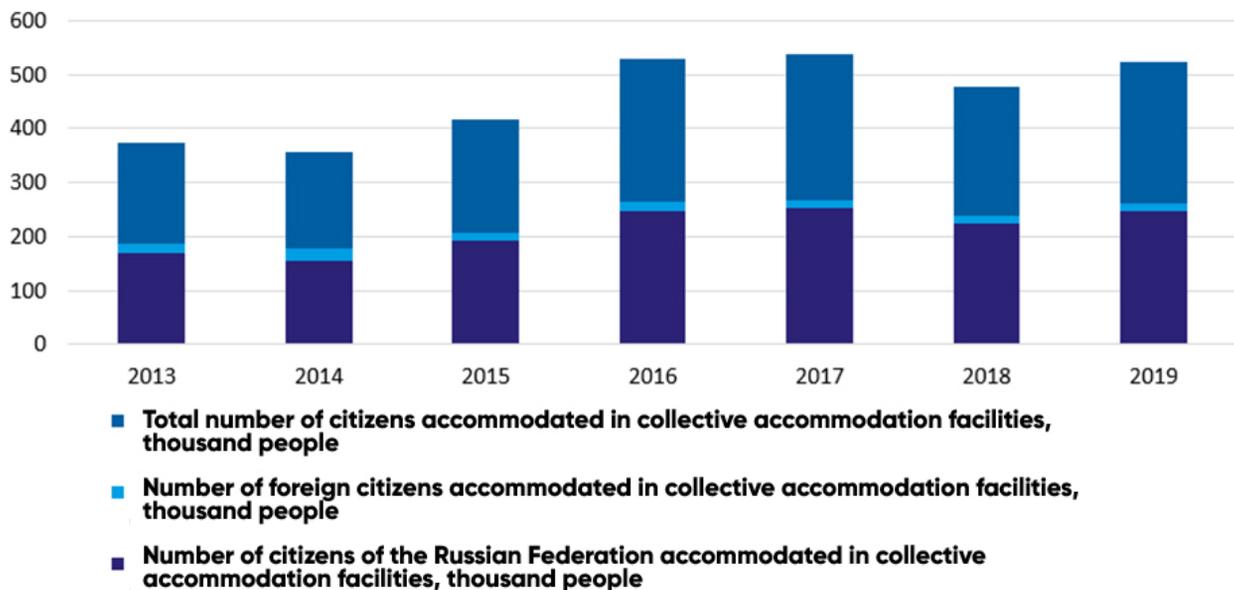
The major tourist and recreational activity is oriented to the fishing and hunting tourism. This is possible due to the unique reserves of aquatic biological resources in the Volga delta and the coastal part of the Northern Caspian, which is adjacent to the Astrakhan region.

Taking into account the unique tourism potential, it is necessary to strengthen the marketing promotion of the region's features, to develop the infrastructure of accommodation and services.

Fig.46 Number of implemented vouchers**552**

the number of collective accommodation facilities on the territory of the Astrakhan region totals

Source: <https://astrastat.gks.ru/folder/41536>

Fig. 47 The number of citizens accommodated in collective accommodation facilities

Potential/Opportunity

A distinctive cultural landscape.

The availability of the tourism industry objects, cultural, educational and recreational attractions.

Rich traditions of national crafts of the peoples living in the Astrakhan region.

Strengthening of the intangible values.

The natural and historical backgrounds in order to promote various types of tourism (ecological, ethnographic, cultural, educational, medical and health tourism, etc.).

Issue/Risk/Restrictions

Unmanifested image positioning of the municipal entities of the Astrakhan region.

Mono-demand and mono-specialization in the field of fishing and hunting tourism.

Relatively small volume and insignificant growth of paid services in the tourism sector.

Lack of large-scale image events in municipal entities located outside Astrakhan.

Lack of a comprehensive tourist offer with route differentiation.

Lack of inter-municipal cooperation; Municipal Entity City of Astrakhan as the only starting point and the



Availability of the sanatorium-and-health-resort areas (Tinaki, Baskunchak).	Kremlin considered as the main object of the demonstration.
Organized event program, including unique events.	Low share of collective accommodation facilities that have passed the official classification.
Increasing the socio-economic efficiency of the tourism sector.	Average rating regional indicators in the tourism sector.
<p>Taking into account the indicators of the annual tourist flow to the Astrakhan region (1.6 million people²⁰), the number of persons accommodated in collective accommodation facilities (hereinafter referred to as CAF) is about 250 people²¹, or 15% of the total tourist flow. According to the data on the average annual occupancy of the CAF rooms in the fishing/</p> <p>hunting sector, it was revealed that about 35% of tourists from the total tourist flow are not officially registered while staying in the CAF.</p> <p>Lost income in tourism is on average 2.75 billion rubles. Consequently, the lost GRP growth in the field of Activities of hotels and public catering establishments is about 1.75 billion rubles.</p>	

²⁰ According to the marketing research of the tourist services market in 2018, conducted by OOO (LLC) IntelMedia.

²¹ <https://rosstat.gov.ru/folder/23457>



Section 2. Analysis of the socio-economic situation and the mainstream development of the municipal district City of Astrakhan



2.1. BRIEF DESCRIPTION OF THE MUNICIPAL ENTITY CITY OF ASTRAKHAN AND ITS RESOURCE POTENTIAL

Astrakhan is the administrative center of the Astrakhan region, located 1534 kilometers southeast of Moscow on the Caspian lowland, in the upper part of the Volga river delta. The city has a unique economic and geographical position, is a large river and seaport located in the lower reaches of the Volga river with access through a system of branched navigable waterways to the Caspian, Azov, Black, Baltic and White seas.

For almost three centuries, Astrakhan was the major administrative center through which trade and political relations of the Russian state with the countries of the East, Transcaucasia and the North Caucasus were carried out. Located at the crossroads of caravan tracks and waterways, during the 17th – 18th centuries Astrakhan turns from a small fortified fortress in the south of the Russian State into a large trade and craft city, while the Volga river became the most important transport corridor of the country for the trade routes of Persians and Arabs.

Astrakhan is the oldest city in the Lower Volga region, it is one of 41 (44, taking into account the updated list) the cities and towns of the Russian Federation, recognized as historically valuable²². For the first time, Astrakhan was mentioned by historians, scientists, travelers in the XIII century. The old city was part of the Golden Horde. It was located 12 km upstream the actual location of Astrakhan, on the right riverbank of Volga.

Urban development of the city of Astrakhan was carried out in relation to the main urban core Kremlin Ensemble of the 16th – 19th centuries and over time it spread to the adjacent territories, which have retained their historical names to this day.

In 2010, the city of Astrakhan was given the status of a historical settlement of federal importance.

Contemporary Astrakhan is located on 11 islands and is actually divided into 4 territorial districts: Kirovsky, Leninsky, Sovetsky and Trusovsky.

According to the Strategy for Spatial Development of the Russian Federation, for the period up to 2025²³, the Municipal Entity City of Astrakhan and adjacent municipal entities are among the promising centers of economic growth of the territorial entities of the Russian Federation, which will provide a contribution to the economic growth of the Russian Federation from 0.2 to 1% annually and is considered as a promising large urban agglomeration.



B.M. Kustodiev about Astrakhan

1558

year of foundation

²² Order of the Ministry of Culture of the Russian Federation, the Ministry of Regional Development of the Russian Federation, dated July 29, 2010 No. 418/339).

²³ Approved by the order of the Government of the Russian Federation of February 13, 2019 No.207-r.



Within the framework of this section, the analysis of the socio-economic situation, the main directions of development of the Municipal Entity City of Astrakhan is carried out, taking into consideration the resource potential for the development of the regional center as an agglomeration core.

To this end, the Survey examined such characteristics of the municipal entity as:

- sociodemographic;
- socio-economic;
- socio-cultural aspects of development;
- peculiar features of city-planning development;
- infrastructure development.

As a result of the analysis of the major characteristics, including those of the natural resource, economic and infrastructural potential of this Municipal Entity, the key issues of socio-economic development and potential solutions were identified, as well as the promising areas of the spatial development of the city of Astrakhan as a center of agglomeration development and a driving force of the growth of the regional economy.

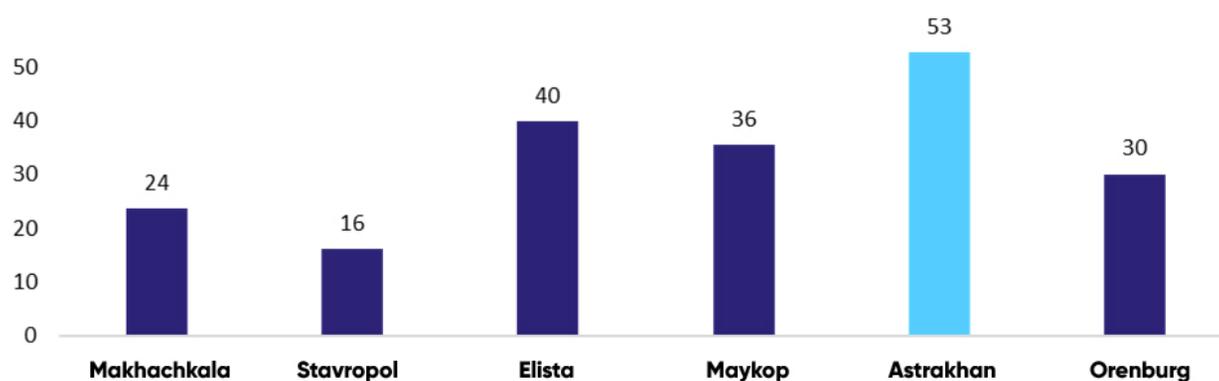


2.2. SOCIO-DEMOGRAPHICS

In order to identify the major issues, risks, restrictions, potential and opportunities aiming to develop the core of the Astrakhan agglomeration, which is the Municipal Entity City of Astrakhan, associated with the socio-demographic situation and directly affecting the human capital of the regional center, the following were analyzed:

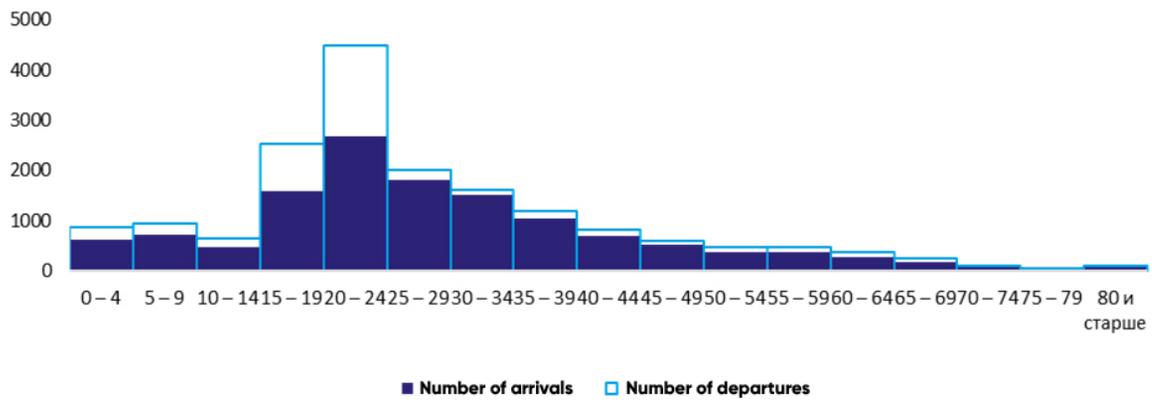
- population size and dynamics;
- migration structure;
- indicators characterizing the health level of the population.

Fig. 48 The percentage of the reference group population of the capitals in relation to the total number of residents of the regions, %



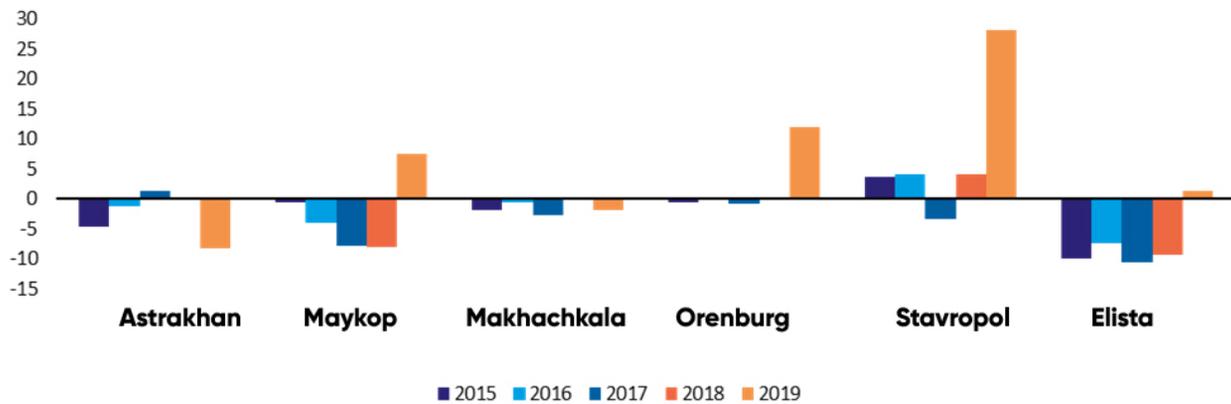
A higher concentration level of the population of the region in the regional center in comparison with the centers of the territorial entities reference group of the Russian Federation, which determines the disproportions taking into consideration the backgrounds for the territorial and economic development

Fig. 49 The age structure of migration to Astrakhan, 2019



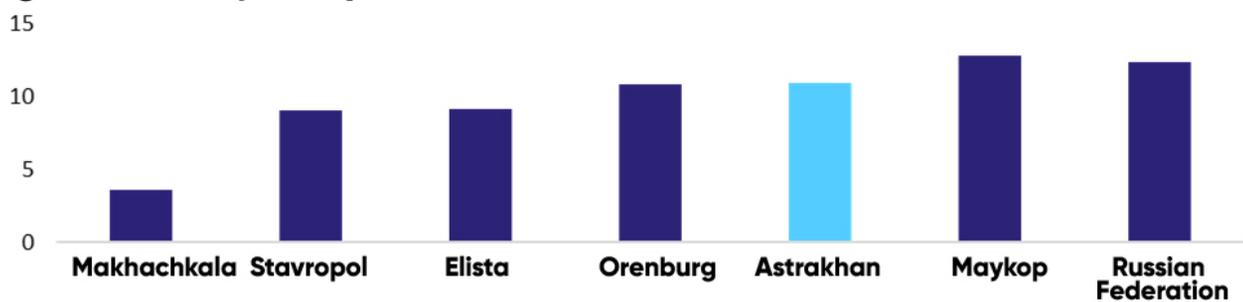
The larger number of the young active population (students from 20 to 24 years old) in the total migration outflow from the regional center.

Fig. 50 Comparative changes in migration growth per thousands, 2015-2019



The indicator of the migration outflow of the population in the city of Astrakhan is comparable with the values of this indicator in the centers of the territorial entities reference group of the Russian

Fig. 51 Mortality rate per thousand, 2019



The mortality rate is slightly higher than the values of the indicator for the centers of the territorial entities reference group of the Russian Federation, but lower than the national average.



Potential/Opportunity

Supporting natural growth at the current level with a decrease in migration outflow will provide a stable basis for the growth of the city's economy at a rate that outstrips the territorial entities of the Southern Federal District.

Issue/Risk/Restriction

The risk of an increase in the migration outflow to the central cities of Russia and foreign countries of a high-quality labor force of young professionals graduated from universities, as well as highly qualified workers with higher education.

As a result, there is a risk of depletion of human capital: a decrease in the urban population and, as a consequence, a decrease in intellectual and cultural potential.



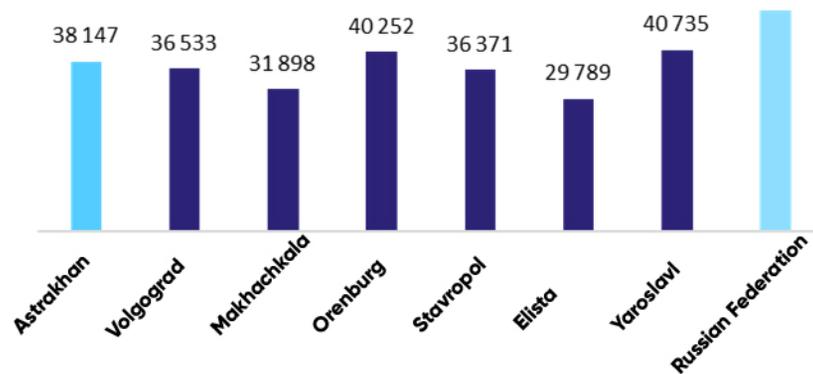
2.3. SOCIO-ECONOMIC CHARACTERISTICS

In order to identify the major issues, risks, restrictions, potential and opportunities for the development of the municipal district City of Astrakhan associated with the socio-economic situation, the following were carried out:

- evaluation of the level of income and employment of the population;
- estimation of retail trade turnover;
- analysis of the state of small business and conditions for its development;
- analysis of the state of urban finances.

2.3.1. Evaluation of the level of income and employment of the population of the Municipal Entity City of Astrakhan²⁴

Fig. 52 Average monthly wages of organizations employees (excluding small businesses), rubles (average for the period 2017-2019)



The average monthly wage of one worker at large and medium-sized enterprises in the city in Astrakhan reaches 38,147 rubles which is lower than the average for Russia, but in general it is at the level of the cities of the Volga region and the North Caucasus (Fig. 52).

115.9

thousand residents of Astrakhan were employed in large and medium-sized organizations

>60%

of employed persons in the public sector (education, healthcare, public administration, etc.)

10,6%

are employed in transport and communication enterprises

5,7%

are employed in manufacturing

3%

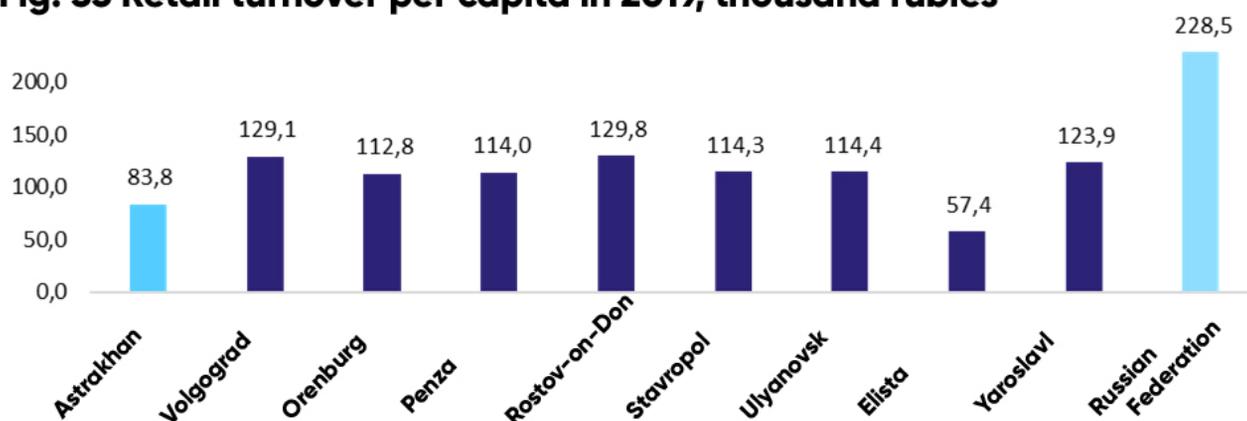
in the extractive industries

²⁴ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru



2.3.2. Evaluation of the retail trade turnover of the Municipal Entity City of Astrakhan²⁵

Fig. 53 Retail turnover per capita in 2019, thousand rubles



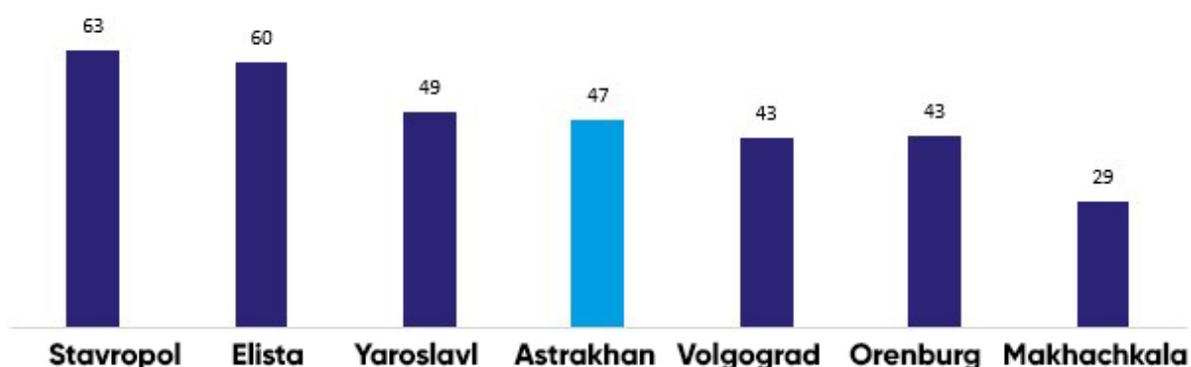
The current level of the retail trade turnover per capita is significantly lower in comparison with reference group cities and almost three times lower than the national average, indicating that there is an underutilized potential for the development of this sector (Fig. 53).

2.3.3. Analysis of the state of the small business entities in order to ensure its development in the Municipal Entity City of Astrakhan

>60%

of the total number of the small and medium-sized business entities in the region are located in the city of Astrakhan

Fig. 54. The number of individual entrepreneurs per 1000 people population in 2020



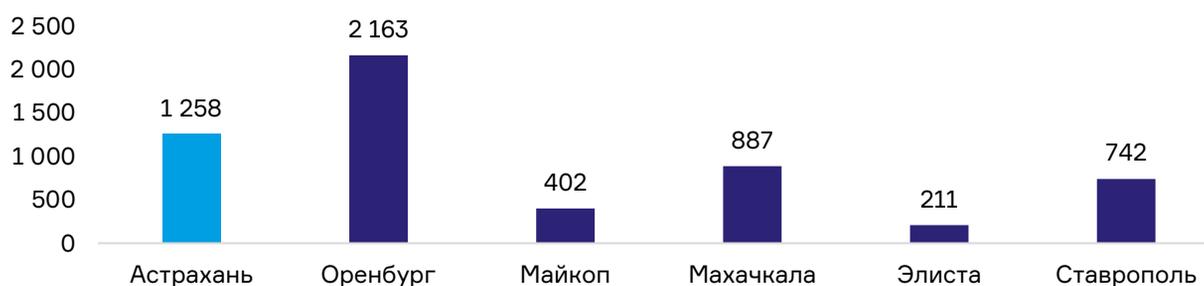
Source²⁶

²⁵ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru

²⁶ Unified register of the small and medium-sized business entities; <https://ofd.nalog.ru/>



Fig. 55 City budget revenues from small business in 2019, million rubles



Source²⁷

By the number of individual entrepreneurs per 1000 people, Astrakhan occupies a middle position among the reference group cities (Fig. 54).

The development of small and medium-sized business entities is one of the top priorities of the city's economic policy. A factor in the development of small and medium-sized business entities is an increase in investment attractiveness, but its potential is currently not realized due to the lack of support and because of the barriers that won't let develop small business entities.

²⁷ Compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru



2.3.4. Analysis of the state of urban finances of the Municipal Entity City of Astrakhan

Urban finance analysis considers the following tasks:

- analysis of the dynamics of actual incomes, expenses and budgetary balance of the Municipal Entity City of Astrakhan;
- evaluation of the structure of tax revenues to the budget of the Municipal Entity City of Astrakhan in the context of the largest organizations and other organizations in the city of Astrakhan.

Analysis of the dynamics of actual incomes, expenses and budgetary balance of the Municipal Entity City of Astrakhan

Fig. 56 Key indicators of budget execution of the City of Astrakhan, RUB million

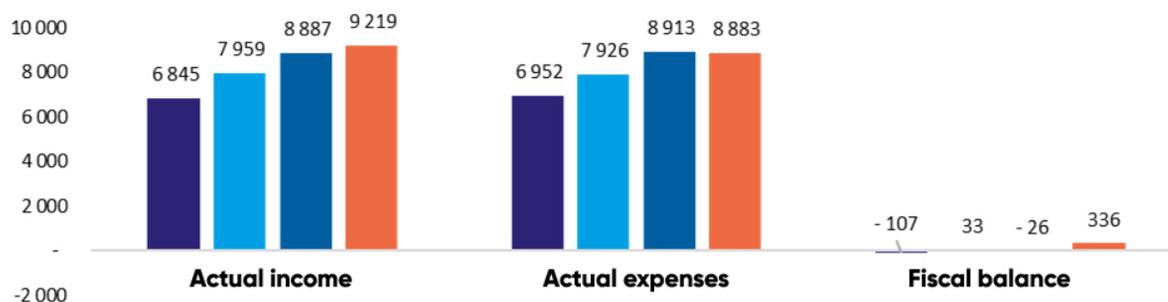
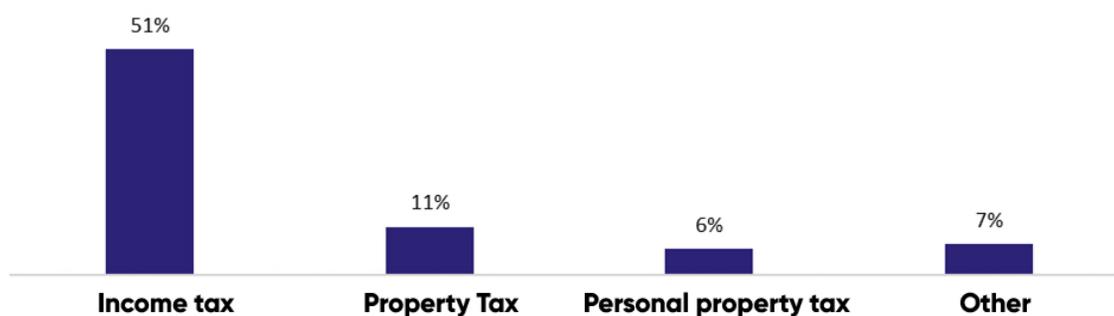


Fig.57 Comparative structure of tax revenues to the budget of the MO "City of Astrakhan" in 2019



Source²⁸

The budget of the Municipal Entity City of Astrakhan is characterized by an insignificant balance, deviating in a positive or negative direction (Fig. 56). The main source of tax revenues for the budget is the personal income tax, which accounts for 51% of all tax revenues (Fig. 57), to a lesser extent - the property tax and the personal property tax.

²⁸ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru

Potential/Opportunity

The potential for job creation and an increase in the proportion of employment in manufacturing industries due to the activation of business entrepreneurship.

Availability of financial capabilities (credit capacity) to attract external co-financing to the local budget to ensure the implementation of some large infrastructure projects.

The potential for increasing city budget revenues due to the activation of street retail.

Development of the non-production sector of the economy by increasing the number of small and medium-sized business entities, reorganization of traditional industries through the introduction of innovative technologies.

Issue/Risk/Restriction

The high proportion of the people employed in the public sector and a low proportion in the manufacturing sector indicate a low degree of development of the manufacturing sector of the economy and the instability of its structure.

The high share of personal income tax in tax revenues of the budget, most of which falls on large enterprises of the oil and gas sector.

Lack of conditions and incentives for entrepreneurial activities in non-manufacturing sectors of the economy and high-tech industries.

Insufficient level of development of the tertiary²⁹ sector in the city, together with a small number of urban attraction points reduce its economic potential.

Lack of established competencies to attract and effectively use external financing for the implementation of large infrastructure projects.

²⁹ The economy's tertiary sector is a set of industries that provide services to economic agents (the service sector, which includes transport, communications, trade, tourism, healthcare, etc.).



2.4. SOCIOCULTURAL ASPECTS OF DEVELOPMENT

2.4.1. Cultural capital

« I would now trade 10 Yaltas and the same number of Black Seas for Astrakhan, I think that even my soul is by nature Astrakhan... »



B.M. Kustodiev from a letter to his mother Ekaterina Prokhorovna, 1897

The city of Astrakhan is located in the Volga delta on 11 islands. Several rivers flow within the city: the Volga, Kutum, May 1 canal (Varvatsievsky), Pryamaya Bolda, Krivaya Bolda, Tsarev Erik, Erik Kazachy, Erik Solyanka, Serebryanaya Volozhka channel. Over 50 bridges have been thrown across these waterways.

Urban development of the territory is associated with the combination of the functions of a fortress, an administrative center and a commercial port of the city.

The main objects of the region's cultural heritage are concentrated in Astrakhan - monuments of the 16th – 20th centuries that belong to the very diverse cultures. Ethnic diversity, active trade, specific climatic conditions, and no serious military destructions contributed to the formation of a unique image of the city. In the downtown area there are trading houses: Indian, Persian, Armenian, the historical toponymy (place names) of the streets is partially preserved, many objects are decorated with plates with the names of residents (Fig. 59).



Community dedicated to the history of Astrakhan, graphic materials

XVI

Фортпост на юге России



XVII-XIX

Торговая столица на стыке Азии и Европы



XX

Центр судостроения, рыбного хозяйства и с/х переработки



Plates with the names of the residents of the house, the historical center of Astrakhan



Astrakhan was included in the list of 115 historical cities already in 1970³⁰, when designing their urban plans it was supposed to preserve the historical component.

Since 2010³¹ Astrakhan is included in the list of 41 (44, taking into account the amended list) of the historical settlements of federal importance.



Fig.58 Persian trade house



Where to find Persia in Astrakhan?



Armenian trade house



Indian trade house

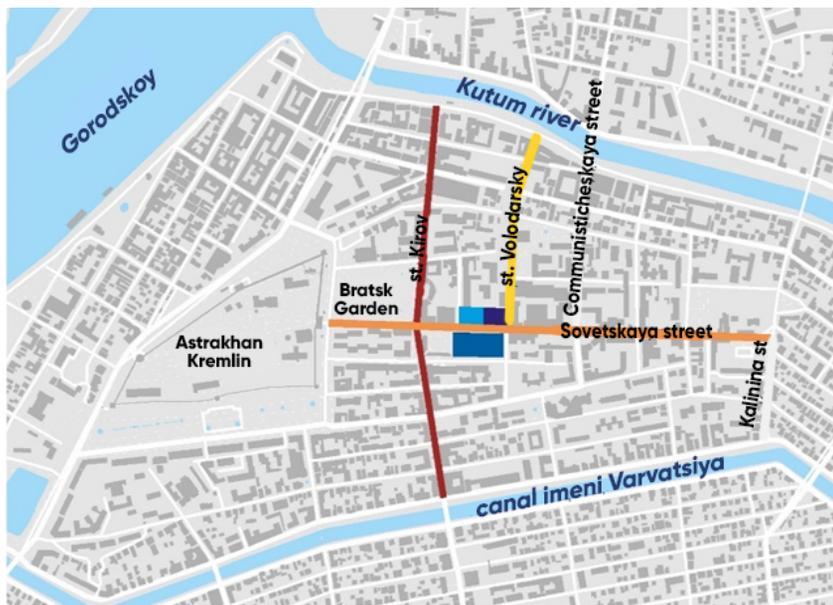


Fig. 59. Locations of the trade houses within the network of the White Astrakhan

- Armyanskoe podvore
- Indiyskoe podvore
- Persidskoe podvore
- Ekaterinskaya street
- Indiiskaya street
- Tabachny Ryad Street

³⁰ Joint order of the Ministry of Culture of the Russian Soviet Federative Socialist Republic and the State Committee for Construction of the Russian Soviet Federative Socialist Republic dated July 31, 1970 No. 36.

³¹ Order of the Ministry of Culture of the Russian Federation, the Ministry of Regional Development of the Russian Federation, dated July 29, 2010 No. 418/339.



Historical and urban planning environment

« The city view from the Volga is beautiful and you can see lot of towers and steeples; but inside, for the most part, it consists of wooden buildings... The city dwellers though are not only Russians, but Persians and Indians as well, with their own commercial premises. »

Adam Olearius, 1636

The architectural-planning and functional structure of Astrakhan has been evolving for over 450 years, and for more than 250 years its development has been regulated by the city's general plans.

There are 6 stages in the urban development of Astrakhan:

Stage I

is characterized by the development of the fortress and buildings within the White City and surrounding areas.

Stage II

is associated with the reconstruction of the urban environment according to the general layout of 1769.

Stage III

The third stage refers to 1801, 1838; it is associated with the development of a system of commercial premises along the banks of the Kutum and Volga rivers, embankments, and the formation of the architectural appearance of the historical center of the city.

Stage IV

refers to the second half of the 19th - early 20th centuries and is associated with the development of the area on the right riverbank of the Volga, building in the north of commercial and industrial institutions.

Stage V

refers to the Soviet period with the placement of industrial centers in the outlying zone of the city where were founded some industrial communities.

Stage VI

The third stage is characterized by the contemporary stage of the city's development, starting with the 1967 General plan, according to which it was proposed to develop both free territories (in Zavokzalny and Trusovsky districts) and the inner-city area reconstructing the territorial areas with historical build-up area.

The emergence and development of the city of Astrakhan is inextricably linked with the construction and transformation of the Kremlin building ensemble which is the first and major fortification of the city. Today, the Astrakhan Kremlin is not only a symbol of the city, but also a unique example of Russian medieval architecture, claiming to be a UNESCO World Heritage Site³².



Places of interest of Astrakhan

6

major urban development stages of Astrakhan

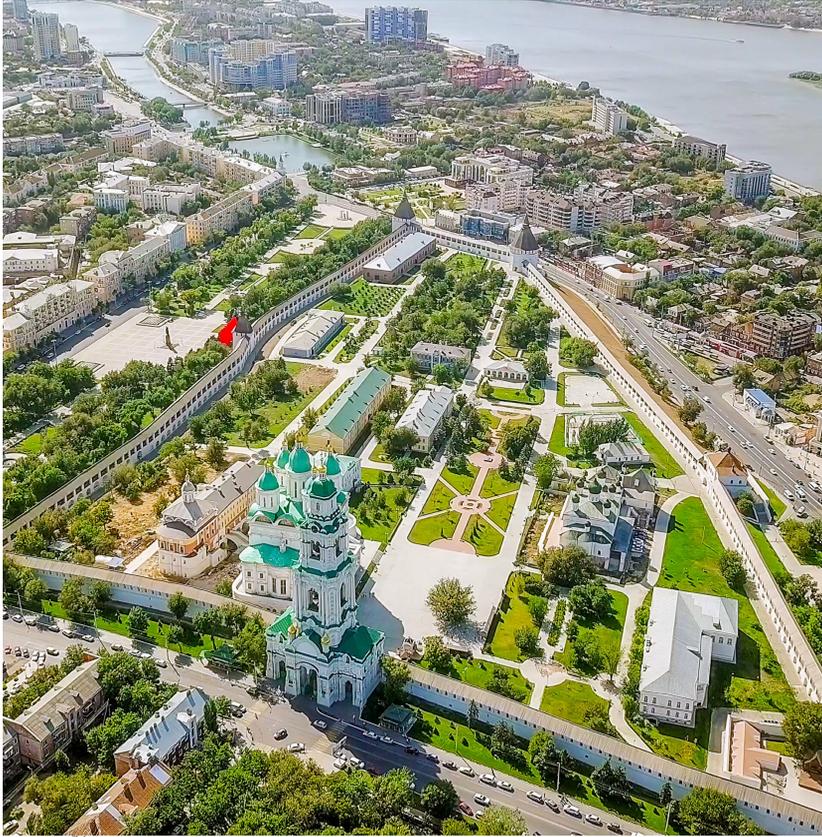
11 hectares

area of the Kremlin territory

³² <https://www.culture.ru/institutes/10076/ansambl-astrahanskogo-kremlya>



The main canonical disclosures of the Kremlin in the structure of the city evolve within the water area, from the island and from the opposite bank of the Volga and have to be protected, taking into account the draft regimes of the land use and the requirements concerning the established urban planning regulations³³.



Source³⁴

An inseparable connection with the river is manifested on the territory of the Kosa (Spit), which became by the middle of the 19th century the new business center of the city. The development of the embankment formed the foreground, which became the background for the perception of the dominants of the Kremlin.

Intra-city views are concentrated on the territory of three historical districts of the city: White City, Posad (from the Kremlin to Kirov street) and Spit. These historical areas were placed under State protection as places of interest by the Decree No. 230 of the Head of the Regional Administration dated December 27, 1993.



Alexander Sergeevich Rubtsov. Urban evolution of the city



Astrakhan city map of Adam Olearius, 1636



Astrakhan. General view. Postcard of the early XXth century.

³³ According to the project of OOO (LLC) MIGI: the project of the united protection zone of the object of cultural heritage of federal importance Kremlin Ensemble, XVI - early XIX centuries and cultural heritage sites located within the boundaries of the area bounded by the streets located on the embankment of the Volga river - Red Embankment street - Kalinin street - 1 May Embankment, Astrakhan, 2019

³⁴ <https://realty.ria.ru/20190514/1553486491.html>



Cultural heritage protection system

The strategic goal of the development of Astrakhan as a historical settlement is to preserve the structure and nature of the build-up area of the historical part of the city³⁵.

Previously, the following projects have been completed in order to determine the ways for sustainable development of the historical environment³⁶:

- the project concerning the boundaries of the territory and the project of the protection object of the historical settlement of the city of Astrakhan, including the area of the Astrakhan Kremlin, as well as 573 objects of cultural heritage, of which 528 objects are architectural monuments³⁷ (Fig. 61);
- the project of the unified protection zone of the object of cultural heritage of federal importance Kremlin Ensemble, XVI - early XIX centuries and cultural heritage sites located within the boundaries of the area bounded by the streets located on the embankment of the Volga river - Red Embankment street - Kalinin street - 1 May Embankment³⁸(Fig.60).

Currently both projects have not been approved. The legal basis of the system for the protection of cultural heritage is the project of zones for the protection of historical and cultural monuments, approved by the Decree No. 4184-m of the Governor of Astrakhan dated 2009/08/28 and the materials of the Astrakhan General City Plan³⁹.

Territories of historical formations with individual historical and cultural significance:

- Historical center of Astrakhan - White City, late 16th - early 20th centuries;
- Posad (between the Kutum and Varvatsievsky Canal), XVIII - early XX century;
- Spit, XIX - early XX century;
- Admiralty Spit, XVIII - early XX century;
- Zakutumye, XIX - early XX century;
- Soldier's settlement, XIX - early XX century;
- Armenian settlement, XVIII - early XX century;
- Tatar settlement, XVIII - early XX century;
- Bezrodnaya settlement, Terebilovka, XIX - early XX century;
- Gorodoforpostinskaya (since 1893 - Atamanskaya) village, 1785 - early XX century;
- Bazaar Bolshie Isady, XVIII - early XX century;
- Tatar Bazaar, XIX - early XX century;
- City Orthodox cemetery, XIX – XX centuries.

1400 hectares

project area within the boundaries of a historical settlement of federal importance

430 hectares

project area within the boundaries of the united protection zone

14

number of historical sites and historical and architectural complexes on the territory of Astrakhan

17

number of architectural and urban planning complexes on the territory of Astrakhan

³⁵ According to the General City Plan, approved by the Resolution of the City Duma (Parliament) of the Municipal Entity City of Astrakhan No. 82 dated 2007/07/19.

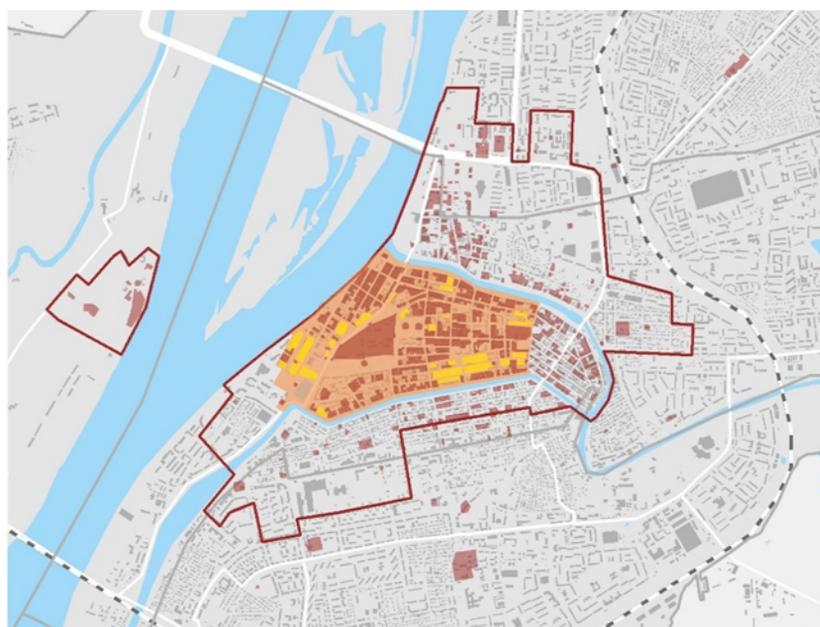
³⁶ Appendix 8. Analysis of the existing system for the protection of cultural heritage, including the relevance of requirements for urban planning activities, regimes and regulations of protection zones.

³⁷ The project was developed in 2012–2018 at the expense of the regional budget within the framework of the Astrakhan region State program Development of culture and tourism of the Astrakhan region, Scientific Research Institution Nasledie (Heritage).

³⁸ ООО (LLC) MIGI, 2019

³⁹ Cl. 3.1. Establishment of a system of restrictions on the terms of protection of cultural heritage objects on the territory of the city of Astrakhan, City General Plan.

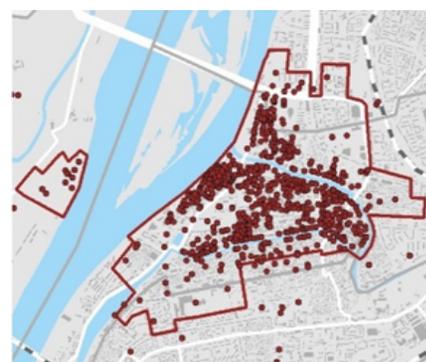




Symbols:

- Regeneration zones of historical buildings
- The boundaries of a single security zone
- Territories
- Historic settlement border

Fig.60. The boundaries of the unified security zone of the Kremlin ensemble (project)



Symbols:

- Historic settlement border
- Cultural heritage sites

Fig. 61 Borders of a historical settlement of federal importance (project)



Typology and state of cultural heritage sites


The whole city and its view is extremely nice from the middle of the Volga. One versta away, to the left, on a small flat hill, there is a long row of stone buildings, dominated by many churches, the white walls of the Kremlin have quadrangular towers, and over all this mass of buildings a huge five-domed Cathedral and its steeple proudly stands out in all its beauty. To the right there is a port with a flag showing four anchors. Below on the river there is a whole forest of masts, in some places between them there are the funnels of steamers. All this is covered by the green shade of spreading purple willows and magnificent Lombardy poplars...


Nikolay Ermakov, book Astrakhan and the Astrakhan province, 1852

Astrakhan is one of the cultural and historical centers of the Lower Volga and Caspian regions. 640 objects of cultural heritage are registered within the city and in its vicinity (monuments of culture and history of the peoples of the Russian Federation)⁴⁰.

The classification of real estate objects is distinguished by the predominance of historical monuments, despite their particular location within the structure of the city and the value of the volumetric-spatial composition of most objects (Fig. 62).

Only 12 cultural heritage objects have an approved protection status. Considering the predominantly private form of ownership of cultural heritage objects (regardless of the category of protection), the absence of the protection status prevents the implementation of measures that are necessary to ensure the preservation, adaptation of objects for modern use and the exercise of a full-fledged right to use objects, including leasing the object.

640

of the cultural heritage sites (historical and architectural monuments) in Astrakhan, including those identified

41

object of cultural heritage of federal importance - architectural monuments

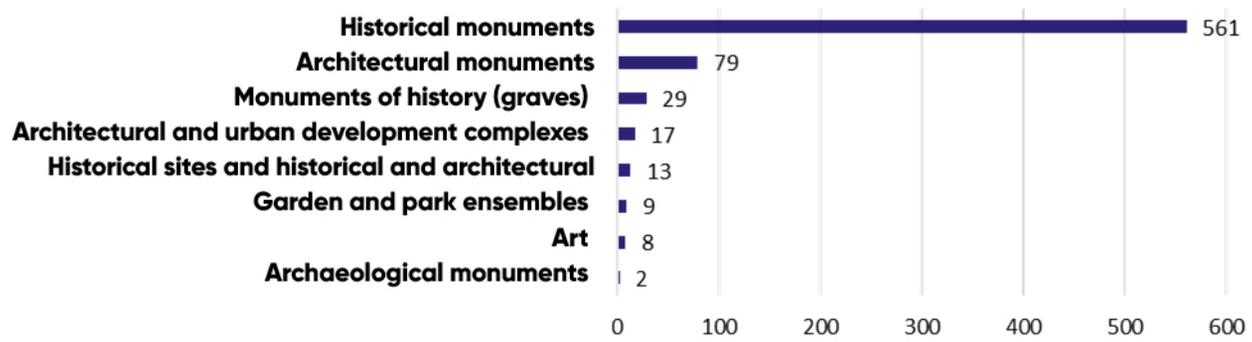
560

of the cultural heritage sites of regional importance - historical and architectural monuments

⁴⁰ According to the data specified within the framework of the Survey. According to the data of the Russian cultural heritage register there are 635 objects; <http://www.astrgorod.ru/podrazdeleniya/svedeniya-o-629-obektah-kulturnogo-naslediya-vneseny-v-egrn>



Fig. 62 Classification of objects of cultural heritage of Astrakhan



The total area of the objects of federal importance is 134,825.15 m².

Of which:

- residential properties (35%) — 47,188.80 m²;
- non-residential properties (65%) — 87,636.35 m².

The total area of the objects of regional importance is 841,650.939 m², of which:

- residential properties (52,4%) — 441,109.26 m²;
- non-residential properties (47,6%) — 400,541.68 m².

Most of the objects of cultural heritage and elements of the environment of the historical center of the city require conservation measures, repair and restoration works, including a cleaning the brickwork of walls and basements from efflorescence and vandalism inscriptions, restoring the integrity of drainage from the roof, repairing plaster and paint layers, replacing individual bricks in the masonry, cleaning metal drainage elements and window gratings from corrosion, cleaning wooden window frames from old paint and painting, repair of door frames (elimination of distortions and replacement of damaged boards), cleaning door leaves from old paint and painting, etc.⁴¹.

39

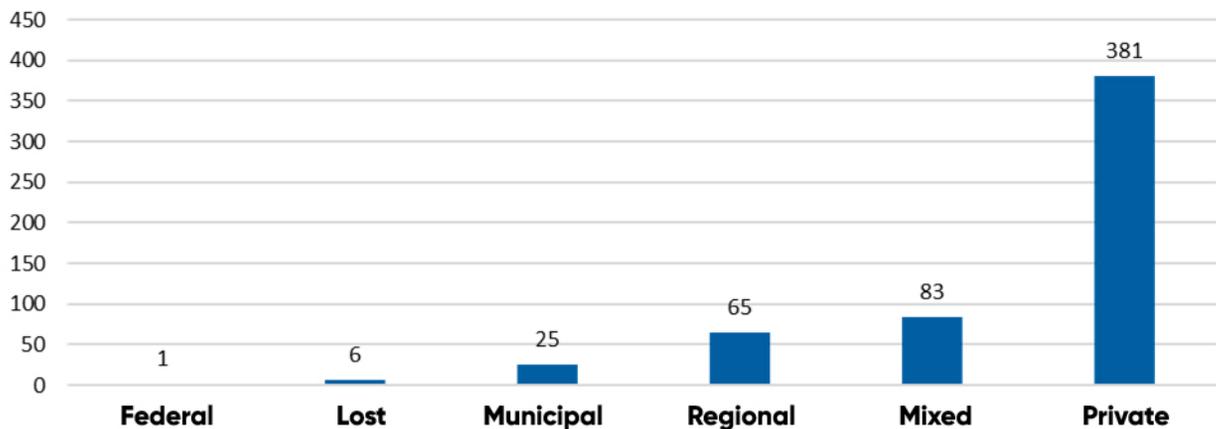
identified cultural heritage sites



356

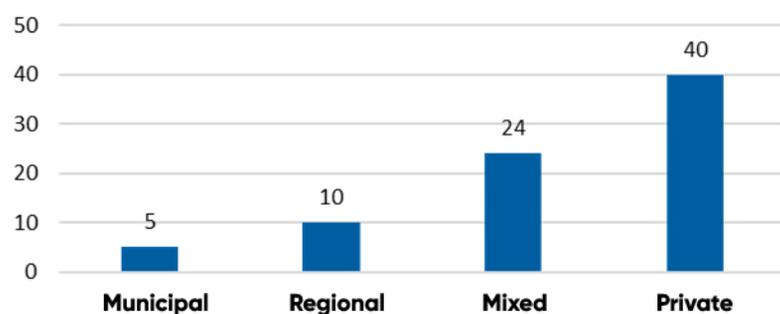
cultural heritage site in unsatisfactory condition

Fig. 63 Historical monuments by form of ownership



⁴¹ According to the indicative list of repair and restoration works provided by the Service for the Protection of Cultural Heritage Sites of the Astrakhan Region.



Fig. 64 architectural monuments

In the inner-city districts of Astrakhan are characterized by block-by-block build-up style in accordance with the established boundaries of households. The prevailing size of the plots largely determines the scale of the historical and urban planning environment and the distinctive features of the city's districts. The boundaries of historical estates determine the spatial build-up typology.

The functional typology of Astrakhan is distinguished by a variety of real estate objects from two historical periods: pre-revolutionary build-up area developed before 1917 and the build-up area of the 1920s and 2000s⁴².

The following functions are characteristic of pre-revolutionary build-up area:

- commercial buildings, including national trade houses, markets, small shops and warehouses;
- social and business buildings, including shops, offices and banks;
- residential buildings, including city estates, mansions of the late 19th - early 20th centuries, individual residential and tenement houses, hotels;
- public and government buildings;
- public gardens and parks;
- industrial facilities.

The following functions are characteristic of the build-up area of the 1920s - 2000s:

- multi-apartment residential buildings of the late 1920s - early 1930s;
- multi-apartment residential buildings of the late 1930s -1950s;
- large administrative buildings of the 1930-1950s;
- halls of culture of the 1930-1950s

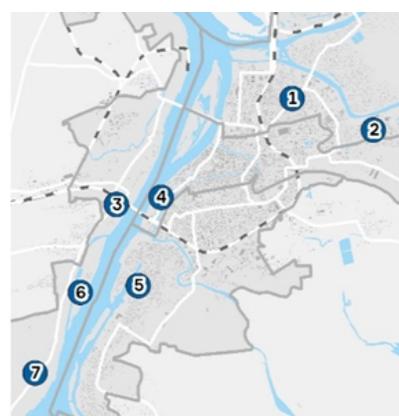
14

cultural heritage sites in unsatisfactory condition

12

cultural heritage site of federal importance in unsatisfactory condition

Fig. 65. Architectural ensembles of late constructivism and early Soviet neoclassicism in Astrakhan (1928-1941)



Symbols:

Architectural ensembles of late constructivism and early Soviet neoclassicism

1-Residential buildings for employees of AstroTPS

2- A working settlement at the shipyard named after Kirov

3- Workers' settlement at the plant. named Lenin

4- Workers' settlement at the plant. named K Marx

5-Residential buildings on the Zolotoy Zaton at the plant named Stalin

6-Workers' settlement on Zayachy Ostrov at the plant named after 10 anniversary of October

7-Workers' village at the plant. III International

⁴² Appendix 9. Analysis of the typologies of historical build-up area and the principles of the volumetric-spatial arrangement of objects in the historical environment.



391 objects of cultural heritage are under State protection (Fig. 66), used as a multi-apartment residential buildings, of which 356 objects are in an unsatisfactory technical condition. 12 objects have the status of cultural heritage sites of federal importance (Fig. 67).

Most of the premises in these buildings-monuments are privatized and remain in private ownership.



Fig.66. Location of the failing buildings in the central city area



Fig.67. Objects of cultural heritage of federal importance in the city of Astrakhan, which remain in an unsatisfactory condition

Potential/Opportunity

Availability of the status Historical settlement of federal importance.

The image of being the cultural capital of the Caspian region.

Approval of the boundaries of the territory, the protection status and the requirements regarding the urban planning regulations within the boundaries of the historical settlement in order to establish the strategy for sustainable development of the city center.

Approval of the project of protection zones of the Kremlin ensemble in order to preserve valuable compositional and spatial ties, historical build-up area and the formation of a single architectural appearance concerning the main architectural landmark of the city.

Issue/Risk/Restrictions

Lack of a strategy for the preservation and development of the historical settlement.

Lack of legal conditions for the preservation and development of real estate objects (absence of territory boundaries, subject of protection, requirements for the regulations of a historical settlement, absence of the protection status for real estate objects, conservation pledge agreements for owners of monuments).

Legal uncertainty for investment development and capitalization of the historical environment due to the lack of approved documentation for the historical settlement and the need to coordinate changes in the documents of territorial planning and urban planning with the Ministry of Culture of Russia.

Implementation of the research in the historical and cultural fields aiming the further approval of the objects to be protected and to ensure the observation of the conservation pledge agreements of the historical real estate objects.

Creation of manuals for owners and users of historical real estate objects.

Popularization of the unique historical heritage of the municipal district City of Astrakhan, including historical districts of the city during different periods of development, trade houses and iconic public buildings.

Prioritization of activities for the restoration of heritage sites in regeneration zones and territories of standard for integrated development of territories.

Development of mechanisms for economic incentives for property owners, users and enterprises involved in the preservation of cultural heritage sites.

Unsatisfactory technical condition of cultural heritage objects, including multi-apartment residential buildings.

The risk of loss of valuable disclosures and of the general composition of the build-up area during the selective development of the quarters under restoration.

The risk of losing the object of protection and the status of a historical settlement.



2.4.2. Symbolical Capital

« This is some kind of Venice or Naples. The noisy life on the piers ... I am awfully glad that I went downstream of the Volga. Here I have seen the real vast wide-open space.



V.I. Surikov in a letter to his sister
from Astrakhan, 1901

The totality of elements of the urban identity is influenced by the following features of the city's lifestyle:

- availability of cultural infrastructure;
- variety and nature of the urban calendar of events;
- activity of the non-profit sector in the field of culture;
- peculiar features of positioning and thematic requests of the users.

On the territory of the historical center of the city there are the oldest cultural establishments, founded in the 19th and early 20th centuries.⁴³:

- Astrakhan State United Historical, Architectural Museum-Reserve;
- Drama Theatre;
- P.M. Dogadina Art gallery
- N.K. Krupskaya Library;
- Movie theatre Illusion

Among the unique socio-cultural urban projects:

- festival for street artists Chilim;
- the Tom Sawyer Fest Historical Restoration Festival;
- International Puppet Theatre Festival Caspian Coast;
- international project of the Astrakhan State Opera and Ballet Theater Russian Operas in the Astrakhan Kremlin.

10th

Astrakhan Opera and Ballet Theater is one of the Top 10 Opera Theaters in Russia



P.M. Dogadina Art gallery



Museum of Local History



Chilim Fest map

⁴³ Photo links:

<http://love-astrakhan.ru/org.php?action=view&id=25>

<https://terra-z.com/archives/73596>

<http://love-astrakhan.ru/org.php?action=view&id=19>





Fig.68. Astrakhan Drama Theater

In Astrakhan are registered more than 1000 non-profit organizations⁴⁴. However, the activity of the non-profit sector in the field of culture⁴⁵ requires the consolidation of project applications for grant projects to endure the preservation of historical memory, support of projects in the field of art and culture of the Presidential Grants Fund and other institutions for the territory of the central city area and the support of the creative sector of the economy and the launch of unique events-projects in the field of education and acceleration of creative business projects.

In order to draw up a figurative scheme of the city's identity palette, the search query statistics were analyzed⁴⁶, a list of the most popular places for residents and tourist destinations was compiled, and the associations of visitors associated with these destinations were determined (Fig. 69).

7

Astrakhan non-profit organizations - winners of the 2021 Presidential Grants Fund competition (first competition)

Potential/Opportunity

Historically formed network of cultural establishments.

Formation of a professional platform in order to coordinate the socio-cultural projects.

Support of existing initiatives and the integration of heritage preservation and contemporary art development.

Issue/Risk/Restrictions

Lack of a unified communication platform for cultural establishments, experts and urban communities for the development of socio-cultural projects.

Low activity of the non-profit organizations in the field of culture.

Lack of regional and city grant support for socio-cultural projects.

⁴⁴ <http://unro.minjust.ru/NKO.aspx>

⁴⁵ <https://www.astrobl.ru/news/123920>

⁴⁶ <https://wordstat.yandex.ru/>

<https://vk.com/>



2.4.3. Tourists potential

« I might go to Astrakhan to work with fishing artels. There are lot of freedom and immense liberty over there, you can feel yourself at will. Just show your skills and do well your job and nobody will never enquire about your origins, who you are and where are you from. »

V.A. Gilyarovsky

The key factors of tourist attraction for the integrated development of Astrakhan are the following combinations of characteristics of the city and ideas about it:

- the uniqueness of the city - the presence of unique cultural models of the urban structure and way of life (Merchant Astrakhan, Theatrical Astrakhan, Poetic Astrakhan);
- the identity of the perception of the city - the city's belonging to some external categories based on common values ("I live in a coastal city", "Volga Venice");
- positivity and inner loyalty - the love degree and affection of the citizens to their city, interest in history and culture;
- urban community gets along, citizens have common interests, they are able to understand common development issues and are ready to implement collective initiatives;
- the practical potential of identity is related to the level of social activity, the effective effort of the community to strengthen the identity, the common idea that was understood and supported, the strategy of the city's development.

According to the results of a survey of residents of Astrakhan, the key direction of the city's development is associated with image positioning as the Cultural Capital of the Caspian Sea (75 answers).

6th

is Astrakhan rank in the top 10 beautiful cities in Russia for inexpensive weekend trips

0,2 million people

tourist flow to Astrakhan

4,2

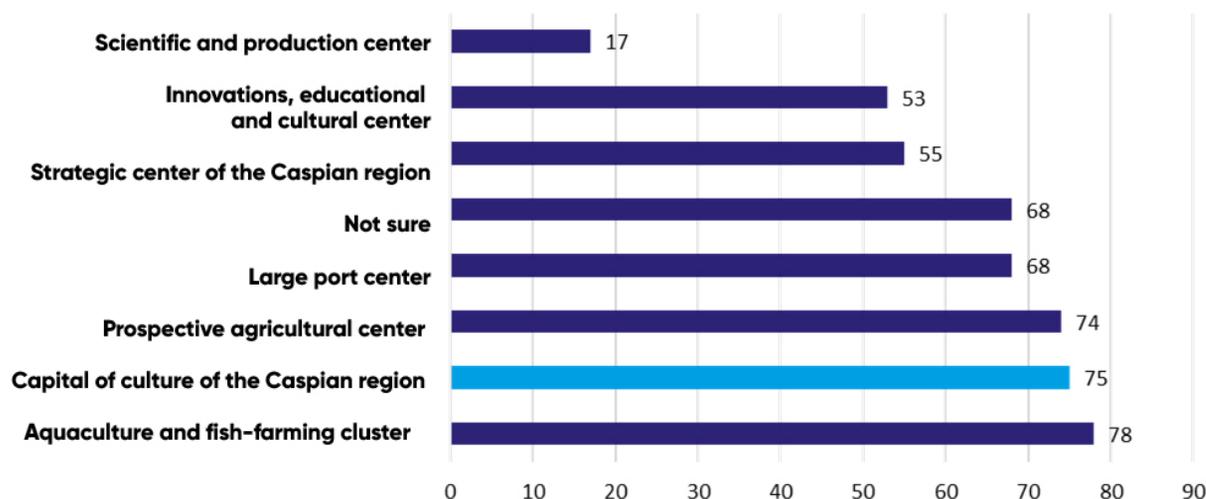
is the number of people employed in the field of tourism in the Astrakhan

121

number of collective accommodation facilities

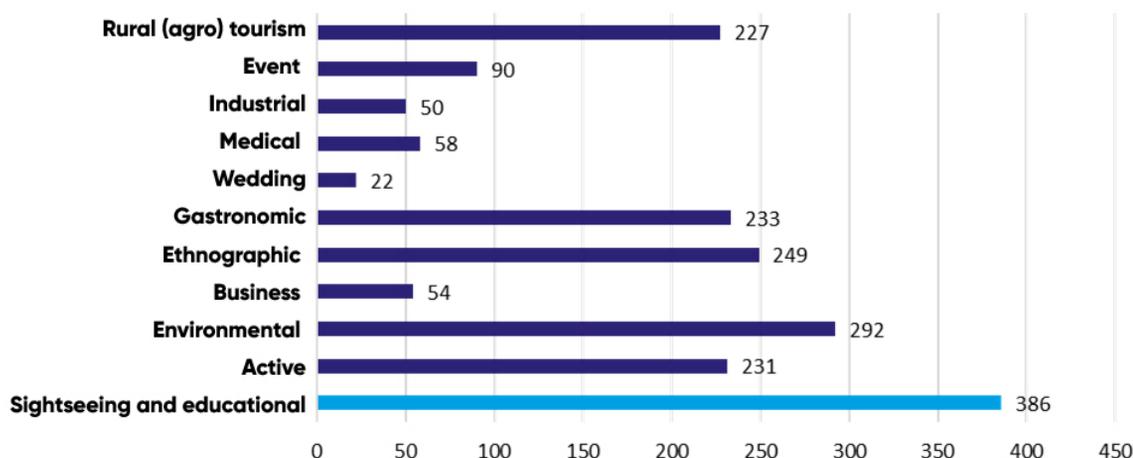


Fig. 70 Opinion of residents about the characteristic key direction of development for the city of Astrakhan



The common interests are consolidated around the prospects for the development of the Kirovsky district (almost 40%), the development of excursion and educational tourism (386 answers).

Fig. 71 Residents opinion on the most promising types of tourism for development in the territory of Astrakhan



Issues related to the development are most clearly focused in the responses of a group of respondents (19–35 years old) who noted the lack of diversity and low quality of the service sector.

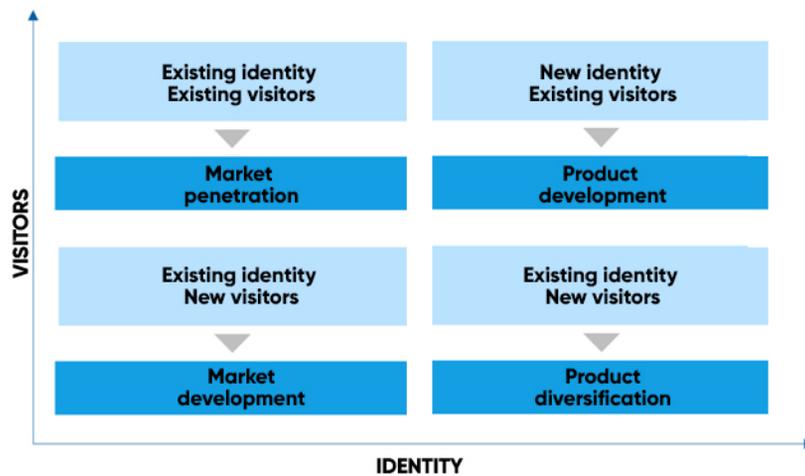
To implement the strategic rate of the city "integrated tourism", it is necessary to diversify the existing tourist product at the expense of current visitors and the prevailing image of the city to form a new image of Astrakhan as a city of opportunities (Fig. 72).

acres



- Symbols:**
- Religious buildings
 - Administrative entities
 - Other attractions
 - Entertainment infrastructure facilities
 - Cultural centers, museums, galleries
 - Theaters
 - Parks, squares
 - Monuments, memorials
 - Bridges
- Excursions in Astrakhan:**
- "Sightseeing tour in Astrakhan"
 - "Temples, cathedrals and mosques of Astrakhan"
 - "Artistic Astrakhan"
 - "Parks and squares of Astrakhan"
 - "Bridges of Astrakhan"

Fig. 72. Schematic diagram of the diversification of a tourist product



Excursions in Bolshie Issady



Interesting places in Astrakhan



Yobbish Trips project

This can be the following directions:

- development of a system of public spaces of the historical settlement with the improvement of routes for pedestrians and cyclists;
- formation of an architectural route for objects of Soviet architecture, including in peripheral working settlements⁴⁷;
- development of a design code and a scenario for the architectural and artistic appearance of the city, reflecting the features of thematic trade houses, communication links: bridges, historical toponymy, highlighting significant dominants and accents, navigation and marking of lost objects, etc.⁴⁸.

⁴⁷ Appendix 10. Proposals for tracing the architectural route in the city of Astrakhan in the 1920s – 1950s.

⁴⁸ In addition to Resolution No.192 dated 2020/07/07 On Approval of requirements for the placement of advertising and information structures on the facades of buildings located on the territory of the Municipal Entity City of Astrakhan.



Characteristics of the service in the historic center

In order to evaluate the potential for the development of the services and the formation of an integrated tourist product in the territory of the historical settlement of Astrakhan, a comparative characteristic with the relevant cities was carried out, in terms of the following sectoral indicators of environmental quality:

- Total city area
- number of inhabitants;
- city's tourist rating⁴⁹;
- urban environment quality index indicator;
- availability of open-air reserve museum
- status of historical settlement;
- number of cultural heritage objects;
- expenses for the culture;
- expenses for housing and communal services.



Astrakhan - ISS images

Fig. 73 Number of cultural heritage sites

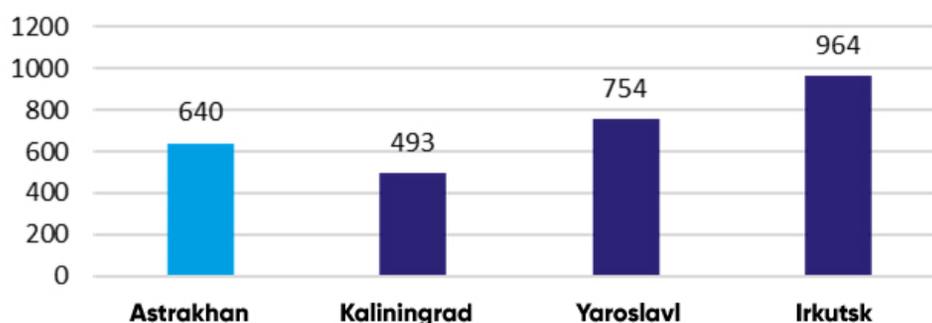
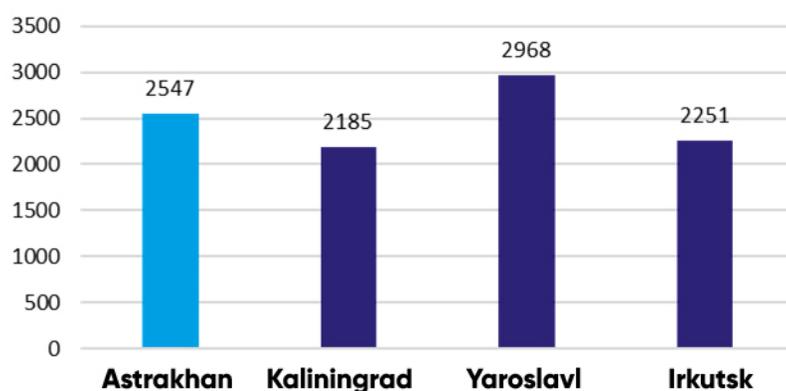


Fig. 74 Population density, thous. people / km²



Comparative evaluation of service maintenance is presented in the context of the following indicators:

- accommodation facilities and tourist offer;
- public catering facilities;
- objects of trade and everyday consumer goods.

⁴⁹ <http://turstat.com/topcityrussiatravel2020>



Fig. 75 Accommodation and tourist offer

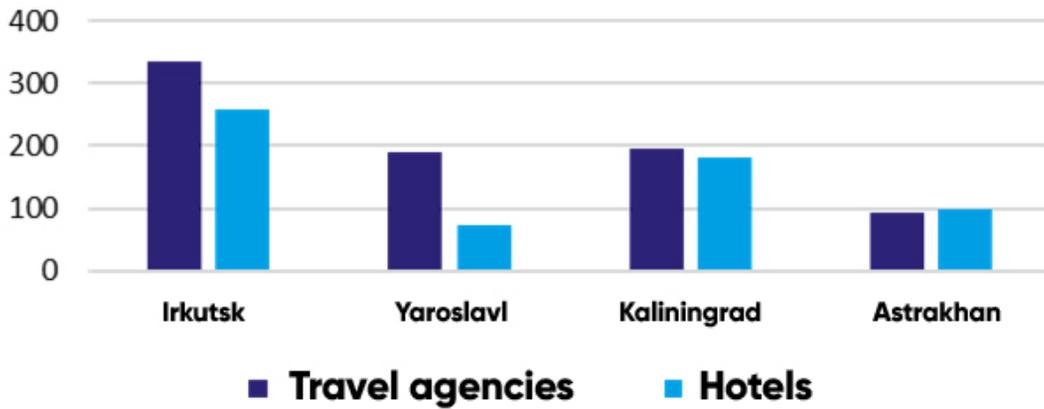


Fig. 76 Public catering facilities

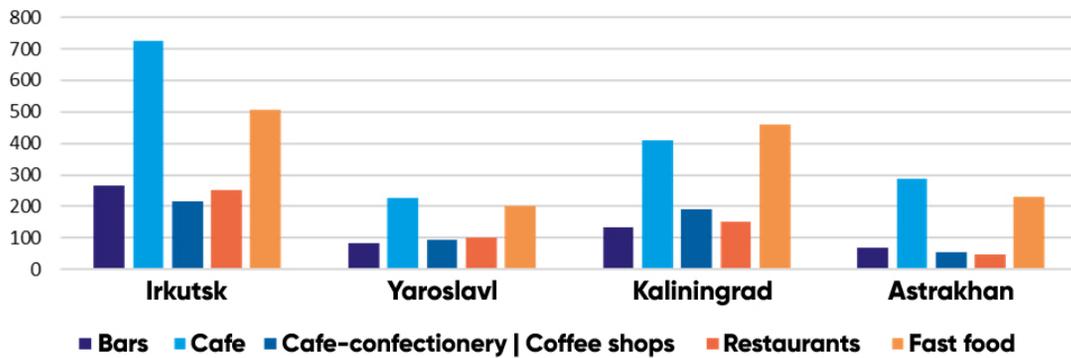
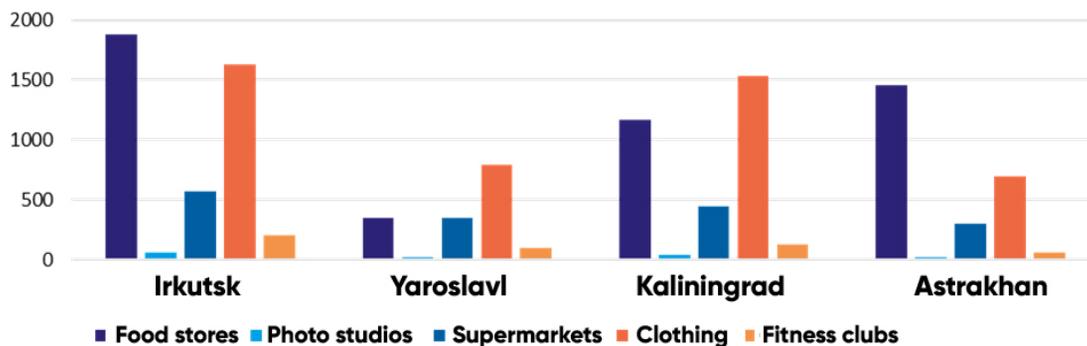


Fig. 77 Objects of trade and everyday demand



Compared to the relevant group of the cities, Astrakhan is distinguished by relatively low indicators of the accommodation facilities and tourist offer, as well as catering facilities (restaurants, cafes, bakeries, bars) and, on average, similar indicators in terms of the number of retail outlets of everyday demand.

While the central city area, which is most in demand by tourists, residents of Astrakhan and the districts of the Astrakhan agglomeration, which includes a large number of multi-apartment residential buildings, public spaces and public and business infrastructure, has the potential



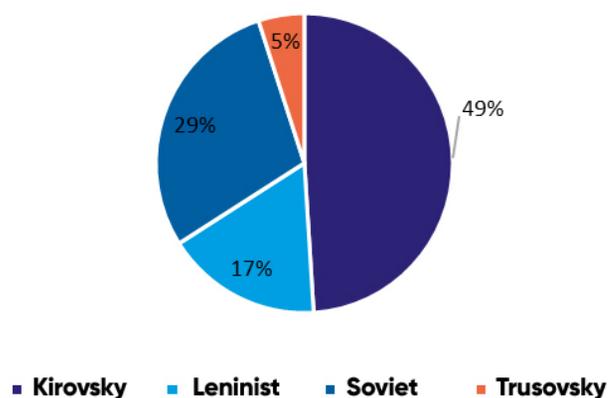
Astrakhan residents expressed some ideas about the tourism development



to be replenished with both within walking distance of everyday demand and tourist services (Fig. 75-77).

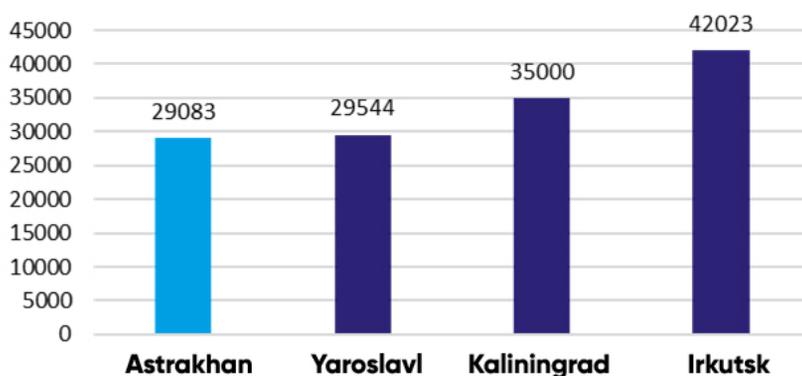
In the first quarter of 2021, in the segment of lease of retail premises of Astrakhan of built-in and attached format, with the distribution of offers in the administrative districts of the city, 49% of the exposition falls on the Kirovsky district. The smallest retail space is in the Trusovsky district (5%) (Fig. 78).

Fig. 78 The structure of the supply of retail real estate objects of built-in-attached format for rent



Notice that, the average rental rate in Astrakhan for retail space of built-in and attached format is lower than the sampling frame and amounts to 29,083 rubles/m² per month⁵⁰.

Fig. 79 Average rental rate for commercial real estate in built-in-attached format



⁵⁰ <https://astrahan.cian.ru/>

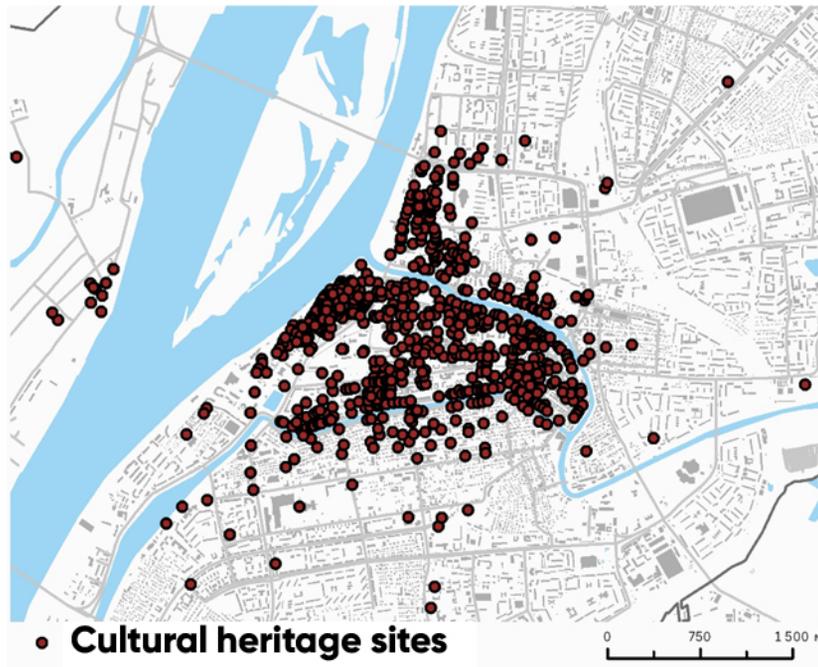


Fig. 80. Astrakhan. Objects of historic real estate properties



Fig. 81. Kaliningrad. Objects of historic real estate properties



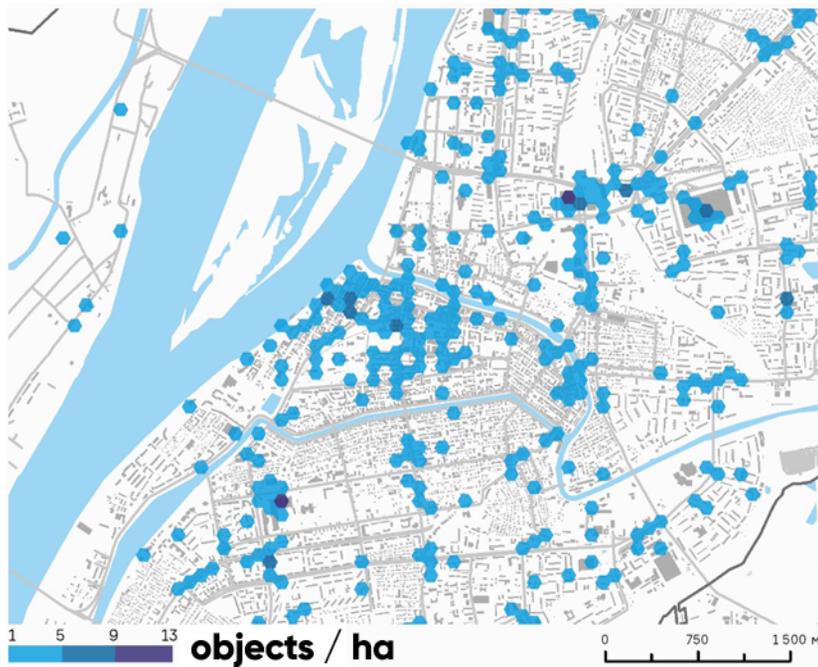


Fig.82. Astrakhan. Density of service objects

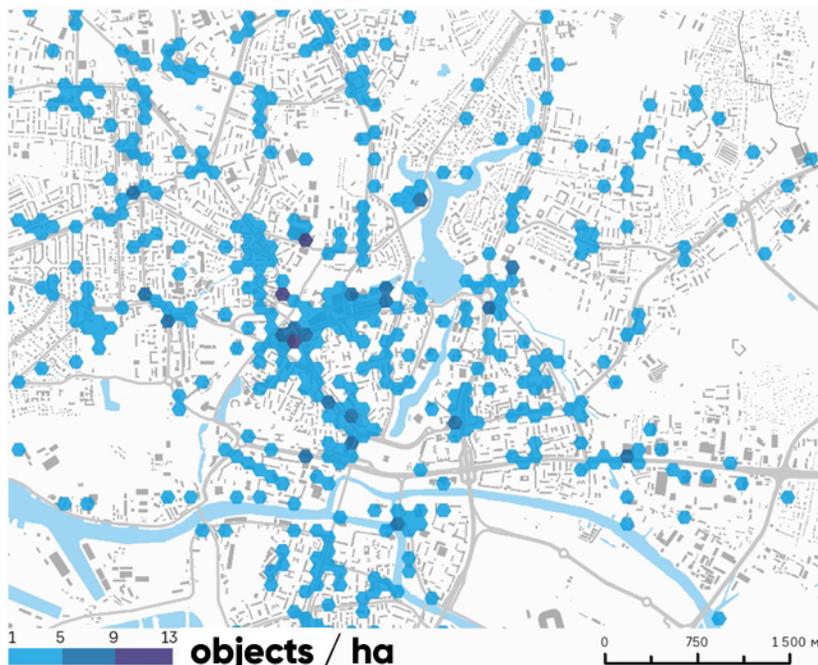


Fig. 83. Kaliningrad. Density of service objects

Considering the importance of culture in the city development scenario, the experience of Yaroslavl in the integrated formation of the tourist product of the territory under the management of the open-air reserve museum with integration into interregional routes, receiving the status of a UNESCO World Heritage Site, the experience of Kaliningrad⁵¹ in implementation of the program of overhaul works on the objects of

⁵¹ The regional overhaul works program has been implemented since 2015, and includes the renovation of in-house utilities, roofs, facades, basements and foundations. To be able to work with historical real estate at the regional level, mechanisms of guarantee support, soft loans and credits have been developed in order to ensure the integration with the activities of the National Project Small and Medium Business Entities and Support for Individual Entrepreneurial Initiatives; <https://rg.ru/2020/08/26/reg-szfo/kak-v-kaliningradskoj-oblasti-sohraniiaut-obekty-kulturnogo-nasledia.html>

historical and cultural heritage and the creation of a system of economic incentives for owners and users of historical real estate, the experience of Irkutsk⁵² in the implementation of the concept of preserving monuments of wooden architecture, objects of cultural heritage with the participation of the Fund for thorough overhaul of multi-apartment residential buildings and municipal programs, the territory of Astrakhan has the potential for the development of tourist infrastructure implementing at the same time an organizational and management activities of all territorial entities related to the cultural policy.

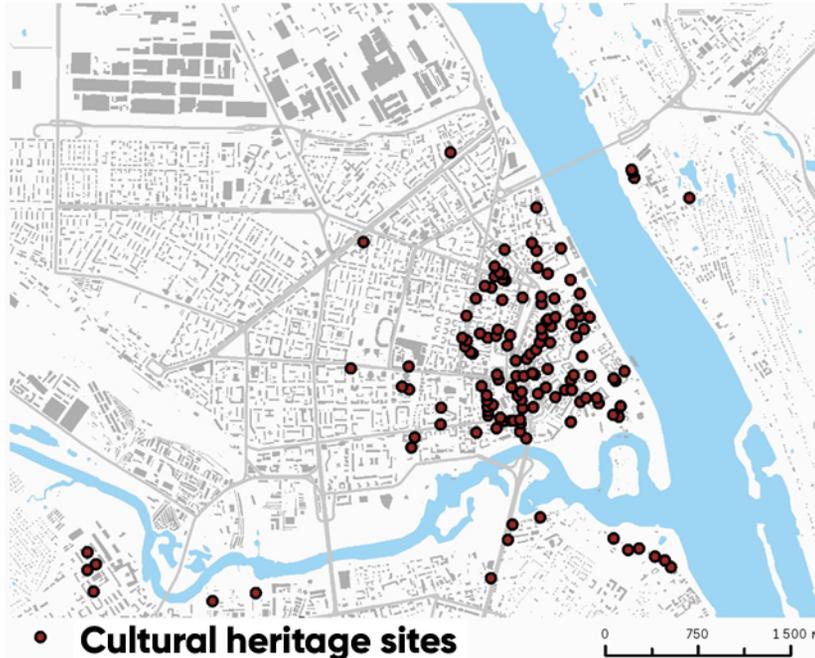


Fig. 84 Yaroslavl Objects of historic real estate properties
Fig. 85. Irkutsk. Objects of historic real estate properties



⁵² The concept includes a ranked list of 362 heritage sites - monuments of wooden architecture; <http://www.irk.ru/news/20200617/concept/>



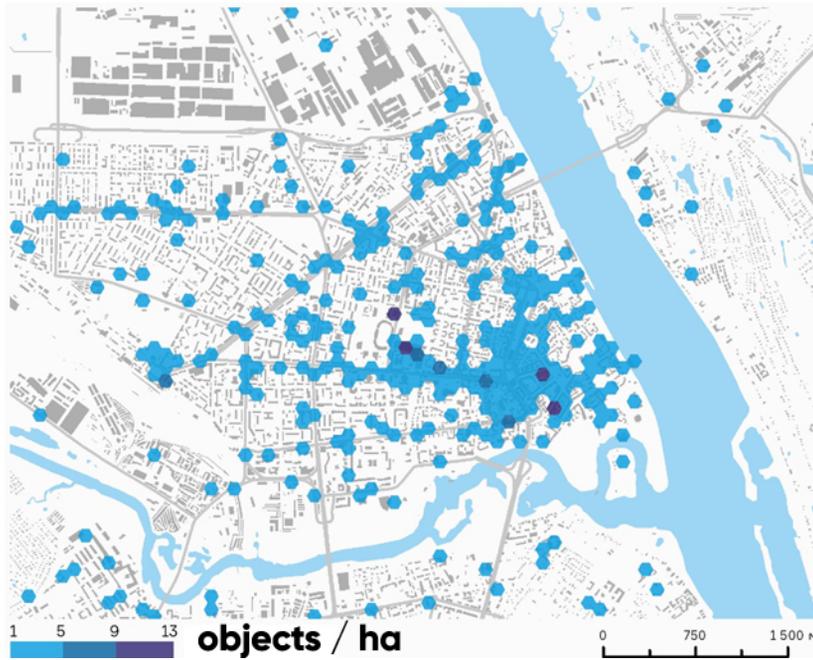


Fig. 86. Yaroslavl Density of service objects

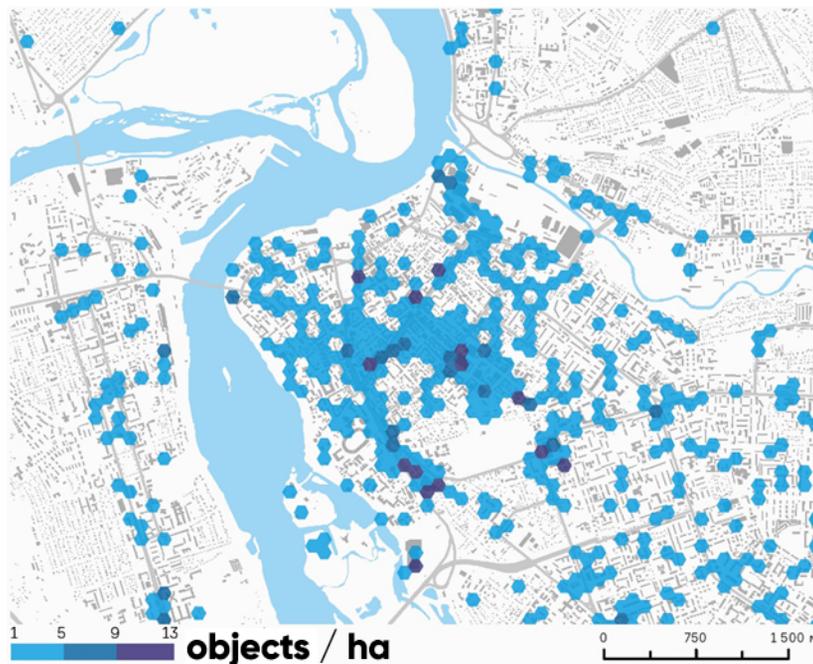


Fig. 87. Irkutsk. Density of service objects

Proposals concerning priority zones in order to develop the historical center of the city and to evaluate on a massive scale the development potential of the tourism sector within the historical center of the municipal district City of Astrakhan are primarily specified in the present Survey in clauses 2.9.2 and 5.4.3, respectively.

Appendix 11 to the Survey provides a brief overview of the practices of working with cultural heritage and symbolic capital.

Potential/Opportunity

A distinctive cultural landscape.

The availability of the tourism industry objects, cultural, educational and recreational attractions.

Rich traditions of national crafts of the peoples living in the Astrakhan region.

The natural and historical backgrounds in order to promote various types of tourism (ecological, ethnographic, cultural, educational, medical and health tourism, etc.).

Availability of the sanatorium-and-health-resort areas (Tinaki, Baskunchak).

Organized event program, including unique events.

Increasing the socio-economic efficiency of the tourism sector.

Issue/Risk/Restrictions

Unmanifested image positioning of the municipal entities of the Astrakhan region.

Mono-demand and mono-specialization in the field of fishing and hunting tourism.

Relatively small volume and insignificant growth of paid services in the tourism sector.
The underutilized potential of the intangible cultural heritage.

Lack of large-scale image-building events in municipalities outside the Municipal Entity City of Astrakhan.

Lack of a comprehensive tourist offer with route differentiation.

Lack of inter-municipal cooperation, the city of Astrakhan as the only starting point and the Kremlin as the main subject of the demonstration.

Low share of collective accommodation facilities that have passed the official classification.

Average rating regional indicators in the tourism sector.



2.5. THE MAIN URBAN DEVELOPMENT PATHS

2.5.1. Analysis of strategic documents, documents of territorial planning and urban planning zoning of the municipal district City of Astrakhan

Strategic development documents

In order to evaluate the compliance of the current development paths of the city of Astrakhan with the development paths defined by the strategic planning documents, within the framework of the Survey, the importance of the regional center was analyzed, according to the Development Strategy of the municipal district City of Astrakhan until 2021 (Table 1).

Table 1. Positioning of the municipal district City of Astrakhan in accordance with the strategic development documents of the regional and municipal levels

Document	Strategic positioning	Strategic priorities and events
Development strategies of the municipal district City of Astrakhan until 2021.	The city has a favorable social environment, which ensures the full development of the personality of each city dweller on the basis of education, culture, and a healthy lifestyle. The city occupies a leading position in terms of investment attractiveness. The city contributing to the strengthening of Russia's position in the Caspian	<p>Strategy guidelines:</p> <p>1.Lodging</p> <ul style="list-style-type: none"> ▪ Bringing the residential properties in line with quality standards to ensure comfortable living conditions for citizens, the formation of an affordable housing market in the city. <p>2. Healthcare</p> <ul style="list-style-type: none"> ▪ Improving the public-health, increasing the life expectancy and the active ageing, reducing morbidity based on the development of disease prevention and improving the quality and availability of medical care. <p>3.Education</p> <ul style="list-style-type: none"> ▪ Improving the quality of preschool and general school education. ▪ Creation of a system of continuing education. ▪ Modernization of the infrastructure of educational establishments. ▪ Implementation of innovative technologies in the educational process. ▪ Creation of an effective system for identifying and supporting gifted children. ▪ Support and encouragement of talented teachers.

Document	Strategic positioning	Strategic priorities and events
		<ul style="list-style-type: none"> ■ Preservation and strengthening of the health of pupils and students of educational establishments of the city. ■ Cooperation of educational, public offices and business structures, increasing the direct contribution of the industry to the city's economy. ■ Participation in the creation of an international university in the Caspian region with the involvement of students from other countries and the orientation of the industry for export. <p>4. Civil Society</p> <ul style="list-style-type: none"> ■ Including the gradual creation of infrastructure: ■ center of non-profit partnership ■ city ethno-confessional center; ■ city public advisory and interconfessional advisory councils under the Governor of Astrakhan. <p>5. Culture</p> <ul style="list-style-type: none"> ■ Formation and development of a unique image of Astrakhan. ■ Preservation and popularization of the multinational cultural heritage of Astrakhan. ■ Creation of conditions for self-realization and development of creative potential in the field of culture and art. ■ Increasing of the availability and quality of cultural goods and services, etc. <p>6. Physical education and sports</p> <ul style="list-style-type: none"> ■ Strengthening and further development of the material and technical sports base. ■ Promotion of physical education and a healthy lifestyle. ■ Development of the system of youth sports. ■ Implementation of the Adaptive Sports project. ■ Staffing support of physical education and sports. <p>7. Enterprises and organizations</p> <ul style="list-style-type: none"> ■ Development of large industrial enterprises based on the synchronization of short-term and long-term objectives of all levels of authorities. ■ Development of consumer market infrastructure. ■ Support for small business entities. ■ Formation of a favorable environment in order to attract investors. ■ Improving the system of state and municipal budgetary institutions. ■ Strengthening cooperation between local governments and public organizations. <p>8. Authority</p> <ul style="list-style-type: none"> ■ Sustainability of political, social and economic development priorities of the country, region, municipal entity. ■ Comprehensive collective work in order to ensure the economic development of the country, region, city.



Document	Strategic positioning	Strategic priorities and events
		<ul style="list-style-type: none"> ▪ Strengthening the positions of the Astrakhan region and Russia in the Caspian region. Positioning Astrakhan as the Caspian capital of Russia. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ urban environment; ▪ information-oriented society; ▪ science and innovations.

Analysis of documents of territorial planning and urban planning zoning

The following documents of territorial planning and urban planning zoning are in force in Astrakhan:

- General City Plan for the development of the city of Astrakhan until 2025, approved by the decision of the City Duma of the Municipal Entity City of Astrakhan No.82 dated July 19, 2007⁵³;
- Rules for Land Use and Build-up development of the Municipal Entity City of Astrakhan, approved by the decision of the City Duma of the Municipal Entity City of Astrakhan No 69 dated July 16, 2020.

The strategic objectives of the territorial planning of the Municipal Entity City of Astrakhan, taking into account the pertinent challenges and tasks of socio-economic development, proceed from the following goals:

- economic diversification;
- increasing the role of Astrakhan as a major trade and transport hub;
- strengthening the potential and competitiveness of the industrial complex of Astrakhan;
- development of the transport infrastructure of the Astrakhan territorial transport system, the suburban area and the whole region;
- the development of science through the creation of research and innovation centers on the basis of the leading scientific institutions of the city, branch research institutes, departments engaged in science, as part of universities, as well as through the creation of research and innovation centers and science parks;
- tourism development as one of the promising sectors of the city's economy;
- development of objects of the commercial and business sectors (finance, credit, insurance, wholesale trade, operations with real estate, informational support, communications);
- maintaining and increasing the natural population growth;
- improving the quality of life of residents of Astrakhan in order to achieve the average European standards in terms of the main indicators, primarily in providing the residents with housing stock for an estimated period of up to 34.6 m² of total area per person;
- increase in the number of social institutions (public health care, education, physical education and sports, social protection of the population, etc.).

⁵³ As amended by the resolutions of the City Duma (Parliament) of the Municipal Entity City of Astrakhan No.140 dated 09/08/2011, No.90 dated 05/30/2013, No.35 dated 04/16/2015, No.153 dated 10/26/2017, No.63 dated 06/07/2018, No.29 dated 2020/03/26).



The regional center is strategically important for the Astrakhan region. In accordance with the selected priorities for the development of the region, the main functions of Astrakhan as a regional center in the long term will be the status of the geopolitical center of Russia in the Caspian Sea region, management of the development of the resources of the Caspian region, as well as production, transport and logistics, educational, innovation and technological, residential and cultural functions.

The major development paths of urban development in Astrakhan are determined by the General City Plan and are specified taking into account the urgent challenges and tasks of socio-economic development and proceed from the following objectives:

- ensuring sustainable development of the territory in the long term;
- improving the quality of life of the population;
- the formation of the city of Astrakhan as a multifunctional center integrated into the Russian and world economy, strengthening the city as the center of the South of Russia, providing communication with the neighboring States of the Caspian region.

The Strategy for the Socio-Economic Development of the Astrakhan region⁵⁴ contains targets that provide for an increase in the area of the housing stock from 2019 to 2035 by 13 million m², which is comparable to the actual area of the housing stock in Astrakhan and involves the commissioning of more than 800 thousand m² of housing annually, which is 3 times higher than the current rates of housing commissioning in the region.

Thus, the target indicators of the strategy do not correspond to the actual rates of housing construction and the existing effective demand.

Potential/Opportunity

Opportunities for well-balanced development due to the economic diversification and an increase in the number of jobs, as well as the level of well-being of the population.

Bringing to the normative values of indicators of provision of social and engineering infrastructure on the territory of the Municipal Entity City of Astrakhan.

Issue/Risk/Restriction

Lack of detail regarding the goals and objectives of measures for their spatial implementation in the strategies of socio-economic development of municipal entities.

Lack of planning documents for complex automation and a body to be able to manage its development.

Failure to meet the goals and objectives of strategic development due to insufficient focus of financial and management resources on established goals and objectives.

Failure to meet the goals and objectives for spatial development due to low rates of housing construction and low consumer demand.

⁵⁴ A brief analysis is given in clause 3.4.1.



2.5.2. Analysis of the key issues regarding the spatial development

In order to determine the promising areas for the spatial development of the city of Astrakhan as a center of agglomeration development within the framework of a comprehensive research, an analysis of the city planning potential of the city was carried out, including the analysis of the key issues and features that hinder and restrict the further development of the city of Astrakhan.

One of the peculiar features of the spatial organization of the Municipal Entity City of Astrakhan is that the city is located on the both banks of the Volga river. Thus, on the left bank of the Volga river are located 3 districts: Kirovsky, Sovietsky and Leninsky, while Trusovsky district is located on the right bank of the river. The only connecting elements of the urban transport network between the two banks of the Volga are two bridge structures operating at their maximum capacity: the Old Bridge and the New Bridge. The street and road network of Astrakhan is characterized by a complex structure. Connections between different districts of the city are hampered by obstacles due to the need to overcome the Volga's natural barriers in the form of a system of watercourses.

Serious issues for transport provision are multiple level crossings organized

at the same level, a low quality indicator of the roadbed of the urban street-road network, a high proportion of streets and roads with non-standard cross-sections, and the lack of storm sewers.

Other peculiar features and characteristics of the transport infrastructure of the city of Astrakhan are given in the subsection 2.6.1 of the present Survey.

Serious restrictions concerning the spatial development of the city are the noise zone and air strips of the airfield Privolzhsky of the Ministry of Defense of the Russian Federation, located on the territory of the Narimanovsky district of the Astrakhan region, and the air strips of the civil aviation Astrakhan airport (Narimanovo). Restrictions on the use of land plots and capital construction facilities

on the territory of airstrips of the airports and on the aerodrome territory are established in the Rules for Land Use and Development of the Municipal Entity City of Astrakhan⁵⁵.

In addition, by order of the Federal Air Transport Agency No.1391-P dated 2019/12/23 On the establishment of the aerodrome territory of the Astrakhan (Narimanovo) airport, the boundaries of the aerodrome territory were established, including the boundaries of subzones and restricted zones; most important restrictions concern the altitude regulations⁵⁶.

⁵⁵ The restrictions concerning the urban planning activities for the airfield indicated on the map doesn't exist anymore from the date of inclusion of the data about the aerodrome territory of the Narimanovo airport (Astrakhan) in the Unified State Register of Real Estate Restrictions on the use of land plots in accordance with the Order of the Federal Air Transport Agency 1391-P dated 2019/12/23.

⁵⁶ In order to indicate the absolute height the Baltic system of elevations is applied.



Zones of restriction of urban planning activities on the territory of the city are presented in the materials of the Rules for Land Use and Build-up of the Municipal Entity City of Astrakhan.

The Fig. 88 shows the main restrictions of spatial development, including the key sources that have a negative impact on the environment and regulated build-up area.

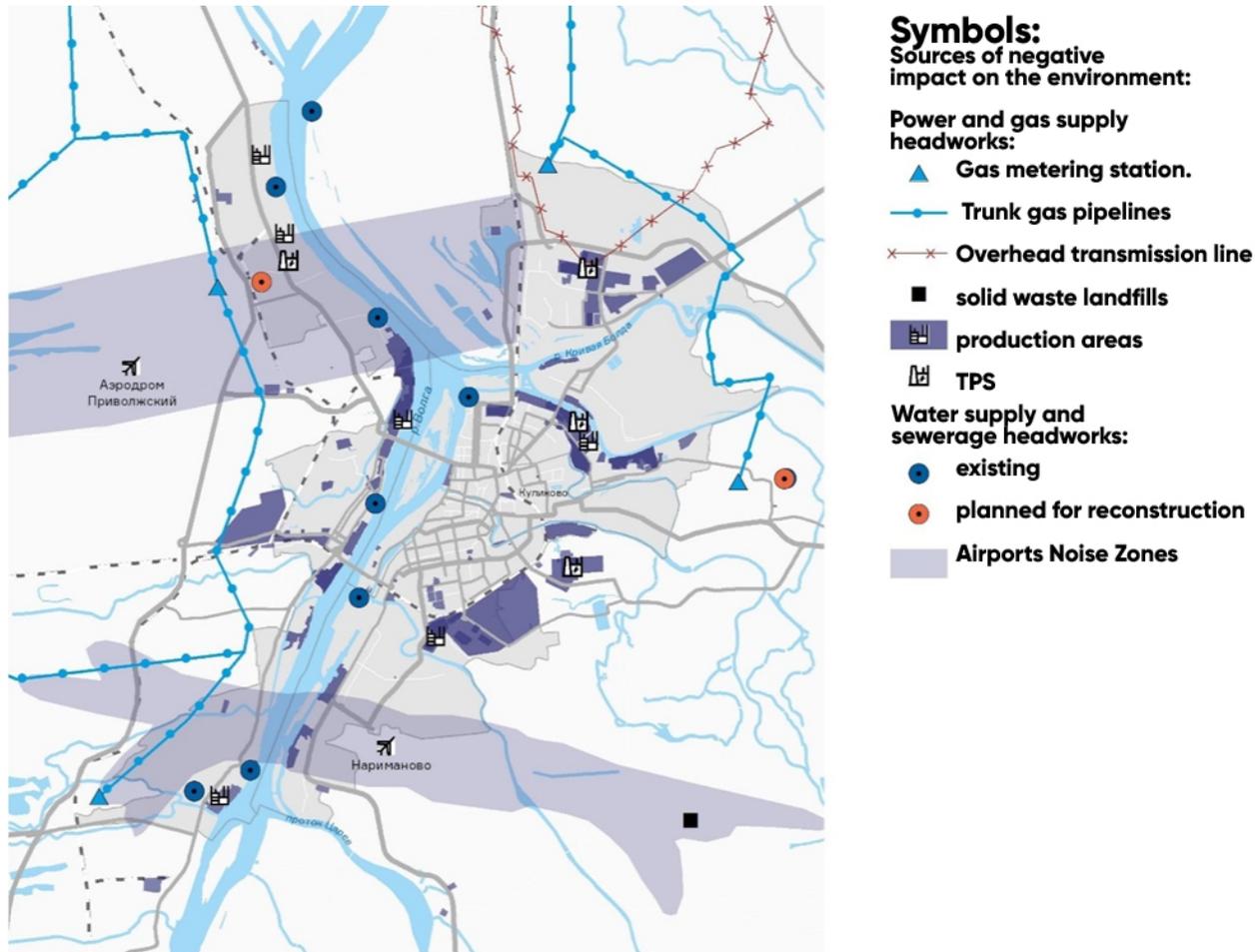


Fig. 88. Schematic picture of the main urban planning restrictions on the territory of the Astrakhan city

High concentration in the historical center of a significant share of urban infrastructure and places of employment, including administrative, public and business, commercial and other facilities of local and regional importance, carries a great weight in terms of transport and pedestrian flows and is also the cause of congestion of the streets of the city and road network during rush hours.

The development of the suburban area, mainly residential, is currently taking place due the absence of an integrated systematic approach and without taking into account the possibility of providing the territory with transport infrastructure.

Peculiar features of the territorial location of the key social infrastructure facilities such as schools, kindergartens, clinics, cultural establishments and sports facilities (subsection 2.6) also demonstrate a certain unevenness of their distribution in comparison to the residential quarters and administrative districts of the city, which creates some discomfort for city residents.



The main urban development restrictions on the territory of Astrakhan:

- project area for the protection of a historical settlement of federal importance;
- territories of industrial and production activities, including city's thermal power plants, head engineering structures of heat power engineering, water supply and sewerage systems, solid waste landfills and other facilities;
- protective zones of the high-voltage power transmission lines and major pipelines, including high pressure gas pipelines;
- zones of noise influence and zones of altitude restrictions from Narimanovo and Astrakhan airports;
- transport restrictions associated with the low density of the road network, the need to overcome numerous watercourses and railways of the same level;
- the presence of flooding zones;
- the passage of freight transit transport along the federal highway E40 in the central city area.

The main infrastructural issues concerning the development of the territory of the city of Astrakhan:

- low level of provision of newly implemented and implemented during the recent years projects for the development of urban areas with transport and social infrastructure;
- a significant part of the city's individual housing construction territories is not provided with hard-surface roads;
- insufficient volume of commissioning of economy class residential property market segment during the recent years;
- a high proportion of dilapidated and dangerously run-down housing in the total housing stock;
- dilapidated housing that requires repair and modernization of the head structures and linear facilities of the engineering infrastructure, limiting the ability to connect new capital construction facilities;
- hazardous condition of pedestrian bridges;
- the location of the main zones for the development of residential, public and business buildings based on the materials of the approved General Plan on the outskirts of the city in areas with a current low level of infrastructure provision, including its transport accessibility.

The main socio-economic restrictions on the development of the territory of the city of Astrakhan:

- lack of sites for the integrated development of residential, public and business functions that have a high investment attractiveness for private investors;
- limited effective demand from investors and the population, which prevents the launch of high-quality redevelopment projects and integrated development of territories;
- the protected status of the city center of Astrakhan and the high concentration of cultural heritage sites are constraining factors for the implementation of investment projects for the development of the built-up areas;
- a intricate structure of owners and existing land and property relations in the territories of investment-attractive industrial and other zones, which limits the consolidation of land plots and the launch of unified redevelopment projects;
- imperfection of legislation in the field of resettlement of citizens from hazardous housing.

Potential/Opportunity

Sustainable development of the city of Astrakhan.

Reducing the migration outflow of the population and increasing investment attractiveness due to the creation of a new quality comfortable urban environment attractive for work and leisure.

Settlements of compact residence located in close proximity to the city limits and the potential for their integration in the urban agglomeration which is the city of Astrakhan.

Issue/Risk/Restriction

Threats to the development of the city through infill construction avoiding the creation of an integrated structure.

The threat of a decrease in the social attractiveness of the city due to the low availability of housing for young families, the presence of dilapidated and dangerously run-down housing and, as a result, an increase in the migration outflow.

Threat of collapse of hazardous buildings and structures.

Threat of accidents at transport and engineering infrastructure facilities.

Every year threat of flooding of Astrakhan by flood waters.



Characteristics of the existing system of recreational public spaces in the city

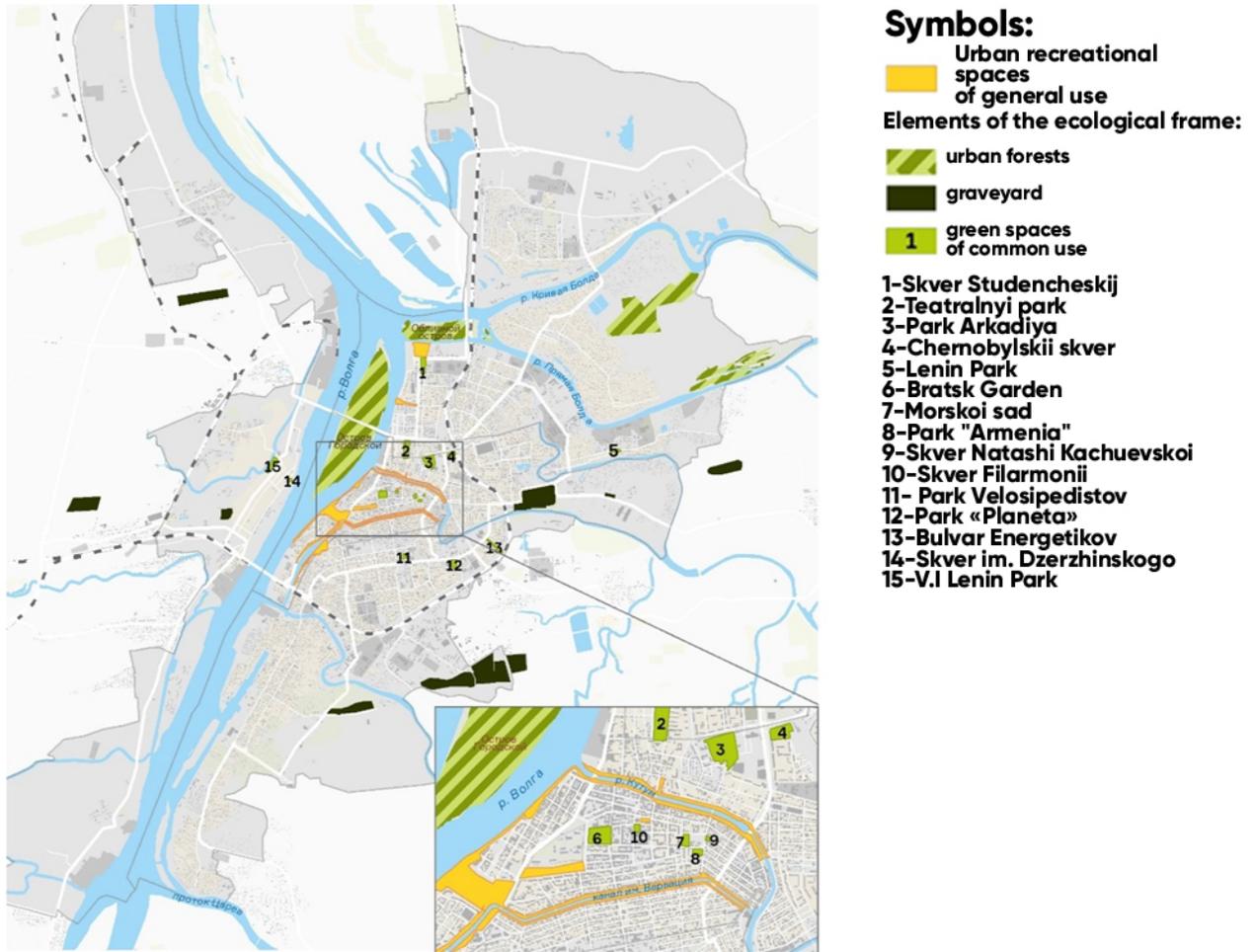


Fig. 89. The existing system of urban public spaces in the Municipal Entity City of Astrakhan

Public green spaces (Fig. 89) are currently located mainly in the central city area close to the railway station and in the riverbank areas. Enclaves without modern conveniences serve as resting places: Gorodskoy island and Oblivnoy island, where during the summer are organized bathing areas.

Within the framework of the municipal city program⁵⁷, the improvement of the following public spaces in Astrakhan is planned in the near future: Teatralny street, Volodarsky street, Kirov street, Krasnoye Znameni street, Lenin street, Sovetskaya street, Trediakovsky street, Chernyshevsky street, Esplanadnaya street, M. Gorky street.

According to the existing balance of the territories of the Municipal Entity City of Astrakhan, public green spaces and city forests occupy about 710.5 hectares (3.4% of the city's territory).

On average, there is 13.4 m² of green space per inhabitant, with a standard indicator of 25 m²/person.

In order to comply with the standard indicator of the area of urban green spaces, their volume must be almost doubled.

In addition, there are no park recreational zones in Astrakhan (territories with an area larger than 10 hectares).

The right riverbank residential areas of Astrakhan, Zaboldinsky and Zatsarevsky planning districts practically do not have any green spaces.

Based on the analysis of public spaces in Astrakhan, the following areas are the most important in order to create a comfortable urban environment:

- reservation of territories for the purpose of subsequent landscaping and environmental improvement as a part of the integrated development of territories;
- creation and landscaping of regional squares, parks, embankments and those located within the central city area;
- creation of a continuous system of interconnected public spaces.

Potential/Opportunity

In order to achieve the standard indicators to ensure the necessary provision of green spaces in the territory of Astrakhan, it is advisable to carry out the environmental improvement of the city islands (Gorodskoy Island and Oblivnoy Island) in compliance with all modes of use established for the category of city forests.

Issue/Risk/Restriction

Risks may be associated with the implementation of selective infill landscaping, the lack of a unified plan for the complex step-by-step measures, with an imbalance of attention towards urban locations like places of interest for tourists, without taking into account the requests and opinions of residents of each district, and also without solving the priority issues of the management system such as organizing a collection system and treatment of surface runoff from the entire area, issues related to the system of sanitary cleaning of territories.

3,4%

of the territory of Astrakhan is occupied by green spaces and city forests

13.4 m²

green public spaces per 1 resident of Astrakhan

⁵⁷ Municipal program of the Municipal Entity City of Astrakhan Formation of a modern urban environment for 2018–2022.



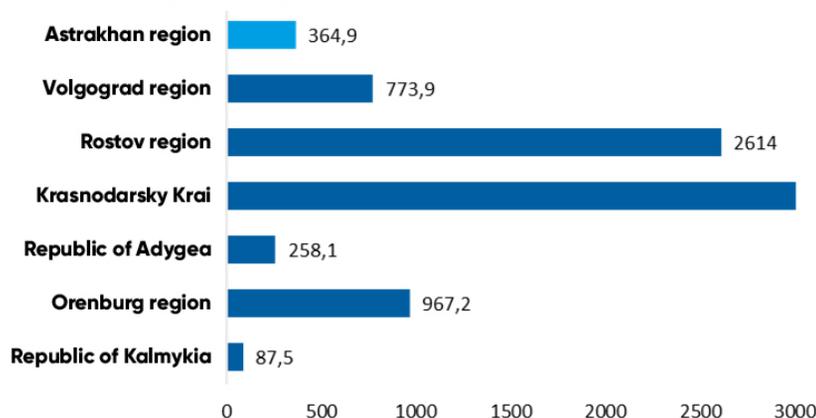
2.5.3. Evaluation of the current state of the construction market

Evaluation of the pace of construction of the housing stock

In order to evaluate the attractiveness of living in the Municipal Entity City of Astrakhan and the region in terms of living standards and urban environment in the present Survey have been analyzed the following:

- the pace of the housing construction;
- the cost of housing stock in the primary and secondary markets;
- condition of the housing stock.

Fig. 91 Comparative characteristics of the volume of the housing stock to be commissioned in 2020



Data source⁵⁸

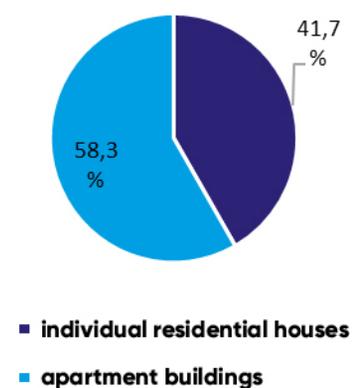
The average annual commissioning of housing on the territory of the Municipal Entity City of Astrakhan over the past 5 years amounted to about 240 thousand m² (Fig. 91), including 100 thousand m² of individual housing constructions and 140 thousand m² of multi-apartment residential buildings.

Thus, the average annual rate of the land development for housing construction is about 100 hectares for individual housing constructions and 15–20 hectares for the multi-apartment residential buildings. At the same time, the development of the multi-apartment residential buildings is diversified by class and location.

The highest quality projects in the business class segment are created in the central city area through the development of selective infill plots, as well as the redevelopment of some unused industrial zones.

The target indicator for the commissioning of housing for the Astrakhan region in 2020 within the framework of the national project Housing and Urban Environment by the Ministry of Construction of Russia (taking into account the reduction) is established at 300.0 thousand m².

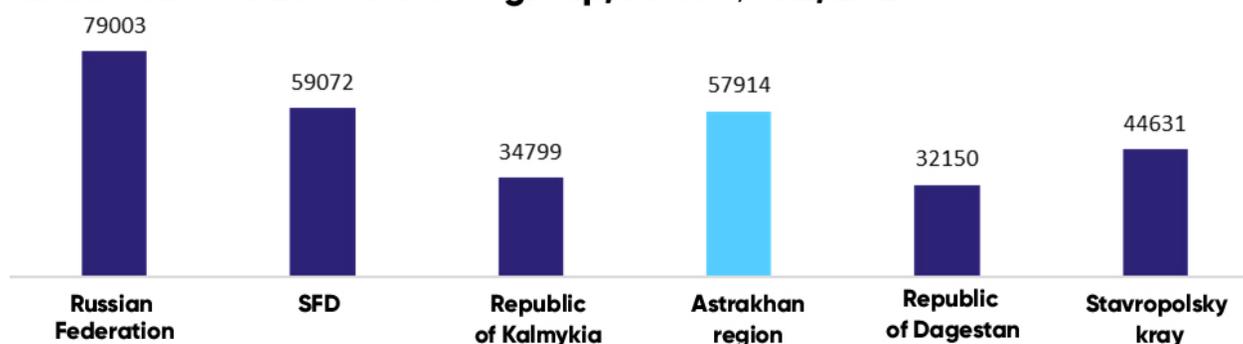
Fig. 90 Characteristics of the housing stock being commissioned, %



⁵⁸ https://gks.ru/bgd/free/b04_03/lsslwW.exe/Stg/d02/21.htm

The completed housing stock in the Astrakhan region is comparable to the Volgograd region, but at the same time it is significantly inferior to the Rostov region and the Krasnodar region.

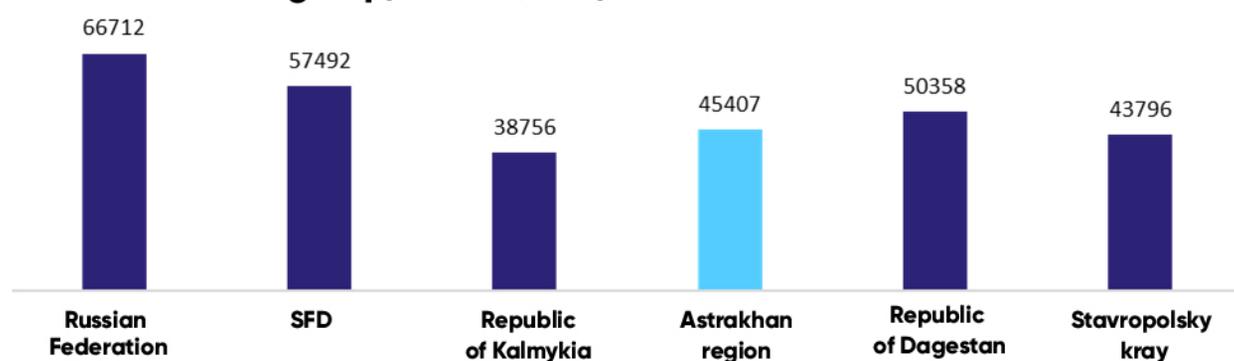
Fig. 92 Comparative characteristics of the cost of 1 m² in the primary housing market in Astrakhan and in the cities of the reference group, rubles / m², 2020



Source⁵⁹

The cost of 1 m² in the primary residential real estate market in the Astrakhan region is significantly higher than in the subjects of the reference group. This difference may be associated with the class of housing being commissioned in the Municipal Entity City of Astrakhan, including with the lack of the

Fig. 93 Comparative characteristics of the cost of 1 m² of housing on the secondary market in Astrakhan and in the cities of the reference group, rubles / m², 2020

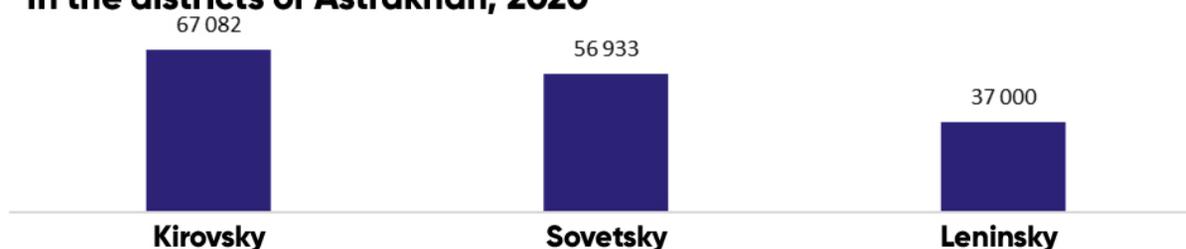


The cost of 1 m² in the secondary residential real estate market in the Astrakhan region is lower than the average for the Southern Federal District, which indicates the low attractiveness of the region for life and work of the population.

⁵⁹ <https://www.fedstat.ru/>



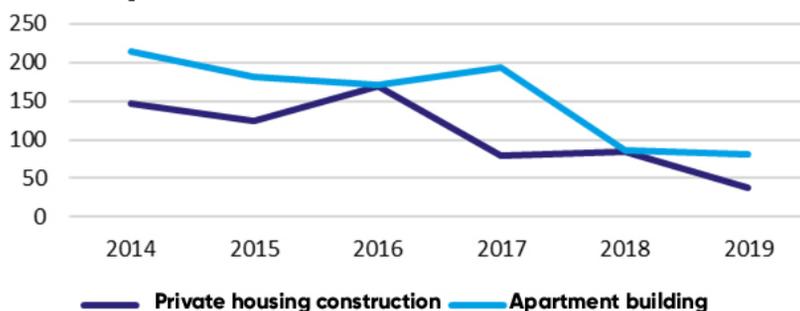
Fig. 94 Comparative characteristics of the cost of 1 m² in the districts of Astrakhan, 2020



Source⁶⁰

The cost of residential real estate in the Municipal Entity City of Astrakhan is extremely dependent on the territorial affiliation to the administrative region and its attractiveness for living.

Fig. 95 Analysis of the rates of residential development in Astrakhan, 2014-2019



The insufficient amount of resources of the municipality in order to ensure the sustainable development of the area limits the possibilities for the implementation of high-quality projects in the housing, public and business sectors.

In the general structure of multi-apartment housing construction in Astrakhan, about 90% of commissioning falls on economy-class housing and housing built at the expense of citizens within the framework of shared construction contracts. The contribution of high-quality comfort and business class projects, as well as projects implemented within the framework of municipal and State programs, is not significant.

The general trend of a decrease in the volume of new housing construction in the Municipal Entity City of Astrakhan, the maximum decline in activity in the multi-apartment housing construction sector was noted in 2017–2018.

⁶⁰ Central Real Estate Information Agency



Evaluation of the hazardous housing stock

The total area of hazardous housing stock in the Astrakhan region is more than 130 thousand m²; about 7.5 thousand people live in dangerously run-down housing.

The largest number of hazardous buildings in the region is located in the regional center, that means in the city of Astrakhan (up to 1.5% of the total area of the multi-apartment residential housing stock). Hazardous buildings in Astrakhan are located mainly in the central city area (Fig. 96).

In the Astrakhan region, 391 objects of cultural heritage are under the State protection, which are used as an multi-apartment residential building (built at the end of the XIX - early XX centuries).

An analysis of the technical condition of cultural heritage objects used as multi-apartment residential buildings shows that most of them remain in an unsatisfactory technical condition. Thus, 365 cultural heritage objects (93.3%) used as multi-apartment residential buildings are in poor technical condition and require to be restored.

Fig. 96. Location of the hazardous housing stock on the territory of the central area of the Municipal Entity City of Astrakhan

5487

of multi-apartment residential buildings built in 1920s

1800

of multi-apartment residential buildings are in hazardous conditions

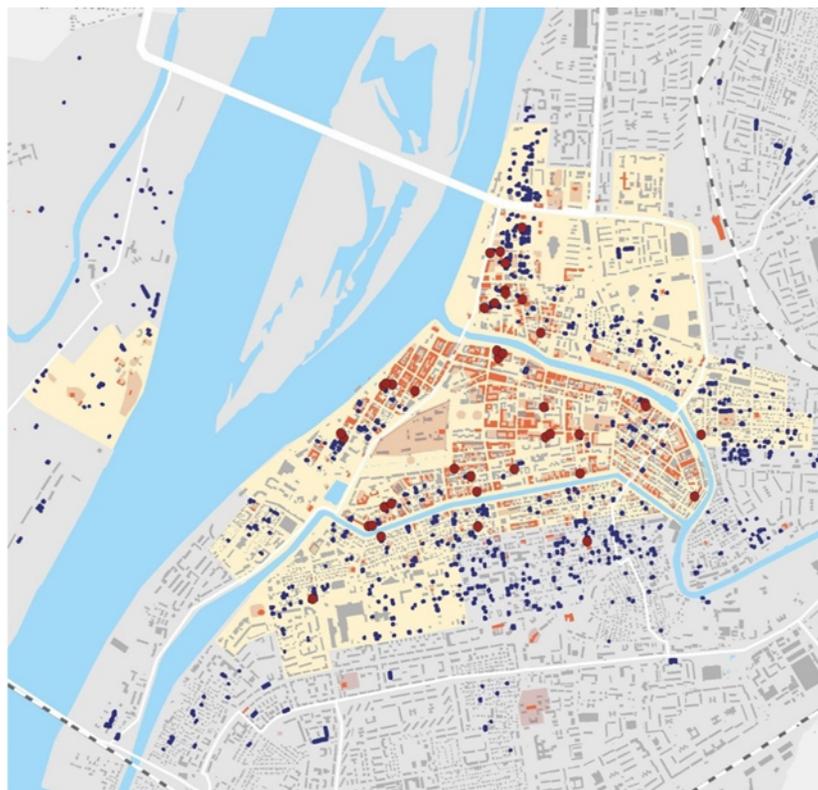
391

the multi-apartment residential building has the status of a cultural heritage object

365

of the multi-apartment residential buildings considered as a cultural heritage objects are in unsatisfactory condition

It is impossible to integrate at the legislative level a multi-apartment residential buildings considered as objects of cultural heritage in the program of resettlement from dilapidated and hazardous housing, financed in particular at the expenses of the State Corporation Fund for Assistance to the Reform of



Symbols:

- Cultural heritage sites
- cultural heritage sites' territories
- The territory of the historical settlement
- emergency and dilapidated housing
- Objects of dilapidated and emergency housing included in the cultural heritage sites



Evaluation of the previously adopted urban planning decisions

From 2013 to 2017, based on the results of open auctions on the territory of the City of Astrakhan, 33 agreements were concluded regarding the further development of the built-up areas with a total area of 57.19 hectares. As part of the implementation of such agreements, the total area of the dilapidated and hazardous housing stock is about 100 thousand m², the planned size of new housing commissioning (determined at the pre-project stage) is **more than 600 thousand m²**.

At the moment, 10 agreements on the development of the built-up area have been terminated due to the failure of the developers to fulfill their obligations, but one agreement has been fully implemented. In relation to the amendments in the legislation introduced since 2017/01/01⁶¹, new decisions on the development of the built-up areas were never put in place by the administration of the Municipal Entity City of Astrakhan.

As part of the implementation of agreements on the development of the built-up area, the construction of multi-apartment residential buildings is currently underway, including a number of residential complexes such **RC Vensky, RC Arcadia, RC Evropeyskiy, RC Lotos-Park, RC Centralny**.

As of 2021/01/01, developers⁶² have commissioned for operation 14 multi-apartment residential buildings (916 apartments, or 49,454 m² of housing stock), at the moment, permits have been obtained for the further construction of another 14 multi-apartment residential buildings (1,781 apartments, or 106,877 m² of housing).

A limiting factor for the successful implementation of integrated development projects in Astrakhan is the lack of tools to work with investors, infrastructure deficits, high construction costs due to some special construction conditions and, as a result, an elevated market prices for housing.

According to experts estimates, in order to speed up the process of replacing the dilapidated hazardous housing, it is necessary to adopt a new program for newly identified objects and build more than 200 thousand m² of municipal housing for the resettlement of citizens investing more than 16.3 billion rubles.

For today, an agreement on the early completion of the program in 2023 has been signed between the government of the Astrakhan region and the Fund for Assistance to Reforming Housing and Communal Services. 175 multi-apartment residential **buildings with a** total area of 38.4 thousand m² with 2.7 thousand dwellers to be resettled before 2023/01/01.

Development of housing construction in the city of Astrakhan, in particular, in order to replace the hazardous dilapidated housing and to improve the quality and comfort of the urban environment, it is planned through to proceed to the implementation of integrated territorial



Igor Babushkin about plans to resettle hazardous residential buildings

⁶¹ About amendments to the Housing Code of the Russian Federation and the Federal Code On the Fund for Assistance to Reforming the Housing and Utilities Sector in terms of resettlement of citizens from the hazardous housing stock.

⁶² The list of key investors in the Astrakhan region is given in Appendix 7.

development projects (ITD) both as part of new microdistricts and as part of projects for the development of the built-up areas.

In addition to housing construction, during the period of 2018–2020 were commissioned in operation a social, cultural and communal facilities in the city, including health care centers, the Church of St. Andrew the First-Called, the business center of the Republic of Azerbaijan, a multifunctional center with a skating rink, sports and education facilities, trade, catering and communal facilities.

2.5.4. Evaluation of the quality of the urban environment

Within the framework of the Survey, a comprehensive evaluation of the state of the quality of the material urban environment, conditions and dynamics of its change was carried out. The Fig. 97 shows the differentiation of the territorial entities of the Southern Federal District of the Russian Federation in terms of the urban environment quality index⁶³.

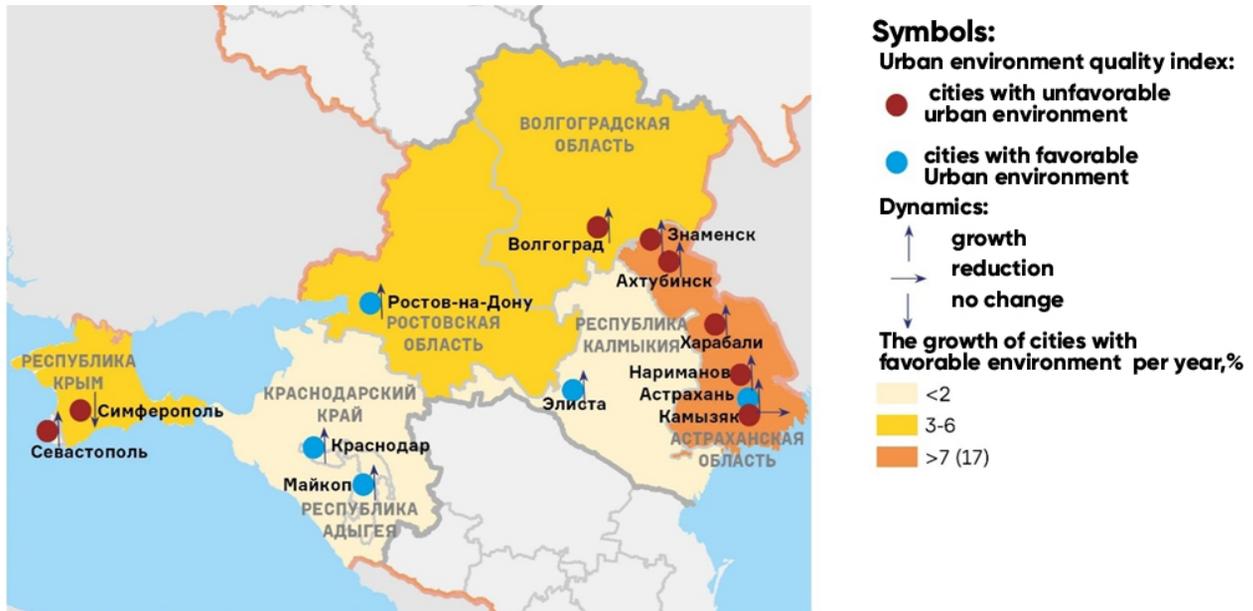


Fig. 97. Diagram showing the quality index of the urban environment in the territorial entities of the Southern Federal District

⁶³ The methodology to determine the quality index of the cities was developed by the Ministry of Construction, Housing and Utilities of the Russian Federation jointly in association with consulting companies Strelka and DOM.RF; <https://индекс-городов.рф/#/>



Fig. 98 Comparative rating of the environment quality of the constituent entities of the Southern Federal District

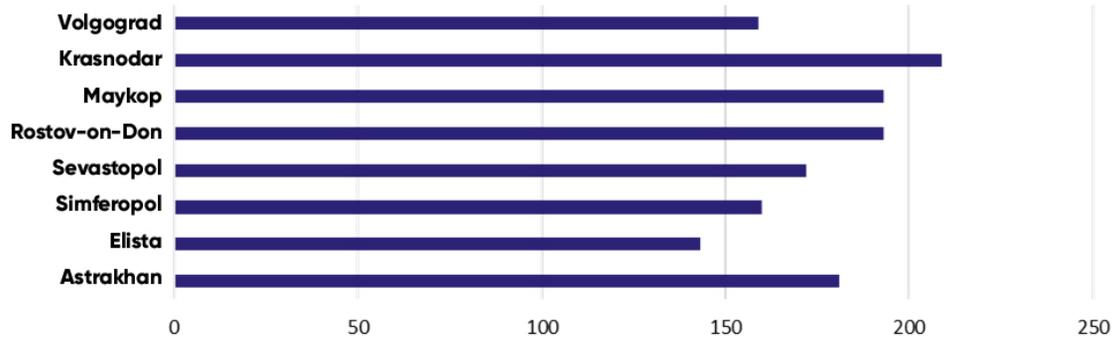
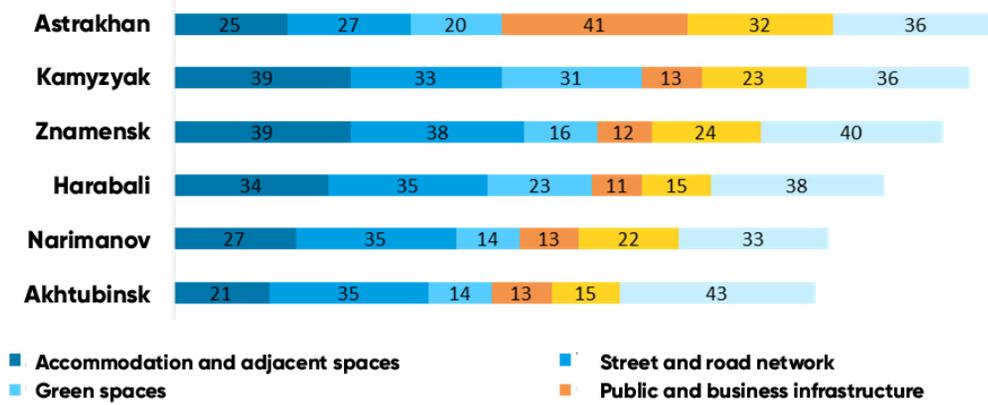
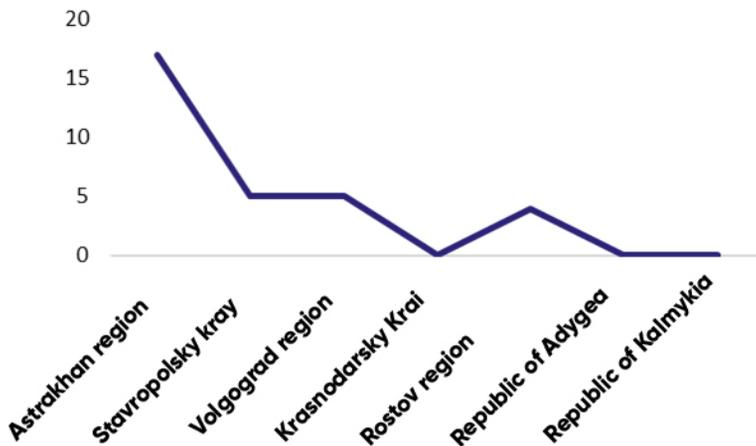


Fig. 98 Comparative rating of the environment quality of the constituent entities of the Southern Federal District



Low indicator of the quality of the urban environment. Lagging behind in terms of green spaces and public and business infrastructure.

Fig. 100 COMPARATIVE GROWTH IN THE MEDIUM QUALITY INDEX FOR THE YEAR,%

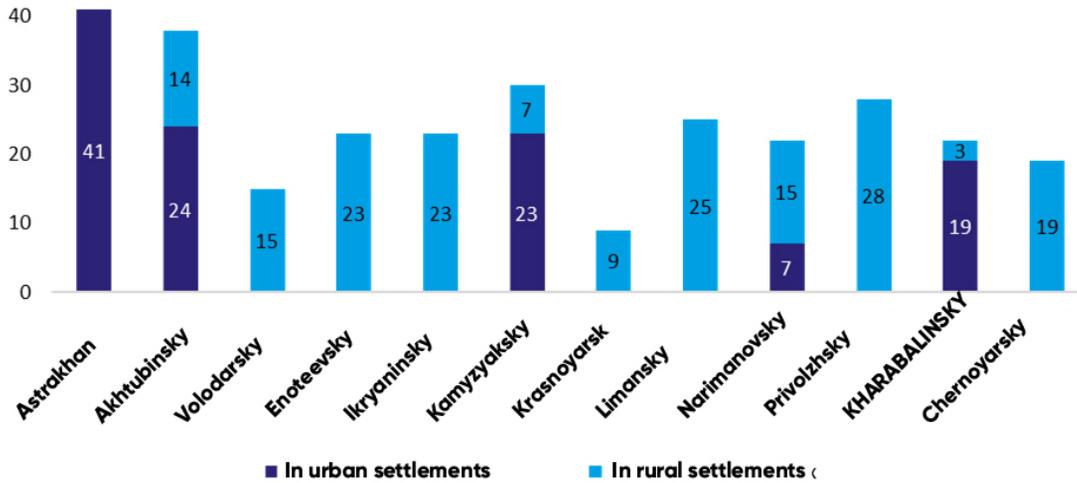


About the planned reconstruction of Maxim Gorky street in the Municipal Entity City of Astrakhan



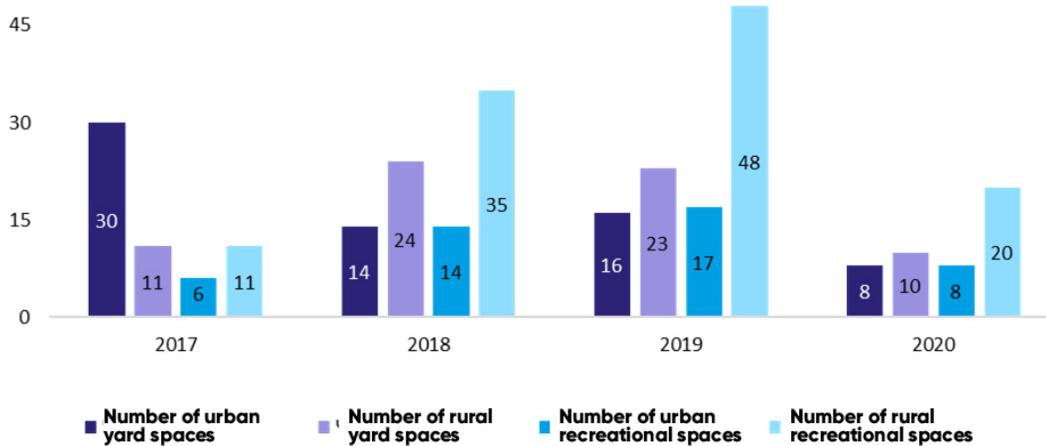
The maximum rate of improvement in the quality of the environment for the year in comparison with the territorial entities of the Southern Federal District (including active improvement of the public spaces in

Fig. 101 The number of comfortable public spaces on the territory of the Astrakhan region for the period 2017-2020



Projects of modernized public spaces have a fairly even proportion in terms of territorial affiliation between the municipal entities of the region.

Fig. 102 The number of comfortable recreational and courtyard spaces on the territory of the Astrakhan region for the period 2017-2020



As part of the implementation of the Comfortable Urban Environment program, a significant number of recreational and courtyard spaces in rural settlements have been landscaped. There is a trend towards an increase in the total number of modernized public spaces in rural areas.

Within the framework of the State program Formation of a modern urban environment in the Astrakhan region for the period 2017–2020 in the Municipal Entity City of Astrakhan were modernized such significant urban spaces as Arcadia park, the square near the shipyard named after S.M. Kirov, Akhmatovskaya street, park of the III International, Lenin park, Stroiteley square (Builders square).

Under the program Comfortable Urban Environment in 2017–2020. 159 public and 136 courtyard spaces were landscaped in 6 cities and 64 rural settlements.



2.6. INFRASTRUCTURES

In order to identify the main risks and opportunities to be able to improve the living environment in the Municipal Entity City of Astrakhan, an analysis of the provision of the following essential elements was carried out:

- transport infrastructure;
- engineering infrastructure;
- social infrastructure.

2.6.1. Transport infrastructure

A peculiar feature and one of the advantages of the transport-geographic location of the Municipal Entity City of Astrakhan is its multimodality, transport-logistics and transit potential, due to the presence of all types of transport:

- automobile transport;
- railway transport;
- waterborne transport;
- air transport.

Automobile transport

Through the territory pass highways of federal importance such as:

- M6 Don–Tambov–Borisoglebsk–Volgograd–Astrakhan, which is a part of the European route E119 and the Asian route AH8, the section from Volgograd to Astrakhan is also a part of the European route E40;
- P216 Stavropol–Elista–Astrakhan.

Highways are of great importance:

- Astrakhan–Moscow, Astrakhan–Elista–Stavropol, Astrakhan–Makhachkala and Astrakhan–Atyrau (Kazakhstan);
- European route E119 Moscow–Tambov–Volgograd–Astrakhan–Kizlyar–Makhachkala–Derbent–Kuba–Baku–Alat–Astara.

The central bus station in Astrakhan is an important strategic object of transport infrastructure, providing an uninterrupted transport links within the region, with the territorial entities of the Russian Federation and neighboring countries. Currently, from the bus station in Astrakhan, interregional routes depart in 22 directions: Moscow, Voronezh, Sochi, Krasnodar, Stavropol, Makhachkala, Derbent and a number of other cities.



A peculiar feature of the transport system of Astrakhan is the location of the city on two banks of the Volga river, the major latitudinal transport corridors pass along the two bridge crossings. From the New Bridge on the Henri Barbusse street and Savushkin street, an exit to the Northern Bypass of Astrakhan is being created. The northern and north-eastern planning areas are connected by a corridor along the Henri Barbusse street, Yablochkova street with an overpass across the railway near the railway station Astrakhan-1 with a subsequent exit to the Solikamskaya street, Avtozaprovchnaya street and further to the Northern Bypass. The second latitudinal corridor runs from the Old Bridge along the N. Ostrovsky street, Sofia Perovskaya street and goes to the Nachalovskoye highway in the direction of the village of Nachalovo of the Privolzhsky district.

In the central area of Astrakhan, the main meridional corridor is a link of Admiralteyskaya and Boevaya streets, which turns into the Kamyzyak highway which is located near the airport. A significant direction is Pobedy street (Victory street), departing from the Henri Barbusse street in the area of the Astrakhan-1 railway station, which turns into Magnitogorskaya street and further towards the Energetikov highway, which continues in a latitudinal direction bypassing the Tri Potoka village (Three streams village) to the village of Nachalovo.

On the right river bank in the area of Trusovsky district, the main meridional corridor runs along the Pushkin street, K.Marx street, Dzerzhinsky street, Pobedy street and further along the river banks of the Volga through the village of Ilyinka goes to the federal highway R-216 near the village of Krasnye Barrikady.

The international corridor North-South passes through the city area, which includes in particular the federal highway E40 connecting the territory of the Astrakhan region with other regions and economic hubs of the Russian Federation and neighboring countries.

Thus, the priority project for the development of the road network in the city of Astrakhan is the construction of the Northern Bypass of the city of Astrakhan with a bridge across the Volga.

The Northern bypass planned for construction in the Municipal Entity City of Astrakhan will ensure the following:

- will provide a transit flow along the international corridor E40 from the Caspian federal highway in the direction of Kazakhstan, bypassing the central city area of Astrakhan;
- will connect the northern and northwestern industrial hubs of the city of Astrakhan;
- will provide an additional and more rational access to the M-6 highway for the Zaboldinsky, Mezboldinsky planning districts of the city and the northern part of the Zavokzalny and Tsentralny districts in comparison with the routes through the existing bridges.

Hereafter it is planned to transfer the section of the Astrakhan regional highway, connecting the P-22 Caspian highway with the border of Kazakhstan, to federal property for the construction of a modern high-quality road.

The connection of the Russian federal highway with the road network of Kazakhstan will improve the quality of the North-South international transport corridor.

The distance of travel between the river banks to ensure the possibility of correspondence in the northern area of Astrakhan will be reduced for up to 10–12 km, and for transit transport for up to 15–20



About the opening of a railway bridge across the Akhtuba river



About the construction of the Northern Bypass

For the development of the transport system of the city of Astrakhan, it is also imperative to start the implementation of the project Construction of the Eastern Bypass of the city of Astrakhan on the section from the Astrakhan-Zelenga highway to the Astrakhan-Kamyzyak highway (completion of construction).

Key projects for the development of the road network in Astrakhan:

- development of a latitudinal corridor from the New Bridge in the direction of the right-of-way of the Privolzhskaya Railway with an exit to the Energetikov highway;
- continuation of the B. Khmelnitsky street in the southern direction with the construction of a bridge across the Tsarev canal with the formation of the shortest connection between the city center of Astrakhan and the airport;
- creation of the Middle East Bypass of the city of Astrakhan with the construction of an extension of the Avtozapravochnaya street, a bridge across the Pryamaya Bolda river with a subsequent exit to the Nachalovskoe highway
- development of the road network in the planning area Babaevsky (Leninsky administrative district);
- reconstruction of some sections of the road network in accordance with the developed documentation.

Plans for the development of transport infrastructure in the territory of the Municipal Entity City of Astrakhan and the Astrakhan region are also given in Appendix 17.

Municipal passenger transport

According to the Register of Municipal Regular Transportation Routes, in the Municipal Entity City of Astrakhan, transport services for residents of Astrakhan are carried out on 71 routes by small buses, on 4 routes - by middle class buses.

According to the decree of the administration of the Municipal Entity City of Astrakhan No.123 dated 2019/03/26 On the approval of the list of names of stopping points on municipal routes of regular transport in the Municipal Entity City of Astrakhan, 800 stopping points were approved within the city.

The city tram network was liquidated in 2007, while the trolleybus network in 2017.

Nowadays the city has plans to launch a city train route with the placement of transfer hubs at the stopping points such as Trusovo, Mostostroy, 422 km, Kutum, Yugo-Vostok (South-East), Sofya Perovskaya, Astrakhan-2 and 1521 km.

The most important task in terms of the transport development is to restore the operation of the urban public transport system.



The main issues in terms of transport provision in the Municipal Entity City of Astrakhan⁶⁴:

- low traffic capacity of public roadways;
- lack of a rational public transport route network and an excessive number of duplicate routes;
- non-compliance by carriers with the established timetable due to the lack of administration tools;
- insufficient number of large-capacity vehicle stock;
- lack of operating routes with regulated tariffs.

Railway transport

Railroad transportation on the territory of Astrakhan and the region is carried out along the tracks of the Astrakhan branch of the Volga railway.

The Astrakhan-1 railway station has established communication with cities of the Russian Federation and other countries. According to the schedule, AO (LC) Federal Passenger Company offers time-tabled trains from Astrakhan to Moscow, Saint Petersburg, Baku, Volgograd, Adler, Tyumen, Atyrau, Kazan, Mineralnye Vody and other cities.

The railway station and the specialized cargo station Astrakhan-2 carry out the transportation of goods and are the most important transport and logistics hubs in Astrakhan and the whole region.

A new logistics hub has been created at the Kutum railway station. On its territory are located a temporary storage warehouse with an area of 8.8 thousand m² and a customs control zone, which provides the possibility of customs clearance of goods in the amount of two trains (22 wagons and 50 trucks). The station carries out transportation of goods from Turkey, Azerbaijan, Georgia, Iran, Kazakhstan, Kyrgyzstan, Uzbekistan, China and in the opposite directions.

Waterborne transport

Currently, in the city of Astrakhan and in the Astrakhan region, there is a system of freight river and sea transport, however the system of passenger river transport is not available.

The cargo port Astrakhan provides water communications along the Volga-Caspian sea shipping canal which is a single deep-water highway connecting the waterways of the river basin of the Volga river and the Caspian Sea.

⁶⁴ From the letter of the Department of Transport and Passenger Transportation of the Administration of the Municipal Entity City of Astrakhan No.01-02-04-54 dated 2021/01/26.



Air transport

Air traffic is provided by the international Astrakhan airport (Narimanovo) named after B.M. Kustodiev that ensures regular domestic and international flights. Currently, the airport operates flights to the following directions: Moscow, Saint Petersburg, Sochi, Krasnodar, Mineralnye Vody, Rostov-on-Don, Volgograd, Kazan, Nizhny Novgorod, Baku (Azerbaijan), Aktau (Kazakhstan), Antalya (Turkey).

360

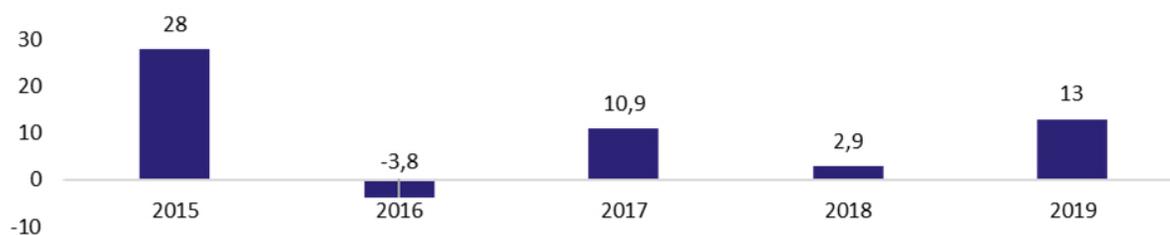
passengers per hour
current capacity of the Astrakhan airport

The airport's capacity allows it to serve up to 360 passengers per hour (240 passengers on domestic flights and 120 on international flights)⁶⁵ According to the statistics for 2019 (Fig. 103), and taking into account the maximum average daily traffic, which is about 75% of the technical capabilities, the airport's capacity reserve varies from 62.9 to 79.4% per month, depending on the season⁶⁶.

600

passengers per hour
planned Astrakhan airport's capacity

Fig. 103 Dynamics of passenger traffic growth at Astrakhan airport for the period 2013-2019, %



Currently, the airport authorities are considering the issue concerning the including of some measures to ensure the Reconstruction of the Astrakhan (Narimanovo) airport in the federal project Development of regional airports and routes. From 2021 to 2023, it is planned to build a new air terminal complex of 7000 m², which will increase the capacity of the air terminal complex by 240 people per hour.

The growth of the airport's passenger traffic is one of the key indicators of successful socio-economic development as an indirect indicator of the increasing attractiveness of the agglomeration for investors and tourists and the growth of the well-being of the population of the Astrakhan region.

⁶⁵ According to the data provided by AO Aeroport Astrakhan (Astrakhan Airport JSC). The dynamics of passenger traffic in 2020 amounted to 22% and while evaluating this data it was not taken into account the development potential of the airport.

⁶⁶ Provided that the daily schedule of flights is distributed evenly, there is a reserve of capacity.



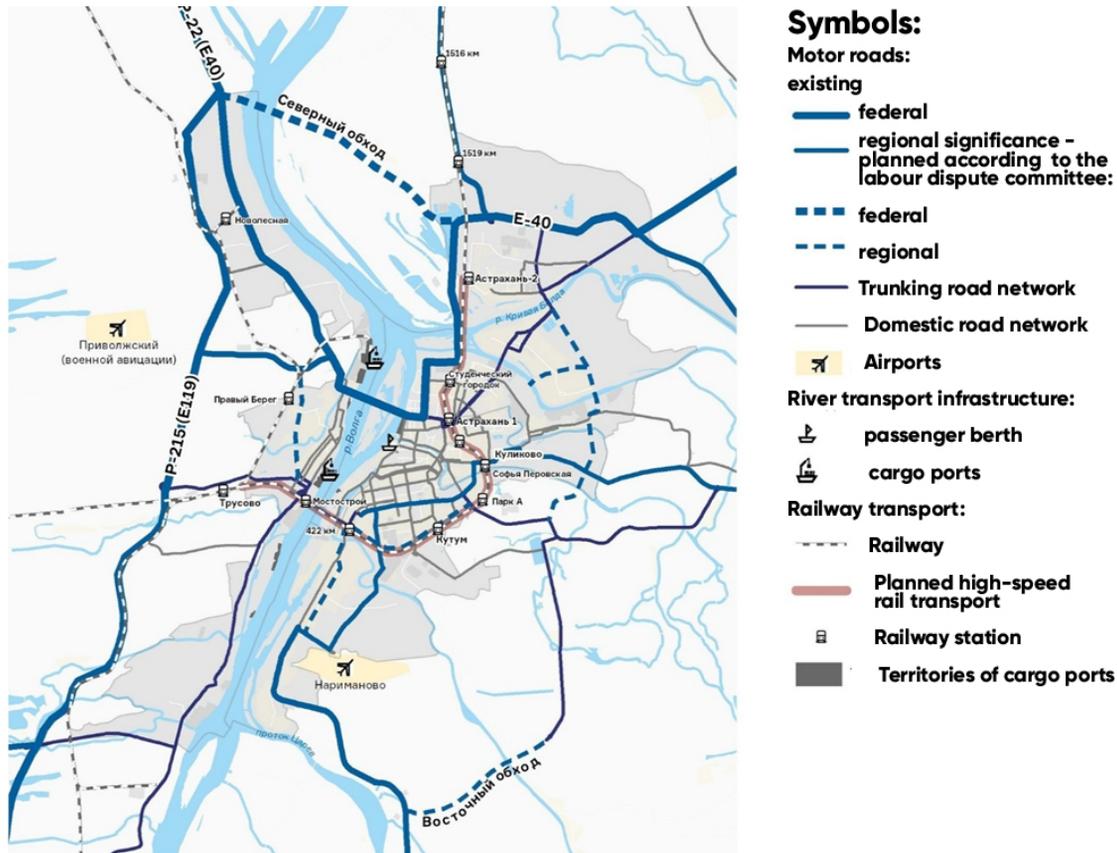


Fig.104. Diagram of the transport frame of the city of Astrakhan

Potential/Opportunity

Possibility of strengthening the city of Astrakhan as a large multimodal transport and logistics hub within the region, the Russian Federation and the Caspian macro-region.

Development of multimodal transportation.

Strengthening the importance of Astrakhan as a major river and sea port.

Availability of one international airport

Availability of customs terminals.

Development of the North-South and the West-East international transport corridors.

The potential to increase the export-import and transit freight road transport, in particular on international routes.

Possibility to optimize the urban road network, including through the implementation of approved planning projects for linear objects and the development of new projects in order to increase its density and connectivity of the city center with peripheral urban areas.

Rehabilitation of the urban public transport system.

Issue/Risk/Restriction

Low density of the road network.

Unsatisfactory quality of the road surface of the road network, non-observance of the normative parameters of the cross-sections of streets and roads.

Poor quality sidewalks and lack of a cycle lanes system.

Lack of a single operator of urban land passenger transport, too much ring roads and irrational character of already existing urban routes.

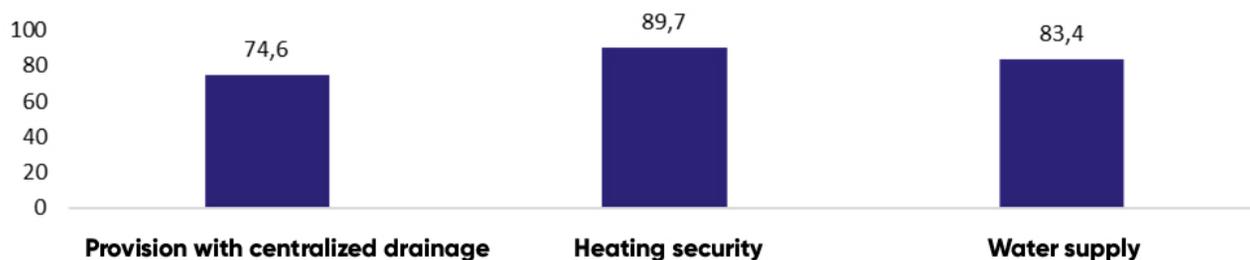
Lack of an updated integrated transport scheme for the Municipal Entity City of Astrakhan.

Lack of urban passenger water transport system.

Threat of accidents on ships of large capacity due to the shallowing of the Volga-Caspian canal.

2.6.2. Utility infrastructure

Fig. 105 Provision with a centralized system of engineering support in the city of Astrakhan, %

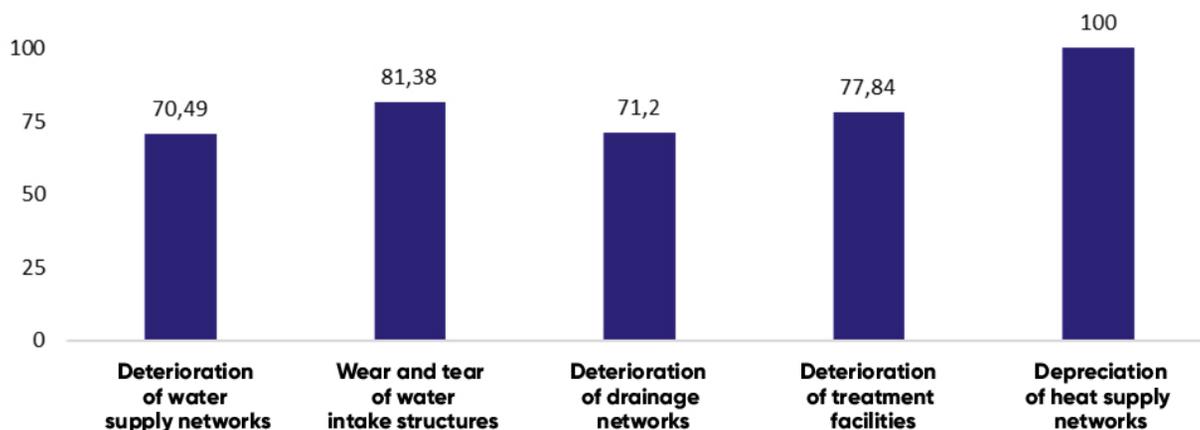


Astrakhan is characterized by an extremely unsatisfactory state of engineering networks and municipal infrastructure: water supply and discharge⁶⁷, gas, electricity and heat supply networks, outdoor lighting and storm sewers (Fig. 105-108).

>70%

Upgrading of the engineering infrastructure facilities is one of the underlying tasks in order to ensure a sustainable development of the

Fig. 106 Wear rate of engineering structures in Astrakhan, %



city.

A high proportion of the population not provided with central water supply and discharge system as well as a heat supply system. The issue of the provision of engineering infrastructure and the degree of its deterioration is especially acute for the territory of the historical city center.

⁶⁷ The list of the main water supply and sewerage facilities of the Municipal Unitary Enterprise Astrvodokanal of the Municipal Entity City of Astrakhan, information about the current state and development plans are given in Appendix 17.



Fig. 107 Differentiation by the deterioration of water supply networks in the districts of Astrakhan

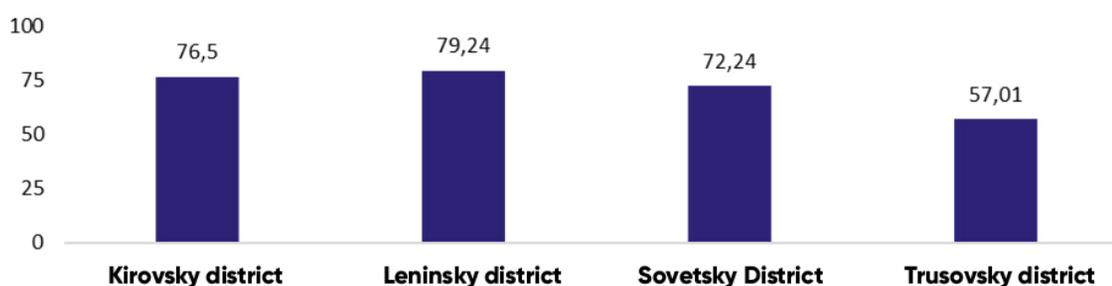
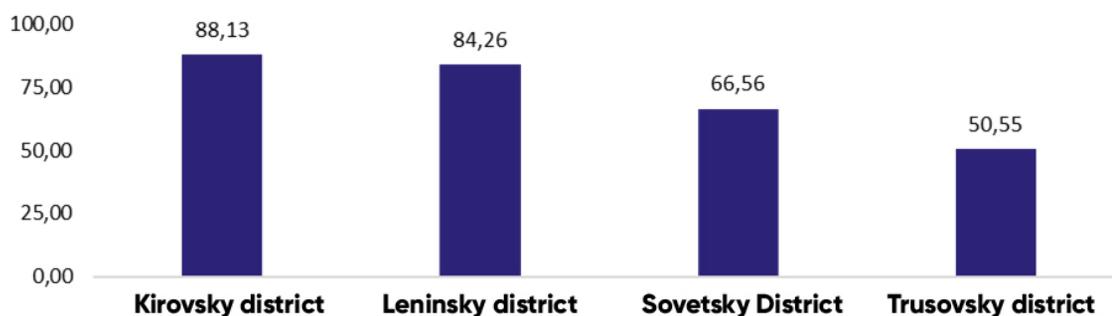


Fig. 108 Differentiation by the deterioration of sewerage networks in the districts of Astrakhan, %t



As of the end of 2020, substations Kirovskaya located in the central city area of Astrakhan, Internatsionalnaya, Okrasochnaya, Oktyabrskaya, Trusovskaya on the Right river Bank could not be connected to the consumers. The sub-feeders, as well as the power supply and distribution networks have to be reconstructed. A serious limitation in the development of built-up areas is the lack of land for the placement of new transformer substations and cable tracks.

The most acute problems concerning the deterioration of the water supply and water discharge infrastructure, as well as the need for its replacement and modernization, are located in the Kirovsky and Leninsky administrative districts of the city.

The city has a high level of deterioration of water supply and water discharge treatment facilities, an insufficient level of sewage wastewater treatment (up to 9% of wastewater does not meet standards), an unsatisfactory conditions of the storm drainage system, which is very deteriorated and doesn't have enough space to be deployed.

One of the peculiar features of Astrakhan is its location in the Volga delta, which in its lower reaches is distinguished by a regulated flow. At another point, this leads to the creation of a high level of groundwater and flooding of the urban area, which negatively affects the foundations of buildings and structures, as well as the condition of underground utilities. In order to prevent damage, some measures are required to regulate the water regime of intracity watercourses, in particular clearing channels and bank protection, construction and reconstruction of pumping stations, gateways-regulators, construction of drainage systems and ensuring the treatment of surface runoff.

Modernization of engineering infrastructure facilities is one of the underlying tasks to ensure a sustainable development of the city. In the context of rising of the tariffs for energy resources, there is a need to improve the efficiency of the use of already existing resources and the implementation of energy saving measures, in particular, using alternative sources.

Potential/Opportunity

Reconstruction and capacity increase of water supply and sewerage major facilities.

Active modernization of generating sources of electricity and heat supply.

Replacement and modernization of main engineering networks that remain in deteriorated condition.

Issue/Risk/Restriction

Damage to the quality of drinking water supply, health of citizens, which negatively affects the general level of comfort of the environment for life and business.

Disruption of the functioning of technical and communal infrastructure due to its significant deterioration.

Serious risks of accidents and denial of impossibility to access to vital engineering resources as a result of the continued operation of obsolete engineering infrastructure facilities.

Significant increase of maintenance and repair costs.

The complexity of the operation of underground communications due to the high degree of soil salinity.

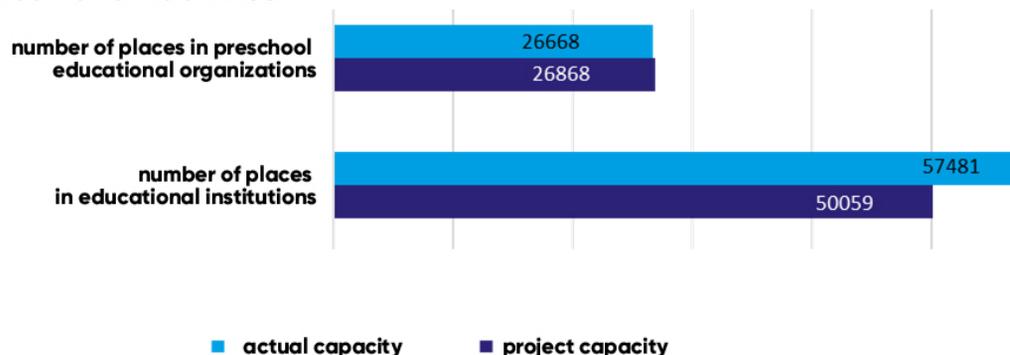
Threat of destruction of bank protection structures as a result of floods.



2.6.3. Social infrastructure

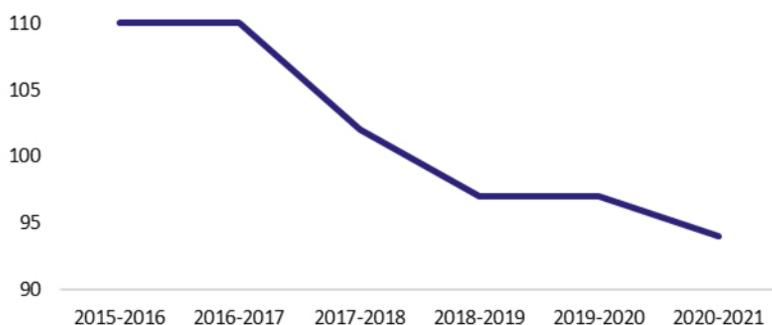
Preschool and general education

Fig. 109 Assessment of the provision of the city of Astrakhan with educational facilities



As part of the implementation of the national project Demography in order to achieve by 2021 100% availability of preschool education for children under 3 years of age in the Municipal Entity City of Astrakhan it is necessary to create additional places for children aged 1.5 to 3 years with a total capacity 2398 people (7 kindergartens with 330 places each).⁶⁸

Fig. 110 The dynamics of the total number of educational organizations engaged in the second shift, in Astrakhan region



In order to eliminate two-shift education in general education establishments on the territory of the Municipal Entity City of Astrakhan, it is required to build at least 12 schools with 1000 places each.⁶⁹



Regional project Promoting the employment of women and creating conditions for preschool education for children under the age of 3 in the Municipal Entity City of Astrakhan

300

of school buildings in the Astrakhan region

10,8%

of them require renovation

33,6%

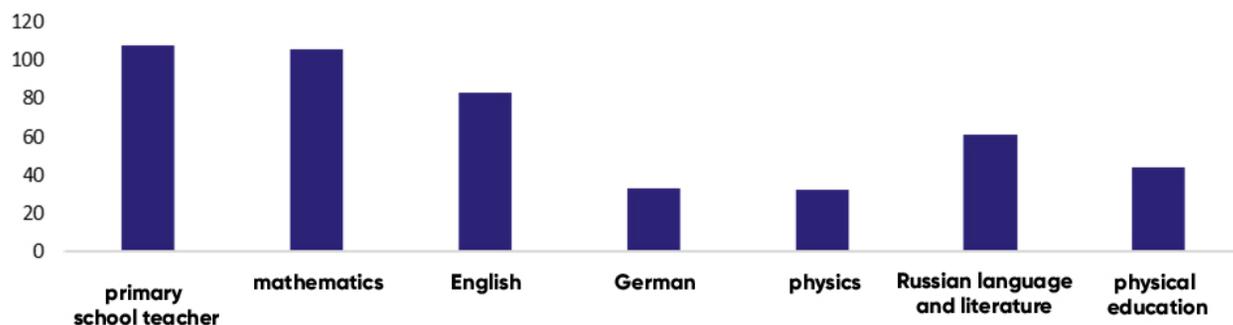
of general education establishments, working in 2 shifts

⁶⁸ Data from the Ministry of Education of the Astrakhan Region.

⁶⁹ Data from the Ministry of Education of the Astrakhan Region.



Fig. 111 Lack of teaching staff in the general education system in Astrakhan region



A high percentage of establishments working in 2 shifts.

A high proportion of educational facilities that require to be modernized, renovated and reconstructed.

Positive dynamics in the liquidation of educational establishments that work during the second shift.

Lack of teaching staff in the general education system, in particular primary school teachers, mathematics, and English.

Failure to comply with the normative accessibility for objects of preschool and general school education in Trusovsky and Leninsky districts.

In the central districts of the city, the issue concerning the shortage of kindergartens and schools in conditions of dense development is most acute:

- in the microdistrict of Babaevsky Leninsky district;
- on the Kulikov street in Kirovsky district;
- on the Admiral Nakhimov street in the Sovietsky district;
- microdistrict of Plescheeva-Bakinskaya street;
- microdistrict Avtogorodok

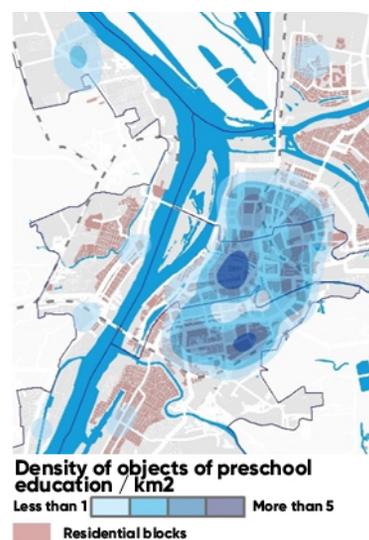


Fig. 112. Schematic map of location of the objects of the pre-school education in the Municipal Entity City of Astrakhan

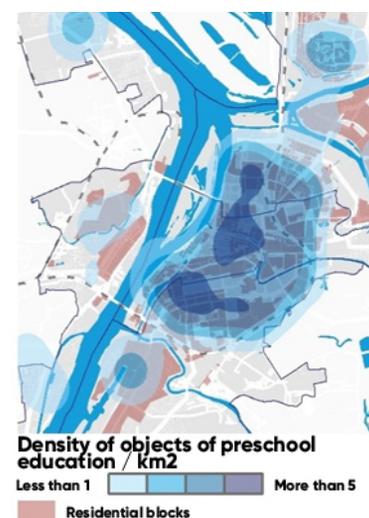
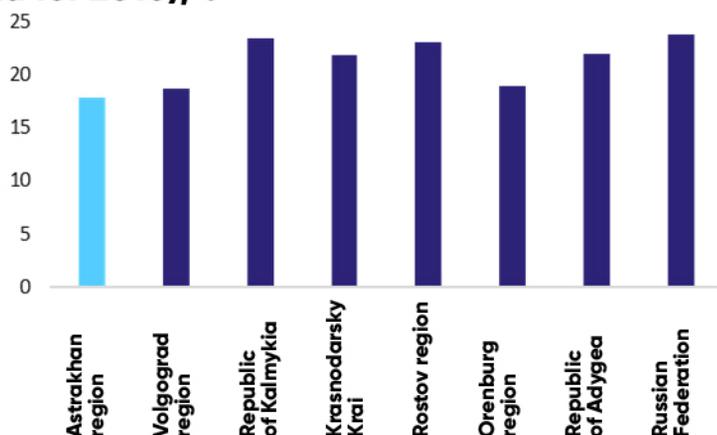


Fig. 113. Location map of general education facilities in the city of Astrakhan



Higher and secondary specialized education

Fig. 114 Comparative characteristics of people with higher education (data for 2010), %

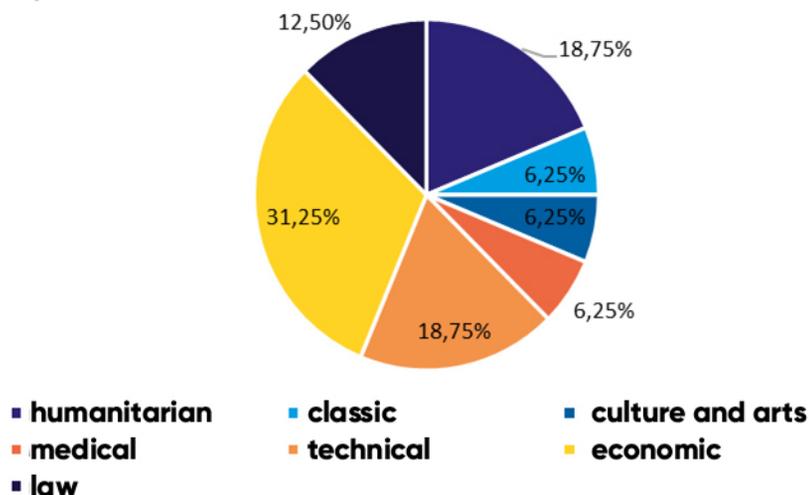


The indicator of the proportion of people with higher education in the region is below the national average.

An analysis of the scientific activities of educational establishments over the past 5 years shows an increase in the number of publications of educational establishments. So, for the 2019/2020 academic year, 4,840 publications were published, which is 13.5% more than in the 2016/2017 academic year.

The number of scientific researches in the 2020/2021 academic year⁷⁰ is 269, which is more than 30% lower than the same indicator for the 2019/2020 academic year (404).

Fig. 115 Principal structure of specializations of higher educational institutions in Astrakhan Астрахани



⁷⁰ At the time of submission of the initial data by the Ministry of Education of the Astrakhan region.

>50

thousand of students in institutes of higher education and secondary specialized educational institutions

6.5

thousand foreign students in institutes of higher education



About the creation of the Caspian scientific and educational center at the base of the Astrakhan State University

11

of the state institutes of higher education

3

of institutes of higher education of Municipal Entity City of Astrakhan constitute

24

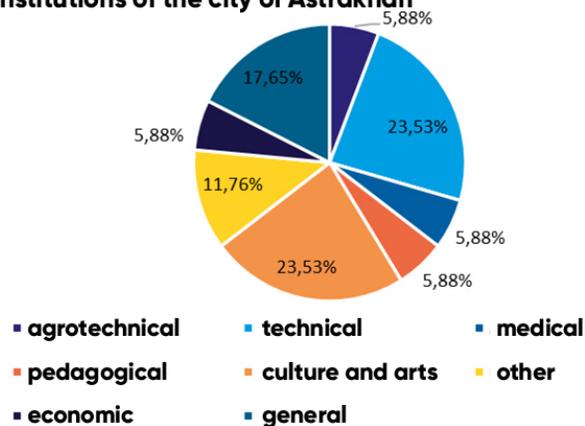
secondary specialized educational institutions



The project office of the Scientific and Educational Center Kaspj (Caspian)



Fig. 116 The basic structure of specializations of secondary specialized educational institutions of the city of Astrakhan



Among the specializations of higher educational institutions of Astrakhan, in absolute numbers prevail humanitarian and economic universities, among secondary specialized educational institutions prevail technical educational establishments and specialization of culture and art.

The share of graduates of professional educational institutions and educational institutions of higher education of the Astrakhan region of the last year, who were employed in their professional specialty, is 50%.

The development of promising high technologies, the implementation of scientific and technological priorities is one of the forms of scientific activity of the universities of Astrakhan, serving as a form of support for fundamental and applied research carried out by temporary creative teams or individual scientists who are university employees.

In order to consolidate the efforts of the scientific and educational elite in the Russian Caspian regions, the government of the Astrakhan region and other executive authorities are considering to create a scientific and educational center for promising studies of the Caspian macroregion (hereinafter referred to as Scientific and Educational Center Kaspj (Caspian)) in the form of an interdepartmental association that integrates several leading scientific and scientific educational institutions with establishments of the real sector of the economy with the involvement of leading Russian and foreign scientists in the correspondent fields.

High scientific and educational potential.

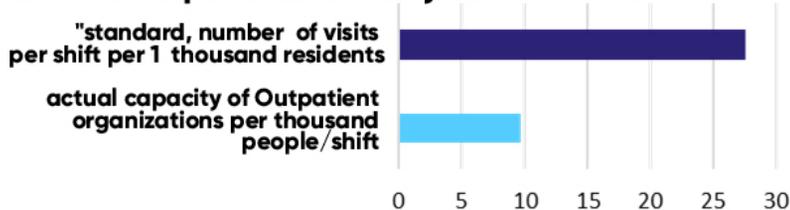
Potential for youth involvement in the implementation of long-term projects and the formation of a stable source of ideas and technologies for industrial companies.



Healthcare

In the Municipal Entity City of Astrakhan there are 29 health care institutions, including 10 city polyclinics for children and for adults with a total capacity of 5137 visits per shift.

Fig. 117 Availability of public health center for 1 thousand residents of the municipal district "City of Astrakhan"



The provision of city polyclinics per 1,000 residents of the Municipal Entity City of Astrakhan is 9.7 visits per shift, which is almost three times lower than the standard indicator.

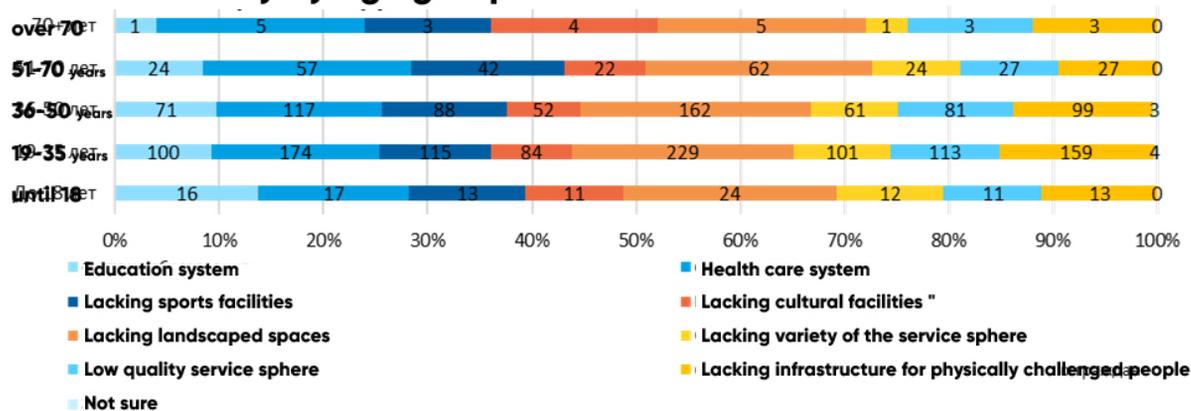
Taking into account the planned activities for the construction of healthcare institutions, in particular existing city polyclinics with a total capacity of 4500 visits per shift, the provision of healthcare facilities per 1 thousand residents for the Municipal Entity City of Astrakhan will amount to 18.12 visits per shift.

According to the survey of residents (Fig. 119), conducted within the framework of the present Survey, issues related to the health care system are most relevant for Astrakhan and its region.

The list of planned actions in order to develop the health infrastructure in the Municipal Entity City of Astrakhan and the Astrakhan region is given in Appendix No. 17 to the Survey⁷¹.

In addition, for the purpose to execute the orders of the President of the Russian Federation No.215Pr dated February 14, 2019, it is planned to build a perinatal center state-financed health institution AO (JSC) Alexandro-Mariinsky Regional Clinical Hospital. The implementation period is 2020–2022.

Fig. 119 Distribution of answers about typical problems of social security by age groups



⁷¹ Data provided by the Ministry of Health of the Astrakhan Region.

48

healthcare institutions in the Astrakhan region

29

clinics for children and for adults in the municipal district City of Astrakhan

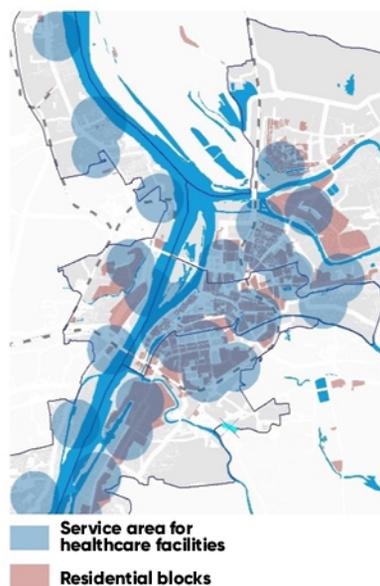
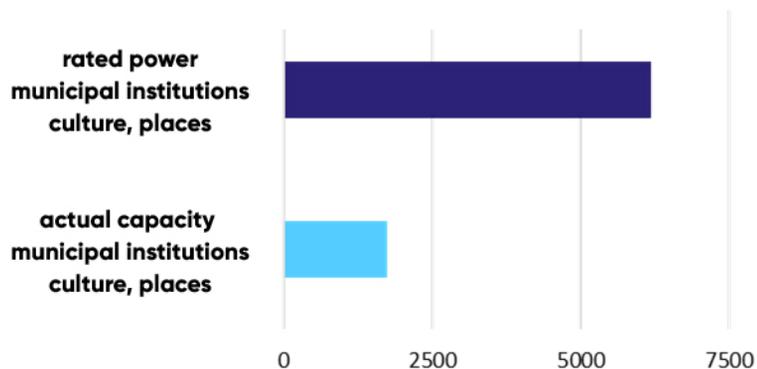


Fig. 118. Location map of the polyclinics in the city of Astrakhan



Culture

Fig. 120 The share of provision with the standard number of seats for cultural and leisure-type institutions, %



9

museums in the Municipal Entity City of Astrakhan

11

libraries in the Municipal Entity City of Astrakhan

5

movie theatres in the Municipal Entity City of Astrakhan

Astrakhan Theatre of Opera and Ballet is in the top 10 Russian theaters

- 2016 - laureate of the First National Opera Prize Onegin in the special category Theater.
- 2017 - the project "Russian Operas in the Astrakhan Kremlin" was awarded the National Event Tourism Award "Russia Event Awards" with the status of "National Event of the Year".
- 2020 - awarded a grant from the President of the Russian Federation in the field of arts and culture in order to support leading theatrical and musical groups and organizations.

Astrakhan is a multifunctional center of the region and meets the overwhelming need of the region's population for cultural and entertainment institutions.



Astrakhan Theatre of Opera and Ballet

Sports

In the Municipal Entity City of Astrakhan operate 7 children and youth sports schools and 1 sports center:

- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School No.1 (soccer, hand-to-hand combat, kickboxing, taekwondo, karate);
- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School No.3 (volleyball, basketball, tennis);
- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School No.4 (judo, unarmed combat, hand-to-hand combat, taekwondo);
- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School No.9 (checkers, chess);
- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School No.10 (boxing, tumbling);
- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School Big Dance (dance sport);

28

organizations that provide services in the field of physical education and sports

Russian nationwide projects are being implemented:

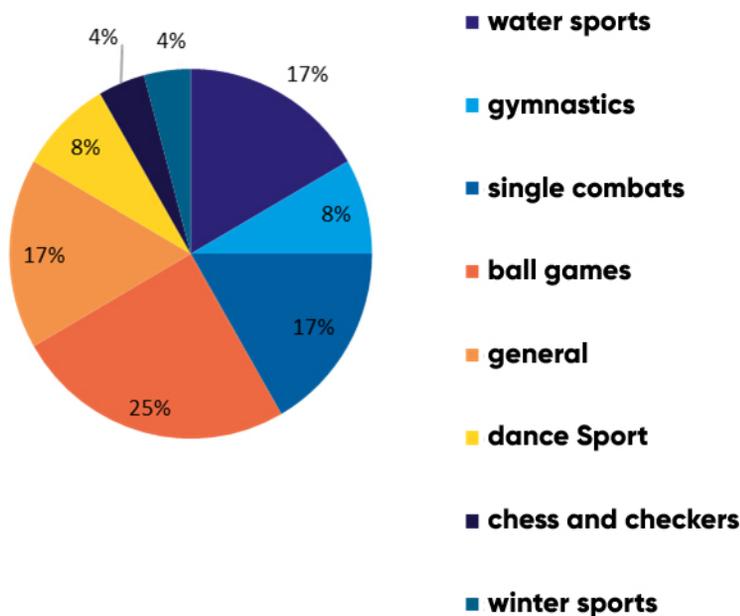
- Futsal to school (160 teams).
- School volleyball league (74 teams).
- School basketball league (32 teams).



- Municipal budgetary institution of additional education of the city of Astrakhan Children's and Youth Sports School Pilgrim (dance sport)
- Municipal budgetary sports institution Martial Arts Center (boxing, wrestling, hand-to-hand combat, MMA).

927 sports sections are operating in municipal educational institutions where are engaged more than 37,000 children from 7 to 17 years old. The number of students in 2021 is 3246 people (in 2019 is 4145 people). Services in the field of physical education and sports are also provided by centers of additional education and other establishments with 3341 people⁷².

Fig. 121 The focus of existing state and municipal sports institutions in Astrakhan



The most popular among the residents of Astrakhan are water sports, ball games and martial arts.

44.5

thousand people go in for sports on a regular basis



Handball team Atrakhanochka

⁷² Data provided by the Department of Education of the Administration of the Municipal Entity City of Astrakhan.



In the city of Astrakhan much attention is paid to the development of mass sports for children and youth. In 2019, the education department, municipal establishments and municipal educational institutions held 924 sports and physical education events (school, district, municipal stages, etc.).

>850

of sports and physical education events annually

At the same time, the city administration organizes annually more than 850 sports and physical education related events with more than 80 thousand participants.

Fig. 122 Share (%) of large-scale sports events held by type of sport, 2019

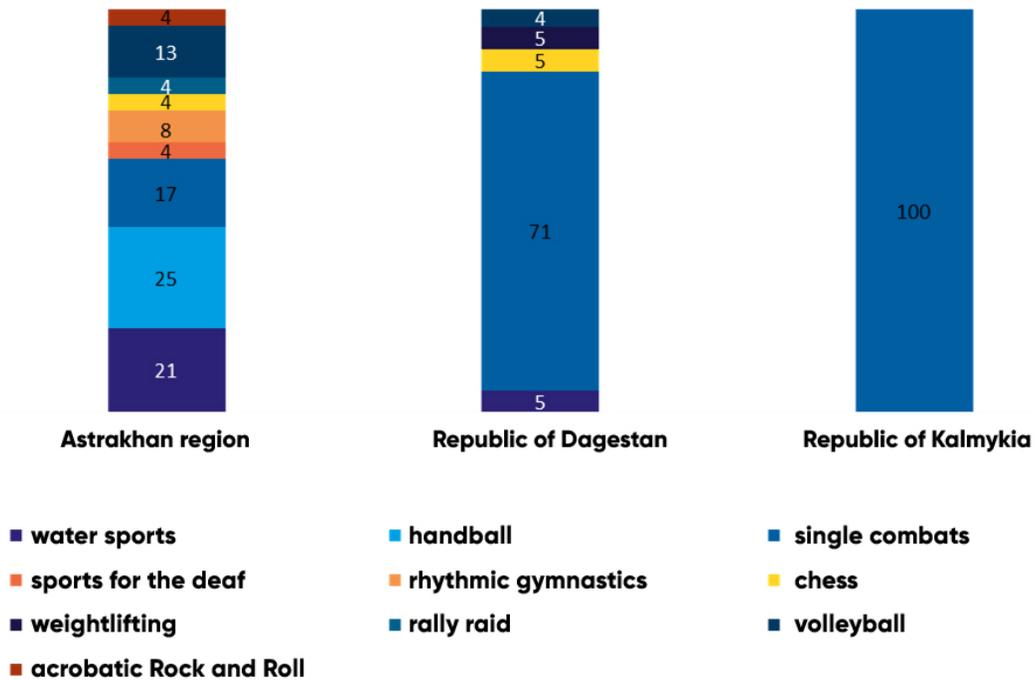
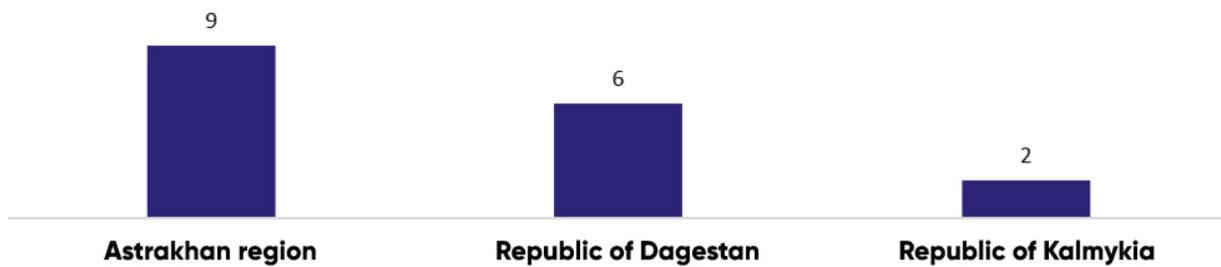


Fig. 123 Number of international sporting events, 2019



A list of key sports events held in the Astrakhan Region, the Republic of Dagestan and the Republic of Kalmykia is given in Appendix 18.

Astrakhan is an active participant and a venue for sports events of various specializations, of various scales and levels.



2.7. KEY ISSUES CONCERNING THE SOCIO-ECONOMIC DEVELOPMENT AND THEIR POTENTIAL SOLUTIONS

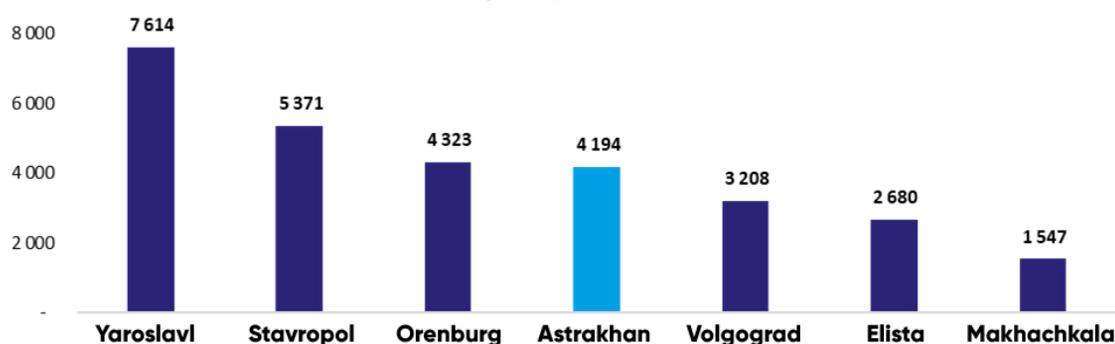
2.7.1. The main directions of development of industries of the production and non-production sectors of the economy and the prospects for their development

Evaluation and analysis of the state of development of industries in the production and non-production sectors of the economy were carried out according to the following plan:

- evaluation of the efficiency of the entire urban economy of the Municipal Entity City of Astrakhan;
- analysis of the structure of the urban economy of the city of Astrakhan.

Evaluation of the efficiency of the urban economy of the Municipal Entity City of Astrakhan

Fig. 124 Budget revenues from the use of 1 km², thousand rubles (by reference group of cities)



Local budget revenues from the use of the territorial resources of the city per 1 km² of its area (land tax, tax on property of individuals, income from leasing and sales of municipal property) are, on average, used effectively in comparison with the cities of the reference group, but there is still potential for more efficient use of the city's territorial resources.

2.7.2. Analysis of the structure of the urban economy of the Municipal Entity City of Astrakhan

The analysis of the structure of the urban economy of the city of Astrakhan was carried out according to the following scheme:

- analysis of the ratio of the state and non-state (commercial) sectors of the economy of the municipality entity City of Astrakhan in terms of the share of the sector in the number of employed population of the municipality entity City of Astrakhan;
- analysis of the ratio between the production and non-production⁷³ sectors of the economy of the Municipal Entity City of Astrakhan in terms of the share of the sector in the number of employed population of the Municipal Entity City of Astrakhan;
- analysis of the ratio between various industries in the manufacturing sector of the economy of the Municipal Entity City of Astrakhan in terms of the revenue of the enterprises of the corresponding industry;
- analysis of the ratio of the state and non-state (commercial) sectors of the economy⁷⁴.

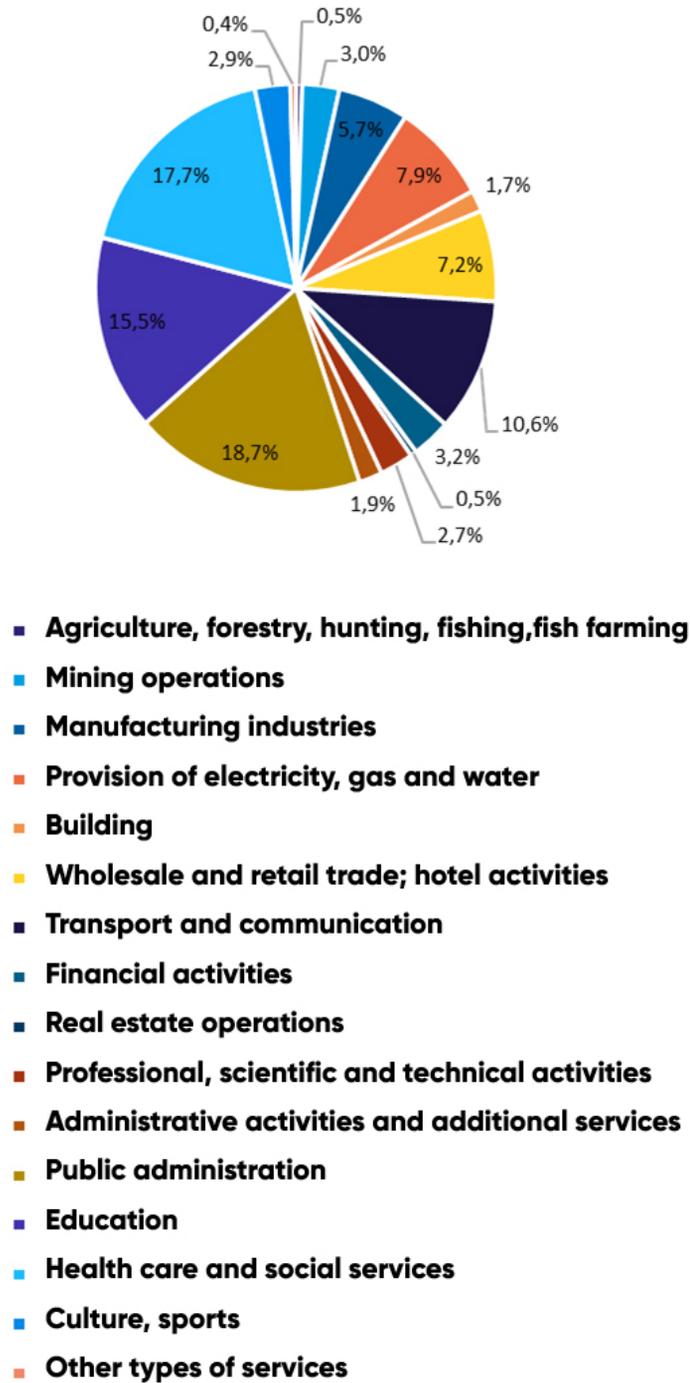
In the structure of employment of the population of Municipal Entity City of Astrakhan, branches of the budgetary sector of the economy make up 60%, respectively, in the commercial sector about 40% of the city's residents are officially employed. The structure of the urban economy has a high proportion of the public sector of the economy.

⁷³ The manufacturing sector of the economy refers to the sectors of the economy that produce goods that can move between the boundaries of cities and countries. Consequently, the non-productive sector of the economy refers to the sectors of the economy that produce non-productive goods that cannot be moved between the borders of cities and countries.

⁷⁴ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru

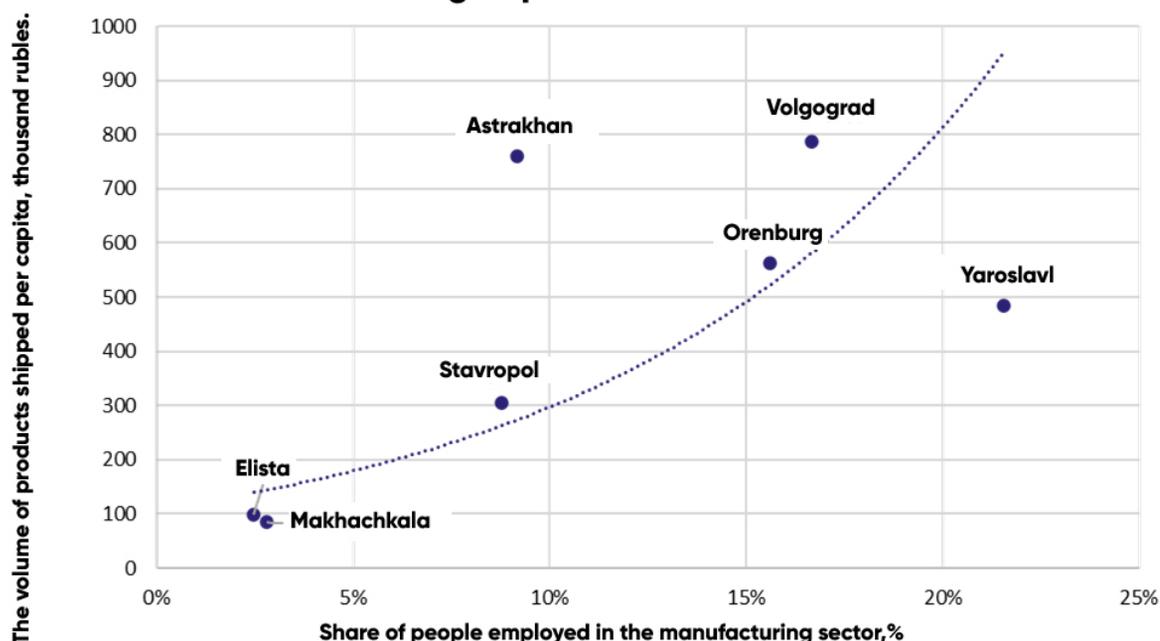


Fig. 125 Distribution of employees of organizations of the municipal entity "City of Astrakhan" by brunch



Analysis of the ratio between the production and non-production sectors of the economy of the Municipal Entity City of Astrakhan⁷⁵

Fig. 126 The relationship between the volume of products shipped per capita and the share of people employed in manufacturing industries for the reference group of cities



In the city of Astrakhan, only 9% of the population is employed in the manufacturing sector of the economy, which is a low figure, while in the total of all shipped products more than 80% are products of the extractive industry, while the share of products of the manufacturing sector is 3%.

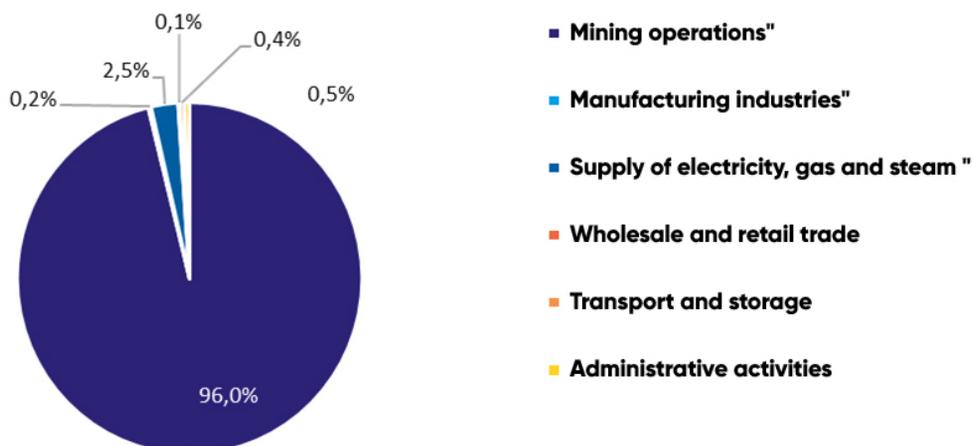
One of the priorities for the development of the economy of the Municipal Entity City of Astrakhan should be the increasing of the share of the manufacturing sector of the economy at the expense of manufacturing facilities.

⁷⁵ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru



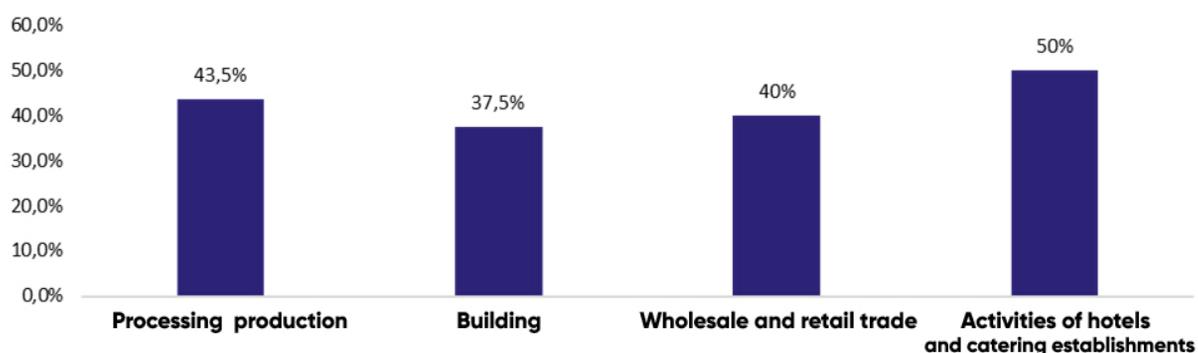
Analysis of the ratio between various industries in the manufacturing sector of the economy of the Municipal Entity City of Astrakhan⁷⁶

Fig. 127 The structure of revenue received by the largest organizations of the municipal entity "City of Astrakhan" by branches



96% of revenue is generated by companies in the oil and gas sector, which are predominantly registered in the Municipal Entity City of Astrakhan, which characterizes the manufacturing sector as a sector-specific one. The industrial sector of the economy of the Municipal Entity City of Astrakhan is characterized by a high share of loss-making enterprises in the most significant sectors, which indicates the relative instability of the existing structure of the sectors of the economy.

Fig. 128 Share of unprofitable enterprises in the most significant industries



⁷⁶ Source: compiled on the basis of Federal State Statistics Service Data: Database of Indicators of Municipal Entities; www.gks.ru

Potential/Opportunity

The possibility of achieving positive effects for the economy of the Municipal Entity City of Astrakhan by diversifying the economy, activating the non-state (commercial) sector of the economy, increasing entrepreneurial and business activity.

Stimulating the development of small businesses, especially (mainly in the segment of micro-enterprises and self-employed entrepreneurs) by creating opportunities in order to obtain modern professional skills.

Increasing the availability of rental space for small businesses.

Opportunity to attract external customers and investors, business residents in the manufacturing sector of the Municipal Entity City of Astrakhan

Possibility to use the potential of attracting federal debt financing in order to create infrastructure for business.

More efficient use of inner-city territories can contribute to the growth of budget revenues by at least 10%.

Issue/Risk/Restriction

High share of the extractive industry in the manufacturing sector of the economy.

Low share of manufacturing industries in the manufacturing sector of the economy, because of a low business and investment activity.

A high share of the budgetary sector of the economy is associated with the risk of a decrease in the stability of the economy of the Municipal Entity City of Astrakhan with a decrease of income to the city budget.

A high share of the non-profit sector in the structure of the urban economy of the Municipal Entity City of Astrakhan.

Oil and gas enterprises generate 96% of the revenue, while in the most significant manufacturing industries the share of unprofitable enterprises exceeds 40%.

Lost budget revenues due to inefficient use of the territory lead to underinvestment in the city's social infrastructure, which inevitably affects the quality of life.



2.8. DETERMINATION OF PROMISING AREAS OF SPATIAL DEVELOPMENT OF THE CITY OF ASTRAKHAN AS A CENTER OF AGGLOMERATION DEVELOPMENT

2.8.1. Areas of the spatial development of the agglomeration core

Spatial development is understood as a system of measures that determine the distribution, intensity and efficiency of the use of material and non-material resources in space through the implementation of policies in order to create an environment for human life.

Based on the above definition, the following threads of spatial development will be highlighted below:

- territorial planning and urban planning zoning;
- infrastructure development;
- improving the institutions of spatial development.

Based on the comparison of potential/opportunities and issues/risks/restrictions, promising threads of the spatial development of the city and the necessary measures were identified.

Territorial planning and urban planning zoning:

- increasing the efficiency when using the city's territorial resources;
- balanced integrated development of the Municipal Entity City of Astrakhan, which provides for the creation, along with public and residential development clusters, of communal-production sites and the reservation of territories with the purpose to create in the future of natural and recreational territories;
- polycentric development of the city through the formation of new local sub-centers - points of growth - with the organization of a new type of infrastructure, corresponding to the modern quality level of the urban environment;
- removing the load from the historical center of the city by planning solutions and functional unloading by placing development drivers on the territory of peripheral districts (of interregional, regional and city levels);
- development of the historical center while maintaining the parameters of the historical environment.



A number of measures for the associated development of municipalities, aimed at strengthening and consolidating centrifugal and centripetal links with the agglomeration core, also seem to be expedient:

- coordinated development of transport and engineering infrastructure facilities and ensuring sustainable transport links between places of employment on the territory of the regional center with suburbanized areas on the outer periphery (primarily with the territories of the Privolzhsky and Narimanovsky districts);
- directed coordinated efforts in order to move the production and storage facilities from the central city area of Astrakhan outside the city limits, in particular to the created peripheral industrial zones (the territory of the Special Economic Zone Lotos, an industrial and production cluster near the railway station Kutum and others) in order to create an impetus for the renewal of fixed assets of industrial enterprises, as well as the release of inefficiently used industrial areas located in the city center in order to create in the future new quarters of residential and public and business buildings;
- development of an organizational and legal model of intermunicipal interaction, interaction of municipal entities of various levels with the regional center in order to fulfill responsibilities and overcome administrative barriers.

Infrastructure development:

- increasing the level of comfort of the urban environment through the improvement of public spaces and the formation of a continuous system of urban public spaces;
- improving the quality of the road network by ensuring the standard values of the profiles, improving the quality of the road surface, organizing a centralized storm sewer system;
- optimization of the transport service system and increasing transport connectivity, including by developing a bicycle infrastructure, pedestrian sidewalks and streets, optimization of parking spaces;
- elimination of deficiencies in engineering support of the city by replacing and modernizing emergency engineering networks and major structures of water supply and sewerage, heat, gas and power supply;
- replacement of emergency housing through the implementation of projects for the integrated development of the territories (including through the tools and mechanisms given in the Urban Planning Code of the Russian Federation No.190-FZ of December 29, 2004⁷⁷);
- elimination of deficiencies in the normative provision of the city with social infrastructure and the provision of services of a new quality level;
- implementation of smart city tools;
- creation of a design code for the city of Astrakhan, including creation of a plan for artistic lighting of the central city area.

⁷⁷ Modified and updated on 2021/01/10



Improving the institutions of spatial development:

- ensuring the comprehensiveness of the city's development through the development of a new strategy for the socio-economic development of the Municipal Entity City of Astrakhan, taking into account the decisions of the master plan of the Astrakhan agglomeration while solving the industry issues and planning events;
- creating conditions for the growth of investment attractiveness and activity;
- creation of conditions for the formation of tourist and resort attractiveness of the agglomeration core;
- creating conditions in order to ensure the free participation of citizens in the formation of decisions in the field of urban development and the involvement of residents in the transformation of the city;
- development of procedures for the implementation of the formulated scenarios of spatial and territorial development of the city of Astrakhan, excluding a conflict of interests.

With the purpose to develop the Municipal Entity City of Astrakhan as a center of agglomeration development, have been identified the following promising areas of spatial development:

1. Improving the quality of the urban environment in the short term.
2. Development of transport and engineering infrastructure.
3. Development of commercial and business facilities.
4. Development of innovative and service sectors of the economy.
5. Increasing the territorial boundaries of the core of the agglomeration.

Taking into account the formulated promising threads for the development of the agglomeration core, the results of the evaluation of the urban development potential and proposals for priority development zones for the city of Astrakhan are presented below.

The evaluation of the main parameters of the potential development of the major planning areas is given in relation to the territory of the core of the agglomeration: the city of Astrakhan and the adjacent settlements of the Privolzhsky and Narimanovsky districts, provided with the greatest demand for the new housing.

The evaluation of the potential was carried out on the basis of the materials of the General Plan of the Municipal Entity City of Astrakhan and neighboring settlements, materials of approved projects for planning the territory and information about the land and property relations available in the public cadastral map.

Based on a combination of factors, several planning districts have been identified, on the territory of which, in the future until 2032, it is possible to implement integrated development projects, mainly for the purpose to establish public and residential quarters and the necessary infrastructure.



2.8.2. Recommendations for identifying priority development zones of the Municipal Entity City of Astrakhan

Central part of the city⁷⁸

Opportunities for the development of comfort-class housing in the central city area may be associated with the development of built-up areas, primarily quarters of dilapidated and hazardous housing (Fig. 129). The most attractive locations are those near the Old Bridge (plots No.1 and No.2); large areas of dilapidated housing are located in the area of Bakinskaya street (plot No.3).

The total area of the territories to be developed within the framework of the implementation of projects for integrated sustainable development of territories within the central city area is more than 100 hectares. Prospective technical and economic indicators of new construction of residential build-up area is up to 500 thousand m². The enlarged indicators of the development of the designated promising sites are presented in Table 2.

It is worth noting that such projects are high-risk projects: in conditions of limited effective demand, their implementation is possible using public-private partnership schemes that provide for the obligations of a public partner to resettle residents and demolish a dilapidated hazardous housing.

Table 2. Enlarged indicators of the development of promising sites in the central city area

Type of the planned construction	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare
			including non-residential part		
Development area with high-rise residential buildings (plot No.1)	10 ⁷⁹	55	6	1	5.5
Development area with high-rise residential buildings (plot No.2)	27.3 ⁸⁰	150	30	3	5.5
Building area with multi-storey residential buildings, including the creation of a creative cluster at the site of a spirits producer. (plot No.3)	114	627 ⁸¹	125	12	5.5

⁷⁸ Except for the territories of the land in which an object of cultural heritage is situated intended for the regeneration of historical buildings.

⁷⁹ 4 hazardous multi-apartment residential buildings are located in this area.

⁸⁰ On this plot hazardous buildings are located .

⁸¹ On the area of the plot hazardous buildings and a number of cultural heritage objects are located.



Redevelopment of the territory of the Steklovolokno plant (plot No.4)	13	71.5 ⁸²	71.5	0	5.5
Multifunctional public and business zone (plot No.5)	21.4	150	150	0	7.0
Improvement of territories of the Oblivnoy island and Gorodskoy island (plots No.6 and No.7)	330	Improvement and landscaping according to the approved modes and regulations of use			

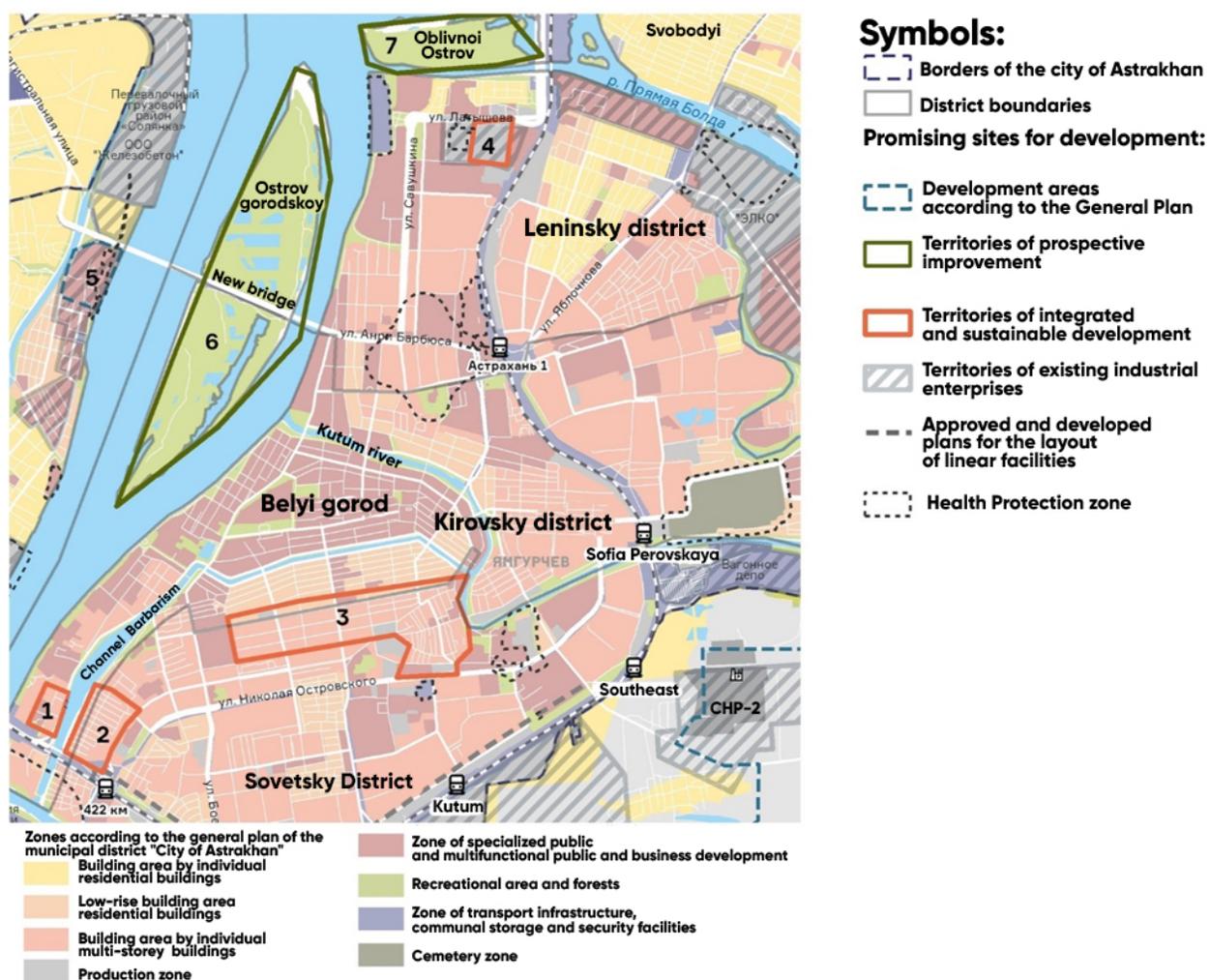


Fig.129. Layout of perspective zones of complex development of territories in the central part of Astrakhan

⁸² In the northern part of the plot are located 3 hazardous multi-apartment residential buildings.



Potential/Opportunity

Proximity to the infrastructure of the central part of the city (bus station, railway station, social infrastructure institutions, cultural and leisure institutions and other city "magnets").

High attractiveness of the territory for investors.

Issue/Risk/Restriction

Difficulties in coordinating land and property relations.

Availability of hazardous housing.

High congestion of the adjacent road network.

Deficit of social infrastructure.

Historical city center

In order to preserve the subject of the city's protection, it is necessary to synchronize the activities of the roadmap according to the inventory of historical real estate objects, the preparation of protection subjects, conservation pledge agreements, historical and cultural research, the development of scientific and project documentation for the renovation and restoration work, the preparation of draft and design proposals for the adaptation of objects, with training programs for qualified specialists, professional workshops and the popularization of heritage, the implementation of measures for the integrated sustainable development of territories and the introduction of economic mechanisms for owners and users of historical real estate.

Considering the amount of work required for the planned development of the central city area of Astrakhan, it is advisable to select several priority zones that should show the effectiveness of measures in order to preserve heritage. **It is proposed to consider the territories 1, 1a, 2 as most important territories in order to test the strategy of preservation and regeneration of the historical and urban planning environment (Fig. 130).**

Territory called Spit (Kosa), XIX - early XX centuries (plot No.1 in Fig. 130), **located within the boundaries:** Naberezhnaya Privolzhskovo Zatona street/ Molodezhny avenue/ Schepkina street/ Babefa street, the port area and industrial enterprises area located between the banks of the Volga river and the Admiralteyskaya embankment from the mouth of the Kutum river towards the New Bridge.

An early type of multi-apartment residential building was formed within Spit area, where the ground floors were used for commercial purposes of the street retail format, including shops, coffee houses, and jewelers workshops. The focus of trade and financial life was the main thoroughfare of the area of the Spit and Nikolskaya Street, stretching from the Admiralteyskaya street towards Volga.

During the last decade of the XXI century, the Spit has experienced a significant redevelopment, irreplaceable changes and the intrusion of modern buildings distorting the existing historical environment. Territory 1a is part of a single route, a spatial extension of the Spit in the historical district of Zakutumye, where Volga embankment is well landscaped.

The southern part is occupied by the territory of the yacht club and the sports center, and to the north there are shopping malls along Admiralteyskaya street and the Uritskiy plant by the river. When moving



along the section of Admiralteyskaya street, a view of the dominants of the Kremlin is revealed. This area serves as the first plan for the perception of the city center when looking from the New Bridge.

This valuable area needs to be rethought and incorporated into the city's pedestrian and bicycle routes, adding commercial functions to the Spit.

Residential quarters near the Opera and Ballet Theater between the Henri Barbusse, Maria Maksakova, Academician Korolev, Chekhov streets (plot No.2 on the fig. 130).

A part of the territory of the historical district of Zakutumye consists of four narrow, elongated from north to south quarters, two of them, close to the territory of the Theater Park, have almost completely lost their historical buildings, two distant ones are distinguished by good preservation of the planning structure and buildings.

Proposal includes the restoration of the facades and technical modernization of historically valuable city-forming features, the western quarters, while preserving the residential function while increasing the comfort of living. Regeneration of the environment can be interpreted as new construction within the boundaries of the historic households of the eastern quarters. The parameters of new buildings must meet the requirements of urban planning regulations - in terms of the width and depth of the buildings, the height, the shape of the roof, the material of the outer walls. At the same time, modern volumes should reproduce the scale and rhythm of the lost building along the red lines. Optimization of the architectural solution is proposed for new buildings. By function, priority can be given to service companies, like tourist agencies or apartments for musicians who come on tour.

Power plant (23/1 Volodorsky street)

(plot No.3 on the fig. 130).

The building is located on the territory of the historic Posad along the red line of the Kutum River embankment and occupies the area of a small quarter.

The 2–5-storey building was built in 1916 from non-combustible materials, it consists of rooms of different sizes, convenient to be adapted for public function.

The object has a unique architectural design, is under state protection as an object of cultural heritage. Currently is not used and is gradually being destroyed.

Taking into account the advantageous location in the city center system, the quality of the architectural solution and the threat of loss of valuable elements and structures, it is necessary, first of all, to carry out measures in order to ensure the preservation of the building, to develop a restoration project and adaptation for modern use. The functional saturation of a building can be quite flexible and combine a cultural center with concert and exhibition halls, classrooms, workshops, coworking spaces, a hotel or condominium.

Stone prison castle (Andreyan Zakharov, Joseph Charlemagne, Karl Depedri, Burov street/Burovsky lane 2/2)

(plot No.4 on the fig. 130).



The object is located inside the White City, 300 meters away from the Kremlin and Lenin Square, between residential buildings and a school.

While creating the image of the castle, this monument of the early 19th century was placed under the State protection as an object of cultural heritage of federal importance.

The current function of the detention facility of the Main Directorate of the Federal Penitentiary Service in the Astrakhan region (White swan) is not appropriate in the residential environment. The historic building does not meet modern requirements for penitentiary institutions.

The location and architectural design of the building is quite attractive for tourism. Here you can place a museum, hotel, tourist center, etc.

Atamanskaya village (Gorodoforpostinskaya)

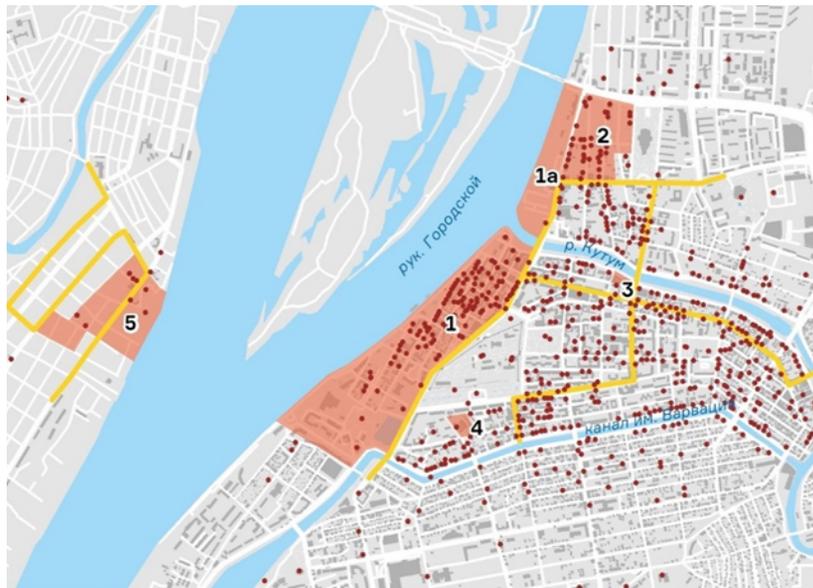
(plot No.5 on the fig. 130).

One of the historical districts of Astrakhan, located in the Trusovsky administrative district of the city on the right bank of the Volga. The view of the village opens from the Spit, from the embankment of the Volga River. The dominant feature is the old water tower of the water utility complex (the ensemble of the water tower and the station is an object of cultural heritage of regional importance). A view of the Kremlin and the central part of Astrakhan opens from the river bank. There is a sandy beach here.

In the village there is a Transfiguration of the Lord church, Trusovsky market which are objects of cultural heritage of regional importance. Here are also valuable objects of the Soviet era: the club building, the monument Dictatorship of the proletariat is the path to communism and the monument to Dzerzhinsky. The district has retained the hierarchy of urban landmarks and ordinary residential buildings.

A quiet area with a sandy beach can be used for a relaxing holiday in this historic urban environment with all the elements of service and the possibility of visiting the center of Astrakhan. Some of the reconstructed buildings can be adapted for a chain of mini-hotels. This function is related to the complex technical modernization and improvement of the area.



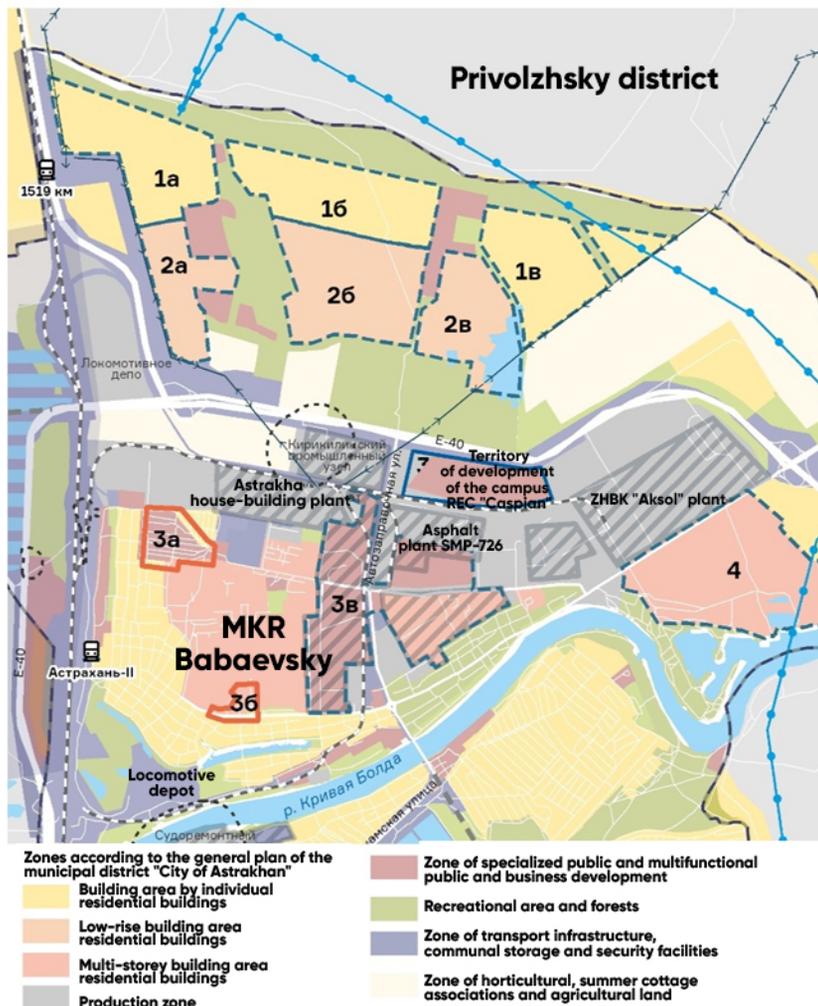


Symbols:

- Cultural heritage sites
- Tourist routes
- Priority development zone:

Fig.130. Priority development zones by regenerating the historical environment in the central city area

In order to identify the urban development potential of the peripheral territories, the following city territories were considered: planning districts Northern (Zaboldinsky), North-Eastern (Moshkarikha) and Trusovsky, Babaevsky microdistrict and aerodrome territory.



Symbols:

- Borders of the city of Astrakhan
- District boundaries
- Promising sites for development:**
- Development areas according to the General Plan
- Territories of integrated and sustainable development
- Regeneration areas of the historical environment
- Territories of existing industrial enterprises
- Approved and developed plans for the layout of linear objects
- Health Protection zone
- Gas pipeline
- Overhead line corridors

- | | |
|--|---|
| <p>Zones according to the general plan of the municipal district "City of Astrakhan"</p> <ul style="list-style-type: none"> Building area by individual residential buildings Low-rise building area residential buildings Multi-storey building area residential buildings Production zone | <ul style="list-style-type: none"> Zone of specialized public and multifunctional public and business development Recreational area and forests Zone of transport infrastructure, communal storage and security facilities Zone of horticultural, summer cottage associations and agricultural land |
|--|---|

Fig. 131. Location map of promising zones to implement a complex development of territories in the northern part of the city of Astrakhan



The Zaboldinsky planning district is allocated on the territory of the Leninsky district of Astrakhan. From the south it is bounded by the Northern Bypass of Astrakhan, a section of the federal highway E40, from the west is bounded by the regional highway 12R-001 Astrakhan-Volgograd and a railway line, from the north is bounded by the administrative border of the city of Astrakhan (Fig. 131).

According to the materials of the General Plan of the Municipal Entity City of Astrakhan on the territory of the district, the complex development of individual housing constructions of the total area of about 400 hectares, development zones with low-rise residential buildings on the area of about 230 hectares, zones of public and business development zones with area of about 100 hectares.

At the same time, for a part of the territory of the development zone with low-rise residential buildings with area of about 100 hectares, a land planning project was developed and approved for the purpose of placing individual housing constructions objects⁸³. The land plots, according to the developed project for land surveying, are currently not included in the cadastral register. At subsequent stages, it is advisable to revise the type of planned residential property.

The enlarged indicators of the development of promising sites on the territory of the Northern (Zaboldinsky) planning area are presented in Table 3.

Table 3. Enlarged indicators of the development of promising sites in the Northern (Zaboldinsky) planning area

Type of the planning build-up area	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare ⁸⁴
			incl. non-residential area		
Development area with private houses (plots No. 1a, 1b, 1c)	400	560	56	12	1.4
Development area with low-rise residential buildings (plots No.2a, 2b, 2c)	230	851	250	10	3.7
Multifunctional public and business zone	50	350	35	7	7.0
Recreational zone	100	General improvement and landscaping			

⁸³ Order of the administration of the Municipal Entity City of Astrakhan No. 4085-r dated 09/07/2018 On approval of documentation for the planning of the territory located to the east of Ilmen (lake) Baklaniy in the Leninsky district of the city of Astrakhan for the construction of a microdistrict of individual residential development.

⁸⁴ Henceforward, the building density for new construction is calculated in accordance with the requirements of the General Plan of the Municipal Entity City of Astrakhan: for multi-storey development of free territories is 7200 m² per hectare , within the range of 7500-6800 m² per hectare ; in the areas of reconstruction average is 5800 m² per hectare (from 5500 to 7300 m² per hectare, depending on the construction area); - for a low-rise apartment building is 3700 m² per hectare; - for an individual with house plots is 1400 m² per hectare.



Potential/Opportunity

Proximity of the 1519 km Railway Station

Potential for the development of suburban passenger rail links with the city center.

Neighborhood of the Northern Bypass provides acceptable transport accessibility from the central city area and from the north-east direction.

Issue/Risk/Restriction

Vicinity of production facilities

The presence of engineering corridors of high-voltage overhead transmission lines and main gas pipelines as restrictions.

Restrictions established on the territories where occur the exploitation of the commonly occurring mineral resources⁸⁵.

Low infrastructure availability.

North-Eastern planning area (residential area Moshkarikha)

The northeastern planning area is allocated on the territory of the Leninsky district of Astrakhan. From the north it is bounded by Kramatorskaya street and the route of the Eastern Bypass of Astrakhan 12k-205, from the south it is bounded by the floodplain of the Krivaya Bolda river, from the east it is bounded by large area of gardening establishments (Fig. 131).

According to the materials of the General Plan of the City of Astrakhan, on the area of the district, the complex development **of the zone of multi-apartment residential buildings and buildings of individual housing construction is envisaged with a total area of about 200 hectares.**

The development of the southeastern part of this planning element began in the individual housing construction format - for a part of the district with an area of about 50 hectares, a planning project was developed for 329 individual housing construction plots with an approximate housing area of 40 thousand m² and a expected population of 1.0 thousand people.

The enlarged indicators of the development of promising sites on the territory of the North-Eastern planning area are presented in Table 4.

Table 4. Enlarged indicators of the development of promising sites of the North-Eastern planning district

Type of the planning build-up area	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare
			incl. non-residential area		
Low-rise housing (plot No.4)	146	1095	219	20	7.5
Private housing	78	109.2	11	2	1.4

⁸⁵ The build-up of areas with mineral deposits is possible only on the basis of a permit that should be obtained in accordance with Article 25 of the Law of the Russian Federation No. 2395-1 dated 1992/02/21 Concerning Subsurface Resources.



Potential/Opportunity

Attractive visual landscape characteristics of the territory due to the proximity of the water area.

The potential for the creation of a quality recreational zone.

The potential for the creation of an integrated sustainable environment.

Issue/Risk/Restriction

Vicinity of production facilities

Weak infrastructural connectivity with the city center, including lack of necessary reserve capacities.

Large costs for engineering and technical measures (river bank protection, etc.).

Babaevsky microdistrict

The Babaevsky planning district area is allocated in the northern part of Astrakhan on the territory of the Leninsky district. It is bounded from the north by the industrial zone, from the west by a railway line, from the south by the individual housing construction build-up area adjacent to the floodplain of the Krivaya Bolda river.

The total area of public and residential areas being created is more than 100 hectares, mainly for multi-storey residential buildings.

The first stage is represented by sections (No. 1 and No. 2 in Fig. 131), in relation to which planning projects have been developed or the corresponding type of permitted use of the territory has been obtained. The total area of development of the territory, first of all, is about 35 hectares, the potential volume of housing construction is 250 thousand m², the expected population growth is up to 5 thousand people.

The second stage is represented by the territories destined in the General Plan for the development of multi-storey residential buildings, but requiring measures for the development of the built-up area such as the redevelopment of the industrial zone (the area along Avtozapavnaya street).

Potentially, the area of the residential zone being formed can be up to 75 hectares, the volume of housing construction is 562.5 thousand m², population growth is up to 9 thousand people. The enlarged indicators of the development of promising sites on the area of the Babaevsky microdistrict (Leninsky district) are presented in Table 5.

Table 5. Enlarged indicators of the development of promising sites in the Babaevsky microdistrict (Leninsky district)

Type of the planning build-up area	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare
			incl. non-residential area		
Multifunctional public and business zone (plot 3b)	9	65.7	20	1	7.3



Low-rise and private housing (plot 3a)	26	190	19	4	7.3
Social and business build-up area (plot 3d)	30	140	140	0	4.7
Multifunctional public and business zone (plot 3c)	75	562.5	169	9	7.5

Potential/Opportunity

Issue/Risk/Restriction

Proximity of the Astrakhan-2 Railway station

Vicinity of production facilities

Potential for the development of suburban passenger rail links with the city center.

Low density of the road network and low transport connectivity of the territory.

Existing infrastructure due to the neighborhood of residential quarters.

Lack of social infrastructure in the area.

Within the boundaries of the land plot with cadastral number 30:12:20060:380 with an area of about 30 hectares, the executive authorities of the city of Astrakhan propose the placement of an interuniversity campus within the framework of the program of Scientific and Educational Center Kaspıy (Caspian) with the formation of a multifunctional communication space to support and ensure the innovative economic development of the region through concentration of intellectual potential and modern scientific and educational infrastructure (section 3d in Fig. 131).

As part of the campus, it is planned to build educational buildings (60 thousand m²), an educational and laboratory complex (5 thousand m²), a research and development complex (6 thousand m²), a science park (7 thousand m²), a living area for students and teachers for 7 thousand people, a congress hotel (21.6 thousand m²), a cultural and entertainment complex (14 thousand m²), a sports and recreation complex (27 thousand m²).

The total area of public and business facilities can be up to 140 thousand m² with area of 29 hectares. The estimated cost of the project is estimated by experts at 25 billion rubles⁸⁶ with priority funding from the federal budget.

The implementation of such an ambitious project will create an additional impetus for the development of the previously mentioned residential areas in the northern and northeastern parts of the city.

Potential/Opportunity

Issue/Risk/Restriction

The proximity of a promising transport highway - the Northern Bypass.

Vicinity of production facilities

Land plot free from buildings.

Remoteness from the city center and the university cluster.

⁸⁶ Based on materials from VEB.RF.



The type of permitted use of the site corresponds to the intended use.

Lack of youth-friendly infrastructure.

The inability to create high-quality public spaces in the adjacent territory while keeping the production function.

The current location for an interuniversity campus seems to be poorly attractive without the development of adjacent territories. Alternative sites are recommended to be considered.

Development of the aerodrome area

In the context of the development of international cooperation and trans-regional integration, the aerodrome area is highly attractive for the development of commercial real estate (office, shopping malls and entertainment centers, hotel and congress and exhibition properties).

Examples of the formation of business districts near the airport exist in most major cities in the world, and this trend is spreading in Russia as well. In the immediate vicinity of the Astrakhan (Narimanovo) airport there are 2 vacant land plots (No. 1 and No. 2 in Fig. 132) with the potential for the development of social and business functions.

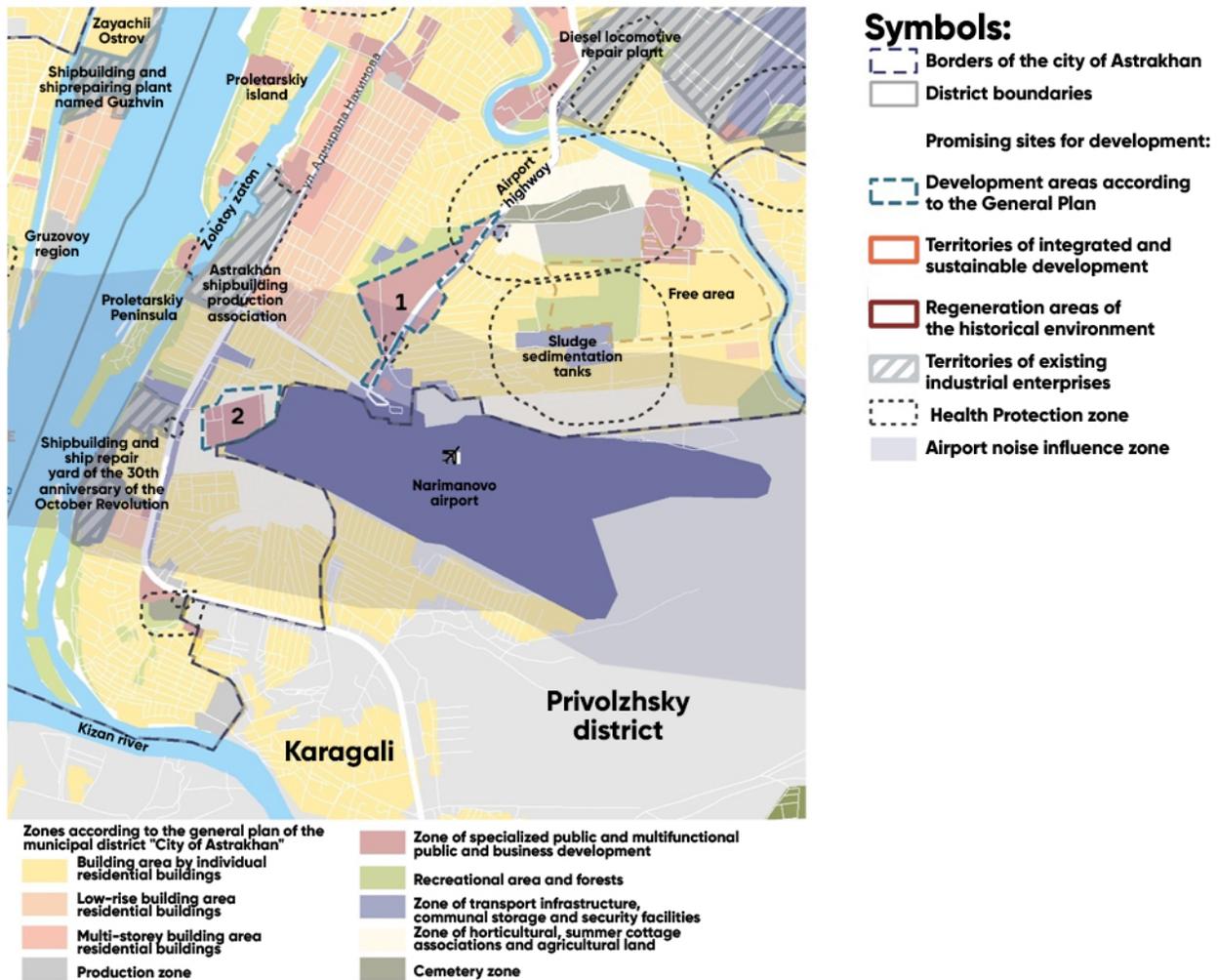


Fig.132. Prospective development areas near the airport



The largest urban planning and territorial potential has the plot No. 1 (land plots with cadastral numbers 30:12:30451:172 and 30:12:30451:180 with a total area of 18 hectares), located on the Aeroportovskoye highway.

The development of site No. 2 with an area of 15 hectares, due to its direct adjoining to the aerodrome area, limits the altitude regulations, taking into account the stringent restrictions for the build-up development due to the regime established for the 7th subzone of the aerodrome area.

As alternative sites for the development of public and business zones, in addition to the aerodrome zone and the territories of multifunctional public zones discussed above, it is proposed to consider the following greenfield sites:

- the territory of the Machine-Tool Plant near the Steklovolokno plant and the Astrakhan State Technical University campus;
- area within the Magnitogorskaya street, adjacent to the sports and entertainment complex Zvezdny, including the area of the refrigerating equipment plant (about 20 hectares);
- area of the fish-canning plant and area of the Boldinsky market (about 26 hectares).

Given the availability of investment resources and consumer demand, up to 1 million m² of commercial and public facilities in combination with residential groups can be built at the specified sites, which will create about 20 thousand jobs in the future.

Among the objects of non-residential build-up development that are in demand in the area of the city of Astrakhan in the future 10 years, taking into account the approved Strategy for the socio-economic development of the Astrakhan region until 2025, other strategic planning documents and previously adopted decisions at the level of regional and local executive authorities, can be distinguished the following objects:

- intercollegiate university campus of the Scientific and Educational Center Kaspy (Caspian)
- Convention and Exhibition Complex;
- water entertainment complex;
- the building of the passenger river station;
- new air terminal complex.

Taking into account the peculiarities of the existing settlement model, in order to identify additional development sites located in close proximity to the agglomeration core, the adjacent territories of the Privolzhsky and Narimanovsky districts were considered as part of the evaluation of the urban development potential and spatial development opportunities of Astrakhan.

Privolzhsky district

Within the area of the Volga region near the Kutum Railway Station there is a significant territorial reserve for the development of the productive function with an area of about 450 hectares (Fig. 133). The investment attractiveness of the site is increased by the close proximity to a large transport and logistics hub which is the Kutum Railway Station and the border of the Municipal Entity City of Astrakhan.



In addition to the production potential, a significant territorial potential for the development of individual housing construction with a total area of more than 600 hectares has been identified on the territory of the Volga region. Significant areas for the construction of individual housing build-up area are located in close proximity to POSK-2 (Right river bank sewerage treatment facilities 2), which reconstruction is planned to be implemented before 2004.

The enlarged indicators of the development of promising sites on the territory of the Volga region are presented in Table 6.

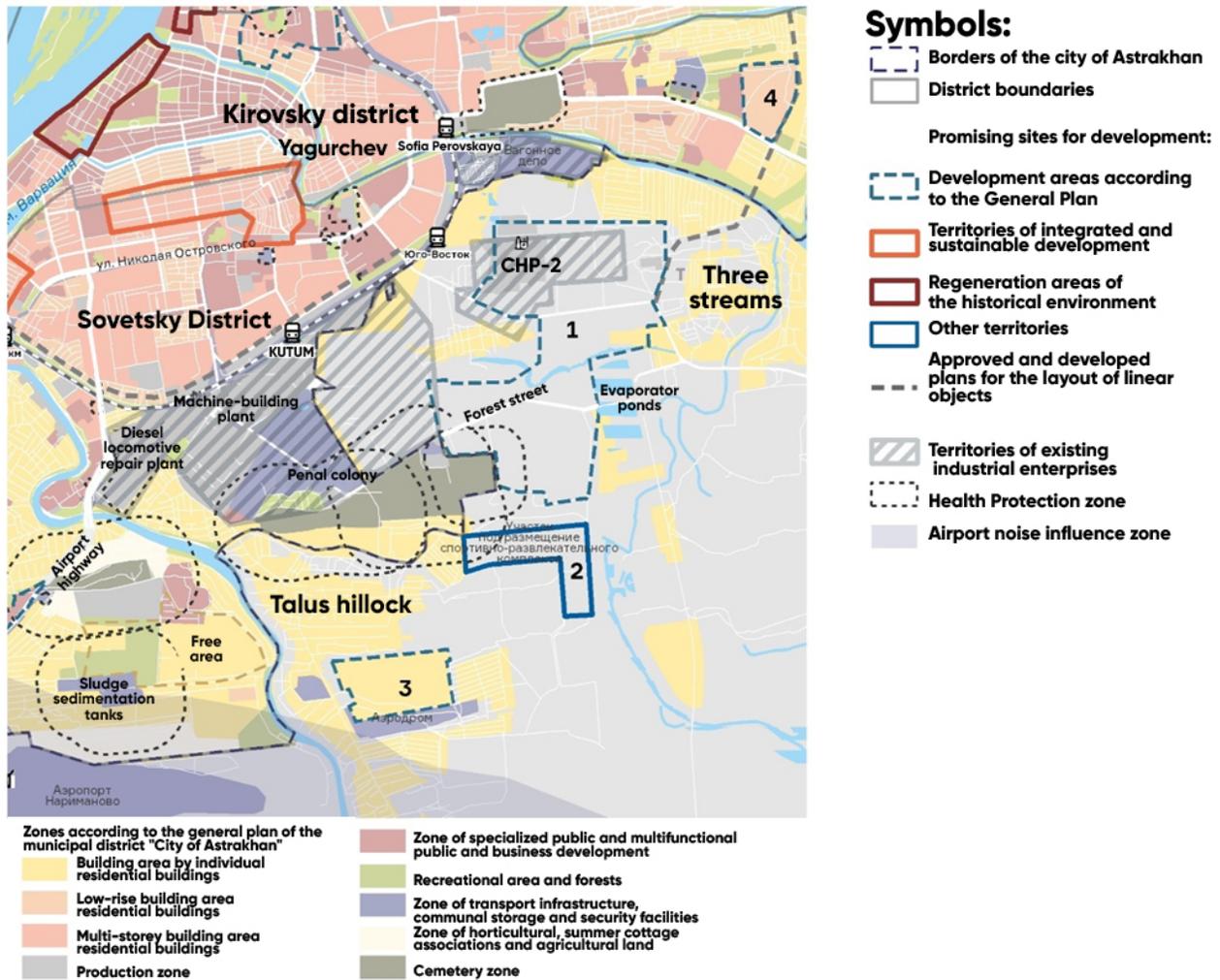


Fig.133. Prospective development sites in the area of the Privolzhsky district

Table 6. Enlarged indicators of the development of promising sites in the area of the Privolzhsky district

Type of the planning build-up area	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare
			incl. non-residential area		
Industrial zone near the Thermal Power Plant 2 (plot 1 in fig.133)	450	2250	2250	0	5.0



Site where the sports and entertainment complex is located (plot No. 30:9:100204:13) (plot 2 in fig.133)	67	335	335	0	5.0
Development area with private houses	76	106	11	16.2	1.4
Build-up area of the individual construction houses in proximity to the POSK-2 (Right river bank sewerage treatment facilities 2)	550	770	77	2.2	1.4

Narimanovsky district

As a result of the analysis of the urban planning potential of the territory of Narimanovsky district, a potential site for the development of production functions with an area of more than 100 hectares was identified (Fig. 134).

The investment appeal of the site is ensured by the proximity of the E119 highway and the Trusovo Railway Station.

The development potential of the site is being realized through the creation of new labor inter-municipal ties.

Table 7. Enlarged indicators of the development of promising sites in the Narimanovsky district

Type of the planning build-up area	Development area, ha	Total area for the new buildings, in thousand m ²		Estimated residents number (thousand people)	Estimated build-up area density, thousand m ² per hectare
			incl. non-residential area		
Production zone near the E119 highway (plot 1 in fig.134)	111	410	410	0	3.7
Development area with private houses, horticulture area (plot 2 in fig. 134 and the area to the south)	80	112	11	2.3	1.4



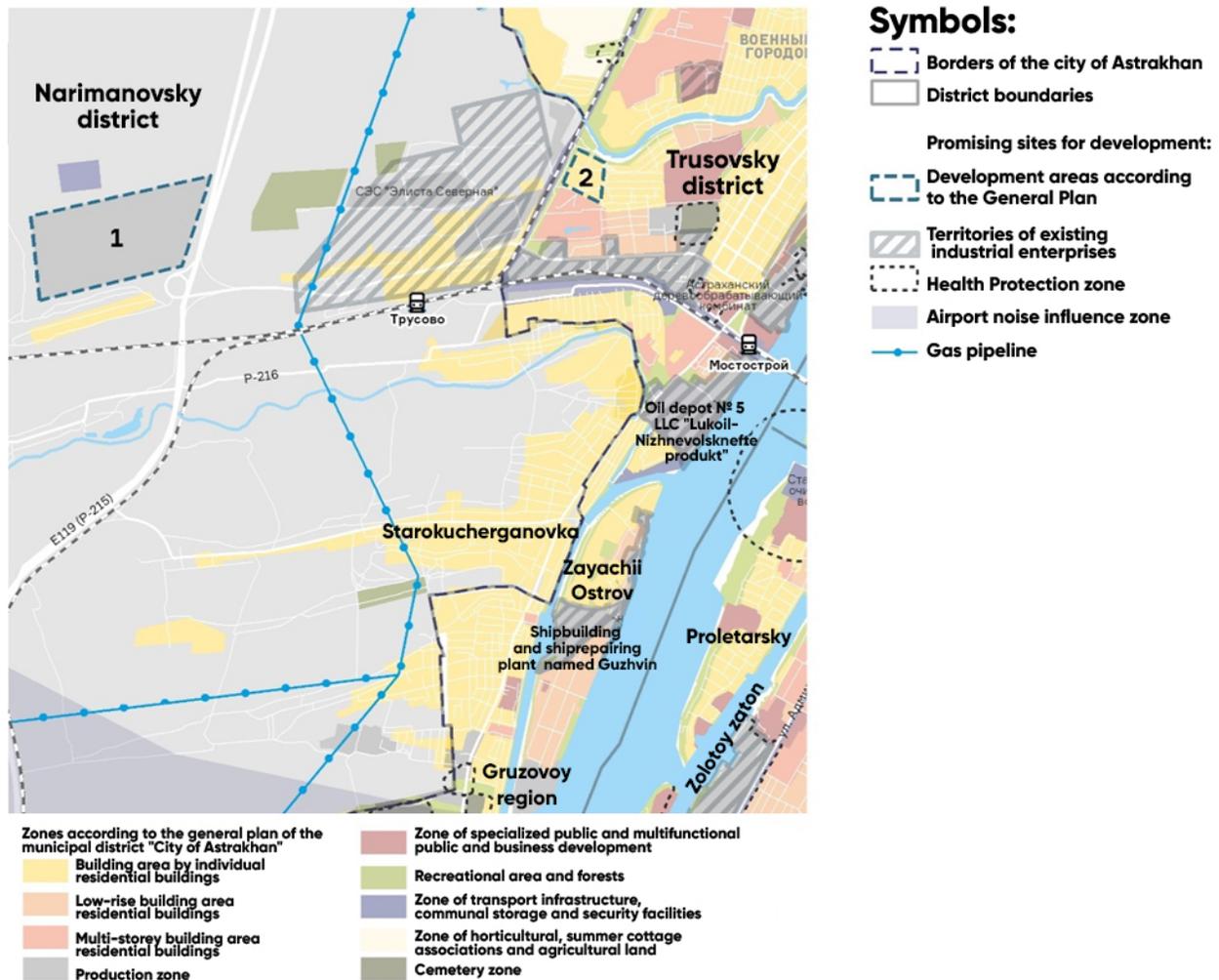


Fig.134. Promising development sites in the Narimanovsky district

Potential/Opportunity

Given the availability of investment resources and consumer demand, up to 5 million m² of residential real estate can be built on the territory of the Municipal Entity City of Astrakhan.

The general evaluation of the development of new housing construction in the suburban areas of Astrakhan for the future is about 1 million m² of residential build-up area.

In the area of the Privolzhsky and Narimanovsky districts, a significant potential for the development of production, transport and logistics clusters has been identified.

In total, the urban planning capacity of the core of the Astrakhan agglomeration exceeds 3 thousand hectares of land plots, where about 6.3 million m² of residential buildings can be constructed.

Possibility of step-by-step implementation of development projects.

Issue/Risk/Restriction

Lack of potential investors in order to ensure the implementation of the projects for the integrated development of territories.

Lack of demand for residential and commercial real estate properties.

Large costs for the construction of infrastructure in the peripheral areas.



Section 3. Analysis of the socio-economic development of municipal entities of the agglomeration, the development background of the Astrakhan agglomeration



3.1. ANALYSIS OF THE EXISTING SETTLEMENT SYSTEM OF THE AGGLOMERATION TERRITORY, DETERMINATION OF THE BOUNDARIES OF THE AGGLOMERATION

In order to determine the boundaries of the Astrakhan agglomeration, an analysis of the existing settlement system and the features of the spatial organization of the region's territory was carried out.

The existing structure of the settlement of the Astrakhan agglomeration (Fig. 135) is characterized by kind of association of local territorial systems to the main city-forming axis stretched from northwest to southeast along the Volga-Akhtuba floodplain, and the fan-shaped system of watercourses in the Volga delta.

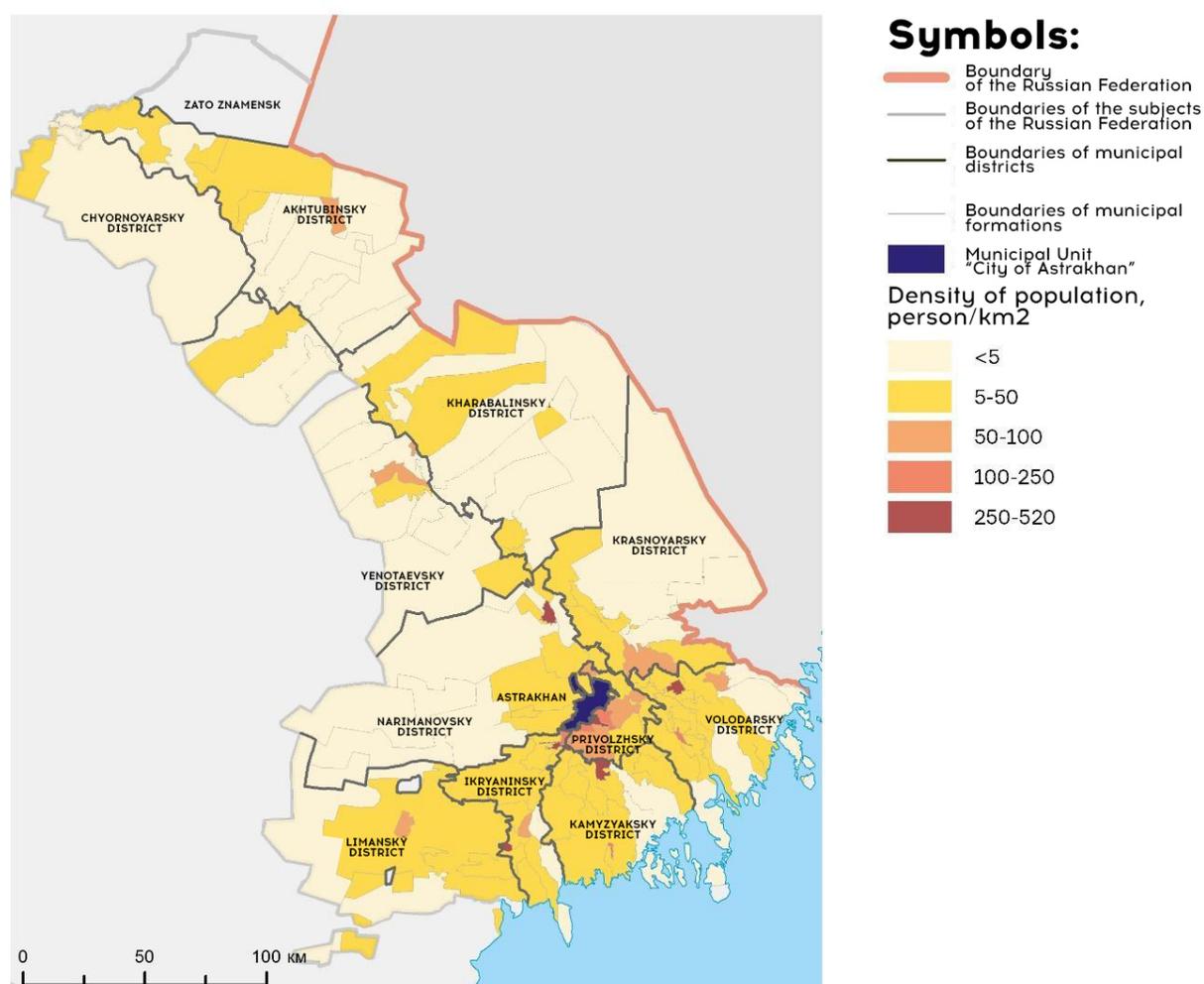


Fig. 135. Characteristics of the population density distribution in the territory of the Astrakhan region



The Volga-Akhtuba floodplain and the Volga river delta are the key city-forming factors that determined the nature of settlement in the Astrakhan region.

Largest part of the population is geographically concentrated in the southern part of the region.

According to the Federal Draft Law About Urban Agglomerations (art. 3, p. 1), the term urban agglomeration refers to the territory of an urban district, or an urban district with an intracity division, or a city or town of federal importance, united with the territories of other municipal entities by stable social and economic ties.

An urban agglomeration is not only a settlement system, but also a form of spatial integration, determined by the presence of intensive processes of economic, financial, infrastructural, economic, socio-cultural and other cooperations.

The following is a brief overview of the existing agglomeration links in order to identify the nature and intensity of inter-municipal integration.



Federal Draft Law About Urban Agglomerations

3.1.1. Analysis of ties within agglomeration

Socio-cultural ties

All urban and rural settlements that complement each other and are grouped around a powerful city, which is the core of an urban agglomeration, presupposes the presence of active socio-cultural ties.

In order to identify the existing socio-cultural ties on the territory of the city of Astrakhan and the municipal entities of the Astrakhan region, the key objects were considered⁸⁷, through the work of which, first of all, is carried out an informational, scientific and cultural exchange between the inhabitants of the region.

⁸⁷ The list of objects is given in Appendix 13 to the present Survey.



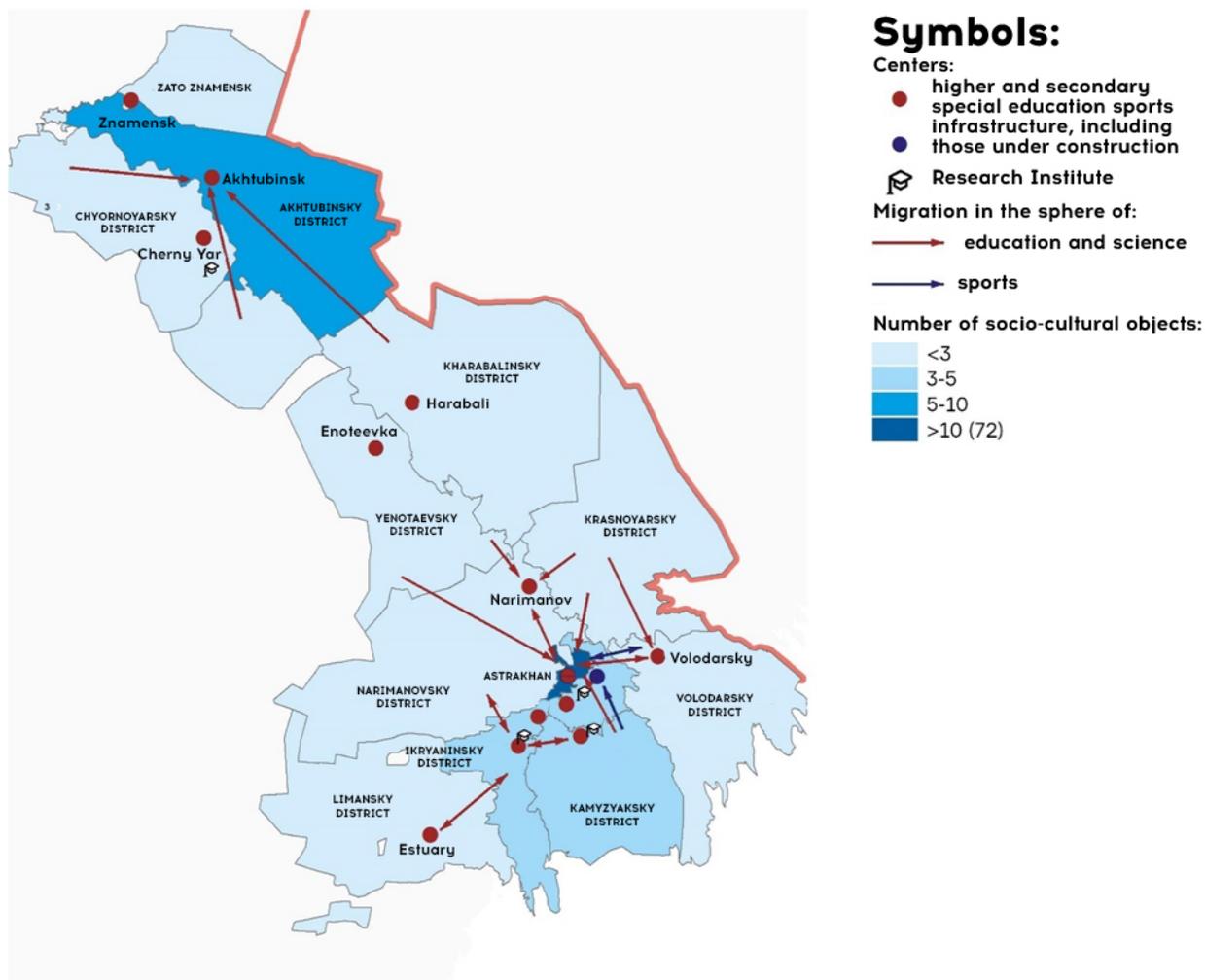


Fig. 136. Schematic diagram of existing socio-cultural ties

The distribution, specialization and importance of objects of education and scientific activity, sports, culture and recreation located in municipal entities were analyzed (the list of objects is given in Appendix 13). Evaluation results showing in particular characteristics of the intensity of existing sociocultural ties are presented below, in table 8.

The nature of the connections is determined by monocentricity, infrastructural polyfunctionality and the power of the agglomeration core: in this case prevail active centrifugal connections of municipal entities.

The regional centers of the Ikryaninsky, Kamyzyaksky and Privolzhsky districts have intermunicipal socio-cultural ties due to the presence in the regional centers of institutions of secondary specialized education, subdivisions of research institutes, sports, culture and recreation facilities.



Table 8. Characteristics of the intensity of existing socio-cultural ties between the administrative districts of the Astrakhan region

	Astrakhan	Closed Administrative	Akhtubinsky	Volodarsky	Yenotaevsky	Narimanovsky	Ikryaninsky	Kamyzyaksky	Krasnoyarsky	Limansky	Privolzhsky	Kharabalinsky	Chernoyarsky
Astrakhan		↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
Closed Administrative Territorial Unit Znamensk	↖		↖										↕
Akhtubinsky	↖				↗				↗			↗	↗
Volodarsky	↖						↖	↖	↕	↖	↖	↖	
Yenotaevsky	↖		↖	↕			↖			↖	↖	↕	↕
Narimanovsky	↖			↖	↗		↖	↖	↗	↕	↖	↖	
Ikryaninsky	↖			↗				↕	↗	↖	↖		
Kamyzyaksky	↖			↗		↗	↕		↗	↖	↖		
Krasnoyarsky	↖			↗	↗	↕	↕	↗		↕	↖	↖	
Limansky	↖				↗	↕	↕	↗			↖		
Privolzhsky	↖				↖	↖	↖	↖	↖	↖		↖	
Kharabalinsky	↖		↖	↗	↗	↗	↗		↗	↖	↖		
Chernoyarsky	↖	↗	↖		↗							↖	

	the most active and most developed socio-cultural ties
	less developed socio-cultural ties
	non-developed socio-cultural ties
	"exported" ties (from "source" to "user")
	"imported" ties (from "user" to "source")

Economic ties

In order to identify economic ties, an enlarged analysis of the existing ties between production sectors was carried out, the concentration of adjacent ties of production chains in the existing spatial structure at the level of the key industries of the region was considered: the agro-industrial complex and the fishing industry (Fig. 137).

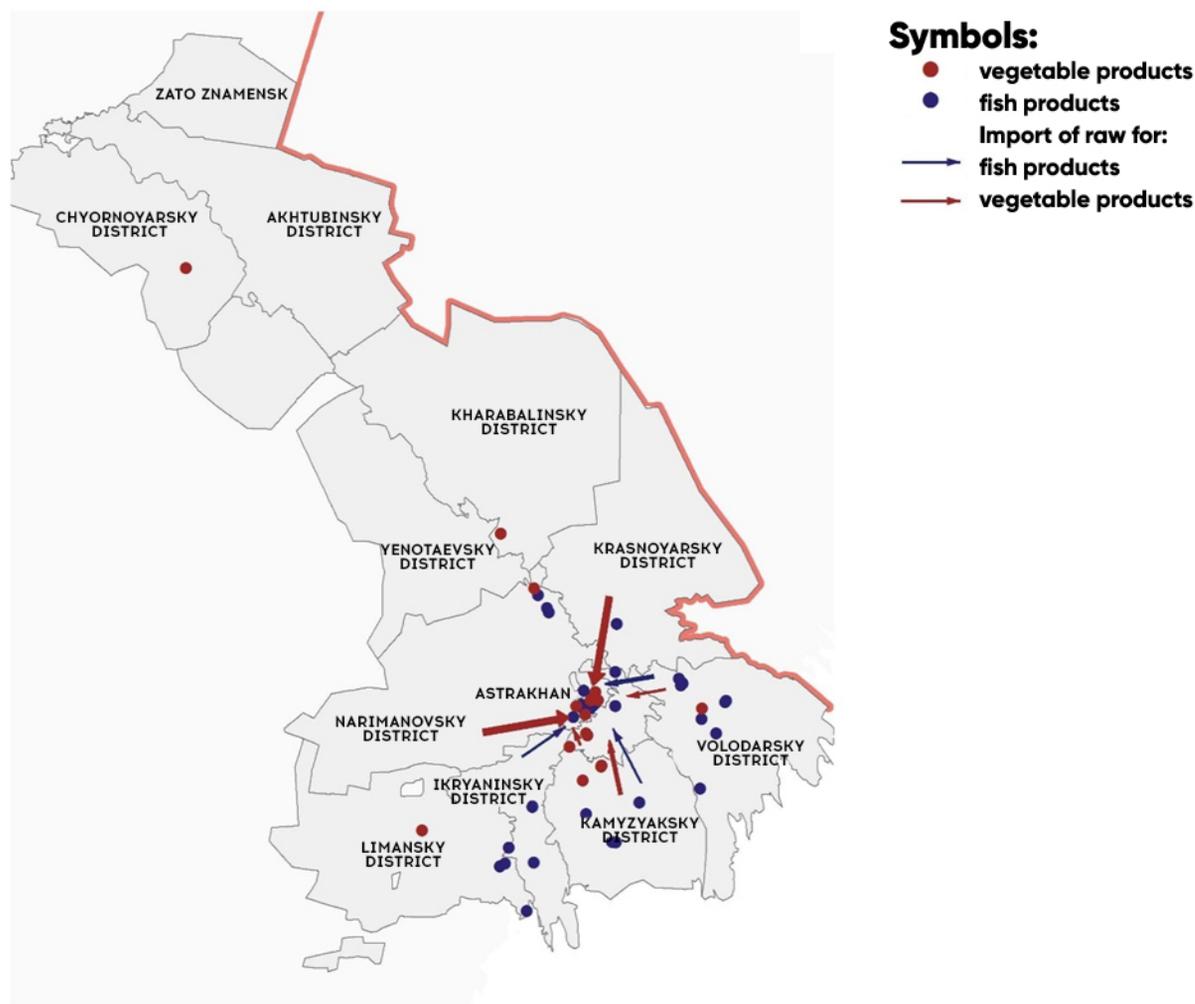


Fig. 137. Schematic diagram of existing economic ties

The results of evaluation of the existing economic ties demonstrate the dominance of centripetal ties towards the city of Astrakhan due to the diversified structure of the economy formed in the regional center.

The maximum activity and concentration of economic ties are due to the need to link large enterprises of the agro-industrial complex to the city of Astrakhan, which is the key transport and logistics core.

Labor ties

The analysis of the existing labor ties in the region was carried out on the basis of the localization of large industrial and production complexes, involving commuting, as well as taking into account the possibility to ensure an optimal transport accessibility of settlements in the nearest districts to the points of the employment concentration.

The evaluation of the most probable migration related ties was carried out on the basis of the data given in Appendix 13, and is presented in Fig. 138.

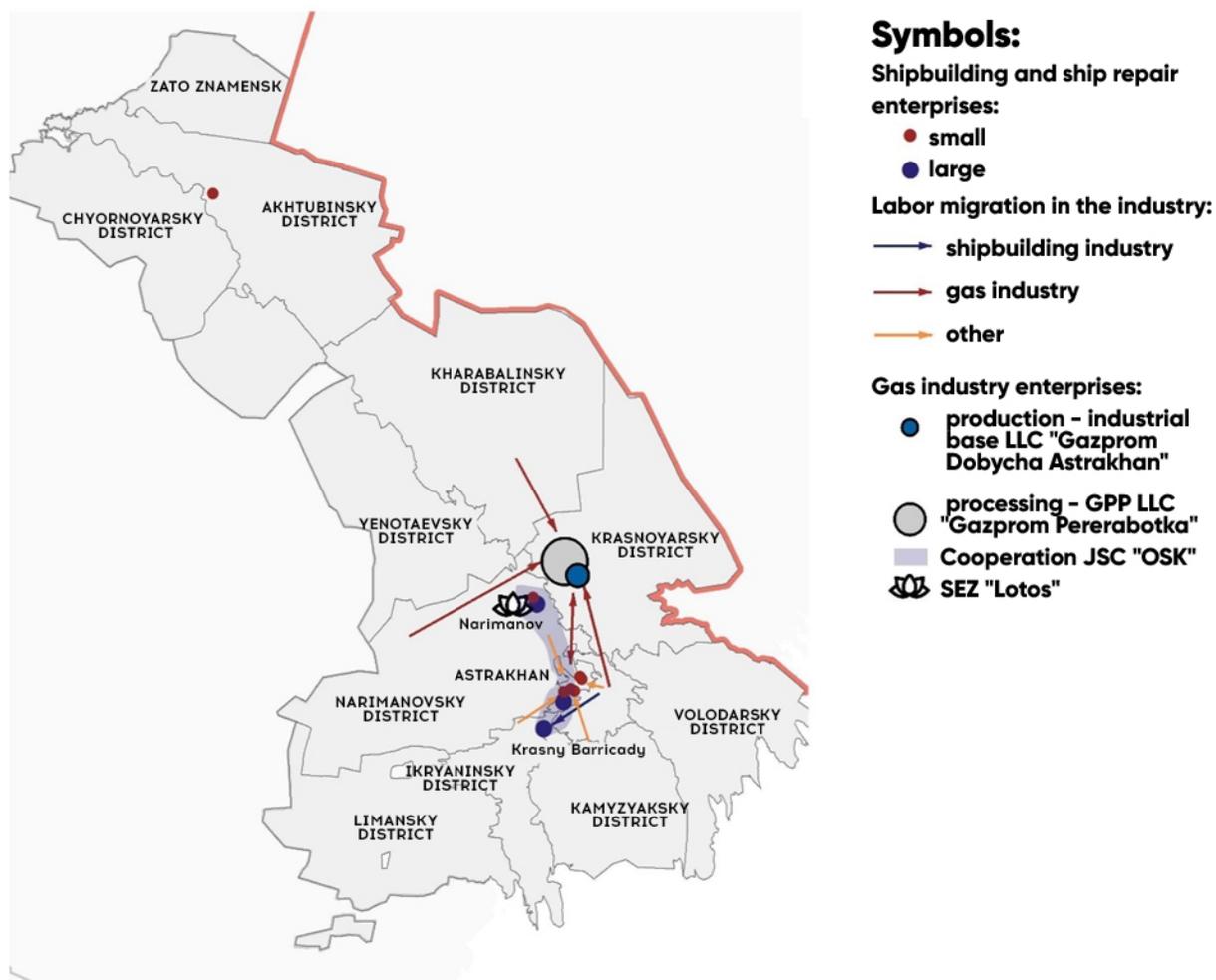


Fig. 138. Schematic diagram of existing labor ties

The most active commuting is typical towards the areas where industrial complexes are concentrated: complexes of the extractive industry (Krasnoyarsky district) and the shipbuilding industry (Ikryaninsky, Narimanovsky districts).

Astrakhan, as a regional center with a developed and diversified economy, is a key hub for attracting labor resources, primarily for residents of the nearest settlements of the Privolzhsky and Narimanovsky districts.

3.1.2. Determination of the boundaries of the Astrakhan agglomeration

Taking into account all specified ties, their nature, intensity and direction, as well as taking into account the existing support frame for the settlement of the Astrakhan region, several options are considered concerning the Astrakhan agglomeration and the definition of its boundaries.

Urban agglomeration

The boundaries of the urban agglomeration are primarily determined by the **continuity criterion of the build-up area**.

The main components of such a territorial structure are **the city-center and the peripheral zone** (or the growth zone of the city-center). In this case, the territories that form a continuous urbanized zone with a central core are included in the agglomeration, and the area of concentration of the population becomes the basis and carrier of the spatial properties of urbanization.

Taking into account the underdeveloped route network of public transport and the peculiar features of the spatial organization of the territory of the Astrakhan agglomeration, **the boundaries of the Urban agglomeration can be considered as the Municipal Entity City of Astrakhan and the territories of the settlements of the Privolzhsky and Narimanovsky districts**, adjacent to its borders, as the most actively involved districts in the process of agglomeration integration and integrated development of the territory.

In this case the area of the **Urban agglomeration** (fig. 139) covers:

- Municipal Entity City of Astrakhan;
- adjacent settlements of the Privolzhsky district:
 - Nachalovsky rural council;
 - Karagaly village;
 - Novorychinsky rural council;
 - Osypnoy Bugor village;
 - Rastopulovka village;
 - Tatarobashmakovsky rural council;
 - Triokhpotokskyrural council;
 - Funtovsky rural council;
 - Yaksatovsky rural council;
- adjacent settlements of the Narimanovsky district:
 - Akhmatovsky rural council;
 - Rassvetovsky rural council;
 - Solyansky rural council;
 - Starokucherganovsky rural council.

1.4 thousand km²

agglomeration area

611 ths. people

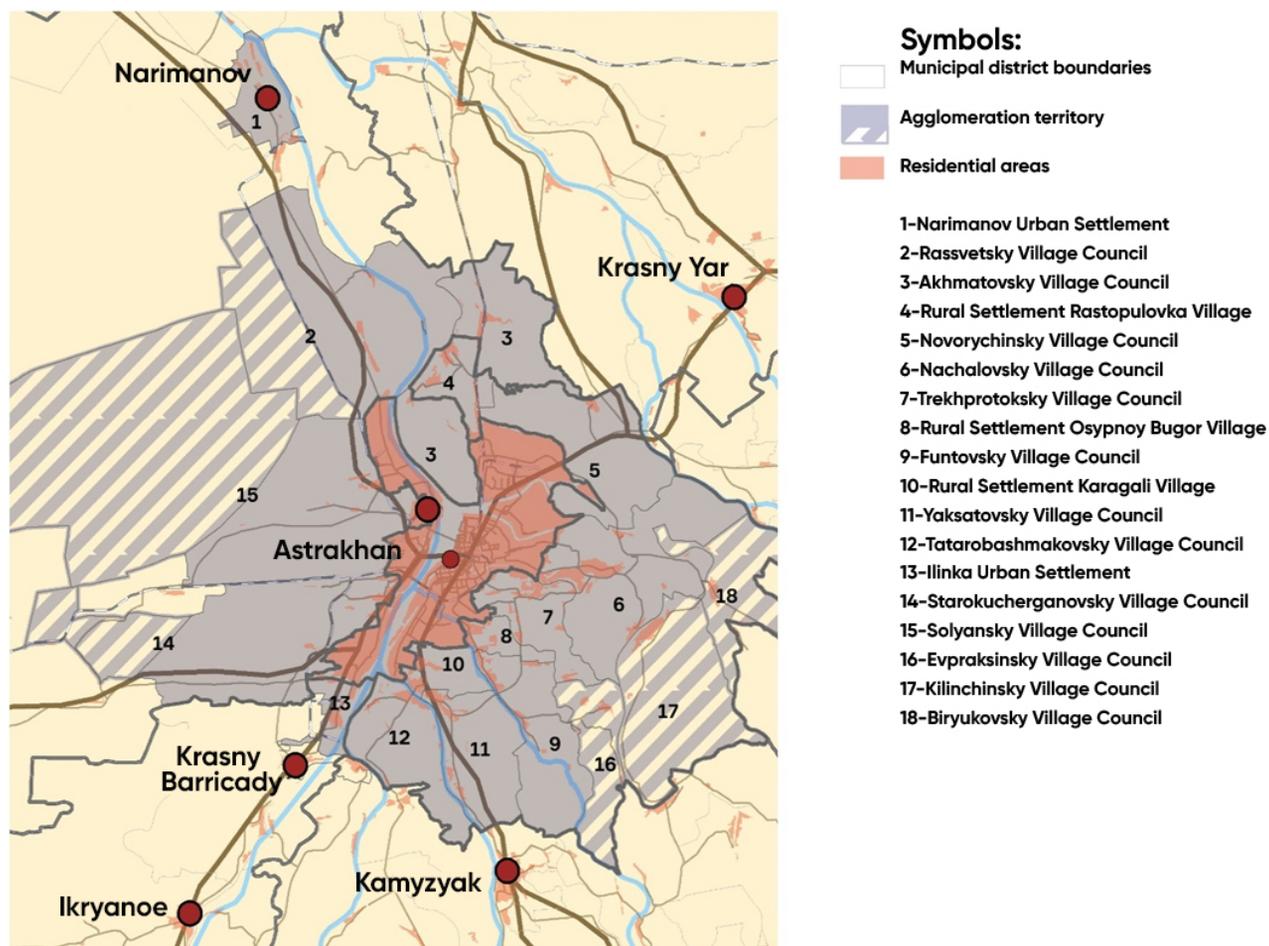
population of the agglomeration

439 persons/km²

population density of the



Fig. 139. Astrakhan agglomeration area (Urban agglomeration)



Agglomeration Megapolis

In this case, the urban agglomeration is also considered as the core which is the Municipal Entity City of Astrakhan and the peripheral zone that bends towards it, taking into account the factor of transport accessibility and the compactness of settlements around the core as a priority in order to determine the boundaries of the Metropolis agglomeration.

According to the method used in order to identify the agglomeration proposed by F.M. Listengurt, a large city with a population of at least 100 thousand people is considered as a potential core of the agglomeration, and the peripheral zone is outlined by isochronous of 2-hour accessibility by all modes of transport⁸⁸. The identified area is the area with for the further promising development of the agglomeration.

The boundaries of the Astrakhan agglomeration Metropolis are determined by the isochron method, provided that the trip from any settlement to the core of the agglomeration within its limits should not exceed 1.5 hours. When determining the maximum permissible travel time, natural barriers were taken into account in the form of operating ferry and pontoon crossings, which impose time restrictions in the average range of 15-30 minutes.

3.98 thousand km²

agglomeration area

731 ths. people

population of the agglomeration

184 persons/km²

population density of the

⁸⁸ Listengurt F.M. Criteria for identifying large-scale agglomerations in the USSR // Izvestia, Academy of Sciences of USSR, geography series 1975 No.1, Pages 41-48



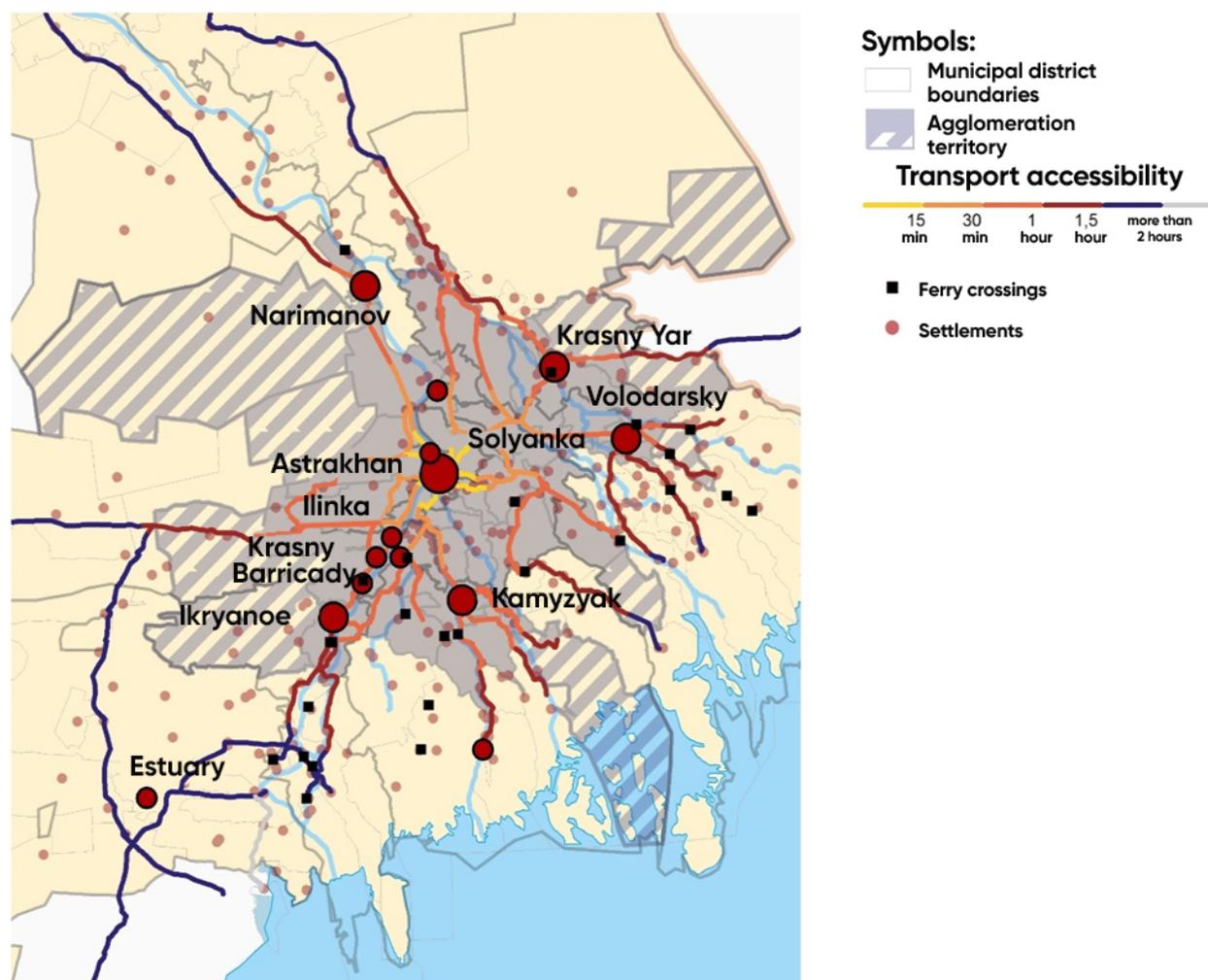


Fig. 140. Astrakhan agglomeration area (Metropolis Agglomeration)

As a result of the analysis of transport accessibility, the territory of the Metropolis agglomeration was determined (Fig. 140), provided with public roads within an hour (with an accuracy of up to 15 minutes) transport accessibility by car from the regional center.

The Metropolis agglomeration area includes, in addition to the regional center, parts of the territories of the following districts which are located within one hour by transport accessibility zone:

- Volodarsky;
- Ikryaninsky;
- Narymanovsky;
- Kamizyasky;
- Krasnoyarsky;
- Privolzhsky.



Urban Rural Agglomeration (resources and industry related)

The **agglomeration spatial structure** in the Astrakhan region is not only a form of settlement and an established support frame, but also a **form of territorial organization of industry, resources and economic management**.

As a result of industrial development and justified territorial growth, some disequilibria have arisen in the development of the territorial and sectoral structure. The major disequilibria that have been arisen include the concentration of basic industries in the southern districts of the Astrakhan region within the **Astrakhan resource and industrial agglomeration**.

The territory of the Astrakhan region has a unique combination of natural systems that cover the area studied in the present Survey in a differentiated manner. Such a differentiated landscape extent determines the mosaic structure of nature management within the boundaries of industrial agglomeration and forms a strong mutual influence in the considered aggregate.

Industrial-resource zoning for a part of the territory of the Astrakhan region was determined by R.V. Kondrashin⁴. A comprehensive geocological evaluation, an analysis of the relations between the indicators of the impact of industries and the results of this impact on the environment, the prospects for sustainable development and location of industrial production on the territory of the Astrakhan industrial agglomeration are given in the thesis of G.Z. Asanova⁸⁹.

The area of the Urban rural-agglomeration includes, in addition to the regional center, 7 districts of the Astrakhan region, and each of them has the potential for the development of key specializations and available resources (Fig. 141):

- Volodarsky;
- Ikryaninsky;
- Limansky;
- Narymanovsky;
- Kamizyasky;
- Krasnoyarsky;
- Privolzhsky.

13.3 thousand km²

agglomeration area

835.9 ths. people

population of the agglomeration

63 persons/km²

population density of the

⁸⁹ Thesis on The influence of the Astrakhan industrial agglomeration on the transformation of natural-territorial aquatic complexes. Astrakhan, 2009.



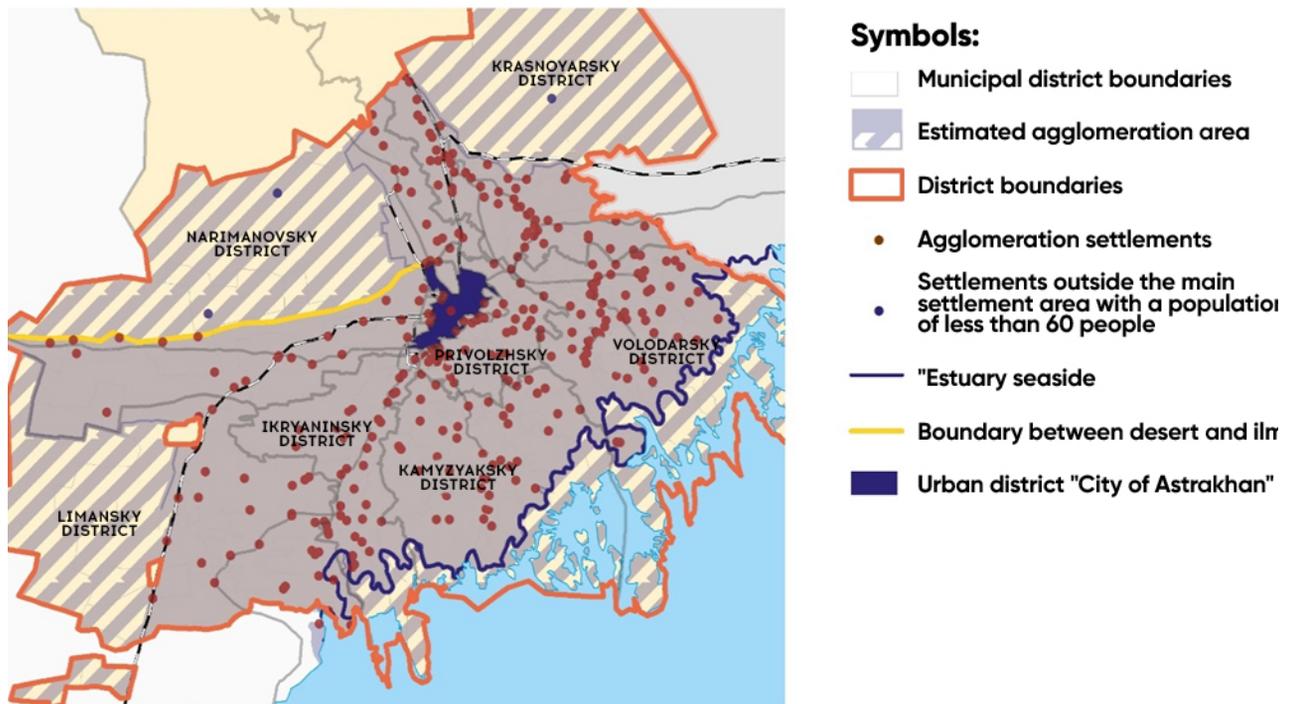


Fig.141. Area of the Astrakhan agglomeration (Urban rural-agglomeration)

From the point of view of the tasks of the Survey and the priority tasks of sustainable development of the area of the Astrakhan agglomeration, the definition of the clearly established boundaries of the agglomeration does not seem appropriate.

Within the framework of the Survey, it is proposed to consider the development of the Astrakhan agglomeration by consolidating and increasing the efficiency of the use of available and attracted resources within the boundaries of the Urban rural-agglomeration.

The proposed for consideration area of the Astrakhan agglomeration meets the key criteria of agglomeration:

- the presence of the administrative center of the urban agglomeration;
- the average population density of⁹⁰ municipal entities planned to be included in the territory of the urban agglomeration, with the exception of the administrative center of the urban agglomeration, cannot be less than the average population density in the corresponding territorial entity of the Russian Federation;
- transport accessibility out and return to the administrative center of the urban agglomeration during the working day for residents of all municipal entities and settlements planned to be included in the corresponding urban agglomeration.

⁹⁰ The calculated parameters of the area of the agglomeration and its population density are given in Appendix 6.



3.2. CHARACTERISTICS OF THE AGGLOMERATION AREA AND MUNICIPAL ENTITIES WITHIN THE AGGLOMERATION, INCLUDING AN EVALUATION OF THE DEMOGRAPHIC SITUATION

The general characteristics of the municipal entities that are part of the Astrakhan agglomeration are given in the form of tabular and graphic materials in Appendix 15 of the present Survey, including:

- the name of towns of district importance, urban-type settlements, rural councils that are part of the Municipal Entity;
- area;
- the number and density of the population of municipal districts, as well as regional centers and urban settlements;
- the number and share of the rural population in the Municipal Entity;
- number of rural settlements within boundaries of the Municipal Entity.

A number of disequilibria in the development of the Municipal Entity of the agglomeration were revealed, in particular the growing influence of the regional center and the contrast with the peripheral territories.

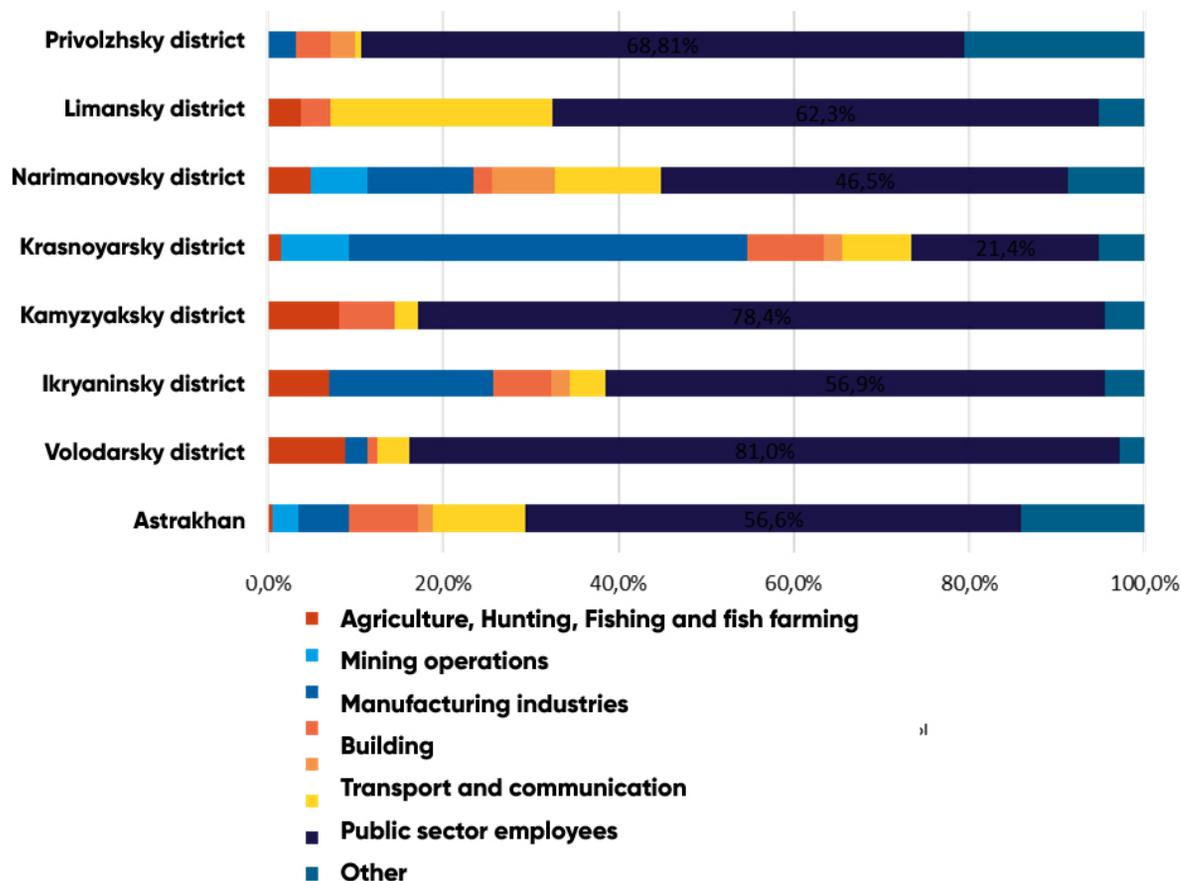
Concentration of the majority of the population, jobs and housing construction in Astrakhan.

According to the current distribution of employment in large organizations across the agglomeration (Fig. 142), the main center of employment is the Municipal Entity City of Astrakhan. 3/4 of all jobs within the agglomeration are concentrated here, the bulk of large commercial organizations, budgetary institutions, industrial enterprises.

In other municipal district, the employment rate in large organizations is less than 20% of the working-age population. This indicates a significant share of employment in small businesses, personal subsidiary plots, as well as a high level of commuting, mainly to Astrakhan, and a high level of overt and hidden unemployment.



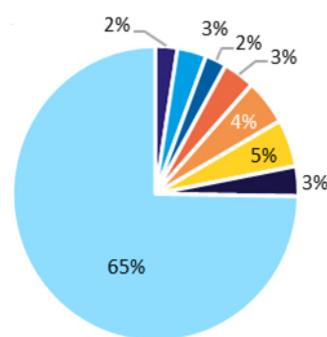
Fig. 142 The structure of employment of the population of the municipal district "City of Astrakhan" and the municipal districts of the Astrakhan agglomeration (excluding small businesses)



In the structure of employment of the population of the Astrakhan agglomeration, the share of those employed in the public sector prevails. The share of those employed in the field of transport and communications prevails in the Limansky and Narimanovsky districts and in the city of Astrakhan. The structure of employment in the Krasnoyarsk region is largely formed by the extractive sector.⁹¹

Fig. 143 The number of small and medium-sized businesses per 10 thousand people of the population of the Astrakhan agglomeration in 2019, units

- Volodarsky district
- Ikryaninsky district
- Krasnoyarsky district
- Kamyzyaksky district
- Privolzhsky district
- Narimanovsky district
- Limansky district
- Astrakhan



Entrepreneurial activity on the territory of the Astrakhan agglomeration is concentrated in its core. The shares of the Small Business Subjects and Medium-Sized Business Subjects are distributed relatively evenly in the adjacent areas.

⁹¹According to Federal State Statistics Service, Database of indicators of municipalities. Excluding small businesses.



3.2.1. Brief demographic characteristics of the agglomeration territory

In addition to the city of Astrakhan, among the largest settlement centers on the territory of the Astrakhan agglomeration, there are regional centers, other urban and rural settlements such as:

- settlements with a population of 10 thousand people and above: Kamyzyak town, Narimanov town, Krasny Yar village, Ikryanoe village, Volodarsky settlement;
- settlements with a population of less than 10 thousand people: Liman settlement, Krasnye Barrikady worker's settlement, Starokucherganovka village, Nachalovo village, Solyanka village, Ilyinka worker's settlement.

Outside the regional center, the Astrakhan agglomeration is characterized by a predominantly rural type of settlement. The urban population proportion of the agglomeration outside Astrakhan is only 21%.

Below Fig. 144-147 show diagrams characterizing the socio-demographic characteristics of the regions of the Astrakhan agglomeration. Appendix 15 presents a brief demographic characteristics of the regional centers of the Astrakhan agglomeration and urban settlements.

Fig. 144 Population dynamics

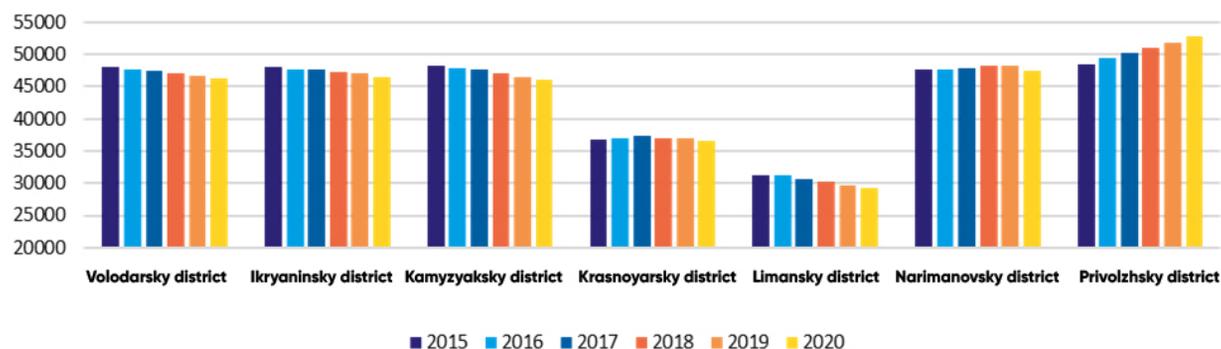
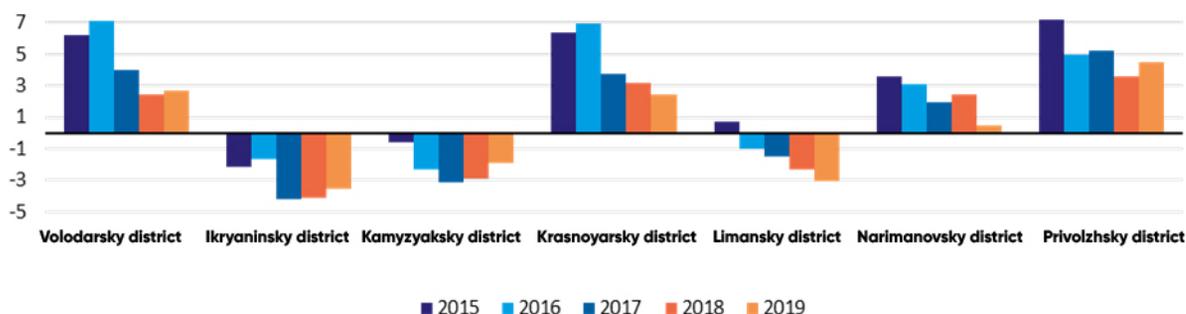
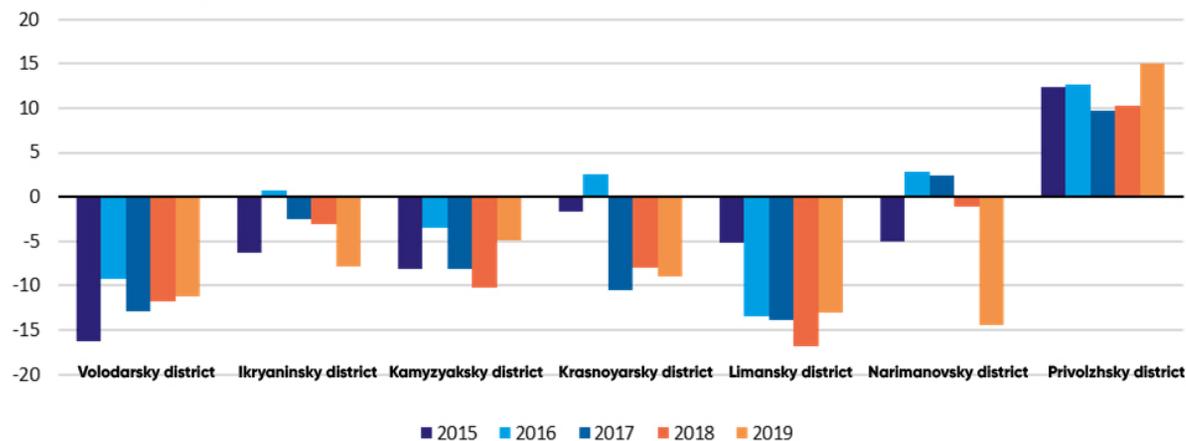


Fig. 145 Natural increase (decrease) of the population on the territory of the Astrakhan agglomeration, per thousand people



Due to the migration outflow, a decrease in the population is observed in most regions, with the exception of the Krasnoyarsky and Narimanovsky districts that have a relatively stable population, as well as the Privolzhsky district, where a stable population growth is taking place.

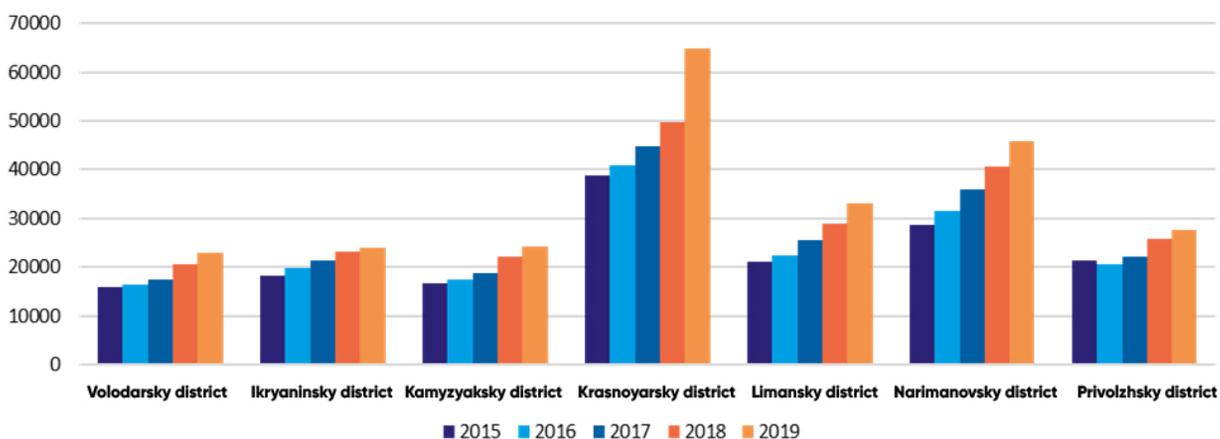
Fig. 146 Migration increase (decrease) of the population of the Astrakhan agglomeration, per thousand people



The intensity of migration growth (loss) of the population does not correlate with the level of average monthly wages: the Krasnoyarsky district with the highest average wages has a migration outflow, and the Privolzhsky district, the most successful in terms of migration and natural population growth, has one of the lowest levels of average monthly wages.

The uneven distribution of the level of per capita income in the Municipal Entities is a pronounced proportional dependence on the concentration of large industrial and agro-industrial enterprises.

Fig. 147 Dynamics of the average monthly wages of employees of organizations on the territory of the Astrakhan agglomeration, rubles



3.3. ANALYSIS OF THE MAIN AREAS OF SOCIO-ECONOMIC AND URBAN DEVELOPMENT OF THE AGGLOMERATION TERRITORY SPECIFIED IN STATE PROGRAMS, STRATEGY PLANNING DOCUMENTS, SOCIO-ECONOMIC DEVELOPMENT AND TERRITORIAL PLANNING

3.3.1. Strategy documents

In order to evaluate and analyze the major areas of the socio-economic development of the Astrakhan agglomeration, the key development areas identified for the Astrakhan region at the regional, macro-regional and federal levels in strategy planning and socio-economic development documents were analyzed (Table 9).

Table 9. Positioning of the Astrakhan region in accordance with strategy documents of the federal, macro-regional, regional and local levels

Document	Strategic positioning	Strategic priorities and events
Federal and macro-regional levels		
Strategy of the spatial development of the Russian Federation until 2025	Border geostrategic territorial entity of the Russian Federation	<p>Promising economic specialization, including the following industries:</p> <ul style="list-style-type: none"> ▪ extraction of mineral resources; ▪ production of finished metal goods, except machinery and equipment; ▪ production of leather and leather goods; ▪ production of coke and petroleum products; ▪ manufacture of computers, electronic and optical products; production of machinery and equipment not included in other groups; ▪ beverage industry; ▪ food production; ▪ production of other non-metallic mineral products; manufacture of other finished goods; ▪ manufacture of other vehicles and equipment; ▪ manufacture of rubber and plastic products; ▪ production of textiles; ▪ production of chemicals and chemical products; manufacture of electrical equipment; ▪ crop and livestock farming, provision of related services in these areas; ▪ fishery and pisciculture; ▪ activities in the field of information and communication; ▪ professional, scientific and technical activities; transportation and storage;

Document	Strategic positioning	Strategic priorities and events
Tourism development strategy in the Russian Federation for the period up to 2035		<ul style="list-style-type: none"> ▪ tourism: activities of hotels and catering establishments, administrative activities and related additional services (activities of travel agencies and other organizations providing services in the field of tourism).
Strategy of socio-economic development of the Southern Federal District for the period up to 2020	<p>Development of the Astrakhan transport hub⁹²</p> <p>Transition from serving export flows to Iran to serving Asian imports to Russia and Europe</p>	<p>Development of cruise tourism in the Caspian Sea as a priority area for the development of cruise tourism:</p> <ul style="list-style-type: none"> ▪ creating conditions for the synchronization of intensive fleet renewal and infrastructure renewal (ports, quay walls, dredging, services on the ground). <ul style="list-style-type: none"> ▪ The most promising subsectors of mechanical engineering for development on the area of the Southern Federal District are automobile, aircraft and shipbuilding, agricultural and railway engineering. ▪ Implementation of a system of high-tech projects for the development of transport routes and transport hubs (clusters of multimodal centers) in the Volgograd, Astrakhan and Rostov regions, the development of transshipment port complexes included in the system of international transport corridors of the Azov-Black Sea and Caspian basins. ▪ Creation of terminal and logistics complexes, information systems at the intersections of international transport corridors (in Novorossiysk, Rostov-on-Don, Astrakhan cities). ▪ Diversification of the tourism business, including the development of new exclusive routes and tourist products under the worldwide recognized brands (Saray-Batu - the capital of the Golden Horde , the territory of ecological, cultural and educational tourism Fishassic Park , etc.). ▪ Creation of the Caspian biopharmaceutical cluster in the Astrakhan region.
Regional level		
The strategy of socio-economic development of the Astrakhan region for the period up to 2035	<p>Astrakhan Region is a key region of Russia in the Caspian Sea region, capitalizing a favorable geopolitical position and resource potential; a center of attraction for capital, technology and talent.</p> <p>Creation of a key region in the</p>	<p>Project initiatives aimed at maximizing the efficient use of the region's potential:</p> <ul style="list-style-type: none"> ▪ Decent Life; <ul style="list-style-type: none"> ▪ Childhood; ▪ Senior generation; ▪ Health care; ▪ Education; ▪ Culture; ▪ Healthy life style; ▪ Science and innovation development. ▪ Region for decent life; <ul style="list-style-type: none"> ▪ Water supply; ▪ Provision of gas supply;

⁹² Including the ports of Astrakhan, Olya, port railway stations and the border railway station Aksaraiskaya, is associated with the formation of the international transport North-South corridor in the direction of Astrakhan-Baku-Tehran and with an increase in the capacity of the Astrakhan transport hub to 30 million tons per year.



Document	Strategic positioning	Strategic priorities and events
	southern direction of Russia with a stable and competitive economy of an advanced type through the development of human capital, production systems and international cooperation.	<ul style="list-style-type: none"> ▪ Housing ▪ Roads; ▪ Comfortable urban environment; ▪ Ecology; ▪ Civil society and Social security; ▪ New production complex; <ul style="list-style-type: none"> ▪ Agriculture: upgrade level; ▪ Fisheries industry: from stabilization to development; ▪ Tourism; ▪ Promotion of the Small and Medium-sized businesses and Self-entrepreneur initiative support; ▪ Development of the fuel and energy complex; ▪ Development of the shipbuilding industry; ▪ Transport infrastructure development; ▪ International cooperation and export; ▪ Digital economy;

According to the Spatial Development Strategy of the Russian Federation, the Astrakhan Region is one of the border geostrategic territories of the Russian Federation. The Municipal Entity City of Astrakhan itself is positioned as a center of economic growth of the second order which has a potential to provide a contribution to the country's economic growth from 0.2 to 1% annually. **However, the region is not among the priority centers of economic growth in the scientific and educational, resource and raw materials and agro-industrial areas.**

The development of the Astrakhan region at the federal and macro-regional levels is currently associated with the positioning of the region as a border geostrategic subject of the Russian Federation, as well as with the development of cruise tourism in the Caspian Sea.

At the level of the Southern Federal District, the development potential of the Astrakhan region is associated with the formation of the Astrakhan transport hub, the creation of terminal and logistics complexes at the intersections with the North-South and West-East international transport corridors, the development of promising industries, including the shipbuilding, agricultural and railway engineering.

At the regional level, the Astrakhan region is considered as:

- a driving force for the formation of a new value in the southern direction of Russia;
- an innovative platform for the implementation of human and production potential, investment opportunities;
- comfortable territory, attractive for life, recreation and business development.

3.3.2. State-run programs

An analysis of the current state-run programs of the Astrakhan region showed areas insufficiently covered by state funding, in particular:

1. Digital Technologies Block within the framework of the Digital Economy of the Russian Federation 2019–2024 project (state-run program Information Society of the Astrakhan Region). Funding in this area is necessary in order to implement the projects in the field of "smart city", as well as for innovative technologies of the demonstration zone of environmental technologies.

10 national projects

is being implemented in the Astrakhan region during 2019-2024



2. Digital culture Block within the framework of the Culture 2019-2024 project (State-run program Development of culture and tourism of the Astrakhan region). Funding for this area is necessary due to the finely dispersed nature of settlement within the agglomeration and the need to replace a hard-to-get offline cultural infrastructure objects by their digital counterparts.

3. Support for families with children Block within the framework of the project Demography 2019-2024 (State-run program Social Protection, Support and Social Services for the Population of the Astrakhan region). Funding in this area is relevant due to the high migration outflow from most districts of the agglomeration.

4. Labor Efficiency project (State-run program Economic Development of the Astrakhan region). Funding in this area is necessary in order to bring enterprises of the traditional economy sectors of the Astrakhan region to a new technological level through the introduction of innovative solutions in order to increase the labor efficiency.

5. Industrial Export Block within the framework of the project International Cooperation and Export (State-run program Economic Development of the Astrakhan region). Financing in this area is necessary in order to increase the competitiveness of export products of the manufacturing industry of the Astrakhan region (mainly for residents of Astrakhan and for the Special Economic Zone Lotos).

A complete list of existing regional projects in the Astrakhan region as part of the national projects of the Russian Federation is given in Appendix 19.

3.3.3. Land planning documents

Territorial planning documents of the Russian Federation

According to the territorial planning documents of the Russian Federation, on the territory of the Astrakhan agglomeration, it is planned to implement a limited number of projects of federal importance.

The territorial planning scheme of the Russian Federation in the field of federal transport on the territory of the agglomeration provides for:

- reconstruction of the Trubnaya - Verkhniy Baskunchak - Aksaraiskaya railway line;
- reconstruction of the Aksaraiskaya – Astrakhan railway line, including the reconstruction of the bridge across the Volga and public railways with a total length of 7 km;
- reconstruction of the Aksaraiskaya II - Small Aral railway line with the construction of a second public railway track on the Aksaraiskaya II - Small Aral section with a throughput of 128 pairs of trains per 24 hours;
- reconstruction of the highway R-215 Astrakhan - Kochubey - Kizlyar - Makhachkala;
- reconstruction of the R-22 Caspian highway;
- development of the Narimanovo airport complex in Astrakhan, in particular the reconstruction of the take-off runway, taxiways, perking

47 projects

is being implemented in the Astrakhan region within the framework of national projects in 2019–2024.

62 billion rubles

it is planned to allocate for the implementation of regional projects within the framework of national projects in the Astrakhan region in 2019-2024.



- apron, drainage facilities, replacement of lighting equipment, construction (reconstruction) of an emergency rescue station;
- development of the Olya seaport, including construction of the first stage of the second cargo area, construction of bulk and oil loading terminals, federal property objects, increasing the turnover of the first cargo area of the port to 4 million tons per year, increasing the port's capacity with the commissioning of the second cargo area of the port to 8 million tons per year;
- aids to navigation, vessel traffic control systems of the Volga-Caspian waterway in order to ensure safety in the seaport area of Astrakhan;
- reconstruction of Gas-Distribution Plant 4 in order to increase productivity, improve the reliability of gas supply to industrial and domestic consumers and maintain gas consumption discipline.

According to the territorial planning scheme of the Russian Federation in the field of energy within the area of the Astrakhan agglomeration is not being planned to locate objects of federal importance. Reconstruction of a number of facilities is envisaged in order to increase their capacity and system reliability.

The territorial planning scheme of the Russian Federation in the field of higher education provides for the construction of separate buildings for the needs of the universities of Astrakhan:

- Federal State Educational Institution of Higher Professional Education Astrakhan State University: addition to the academic building; area 14,180 m²;
- Federal State Educational Institution of Higher Professional Education Volga State University of Water Transport, Astrakhan branch, construction of the dormitory of the Astrakhan branch with area 10,420 m².

The territorial planning scheme of the Russian Federation in the field of healthcare does not provide for the construction of new medical facilities; it is planned to reconstruct the main building of the Federal State Budgetary Institution Research Institute for the Study of Leprosy of the Ministry of Public Health of Russia. In addition, proposals are made for the production of Mineral medicinal table water Tinaki and therapeutic muds (sapropels) within the framework of the creation of the Caspian biopharmaceutical cluster.



Territorial planning scheme of the Russian Federation in the field of federal transport

The analysis of strategic documents showed that the strategic directions for the development of the Astrakhan region developed at the regional level generally correspond to the priorities selected for the region at the federal and macroregional levels. However, the innovative development vector of the Astrakhan region definitely needs support and recognition at the level of strategy documents of the supra-regional level.

Territorial planning documents of the Astrakhan region

The territorial planning scheme of the Astrakhan region provides for a number of measures for the development of the industrial complex. Expansion of the special economic zone (SEZ) of industrial-production type Lotos in Narimanovsky district will allow carrying out production and repair activities for the seaport, and processing of goods arriving through the North-South transport corridor. The creation of a seaport SEZ near the seaport of Olya in the Limansky district with the subsequent unification of the seaport SEZ and Lotos SEZ into a cluster

will provide an opportunity to until 2029 to increase the port's cargo turnover by 8 million tons.

As a result, the largest container hub in the south of Russia will be created. In addition, a significant socio-economic effect will be obtained as a result of the creation of an estimated over 2,000 jobs. In addition, a number of local investment projects in the food industry, agro-industrial and fishery complex, logistics and other sectors of the economy is listed.

Among the most significant projects **for the development of transport infrastructure, the territorial planning scheme of the Astrakhan region** provides for the following:

- construction of the Northern Bypass motorway of the city of Astrakhan with a bridge over the Volga;
- completion of the construction of the Eastern Bypass motorway of the city of Astrakhan;
- reconstruction of the federal highway M-6;
- reconstruction of the motorway Astrakhan - Krasny Yar - Border with the Republic of Kazakhstan with the construction of a bridge across the Buzan river⁹³;
- construction of a road with three bridge crossings Ikryanoe village - Kamyzyak town;
- construction of a road with a bridge crossing and an overpass of Red Barricades worker's settlement with Ikryanoe village, entrance to the village Trudfront from the Astrakhan-Makhachkala motorway with the installation of berthing facilities on the Bakhtemir river, entrance to the Novobulgary village, Beketovka village in the Ikryaninsky district;
- construction of a ring road for Kamyzyak town;
- construction of a ring road for Narimanov town;
- construction of a bridge over the Erik Algarka on the Seitovka – Vatazhnoe highway - the border of Kazakhstan.

Among the **measures for the engineering preparation of the territory**, it is provided:

- construction of bank protection for the Tsarev fork in the Sovietsky district of Astrakhan;
- construction of dams with quay walls in Marfino village, Sorochie village of the Volodarsky district;
- construction of the bank protection facilities in Bakhtemir village, Fedorovka village, Ilyinka worker's settlement, Ikryanoye village, Mumra village, Tovarny settlement of the Ikryaninsky district;
- construction of bank protection facilities in Novorussovka village, Baibek village of the Krasnoyarsky district;
- Construction of the bank stabilization facilities in Pervoe Maya of Privolzhsky district.

⁹³ In accordance with the plan for the acceptance and transfer of roads from one form of ownership to another, approved by the minutes of the meeting of the Government Commission on Transport No. 2 dated April 13, 2018 (hereinafter referred to as the Plan), taking into account the changes approved by the minutes of the meeting of the Government Commission on Transport No. 4 dated 10.12. 2019, a public highway of regional importance Astrakhan - Krasny Yar - The border of the Republic of Kazakhstan is provided for by the Plan with a deadline for transferring into the State ownership of the Russian Federation in 2021.



The territorial planning scheme of the Astrakhan region provides for large-scale measures for the development of the Lotos SEZ, as well as the placement of a number of large social infrastructure facilities in the city of Astrakhan, the development of primary health care in rural areas and a number of other projects.

One of the significant tasks of developing a master plan is to attract the attention of the federal center in order to the implement new projects.

Potential/Opportunity

Positioning the Astrakhan region as a border geostrategic territorial entity of the Russian Federation.

Inclusion of the Astrakhan region in the number of priority centers of economic growth in the scientific and educational, resource and raw materials and agro-industrial areas as part of the top-level documents of the Russian Federation.

Prospects for the development of cruise tourism in the region, established in the Tourism Development Strategy of the Russian Federation.

Availability of opportunities for balanced development due to the diversified nature of strategic priorities and activities identified for the Astrakhan region in strategy documents of various levels.

Bringing to standard values of indicators of provision of social and engineering infrastructure on the territory of municipal entities of the Astrakhan region as a result of the implementation of state-run programs in the Astrakhan region⁹⁴.

Issue/Risk/Restriction

Events of federal importance implemented within the Astrakhan agglomeration are of a limited scale, the region is not included in the number of priority centers of economic growth in the scientific and educational, resource and raw materials and agro-industrial areas, according to the Spatial Development Strategy of the Russian Federation.

Failure to meet the goals and objectives specified in the strategy development documents due to insufficient focus of financial and management resources in those goals and objectives.

⁹⁴ Register of state-run programs of the Astrakhan region:
<https://minec.astrobl.ru/ru/page/reestr-gosudarstvennyh-programm-astrahanskoi-oblasti>



3.4. ASSESSMENT OF THE RESOURCE POTENTIAL OF THE URBAN AGGLOMERATION TERRITORY

Astrakhan industrial agglomeration has a unique geographical location; it is attributed to one of the richest and most economically promising regions of Russia in terms of resources and raw materials.

The most important industrial resources of the Astrakhan Region are hydrocarbons, water and biological resources.

Natural gas extraction is the basic industry of the modern Astrakhan industrial agglomeration, which has predetermined the rapid growth of fuel industry and natural gas conversion in the last decade.

In order to identify promising areas for development of manufacturing industries in the Astrakhan agglomeration, the Study assessed the existing potential for development of a number of manufacturing and non-manufacturing industries, such as:

- fuel and energy;
- transport and logistics;
- agriculture, including:
 - crop production;
 - animal husbandry;
- fishing industry, including:
 - fishing;
 - fish farming;
- shipbuilding;
- scientific and innovative and technical potential.



3.4.1. Potential for fuel complex development

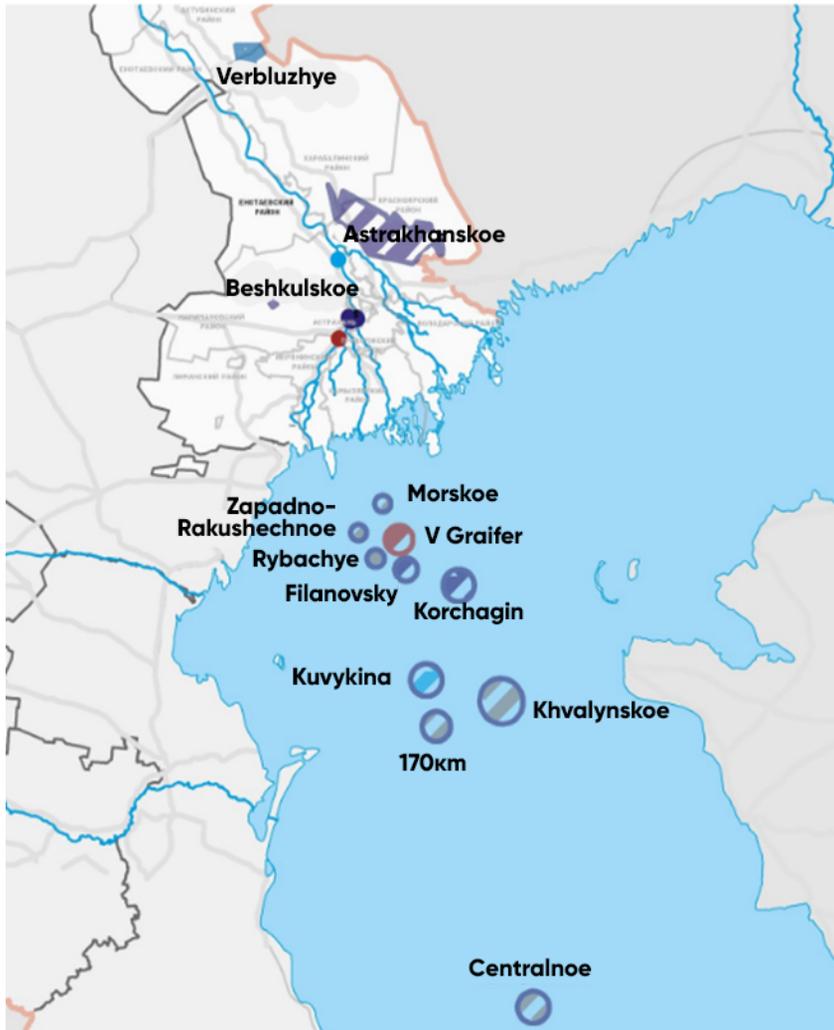


Fig. 148 Hydrocarbon deposit map

Symbols:

Hydrocarbon deposits

raw materials:

in industrial development

in pilot operation

in preparation for industrial operation

in preparation for mastering

in intelligence

Large companies:

Lukoil corporate training center

JSC

Large mining companies

20%

of condensate reserves of Russia

10

raw hydrocarbon deposits in the Astrakhan Region with reserves of 1.1 billion tons of oil and gas condensate, 5.3 trillion m³ of gas (extractable)

10

raw hydrocarbon deposits in the Caspian Sea with reserves of 0.35 billion tons of oil and gas condensate, 0.65 trillion m³ of gas (extractable)

20%

increase in the index of industrial production of electricity for 2012-2020.

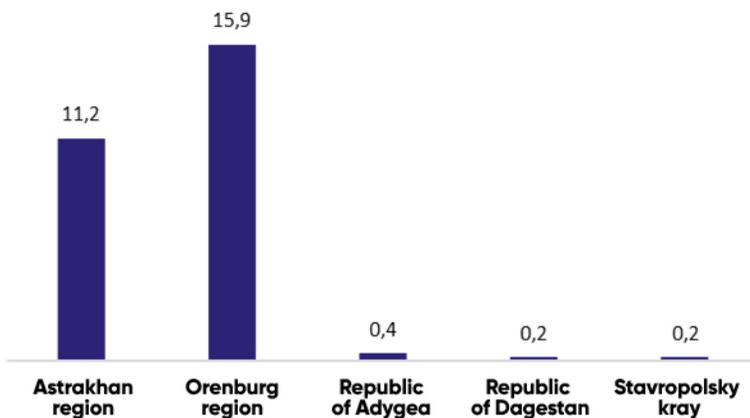
12

solar power facilities commissioned with a total capacity of 285 MW

5th

in electricity, gas and steam supply and air conditioning in the Southern Federal District in 2018.

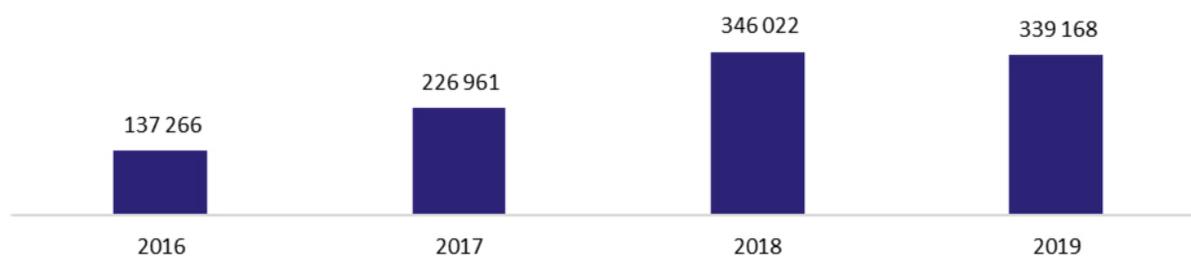
Fig. 149 Free gas production, billion cubic meters per year (according to the Ministry of Natural Resources and Environment in 2018)



The Astrakhan Region is among the regions with a dominant share of the extractive industries in GRP (47.9%). At the same time, since 2009 the volume of output of the extractive industry in the region has only been growing, and at the end of 2020 it exceeded the indicators of the early 2010s almost three times.

Oil and gas account for most of the mining operations. In total the territory of the Astrakhan Region has 10 deposits of hydrocarbon raw materials with the reserves up to 1,1 billion tons of oil and gas condensate and 5,3 trillion m³ of gas and 10 deposits in the water area of the Russian sector of the Caspian Sea with the reserves up to 0,35 billion tons of oil and gas condensate and 0,65 trillion m³ of gas, which is about 20% of the total Russian reserves of condensate.

Fig. 150 The volume of shipped goods of own production by type of economic activity "Mining", RUB million



However, the Astrakhan field currently ranks only third in terms of volume among PJSC GAZPROM's promising fields. The oil and gas industry and the fuel and energy complex traditionally occupy a leading position in the region's industry. The largest reserves in the region are the Velikoe oil field, large oil and gas fields named after V.A. Filanovsky and V.A. Vernadsky and located on the shelf of the Caspian Sea. The high cost of oil extraction and threats of instability in world oil prices reduce the development potential of the Astrakhan agglomeration production sector.

Despite this, promising competencies for the development of such fields are concentrated in the Astrakhan Region. Scientific organizations of the region own about 50 patents in this area, seven of which have joint authorship with representatives of business. AO "Yuzhny`j centr sudostroeniya i sudoremonta" (JSC Southern Shipbuilding and Ship Repair Center), being a part of AO "Ob`edinyonnaya sudostroitel`naya korporaciya" (JSC United Shipbuilding Corporation), specializes in creating platforms for offshore field development. LUKOIL's competence center is located in Ikryaninsky District.

Electricity generation

In terms of electricity, gas and steam supply, the Astrakhan Region ranks 53rd in Russia and 5th in the Southern Federal District, according to 2018 data.

Alternative energy is actively developing in the Astrakhan Region. Thus, to date, solar power accounts for 6% of the energy consumed by the Astrakhan Region and occupies the 10th place in retail sales of Russian solar modules⁹⁵. A total of 12 solar power plants with a total capacity of 285 MW were built and commissioned in the region between 2017 and 2020.

⁹⁵ <https://www.hevelsolar.com/kz/about/news/top-15-rossiiskikh-regionov-po-razvitiyu-solnechnoi-mikrogeneracii/>



Potential/Opportunity

The opportunity to concentrate competencies in services for the extractive industry in Astrakhan.

The potential for alternative energy development.

Issue/Risk/Restriction

Risks of reducing the multiplier effects of the extractive industry for the region by attracting external counterparties.

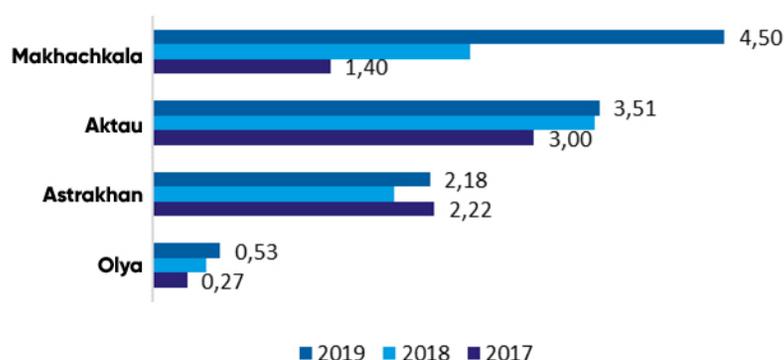
Lack of a single territorial center of competence in the oil and gas industry.

High cost of oil extraction on the Caspian Sea shelf.

Environmental degradation due to increased pressure on unique natural landscapes.

3.4.2. Transport and logistics potential

Fig. 151 Dynamics of cargo turnover in the ports of the Caspian Sea in 2017-2019, million tons



The basis of the cargo turnover of the Astrakhan port in 2019 were grain, products and lumber. The most common items in the cargo turnover of the port of Olya are grains, chemical products and fertilizers.

Low cargo turnover of the seaports of Astrakhan Region compared with other ports of the Caspian Sea.

The project of the port SEZ and the Caspian cluster in the Astrakhan Region is implemented by the order of the President of the Russian Federation, Vladimir Putin, as part of comprehensive measures to develop the international transport corridor (ITC) "North-South" in the Russian Federation.

A step-by-step implementation of the project is in the planning stage. At the initial stage, transportation of goods will be carried out through the piers of the sea port of Olya with number 8 and 9, which were built and will be equipped with container handling equipment at the expense of private investor. The next stage involves construction of a new cargo district in the surrounding area of the ilmen Zaburunny (8 km south of the port of Olya).

The geography of foreign trade is represented by 70 countries, including:

7% GRP

forms the transport

16.4 million tons

total current capacity of seaports in the Astrakhan Region

8 million tons

planned increase in the capacity of the port of Olya



About the creation of the Astrakhan Region's port SEZ and Caspian cluster



Caspian region countries: Iran, Turkmenistan, Azerbaijan, Kazakhstan;

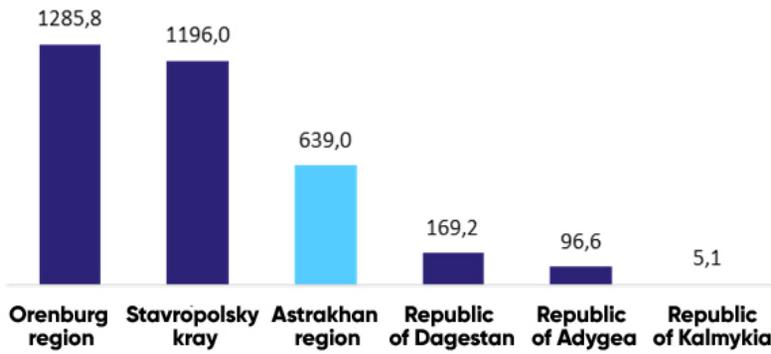
CIS countries: Armenia, Belarus, Kyrgyzstan, Uzbekistan.

The anchor project of the port SEZ is the construction of a modern container terminal for handling cargo going through the "North-South" ITC.



Fig. 153 Caspian Sea Port Scheme

Fig. 152. Foreign Trade Turnover in 2019, USD million



Potential/Opportunity

High transport and transit potential.

Advantageous position in the system of "North-South" and "West-East" ITCs, the presence of an international airport.

Competitive advantage in the form of territorial development potential of the port territory.

Issue/Risk/Restriction

Underutilized potential of the "Olya" port territory and foreign economic integration.

Irrational and expensive logistics.

High competition from overland transportation.

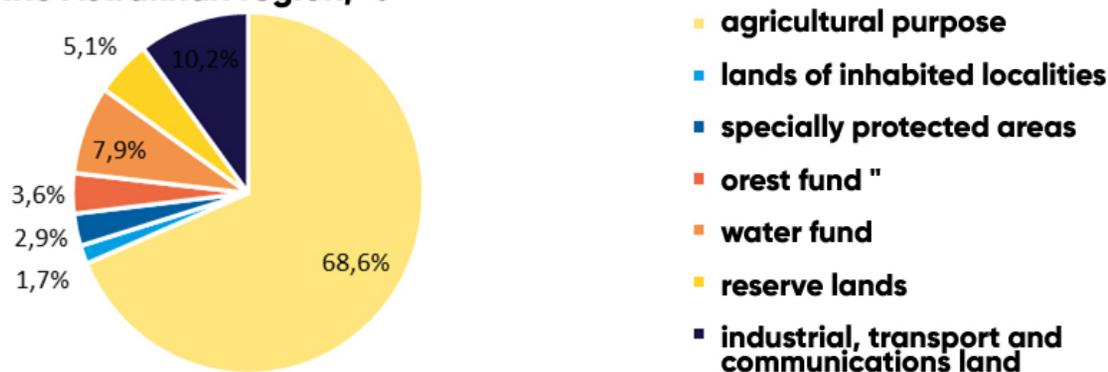


3.4.3. Agricultural development potential

The largest share (68.6%) of the regional land fund is taken by **agricultural lands** — 3,631 thousand ha, 82% of which are agricultural lands (Fig. 154, 158).

Thus, in the territory of the Astrakhan Region formed a territorial and industrial complex on the basis of two complete cycles of production: **industrial and agrarian and fishing industry, which outlined the**

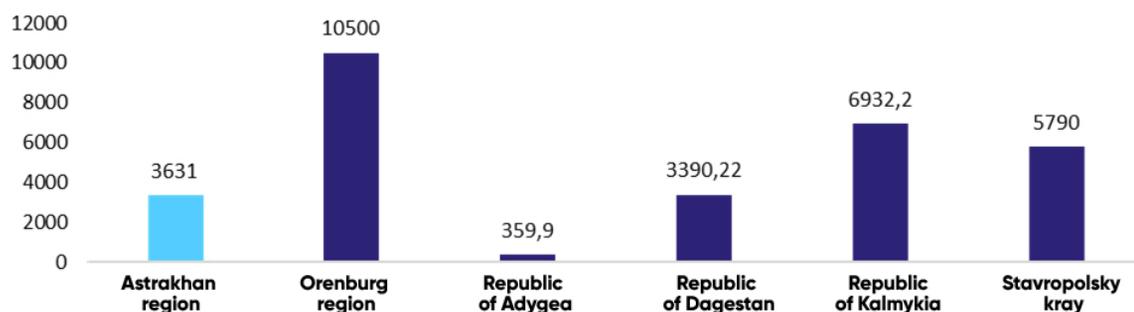
Fig. 154. The ratio of different categories of land on the territory of the Astrakhan region, %



specialized industrial districts.

Source⁹⁶

Fig. 155. Agricultural land area, thous. ha

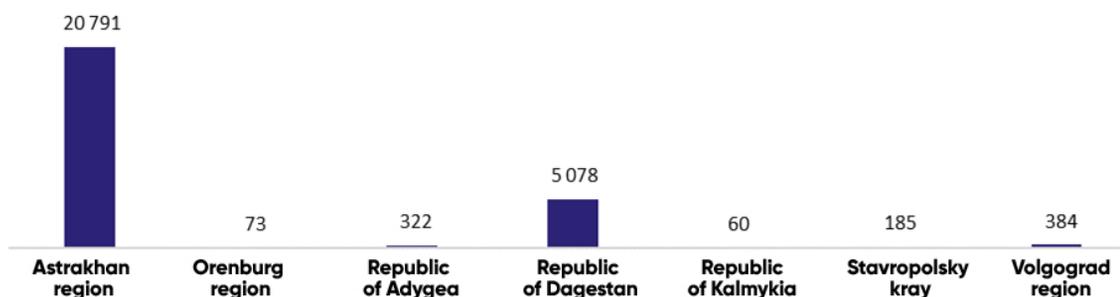


⁹⁶ Source: <https://msh.astrobl.ru/section/zemli-selhoznaznacheniya>

Agricultural land is represented mainly by pastures (77.8%), to a lesser extent — by hayfields (12.5%) and arable land (9%). At the same time, arable lands are extremely underutilized: about 36.7% of 276.8 thousand ha are not utilized⁹⁷ (Fig. 157).

The total indicator of underutilized land resources (13%⁹⁸ of agricultural land is not involved in the turnover as of 01.01.2020) reduces the possible income of the agglomeration from agriculture.

Fig. 156. Evaluation of the efficiency of the use of the sown area of agricultural crops (Whole Yield of vegetables and potatoes from 1000 ha of sown area), tons



However, Astrakhan Region is the leader in terms of the efficiency of the use crops-growing area among the regions of the reference group.

Astrakhan Region is classified as a zone of risky agriculture⁹⁹. Because of insufficient moisture and frequent droughts, crop yields, livestock productivity, and production volume are decreasing.

1/10

of the region's territory is occupied by rivers, streams, ilmens and yeriks

Increasing the volume of agricultural production and neutralizing the negative impact of droughts and dry winds can only be achieved through an optimal combination of various types of reclamation and irrigation.

⁹⁷ The data were provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.

⁹⁸ According to the Ministry of Agriculture and Fisheries of the Astrakhan Region.

⁹⁹ Decree of the Government of Astrakhan Region No 138-P of May 3, 2006 "On the Concept of the Industry Target Program "Preservation and Restoration of Soil Fertility of Agricultural Lands in Astrakhan Region for 2007-2010".



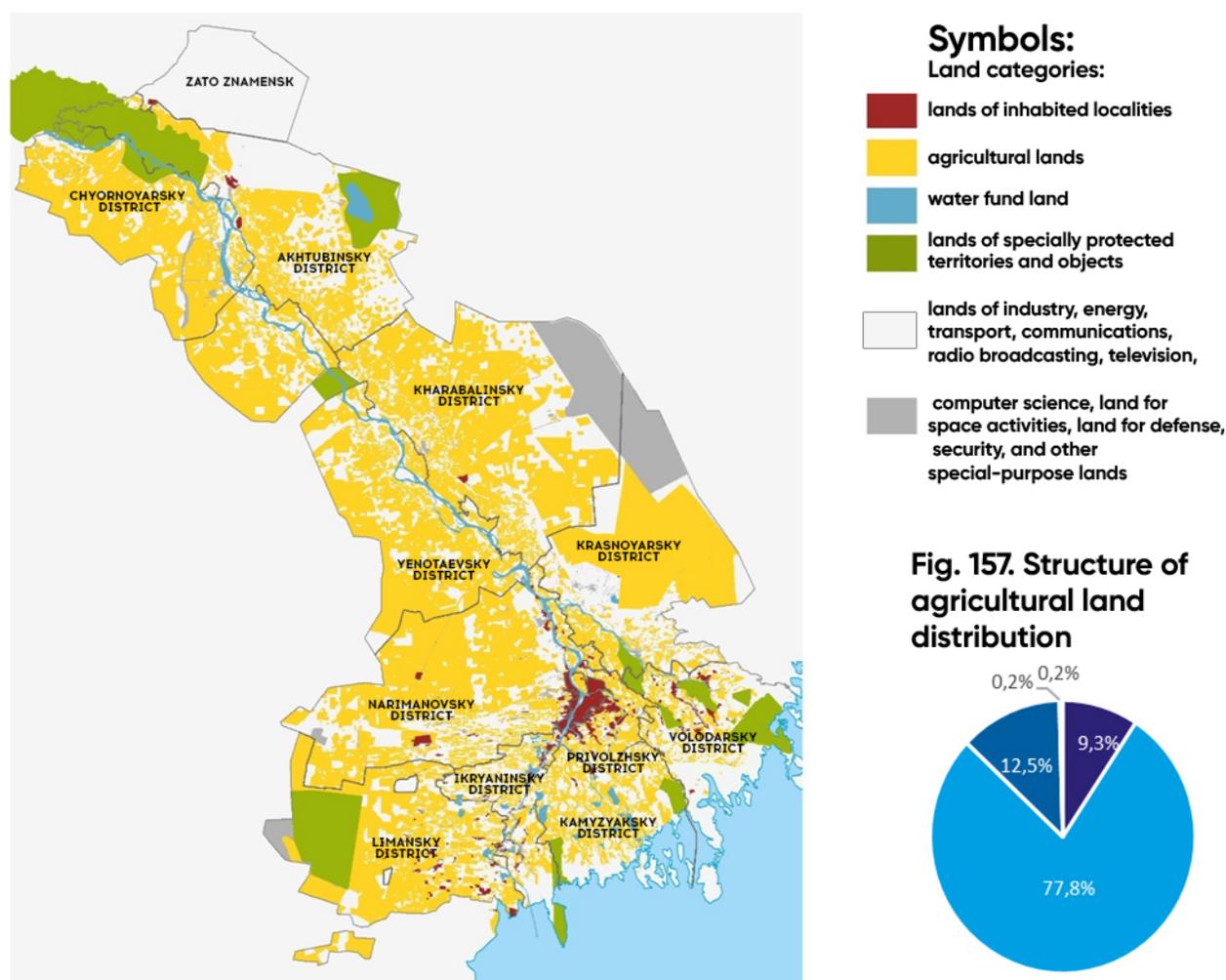
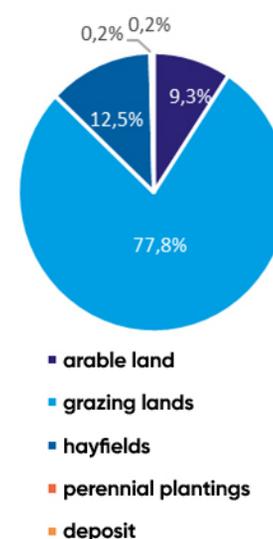


Fig. 158. Schematic diagram showing the categories of land on the territory of Astrakhan Region

Fig. 157. Structure of agricultural land distribution



Analysis of natural territorial complexes of the Astrakhan agglomeration

Within the framework of this Study a part of the territory of Astrakhan agglomeration¹⁰⁰ was analyzed using digital remote sensing devices (Sentinel-1A, Sentinel-2A and 2B, Landsat) for the main factors of anthropogenic transformation of natural territorial complexes (NTC) on the basis of geoecology, landscape planning, anthropogenic and applied landscape science, taking into account the morphological structure of the studied region.

The conducted research revealed that the agricultural lands with the greatest expansion in the central part of the agglomeration area are concentrated in the Volga Delta; in most cases they are built into the boundaries of natural boundaries: bay-plain-like areas, channel, the tracts of the Baer knolls, etc.

¹⁰⁰ Astrakhan, Ikryaninsky, Volodarsky, Kamyzyaksky, Privolzhsky districts and a part of Krasnoyarsky district.

Based on the results of the work performed in the studied part of the Astrakhan agglomeration, several types of agricultural land have been identified:

- territories used as farmlands (arable land; in some cases, greenhouses);
- fallow lands with absent or sparse cover of shrub natural-ruderal vegetation;
- fallow lands with a moderate cover of shrub natural-ruderal vegetation;
- fallow lands with high coverage of wood and shrub natural-ruderal vegetation, including with oleaster forests.

In the course of the conducted assessment and analysis of NTC territories it was established that part of fallow lands in the territory under consideration is periodically flooded with water due to destruction in the drainage and irrigation system, in some areas there is a tendency to change the type of use (for example, from using fish ponds for arable land, and vice versa). There is a separate group of small territories previously used as arable land, with the current status of land for estate development¹⁰¹— mainly the territories adjacent to the "Gorod Astrakhan" municipal district and the village of Nachalovo.

Based on the results of the assessment, taking into account the main external landscape and environmental factors affecting the economic use of the Volga Delta landscape, we identified some recommendations for the rational use of NTC and optimization of agricultural, including:

- regulation of water flow and planned water use;
- minimization of impacts on natural complexes that haven't been extensively altered by humans;
- implementation of natural and economic adaptability and diversity of NTC.

Based on the principle of natural and economic adaptability, it is recommended to exclude the natural boundaries formed on the basis of sea islands from further economic use (southern territories of Kamyzyaky, Ikryaninsky and Volodarsky districts).

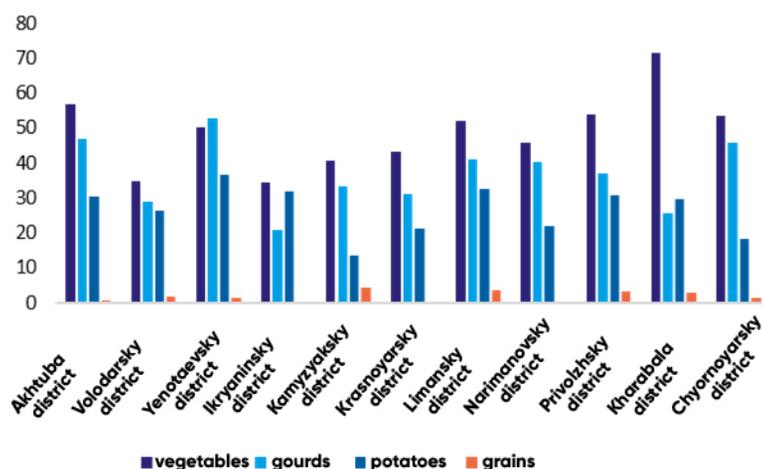
A brief methodology for identification of the main factors of anthropogenic transformation of natural complexes of the part of the Astrakhan agglomeration and the result of the analysis — the scheme "Types of economic use of natural territorial complexes in the part of the Astrakhan agglomeration" are shown in Appendix 5 of the Study.

¹⁰¹ According to the Public Cadastral Map (requested in May-June 2019).



Potential for crop production development

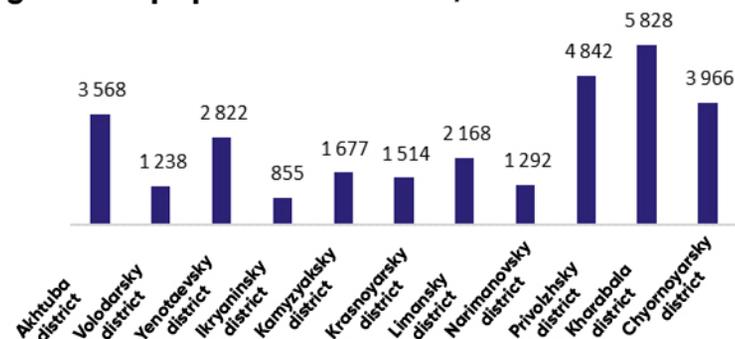
Fig. 159. Crops yield in 2019, tons / ha



Source¹⁰²
Source for Fig. 160.¹⁰³

The crop production industries traditionally retain the leading position in the Astrakhan Region's agroindustrial complex. Vegetable crops occupy the largest share.

Fig. 161. Crops production in 2019, RUB million



Source¹⁰⁴

>85%

increase in gross agricultural output in Astrakhan Region over 8 years (47.6 billion rubles)

>68%

increase in the volume of vegetable production in the Astrakhan Region over 8 years (1,362 thousand tons)

>62%

increase in the production of melons in the Astrakhan Region over 8 years (317 thousand tons)

>21%

increase in the volume of potato production in the Astrakhan Region over 8 years (325 thousand tons)

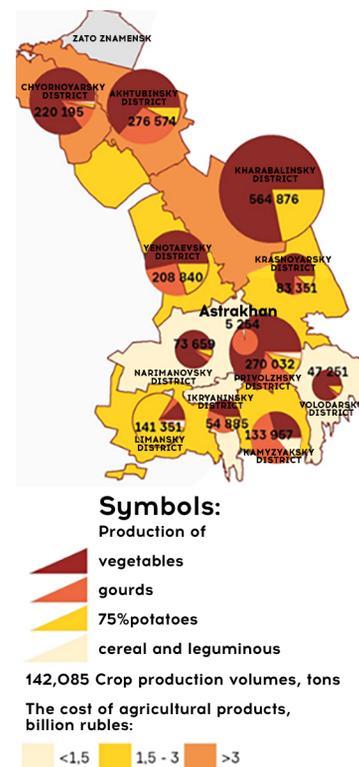


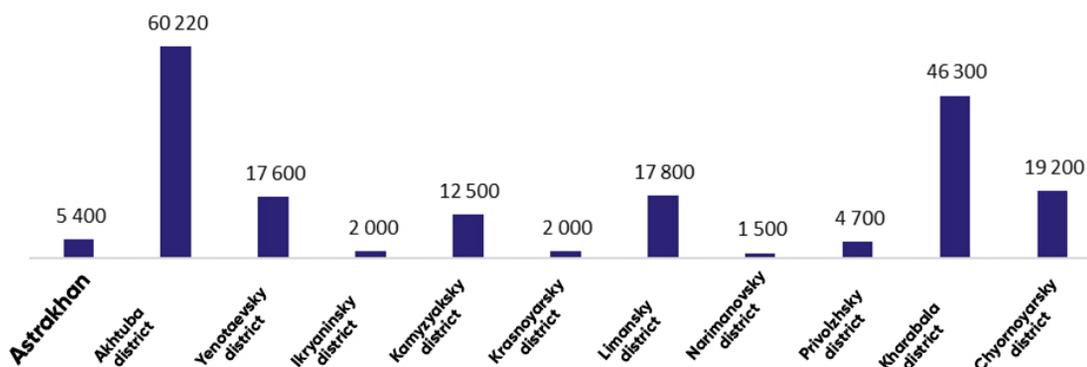
Fig. 160. Scheme of distribution by volume of crop production

¹⁰² According to the data of the Statistical book "The main indicators characterizing the state of agriculture in the Astrakhan Region in 2015-2019".

¹⁰³ According to the data of the Statistical book "The main indicators characterizing the state of agriculture in the Astrakhan Region in 2015-2019".

¹⁰⁴ According to the materials provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.



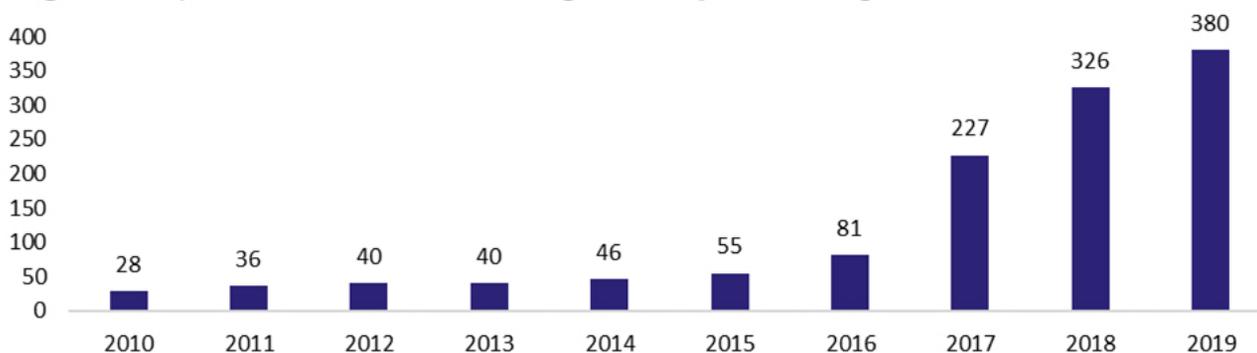
Fig. 162. Capacity of one-time storage of fruit and vegetable products and potatoes in 2019, tons

The leader in vegetable production on the territory of Astrakhan agglomeration is Privolzhsky district, as well as the northern districts of the region: Kharabalinsky, Akhtubinsky, Chernoyarsky and Enotayevsky. These districts produce more than 80% of the total volume of vegetable crops.

Source¹⁰⁵

Simultaneous storage capacity in the region allows planning for more than 40% of the total volume of fruit and vegetable production (excluding early products). Taking into account the region's district specifics, the main share of simultaneous storage capacities is in Akhtubinsk, Kharabalinsky, Limansky, and Enotayevsky districts.

Vegetable processing industry of the region is represented by 15 enterprises, 8 of which are engaged in canning of fruit and vegetable products, 3 — the production of salted food, the rest — freezing of crop products. Production facilities annually process about 400 thousand tons of fruit and vegetable products. The share of raw vegetables sent for processing is about 30% of total production.

Fig. 163. Dynamics of fruit and vegetable processing, thousand tons

Source¹⁰⁶

¹⁰⁵ According to the data of the Statistical book "The main indicators characterizing the state of agriculture in the Astrakhan Region in 2015-2019".

¹⁰⁶ According to the materials of the Strategy for social and economic development of the Astrakhan Region up to 2035.



Potential/Opportunity

High potential for the development of agricultural industries related to processing and implementation of its export potential.

The potential of using science-based modern technologies to increase yields and expand the range of crop production. Stable raw material base.

Potential for involvement of unused land resources into agricultural turnover.

Opportunities for effective application of ecosystem approach.

The potential for the development of industry of deep processing of fruit and vegetable products in the immediate vicinity of a stable raw material base.

Issue/Risk/Restriction

Low investment attractiveness of agricultural industries for capital investment, low investment inflow in the industry of raw fruit and vegetable processing.

High share of unused land resources (arable land) — 50% on average in the region.

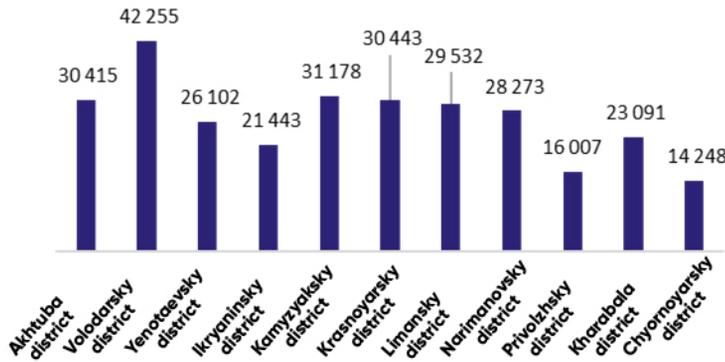
The high share of small farms, the lack of major regional players in the market of crop product processing.

The need for a flexible, coordinated product marketing policy that meets the requirements of the consumer market for agricultural products.



Potential for livestock husbandry development

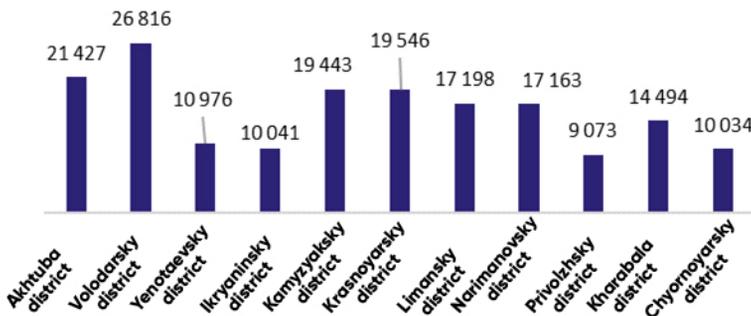
Fig. 164. Livestock of farm animals (cattle) in 2019, heads



Source¹⁰⁷

The leading districts in terms of livestock, which account for about 50% of the region's farm animals: Volodarsky, Kamyzyaksky, Akhtubinsky and Krasnoyarsky.

Fig. 165. Milk production volumes in 2019, tons



Source for Fig. 160.¹⁰⁸

The volume of milk production is concentrated mainly in personal subsidiary economy, which account for 78% of the volume and used for in own consumption. There are 14 processing companies in the region with a processing capacity of about 6 thousand tons engaged in the production of dairy products. The volume of processed raw materials in 2019 was about 3 thousand tons, which indicates the low level of availability of dairy products to the population, as this direction is a high-cost for the region.

4th

place is occupied by the Astrakhan region in the Russian Federation for the number of goats and sheep — 1404 thousand heads in 2019. It has export potential

30

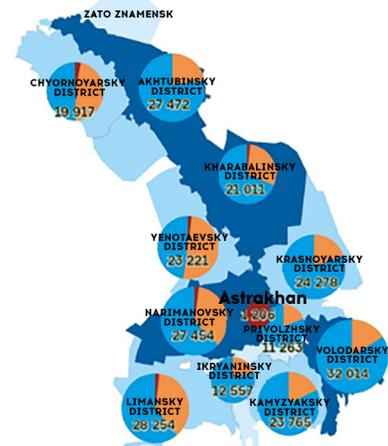
enterprises for slaughtering and primary processing of livestock and 17 enterprises for deep processing of meat products in the Astrakhan Region

177 thousand tons/year

milk production in 2019.

410 million pcs.

egg production in 2019.



Symbols:

animal husbandry:

- meat
- milk
- wool

5 500 Production volumes, tons

Cost of livestock products, million rubles:

- <1000
- 1000 - 2000
- >2000

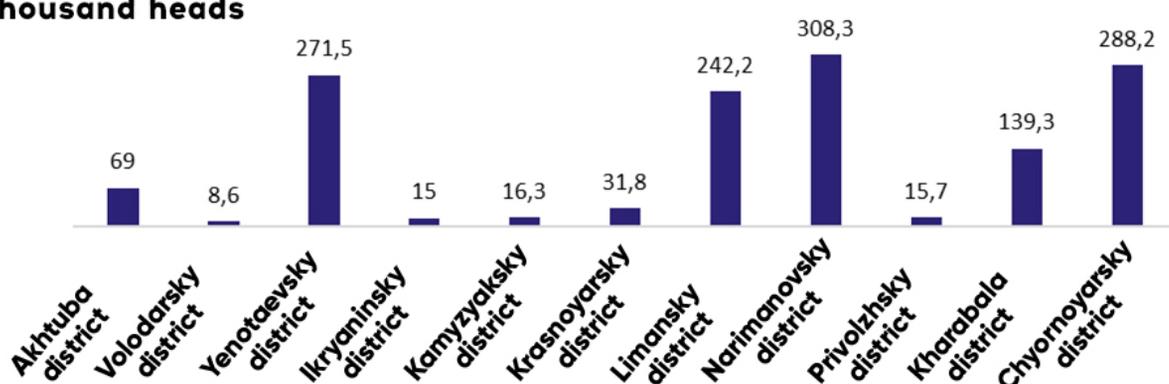
Fig. 166 Scheme of distribution of livestock production

¹⁰⁷ According to the materials provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.

¹⁰⁸ According to the materials provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.



Fig. 167. Number of sheep and goats in 2019, thousand heads



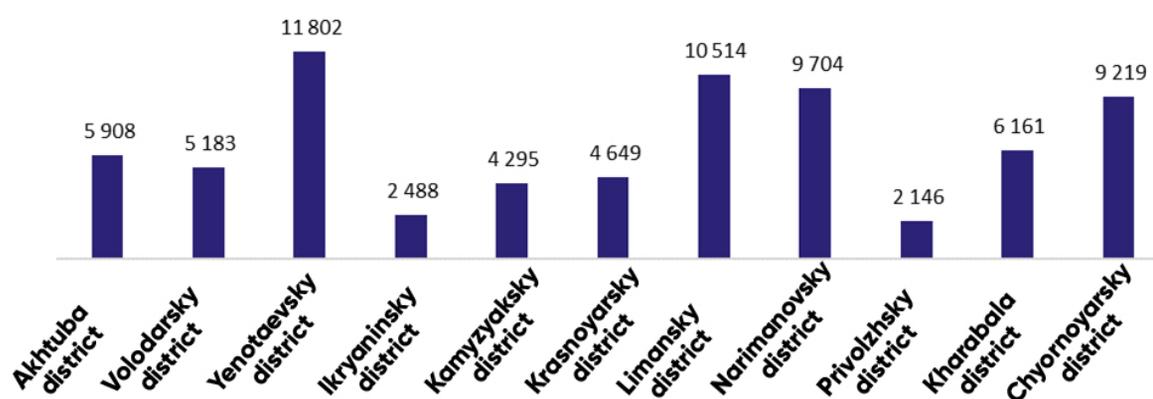
The Astrakhan Region ranks 4th in Russia by the number of sheep and goats and has significant export potential. The production of sheep and goat meat in 2019 was 13.6 thousand tons in carcass weight or 170% of the need. In turn, the production volume of wool amounted to 2.9 thousand tons, including 95 tons of fine and semi-fine wool. There is a need to reconsider the role of the sheep and goat segment of industry in terms of adaptation to domestic and foreign markets, to search for opportunities to enter new markets.

Yenotaevsky, Limansky, Narimanovsky and Chernoyarsky districts are leading in the production of livestock and poultry for slaughter.

The meat processing industry is represented by 30 enterprises for slaughtering and primary processing of livestock and 17 enterprises for deep processing of meat products.

Production of livestock and poultry for slaughter in 2019 amounted to 72.4 thousand tons in live weight, 35.9 thousand tons in carcass weight or 36 kg per capita. Based on the norms of meat consumption per year (an average of 70 kg per capita) self-sufficiency is 51%, including self-sufficiency of beef is 88%, mutton 170%, pork 3%, meat and poultry 5%. It is necessary to create new production facilities in the region, specialized in the production of broiler meat, as well as the additional enterprises for breeding and fattening of cattle.

Fig. 168. Meat production volumes in 2019, tons



Potential/Opportunity

High potential for the development of agricultural industries related to processing and the use of the export potential in crop production.

Export potential of sheep breeding products, increasing the role of sheep and goat breeding in the agroindustrial complex of the region, adaptation to domestic and foreign markets, entering new markets.

Improvement of competitiveness of dairy cattle breeding by improving the material base, development of selective breeding work, increasing the number of dairy cows, their productivity and creation of new production facilities for milk production.

Opportunities for effective application of ecosystem approach.

The potential to increase the meat consumption reserve by over 90 thousand tons per year due to consumption of local local cuisine with activation of tourism sector.

Issue/Risk/Restriction

Unrealized potential of agricultural exports. Insufficient degree of development of high-added value production in agro-industrial complex industries.

Underutilized synergistic potential of agricultural industries.

Lack of unique competitive advantages.

A significant amount of the produced meat is used for domestic consumption by residents of the region, and there is a lack of sufficient reserves and stocks to be sent for processing.

Milk and dairy products are produced mainly by small farms in exact amounts that are needed within the districts.

The need for special measures to enter large agricultural marketing outlets.

Limited land resources for livestock development.

Low attractiveness of agriculture for young and highly qualified specialists.



3.4.4. Potential for the fishing and fish farming development

0.3% GRP

is accounted for by the fishery complex in the total structure of GRP of the region

>200

economic entities engaged in fishing and fish farming in the region

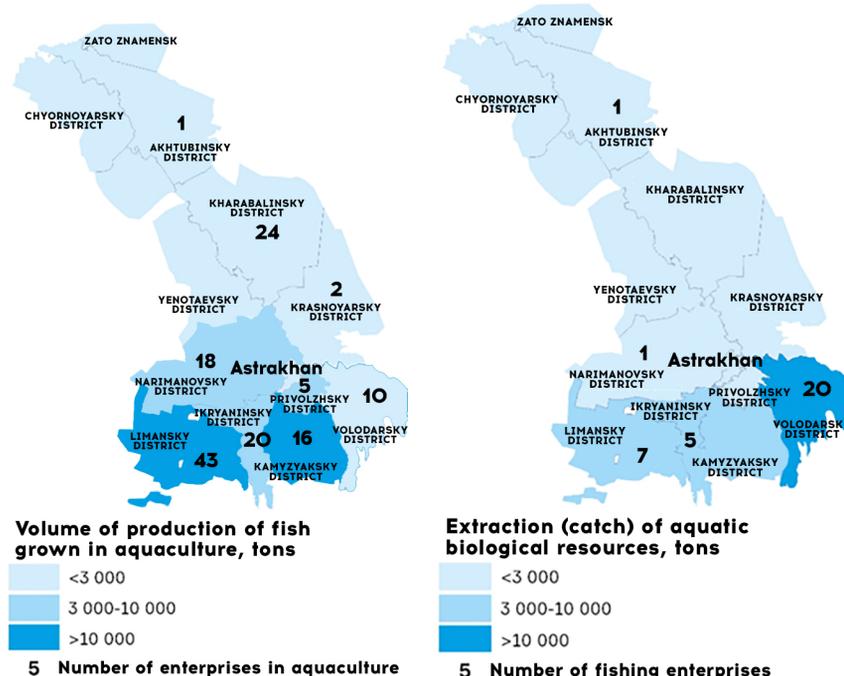


Fig. 169. Scheme of fish farming and fishing development potential¹⁰⁹

Fig. 170. The average number of employees of organizations in 2019, people.

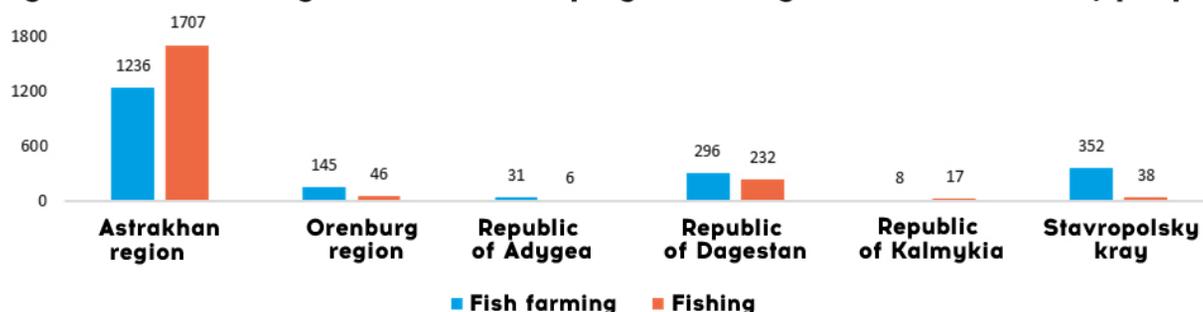
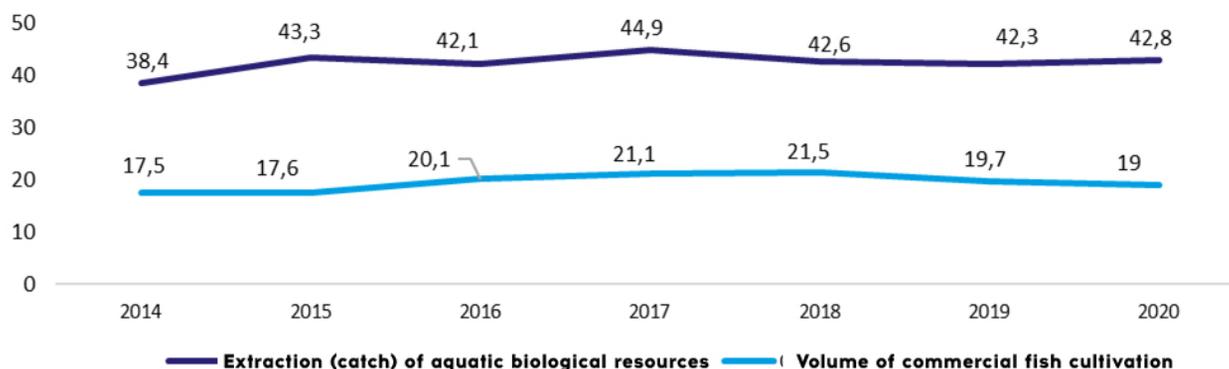


Fig. 171. Dynamics of the volume of catch of aquatic biological objects and the volume of grown aquaculture objects for 2014-2020, thousand tons



¹⁰⁹ According to the data of the Statistical book "The main indicators characterizing the state of agriculture in the Astrakhan Region in 2015-2019".



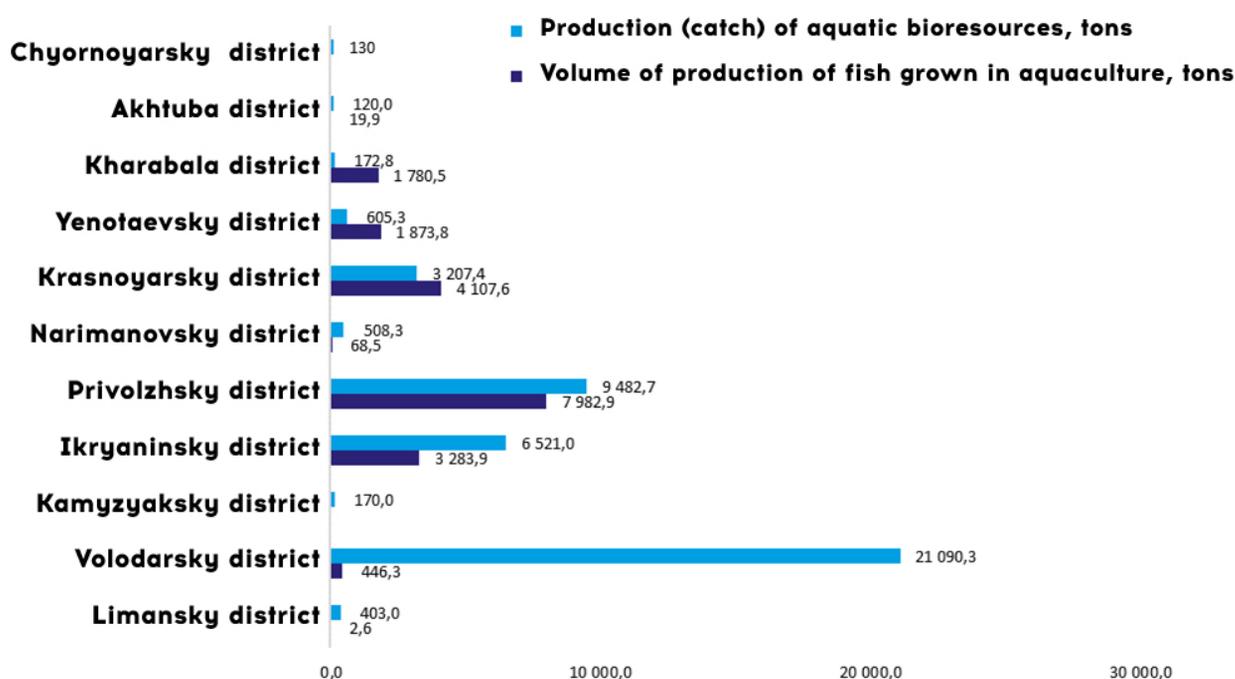
Fisheries industry of Astrakhan Region takes one of the leading places in the fishing industry of Russia and the region's economy. The level of availability of fish and fish products to the population in the region is about 160%.

Fishing and fish farming have the potential to increase production.

The leading districts with economic potential in the fishing industry are located in the Volga Delta: Volodarsky, Kamyzyaksky, Ikryaninsky, Limansky and Narimanovsky.

Aquaculture is a promising direction against the background of depletion of fish reserves and reduction of species diversity of biological resources.

Fig. 172. Development of the fishery complex of the Astrakhan region in 2019, tons



Potential/Opportunity

Unique reserves of aquatic biological resources of the Volga Delta and the coastal part of the Northern Caspian Sea, adjacent to the region.

Fishing and fish farming have the potential to increase production.

Aquaculture is a promising direction against the background of depletion of fish reserves and reduction of species diversity of biological resources.

Issue/Risk/Restriction

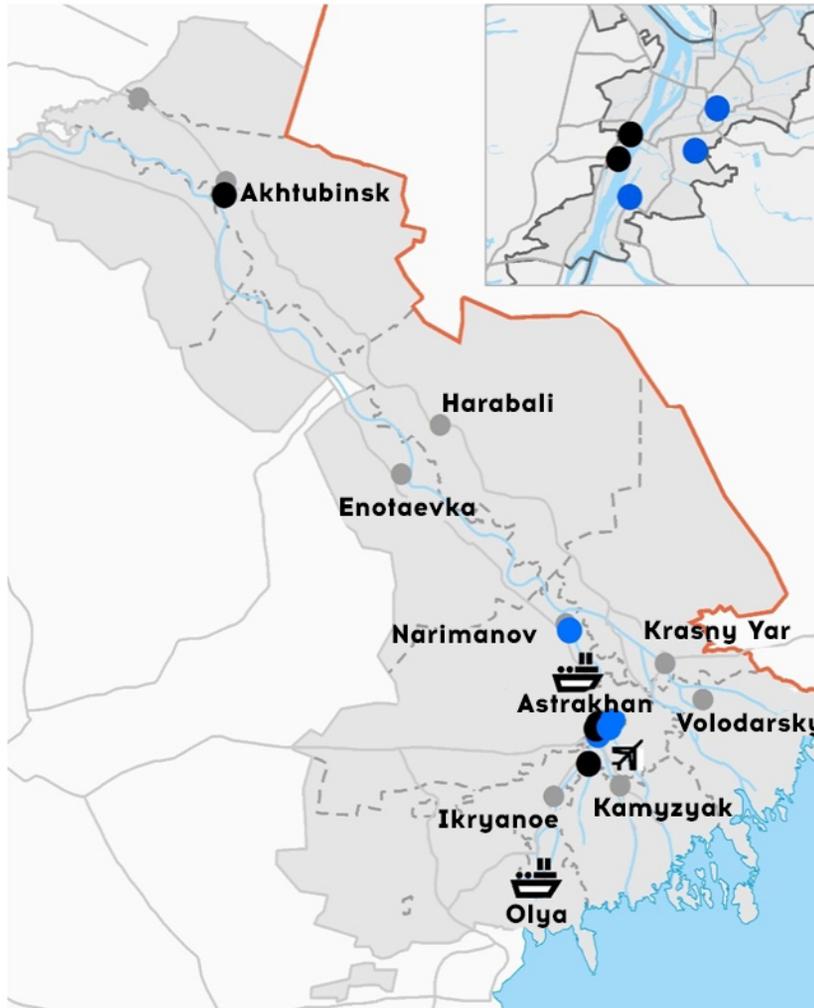
It is necessary to optimize the spring flood schedule in favor of creating favorable conditions for natural spawning of semi-anadromous and river fish species.

To preserve the natural population of valuable fish species (Caspian roach, pike-perch, carp, bream) it is necessary to increase the volume of artificial reproduction.

The region's fisheries industry is mainly represented by small businesses, which account for 50% of the volume of fish production.



3.4.5. Shipbuilding development potential



- Symbols:**
Major transport hubs:
 ✈️ airport
 🚢 port
 ● Construction of ships, vessels and floating structures
 ● Repair and maintenance of ships and boats

1.5% GRP

the share of shipbuilding enterprises in the structure of GRP

486%

exceeding of the planned growth rate of civilian ships production as compared to defense equipment for 2020-2032 in the Russian Federation

120

of ships requiring replacement in the fishing industry in the Volga-Caspian, Azov-Black Sea and Western basins, as of 2019.

Fig. 173. Scheme of concentration of shipbuilding enterprises

Fig. 174. Production of vehicles and equipment in 2018, RUB million

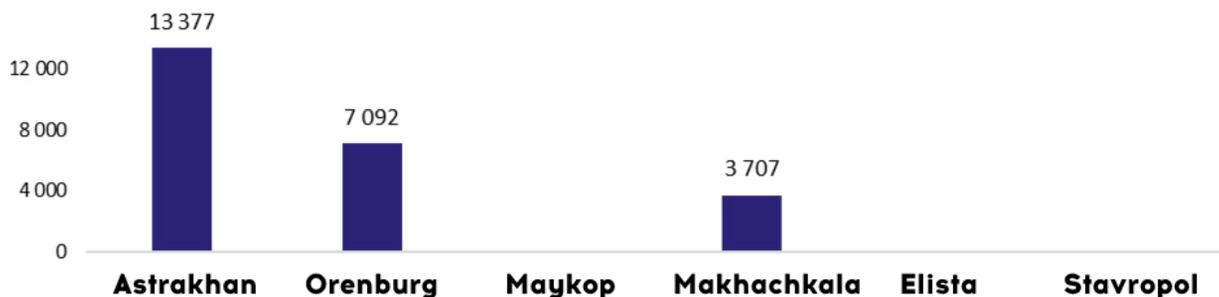
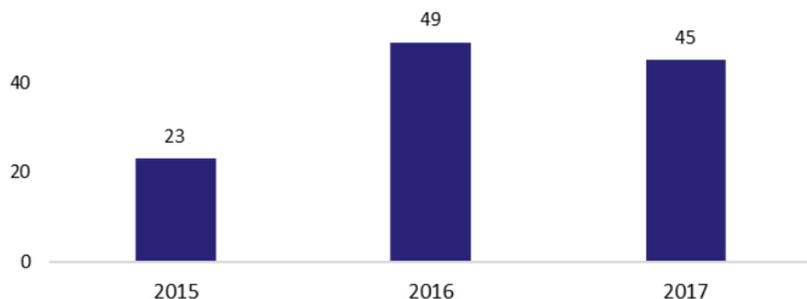
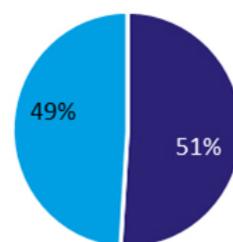


Fig. 175 JCS "United Shipbuilding Corporation" revenue, billion rub.



The importance of the task of diversifying the public tendering through civilian areas of production, given the planned increase in the volume of civilian products more than 4 times by 2032 compared to 2018.

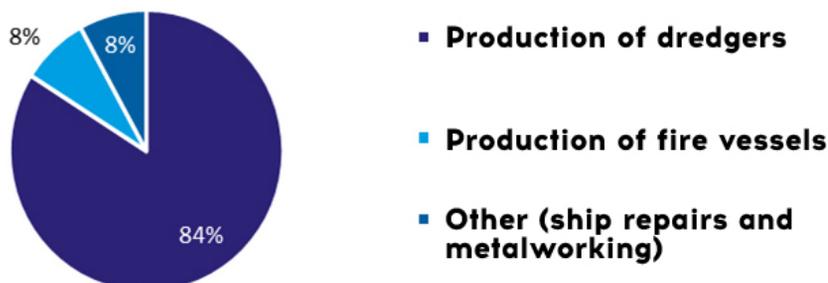
Fig. 176 Revenue structure of enterprises in the shipbuilding and ship repair segment by the criterion of enterprises belonging to large industrial groups at the end of 2019



- United Shipbuilding Corporation
- Other owners

The low level of diversification of the public tendering by types of shipbuilding products reduces the sustainability of the industry.

Fig. 177. Structure of government orders executed by the largest enterprises in the industry, accounting for 90% of revenue, end of 2020.



- Production of dredgers
- Production of fire vessels
- Other (ship repairs and metalworking)

Dredgers diagram



Potential/Opportunity

Potential to increase production capacity and professional competencies (availability of SEZ "Lotos").

Issue/Risk/Restriction

Unstable demand, dependence on large producers and consumers.

Risks of losing qualified personnel, uncomfortable conditions for labor migration (lack of conditions for fast hiring of personnel with the growth of demand for products).

Shallowing of the Volga-Caspian marine navigation channel.

3.4.6. Scientific and innovative and technological potential

Astrakhan Region ranks 49th in the rating of innovative development of the subjects of the Russian Federation¹¹⁰, which generally corresponds to the position of the Astrakhan Region in other indicators of socio-economic development.

If we look at the innovation activity of Astrakhan Region in comparison with the reference group of cities, we can say that, in this group, the region is at an average level (Fig. 178).

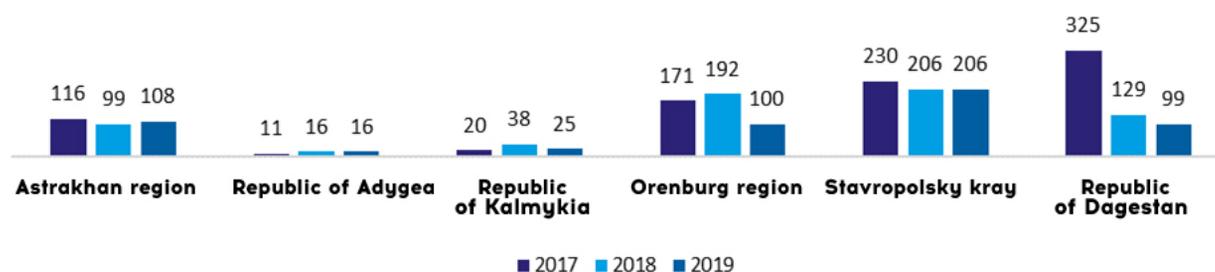
407

patents from scientific organizations

6

Research institutes and research centers in the region

Fig. 178. The number of patent applications filed for inventions and utility models on average per year for 2017-2019, units.

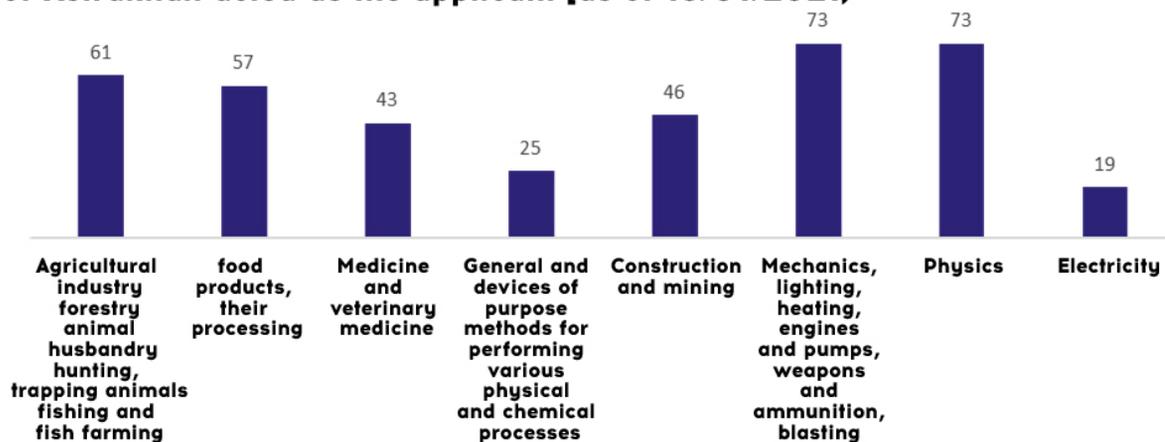


The largest number of patents is registered by Astrakhan Region organizations in such areas as mechanics, lighting, heating, engines and pumps, weapons and ammunition, demolition works, physics and agriculture (Fig. 179).

¹¹⁰ <https://issek.hse.ru/mirror/pubs/share/315338500>



Fig. 179. The number of Russian patents where scientific organizations of Astrakhan acted as the applicant (as of 13/01/2021)



The Astrakhan Region's position looks more significant in the context of another indicator of innovation development level in the region: the share of organizations implementing innovations, which indicates a good potential of Astrakhan Region to implement new knowledge in business (Fig. 180).

Fig. 180. The proportion of organizations engaged in technological innovations in the total volume of surveyed organizations in 2019, %

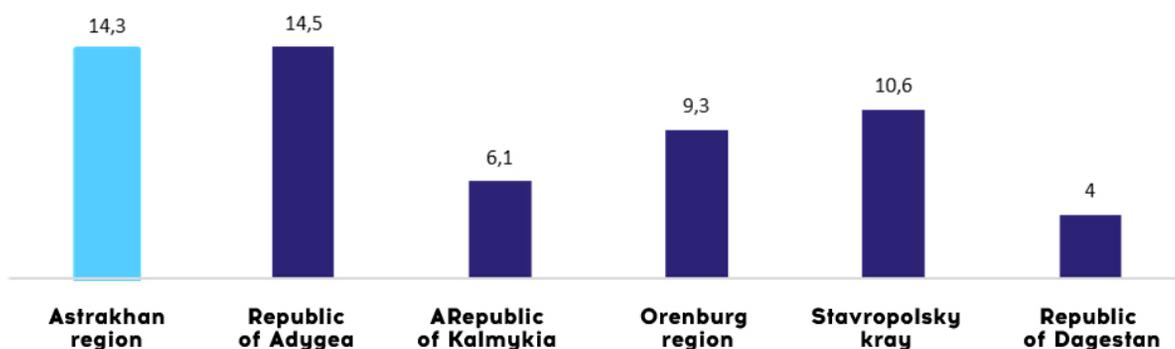
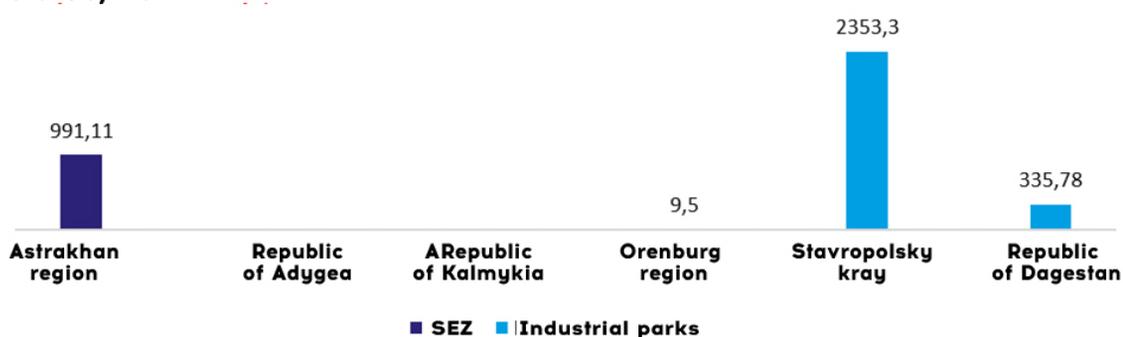


Fig. 181. The area of SEZ and industrial parks that have a legally fixed status, ha



Since 2014 industrial-type SEZ "Lotos" operates on the territory of Narimanovsky district of Astrakhan Region with officially approved status and an area of 991.11 ha.

Potential/Opportunity

Scientific potential of the city of Astrakhan (availability of advanced specialty options in universities).

Existing base of scientific developments, including in the field of agriculture and fish farming.

Issue/Risk/Restriction

Shortage of qualified personnel.

The small number of patent applications — almost 2 times lower than in the reference cities.

Lack of collaboration between educational institutions and regional businesses.



3.5. ASSESSMENT OF THE CURRENT LEVEL OF SOCIAL AND ECONOMIC DEVELOPMENT OF MUNICIPAL DISTRICTS INCLUDED IN THE URBAN AGGLOMERATION

To assess the current level of social and economic development of the agglomeration's municipal districts we used 4 categories of indicators, characterizing:

- district's settlement system:
 - population density;
- the state of production in the district and efficiency of business processes:
 - gross added value ¹¹¹per capita;
 - official unemployment rate;
- quality and conditions of life in the district:
 - average monthly wage and its dynamics;
 - availability of housing stock;
 - growth or decline in population due to migration;
- further prospects for the district development in the medium term:
 - dependency ratio;
 - share of investment in fixed capital.

The results of the assessment are presented in graphic form in Fig. 182.

Additional graphic and tabular materials are presented in Appendix 15.

¹¹¹ The aggregate of financial results and payroll funds of organizations registered in the district.



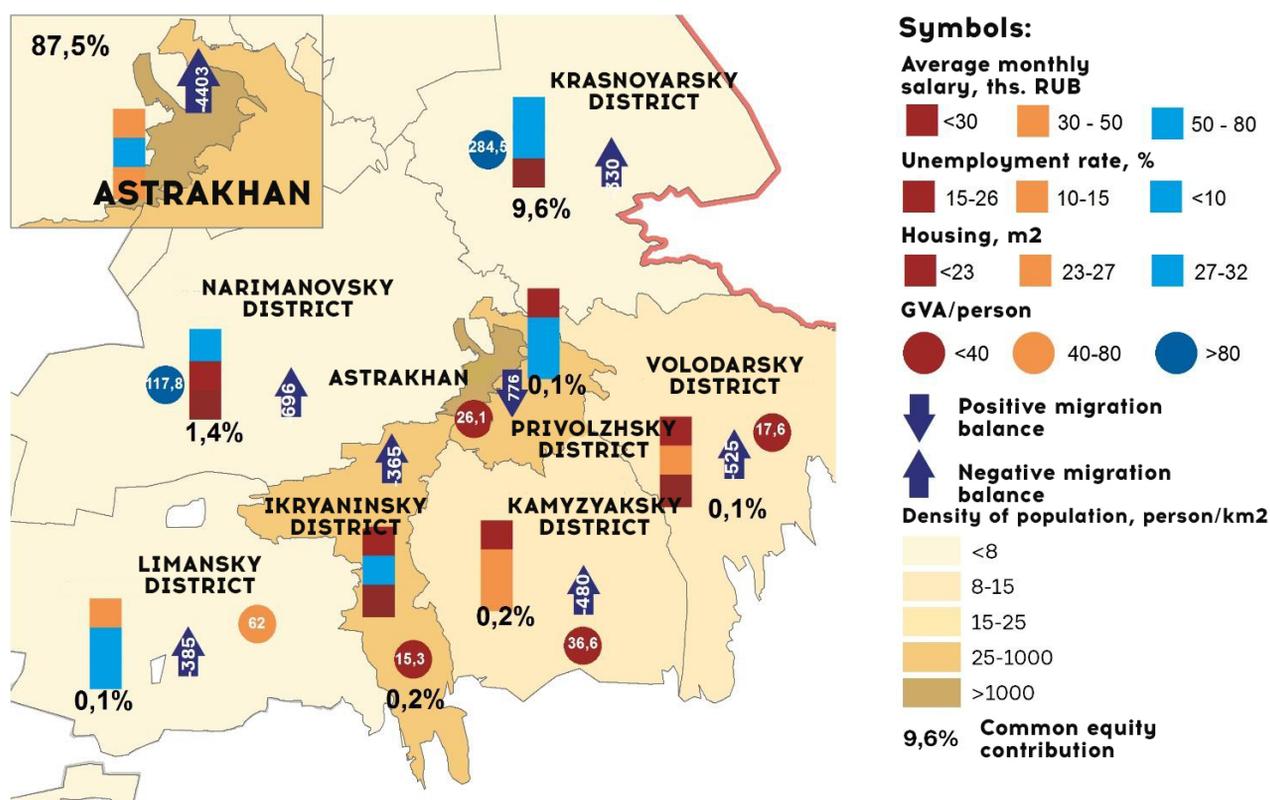


Fig. 182. Differentiation of social and economic characteristics in the territory of the Astrakhan agglomeration

The results of assessment of the current level of social and economic development of the Astrakhan agglomeration municipal districts showed the following:

1. All districts of the Astrakhan agglomeration are characterized by positive dynamics of wages from 2015 to 2019. The Narimanovsky and Krasnoyarsk districts are characterized by a more favorable and efficient business environment, where business success is partially converted into higher wages compared to other districts. However, according to other quality-of-life indicators (such as unemployment and housing stock availability), these districts are lagging behind the regional center and neighboring municipal districts. The same districts are ahead of the others in terms of investment, with a low dependency ratio, indicating that their territory can maintain the leading pace of development.
2. The lowest level of housing stock is observed in Ikryaninsky, Krasnoyarsky and Volodarsky districts. The relatively low levels of unemployment in these territories indicate the possibility of solving this problem by increasing the availability and popularization of mortgage mechanisms.
3. The lowest level of wages is observed in Volodarsky, Ikryaninsky and Kamzyaksky districts. However, Volodarsky district slightly differs from the other two mentioned districts by its lower quality of life indicators and share of investment.
4. Limansky district occupies an intermediate position in terms of added value per capita between Krasnoyarsk and Narimanovsky districts and a group of lagging districts (Ikryaninsky, Kamzyaksky and Volodarsky). The higher dependency ratio in the district is a source of concern, which

clearly points to the need to work with young people to preserve and unlock the area's potential.

Krasnoyarsky, Narimanovsky, Limansky and Privolzhsky districts are among the most favorable from the point of social and economic characteristic assessment.

Krasnoyarsky and Limansky districts are characterized by existing (Astrakhansky GPZ) and future ("Olya" SEZ) points of growth. The peculiarity of development of the Privolzhsky district is the accessibility of the regional center's infrastructure, including places of employment.

Volodarsky and Kamyzyaksky districts are characterized by an overall low level of social and economic development in comparison with the neighboring districts of the Astrakhan agglomeration.

Potential/Opportunity

The possibility of equalizing imbalances in social and economic development within the framework of agglomeration development.

Issue/Risk/Restriction

Migration outflow of population in the territory of municipal districts of the agglomeration, except for Privolzhsky district.

Unequal distribution of the level of average income in the territory of the agglomeration municipal districts is a clear direct proportionality with concentration of large industrial /agro-industrial enterprises.



3.6. ASSESSMENT OF THE PROBLEMS OF INFRASTRUCTURE AVAILABILITY (TRANSPORT, ENGINEERING, AND SOCIAL INFRASTRUCTURE) IN THE MUNICIPAL DISTRICTS THAT ARE A PART OF THE URBAN AGGLOMERATION

To assess the infrastructure availability of the agglomeration municipal districts we used indicator categories characterizing:

- availability of social infrastructure (including educational, health care, culture and sport facilities) to the population;
- availability of engineering infrastructure (water supply, wastewater disposal, heating and gas supply) and the percentage of its wear and tear;
- share of dilapidated and hazardous housing;
- quality of roads and their length.

The results of the assessment are presented in graphic form in Fig. 183. Additional text and tabular materials are presented in Appendix 17.

Table 10. Differentiation of infrastructure availability in the territory of the Astrakhan agglomeration

Municipal district of the agglomeration	Education	Healthcare	Culture	Sports	Utility infrastructure	Transport infrastructure
"Gorod Astrakhan" municipal district	Orange	Orange	Orange	Orange	Orange	Orange
Volodarsky district	Orange	Orange	Orange	Orange	Orange	Orange
Ikryaninsky district	Orange	Blue	Orange	Orange	Orange	Orange
Kamyzyaksky district	Orange	Orange	Orange	Orange	Orange	Orange
Krasnoyarsky district	Blue	Orange	Orange	Orange	Orange	Orange
Limansky district	Orange	Orange	Blue	Orange	Orange	Orange
Narimanovsky district	Orange	Blue	Orange	Orange	Orange	Orange
Privolzhsky district	Blue	Orange	Orange	Orange	Orange	Orange



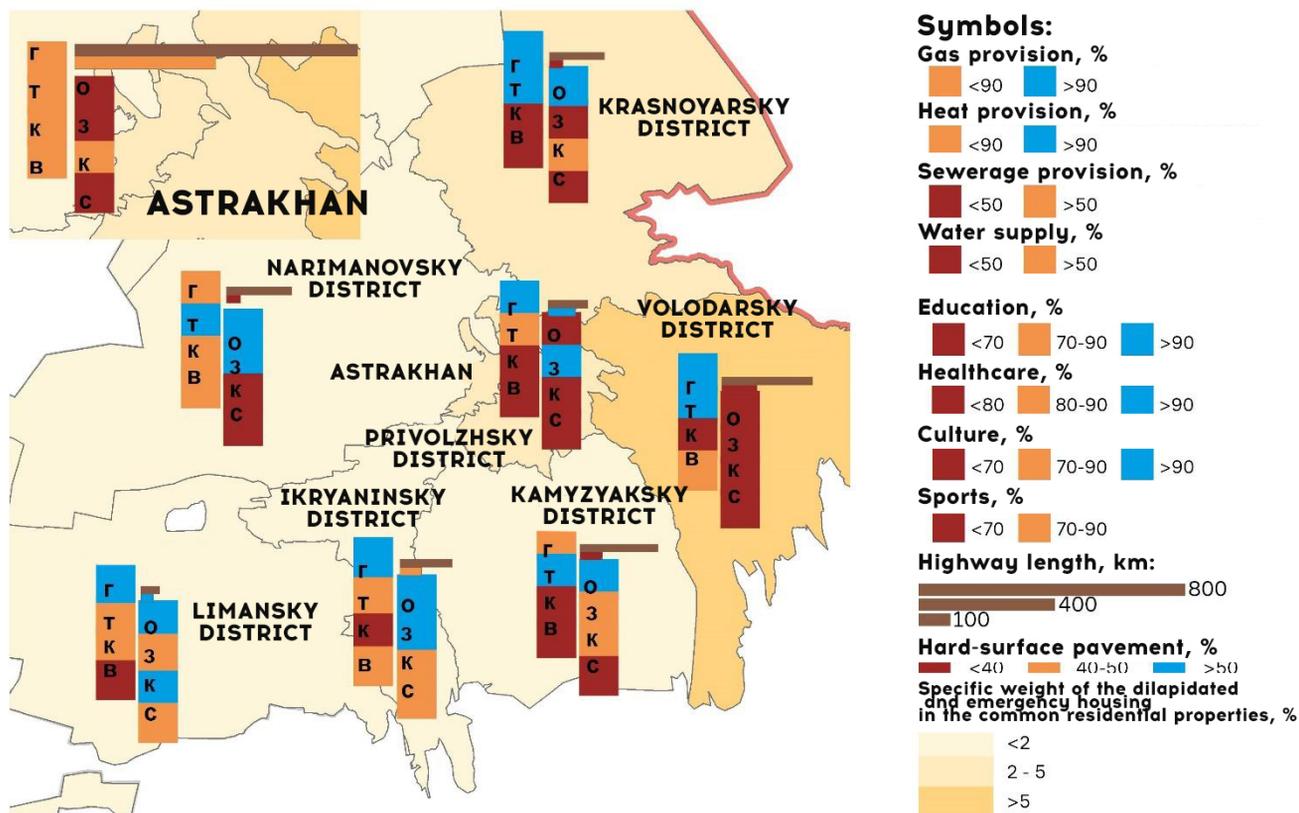


Fig. 183. Differentiation of infrastructure availability in the territory of the Astrakhan agglomeration

Insignificant correlation between the quality of environment and the level of income of the population by district

Differentiation of the level of infrastructure availability by districts:

- Astrakhan and the Privolzhskiy district are characterized by maximum deficits in the availability of social infrastructure;
- Volodarskiy district has the lowest level of infrastructure, the share of dilapidated hazardous housing stock;
- Liman district is characterized by the lowest density of the street and road network in comparison with other districts of the agglomeration;
- Volodarskiy district has the lowest percentage of paved roads out of the total length of the road network in the district, while Privolzhskiy district has the highest percentage.

Potential/Opportunity

Opportunities for creation of joint infrastructure projects as part of agglomeration development.

Issue/Risk/Restriction

The most acute infrastructure problems are related to the low level of availability of engineering and transport infrastructure.

The overall low level of infrastructure availability with insignificant differentiation by districts.



3.7. ASSESSMENT OF THE EFFECTIVENESS OF USE OF THE TERRITORIES OF MUNICIPAL DISTRICTS THAT ARE A PART OF THE AGGLOMERATION FROM THE CITY DEVELOPMENT POINT OF VIEW

In order to determine promising directions for the spatial development of the Astrakhan agglomeration, we analyzed the effectiveness of use of municipal districts' territories that are a part of it in the study.

The total area of the housing stock is 21.0 million m², i.e. 85% of the total area of the housing stock in the region.

Specific feature of the Astrakhan agglomeration is the predominance of individual buildings in the overall structure of the housing stock. This includes the regional center.

In addition, Appendix 16 contains a characteristic of the municipal districts that are a part of the Astrakhan agglomeration in terms of differentiation:

- Analysis of the housing construction rate;
- distribution of the structure of development in the main settlements of the agglomeration by type of housing (individual housing construction, blocks of flats, including the share of hazardous housing).

Reduction of the overall intensity of development of the territory.

Shift of the centers of housing development activity to the outskirts of Astrakhan and to areas located on the outer side of the administrative border in the Privolzhsky and Narimanovsky districts.

The regional center accounts for 64% of the total housing stock in the agglomeration area. The average level of housing is 25.7 m² per person. The high level of housing availability indicates the predominance of individual housing construction in the structure of development (Appendix 16), as well as the presence of non-utilized flat block stock.

In addition to Astrakhan, the role of urban development is also significant in the cities of Narimanov, Kamyzyak, and the village of Krasnye Barrikady. Against the background of little employment in the agricultural sector and small fractional land parcels, the individual housing construction of Astrakhan and the immediate surrounding areas, being rural in form, is in fact a continuation of the urban structure within the process of suburbanization.



The high share of individual residential development is a sign of low population density and, consequently, low efficiency of land use.

In conditions of limited consumer demand, this leads to a low level of infrastructure and environmental quality of areas of individual residential development.

Table 11 systematizes the main competitive advantages of municipal districts in terms of their current city development and social and economic development.

Table 11. Competitive advantages within the agglomeration

Municipal district	Main competitive advantages	Including transport and logistics
Astrakhan	<ul style="list-style-type: none"> ▪ regional center; ▪ high concentration of jobs in the post-industrial economy; ▪ center of attraction for labor migration from the entire territory of the agglomeration; ▪ availability of public institutions of social infrastructure; ▪ concentration of regional budget resources; ▪ potential for implementation of major infrastructure projects; ▪ significant historical and cultural potential. 	<ul style="list-style-type: none"> ▪ combined transport and logistics center of the region (including a cargo hub near the railway stations "Astrakhan-2" and "Kutum").
Narimanovsky	<ul style="list-style-type: none"> ▪ proximity to the regional center; ▪ high rates of housing construction — suburbanization of the regional center; ▪ presence of potential points of growth in the agglomeration: the Special Economic Zone "Lotos", a promising tool for organizing the flow of commuting in the opposite direction (towards Astrakhan), and the "Tinaki" health center. 	<ul style="list-style-type: none"> ▪ transit of the federal highway R-22 "Caspian"; ▪ proximity of the planned Northern Bypass of Astrakhan.
Krasnoyarsky	<ul style="list-style-type: none"> ▪ resource and raw material and industrial specialization (the largest industrial complex of the region, represented by production and gas-processing assets of PJSC Gazprom); ▪ the most important center in terms of jobs; ▪ flow of commuting in the opposite direction (toward Astrakhan). 	<ul style="list-style-type: none"> ▪ transit of the federal highway in the direction of Kazakhstan; ▪ railroad track; ▪ possibility of strengthening the logistics center near the station "Aksarayskaya".
Privolzhsky	<ul style="list-style-type: none"> ▪ close proximity to the regional center, including transport and infrastructure connection with the agglomeration core; ▪ high rates of housing construction — suburbanization of the regional center; ▪ contributes to the active development of the territory and higher-than-anticipated population growth; ▪ presence of potential points of growth of the agglomeration: the airport of Astrakhan and a large recreational area near the village of Yaksatovo. 	<ul style="list-style-type: none"> ▪ infrastructural connection with the agglomeration core (including a cargo hub near the railway station "Kutum").
Volodarsky	<ul style="list-style-type: none"> ▪ agricultural and fishery specialization; 	



Kamyzyaksky	<ul style="list-style-type: none"> high attractiveness for development of recreation and tourism facilities (unique natural and landscape characteristics). 	
Ikryaninsky	<ul style="list-style-type: none"> agricultural and fishery specialization; high attractiveness for development of recreation and tourism facilities (unique natural and landscape characteristics). "Krasniye Barrikady" plant (part of the Caspian cluster based on the SEZ "Lotos"); Lukoil's oil loading terminal is one of the main centers of oil production on the Caspian shelf. 	<ul style="list-style-type: none"> federal highway transit; railroad transit.
Limansky	<ul style="list-style-type: none"> presence of potential points of growth of the agglomeration: the sea port of Olya and adjacent territories; involvement in commuting with Astrakhan, but due to its remoteness and poor transport connectivity, its intensity is lower compared to other territories. 	<ul style="list-style-type: none"> sea port of Olya; availability of a port special economic zone; transit of the federal highway in the direction of the North Caucasus and Azerbaijan; mainline railroad transit.

To achieve the maximum agglomerative effect from the development of the Olya port zone and to increase exports it is necessary to optimize the existing transport accessibility of key areas in terms of the development of the agricultural sector (Ikryaninsky, Volodarsky, Kamyzyaksky) or it is necessary to develop a two-phase logistics system – by engaging the transport logistics of the regional center.

In order to rationalize migration flows it is advisable to consider options for the development of manufacturing complexes and other centers of employment in the territories suburbanized to the regional center, primarily in the territory of Privolzhsky and Narimanovsky districts.

Potential/Opportunity

Prospects for the development of transport and logistics potential in the territories of municipal districts provided with multimodal transport ("Gorod Astrakhan" municipal district, Krasnoyarsky, Ikryaninsky and Limansky districts).

The possibility to optimize the network of passenger transport and to distribute migration flows within the framework of joint transport infrastructure development projects.

Issue/Risk/Restriction

The risk of inefficient use of existing development potential of some municipal districts.



3.8. ASSESSMENT OF THE SOCIAL AND CULTURAL ASPECTS OF REGIONAL DEVELOPMENT, INCLUDING AN ASSESSMENT OF TANGIBLE AND INTANGIBLE HERITAGE AND SYMBOLIC CAPITAL THAT CONTRIBUTE TO THE AGGLOMERATION DEVELOPMENT

In order to comparatively characterize the symbolic capital of the territory of Astrakhan agglomeration and to identify potential areas of tourist development, 3 key components were analyzed for each municipal district with subsequent ranking according to the sum of points (Fig. 184).

1. Tourism potential:

- cultural heritage sites (architectural, historical and archaeological monuments);
- objects of intangible heritage (traditions, customs, holidays, performing arts, traditional economic culture and folk crafts);
- natural landmarks;
- ethnocultural identity.

2. Tourism draw:

- interest in the municipal district as a place of rest and recreation¹¹².

3. Infrastructure development level:

- number of public accommodation facilities;
- number of cultural and educational institutions.

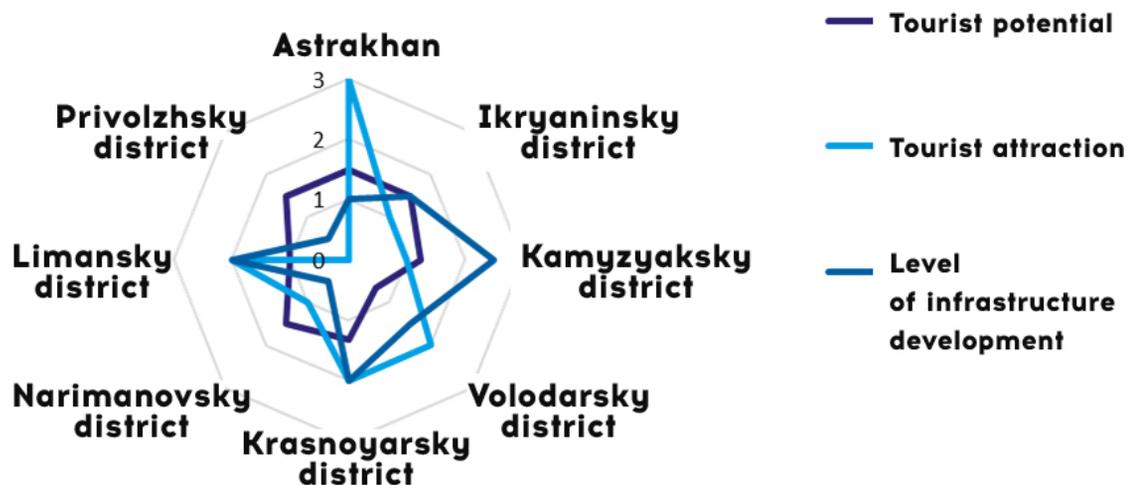
720

cultural heritage sites on the territory within the agglomeration

>14

of search queries according to Yandex.Wordstat

Fig. 184. Socio-cultural relations of agglomeration areas



¹¹² According to the number of queries based on Yandex.Wordstat, by keywords: "Recreation in + the name of the area".



Lower tourist potential in Limansky and Volodarsky districts is caused by a small number of cultural heritage sites and relatively weak use of ethnic and cultural potential (diversity of nationalities, representation of performing arts, holidays and ceremonies, traditional economic cultures and crafts, oral folklore, etc. in the event calendar).

Astrakhan, Krasnoyarsky, Limansky and Volodarsky districts are characterized by tourism draw (external demand), which is associated with the popularity of excursion and cognitive, fishing and hunting tourism in the districts.

The development of culture and tourism infrastructure is primarily required in Narimanovsky and Privolzhsky districts, considering the complex formation of a tourist product of the Astrakhan agglomeration¹¹³.

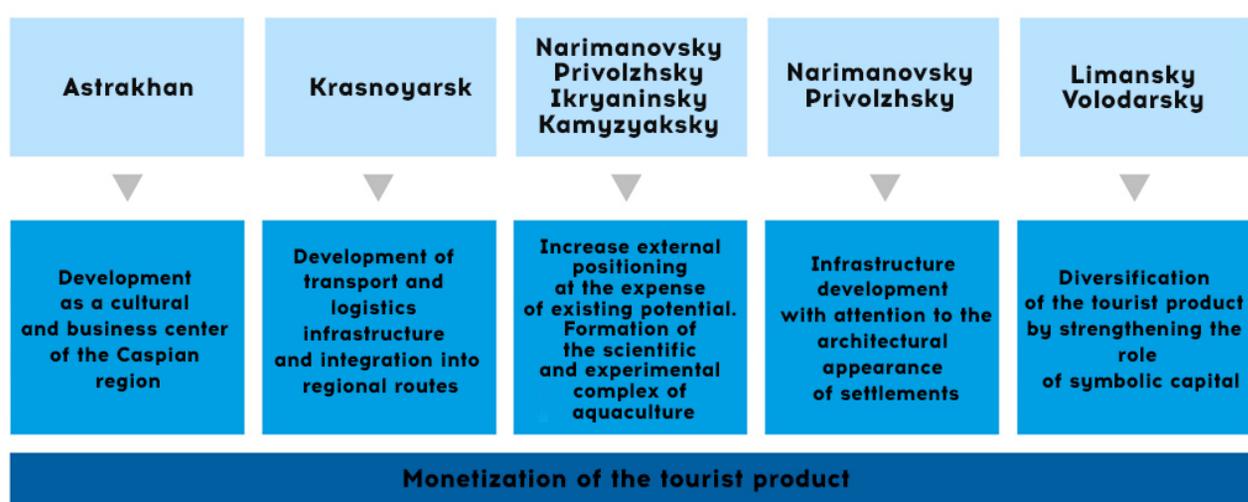


Fig. 185. Directions for monetization of the tourist product

¹¹³ Within the framework of the state program "Development of Culture and Tourism in the Astrakhan region", approved by the Government of the Astrakhan Region as of 12.09.2014 No. 388-P, it is planned to build 18 municipal houses of culture: Ikryaninsky district – 2 pcs, Kamizyaksky district – 5 pcs, Krasnoyarsky district – 2 pcs, Narimanovsky district – 1 pc, Privolzhsky district – 5 pcs, Kharabalinsky district – 1 pc, Chernoyarsky district – 1 pc, Volodarsky district – 1 pc.

3.8.1. Proposals for points of growth in the sphere of culture and tourism in the Astrakhan agglomeration

Based on the conclusions about the tourist potential of the Astrakhan Region, taking into account the strategic mission and project directions of social and economic development of the Astrakhan Region Strategy until 2035, including measures for construction, reconstruction and overhaul of state and municipal cultural and art institutions, **creating conditions for the conservation and use of sites of historical, cultural and archaeological heritage, development of a competitive tourist industry as key points of growth for the development of social and cultural relations of the Astrakhan agglomeration we should consider the following territories:**

1. The territory: Narimanovsky district, "Solyansky Selsovet" municipal district, "Tinaki" Spa Garden, late 19th — early 20th centuries, "Tinaki-1" on the right bank of the Volga River — Tinaki Mud Baths of the welfare board, late 19th century, 1900-1913 — the cultural heritage object of regional significance.

Direction of development: primary wellness tourism.

Scale: interregional.

The object is classified as a park and garden monuments — it is the only monument of this type in the Astrakhan Region.

On the map of the municipal district settlement boundaries, the territory in question falls within the boundaries of natural areas under special protection "Tinaki Lake Natural Landmark" and "Tinaki Resort Arboretum Natural Landmark".

The boundaries of the landmark have been approved by the Decree of the Department of State Protection of Cultural Heritage of the Astrakhan region dated 23.10.2019 No. 020-P.

The territory is located near the city of Astrakhan. The church building was handed over to the church members, and with allocation of the funds for its restoration.

Tinaki is one of the country parks of historic Astrakhan. The survived fragments of buildings will allow to restore the historical appearance of the resort. Combination of historical appearance and natural monuments will make Tinaki a hallmark of resorts in the Astrakhan Region.

2. Territory: Krasnoyarsky district, Krasny Yar village, Sovetskaya st., Generala Tutarinova st., Molodezhnaya st. A landmark of regional significance, historical and architectural complex of the historical center of the Krasny Yar village.

Direction of development: cultural and educational tourism.

Scale: intraregional.



<http://www.iworker.ru/post/388369>



<https://mo.astrobl.ru/mokrasnojarskijsselsovet/node/3>



Developmental prerequisites:

- integrity of fragments of the sight's historical development;
- modern promenade;
- development of the local history museum, opened in 1970. The museum features archeological findings from the period of the Golden Horde, and exhibits telling the history of the Region;
- historical connection with the Great Silk Road (the old road to Khiva and Bukhara, which was used by camel caravans, passed through Krasny Yar);
- pontoon crossing while inconvenient for local residents is perceived as a tourist attraction.

For the purposes of comprehensive protection and development, it is necessary to establish boundaries that approve the subject of protection and requirements for maintenance regimes and city planning regulations for the territory of the sight.

3. Territory: Ikryaninsky district, Ikryanoye village

Direction of development: educational and event tourism.

Scale: intraregional.

Developmental prerequisites:

- transport accessibility from Astrakhan (40 km);
- Fishing History Museum, founded in 1987, — the only thematic museum in Russia. The museum offers master classes in weaving from willow and chakan (cattail).

Restoration of sturgeon population and activities of the Aquaculture Research and Experimental Complex "BIOS" will allow developing cognitive tourism with organization of educational excursions for schoolchildren and improving the quality of tourist infrastructure.

4. Territory: Privolzhsky district, Nachalovsky village council.

Direction of development: cultural and educational tourism.

Scale: intraregional.

Developmental prerequisites:

- rapidly developing historic village, located 14 km from Astrakhan and directly connected with the city;
- House and outbuilding of the Akhmatov School of Gardening, Horticulture and Viticulture, 1909, — the cultural heritage site of regional importance (restoration is underway).

It is necessary to establish zones of protection of the cultural heritage site, in order to preserve the exact scale of historical environment and views opening at the monument.

Organization of an agricultural and local history museum in the building of the Akhmatov School of Horticulture, Gardening and Viticulture.

Organization of demonstration gardens at the museum.

5. Territory: Privolzhsky district, Yaksatovo village.



<http://astrafishka.ru/>



<https://kartarf.ru/dostoprimechatelnosti/177790-ahmatovskaya-shkola-sadovodstva-ogorodnichestva-i-vinogradar>

Direction of development: cultural and educational tourism.

Scale: intraregional.

Developmental prerequisites:

- historical village located 17 km from Astrakhan and directly connected with the city;
- pragmatic use of the territory between the river and the highway, which was used for children's camps and sports bases.

For this area, it is possible to develop an architectural theme of the entrance constructions to the territory from the highway, as well as:

- to preserve the entrance to the territory of the tourist complex "Druzhba";
- to build a water park, designed for year-round use;
- to develop a sports base focused on water sports.

Development of these points of growth along with formation of a diversified map of tourist routes based on the qualitative characteristics of the territory's symbolic capital (Fig. 186) will increase the overall social and economic efficiency of the Astrakhan agglomeration as a result of the following:

- increased significance and recognition of the agglomeration's districts;
- inclusion of the most significant objects of the region in ethnographic and cultural and cognitive intraregional tourist routes;
- preserving the integrity and authenticity of the historic environment;
- promotion of the traditions of national crafts of peoples living in the territory of the agglomeration settlements.



https://www.komandirovka.ru/cities/yak-satovo_astr_obl/#anchor_map

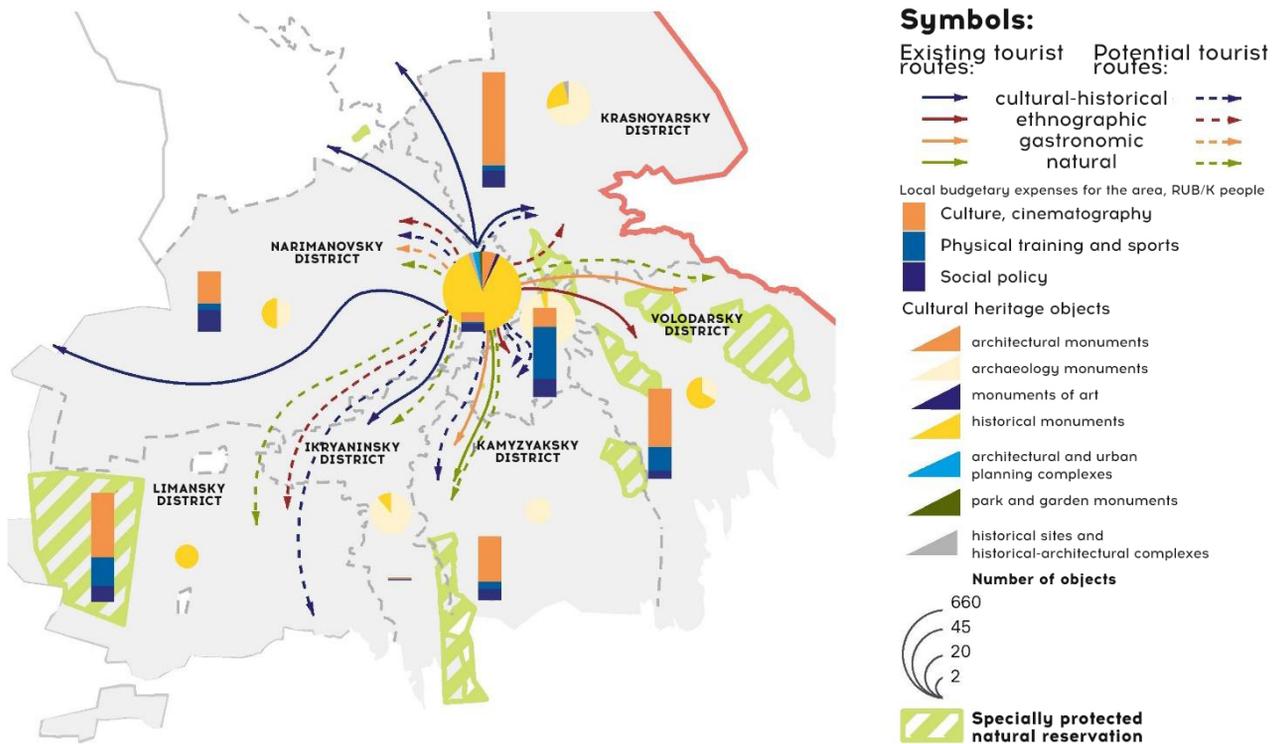


Fig. 186. Social and cultural potential for creation of a comprehensive tourist product



3.9. ASSESSMENT OF DEVELOPMENT OF KEY MANUFACTURING AND TERTIARY INDUSTRIES OF THE ECONOMY, IDENTIFICATION OF SECTORS OF PERSPECTIVE SPECIALIZATION OF THE ECONOMY OF MUNICIPAL DISTRICTS THAT ARE A PART OF THE AGGLOMERATION. IDENTIFICATION OF INDUSTRIES THE MOST AFFECTED BY AGGLOMERATION EFFECT

The purpose of this subsection of the Study is to assess the potential prospects of development of key sectors of manufacturing and tertiary industries in the Astrakhan agglomeration and to identify those that can provide the most significant agglomeration effect.

For the assessment we identified a number of industries meeting the following requirements:

- traditional promising industries of specialization;
- competitive advantages and export potential.

As a result, the following list of industries was formed for analysis.

Manufacturing industries:

- production of agro-industrial products: crop production, vegetable processing;
- production of fish food products, production of fish grown in aquaculture, industrial fishing;
- machinery-producing industry: shipbuilding;

Tertiary industries:

- logistics;
- tourism.

Prospects for development of the said manufacturing and tertiary industries of the Astrakhan agglomeration economy are analyzed in the framework of this study in subsections 3.9.1-3.9.5.



3.9.1. Manufacturing: specializations of districts

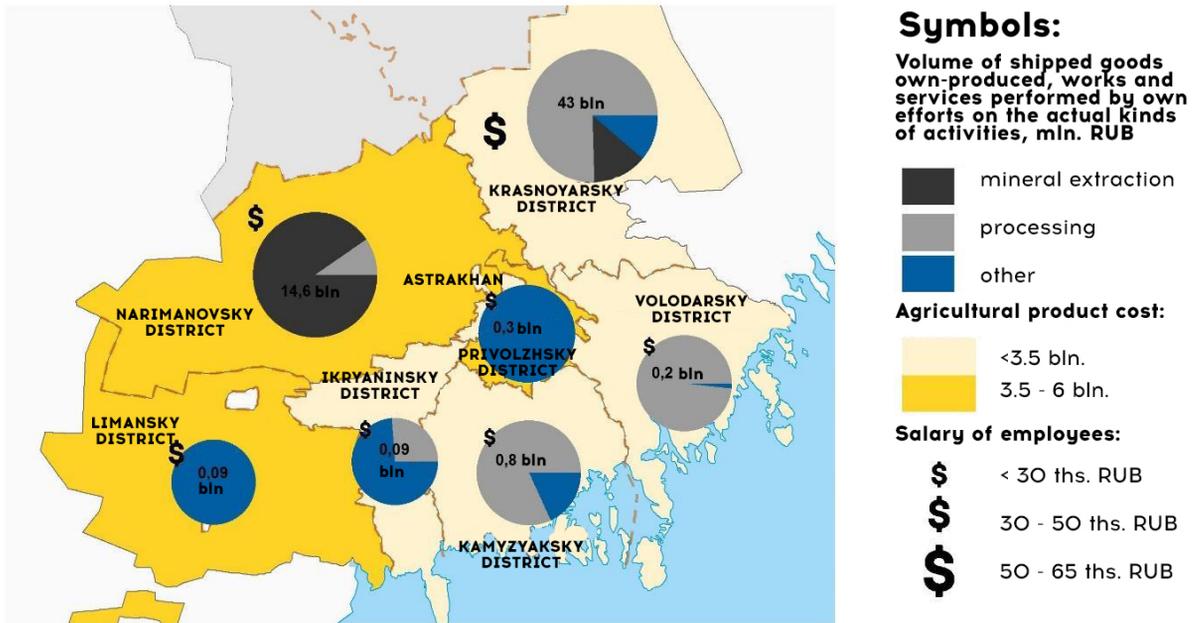


Fig. 187. Scheme of differentiation of manufacturing industries in the Astrakhan agglomeration

A significant share in the manufacturing is occupied by the types of economic activity such as "production of petroleum products" and "production of chemicals and chemical products", which are formed by the only processing company in the oil and gas sector of the region — Astrakhansky GPZ branch of OOO "Gazprompererabotka", which produces a limited range of products.

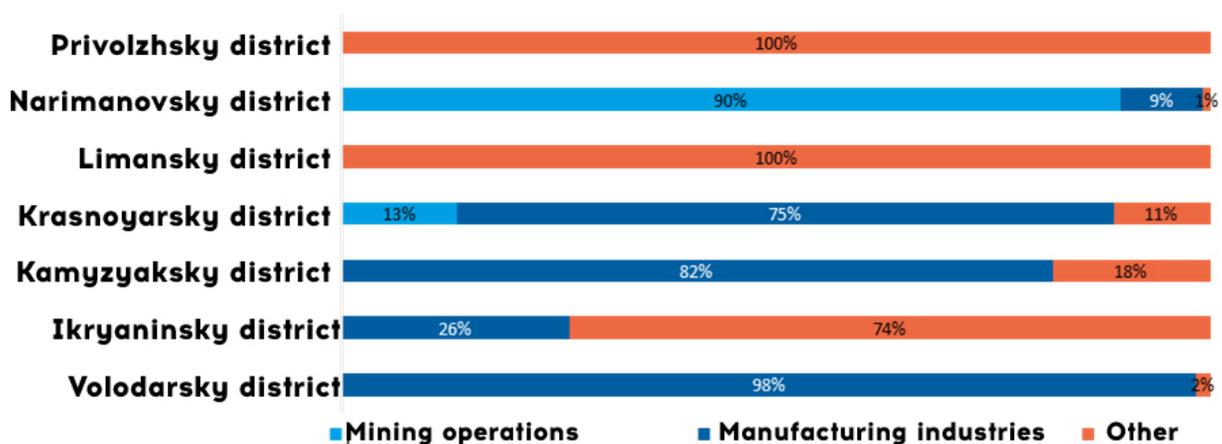
4.3%

— the share of manufacturing in the structure of the region's GRP 2019

45%

of manufacturing in the value of the region's manufacturing shipments is accounted for by the agglomeration districts in 2019

Fig. 188. The ratio of mining and processing industries in the total volume of shipped goods of own production in 2019, %



45% of manufacturing companies are located in the districts of Astrakhan agglomeration, most of them (42.4%) belong to Krasnoyarsk district (OOO "Astrakhansky GPZ"), 1.8% — to Narimanovsky district (shipbuilding); 1.3% — to Kamyzyaksky, Volodarsky and Ikryaninsky districts (processing of agricultural and fish products).

Table 12. Specializations of Astrakhan agglomeration municipal districts in the sphere of manufacturing¹¹⁴

Districts of the Astrakhan agglomeration	Manufacturing industries			
Narimanovsky district	Provision of drilling services related to oil, gas and gas condensate production	Shipbuilding, repair and maintenance of ships and boats	Manufacture of rubber and plastic products	Beverage production, provender milling
Ikryaninsky district	Fish processing			
Kamyzyaksky district	Fish processing	Repair and maintenance of ships and boats	Production of textiles	
Krasnoyarsky district	Petroleum processing			
Limansky district	Crop production			
Volodarsky district	Fish processing			
Privolzhsky district	Crop production			

Potential/Opportunity

The agglomeration has districts with a pronounced specialization in the processing of agricultural and fish products (Volodarsky and Kamyzyaksky districts).

Points of concentration of other manufacturing industries: Krasnoyarsk district (production of chemical products, OOO "Astrakhansky GPZ") and Narimanovsky district (production of machinery and equipment in shipbuilding, OAO "SSZ "Lotos", AP "YuCzSS").

Issue/Risk/Restriction

Insufficient degree of development of high-added value production in agro-industrial complex industries, low share of full-cycle processing industries.

There are no manufacturing industries in the agglomeration districts, or they account for a small share in the Limansky, Privolzhsky, and Ikryaninsky districts.

¹¹⁴ This was compiled on the basis of raw data provided by industry ministries of the Astrakhan region, as well as accounting statements of the companies from the "TASS-BIZNES" database <https://tassbiz.ru/>



3.9.2. Agro-industrial complex: crop production

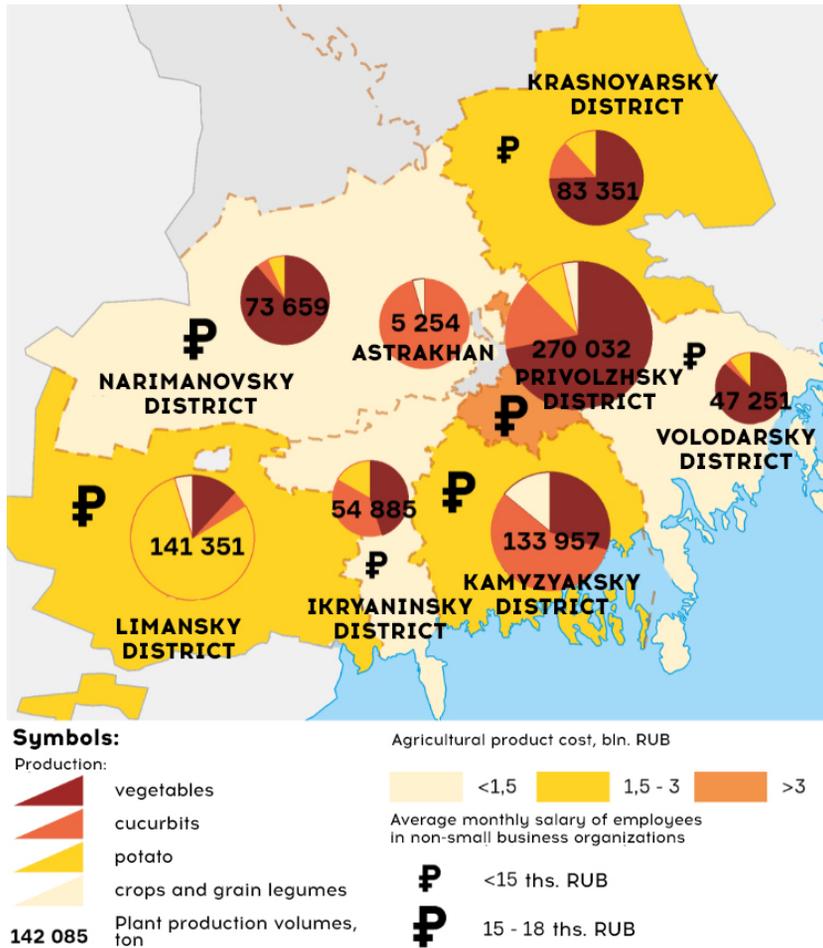


Fig. 191. Scheme of differentiation of agglomeration districts by value and volume of agricultural production

The reserves for increasing the volume of shipments of crop and vegetable products are calculated on the basis of the need to improve the economy's structure towards the manufacturing industries and the need to grow the non-resource share of Gross Regional Product. The calculation is based on the assumption that 50% of idle agricultural land is involved in economic turnover and the structure of land use is optimized in the direction of growing the most productive crops in the territory.

According to the data provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.

Fig. 192. Investments in fixed assets in agriculture, thousand rubles.

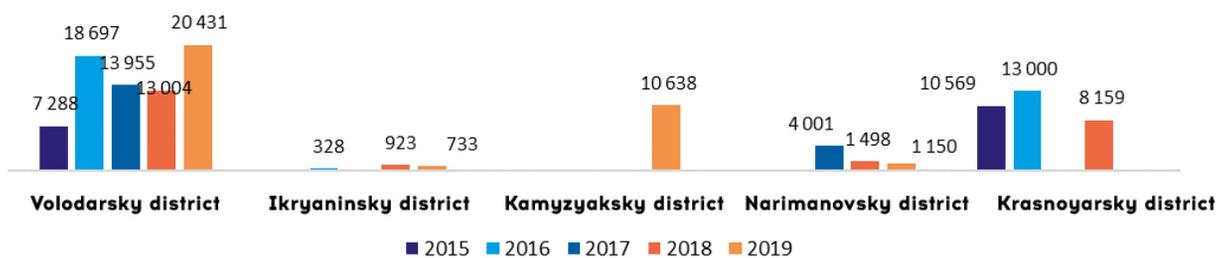
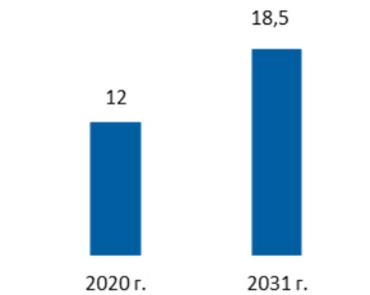
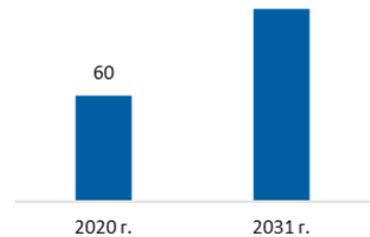


Fig. 189. Reserves for increased shipment of crop products 2020-2031, RUB bln.



This was calculated by the agency "CENTR" on the basis of expert forecasts and official statistics.

Fig.190 Reserves for increased shipping of vegetable products processing in 2021-2031, tons

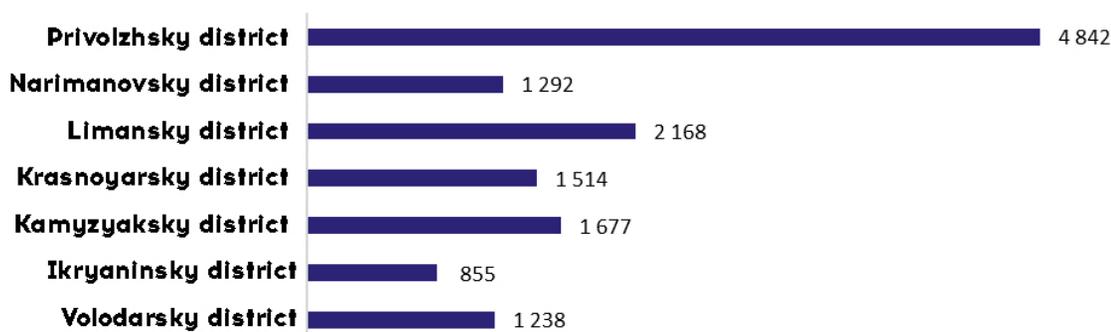


This was calculated by the agency "CENTR" on the basis of expert forecasts and official statistics.



Relatively similar level of contribution of the first ring districts to the agriculture development and increasing contribution at the level of Limansky district.

Fig. 193. The cost of crops production in 2019, million rubles



The Statistical book "The main indicators characterizing the state of agriculture in the Astrakhan Region in 2015-2019".

Underinvestment in the agricultural sector in Privolzhsky, Limansky and Ikryaninsky districts compared to Volodarsky and Krasnoyarsky districts. Prospects for further strengthening of the agricultural sector in Limansky district, despite the better transport accessibility and shorter distance from the Privolzhsky district to Astrakhan.

Fig. 194. Export of vegetables and potatoes in 2019, tons



According to the data provided by the Ministry of Agriculture and Fisheries of the Astrakhan Region.

The high level of exports from Limansky district compared to Narimanovsky and Privolzhsky districts, is due to the presence of appropriate logistics infrastructure in the district.

Potential/Opportunity

The use of territorial potential in Limansky, Narimanovsky and Ikryaninsky districts to its fullest extent is proportional to the volume of investments in fixed capital in these municipal districts.

Issue/Risk/Restriction

Insufficient processing capacity.

High level of unclaimed shares in Limansky, Privolzhsky and Volodarsky districts.

The need to improve the interaction between Limansky district and the rest of the agglomeration in order to more fully realize its export potential.



3.9.3. Fishing and fish farming

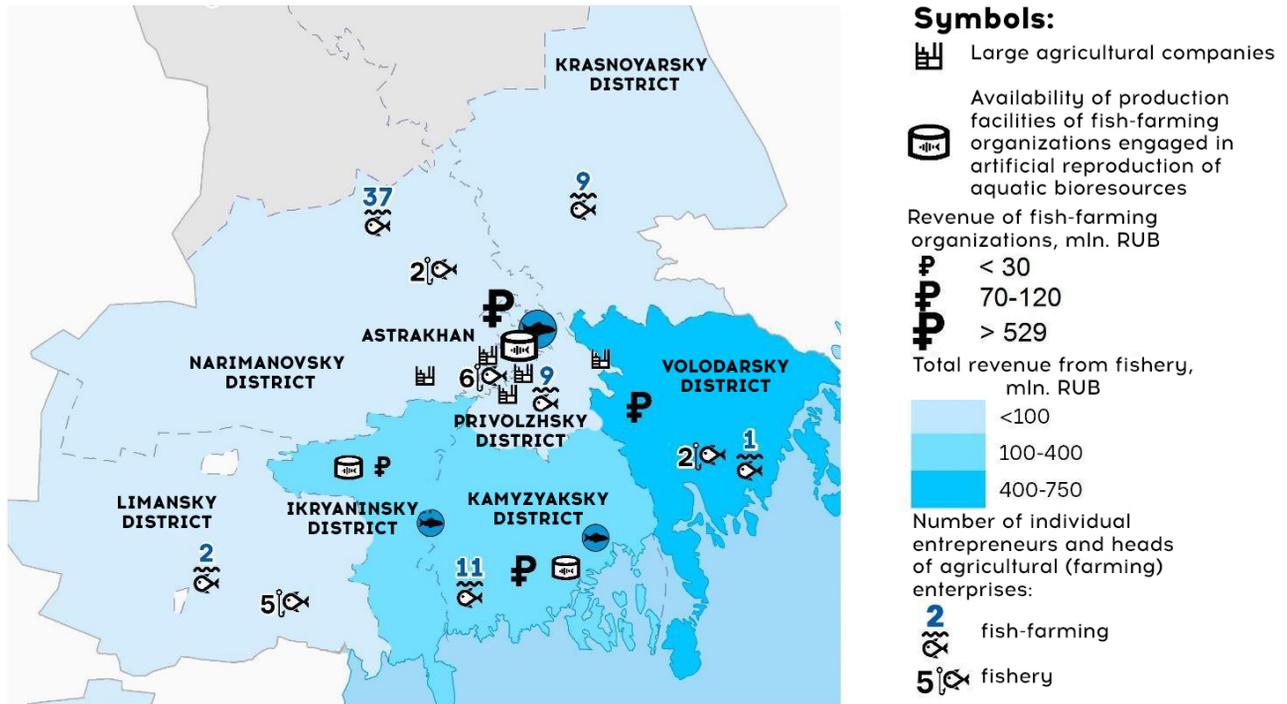
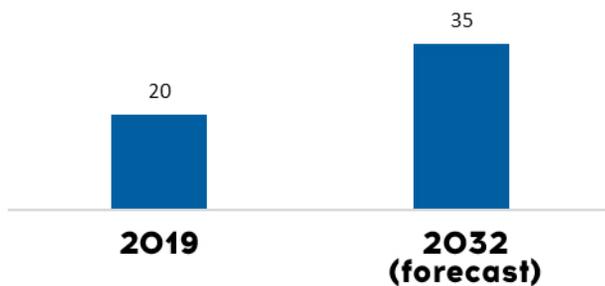


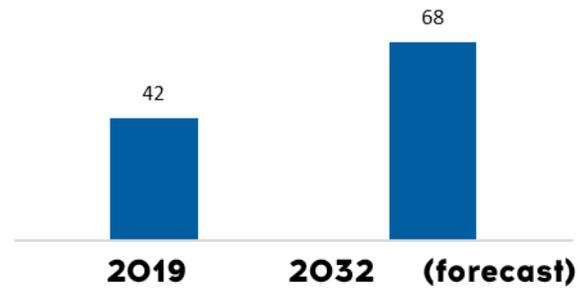
Fig. 195. Scheme of differentiation of districts by concentration of production capacity of fish-farming organizations and total revenues from fishing

Fig. 196. Volume of aquaculture grown, thousand tons



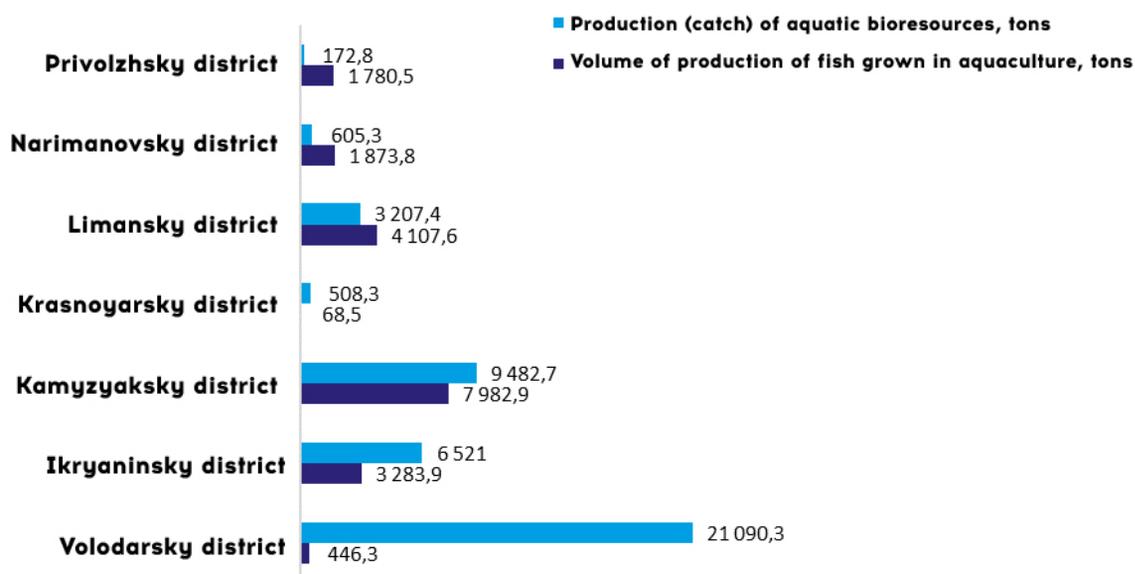
The estimated volume of grown aquaculture was calculated by the agency "CENTR" based on the need to improve the structure of the economy towards manufacturing and the need to grow the non-resource share of GRP based on expert forecasts and target values of one of its closest competitors — Krasnodar Krai for the same year

Fig. 197. Number of fish caught, thousand tons



The volume of fishing is calculated based on expert estimates of the potential to increase the types of fish subject to total allowable catch quota (+30%) and quota-free types (+100%)



Fig. 198. Development of the fishery complex in 2019, tons

Districts' specialization in the fishing industry: fish farming in Kamyzyaksky district, fishing in Volodarsky district. Low quality of life in Ikryaninsky and Volodarsky districts, caused, among other things, by the implicit and obsolete specialization of these districts.

Potential/Opportunity

Traditional leaders in fishing and fish farming: Ikryaninsky, Kamyzyaksky (fish farming) and Volodarsky (fishing).

Astrakhan concentrates scientific competence in the field of fish farming.

The priority is to improve fish processing technology on the basis of new technologies, providing multipurpose use of fish raw materials.

Issue/Risk/Restriction

Low efficiency and lack of transparency in the fishing industry.

Stable positions in fish farming.

Most of the fish production is still provided by the area specializing in fishing.

The need for modernization of the fishing industry in Volodarsky district and introduction of more modern technologies in the existing industry.

3.9.4. Machinery-producing industry: shipbuilding;

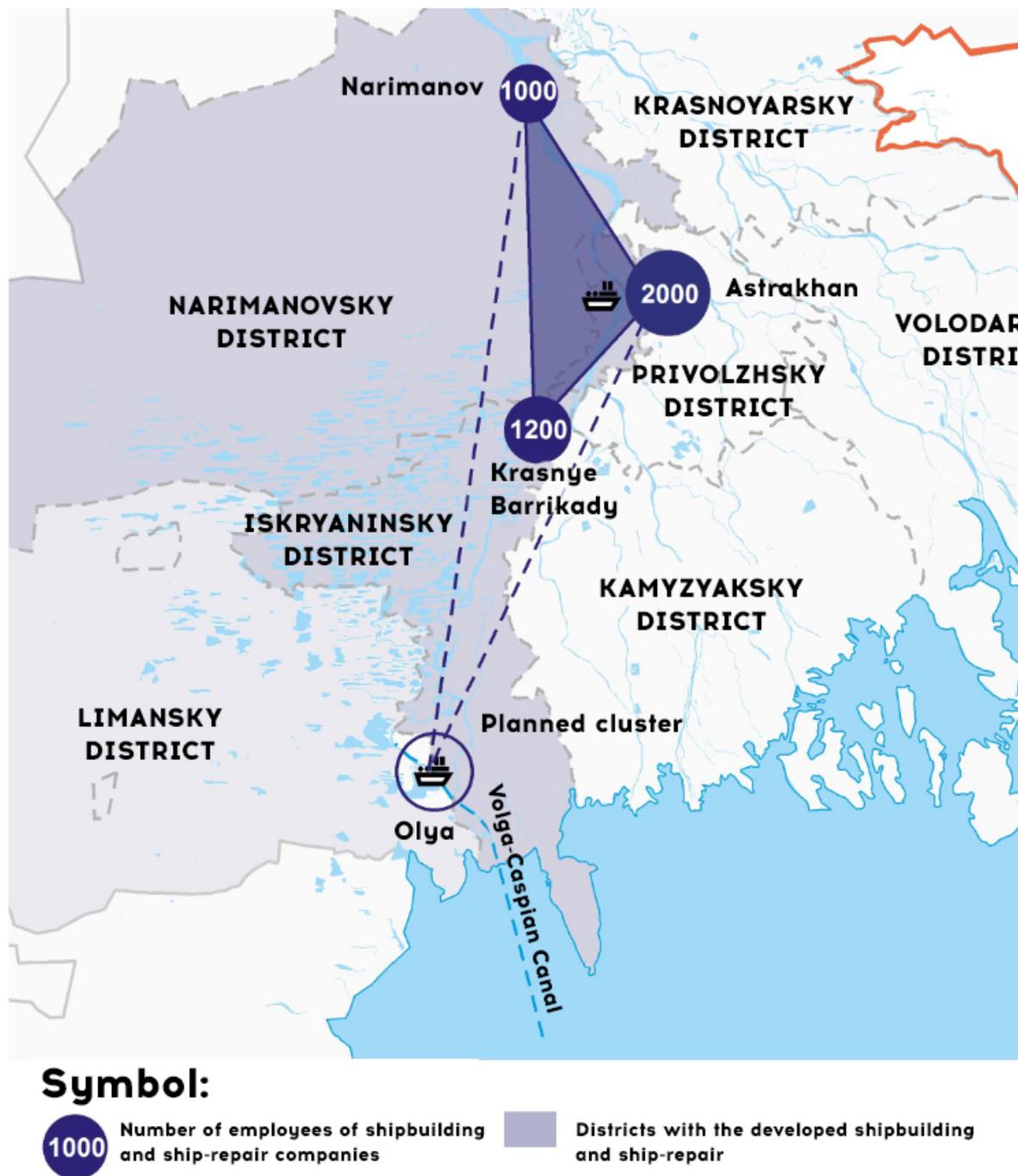


Fig. 199. Principle model of the Caspian cluster operation



Fig. 200. Shipbuilding companies revenue in the Astrakhan agglomeration, billion rubles

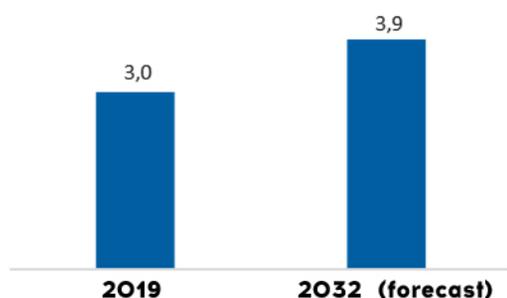
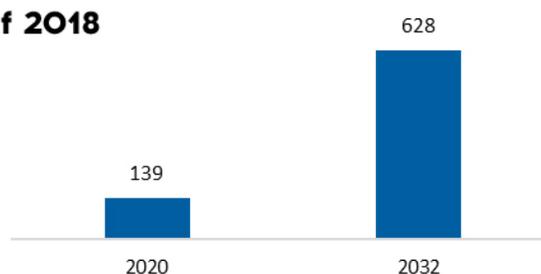


Fig. 201. The volume of production of civil ships and marine technicians in value terms in% of the volume of 2018



Estimated revenues of shipbuilding enterprises and volumes of production of civil ships and marine equipment are calculated by the agency "CENTR" on the basis of needs of the Volga-Caspian, Azov-Black Sea and Western fishing basins in re-equipment of small fishing shops according to research of Morskoj Byulleten` magazine called "Razvitie grazhdanskogo sudostroeniya v Rossii" (Development of civil shipbuilding in Russia) in accordance with the Strategy for the development of shipbuilding industry of the Russian Federation.

Geographical distribution of competencies in machinery-producing and metal-fabricating industries. Lack of a distinct center of competence concentration.

Potential/Opportunity

Potential for development of shipbuilding cluster, construction and repair of ships for the development of shipping in the Caspian Sea.

Potential for development of shipbuilding industry due to collaboration of existing shipbuilding and ship repair enterprises with the planned port zone "Olya" and industrial-type SEZ "Lotos".

Potential in the production of civil and general purpose shipbuilding products

Issue/Risk/Restriction

High share of imported shipboard equipment.

Shortage of highly qualified personnel in the industry.

High degree of wear and tear of the main production assets.

Dependence of the industry on public contracts.

3.9.5. Sectors of prospective specialization of the economy of municipal districts included in the agglomeration and the industries most affected by the agglomeration effect

Based on the results of assessment of potential prospects for the development of key sectors of manufacturing and tertiary industries in the territory of the Astrakhan agglomeration, we formed the following list of industries for further analysis:

Manufacturing industries:



- production of agro-industrial products:
 - crop production;
 - vegetable processing;



- production of fish food products;
- production of fish grown in aquaculture, industrial fishing;
- industrial fishing;



- machinery-producing industry: shipbuilding;

Tertiary industries:



- logistics;



- tourism.



The most significant sources generating agglomeration effects for the industries are:

1. Formation of common markets for services the efficiency of which is affected by agglomeration effect, such as:
 - water supply and wastewater disposal;
 - services for household solid wastes and municipal solid waste management;
 - public transportation services.
2. Implementation of innovative projects that require involvement of production and technological competences developed in different territories.
3. Optimization of production force allocation within the production chains that ensures the reduction of business transportation costs.
4. Optimization and creation of complex tourist routes in the territory of the agglomeration.
5. Optimization of the housing estate placement in terms of minimizing traffic congestion, travel time to work and the cost of housing.
6. Investment inflow to the underinvested territories in the agglomeration by business groups located in other territories of the agglomeration.

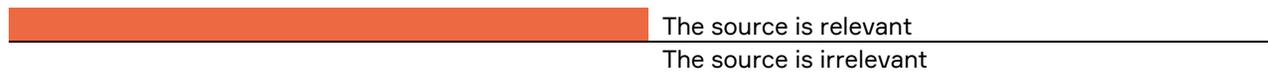
The source relevance in relation to an industry of the economy determines the magnitude of the positive effect that the formation of an agglomeration will have on it.

Table 13 provides information about the degree of relevance of the sources of agglomeration effects in relation to the industries. In other words, if the source is relevant, the industry gets a positive effect for its development from this source. The more numbers of sources relevant to an industry, the greater the positive effect of agglomeration processes will be.

The source of agglomeration effects is a phenomenon typical of agglomeration and contributes to the realization of latent potential of industry development.



Table 13. The degree of relevance of the agglomeration effect sources in relation to the economy

	Formation of common markets for services the efficiency of which is affected by the economy of scale	Consolidation of production and technological competencies developed in different territories	Optimization of production force allocation within the production chains that ensures the reduction of business transportation costs	Investment inflow to the underinvested territories in the agglomeration by business groups located in other territories of the agglomeration
Tradable industries¹¹⁵				
Crop production				
Meat and dairy cattle husbandry				
Processing of crop products				
Processing of livestock products				
Fishing				
Fish farming				
Fish processing				
Specialized shipbuilding				
General shipbuilding				
Metal-fabricating				
Production of plastic and rubber products				
Chemical industry				
				

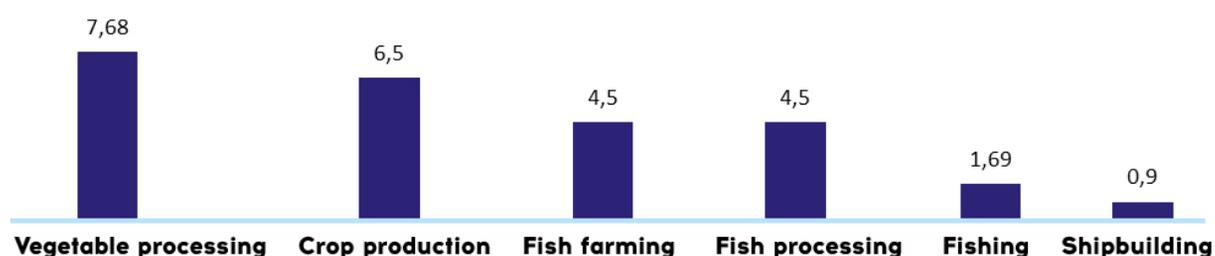
The greatest number of diverse sources forming agglomeration effects is characteristic of crop and livestock processing industries and fish processing (3 sources). The 2nd place is occupied by fish farming and general shipbuilding (2 sources).

The quantitative analysis of potential reserves for the development of traded industries (the increase in the income of industry organizations as a result of agglomeration mechanisms) conducted within the framework of the study correlates mainly with the results of the qualitative analysis (Fig. 202).

¹¹⁵ Tradable industries are defined as industries which final product can be physically moved (including exported) beyond the borders of the territory in which it was produced.



Fig. 202. Potential reserves for the development of traded industries – an increase in the annual income of industry organizations as a result of agglomeration mechanisms in 2032 compared to 2020, billion rubles.



Thus, it is the agricultural production and processing industries along with shipbuilding that should be the focus of the agglomeration's industrial policy.

Territorial and economic integration of municipal districts included in the agglomeration should be aimed at intensifying commodity-money flows and exchange of knowledge between districts. The second priority of such integration can be the creation of integrated tourist routes and increasing the connection of territories.

Territorial and economic integration of agglomeration districts should take place simultaneously in several planes:

- on the plane of territorial planning – to include measures to coordinate the spatial development plans of districts;
- in the plane of local business communities, for which the formation of an agglomeration provides a chance for new contacts, the exchange of experience and the establishment of new economic relations;
- directly in the space of investment and infrastructure projects;
- in a scientific and educational environment. This aspect of territorial and economic integration means expanding the geography of educational organizations of the Astrakhan agglomeration, increasing labor mobility of academic personnel;
- in legal and regulatory space. This item refers to the implementation of general measures to support the priority industries for the agglomeration and the synchronized reduction of administrative barriers.

Table 14. Prospective directions of economic integration of the Astrakhan agglomeration territory

	Direction of economic integration	Territorial intensification
1	Launching businesses for processing agricultural products that would receive raw materials from several districts of the agglomeration:	
1.1.	Fish processing	<ul style="list-style-type: none"> ■ Kamizyasky; ■ Volodarsky; ■ Limansky; ■ Ikryaninsky.
1.2.	Vegetable processing	Privolzhsky; Narymanovsky;



		Krasnoyarsky.
1.3.	Meat processing	Krasnoyarsky; Limansky.
2	Creation of common markets — consolidation of demand for certain goods and services within the agglomeration in order to make it more attractive for large players	All districts of the agglomeration
3	Creation of unified competence centers	All districts of the agglomeration with emphasis on: <ul style="list-style-type: none"> ■ Municipal Entity City of Astrakhan; ■ Narymanovsky; ■ Kamizyasky district.
4	Raising awareness of business circles about the existing production and investment plans of other territories	All districts of the agglomeration

Table 15. Key directions for the development of promising industries of specialization of the Astrakhan agglomeration

Industry of specialization	Direction of development
Crop production	<ul style="list-style-type: none"> ■ optimization of the land use structure within the agglomeration based on the demand for crop production and yield indicators in the territory; ■ cultivation of high-margin crop products; ■ development of ecosystem-based, nature-saving approaches to growing products; ■ Creation of a zone demonstrating the use of ecosystem-based, nature-saving approaches to growing products; ■ expansion of areas under grain, forage and industrial crops with the introduction of production facilities for their industrial processing through the introduction of unused agricultural land.
Meat and dairy cattle husbandry	<ul style="list-style-type: none"> ■ optimization of logistics chains for the export of livestock products; ■ creation and commissioning of new production facilities for the development of poultry, meat and dairy cattle husbandry.
Processing of crop products	<ul style="list-style-type: none"> ■ development of industries focused on the deep processing of crop products: ready-to-cook foods (including products for vegetarians), canned vegetables, healthy foods; ■ development of innovative technologies for processing vegetable products (for example, innovative methods of freeze-drying and fermentation); ■ creation of vegetable storage facilities in optimal geographical locations.
Processing of livestock products	<ul style="list-style-type: none"> ■ development of local brands involved in the processing of meat livestock products, including those aimed at the tourist and foreign markets. Geographically optimal placement of such productions.
Fishing	<ul style="list-style-type: none"> ■ consolidation and improvement of the technological level of fishing organizations
Fish farming	<ul style="list-style-type: none"> ■ intensification of work on attracting lessees to fish farms; ■ creation of fish farms, providing territory for placement of infrastructure for fish processing; ■ development of ecosystem approaches — joint cultivation of fish and plant crops.



Fish processing	<ul style="list-style-type: none">■ creation of fish processing facilities in optimal geographical locations;■ development of facilities for deep processing of fish (fish semi-finished products, fish canning).
Offshore shipbuilding	<ul style="list-style-type: none">■ development of technological competences and engineering in the field of specialized shipbuilding;■ promotion of engineering services in the field of specialized shipbuilding.
General shipbuilding	<ul style="list-style-type: none">■ development of small fishing ships production;■ development of production of transport, passenger and auxiliary fleet.
Metal-fabricating	<ul style="list-style-type: none">■ attraction of organizations capable of integrating into the value-added chains of the shipbuilding industry and (or) producing products for the needs of agriculture and processing of agricultural products.
Production of plastic and rubber products	<ul style="list-style-type: none">■ attraction of organizations producing products for the needs of housing and infrastructure construction, supplies demanded in agriculture and agricultural processing, as well as products demanded in Central Asian markets (construction and finishing materials, goods for trade, etc.).
Chemical industry	<ul style="list-style-type: none">■ Development and attraction of organizations producing chemical substances from vegetable and hydrocarbon raw materials, i.e. able to integrate into the existing production chains in the territory.



3.10. ANALYSIS OF INTRA-AGGLOMERATION CONNECTIONS: EVALUATION OF MIGRATION FLOWS, INTERMUNICIPAL TRANSPORT ROUTES, IDENTIFICATION OF EXISTING DIRECTIONS OF COOPERATION BETWEEN REPRESENTATIVES OF DIFFERENT TERRITORIES OF THE AGGLOMERATION IN THE BUSINESS SECTOR AND JOINT INVESTMENT PROJECTS; IDENTIFICATION OF SOCIAL INFRASTRUCTURE FACILITIES MOST INTENSIVELY USED BY RESIDENTS OF DIFFERENT TERRITORIES OF THE AGGLOMERATION

In order to assess the quality of performance of the most manifested intra-agglomeration connections, including social and cultural, economic and labor (defined in subsection 3.1.1), in this subsection we assessed:

- existing intermunicipal routes;
- identification of existing directions of cooperation of representatives of different territories of the agglomeration in the business sector and joint investment projects;
- identification of social infrastructure facilities most intensively used by residents of different territories of the agglomeration.

3.10.1. Intermunicipal routes analysis

The main factor that ensures the quality of intra-agglomeration connections for residents is the transport infrastructure.

The specific feature of the Astrakhan agglomeration road network is its location in the Volga Delta and, as a consequence, the circular principle of building the transport framework — there are practically no transverse connections, and the work of existing ones is constrained by the complex hydrographic network and low population density in the Volga Delta.

There are no permanent bridge structures in a number of areas, and there are pontoon bridges and ferry crossings. The main crossings that constrain the potential for the development of transport intermunicipal connections are shown in Fig. 140.

The most significant area that does not have a permanent road connection is the western part of Kamizyasky district in the direction of Karagali-Volgo-Kaspiysky-Zhitnoye, connected to the road network by



ferry crossings near the village of Volgo-Kaspiysky and the village of Ikryanoye.

Fig. 203. shows the characteristic of the existing differentiation of the agglomeration territory by the degree of interconnection through public passenger transport, based on the analysis of data from the official registry of intermunicipal regular transportation routes of Astrakhan Region.¹¹⁶

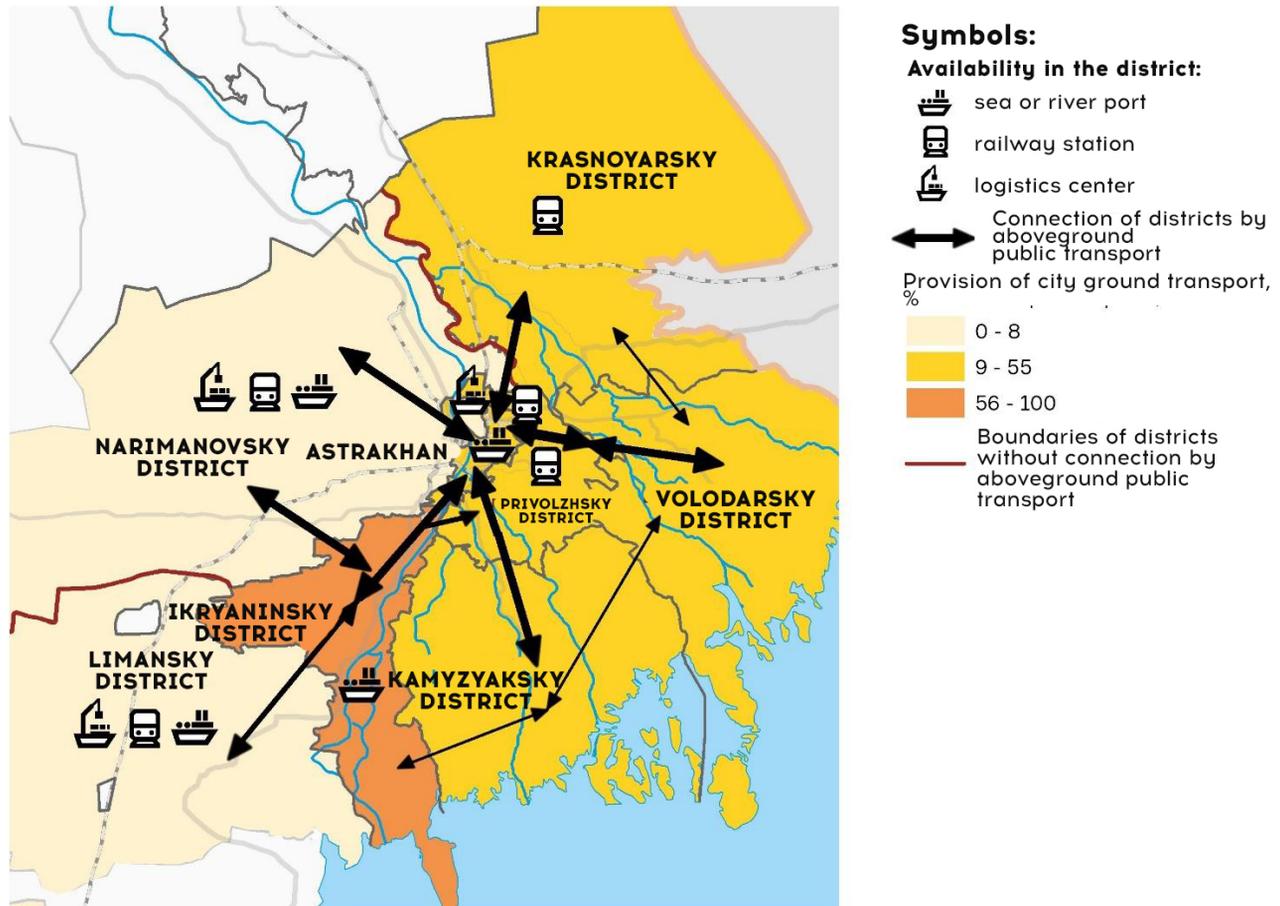


Fig. 203. Differentiation of the agglomeration territory by the degree of interconnection through public passenger transport

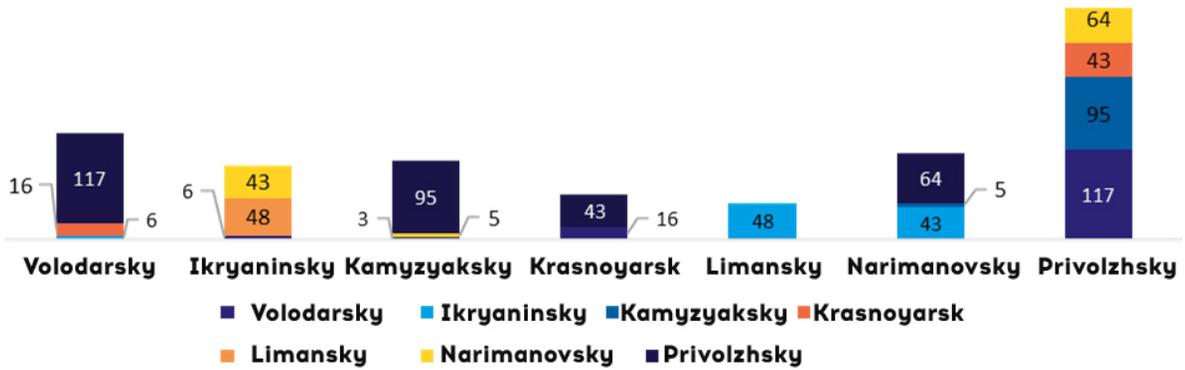
There is no unified system of public transport in the Astrakhan agglomeration.

Centrifugal transport connections are the most dense between the districts of the agglomeration and "Gorod Astrakhan" municipal district.

The most vulnerable transport links are transverse ones, due to the need to cross numerous bridges and crossings.

¹¹⁶ Source: <https://mintrans.astrobl.ru/document/reestr-mezhmunicipalnykh-marshrutov-regulyarnykh-perevozok>

Fig. 204. Comparative characteristics of passenger transport availability between agglomeration municipal formations



The most active transport routes of the agglomeration district territory are connected with Privolzhsky district, the least active connections – with Limansky district.

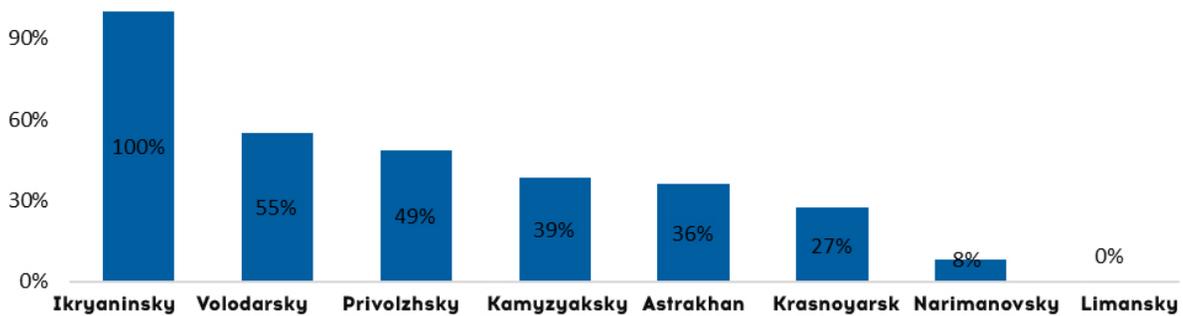
Fig. 205. Comparative characteristics of passenger transport availability of municipal formations with the MF "Astrakhan city"



Due to natural natural limitations (concentration of bridges and crossings) Ikryaninsky and Volodarsky districts have the maximum intensity of transport routes within districts.

Limansky and Narimanovsky districts are characterized by minimum intensity within municipal districts.

Fig. 206. Comparative characteristics of passenger transport availability within municipal formations



The results of the survey of residents about their satisfaction with current transport accessibility to the city of Astrakhan (Fig. 207) and to other settlements of the agglomeration (Fig. 208) are shown below.

Fig. 207. Gradation of assessments of the level of satisfaction of transport accessibility from the place of residence to the MF "Astrakhan City"

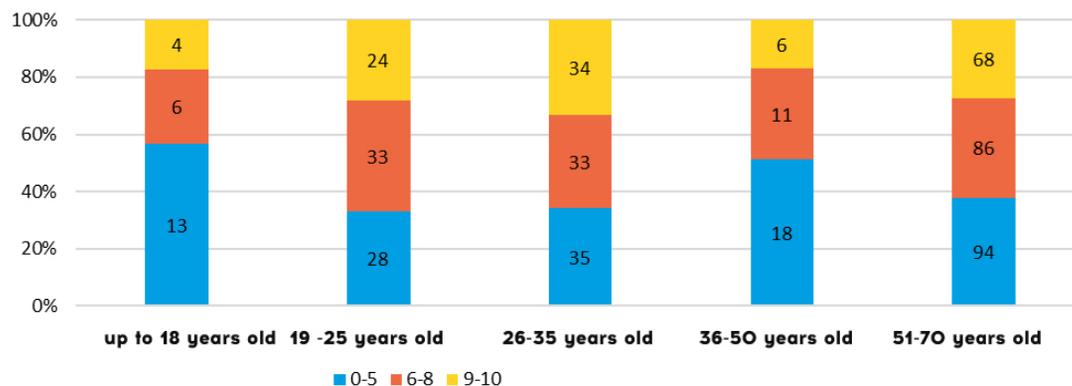
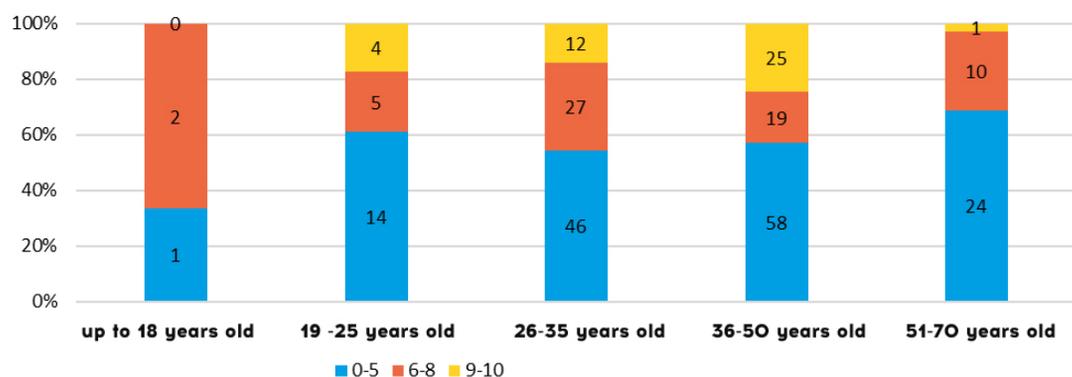


Fig- 208. Gradation of assessments of the level of satisfaction of transport accessibility from the place of residence to other localities



High satisfaction with transport infrastructure was reported by respondents from the city of Narimanovsky and urban-type settlement of Limansky (8-10 points).

The quality of transport infrastructure up to Astrakhan is higher for most respondents in all district centers than to other settlements of the Astrakhan agglomeration.

3.10.2. Identification of existing directions of cooperation of representatives of different territories of the agglomeration in the business sector and joint investment projects

In order to identify the existing directions of cooperation in the business sector on the territory of Astrakhan agglomeration, we systematized data on the number of groups of affiliated organizations on the territory of the agglomeration municipal districts. The results of the assessment are shown in Table 16 below.

Table 16. Number of groups of affiliated organizations on the territory of the Astrakhan agglomeration

	Astrakhan	Narimanovskiy	Krasnoyarskiy	Privolzhskiy	Volodarskiy	Ikryaninskiy	Kamyzyakskiy	Limanskiy
Astrakhan	0	>5	1-5	1-5	>5	1-5	1-5	1-5
Narimanovskiy	>5	0	1-5	1-5	0	1-5	1-5	1-5
Krasnoyarskiy	1-5	1-5	0	1-5	0	0	0	0
Privolzhskiy	1-5	1-5	1-5	0	1-5	1-5	1-5	0
Volodarskiy	>5	0	1-5	1-5	0	1-5	1-5	0
Ikryaninskiy	1-5	0	1-5	1-5	0	0	1-5	0
Kamyzyakskiy	1-5	1-5	1-5	1-5	1-5	0	0	0
Limanskiy	1-5	1-5	0	0	0	0	0	0

	0 organizations
	1-5 organizations
	>5 organizations

The potential to apply mechanisms to stimulate cooperation is evidenced by rather dense financial and economic relationships between organizations in different districts of the agglomeration, especially in Privolzhskiy, Volodarskiy and Ikryaninskiy districts.



According to the results of the assessment of the existing directions of business cooperation given in subsection 3.11.2, the following directions are possible in the perspective of agglomeration development:

- suppliers of agricultural raw materials and organizations in the field of agricultural processing, including manufacturers of food, forage, fertilizers and various chemicals;
- manufacturers of forage, manufacturers of raw materials for this forage and consumers of forage — agricultural organizations of livestock husbandry and fish breeding;
- manufacturers of equipment and supplies for agriculture, consumers of this equipment and supplies, and suppliers of components for this equipment and supplies;
- organizations in the field of crop production and aquaculture with respect to the creation of productions based on the joint breeding of plants and aquacultures as part of an ecosystem approach to agriculture;
- shipbuilding and metal-fabricating organizations (the latter are not yet sufficiently represented within the agglomeration);
- manufacturers of materials for road construction and construction organizations.

Table 17 below summarizes the key directions of prospective cooperation for the Astrakhan agglomeration districts, indicating the main mechanisms and infrastructure needs.



Table 17. Directions for prospective cooperation for the Astrakhan agglomeration districts with indication of the main mechanisms and infrastructure needs

Cooperation directions and its subjects	Incentive mechanisms	Infrastructure needs	Priority districts for cooperation
Suppliers of agricultural products and organizations in the field of processing of agricultural products, including manufacturers of forage and forage crops	Creation of vegetable storage and vegetable processing enterprises with mandatory share of representatives from all districts of the agglomeration to motivate the interests of small agricultural business representatives from these districts	Road infrastructure to improve transport accessibility of vegetable processing enterprises and vegetable storage facilities	Privolzhsky, Volodarsky, Krasnoyarsky, Limansky, Ikryaninsky, Kamyzyaksky, Narimanovsky districts
Manufacturers of forage, manufacturers of raw materials for this forage and consumers of forage – agricultural organizations of livestock husbandry and fish breeding	Creation of purchasing alliances involving representatives of all districts of the agglomeration to purchase large batches of forage and form guaranteed demand from new forage manufacturers	Road infrastructure to improve transport accessibility of forage production enterprises	Astrakhan, Narimanovsky, Limansky, Ikryaninsky, Kamyzyaksky, Volodarsky
Manufacturers of equipment and supplies for agriculture, consumers of this equipment and supplies, and suppliers of components for this equipment and supplies;	Creation of purchasing alliances involving representatives of all districts of the agglomeration to purchase large batches of products and form guaranteed demand from manufacturers of this products Participation of manufacturers in private-public partnership projects for soil reclamation, implemented with the participation of various districts of the agglomeration	Infrastructure required for the implementation of reclamation projects	Astrakhan, Privolzhsky, Volodarsky, Krasnoyarsky, Limansky districts
Organizations in the field of crop production and aquaculture with respect to the creation of productions based on the joint breeding of plants and aquacultures as part of an ecosystem approach to agriculture	Subsidization of innovative projects in the field of ecosystem-based agriculture from the regional budget. Participation in federal tenders for financing innovative projects in the field of agriculture	Road infrastructure increasing transport accessibility of joint agro- and aquaculture breeding sites, as well as the necessary engineering infrastructure	Kamyzyaksky, Ikryaninsky, Volodarsky districts



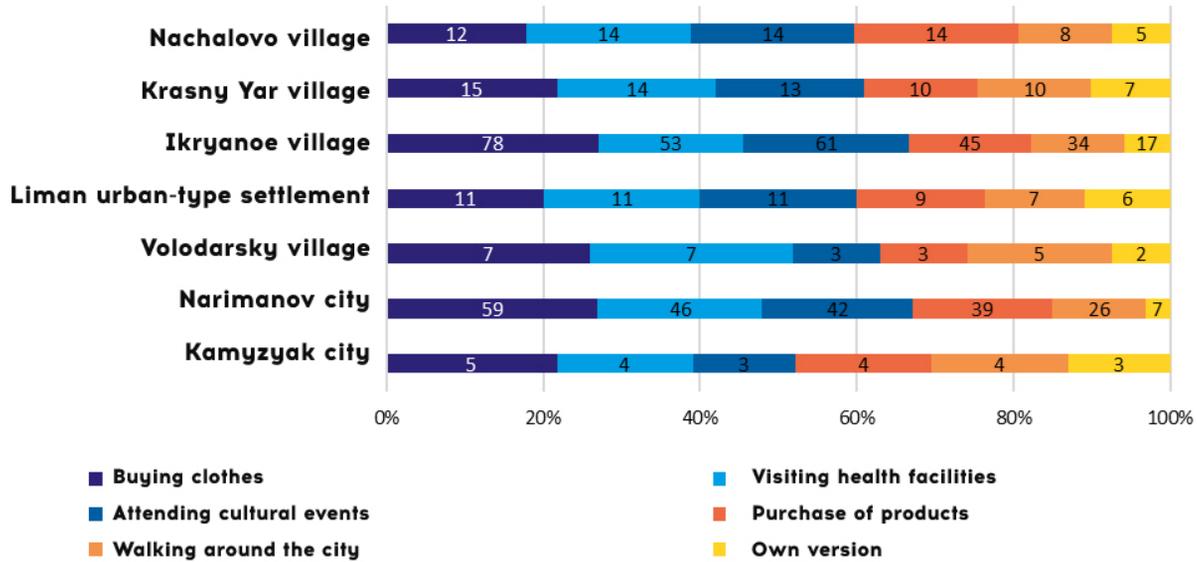
Shipbuilding and metal-fabricating organizations (the latter are not yet sufficiently represented within the agglomeration);	Creation of purchasing alliances with the participation of representatives of fishing organizations of the agglomeration. Subsidization of fishing ships procurement from a new high-tech manufacturer through the regional budget. Insurance of demand for the first batch of ships from the regional budget	–	Astrakhan, Narimanovsky, Kamyzyaksky, Ikryaninsky, Volodarsky districts
Manufacturers of materials for road construction and construction organizations	Involvement of manufacturers in private-public partnership projects for infrastructure and housing construction	Transport and engineering infrastructure required for construction	All districts of the agglomeration



3.10.3. Identification of social infrastructure facilities most intensively used by residents of different territories of the agglomeration

The results of the analysis of main social and cultural connections on the territory of the Astrakhan agglomeration revealed key sub-centers of social and cultural activity, in addition to the multifunctional core of the agglomeration — the "Gorod Astrakhan" municipal district.

Fig- 209. Goals of visiting the MF "Astrakhan City" among respondents



Among the major centers of gravity on the territory of agglomeration municipal districts we shall note:

1. Educational and scientific institutions in Kamyzyaksky district (State Budget Educational Institution of Astrakhan Region Secondary Vocational Education State Budget Educational Institution of Astrakhan Oblast "Kamyzyak Agricultural College, All-Russian Research Institute of Irrigated Horticulture and Melon-Growing), in Privolzhsky district (Federal Research Center All-Russian Institute of Plant Genetic Resources named after N. I. Vavilov), in Ikryaninsky district (Federal Research Center All-Russian Institute of Genetics).

2. Recreation and sports facilities in Privolzhsky district (race track in Tri Protoka village, recreation centers named after A.S. Pushkin and "Dubravushka" near Yaksatovo village) and in Narimanovsky district ("Tinaki" health center in Rassvet village).

According to the results of the survey of residents of municipal districts, the most popular of the suggested purposes for visiting Astrakhan in the questionnaire was to buy clothes (11%). The respondents also noted that they often come to the capital to visit health facilities and cultural events.



Section 4. Identification of the key directions for the development of the Astrakhan agglomeration and model of the agglomeration



4.1. IDENTIFICATION OF COMMON PROBLEMS OF SPATIAL DEVELOPMENT OF THE AGGLOMERATION TERRITORY, INCLUDING THE PROBLEMS OF IMPLEMENTATION OF PRODUCTION, TRANSPORT, SOCIOCULTURAL AND OTHER CONNECTIONS

4.1.1. Key features and limitations of spatial development of the Astrakhan agglomeration

In order to assess the city planning potential of the Astrakhan agglomeration, we analyzed the key features and limitations of its spatial development.

One of the fundamental factors in the spatial development of the Astrakhan agglomeration territory is the presence of the main city-forming axis — the Volga delta and the Volga-Akhtuba floodplain. Federal and regional highways (R-22, R-215, R-216) and the Volga Railroad are also co-dependent city-forming axes that affect the overall structure of settlement.

Features of the current spatial organization of the Astrakhan agglomeration territory are primarily related to the natural structure of the region and the influence of the hydrological network configuration on the transport structure of the territory.

The territory of the Astrakhan agglomeration has zones with special conditions that determine the spatial structure at the macro level (Fig. 210), requiring compliance with the regimes of use established by the regulatory and legal acts of the Russian Federation.

The most significant zones and territories with special regimes of land use:

- border zone of the Russian Federation;
- natural areas under special protection of federal and regional significance;
- protected zones of main oil and gas pipelines;
- oil and gas fields;
- water conservation zones and coastal zones of the Caspian Sea, the Volga River and other water bodies;
- Sanitary Protection Zones (SPZ) around large industrial and production complexes of the region, including the Astrakhan Gas Processing Plant (GPP).

In terms of territory, the concentration of gas-chemical complex facilities and the presence of prevailing northwestern winds cause the regular spread of hazardous suspensions and pollutants along the main settlement belt of the Astrakhan agglomeration and increase the potential for environmental risks.



Further development of the gas-chemical complex industries, which play an important role in the region's economy, requires a transition to new technological schemes in order to avoid the growth of the environmental load.

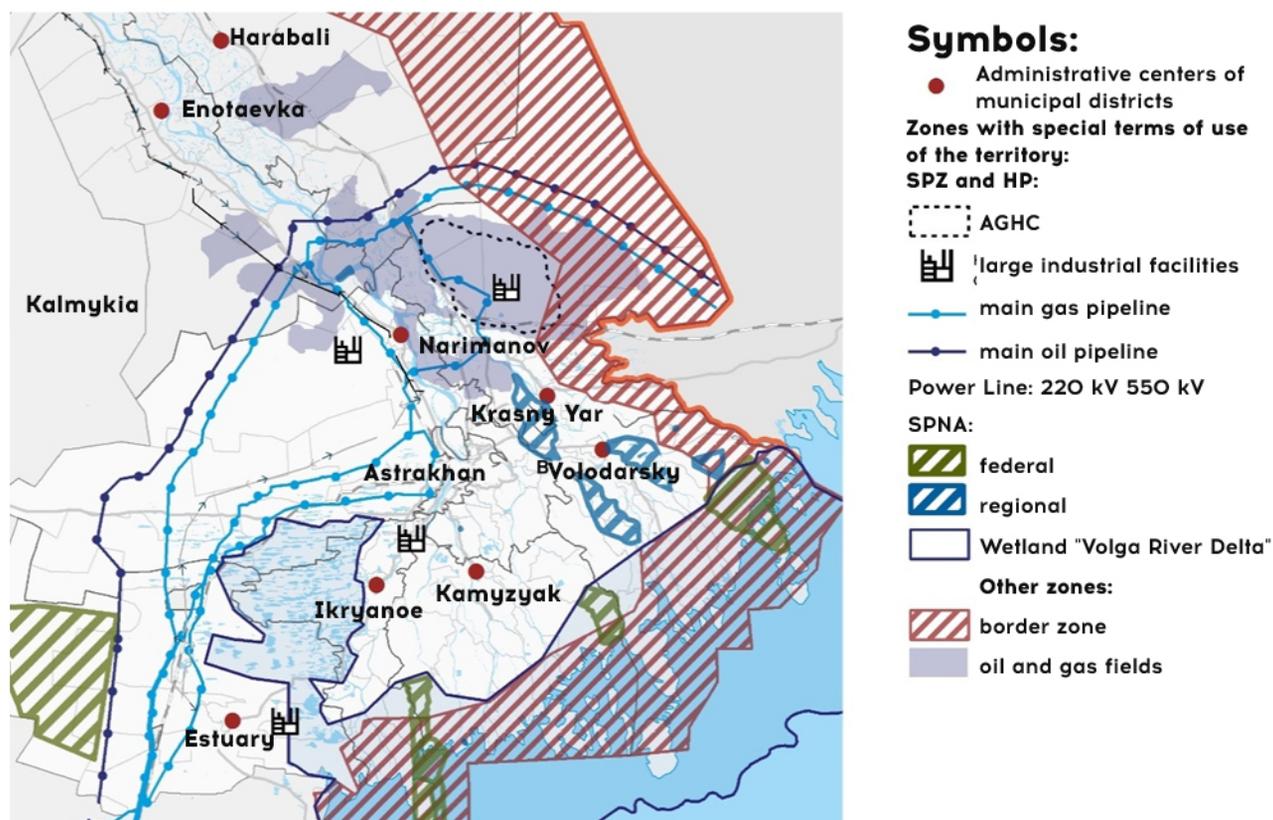


Fig. 210. Scheme of main city planning restrictions and features of development of the agglomeration territory

Virtually the entire developed territory of the region falls within the zone of catastrophic flooding in case of emergencies at the Volga HPPs cascade.

4.1.2. Problems with implementation of production, transport and sociocultural connections

Based on the results of a comprehensive analysis of the main social, economic and city planning features of the Astrakhan agglomeration territory development (Section 3), including the existing small settlement system, the key problems of spatial development that require a coordinated solution within the agglomeration development have been identified.

The analysis of the existing social and cultural links (Section 3.1.1) shows that most of the objects of social and cultural significance are concentrated in the core of the agglomeration, "Gorod Astrakhan" municipal district, and in several district centers located within 30-60 minutes' travel.

The results of the survey of residents of the Astrakhan agglomeration (Appendix 2) showed that the main purposes for visiting the "Gorod Astrakhan" municipal district for the population are to visit health facilities and to buy clothes. A visit to health care facilities in the "Gorod Astrakhan" municipal district is associated with a high concentration of specialized centers of regional importance in the regional center (their list is given in Appendix 13).

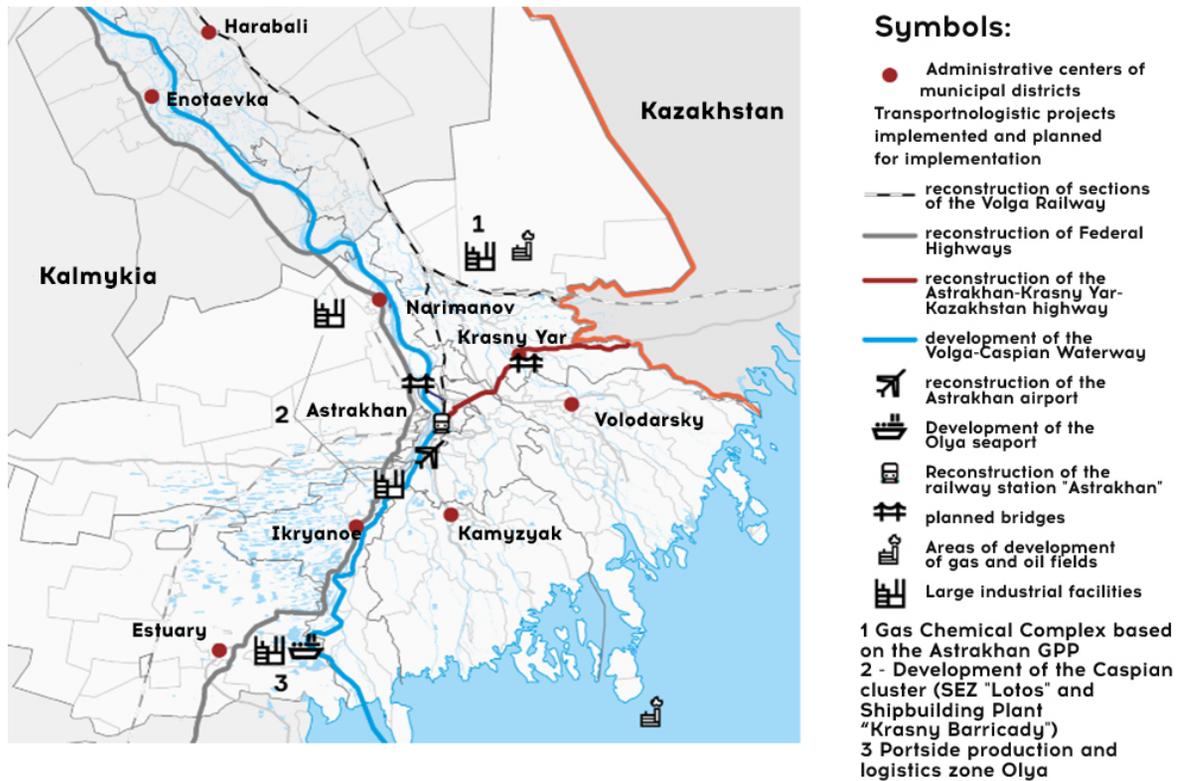


Fig. 211. Scheme of prospective projects in the territory of Astrakhan agglomeration

As shown by the assessment of transport connections, the territory of the agglomeration lacks a single interconnected system of public passenger transport. For example, most of the district territory is not connected by direct routes to the regional airport, and the promising development zone, Limansky district, has the weakest transport connections, going through the existing inter- and intra-municipal routes.

The nature of the existing planning structure and the functional zoning of the agglomeration territory, in particular the pronounced monocentricity, create conditions for increased commuting, which increases the peak loads on the transport infrastructure.

Transport centrifugal connection from the side of the "Gorod Astrakhan" municipal district to the point of concentration of employment sites — the production site of the Astrakhan gas processing plant in the Krasnoyarsky district is carried out by crossing the bridge over the Buzan river, which belongs to private individuals, at the established tariffs.

Transport centrifugal connection from Astrakhan in the direction of the village of Krasniye Barrikady is carried out by crossing the bridge over the yerik (shallow channel) Pryamoy Bertul, which currently has one reverse lane for cars.



At the same time, the development of a gas-chemical complex in the Krasnoyarsk district and the shipbuilding center "Krasniye Barrikady" in the Ikryaninsky district is currently considered one of the largest industrial-production projects of the Astrakhan agglomeration and a promising node point of concentration of intra-agglomerational connections.

A aggregate estimate of the current situation and prospective development of the system of social, cultural, economic and labor relations within the agglomeration showed that the key points of growth in the mining, industrial and recreational sectors are located outside the regional center, and this requires high infrastructure costs and does not lead to increased capitalization of the Astrakhan territory.

The current problems of implementation of production, transport, social and cultural connections on the territory of the Astrakhan agglomeration are caused by the fragmentation of potential points of growth and infrastructure.

There is a need for a coordinated solution to problems within the framework of inter-municipal interaction, including

Transport and logistics projects that are underway and planned and which will strengthen intra-agglomerational connections in the future:

- development of the Olya seaport;
- reconstruction of the Trubnaya-Aksaraykaya railway line with branch lines to Astrakhan and Kazakhstan;
- reconstruction of the federal highway M-6;
- reconstruction of the highway "Astrakhan — Krasny Yar — border with the Republic of Kazakhstan" with the construction of a bridge over the Buzan River;
- reconstruction of the railway station "Astrakhan-1";
- reconstruction of the Astrakhan airport.

4.2. CONSOLIDATION OF THE MAIN PROBLEMS OF THE MUNICIPAL DISTRICTS INCLUDED IN THE AGGLOMERATION, WHICH REQUIRE COORDINATED SOLUTIONS, INCLUDING PROBLEMS OF SPATIAL DEVELOPMENT

4.2.1. SWOT analysis

In order to consolidate the problems of agglomeration development and determine the strategic directions of Astrakhan agglomeration development, we conducted a **SWOT analysis**, during which we analyzed the strengths and weaknesses of the territory, opportunities and threats to its development as agglomeration (Table 18).

The generated SWOT analysis formulated general problems of municipal districts and weaknesses of the Astrakhan agglomeration, such as:

- weak federal positioning;
- resource-based economy;
- low level of economic diversification;
- competitive weakness;
- low investment attractiveness;
- lack of science and business collaborations;
- poor interaction between municipalities;
- low quality of life and disproportionate development;
- lack of a unified strategy to improve the region's tourist attractiveness.

The results of conducted SWOT analysis demonstrate the presence of development opportunities, not used to the fullest extent, which in the future can increase the efficiency of the use of the potential of Astrakhan agglomeration. For example, historical, cultural and natural potential, accumulated symbolic capital, along with the existing opportunities for development of innovative sectors of the economy, existing transport and logistics infrastructure create prerequisites for diversification of the economy.

At the same time, there are significant threats that could slow down the development: preservation of the economy's resource dependence and low investment attractiveness, impoverishment of human capital, etc.

Potential opportunities are primarily related to the most effective use of a favorable geographical location, strengthening trans-regional and international integration, as well as strengthening intra-agglomerational connections.



Table 18. SWOT analysis of the territory of agglomeration development

Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ favorable geostrategic position; ▪ scientific and innovative potential; ▪ developed transport and production infrastructure; ▪ presence of major actors capable of acting as initiators of large-scale projects for the integrated development of the territory; ▪ the Volga Delta geosystem uniqueness; ▪ high natural resource potential and concentration of resources; ▪ historical and cultural identity; ▪ accumulated symbolic capital (including competencies in agriculture and fish farming). 	<ul style="list-style-type: none"> ▪ weak federal positioning; ▪ low level of economic diversification; ▪ competitive weakness; ▪ resource-based economy; ▪ low investment attractiveness; ▪ lack of science and business collaborations; ▪ poor interaction between municipalities; ▪ low quality of life and disproportionate development; ▪ lack of a unified strategy to improve the region's tourist attractiveness.
Opportunities	Threats
<ul style="list-style-type: none"> ▪ effective use of the region's competitive advantages for repositioning of the Astrakhan agglomeration; ▪ promotion of regional products and attraction of investments; ▪ introduction of innovation into the traditional economy; ▪ strengthening of intraglomerational and interregional economic connections; ▪ creation of new competitive products; ▪ prospects for transregional and international integration; ▪ institutional and organizational opportunities. 	<ul style="list-style-type: none"> ▪ dependence of the budget revenue base on external factors, including fluctuations in prices of primary commodity markets; ▪ impoverishment of human capital; ▪ inertial scenario of development; ▪ aggravation of intra-agglomerational disproportions in development; ▪ lack of international integration and influence in the Caspian region; ▪ shoaling of waterways as a constraint to the shipping industry development; ▪ degradation of vulnerable ecosystems under increasing anthropogenic pressure; ▪ loss of water resource complex potential; ▪ loss of identity in the case of loss of historical and cultural heritage and degradation of ecosystems.

4.2.2. CROSS SWOT analysis

In order to identify promising directions of agglomeration development and develop preliminary scenarios for the development of the Astrakhan agglomeration, we conducted a CROSS SWOT analysis, where we compared:

- strengths and opportunities;
- weaknesses and opportunities;
- strengths and threats;
- weaknesses and threats.

The results of the CROSS SWOT analysis show the most successful (strengths + opportunities) and the least successful (weaknesses + threats) scenarios for development of the Astrakhan agglomeration.

Table 19. CROSS SWOT analysis

Strengths + Opportunities	
<ul style="list-style-type: none"> ▪ favorable geostrategic position; ▪ high natural resource potential and concentration of resources; ▪ the Volga Delta geosystem uniqueness; ▪ accumulated symbolic capital (including competencies in agriculture and fish farming). ▪ scientific and innovative potential; ▪ developed transport and production infrastructure; ▪ historical and cultural identity. 	<ul style="list-style-type: none"> ▪ prospects for transregional integration; ▪ promotion of regional products and attraction of investments; ▪ increase in the efficiency and profitability of industrial production through introduction of innovative technologies; ▪ introduction of innovation into the traditional economy; ▪ strengthening of intraglomerational and interregional economic connections; ▪ creation of new competitive products; ▪ repositioning of the Astrakhan agglomeration, promotion of regional products.

Directions of agglomeration development:

- strengthening of international cooperation and Caspian integration;
- strengthening of the transport and logistics structure;
- promotion of regional products on the Russian and international markets;
- effective use of resource potential through the introduction of new technologies in traditional industries;
- development of a knowledge economy on the basis of existing universities and research institutes;
- formation of a competitive tourist product;
- strengthening of territorial identity.

The synergetic effect of effective use of strengths, such as the unique geostrategic position of the region and high natural resource potential, together with the activation of potential opportunities in the form of strengthening of transport and logistics structure, activation of innovation potential and others, in the future may lead to strengthening of international influence of the Astrakhan Region and its Caspian integration.



Weaknesses + Opportunities	
<ul style="list-style-type: none"> ▪ poor interaction between municipalities; ▪ lack of science and business collaborations; ▪ resource-based economy; ▪ competitive weakness; ▪ low quality of life and disproportionate development; ▪ low investment attractiveness; ▪ lack of a unified strategy to improve the region's tourist attractiveness. 	<ul style="list-style-type: none"> ▪ institutional and organizational opportunities. ▪ strengthening of intraglomerational and interregional economic connections; ▪ introduction of innovation into the traditional economy; ▪ prospects for transregional and international integration; ▪ creation of new competitive products; ▪ improvement of the quality of life, elimination of disproportions in development; ▪ repositioning; ▪ promotion of regional products and attraction of investments.

Directions of agglomeration development:

- strengthening of international cooperation and Caspian integration;
- restructuring of the managerial and institutional spheres;
- introducing innovations into traditional industries;
- creation of a quality living environment;
- strengthening of the intangible values;
- human potential development;
- formation of a competitive tourist product;
- image positioning of the agglomeration municipal districts within a single brand;
- increase in the level of service.

Strengths + Threats	
<ul style="list-style-type: none"> ▪ scientific and innovative potential; ▪ accumulated symbolic capital (including competencies in agriculture and fish farming). ▪ high natural resource potential and concentration of resources; ▪ the Volga Delta geosystem uniqueness; ▪ historical and cultural identity; ▪ favorable geostrategic position; ▪ developed transport and production infrastructure; 	<ul style="list-style-type: none"> ▪ dependence of the budget revenue base on external factors, including fluctuations in prices of primary commodity markets; ▪ degradation of vulnerable ecosystems under increasing anthropogenic pressure; ▪ loss of water resource complex potential; ▪ loss of identity in the case of loss of historical and cultural heritage and degradation of ecosystems; ▪ impoverishment of human capital; ▪ lack of international integration and influence in the Caspian region.

Directions of agglomeration development:

- development of knowledge economy;
- transformation of scientific and educational sphere;
- effective use of resource potential through the introduction of new technologies in traditional industries;
- innovative development;
- human potential development;
- strengthening of the intangible values.



Weaknesses +Threats		Directions of agglomeration development:
<ul style="list-style-type: none"> ▪ competitive weakness; ▪ poor interaction between municipalities; ▪ resource-based economy; ▪ low quality of life and disproportionate development; ▪ lack of science and business collaborations; ▪ lack of a unified strategy to improve the region's tourist attractiveness. 	<ul style="list-style-type: none"> ▪ lack of international integration and influence in the Caspian region; ▪ aggravation of intra-agglomerational disproportions in development; ▪ degradation of vulnerable ecosystems under increasing anthropogenic pressure; ▪ loss of water resource complex potential; ▪ dependence of budget revenue base on external factors; ▪ impoverishment of human capital; ▪ reduction of competitiveness and markets for regional products; ▪ loss of identity in the case of loss of historical and cultural heritage and degradation of ecosystems. 	<ul style="list-style-type: none"> ▪ promotion of regional products on the Russian and international markets; ▪ strengthening of international cooperation and Caspian integration; ▪ economic diversification; ▪ innovative development; ▪ advanced development in sectors of sustainable agriculture, ecosystems, and green technologies; ▪ repositioning of the region based on its real development potential; ▪ creation of a quality living environment; ▪ human potential development; ▪ strengthening of inter-municipal interaction.

If the resource-oriented economy and low efficiency of inter-municipal interaction remain, against the background of growing competition from the Caspian states, the development of the Astrakhan agglomeration seems possible only under the extensive scenario.

The results of the SWOT analysis and CROSS SWOT analysis (subsection 4.2.2.) describing the Astrakhan agglomeration development potential formed the basis for identification of the strategic goals and objectives of its development (subsection 5.1) and further proposals for future development scenarios (subsection 5.3).



4.2.3. Consolidated problems of the municipal districts that are a part of the agglomeration

Among the main problems of municipal districts that are a part of the Astrakhan agglomeration, requiring the development of coordinated solutions, we can distinguish the following:

- Insufficient level of inter-municipal interaction;
- the need for managerial and institutional restructuring;
- resource-based economy;
- lack of effective interaction between science and business;
- lack of effective tools to implement innovations and modern technologies in traditional industries;
- weak promotion of regional products on the Russian and international markets;
- lack of a competitive tourist product;
- monocentricity (including the formation of the transport and logistics structure and the spatial distribution of social and cultural centers on the agglomeration territory);
- the threat of degradation of human potential and intangible values;
- low to average quality of the living environment in the agglomeration territory, including a high degree of differentiation between the quality of the environment of cities and village settlements;
- insufficiently high level of service;
- poor image positioning;
- unexpressed territorial identity;
- insufficient international interaction and integration.

Among the main problems and constraints of the spatial development of the agglomeration municipal districts, we can additionally highlight the following:

1. Low level of infrastructure support, including:

- transport (poor quality of road infrastructure, the presence of hazardous bridges and crossings, as well as transport facilities that belong to private individuals and legal entities);
- engineering (some settlements of the agglomeration are not provided with centralized water supply and wastewater disposal, high percentage of wear and tear of linear objects of engineering infrastructure and key structures);
- social.

2. Weak inter-municipal cooperation in the implementation of joint infrastructure projects in the field of transport and engineering infrastructure, including:

- lack of a rational network of intermunicipal passenger transport;
- Lack of stable connections between places of labor and living, primarily between the agglomeration core and the adjacent territories of the Privolzhsky and Narimanovsky districts.

Also, based on the results of the CROSS SWOT analysis and the formulated problems of the municipal districts that are a part of the Astrakhan agglomeration, we identified the main **consolidated directions of agglomeration development** that require coordinated solutions:



- strengthening of international cooperation and Caspian integration;
- promotion of regional products on the Russian and international markets;
- repositioning of the region based on its real development potential;
- economic diversification;
- strengthening of the transport and logistics structure;
- development of a knowledge economy on the basis of existing universities and research institutes;
- transformation of scientific and educational sphere;
- innovative development;
- introducing innovations into traditional industries;
- effective use of resource potential through the introduction of new technologies and innovations in traditional industries;
- advanced development in sectors of sustainable agriculture, ecosystems, and green technologies;
- creation of a quality living environment;
- strengthening of the intangible values;
- human potential development;
- strengthening of territorial identity;
- formation of a competitive tourist product;
- image positioning of the agglomeration municipal districts within a single brand;
- increase in the level of service;
- restructuring of the managerial and institutional spheres;
- strengthening of inter-municipal interaction.

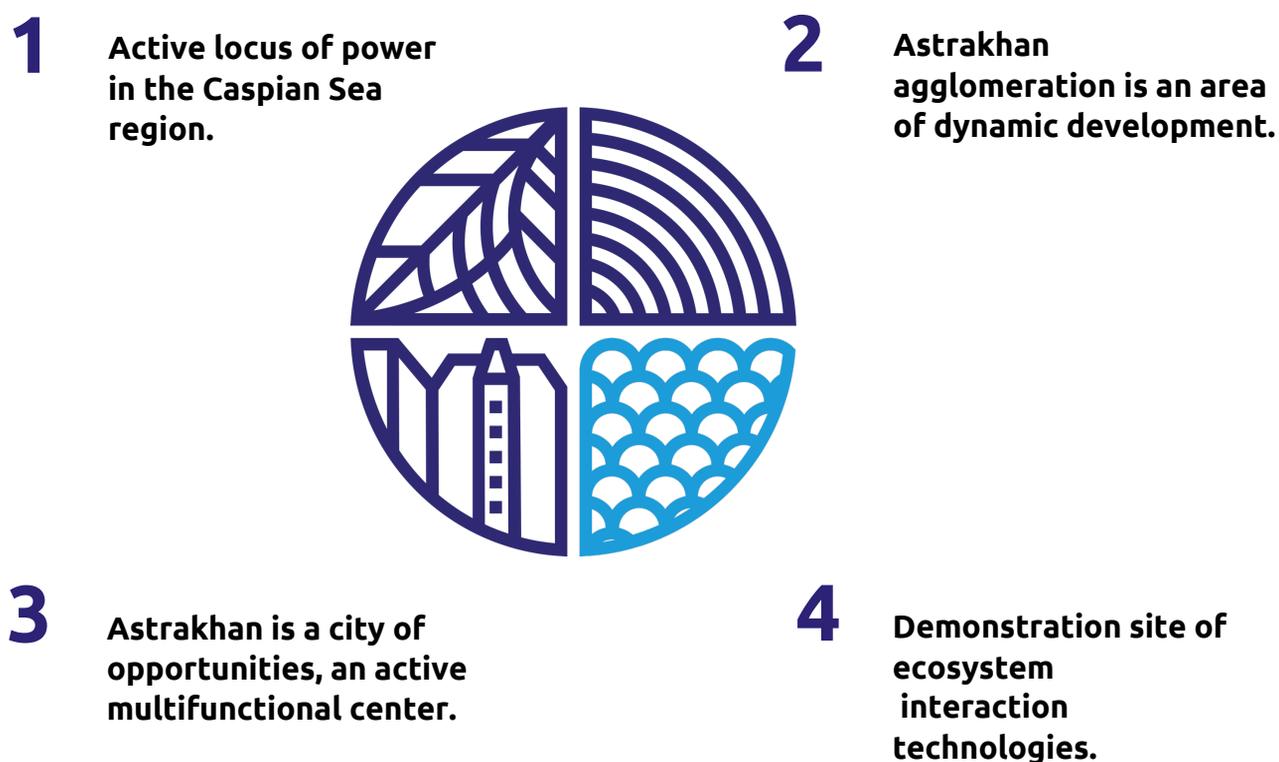


4.3. IDENTIFICATION OF KEY GOALS AND OBJECTIVES FOR DEVELOPMENT OF THE AGGLOMERATION

4.3.1. Strategic development goals and objectives based on the results of a comprehensive assessment of development potential

Based on a comprehensive analysis of the potential, problems and prospects of social and economic development of the Astrakhan agglomeration, features and opportunities for social, economic and spatial development, identified by the SWOT analysis and CROSS SWOT analysis, we identified four strategic directions for development:

- active locus of power in the Caspian Sea region;
- Astrakhan agglomeration is an area of a dynamic development;
- Astrakhan is a city of opportunities, an active multifunctional center;
- demonstration site of ecosystem interaction technologies.



The City of Opportunity: its foundation is the structure of the economy, the differentiator is the specific opportunities for self-fulfillment.

T.A. Gibson

For each direction of development, we formulated strategic goals and objectives, the solution of which will allow to achieve the goals.

1. Active locus of power in the Caspian Sea region.

Development of the Astrakhan agglomeration as a priority for the development of a key region of Russia in the Caspian Sea, capitalizing on the region's favorable geopolitical location and unique resource potential through the synergy of international transport flows and industry complexes producing and processing products with high added value.

Key objectives and recommended activities to achieve the strategic goal:

1.1. Creation of a transport and logistics hub of international scale:

- integrated development of all types of transport at the federal and regional levels, including:
 - modernization of the road network as part of development of the "North-South" and "West-East" ITCs, including the completion of the Eastern bypass, construction of the Northern bypass, construction of a bypass of the village of Krasny Yar, etc.;
 - modernization of the capacities of the seaports of Astrakhan and Olya;
 - modernization of rail transport infrastructure;
 - development and modernization of airport infrastructure, including the construction of a new 7,000 m² airport terminal;
- increase in transit and export cargo turnover, including:
 - placement of new multimodal transport and logistics centers;
 - creation of a unified transport and logistics system;
 - development of the Caspian cluster, including the port SEZ and industrial-type SEZ "Lotos".

1.2. Formation of a social and business center of the Caspian Sea region, including:

- development of regional and international business tourism;
 - placement of a congress and exhibition center of regional/international level;
 - development of social, business and hotel infrastructure in the city of Astrakhan and its neighboring cities;
 - development of a system for classification of tourist infrastructure;
 - improvement of the quality of tourism services, interaction with professional associations;
 - attracting international rotating events;
 - provision of intercultural communication, interregional and international interaction within the framework of the "Great Silk Road" project.



2. Astrakhan agglomeration is an area of dynamic development.

Development of the Astrakhan agglomeration as a territory with a high level of economic potential, characterized by the efficient use of natural resources, developed competitive industries, a high level of quality and availability of infrastructure, and a favorable investment climate.

Diversification of the economy involves the modernization of traditional regional industries: oil production, shipbuilding, agriculture, on the other hand – creation of infrastructure for industries that will be the flagships of the regional economy of the XXI century, primarily transport, trade and tourism.

Key objectives and recommended activities to achieve the strategic goal:

2.1. Formation of a quality city environment, including:

- Development of a social service system, including:
 - education;
 - health care;
 - culture;
 - sport;
- development of commercial infrastructure and creation of new places of employment;
- Improvement of the quality of environment in cities and village settlements and reduction of disproportions in development, including:
 - development of a system of new-type uninterrupted city public spaces;
 - improvement of public spaces on the territory of village settlements;
- development of a unified system of transport services for the population and the implementation of joint transport infrastructure development projects, taking into account future development scenarios in order to strengthen inter-municipal relationships;
- implementation of joint engineering infrastructure development projects in order to strengthen inter-municipal economic relations;
- provision of quality housing, including:
 - renovation of dilapidated housing stock;
 - increasing housing availability on the territory of municipal districts of the agglomeration.

2.2. Formation of a competitive tourist infrastructure, including:

- construction of year-round tourist infrastructure and hotel service, including:
 - hotel and entertainment complexes;
 - water and entertainment complexes
 - objects for business tourism (sites for congress and exhibition events);
- development of a platform of tourist information center;
- creation of a unified route network of passenger transport in the agglomeration territory;
- improvement of the quality of cultural and business events at the agglomeration level;
- approval of preservation orders and cultural heritage site in the territory of the agglomeration;
- historical, cultural and archaeological research (as part of the project "Astrakhan Mounds: Strategies for Development of Archaeology in Astrakhan Region");



- launch of online excursions to promote agglomeration destinations, integration with major tourist aggregators, creation of unique points of attraction (land art objects, museum expositions, etc.).

2.3. Strengthening of the agro-industrial complex, including:

- measures for modernization of the agro-industrial sector of the economy, including:
 - modernization of the system of territorial planning in terms of allocation of agricultural land;
 - consolidation of parties and creation of agricultural holdings;
 - creation of a unified system of additional product processing facilities on the agglomeration territory, interconnected with the rational use of raw material flows and transport and logistics resources;
 - establishment of a Scientific Production Association structure;
 - selection, creation of unique crop species, conservation and mobilization of genetic resources and biodiversity of the Caspian Sea;
 - branding and development of commercial aquaculture;
 - encouragement of private initiatives;
- implementation of innovative technologies in traditional industries, including:
 - integrated development of innovative scientific and technological platforms;
 - encouragement of scientific research activities;
 - launch and encouragement of the work of the innovation points;
 - scientific, technological and innovative development of the agricultural complex, business partnership of research institutes and traditional sectors of economy;
- implementation of a program to attract change agents, including:
 - agricultural holdings of regional scale from other regions of Russia;
 - suppliers of technological solutions for small businesses in the field of agriculture;
 - manufacturers of components for ships;
 - manufacturers of rubber and plastic products used in agriculture and shipbuilding.



3. Astrakhan is a city of opportunities, an active multifunctional center.

Strengthening of the role of regional center and the core of the Astrakhan agglomeration as an active multifunctional economic and innovative center, a platform for effective interaction of government, business and society.

The strategic goal is to develop Astrakhan as a center of innovative technologies in various spheres, generating cash flows in the territory of the agglomeration and the region, creating a comfortable social and cultural space for the development of human capital and public institutions, successfully functioning and needed by the economy.

Key objectives and recommended activities to achieve the strategic goal:

3.1. Formation of a quality city environment, including:

- Development of a social service system, including:
 - education;
 - health care;
 - culture;
 - sport;
- development of commercial infrastructure and creation of new high-performance jobs;
- improvement of the quality of city environment at the expense of:
 - development of a system of new-type uninterrupted city public spaces;
 - restoration of the historical center of Astrakhan as part of a single integrated project;
- development of a transport maintenance system, including:
 - reconstruction and new construction of the street and road network;
 - optimization of the city' s passenger transport system;
 - restoration of the historical center of Astrakhan as part of a single integrated project;
- implementation of joint projects for development of engineering infrastructure in order to achieve an increase in their efficiency;
- provision of quality housing, including:
 - Renovation of dilapidated housing stock, including rehousing of residents from houses with the status of cultural heritage sites;
 - Increasing housing availability to the population through the construction of new residential real estate as part of integrated territorial development (ITD) projects in the central and peripheral parts of Astrakhan, in the adjacent territories of Privolzhsky and Narimanovsky districts¹¹⁷.

3.2. Strengthening of the city' s transport and logistics structure, including:

- formation of industrial and logistics sites in the city territory and suburbanized territories of Privolzhsky and Narimanovsky districts, taking into account the prospective development of industries of production sector;
- modernization of capacities and optimization of infrastructure of cargo ports;
- reconstruction of the regional airport infrastructure, and creation of a cargo terminal;

¹¹⁷ The recommended list of prospective development zones on the territory of the "Gorod Astrakhan" municipal district is given in subsection 2.9.2.



- integrated development of all types of transport at the federal and regional levels.

3.3. Formation of a competitive tourist infrastructure, including:

- construction of year-round tourist infrastructure and hotel service, including:
 - hotel and entertainment complexes;
 - water and entertainment complexes;
 - congress and exhibition complex;
 - marine passenger terminal buildings;
 - new air terminal building;
- improvement of the quality of tourist services;
- package tourism development;
- approval of protected cultural heritage sites on the territory of Astrakhan;
- approval of territorial boundaries, protected object and requirements for city planning regulations within the boundaries of the territory of a historic settlement;
- approval of a protection zone project for the Astrakhan Kremlin;
- using the infrastructure of the Astrakhan Historical and Architectural Museum as an acceleration platform for initiatives to implement a comprehensive strategy for revitalization of the historic settlement;
- promotion of thematic routes (merchant and Soviet architecture, Bolshiye Isady, ethnic farmsteads), art residences and festivals of contemporary art as flagship events of a comprehensive revitalization project.

3.4. Formation of a scientific center of the Caspian macro-region, including:

- construction of a university campus as part of development of the Research and Educational Center "Kaspij";
- construction of a cultural and educational complex (with branches: the Central Music School of the Tchaikovsky Moscow Conservatory, the State Tretyakov Gallery, the State Hermitage Museum, and the Moscow State Academy of Choreography).
- realization of human and production potential;
- strengthening of collaboration activities at the level of the municipality, region, and international cooperation, including:
 - training personnel to solve major scientific and technical problems to overcome the challenges of the Caspian macro-region;
 - export of Russian education to the countries of the Caspian Sea;
 - recruiting prospective employees.

3.5. Creation of high-tech jobs, including:

- creation of an engineering center in the field of environmentally friendly oil production, shipbuilding, and sustainable agriculture:
 - selection of the most promising representatives of the business in selected areas;
 - acceleration of these business representatives on the basis of existing and new infrastructure;
 - promotion on the macro-regional market.



4. Demonstration site of ecosystem interaction technologies.

Because of their geographic location, urbanized territories located in river deltas are highly vulnerable, but at the same time they respond with active development of external relations, which makes them a point of economic growth for the entire region.

In order to reduce anthropogenic load on ecosystems, the delta regions are looking for non-standard solutions for development of territories allowing them to maintain a balance between economy and environmental situation. The solution to environmental problems is achieved both through the legal regulation of the use of natural resources and protection of nature at all levels of government, and through the maintenance of infrastructure, its continuous improvement, as well as the application and development of "smart technologies". As a result, environmentally friendly infrastructure projects are being created in the delta regions, a post-industrial economic sector is developing, including high-tech sectors of the traditional economy, tourism, innovative industries, and growth of employment in the service sector.

The territory of the Astrakhan agglomeration has all the necessary resources and potential to become a demonstration ground for ecosystem interaction.

Key objectives and recommended activities to achieve the strategic goal:

4.1. Building competencies in ecosystem interaction, including:

- protection of nature;
- resource reproduction;
- eco-tourism;
- "green" construction;
- collection, disposal and recycling of household and industrial waste;
- modern farming and fish farming technologies;
- eco-technologies in the oil and gas industry.

4.2. Development of a scientific and scientific-production base for development of technologies in the field of ecosystem interaction:

- development of regional educational institutions of higher and specialized secondary education specializing in this direction and strengthening their cooperation;
- strengthening of interregional and interuniversity cooperation;
- creation of high-tech jobs at the agglomeration' enterprises.

4.3. Creation of specialized sites for demonstration of modern technologies:

- experimental sites of "green" construction for testing and demonstration of resource-saving city solutions ("Gorod Astrakhan" municipal district), autonomous houses (for poorly urbanized territories);
- model sites for testing and demonstrating high-tech vehicles (unmanned aerial vehicles, electric vehicles, watercraft, etc.);
- model sites for testing and demonstrating modern agricultural technologies ("smart farm") and fish farming;
- a reference site for ecotourism infrastructure;
- other specialized platforms for testing and demonstrating technologies that are in demand in the region.



4.4. Creation of an advanced development territory for sustainable agriculture.

4.5. Development of those types of tourism that promote an ecosystem worldview:

- ecotourism as the type of tourism that best meets the principles of sustainable development;
- scientific tourism contributing to accumulation and spread of knowledge in the field of ecosystem interaction;
- business tourism popularizing regional eco-technologies and promoting their sales outside the region.

4.6. Development of new intellectual and high-tech activities, increasing employment in the relevant sector of economy.



4.4. DEFINING THE AGGLOMERATION MODEL AND CLARIFYING BOUNDARIES

The prospective model of the Astrakhan agglomeration is monocentric; it represents a system of "center-satellites". The core of the agglomeration is the "Gorod Astrakhan" municipal district. As for the satellites, there are sub-centers of the first and second order.

The territory of Privolzhsky District is defined as a suburban area of the regional center, since the municipal district is highly dependent on Astrakhan in terms of infrastructure. A part of the territory of Narimanovsky district (Ahmatovsky, Rassvetsky, Solyansky and Starokucherganovsky village councils) can also be attributed to the suburbs of the regional center.

The city of Narimanov (Narimanovsky district) and the city of Kamyzyak (Kamyzyak district), located within an hour's drive from the center of the agglomeration, can also be attributed to the first-order sub-centers.

The second-order sub-centers (less significant) include the remaining district centers: the villages of Krasnyi Yar Volodarsky, Nachalovo, Liman (urban-type settlement) and Ikryanoye.

Among the system of second-order sub-centers of the Astrakhan agglomeration we can distinguish industrial and production and production-logistics hubs, including:

- the territory of industrial-type SEZ "Lotos" near the city of Narimanov, Narimanovsky district;
- the urban-type settlement of Krasnye Barrikady, plant "Krasnye Barrikady", Ikryaninsky district;
- PJSC Gazprom's industrial and production site, Krasnoyarsky district;
- the territory of port SEZ, village of Olya, Limansky district.

In the future the territory of the village of Olya can become a first-order center, primarily through the development as a major industrial and logistics hub after the implementation of the port SEZ project, the development of adjacent territories with the placement of a large logistics center and other industrial and production facilities.

We suggest considering the prospective model of the Astrakhan agglomeration as a cluster system of interconnected centers of different order with the possibility of activating any of them as a point of growth and formation of new development drivers.

Comprehensive development of the regional center and adjacent territories of Privolzhsky and Narimanovsky districts plays a key role.



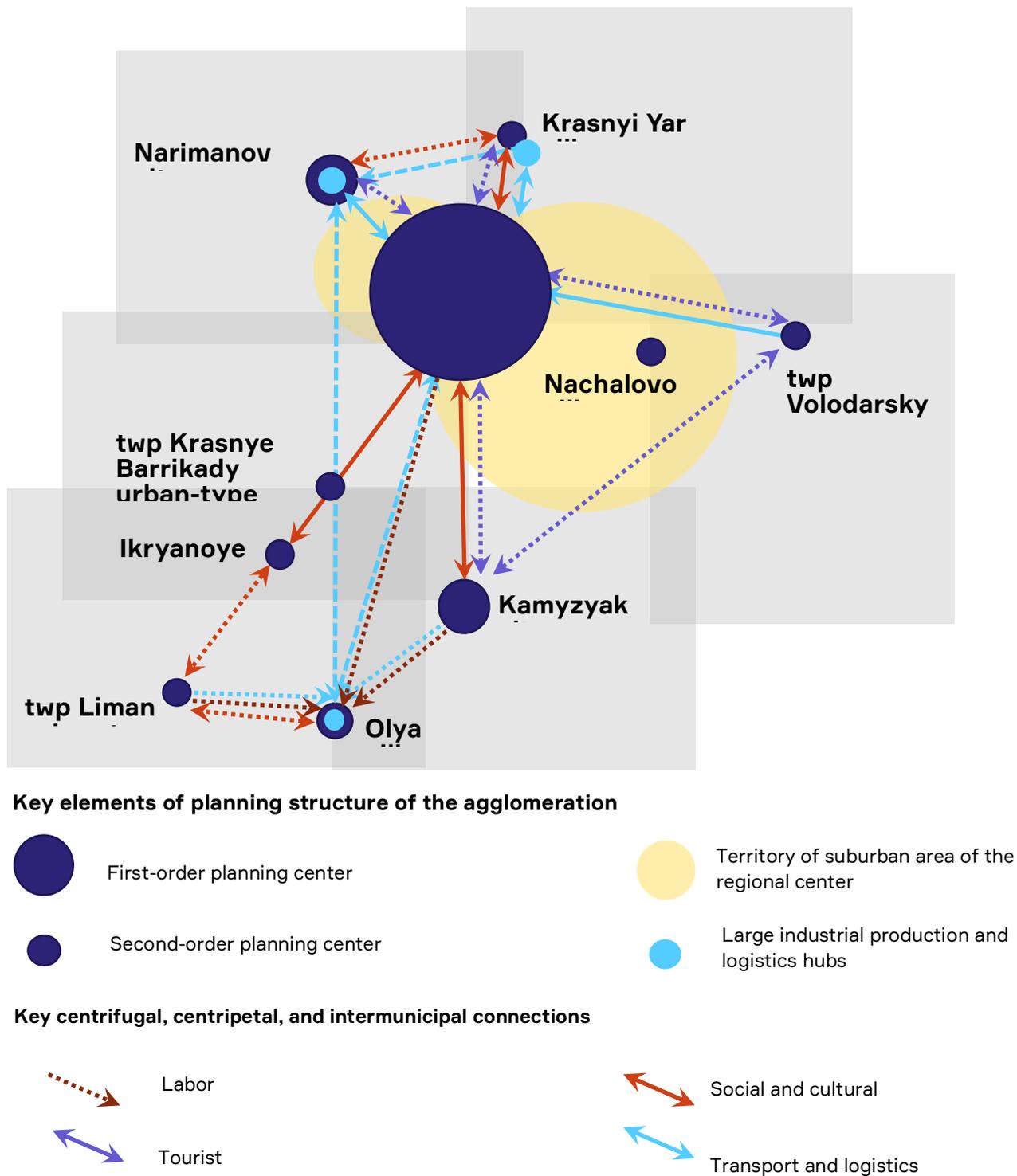


Fig. 212. Principle spatial model of the Astrakhan agglomeration



Thus, the prospective model of the Astrakhan agglomeration highlights the following key elements of the planning structure:



Agglomeration core — "Gorod Astrakhan" municipal district.

The suburban territory of the regional center: Privolzhsky district, a part of the territory of Narimanovsky district.

First-order sub-centers: the cities of Narimanov and Kamyzyak.

Second-order sub-centers: other centers of municipal districts of the Astrakhan agglomeration (the village of Krasnyi Yar, the urban-type settlement of Volodarsky, the village of Nachalovo, the urban-type settlement of Liman, the village of Ikryanoye).

Industrial-production and production-logistics hubs: SEZ "Lotos", Krasniye Barrikady, Krasny Yar, the planned SEZ "Olya".

The main drivers of spatial development on the agglomeration periphery are the industrial and production territories of GAZPROM and Lukoil, the territory of SEZ "Lotos" and SEZ "Olya", the territory of JSC "YuCzSS".

In the work of the agglomeration model we can distinguish 3 basic types of connections:



Centripetal — implying consolidation of efforts in the direction of Astrakhan.

Development of competencies; symbolic capital, resource base (products), large cooperative, logistical, social, cultural and economic connections.



Centrifugal — implying consolidation of efforts in the direction of the agglomeration municipal districts coming from the city of Astrakhan.

Development of competencies; political, administrative and social and cultural initiatives; investment, legal, informational and institutional support; development of innovation and technology.



Intermunicipal — implying a bipolar concentration of efforts between the municipal districts of the agglomeration.

Cooperative, sociocultural, economic connections, shared-use infrastructure.

One of the key directions of agglomeration development is the strengthening of inter-agglomerational connections: inter-municipal, centrifugal and centripetal.

Appendix 15 of the Study (Table 51) summarizes the characteristics of the Astrakhan agglomeration municipal districts, indicating the main directions of their development¹¹⁸. According to this characteristic, the agglomeration districts, based on the potential for economic growth, are divided into:

- zones of potential growth (Krasnoyarsky, Narimanovsky, Ikryaninsky and Limansky districts);
- current zone (Volodarsky and Kamyzyaksky districts);
- conditionally depressive zone (Privolzhsky district).

In the considered prospective model of Astrakhan agglomeration, a significant share of territories is occupied by village-type municipal districts. According to the results of assessment of region's resource potential, these territories have significant reserves and potential for development of primarily traditional industries (agriculture and fishing industry) that can ensure the maximum agglomeration effect in the future.

Thus, within the framework of this Study it was decided to proceed with considering the Astrakhan agglomeration as an urban rural area within the framework defined in subsection 3.1.2: the territory of the "Gorod Astrakhan" municipal district and 7 adjoining administrative districts (Privolzhsky, Krasnoyarsky, Volodarsky, Kamyzyaksky, Ikryaninsky, Limansky and Narimanovsky).

¹¹⁸ According to the materials of the Ministry of Economic Development of the Astrakhan Region on the basis of the approved Strategy of Social and Economic Development of the Astrakhan Region until 2035.



4.5. IDENTIFICATION OF THE MAIN SYSTEM-FORMING FACTORS OF THE AGGLOMERATION DEVELOPMENT OF THE TERRITORY

4.5.1. Key factors of agglomeration development

The main factors determining the development of the Astrakhan agglomeration and contributing to its advanced development in the perspective of 2023 can be divided into the following groups — indicators of agglomeration development:

- an environment attractive for living;
- an environment attractive to young people;
- an environment attractive for business;
- economic diversification;
- innovation economy and knowledge economy.



Formation of an environment attractive for living:

- high level of availability of recreational and other types of public spaces for public use;
- affordable and quality school and pre-school education and health care;
- balanced placement of social infrastructure facilities;
- formation of complex neighborhoods of public and residential development with a variety of types of development and creation of new jobs;
- effective mechanisms for restoration of the historical environment and reorganization of industrial buildings;
- high level of availability of quality engineering infrastructure;
- high quality of the street and road network, a rational scheme of public transport routes.



Formation of an environment attractive to young people:

- creation of a new format of quality living environment;
- formation of active urban communities;
- formation of a unified social and cultural space;
- strengthening of the intangible values;
- increase in the level of service;
- creation of conditions for youth entrepreneurship;
- creation of high-tech paid jobs.



Formation of an environment attractive for business:

- alignment of economic and spatial development;
- stimulation of a high level of entrepreneurial activity;
- efficient and transparent real estate market;
- current and predicted availability of labor resources.



Economy diversification:

- restructuring of the managerial and institutional spheres;
- effective use of resource potential through the introduction of new technologies in traditional industries;
- advanced development in sectors of sustainable agriculture, ecosystems, and green technologies;
- strengthening of inter-municipal interaction;
- effective investment in infrastructure;
- strengthening of the transport and logistics structure.

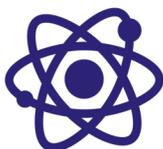


Formation of innovation economy and knowledge economy:

- transformation of scientific and educational sphere;
- development of a knowledge economy on the basis of existing universities and research institutes;
- introducing innovations into traditional industries.

Prospective directions of integration and conjugate development of municipal districts, which are part of it, will allow to achieve a synergetic effect in the future.

A separate direction of development of the Astrakhan agglomeration, established by strategic documents at the regional and federal levels, is international integration and strengthening as the center of the Caspian macro-region.



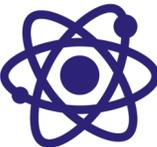
International integration:

- repositioning of the region based on its real development potential;
- strengthening of international cooperation and caspian integration;
- formation of a competitive tourist product;
- promotion of regional products on the Russian and international markets.

Taking into account the above factors determining agglomeration development, the conceptual model of Astrakhan agglomeration development can be presented in the form of the following scheme (Table 20).



Table 20. Conceptual model of agglomeration development

	<p>An environment attractive for living</p>		<p>An environment attractive to young people</p>		<p>An environment attractive for business</p>
<ul style="list-style-type: none"> ▪ quality living environment in urban and rural communities; ▪ normal infrastructural availability. 	<ul style="list-style-type: none"> ▪ new environment and housing formats; ▪ favorable conditions for youth entrepreneurship; ▪ high level of service; ▪ favorable conditions for youth entrepreneurship; ▪ high-tech paid jobs; ▪ unique and diverse symbolic capital of the territory; ▪ a unique tourist product. 	<ul style="list-style-type: none"> ▪ high level of entrepreneurial activity; ▪ favorable conditions for entrepreneurship; ▪ availability of attractive investment sites; ▪ significant competencies in traditional and innovative industries; ▪ high logistics capacity. 			
	<p>Economy diversification</p>		<p>Innovation economy Knowledge economy</p>		<p>International integration</p>
<ul style="list-style-type: none"> ▪ science and business collaborations; ▪ developed industries with high margins; ▪ introducing innovations into traditional industries; ▪ high transport and logistics capacity. 	<ul style="list-style-type: none"> ▪ successful commercialization of knowledge; ▪ introducing innovations into traditional industries. 	<ul style="list-style-type: none"> ▪ quality of environment and life, attracting residents of neighboring regions and states; ▪ demand for a unique regional product in the foreign market; ▪ demand for a unique tourist product in the foreign market. 			

4.6. IDENTIFICATION OF PROMISING DIRECTIONS OF TERRITORIAL AND ECONOMIC INTEGRATION OF MUNICIPAL DISTRICTS THAT ARE A PART OF THE AGGLOMERATION

The factors of development of the Astrakhan agglomeration determine the features of its spatial development, presented below (Table 21).

Table 21. Factors and characteristics of the spatial development of the Astrakhan agglomeration

An environment attractive for living

Development factor	Spatial development features
<p>High level of availability of recreational and other types of public spaces for public use</p>	<p>Creation of a system of uninterrupted public spaces corresponding to the specifics of the spatial organization of settlements of the agglomeration (including balancing of disproportions of environmental quality between urban and rural settlements) and the historical and cultural identity of the settlements.</p> <p>Preservation and development of the natural and recreational structure in the territory of the agglomeration, including the system of natural areas under special protection.</p>
<p>Affordable and quality school and pre-school education and health care. Balanced placement of social infrastructure facilities</p>	<p>Territorial planning that is taking into account the need for educational and health infrastructure facilities in order to support the territories that are outside the service areas of existing facilities.</p> <p>Placement of new centers of attraction of intermunicipal importance in the territory of settlements of the agglomeration in accordance with the selected development scenario.</p>
<p>Formation of complex neighborhoods of public and residential development with a variety of types of development and creation of new jobs</p>	<p>Territorial planning that is taking into account the need to form zones of integrated public and residential development (blocks of flats and individual housing construction), aimed at improving the availability of quality housing for the population of the agglomeration.</p> <p>Based on a multi-factor assessment, there is a need to determine the zones of complex</p>



	public and residential development, zones of production sites, which location provides the greatest increase in tax revenues to the local budget while maintaining a high quality of life.	
Effective mechanisms for restoration of the historical environment and reorganization of industrial buildings¹¹⁹	Territorial planning of zones for commercial infrastructure and transformation of the city environment in the zone of historic buildings in accordance with current regulations. Territorial planning of zones for the placement of residents working in the field of manufacturing and logistics, not reducing the capitalization of residential real estate. Development of mechanisms for the redevelopment of industrial and municipal warehouses that are no longer operational.	
High level of availability of durable quality engineering infrastructure;	New construction, reconstruction and modernization of linear objects of engineering infrastructure and headworks in accordance with the city planning zoning.	
High quality of the street and road network, a rational scheme of public transport routes	Optimal planning of the street and road network, increasing the density of the road network, diversity of public transport routes and balance of all types of movement.	
An environment attractive to young people		
A new format of quality living environment, formation of a single social and cultural space	Creation of a system of new quality public spaces, including those that take into account natural, historical, cultural, symbolic and other features of the region.	
Increase in the level of service	Territorial planning that is taking into account the activities aimed at the formation of a system of commercial facilities, including sports, recreation, service and tourism facilities. Formation of the new and development of existing recreational and sports-recreational clusters in the territory of the agglomeration ¹²⁰ .	
Creation of conditions for youth entrepreneurship	Territorial planning that is taking into account the need for a business infrastructure facility in order to provide information and consulting and educational services for small businesses.	
Creation of high-tech paid jobs	Territorial planning that is taking into account the need to create innovation	

¹¹⁹ For the territory of the "Gorod Astrakhan" municipal district.

¹²⁰ Including the territories of sports and recreation complexes in Tinaki and Yaksatovo, a water sports center under construction near Yaksatovo (Privolzhsky district).



	centers, technoparks and technopolises and other facilities that involve creation of high-tech jobs.	
An environment attractive for business		
Alignment of economic and spatial development	Territorial planning that is taking into account the need for construction and modernization of engineering infrastructure for the territorial zones of placement of residents working in the field of manufacturing and logistics. Increasing the level of provision and efficiency of engineering and transport infrastructure of public and business and administrative zones	
Efficient and transparent commercial estate market;	Improvement of infrastructure availability of estate objects with high commercial potential.	
Stimulation of a high level entrepreneurial activity (competence centers, special tax regimes, information and consulting centers)	Territorial planning that is taking into account the need for a business infrastructure facility in order to provide information and consulting and educational services for small businesses.	
Economy diversification		
Effective use of resource potential through the introduction of new technologies in traditional industries	Territorial planning that is taking into account the need to build engineering centers, new centers for agricultural products processing and other production and storage facilities, depending on the selected development scenario.	
Advanced development in sectors of sustainable agriculture, ecosystems, and green technologies	Territorial planning that is taking into account the need to form a demonstration ground for ecosystem interaction technologies.	
Effective investment in infrastructure	Territorial planning that is taking into account the need for construction of transport and engineering (including reclamation) shared-use infrastructure, including trunk facilities.	
Strengthening of the transport and logistics structure	Territorial planning that is taking into account the need for construction and modernization of transport and logistics centers and placement of domestic utility and warehousing facilities.	
Formation of innovation economy and knowledge economy		
Development of a knowledge economy on the basis of existing universities and research institutes	Territorial planning that is taking into account the need to form additional educational infrastructure (including placement of an inter-university	



	university campus on the territory of the "Astrakhan" municipal district as part of the development of the Research and Educational Center "Kaspj").	
Introducing innovations into traditional industries	Territorial planning that is taking into account the possibility of placement of innovation centers on territories adjacent to the areas of industrial, agricultural and other purposes.	
International integration		
Strengthening of international cooperation and caspian integration	Territorial planning that is taking into account the need for formation of sites and infrastructure necessary for international events (including MICE-tourism events, cultural, sport, political and other events of interregional, regional and international scale).	
Formation of a competitive tourist product	Territorial planning that is taking into account the need for placement of tourist infrastructure on a regional, interregional and international scale.	

Legend

Very strong influence on city development



Strong influence on city development



Medium influence on city development



Thus, a greater share of the activities in spatial development of the Astrakhan agglomeration, including the main activities related to formation of innovation economy and international integration, is implemented through the strengthening of its core, the "Gorod Astrakhan" municipal district¹²¹.

At the same time, sub-centers of the first and second order, as well as large industrial and production and logistics hubs, will play a significant role in the model of agglomeration development (section 4.4). The territories of these sites can become points for the effort to strengthen the industrial and agro-industrial sector, to form the infrastructure of innovative industries, to place demonstration grounds of ecosystem interaction, etc.

Thus, Appendix 20 to the Study shows diagrams illustrating city planning potential of the first-order sub-centers of the Astrakhan agglomeration (the cities of Narimanov and Kamyzyak), as well as the territory of Olinsky village council in the Limansky district near the developing port SEZ "Lotos".

¹²¹ Prospective directions for the spatial development of Astrakhan and the adjoining territories of the Privolzhsky and Narimanovsky districts are shown in section 2.9.

Thus, a future potential for formation in the territory of "Gorod Kamyzyak" municipal district was identified:

- public-business and tourist-recreational cluster on Timokhin Island;
- individual housing construction blocks mostly in the southern part of the city;
- integrated public and residential blocks (blocks of flats) in the central part of the city on the site of the existing blocks of hazardous housings;
- development of a production function in the southern part of the city near the Brick Factory.

The territory of the "Gorod Narimanov" municipal district revealed the potential for formation of individual housing construction blocks west of the highway R-22 (North and West residential areas, according to the materials of the General Plan).

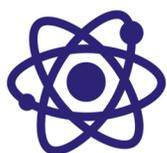
Development of the territory of Olya village council in Limansky district is associated with the development of port SEZ "Olya", including the formation¹²²:

- port SEZ;
- SEZ of industrial-production type, including placement of industrial warehouse complexes for processing and storage of products;
- individual housing construction blocks on the territory of the villages of Olya Lesnoe.

¹²² According to the approved territorial planning project of the industrial-production and port-type SEZ in the Liman district of the Astrakhan Region.



Below we formulated the consolidated directions of integration and conjugate development of municipal districts of the Astrakhan agglomeration.



Balancing of disproportions in development of the agglomeration districts, including the territorial and economic integration of urban and rural municipal districts of the agglomeration in order to intensify commodity-money flows and exchange of knowledge between districts.



Strengthening the centripetal and centrifugal links between the core and first- and second-order sub-centers (economic, tourism, engineering, transport, and others).



Strengthening of intermunicipal connections, including the implementation of joint infrastructure projects (tourist, engineering, and transportation, including the optimization of routes, primarily between the first- and second-order sub-centers).



Creation of new jobs in district centers and other promising sites.



Creation of new centers of attraction for social, cultural, public and business purposes at the regional/international level.

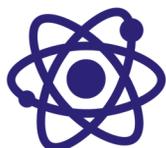


Optimization and rationalization of the transport and logistics structure, taking into account the growth points in the territory of the agglomeration that are developing or to be developed.

4.6.1. Directions for strengthening of the agglomeration core

A special role in development of the agglomeration is assigned to the regional center — the city of Astrakhan, as the most important international strategic contact center of the South of the Russian Federation and the multifunctional core of the Astrakhan agglomeration.

Based on the results of the analysis of the social and economic situation, social and demographic characteristics and infrastructure availability in Astrakhan, we identified **its key factors of development as the core of the Astrakhan agglomeration.**



Repositioning of Astrakhan at the level of the Russian Federation and in the international arena as a center of Caspian Sea cooperation.



Strengthening of the role of Astrakhan as a center of innovative development of historically established competences.



Improving the quality of the urban environment in the short and long term.



Creation of the most favorable environment for self-fulfillment of young people in the city (institutional, financial, support, creation of modern urban spaces, etc.).



Improvement of investment attractiveness.



Section 5. Preparation of scenarios for development of the Astrakhan agglomeration, taking into account the identified potential and promising directions of



5.1. PREPARATION OF SCENARIOS FOR THE AGGLOMERATION DEVELOPMENT

5.1.1. Scenarios for the agglomeration development

When selecting a perspective scenario of Astrakhan agglomeration development the priority conditions are minimization of costs and optimization of available resources, as well as the achievement of maximum return for the region, taking into account the opportunities to attract new resources, including financial and technological.

In this case, the successful implementation of the second condition is possible only on the basis of the first. In this regard, in order to implement the ambitious goals and objectives set for the Astrakhan agglomeration, within the framework of the Comprehensive Study we propose to consider 2 promising development scenarios up to 2032:

- optimizing scenario;
- accelerating scenario.

The optimizing scenario is focused on improving the efficient use of already available resources and assets, optimizing the use of land, eliminating infrastructure shortages and problems that hinder inter-municipal interaction, and formulating a request for change agents.

Agents of change mean external organizations that are ready to open a profitable and high-tech business in the territory of the agglomeration, which will have a positive effect on the territory: creation of new professional competencies of employees, attracting potential investors and clients to the territory for other businesses, business tourists, etc.

Recommended agents of change:

- agricultural holdings of regional scale from other regions of Russia;
- suppliers of technological solutions for small businesses in the field of agriculture;
- manufacturers of components for ships;
- manufacturers of rubber and plastic products used in agriculture and shipbuilding.

The optimizing scenario does not imply an increase in resource consumption.

The accelerating scenario is focused on the formation of the agglomeration's competitive advantages sought after at the level of the Caspian macro-region, both in terms of the produced goods and in terms of standard of living and quality of life.

The implementation of the scenarios has to affect the main strategic factors in the development of the Astrakhan agglomeration:

- quality of life;
- an environment attractive to young people;



- an environment attractive for business;
- economic diversification;
- innovation economy.

Possible scenarios for social and economic development of the territory of the Astrakhan agglomeration are shown in Fig. 213.

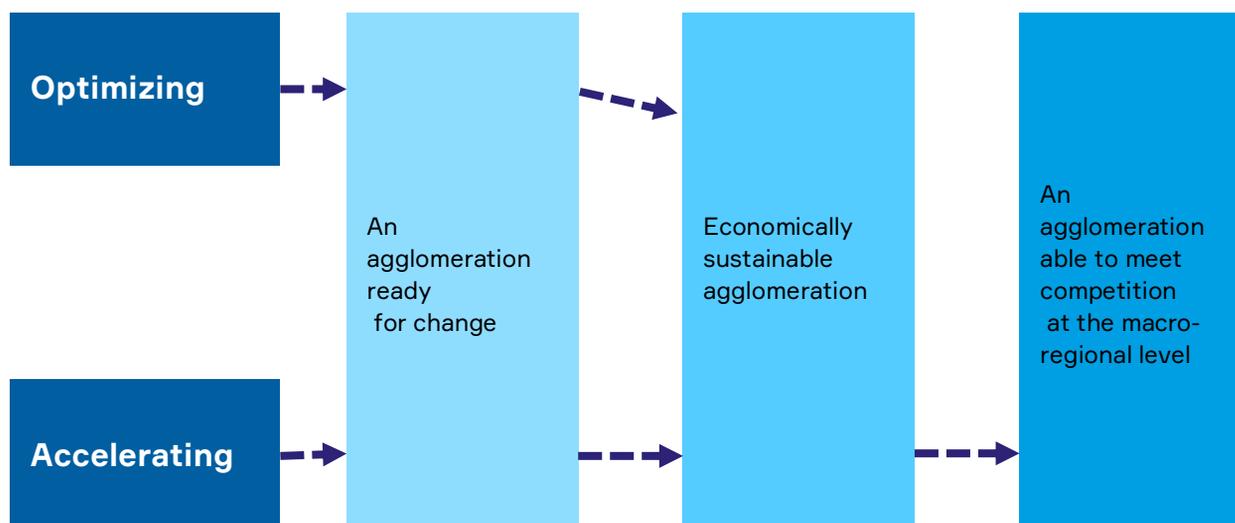


Fig. 213. Possible scenarios for social and economic development of the territory of the Astrakhan agglomeration

5.1.2. Time benchmarks for the agglomeration development scenarios

The following tables show the *time* benchmarks for implementation of optimizing (Table 22) and accelerating (Table 23) scenarios for development of the Astrakhan agglomeration.

Thus, in 2024, in the framework of the optimizing scenario we will see the following:

- improved quality of life to the point where intellectual resources do not leave the agglomeration for competing regions;
- created conditions for the development of small business and youth entrepreneurship;
- formed channels for transfer of knowledge from science to business;
- a number of high-margin investment projects have been implemented, replenishing the budget and attracting young people.

By 2027, under the same scenario, agents of change — businesses, specialists and experts capable of transferring, effectively implementing new and commercializing existing knowledge and technology — will be attracted to the territory.

In the accelerating scenario, in 2027 we will see:

- The new shaped quality of life and environment for young people attracts specialists from neighboring regions and states;
- Industry 4.0 operates in the territory of the agglomeration, a sector of the knowledge economy has been formed, successfully commercializing its developments.

In 2032 the accelerating scenario will lead to the final goal — Astrakhan will achieve a significant role in the commodity and money flows of the Caspian macro-region through the work of the logistics sector, effectively working eco-technology agriculture, Industry 4.0 and smart services sector.

Table 22. Time benchmarks for implementation of optimizing scenario for development of the Astrakhan agglomeration

Factors of development	Optimizing scenario		
	2024	2027	2032
Quality of life	<ul style="list-style-type: none"> ■ quality of life reaches the standard of living of reference cities. 	<ul style="list-style-type: none"> ■ new quality of life in cities and rural settlements; ■ reduction of the disproportion between urban and rural settlements and districts of the agglomeration. 	<ul style="list-style-type: none"> ■ the level of quality of life corresponds to the leaders of the Southern Federal District and the North Caucasus Federal District.
An environment attractive to young people	<ul style="list-style-type: none"> ■ high-tech paid jobs; ■ creation of conditions for youth entrepreneurship. 	<ul style="list-style-type: none"> ■ a new format of housing; ■ new quality of environment for young people. 	<ul style="list-style-type: none"> ■ the environment attracts young people from neighboring regions and states.
An environment attractive for business	<ul style="list-style-type: none"> ■ Creation of conditions for small and medium-sized business development: tax and financial incentives; ■ preparation of investment sites for large businesses. 	<ul style="list-style-type: none"> ■ availability of qualified personnel; ■ agents of change attraction. 	<ul style="list-style-type: none"> ■ successful functioning of the agents of change.
Economy diversification	<ul style="list-style-type: none"> ■ creation of incentives for science and business collaborations; ■ development of industries with high margins (processing, tourism). 	<ul style="list-style-type: none"> ■ introduction of new technologies in traditional industries; ■ development of new technologies (construction). 	<ul style="list-style-type: none"> ■ a sustainable sector of the post-industrial economy; ■ sustainable functioning of Industry 4.0.
Innovation economy	<ul style="list-style-type: none"> ■ comprehensive acceleration of existing initiatives through external positioning and introduction into regional economy. 	<ul style="list-style-type: none"> ■ successful commercialization of knowledge on regional and interregional markets. 	<ul style="list-style-type: none"> ■ successful commercialization of knowledge at the country level.
Knowledge economy			



The main risks of the optimizing scenario include:

- depopulation due to untimely reduction of migration outflow, which is critical for further development;
- loss of potential large and high-tech investors due to insufficiently high rate of attractive environment formation;
- reduction of ability to meet competition in the Caspian macro-region due to the faster pace of development of neighboring states.

Table 23. Time benchmarks for implementation of accelerating scenario for development of the Astrakhan agglomeration

Factors of development	Accelerating scenario		
	2024	2027	2032
Quality of life	<ul style="list-style-type: none"> ▪ new quality of life in cities and rural settlements; ▪ reduction of the disproportion between urban and rural settlements and districts of the agglomeration. 	<ul style="list-style-type: none"> ▪ the level of quality of life corresponds to the leaders of the Southern Federal District and the North Caucasus Federal District. 	<ul style="list-style-type: none"> ▪ the quality of life attracts residents of neighboring regions and Caspian Sea states.
An environment attractive to young people	<ul style="list-style-type: none"> ▪ high-tech paid jobs; ▪ a new format of housing. 	<ul style="list-style-type: none"> ▪ the environment attracts young people from neighboring regions and states. 	
An environment attractive for business	<ul style="list-style-type: none"> ▪ Creation of conditions for small and medium-sized business development: tax and financial incentives; ▪ preparation of investment sites for large businesses; ▪ availability of qualified personnel; ▪ agents of change attraction. 	<ul style="list-style-type: none"> ▪ successful functioning of the agents of change. 	<ul style="list-style-type: none"> ▪ creation of conditions for successful functioning at the macro-regional level.
Economy diversification	<ul style="list-style-type: none"> ▪ creation of incentives for science and business collaborations; ▪ development of industries with high margins (processing, tourism); ▪ introduction of new technologies in traditional industries; ▪ development of new technologies (construction). 	<ul style="list-style-type: none"> ▪ a sustainable sector of the post-industrial economy; ▪ sustainable functioning of Industry 4.0. 	
Innovation economy	<ul style="list-style-type: none"> ▪ comprehensive acceleration of existing initiatives through external positioning and introduction into regional economy; ▪ successful commercialization of knowledge on regional and interregional markets. 	<ul style="list-style-type: none"> ▪ successful commercialization of knowledge at the country level. 	<ul style="list-style-type: none"> ▪ successful commercialization of knowledge at the macro-regional level.
Knowledge economy			



The main risks of the optimizing scenario include:

- early depletion of natural resource base in case of insufficient control over the pace of its development and lack of coordination between government and business entities;
- failure to achieve sustainable reinvestment rates by high-tech entrepreneurship companies due to the focus of such entrepreneurs on relocation to large cities;
- inefficient spending of funds to support science due to insufficiently well-defined priorities for scientific development in the region.

Among the potential risks that may arise in the implementation of both scenarios, we should note:

- inefficient spending on infrastructure while failing to achieve indicators of migration outflow reduction;
- reduction of positive balance of regional budget due to the implementation of projects for improvement of rural and urban territories;
- decrease in the level of approval of the actions of regional authorities by local business due to the work of regional authorities to attract external agents of change.



5.2. DETERMINATION OF THE MAIN INDICATORS CHARACTERIZING THE GOALS AND OBJECTIVES OF THE AGGLOMERATION DEVELOPMENT

Based on the understanding of spatial development as a system of measures determining the distribution, intensity and efficiency of use of material and non-material resources in space through the implementation of policies aimed at creating a human environment, we identified key criteria that act as indicators of effectiveness of spatial development of the Astrakhan agglomeration:

- an environment attractive for living and young people;
- an environment attractive to business (small, medium and large-sized businesses);
- knowledge economy.

Table 24. Main indicators characterizing development of the Astrakhan agglomeration¹²³

Indicator name	Current indicator	Strategy for the Socio-Economic Development until 2035		Optimizing scenario			Accelerating scenario		
		2024	2035	2024	2027	2032	2024	2027	2032
An environment attractive for living and young people									
Average salary of corporate employees in Astrakhan, thousand rubles.	40	–	–	54	60	68	54	68	80
Average salary of corporate employees in the Astrakhan agglomeration, thousand rubles.	36	–	–	48	54	61	48	61	71
Number of high-tech jobs, thousand people.	63	74	85	74	80	87	74	85	87
Share of working-age population, %	53.6	60.5	61.3	60.5	60.7	61.3	60.5	60.7	61.3

¹²³ This was calculated by the agency "CENTR" on the basis of methods of correlation and regression modeling, comparative analysis with the reference regions, strategic documents of the federal and regional levels and expert evaluations.



Average index of quality of city environment for a territory of the agglomeration¹²⁴	161	–	–	166	172	181	170	181	185
Housing availability, m²	25.7	27.57	36.56	28	30	36.56	28	30	36.56
The volume of housing construction in the city of Astrakhan, m² / person per year	240	–	–	300	500	500	500	500	600
An environment attractive to business (small and medium-sized businesses)									
The number of small and medium-sized businesses operating in the territory of the subject of the Russian Federation, per 100,000 people	2840	3060.6	3080.8	2915.82	2933.3	2962.6	2937	2989.8	3079.4
Share of tax on comprehensive income in the budget revenues of Astrakhan Region, %	2	–	–	5	7	10	5	10	12
Share of vegetable and potato products, subjected to deep processing in the territory of the agglomeration, % of the total value of these products produced in the territory of the agglomeration	5	–	–	5	7	10	5	10	15
Volume of production of fish grown in aquaculture, thousand tons	20	23	25	22	27	35	22	35	40
An environment attractive to business (large industrial business)									
Gross Regional Product of the Astrakhan Region, bln. rub.	520.8	653.6	1024.5	706	833	960	706	960	1168
Average growth rate of GRP, % per year		2.75	5.56	1.2	3.3	2.9	5.8	6.3	4
Volume of innovative goods, works, services produced in the agglomeration's industry, billion rubles.	13 ¹²⁵	–	–	30	35	50	30	50	65
Knowledge economy									

¹²⁴ Taking into account both urban and rural settlements that are a part of it.

¹²⁵ The indicator is given for the Astrakhan Region for 2016.



Number of filed patent applications, pcs.	104	–	–	150	175	200	200	400	600
including in cooperation with the business	7	–	–	10			10	25	50

The method of calculation of development indicators is given below in note 1.

Note 1. The method of calculation of indicators for development of the Astrakhan agglomeration (optimizing and accelerating scenarios of development)

Calculation of the number of high-performance jobs:

- 25.77 billion – increase in the annual revenue of organizations in the region;
- $25,77 \text{ billion} / 1,15 = 22,41$ – prime cost of production (it was assumed that the level of profitability of sales, calculated at prime cost, for newly created organizations at the level of 15%, which corresponds to the average level of profitability of agricultural organizations planned for the development of industries);
- $22,41 \times 0,3 = 6,723$ billion – payroll fund (without insurance payments, assuming a share of payroll fund in the cost of production is at 30%);
- $6,723 / (54 \text{ thousand rubles} \times 12) = 10,375$ (rounding to 11,000, 54 thousand rubles – the average salary).

Calculation of the average salary of corporate employees in Astrakhan and Astrakhan Region in 2032.

The indicator is calculated on the basis of the average annual growth rate of the average salary of corporate employees in the Astrakhan region in the period from 2025 to 2032 in accordance with the Strategy for Social and Economic Development of the Astrakhan Region until 2035.

Calculation of the volume of innovative goods, works, services produced in the agglomeration's industry

The indicator is calculated using correlation and regression modeling based on the assumption of a direct relationship between the volume of GRP and the volume of innovative products in non-resource-based regions of Russia.

Number of filed patent applications, pcs.

The indicator was calculated using correlation and regression modeling based on the assumption of a direct relationship between the volume of GRP and the number of patent applications filed in the reference regions of the Southern Federal District.

Gross Regional Product of the Astrakhan Region

The indicator was calculated using correlation and regression modeling based on the assumption of a direct relationship between the volume of GRP and the population in the regions of Russia with a high level of social and economic development (the Republic of Tatarstan, the Moscow Region), as well as in the reference regions.



Share of vegetable and potato products that are deeply processed in the territory of the agglomeration

The indicator is calculated on the basis of data on the current volume of processing, volume of consumption of canned vegetables in Russia, with the assumption of the existing potential for the Astrakhan Region: to take 10% of the consumption volumes of deep-processed products of vegetable and potato growing by 2032.

Number of patent applications filed in cooperation with business

The indicator is calculated based on the assumption that the newly created organizations involved in the realization of the agglomeration economy industries' potential, can register at least one patent together with a scientific or educational organization. The estimated number of newly created organizations is: $5,500 \text{ high-performance jobs} / 220$ (average number of organizations) = 25. Total of 25 patents in 5 years in the accelerating scenario.

The optimizing scenario assumes increase in the number of such patents will be 2 times slower.

Share of tax on comprehensive income in the budget revenues of Astrakhan Region, %

The indicator is calculated based on the benchmarking analysis of a similar indicator for the most successful regions in terms of involvement in small business (Kaliningrad, Nizhny Novgorod and Novosibirsk regions¹²⁶) and the most successful reference regions (Volgograd and Rostov regions).

Volume of aquaculture-grown fish production

The indicator is calculated on the basis of information about the plans of the closest competitors of the Astrakhan Region to increase the volume of fish production (Rostov Region, Krasnodar Territory and the Republic of Dagestan).

The number of small and medium-sized businesses operating in Astrakhan Region, per 100,000 people

The indicator is calculated on the basis of data on the number of small and medium-sized businesses operating in the region and the number of population according to the 2019 data.

Source: RIA "REJTING" rating agency.¹²⁷

¹²⁶ Source: Rating of regions by involvement of population in small business — 2019; <https://riarating.ru/regions/20190409/630122830.html>

¹²⁷



5.3. DEVELOPMENT OF MEASURES FOR IMPLEMENTATION OF TWO SCENARIOS OF THE AGGLOMERATION DEVELOPMENT WITH SELECTION OF THE OPTIMAL ONE

In order to achieve the strategic objectives of Astrakhan agglomeration development by 2032, including a new quality of life and economic development, a system of measures needed to implement the proposed future scenarios of agglomeration development: optimizing and accelerating, was proposed in subsection 4.3.1 of this Study.

In the short term (2021-2022), under both scenarios, it is planned to improve public spaces and quality of city environment through implementation of a municipal city environment formation program in Astrakhan and the region, the consolidation of the federal and regional budget and extra-budgetary sources.

The system of measures for both development scenarios is formed in key directions:

- measures in the sphere of spatial planning and urban development zoning;
- measures for development of infrastructure (transport, engineering and industrial) and improvement of the quality of life;
- measures to support business;
- measures in the sphere of spread of knowledge and competencies.

Table 25 shows a list of measures with a time frame for their implementation for the two proposed development scenarios.

Table 25. Measures for implementation of the two scenarios for the agglomeration development

Direction of development	Optimizing scenario			Accelerating scenario		
	2019–2024	2024–2027	2027–2032	2019–2024	2024–2027	2027–2032
Measures in the sphere of spatial planning and urban development zoning						
Formation of functional zones and reservation of land plots for projects of priority development of industrial, public and business, innovative and other needed facilities.						
Development of planning and land surveying projects for prospective development sites.						

Amending the regulatory and legal documents of the subject of the Russian Federation and the agglomeration's municipal districts.		
Development of the General Plan of the "Gorod Astrakhan" municipal district.		
Development of a strategy for the social and economic development of the "Gorod Astrakhan" municipal district.		
Adjustments to urban development zoning and spatial planning, taking into account the general directions of development of the Astrakhan agglomeration.		
Development of a unified information system for urban development.		
Historical, cultural and archeological research and approval of preservation orders for cultural heritage sites on the territory of the agglomeration's settlements.		
Approval of preservation orders and cultural heritage sites in the territory of Astrakhan.		
Measures to develop infrastructure and improve the quality of life		
Development and implementation of joint infrastructure projects for modernization and construction of engineering and transport facilities on the territory of the agglomeration.		
Creation of new centers of attraction of social and cultural interest at local and regional levels (educational, health, sport, cultural facilities) mainly in the sub-centers of the first and second order.		
Construction of new comfortable housing as part of projects for integrated development of the territories.		
Creation of infrastructure and facilities as new jobs, including high-tech ones.		
Creation of new public spaces and increasing attractiveness of existing ones.		
Creation of a new quality environment in urban and rural settlements.		
Formation of investment lots in the format of brownfields for large industrial business, capable of acting as agents of change, including in industries that are prospective from the point of the agglomeration: <ul style="list-style-type: none"> ■ shipbuilding; ■ metal-fabricating and production of finished metal products. 		
Creation of infrastructure of technoparks, technopolises and innovation centers.		



Development and implementation of projects of large industrial complexes on the territory of the agglomeration, taking into account the existing and prospective transport and logistics structure.				
Creation of new international-level centers for social, cultural, public and business purposes, including objects for congress and exhibition activities.				
Development of basic and commercial tourist infrastructure (transport, engineering, navigation, tourist information centers, retail and service points) to create a unified route network of the agglomeration, primarily in the Krasnoyarsky, Narimanovsky and Privolzhsky districts.				
Creation of technopark infrastructure facilities for the manufacturing industry.				
Improvement of transport connections with key locations involved in the processing of agricultural products.				
Creation of an agricultural technology exchange focused on fish farming.				
Measures to support business				
Identification of business categories recommended for further development within each district within the agglomeration, i.e. agents of change.				
Adjustments to master plans and industrial-type SEZ , taking into account territorial needs of such businesses.				
Tax amnesty for newly registered organizations of small and medium-sized businesses in agriculture and processing.				
Formation of a body for monitoring of the needs of small and medium-sized businesses and preparation of subsequent proposals on creation of procurement alliances.				
Mediation in negotiations of small and medium-sized businesses with major suppliers of raw materials and components.				
Acquiring the status of a regulatory "sandbox" for agricultural innovations.				
Denationalization of the monitoring body and procurement alliances.				
Formation of district centers of competence in the field of agriculture and agricultural processing. Creation of an agricultural cluster in a "bottom-up" format, uniting producers of agro- and aquaculture and processors of their products.				

<p>Formation of local expert and business communities in key sectors of economy:</p> <ul style="list-style-type: none"> ▪ agriculture, including fish farming; ▪ processing of agricultural products; ▪ shipbuilding and metal-fabricating; ▪ green technologies of oil production. 			
Implementation of a private-public partnership project for re-equipment of fishing companies by involving manufacturers of fishing ships and their possible localization in the territory of the agglomeration with the guaranteed demand.			
Subsidizing local businesses to attract specialists in the field of high-tech agriculture from other regions.			
Subsidizing projects for development and implementation of agricultural technologies focused on fish farming.			
Creation of a fund for social development of the agglomeration with participation of local self-government bodies of the territories included in the agglomeration, representatives of business and science. Implementation of joint projects aimed at social development, preservation and multiplication of human capital of the agglomeration.			
Development of new types of eco-tourism, taking into account the existing natural structure and system of natural areas under special protection.			
Development and implementation of measures supporting the agricultural cluster.			
Subsidizing introduction of sustainable agriculture and green technologies.			
Creation of a national center of competence in the field of sustainable agriculture and green technologies.			
International promotion of the cluster.			
Integration of the cluster into the TCI Network.			
Measures in the sphere of spread of knowledge and competencies			
Subsidizing local businesses to attract specialists in the field of high-tech agriculture from other regions.			
Subsidizing projects for development and implementation of agricultural technologies and fish farming.			
Creation of a regional center that prepares qualified workers for the industries.			
Creation of a center of competence in the field of green technologies of oil production.			



Formation of additional education centers for children focused on sustainable agricultural and green technologies and oil production.

Thus, measures to implement both scenarios for development of the Astrakhan agglomeration as a whole include consecutive task-solving in terms of:

- setting up an effective system of agglomeration territorial planning;
- forming an attractive city environment that meets the requirements of young people and highly qualified personnel;
- creating production, logistics and business infrastructure for high-tech businesses and agents of change;
- organizing conditions for more active creation, spread and implementation of scientific knowledge;
- promoting agglomeration at the level of the Caspian macro-region.

We should specifically point out the institutional mechanisms for the work with cultural heritage on the territory of the Astrakhan agglomeration:

- Development of economic incentive mechanisms for owners, users and businesses involved in the preservation of cultural heritage (deferment/reduction/partial exemption from property taxes, discounted VAT rate for those working on the restoration of historic buildings, easy credit terms, deduction of total reconstruction expenses from rent/reduction of rent, preferential rent for up to 49 years for 1 ruble, preferential privatization of dilapidated cultural heritage sites, private-public partnerships and concessions).
 - 1a. **Co-financing of restoration** (JSC/the Agency partially replenishes the cost of adaptation/reconstruction of the object at the expense of the Agency's/JSC's fund in case of a high degree of deterioration).
 - 1b. **Social rent for small businesses** (facilities of small area are attractive to small and medium-sized businesses). A reduction in rental rates for small facilities will increase the inflow of potential users and create a favorable environment for small businesses.
 - 1c. **Hybrid programs** (compiling a hybrid program involves finding additional sources of funding, may include several federal and regional programs not related to the objects of cultural heritage. For example, the target program "Energy-saving and improvement of efficiency").
 - 1d. **Participatory budgeting** (direct participation of citizens in the distribution of 1 to 10% of municipal budget). Supporting redistribution of funds in favor of restoration of historic buildings. Users of the territory (residents and businesses) can participate in funding and work with the municipality on restoring the facilities that need it most.
- Approval of preservation orders and cultural heritage sites in the territory of Astrakhan.
- Development of historical environment: (algorithm) selection of functional purpose of objects in the historic center of Astrakhan in accordance with the location relative to the points of attraction; increasing investment attractiveness of objects as a result of integrated development of the city environment around the object; implementation of a mechanism of unified object management.
- Launching interdisciplinary projects at the intersection of art, historical heritage, and tourism (similar to the Brest Stories Guide Project), documenting the stories of the city's residents.
- Formation of a professional platform to coordinate projects for implementation of a comprehensive strategy of revitalization of a



historical settlement on the basis of four institutions: Astrakhan State University of Architecture and Civil Engineering (AGASU), the Astrakhan Museum-Reserve, the Astrakhan Regional Scientific Library and the State Archive of the Astrakhan Region.

- Creation of an interactive map of cultural heritage sites featuring investment lots and information on each regeneration quarter.
- Development of a strategy on the city environment of the historic center, an integral part of which should be a strategy for preservation and development of flat blocks.
- Creation of a specialized organization with public ownership — the Institute for Development of the Historic Center/ Specialized AO "Agentstvo razvitiya ob`ektov kul`turnogo naslediya" (Agency for the Development of Cultural Heritage Sites, JSC).
- Formation of a separate architectural tourist route on the commercial farmsteads, the architecture of the workers' settlements and Soviet constructivism.
- The launch of the art residency program as part of "Chilim fest" and "TomSojerFest" projects, and comprehensive revitalization of the historic center.

Figure 214 below shows a schematic diagram of the key measures for development of the Astrakhan agglomeration.



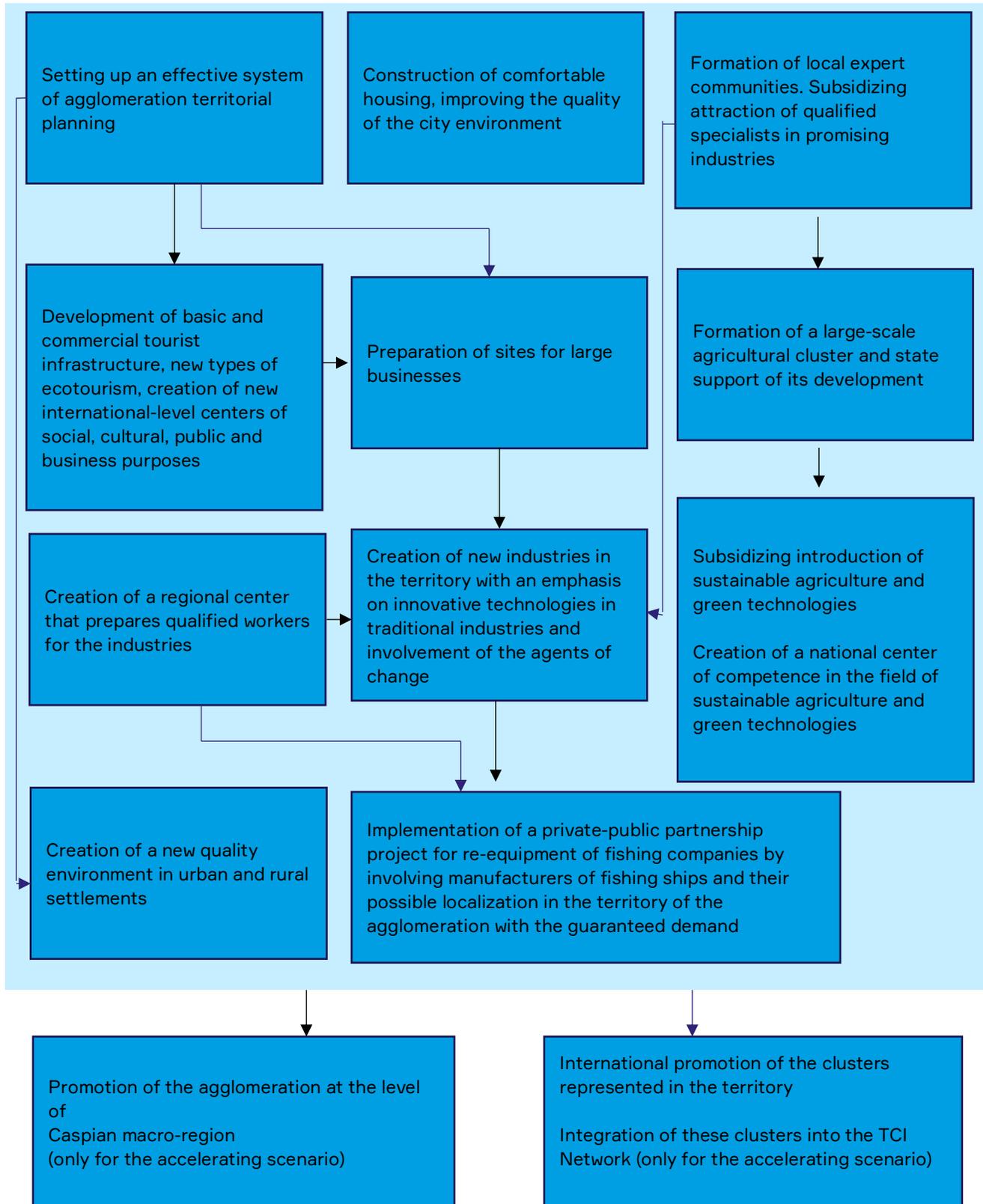


Fig. 214. Basic block diagram of key activities for development of the Astrakhan agglomeration

Table 26 contains recommendations on introduction of individualized agglomeration mechanisms in the territory of individual municipal districts, on the basis of which subsection 5.4.3. provides an aggregated estimation and assessment of the expected effects of agglomeration development.

Table 26. Recommendations on introduction of agglomeration mechanisms in the territory of municipal districts

Mechanism	Astrakh an	Privolzhsk y	Narimano vsky	Kamyzyaks ky	Volodars ky	Ikryanins ky	Limansk y	Krasnoyar sky
Formation of common markets	<ul style="list-style-type: none"> ■ creation of a single public transport operator; ■ implementation of private-public partnership projects in the sphere of municipal solid waste and household solid wastes; ■ implementation of private-public partnership projects in the sphere of water supply and wastewater disposal. 							
Implementation of innovative projects	<ul style="list-style-type: none"> ■ formation of an engineering center. 			<ul style="list-style-type: none"> ■ formation of demonstration site for ecosystem interaction technologies. 				
Optimization of production force distribution	<ul style="list-style-type: none"> ■ placement of vegetable processing facilities and vegetable storage facilities. 			<ul style="list-style-type: none"> ■ placement of fish processing facilities. 			<ul style="list-style-type: none"> ■ placement of meat processing facilities. 	
Optimization of placement of residential areas	<ul style="list-style-type: none"> ■ construction of comfortable housing neighborhoods. 							
Attracting investment to underinvested territories	<ul style="list-style-type: none"> ■ creation of a single institution for investment development of the agglomeration. 							



5.3.1. A broad estimate of expected effects of the agglomeration development

The main effects of the agglomeration development lie in realization of latent potential of interaction between the territories of municipal districts that are a part of the agglomeration. We should highlight the following mechanisms used to achieve maximum effect:

- formation of common markets providing services, the efficiency of which is affected by the economy of scale: water supply and wastewater disposal infrastructure, household solid wastes and municipal solid waste management services, public transportation services;
- implementation of innovative projects that require involvement of production and technological competences developed in different territories;
- optimization of production force allocation within the production chains that ensures the reduction of business transport and logistics costs;
- optimization of the housing estate placement in terms of minimizing traffic congestion, travel time to work and the cost of housing;
- investment inflow to the underinvested territories in the agglomeration by business groups located in other territories of the agglomeration.

Table 27 below shows an aggregated estimation of the agglomeration development effect for the city of Astrakhan and the seven municipal districts in question.

Table 27. Aggregated estimation of the agglomeration development effect

Mechanism for achieving the agglomeration effect	Potential agglomeration effect	Investments, rub.	Revenue, rub.	Value added, rub. ¹²⁸	Increase in tax revenues
Creation of a single public transport operator	The possibility of obtaining investment for such a project arises only when it involves at least 800 thousand people (i.e. the agglomeration population in the resource scenario)	30,000,000,000	–	30,000,000,000 × 10% = 3,000,000,000 (10% is the share of labor costs in the project's investment structure)	
Implementation of private-public partnership projects in the sphere of municipal solid waste and household solid wastes;	The project is already being partially implemented by the region	–	–	–	

¹²⁸ Method used for the aggregated estimation of efficiency of the mechanism "Stimulation of service sector in new public and business areas and housing construction zones".



Implementation of private-public partnership projects in the sphere of water supply and wastewater disposal.	For effective implementation of this kind of projects, the population of the city has to be at least 50,000 people. There are no such settlements within the agglomeration, except for Astrakhan.	–	–	–	
Formation of a demonstration zone for green agriculture	The project has the potential to provide 30% of the maximum increase in the volume of crop production, but its implementation requires involvement of business experts from as many districts as possible	30% × 6,500,000,000 rub. = 1,950,000,000 rub.	30% × 6,500,000,000 rub. = 1,950,000,000 rub.	30% × 6,500,000,000 rub. = 1,950,000,000 rub.	1,950,000,000 × 13% × 0.85 = 215,475 rub. – the amount of personal income tax received by the regional budget
Placement of fish processing facilities (construction of a shop with refrigerated chambers for processing and storing vegetable and fish products of the Agricultural Marketing Consumer Cooperative (SSPK) in Tsvetnoye village – Volodarsky; construction of a fish processing plant for deep processing of fish in Chapaevo village – Kamizyasky)	Participation of Kamyzyasky, Volodarsky and Ikryaninsky districts in the agglomeration can increase the volume of fish catch by 26 thousand tons per year due to the expansion of fishery equipment. This can provide an increase in revenues of fish processing enterprises by 1 billion rubles a year, provided that 20% of fish will be processed and its wholesale price will be 200 rubles per 1 kg. Inflow of funds into the regional budget	20% × 26,000, 000 × 200 rub. = 1,040,0 00,000		1,040,000,000 × 30% = 312,000,000 (30% – the share of labor costs and profits in the annual revenue of fish processing projects that can be implemented in the Volodarsky, Kamyzyasky and Ikryaninsky districts	312,000,000 × 0.13 × 0.85 = 34,476,000 rub.
Creation of a single institution for investment development of the agglomeration	Increase in the number of ongoing investment projects in Krasnoyarsky and Privolzhsky districts (2 projects for 200 million rubles each)	2 × 200,000 ,000 = 400,000 ,000	400,000,000 × 0.25 (investment turnover ratio) = 100,000,000	400,000,000	



Export promotion	Promoting exports through the seaports of Astrakhan and Olya should contribute to the growth of agricultural exports in the region to the level of the Rostov Region. To date, Rostov Region supplies 10% of the total value of Russian exports of vegetables, and Astrakhan Region – 3.5%.	147 million dollars (the value of all-Russian exports of vegetables) × (10 – 3.5%) = \$9.5 million × 73 rubles per dollar = 693,500,000	693,500,000	
Stimulation of service sector in new public and business areas and housing construction zones	Calculation method is given below, in Note 2	45,428,075,361	45,428,075 36 × 10% (wage share in service sector revenue) = 4,542,807,536 rub.	Increase in personal income tax 501,980,173
Increase in the cadastral value of land in areas of housing construction				Increase in land tax per year – 8,480,700 rubles; as a result of the increase in cadastral value of land
Increase in revenues of businesses in the service sector, located on the first floors of the cultural heritage sites, as a result of increased demand from tourists	Calculation method is given below, in Note 3	2,750,000 0,000 rub.	2,750,000,000 rub. / 1.3 × 20% = 423,076,000	135,000,000 (calculated based on the assumption that every 5th business will use the simplified taxation system)
Total:	16,173,575,000 – annual GRP growth in the first 10 years of the project implementation, taking into account the effect of investments (3.0% of the GRP of Astrakhan Region). 3,466,576,000 – GRP growth in subsequent years, taking into account the effect of growth of income of the region's residents (0.65% of Astrakhan Region's GRP). 762,825,709 – increase in revenues to the regional budget as a result of an increase in the revenue base for personal income tax and land tax (1.5% of revenues to the regional budget for 2020). 125,000,000,000 rub. – estimated amount of investments in project			



Thus, in accordance with the expert assessment it is possible that the estimated agglomeration effect will increase GRP by 16 billion 173.6 million rubles in the first 10 years of implementation of the agglomeration formation project and by 3 billion 466.6 million rubles in subsequent years of implementation.

In this case the value of the GRP growth in the region after 10 years of the project (162 billion rubles) will exceed the cost of its implementation (125 billion rubles) by 37 billion. Thus, the calculations indicate the social and economic feasibility of the project within the 10-year planning time-frame.

During implementation of the optimizing scenario, the annual increase in GRP in subsequent years after the implementation of the project will be reduced to

1 billion 387 million rubles due to the inability to fully benefit from the positive effects of the following mechanisms:

- formation of a demonstration zone for green agriculture;
- creation of a single institution for investment development of the agglomeration;
- export promotion.

In this case, the reduction in investment will only be up to 115 billion rubles.

Thus, the savings effect of the optimizing scenario will be exhausted in 10 years after the project implementation.

The accelerating scenario seems more reasonable.

Note 2. Method used for the aggregated estimation of efficiency of the mechanism "Stimulation of service sector in new public and business areas and housing construction zones"

Calculation of the revenues of the services sector, newly formed in the new housing construction territories, is calculated on the basis of technical and economic indicators of development, taking into account the following assumptions:

- 1) coverage area of sociocultural objects and public utilities within the territory of residential housing is 800 m;
- 2) average revenue of sociocultural objects and public utilities within the territories of individual housing construction is 50 million rubles;
- 3) the number of seats in catering establishments in areas of multi- and low-rise buildings is calculated as 100 people per 0.35 ha occupied by the development;
- 4) the norm of occupancy of public catering establishments is 60%;
- 5) average check — 300 rubles per seat;
- 6) turnover of seats — 4 visitors per seat;
- 7) the need for retail facilities in areas of low and multi-storey buildings is 355 m of space occupied by food retail facilities, and 156 m of space occupied by non-food retail facilities per 1,000 inhabitants;
- 8) the income from 1 m² of retail space is 40 thousand rubles.

So, in accordance with the expert assessment of the estimated agglomeration effect, it is possible to increase GRP by 6 billion 355.5 million rubles in the first year of implementation of the projects and by 3 billion 43.5 million rubles in subsequent years of implementation.

Note 3. Method used for the aggregated estimation of revenues of businesses in the service sector, located on the first floors of the cultural heritage sites, as a result of increased demand from tourists



Experts identified the following prerequisites for activation of the center of Astrakhan:

1. The potential to increase tourist spending in annual terms, amounting to 2.75 billion rubles.
2. The potential for growth in retail trade turnover, amounting to 8.5 billion rubles.
3. Estimated area of inactive first floors in the cultural heritage sites of the central part of Astrakhan, amounting to about 60,000 sq. m¹²⁹.

By benefitting from these prerequisites, active economic turnover may receive about 26,500 m² of retail space and 3,500 m² of space for catering facilities; a total of 30,000 m² of space, or 50% of the conditional offer of the inactive first floors (the activities of the first order).

Within the zones of the historic center prioritized for transformation in Astrakhan (the Kosa district, Admiralteyskaya street, the blocks adjacent to the Astrakhan State Opera and Ballet Theater) there are objects (about 100 pcs) that provide the necessary amount of space for the implementation of opportunities for the growth of tourist spending and retail trade turnover. At the same time, 90% of these objects require comprehensive repair and restoration work, while 10% of these objects require partial repairs, restoration of brickwork and/or partial repair of ceilings. Taking into account the average estimated cost of works on the preservation of similar cultural heritage sites, the repair of these objects will require about 450 million rubles. Thus, in the case of coordinated efforts to develop the tourism sector and increase consumer demand in Astrakhan, the cost of repair and restoration work with the adaptation of objects for modern use can bring payback within 3 years.

¹²⁹ The main features of objects that correspond to the concept of conditional offer of inactive first floors:

- no indication in the registry of the legal entity, the user of the object;
- no visual design of the first floors, signs, entrance panels, banners, etc.;
- location above the ground, not buried in the basements.



5.4. IDENTIFICATION OF REQUIRED RESOURCES

The investment attractiveness of regions is determined by a combination of objective and subjective factors — from the geographical location and availability of natural resources to the state of business environment and human resources. With the increasing competition of regions for investors, it is important for the regional government to use both financial and administrative tools in order to increase the investment attractiveness.

The key requirement for implementation of the proposed measures for development of the Astrakhan agglomeration is to attract external investors and agents of change to the region.

Working with investors is a complex task that is based on meeting the needs of groups of potential investors and agents of change in terms of labor and intellectual resources. The main components of the process required for its implementation on the territory of the Astrakhan agglomeration are shown in Fig. 215.

Key centrifugal, centripetal, and intermunicipal relationships

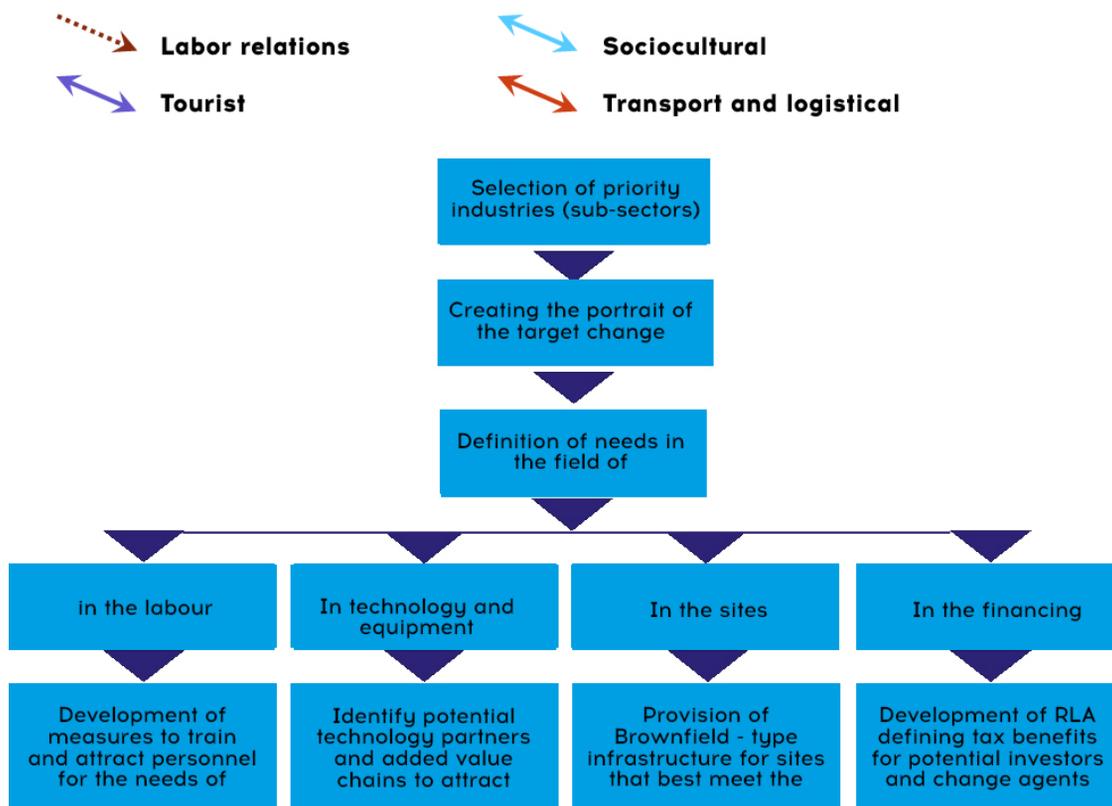


Fig 215. The main elements of comprehensive work with investors, recommended for the Astrakhan agglomeration

The multifaceted approach presented above requires a wide range of financial instruments to provide monetary resources for both housing and transportation and engineering infrastructure projects, support for business projects in manufacturing and development of science, innovation and personnel training. A brief description of such instruments with their disadvantages and advantages is presented in Table 28.



Table 28. List of recommendations for attracting resources

Instrument	Goals of financing	Maximum and minimum volume	Body	Disadvantages	Advantages
INFRASTRUCTURE AND HOUSING					
Decree of the Government of the Russian Federation of October 19, 2020, No 1705 "On approval of the rules for writing off the debt of a subject of the Russian Federation to the Russian Federation on budget loans and the list of tax revenues to be credited to the federal budget from implementation of new investment projects, in the amount of actual receipt of which the Government of the Russian Federation has the right to write off the debt of subjects of the Russian Federation on budget loans".	Reduction of subject's debts on budgetary credits	The volume of actual tax revenues to the federal budget from the implementation of new investment projects	Federal Tax Service	Write-offs occur only once a year. Investment projects have to be new and implemented by a newly created legal entity. Write-off only in the amount of tax revenues from the projects. Tax revenues from projects are deferred	The possibility of achieving two goals at once: improving financial situation of the subject and attracting investment
Decree of the Government of the Russian Federation of October 19, 2020 No. 1704 "On approval of the Rules for determining new investment projects, for the implementation of which the budget funds of the subject of the Russian Federation, released as a result of reducing the volume of repayment of debt of the subject of the Russian Federation to the Russian Federation on budget loans, are to be sent to the subject of the Russian Federation to make budgetary investments in infrastructure facilities".	Reduction of subject's debts on budgetary credits	The volume of actual tax revenues to the federal budget from the implementation of new investment projects	Federal Tax Service	Write-offs occur only once a year. Investment projects have to be new and implemented by a newly created legal entity. Write-off only in the amount of tax revenues from the projects. Tax revenues from projects are deferred	The possibility of achieving two goals at once: improving financial situation of the subject and attracting investment
Priority project "Creation of a modern educational environment for school students"				The need for a special agreement with the federal authorities	Direct non-returnable funding



The project "DOM.RF — Infrastructure Bonds"	Construction of social, engineering and transport infrastructure as part of housing construction or citywide infrastructure	The minimum volume is 300 million rubles	"DOM.RF"	Subsidizing and the possibility of redemption of bonds by DOM.RF	The need for state guarantees from the region in the amount of 90% of the value of the bond loan
Green bonds "Implementation of the best available technologies" of the national project "Ecology"; Decree No. 541 of 30.04.2019	Projects in the sphere of renewable energy sources, energy efficiency, efficient waste management, biodiversification, rational use of resources, clean transport, water management and adaptation to climate change	The maximum volume of a loan is 30 billion rubles.	Ministry of Industry and Trade of the Russian Federation (subsidizing)	The upcoming opportunities to subsidize the costs of payment on green bond coupons	Targeted nature of the funds received as a result of the bond-secured loan
Subsidizing the costs of utility infrastructure renovation projects from the Housing and Utility Reform Foundation	Utility infrastructure renovation projects	The maximum amount of subsidizing — up to 300 million rubles.	Ministry of Construction, Housing and Utilities of the Russian Federation	Direct financing	—
Participation in private-public partnership projects in the field of urban economy and transport	Port construction projects		VEB.RF	Payment and repayment of funding	Significant scale of financing, sufficient to implement projects important for the agglomeration
State Program "Integrated Development of Rural Areas"; the federal budget subsidizes regional expenditures on improvement of housing conditions of citizens living in rural areas.	Housing construction		Ministry of Agriculture of the Russian Federation	The need for co-financing from the region	
State Program "Integrated Development of Rural Areas"; the federal budget subsidizes regional expenditures on financial support in the	Housing construction		Ministry of Agriculture of the Russian Federation	The need for co-financing from the region	



performance of expenditure commitments of municipal districts related to the construction of housing provided under residential lease agreement

State Program "Integrated Development of Rural Areas"; the federal budget subsidizes regional expenditures on development of engineering infrastructure facilities and improvement of sites located in rural areas in order to create compact housing development	Projects in the field of engineering and transport infrastructure and public amenities	Ministry of Agriculture of the Russian Federation	The need for co-financing from the region
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State Program "Integrated Development of Rural Areas"; the federal budget subsidizes regional expenditures on implementation of measures to improve rural areas, creation of transport and engineering infrastructure	Projects in the field of engineering and transport infrastructure and public amenities	Ministry of Agriculture of the Russian Federation	The need for co-financing from the region
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BUSINESS

VEB.RF support measures: loans, guarantees and sureties, participation in authorized capital, financial and guarantee support of exports	Projects in the sphere of high-added value industries (in case of Astrakhan agglomeration — production of modern materials and shipbuilding)	The value of investment in projects is not less than 1 billion roubles.	VEB.RF	Possibility to customize the financing scheme to the specifics of a particular project	High barrier of entry
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Support of construction, acquisition and leasing of civil ships			VEB.RF	High relevance of funding goals to the region's needs	Payment and repayment of funding
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Subsidizing exports	Projects for the export of products of tradable industries		VEB.RF	High relevance of funding goals to the region's needs	Payment and repayment of funding
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Subsidizing the interest rate on loans for projects in the field of engineering	Engineering projects		Ministry of Industry and Trade of the Russian Federation	Free non-returnable funding	Only part of the interest rate is subsidized
Subsidizing working capital costs and subsidizing the interest rate	Projects in the field of industrial biotechnologies		Ministry of Industry and Trade of the Russian Federation	Free non-returnable funding	Only part of the interest rate and expenses is subsidized
State Program "Integrated Development of Rural Areas"; the federal budget subsidizes regional expenditures on implementation of measures aimed at assisting agricultural producers through provision of qualified specialists	Agricultural organizations		Ministry of Agriculture of the Russian Federation	High relevance of funding goals to the region's needs	The need for co-financing from the region

SCIENCE AND INNOVATIONS

Big grants for opening international scientific laboratories	Scientific research in priority areas of economic development		Ministry of Science and Higher Education of the Russian Federation		
Financing the creation of a national medical research center			Ministry of Health of the Russian Federation		

CULTURE AND TOURISM

Financing the creation of multimedia concert halls in community centers and libraries			The Ministry of Culture of the Russian Federation		
Provision of interest-free loans for payment of wages			Small and medium business corporation ("MSP")		
Grant support of domestic and inbound tourism	Acquisition of non-stationary tourist equipment, development of tourist routes, etc.	Up to 3 million rubles			Small amount of financing



The analysis of the presented funding sources showed that implementation of measures to improve infrastructure availability of the agglomeration will require the use of infrastructure bonds mechanisms and various types of private-public partnership projects. At the same time, the business projects planned for implementation in the agglomeration should not miss the opportunity to receive budget subsidies, since most of them correspond to the key priorities of industrial policy.

The following principles should guide the search for project financing sources:

- to diversity financing sources from state federal, regional, municipal and private sources;
- to use the opportunities to divide complex projects into separate structural blocks in order to use several sources of financing;
- to use both free and paid sources of financing, in particular, bonded loans and bills of exchange. Refocusing on paid sources of financing due to the scale and long-term nature of the agglomeration development project;
- individual approach to private-public partnership projects. Finding optimal conditions for the various parties included in the project. Application of not only bilateral, but also more complex, such as trilateral, financing schemes;
- to use the opportunities to create a single center for the accumulation of financing from various sources — the agglomeration development funds;
- information and consulting support for business projects to improve communication between regional authorities and the business sector. Using incentives to increase the scope of social responsibility of organizations.



Conclusion

1. Astrakhan region is highly potential for development due to its favorable geostrategic location, combination of natural resources and their concentration, unique natural, historical and cultural legacy, and symbolic assets accumulated.
2. This potential can be realized due to the existing infrastructure for production, transport, logistics, and engineering, but still there are reasons that reduce its efficiency:
 - weak self-presentation at the national level;
 - poor diversification and lack of focus on resources in the economy;
 - insufficient investment prospects of the region and lack of investment;
 - underdevelopment of non-productive sector of the economy, such as services, tourism, and innovative industries;
 - poor interaction between municipalities.
3. The insufficient rate of economic development led to problems in the social sphere, at the moment, the most important of these problems are:
 - low living standards compared to the leading regions of the Southern and Volga Federal Districts;
 - emergency dwelling stock (about 7.5 thousand people are currently living in failing buildings);
 - emergency condition of cultural heritage sites;
 - high wear and tear of utility lines (average level of wear and tear is 80%);
 - Development disparities between Astrakhan and municipalities, settlements of different municipalities, such as:
 - high differentiation in wages in municipalities of the agglomeration;
 - different levels of transport infrastructure and public transport systems;
 - different level of engineering infrastructure (some rural settlements of the agglomeration are not provided with water supply and centralized water disposal system);
 - imbalance in workplaces concentration in the agglomeration area (about 75% of workplaces are located in core of the agglomeration), etc.
4. One of the important factors to solve the problems is the use of the agglomeration development mechanism as there are historical economic ties between urban and rural settlements in the Volga delta conditioned by the resource based economy and the concentration of the main processing industries in Astrakhan.



5. The study analyzed the development potential of the Astrakhan agglomeration, suggested a conditional model of the agglomeration and explained its boundaries.

The proposed model of the Astrakhan agglomeration:

- monocentric, with a multifunctional center in Astrakhan Municipality;
- with first- and second-tier subcenters;
- with the first-tier subcenters situated in an hour drive distance from the agglomeration center: Narimanov (Narimanovsky district) and Kamyzyak (Kamyzyaksky district);
- with dynamically developing second-tier subcenters: industrial and production, industrial and logistics hubs: industrial SEZ (Special Economic Zone) "Lotus" (near Narimanov, Narimanovsky district), Krasnye Barrikady plant (Krasnye Barrikady urban locality, Ikryaninsky district); production and gas-processing facilities of Gazprom (Krasnoyarsky district);
- port SEZ "Olya" (Olya village, Limansky district).

The spatial development of Astrakhan agglomeration is performed as an organized system of different tiers points of growth. Meanwhile, the core of the agglomeration - Astrakhan Municipality and surrounding areas of Privolzhsky and Narimanovsky districts - will play a priority role in its development. The main development of the agglomeration core is associated with the area comprehensive development, allocation of infrastructure for innovative and knowledge-driven economy, infrastructure for tourism and international integration. Activities aimed at the development of specialized functions including industrial and production, logistics, innovation functions on the area of the agglomeration municipalities are specified considering the selected development scenario.

6. Based on a comprehensive analysis of the potential, problems and prospects of social and economic development of Astrakhan agglomeration, peculiarities of spatial development of the territory analyzed, opportunities for development as identified by SWOT and CROSS SWOT analyses, four strategic development directions were identified:

- active locus of power in the Caspian Sea region;
- Astrakhan agglomeration is an area of a dynamic development;
- Astrakhan is a city of opportunities, an active multifunctional center;
- demonstration site of ecosystem interaction technologies;

7. The agglomeration center Astrakhan Municipality has a unique historical and cultural heritage, high transport and logistics potential, and prerequisites necessary for the formation of innovative economic trends and development of a comprehensive tourism sector; in general, the center has a high potential for development. However, an urban environment remains in poor state reducing the attractiveness of the city both for local residents, especially for young people, and for potential investors.

8. Despite the problems of the urban environment and utilities, the urban planning potential of Astrakhan can be assessed as quite high. Severny and Severo-Vostochny planning areas, Babaevsky microdistrict have the greatest potential for integrated development, and the potential for redevelopment of industrial areas in future. Privolzhsky and Narimanovsky districts adjacent to Astrakhan have the potential for individual residential development, along with industrial and warehouse functions.



The study outlines promising sites recommended for urban development:

- regeneration of the historic center of the city (Kosa, the area near the Opera and Ballet Theater, the power plant complex, the Stone Prison Castle, and the Ataman's Station);
- areas of integrated development of public and residential buildings (Severny, Severo-Vostochny, Trusovsky planning areas, Babaevsky microdistrict, the city center near the Old Bridge);
- areas of public and business development near the airport;
- areas for development of industrial and warehouse function near the railway stations "Kutum" (Privolzhsky district) and "Trusovo" (Narimanovsky district).

9. There is also a potential for urban development in the municipal district centers of the agglomeration with respect to individual residential development, the area in the central part of Kamyzyak (area of emergency dwellings) has potential for comprehensive development. The area of Olya village in Limansky district has the potential to develop industrial and warehouse zone near the port SEZ.

10. The industries likely to benefit most from the agglomeration development include agriculture (crop farming, fishing, fish farming), agricultural product processing, general shipbuilding and metal industry, production of rubber and plastic products for agriculture and agricultural product processing, engineering in agriculture, specialized shipbuilding, oil production, and tourism.

The agglomeration effect in these industries can be achieved through such mechanisms as:

- creation of shared markets for services and products increasing the attractiveness of Astrakhan agglomeration for investors and positive change agents;
- implementation of innovative projects that require the involvement of production and technological expertise that have been developed in different settlements within the agglomeration, under the leading role of Astrakhan;
- optimization of production force allocation within the production chains that ensures the reduction of business transportation costs;
- investment inflow to the underinvested territories in the agglomeration by business groups located in other territories of the agglomeration;
- attraction of outside investments for projects across the agglomeration area.

11. An appropriate organizational support is essential for the successful development of the Joint-Stock Company:

- establishment of the agglomeration governing body;
- elaboration of a strategy (plan, program) for the agglomeration development;
- establishment of a unified center for concentration and consolidation of financial resources of the agglomeration.

The implementation of intentions to develop an agglomeration requires the alignment of financial resources by a wide range of project participants from public, quasi-public, private and public sources. In designing the project, special attention should be devoted to paid public sources of funding (for example, a bonded loan or a bill of exchange) since the project is large-scale and long-term in scope.



12. The Research presents two prospective scenarios of Astrakhan agglomeration development - optimizing one and accelerating one, which are based on the following crucial conditions:

- cost minimization and optimization of available resources;
- reaching the maximum return for the region given the opportunities to attract new resources, including financial and technological ones.

The optimizing scenario is focused on improving the efficient use of already available resources and assets, optimizing the use of land, eliminating infrastructure shortages and problems that hinder inter-municipal interaction, and formulating a request for change agents.

The accelerating scenario is focused on the formation of the agglomeration's competitive advantages sought after at the level of the Caspian macro-region, both in terms of the produced goods and in terms of standard of living and quality of life.

Both scenarios are aimed at the same goal - create a successful agglomeration, competitive at the macro-regional level, but they assume different rates of transformation and the amount of resources attracted. The optimizing scenario helps to reach the set strategic goal for the period 2021-2032, while the implementation of the acceleration scenario over the same period allows to ensure a new quality of life, economic sustainability and create conditions to make the agglomeration competitive at the macro-regional level.

For example, by 2032 the average GRP growth rate indicator for the optimizing scenario is about 3% per year, for the accelerating scenario - 4%. The same is true for the knowledge-based economy: the optimizing scenario assumes an increase in science-business collaborations represented by the "number of patent applications filed" indicator reaching 10 units by 2032, while the accelerating scenario sets a target of 50 units by 2032.

The study involved participatory tools to capture the opinions of residents in determining the model and scenario for Astrakhan agglomeration development. The following survey tools were used: otmetky.com and Yandex.Forms. In total, more than 2,000 Astrakhan residents took part in online surveys. The results of the surveys are given in Appendices 1-2 of the Research.

Research materials: assessment of the development resource potential, agglomeration conditional model, outlined strategic goals and structured objectives for agglomeration development, including the implementation of urban development potential, proposed development scenarios and indicators of milestones achievement form the basis for the Terms of Reference for Astrakhan agglomeration master plan (Appendix 22) as part of the planned open international contest for the development of the Astrakhan agglomeration master plan.



Appendices



APPENDIX 1. A BRIEF SUMMARY FOLLOWING THE RESULTS OF THE SURVEY CONDUCTED ON OTMETKY SERVICE

The survey was conducted from February 15 to 28. The total number of the website visitors for this period is 3,182, which is equivalent to 0.4% of the agglomeration population. The number of visitors responded to the questions is 101. 66% of survey participants were men and 34% were women. Participants ranged in age from 17 to 64. 79% of responses were received from residents at the age from 18 to 39.

In total, 391 responses were received, 327 of them were proposals. 19% of the proposals were related to the issues of operation, maintenance and current repairs. Since this poll was conducted to collect residents' proposals on Astrakhan agglomeration area development, they are not considered in further aggregate analysis.

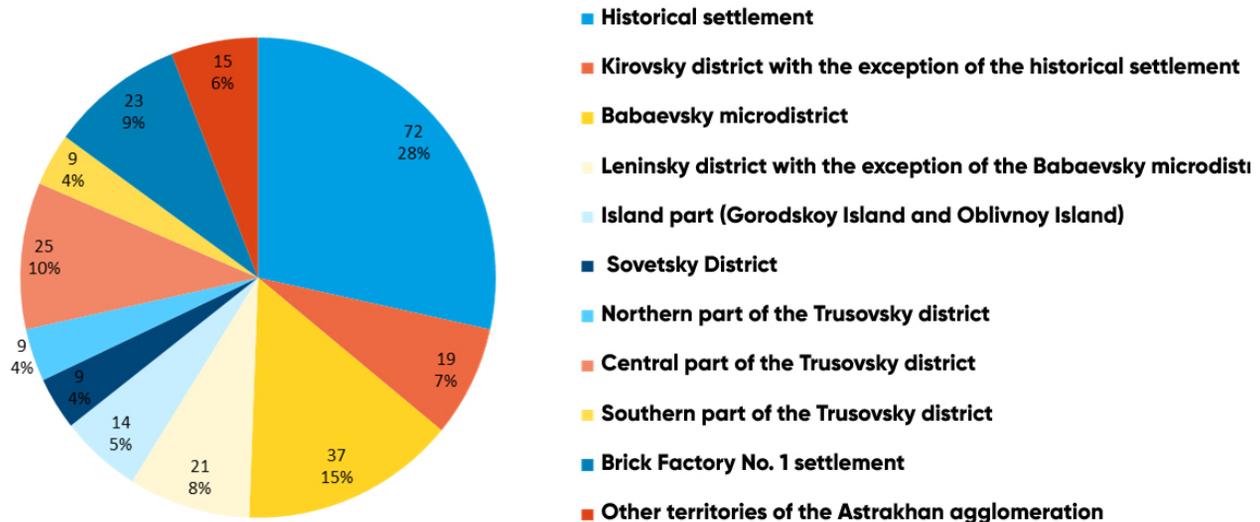
Aggregate analysis of residents' proposals

The area was divided into the following districts in order to structure, analyze and graphically display the findings.

- Historical settlement.
- Kirovsky district, not including the historic settlement.
- Babaevskiy microdistrict.
- Leninsky district, without Babaevsky microdistrict.
- Island part (Gorodskoy Island and Oblivnoy Island).
- Sovetsky district.
- Northern part of Trusovsky district.
- Central part of Trusovsky district.
- Southern part of Trusovsky district.
- Brickyard village No. 1.
- Other areas of Astrakhan agglomeration.



Fig. 216. Distribution of responses by selected territories



1. The most part of the proposals was related to the historical settlement area development - XX% of the total number of proposals.
2. **Historical settlement.** The residents specified 16 facilities deemed to be the most attractive in terms of history and architecture. 8 facilities were proposed for revitalization and reconstruction along with changing their functions: replacement of them with cultural and exhibition centers, creative clusters, office spaces, and construction of a multifunctional space on the territory of the cargo port located in Seleniya block. The residents chose 1 hiking path and 6 touristic routes. As for proposals for public spaces: creation of parks to replace vacant lots, creation of pedestrian streets (Akhmatovskaya, Nikolskaya and a section on Kirov Street) and recreation areas by the water, including the reconstruction of Red Embankment. 11 abandoned, 4 unused and 5 irrationally used territories were noted. There were also 3 proposals for bridges, all to improve the link to Gorodskoy Island.
3. It was proposed to establish a local cultural center in the area of Tatarskaya Sloboda. As for sports facilities, there were suggestions to build a stadium without specifying its exact location, and a sports field near Vokzalnaya Square.
4. The most part of other proposals regarding the development of the historic settlement are proposals to develop public transport (bringing back trolleybus and tram routes, introducing new routes) as well as to regulate traffic. Some proposals were related to limiting the number of stories for new buildings, transferring the penitentiary outside the central part, there were also general suggestions to improve the quality of the urban environment.
5. **Kirovsky district, not including the historic settlement.** In a quarter of the responses examined, the residents referred to unused and/or irrationally used, abandoned areas. These are mainly areas along the railroad tracks. 20% of the proposals were devoted to the creation of new and reconstruction of existing public spaces, there was a unique proposal to place a square on top of Tri Kota shopping mall. 2 proposals were related to creating recreational areas by the water, 1 to a promenade. The residents noted 3 facilities, which, according to the residents, are the most attractive in terms of history and architecture, such as Yamgurcheva Sloboda and the plant named after Karl Marx. A point on Valeria Barsova Street was noted as a promising location for a



House of Culture. It was suggested to locate 3 sports facilities: 2 open-air ones including a sports field inside the residential blocks on Sofia Perovskaya Street, and 1 indoor water park near the Nachalovskoye Highway at the exit from the city. The construction of an overpass between Kulikov Street and Karl Marx Street was among the proposals. The residents also asked to bring back the public transport stop on Kirov Street closer to the pediatric outpatient clinic.

6. Babaevskiy microdistrict. The most part of the residents' wishes concerned arrangement of sports facilities and development of public spaces. There were unique sports facilities, such as an indoor ice rink, a stadium near the Energeticheskaya Street and a bowling alley. There were also offers to arrange a football pitch and health and fitness complex with a swimming pool. Parks and squares were among the proposed recreational facilities, while cultural facilities included a movie theater next to School No. 28. One unused and one irrationally used area were pointed out. The residents also asked to return the building, reopen the kindergarten on Aksakov Street and build a new road linking Zhilaya and Avtozapravochnaya Streets.

7. Leninsky District except for Babaevsky microdistrict. 40% of the proposals included the residents' reference to unused and/or irrationally used, abandoned territories. Most of them are concentrated in the southern part, at the border with Kirovsky district, 2 proposals referred to the development of vacant land near the railway station. Also, there were 5 proposals to construct bridges: 2 overpasses over the railroad tracks, 1 - the link to Gorodskoy Island, 2 - over the rivers Krivaya Bolda and Pryamaya Bolda. The building of the Astrakhan Cossack Troops Administration was mentioned as the most attractive in terms of history and architecture. As for the new sports facilities - there was a proposal to build a rowing base for the residents of the Kazachy Yerik microdistrict, as for cultural facilities - the House of Culture in Yango-Aul village, as for public spaces - the reconstruction of the station square and improvement of Timiryazev embankment. The residents also asked to continue the public transport route 19 to the beginning of Karagalinskaya Street and move the Central Stadium in the Soviet district, and to provide the current building to ASU students for physical education classes and sports competitions.

8. Island part (Gorodskoy Island and Oblivnoy Island). The great majority of suggestions were related to establishing public spaces: parks and eco-parks throughout the islands and recreation areas by the water. Arrangement of a zoo in the southern part of Gorodskoy Island was one of the unique responses. As for the offers regarding cultural objects - construction of an inter-university campus and a replica of the wooden theater complex Arcadia, as for sports facilities - construction of a central stadium, an indoor rowing channel and an outdoor water sports center. The residents also asked to forbid traffic on Gorodskoy Island, close the exits on Novy Bridge, and leave only the present parking spaces.

9. Sovetsky district. Most of the areas that the residents proposed to develop are situated in microdistricts 1st, 2nd and 3rd Yugo-Vostok, as well as along Admiral Nakhimov Street. Most of the responses refer to vacant and unused areas. There were a lot of proposals to place new sports facilities: as for the standard ones - 2 sports complexes, as for the unique ones - an open water park, a new central stadium and an indoor ice palace next to Zvezdnyi sports complex. One of the users mentioned that there could be a comfortable jogging route along the railroad from Kubansky Bridge to Admiral Nakhimov Street. As for the

wishes for public spaces - a public garden in the 1st Yugo-Vostok microdistrict, a promenade along the Kutum River, and a pedestrian street. The residents twice suggested to locate the House of Culture on the border with the historical settlement. The boiler room building on Menzhinsky Street was also noted as a promising place for a local cultural center. According to the residents, Tsarevskaya Sloboda and the Powder Depots on Nikolai Ostrovsky Street are the most attractive sites in terms of history and architecture. To improve the connections inside the city and to relieve other arteries, there were two proposals to build a new bridge over the Volga River. The arrangement of a walking route from Admiral Nakhimov Street to the airport, arrangements for public bus stops, and the construction of a new highway to connect the Novy and Old Bridges are among the other wishes.

10. Northern part of Trusovsky district. There were not many responses regarding the development of this area: 2 proposals to build sports and recreation centers and 3 to build bridges across the Volga. Four vacant areas were mentioned by the residents.

11. Central part of Trusovsky district. Most of the responses by residents concerned the creation of public spaces and indicating abandoned and unused areas. As for recreation facilities - construction of an embankment along the Eric Solyanka from Novy Bridge to Voenny Gorodok, improvement of the beach on Serebryanaya Volzhanka channel and two public gardens in the central part, as for sports facilities - construction of a sports and recreation center.

12. Northern part of Trusovsky district. Most of the responses suggested the development of 20 Let Oktyabrya microdistrict and the area along Chkalov Street. The most part of the residents' desires was related to arranging new recreational areas. Four locations for waterfront recreation areas and six areas for pedestrian promenades were mentioned. There was also a proposal to make a square in the central part of the island. As for new cultural facilities - 2 Houses of Culture and 1 cinema, as for standard sports facilities - 2 sports grounds and 1 sports and recreation center, as for unique sports facilities - stadium on Vodnikov Street. The residents suggested to arrange two new stops of public transport - in the settlement of Ordzhonikidze on Williams Street and in the central part of the island on Nikolai Vetoshnikov Street, closer to the Tax Service building. Also, a pedestrian route was offered along the territory of 20 Let Oktyabrya microdistrict. As for responses on unused and abandoned territories, 2 wishes concerned the site and the building of the former House of Culture on Kapitan Krasnov Street, 1 - the territory of the former ship repair base and 1 - the territory where the House of Culture of Tretiego Internatsionala microdistrict used to be.

13. Brickyard village No. 1. The most part of the residents' wishes concerned arrangement of sports facilities and development of public spaces. As for recreational facilities - recreation area by the water, a square in the central part and two proposals to create a pedestrian street. As for indoor sports facilities - a swimming pool and fitness center, outdoor facilities - a sports field and stadium. Also, the residents noted the plot of land on Chekhov Street as a promising location for a house of culture.

14. Other areas of Astrakhan agglomeration. There were few answers on the development of the remaining areas of Astrakhan agglomeration. Four outdoor sports facilities were proposed: sports fields in Rastolupovka village in Privolzhsky district, Starokucherganovka village



and Zelenga village in Narimanovsky district. Improvement of the coast for swimming in Rastolupovka village, a park in Volodarskiy urban settlement and a park near the Tinaki sanatorium were among the proposals for recreational facilities. There were 2 proposals to build new bridges - in Zelenga village and near Volgo-Kaspiysky village in Kamizyasky district. A cinema in Trusovo village and a house of culture in Ikryanoye village were among the proposals related to new cultural facilities. The residents also proposed to organize a new stop of public intermunicipal transport near the turn at the entrance to Starovolzhskoe gardening community. Other proposals include changing the boundaries of Kamizyasky and Privolzhsky districts in the area of Starovolzhskoe gardening community and the construction of social housing in Narimanovsky district near the Krivaya Bolda river.



APPENDIX 2. A BRIEF SUMMARY FOLLOWING THE RESULTS OF THE SURVEY IN YANDEX.FORMS

Results of the survey of Astrakhan agglomeration residents

In total, 1,638 respondents were surveyed. Among them, there were 33% of Astrakhan residents, 22% of residents of municipalities district centers, the most active participation (45%) was demonstrated by residents of other settlements of Astrakhan agglomeration. Employable population at the age of 26 to 50 years old accounted for about 70% of the total number of respondents. It is worth noting that most forms were filled out by women (77%).

While processing the obtained questionnaires, the data were structured by several features:

- age of participants;
- place of residence.

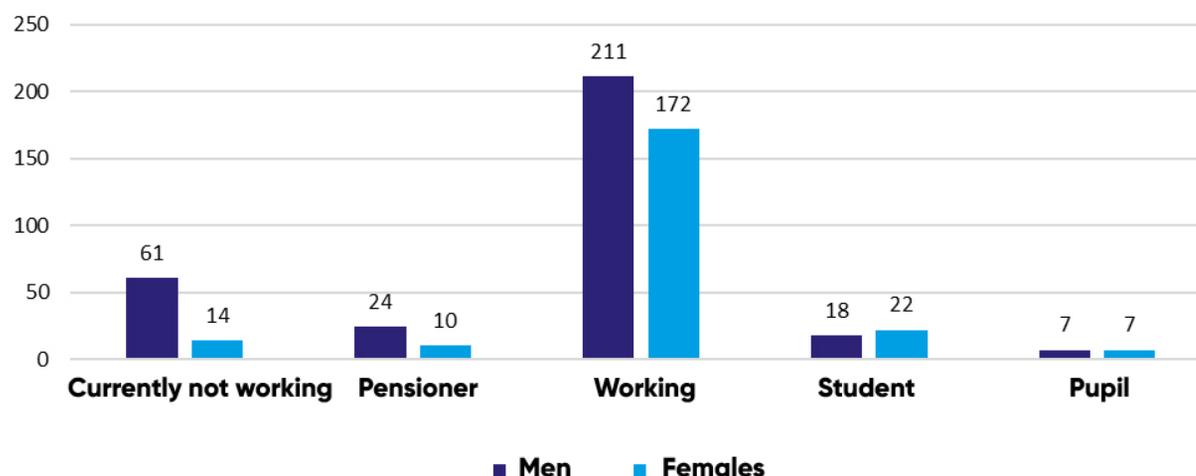
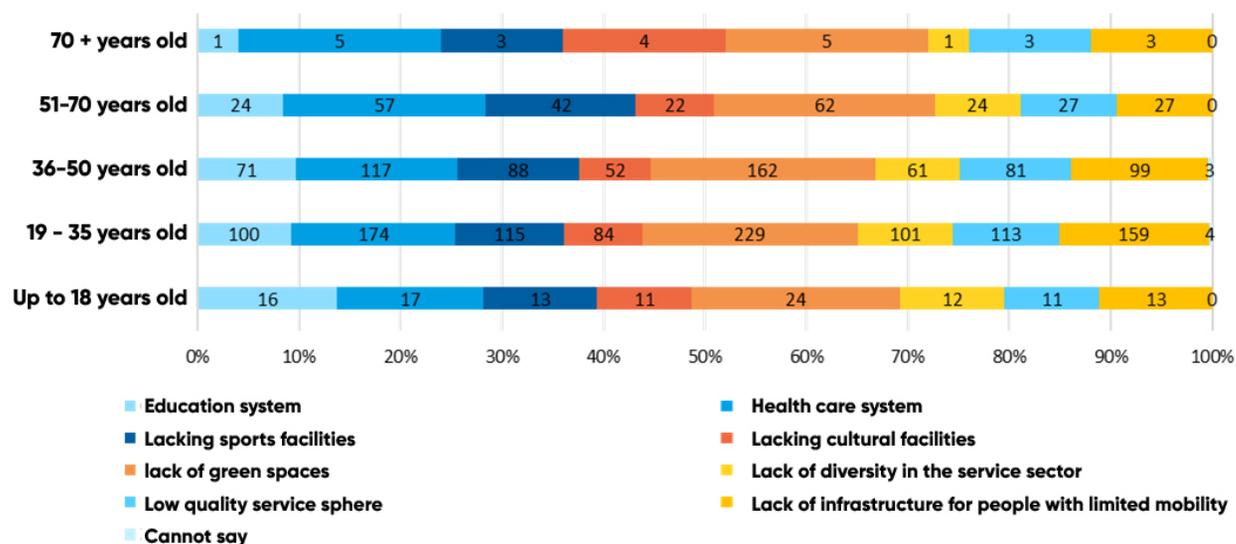
The following age groups were identified:

- up to 18 years old;
- 19-25 years old;
- 26–35 years old;
- 36–50 years old;
- 51–70 years old;
- more than 70 years old.

Results of the survey of Astrakhan residents

The most active respondents in Astrakhan were employable people at the age of 25 to 50 years old. And 383 respondents (70% of the total number) reported that they are currently employed, while 75 respondents (about 14%) reported that they were not employed.

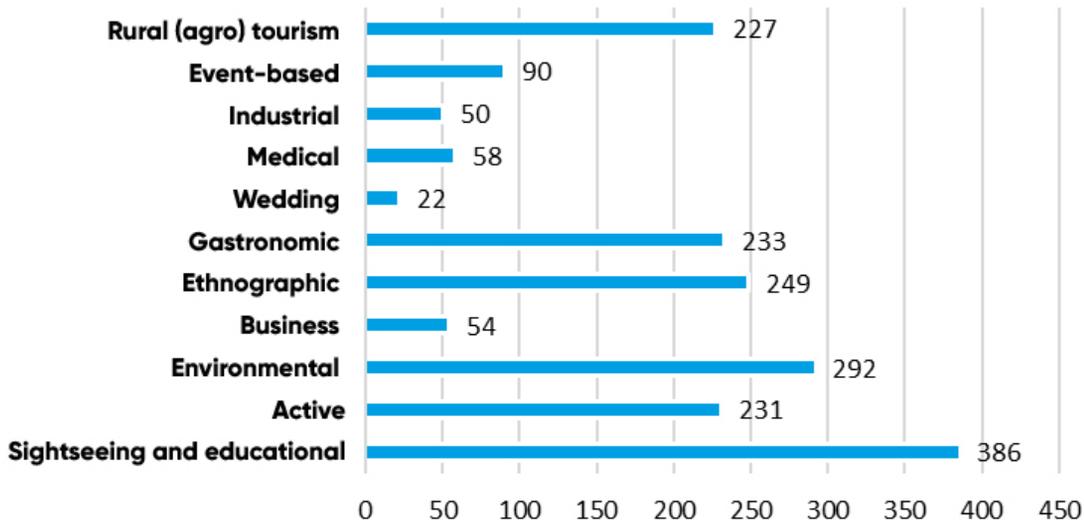


Fig. 217. Distribution of respondents by gender and occupation**Fig. 218. Distribution of responses on specific social security problems by age group**

According to residents of all age groups, for Astrakhan the most common problem in the social sphere is a lack of green spaces, the second place is taken by the health care system. Also, many respondents reported a lack of infrastructure for mobility impaired people. In addition, a high portion of the respondents that chose this problem as common to the city were young participants at the age of 19 to 35 and middle-aged people at the age of 36 to 50. For the age group 51-70 years old, the third place was given to the issue of sports facilities lack, and for respondents under 18 years old - to the education system.

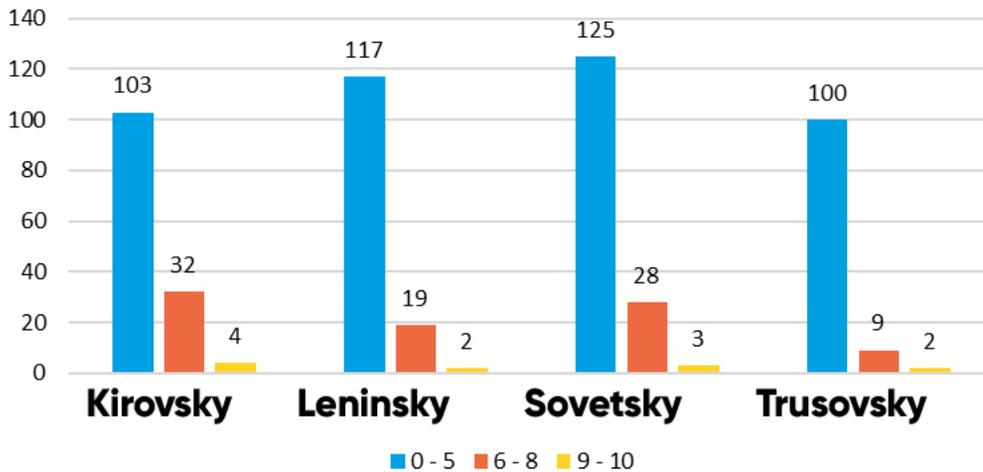
According to the survey, the residents believe that the most promising type of tourism to be developed in Astrakhan is sightseeing and informative tourism - 386 responses. The respondents also noted ecological, ethnographic, gastronomic, active and rural (agro) tourism as promising directions. The wedding tourism had the least number of responses in the questionnaires. The development of business, medical and industrial tourism directions is also considered irrelevant.

Fig. 219. Residents opinion on the most promising types of tourism for development in the territory of Astrakhan



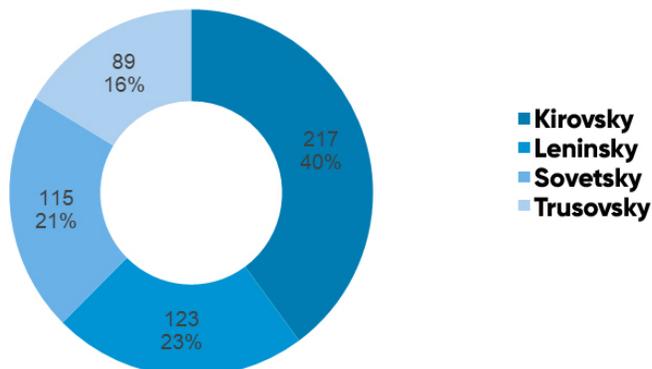
According to the survey results, the distribution of respondents among areas of residence is roughly the same. At the same time, the percentage of employed people in the area of residence is the highest among the residents of Kirov district (43%), the lowest one is in Sovetsky district (21%). Sovetsky district also showed the lowest score for living standard in the districts of Astrakhan: the most popular response was "2 points", while the rest of the districts were mostly given "3 points". Most of the scores for all urban districts were in the range from 0 to 5. "3 points" is also the most popular score for the city's overall standard of living.

Fig. 220. Gradation of assessments of the standard of living in the districts of Astrakhan



Among the responses to the question about the most promising area to be developed in the city, the most frequent answer was Kirovsky district (almost 40%), the most unpopular was Trusovsky district - only 16% of the respondents chose it as a promising district to be developed.

Fig. 221. Distribution of residents opinions about the most promising area for development

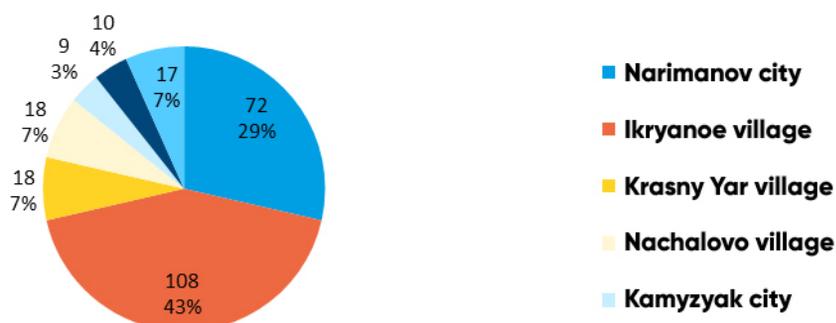


Results of the survey of residents in the district centers of Astrakhan agglomeration municipalities

The total number of questionnaires is 360. 108 questionnaires (30%) of the above number were filled out by residents of other settlements of Astrakhan agglomeration, so this section does not cover them.

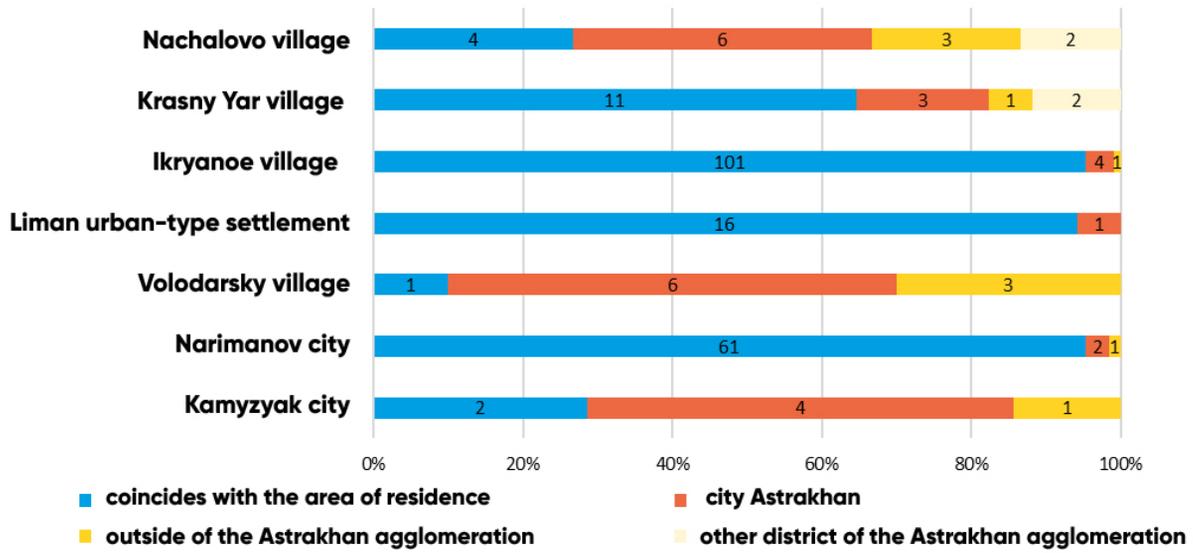
90% of the respondents surveyed belonged to employable individuals. The most active participants were residents of Ikryanoye village - 43%, also the residents of Narimanov town submitted a lot of questionnaires (29%), the least number of questionnaires was received from the residents of Kamyzyak town - 3.5%.

Fig. 222. Localities of respondents residence



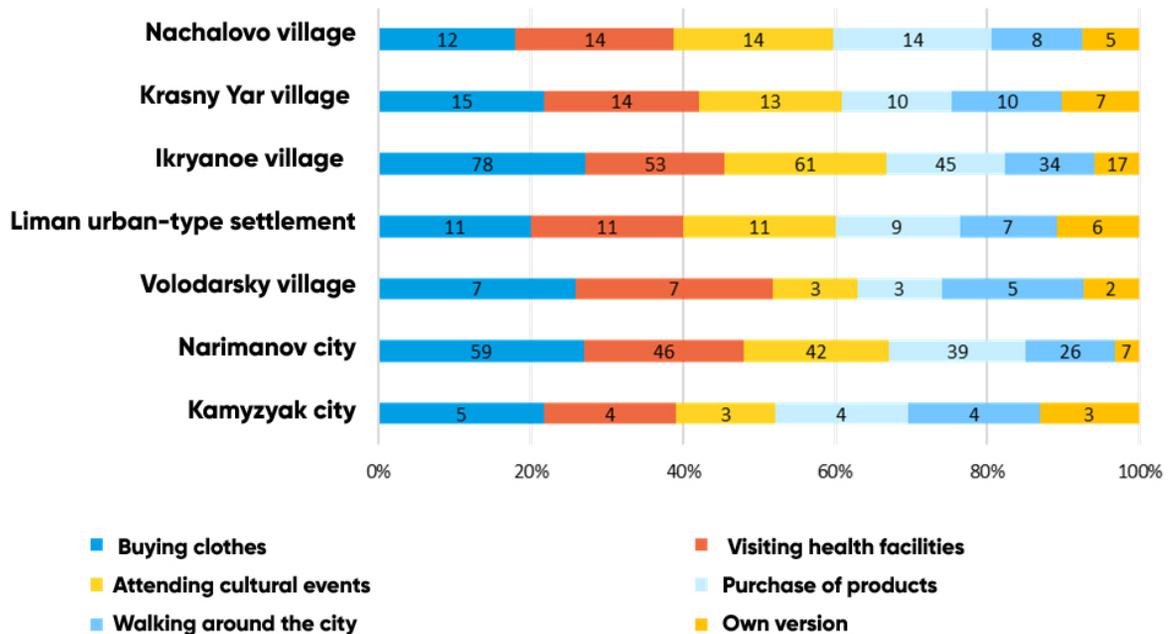
Most of the respondents among the employed residents stated that their region of residence and work was the same. 10% of respondents work in Astrakhan, 2% in a different district of Astrakhan agglomeration, and 4.5% outside Astrakhan agglomeration.

Fig. 223. Place of work of respondents depending on the area of residence



The most popular purpose for visiting Astrakhan among the surveyed population was buying clothes (187 responses). The only district center that did not place this goal at the forefront was Nachalovo village. The least popular goal among residents of all districts is grocery shopping. The respondents also noted that they often come to the capital to visit health facilities and cultural events. The "walk around city" option received slightly fewer votes. The most common answer was "visiting

Fig. 224. Goals of visiting Astrakhan among respondents



relatives" (7 responses).

Most respondents prefer to get to the regional capital by private car (59%), 38% choose public transport, and 2% choose other ways. Public transport is most popular among the age groups under 18 and from 51 to 70.



At the same time, the level of satisfaction with the quality of transport accessibility to Astrakhan is positive, in general. Middle-aged people (from 26 to 50 years) most often gave the maximum score of 10 points. Respondents in the age groups 19-25 and 51-70 were more likely to report a satisfaction score of 5.

Satisfaction with the quality of transport accessibility to other settlements in Astrakhan agglomeration was lower than to the region capital, with an average score of 5. The most frequent score for the age group 51-70 years old was 2 points.

Based on the place of residence, high satisfaction with transport infrastructure was shown by respondents who indicated Narimanov and Liman urban-type settlement as their places of residence. The frequent scores here are 8-10. Residents of Ikryanoye village, in general, were satisfied with the transport infrastructure and rated it as 5. It is worth noting that the majority of respondents in all the district centers reported a higher quality of transport infrastructure to Astrakhan than to other settlements in Astrakhan agglomeration.

Fig. 225. Gradation of assessments of the level of satisfaction with transport accessibility from the place of residence to Astrakhan city

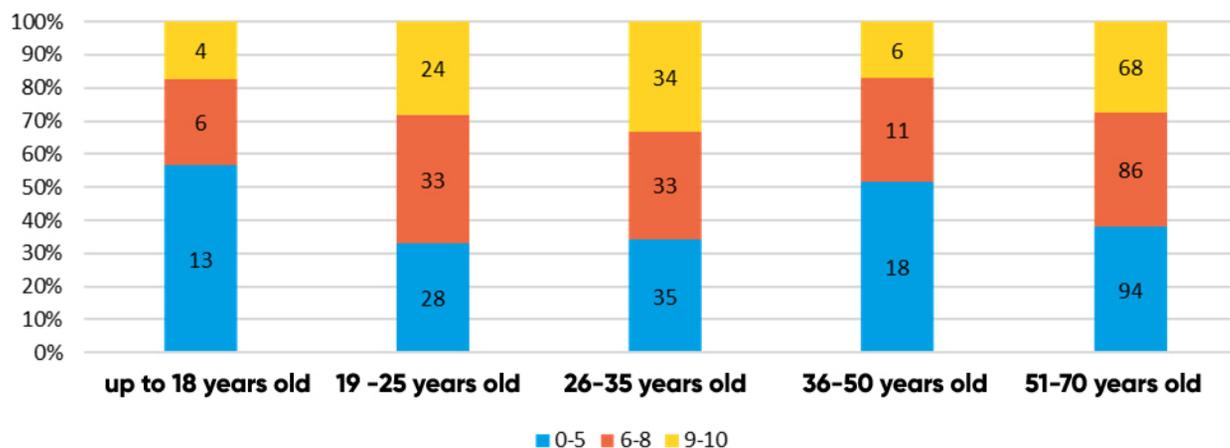
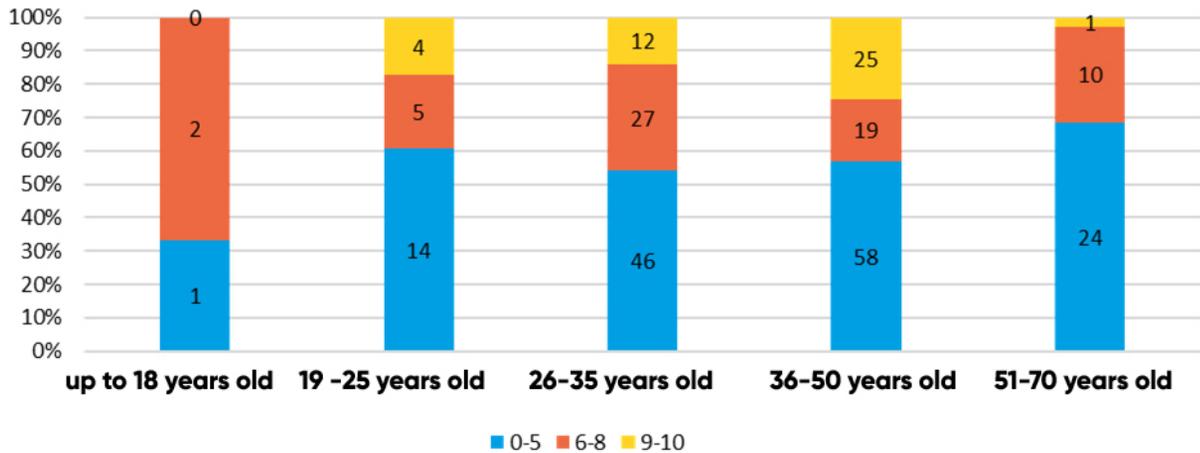
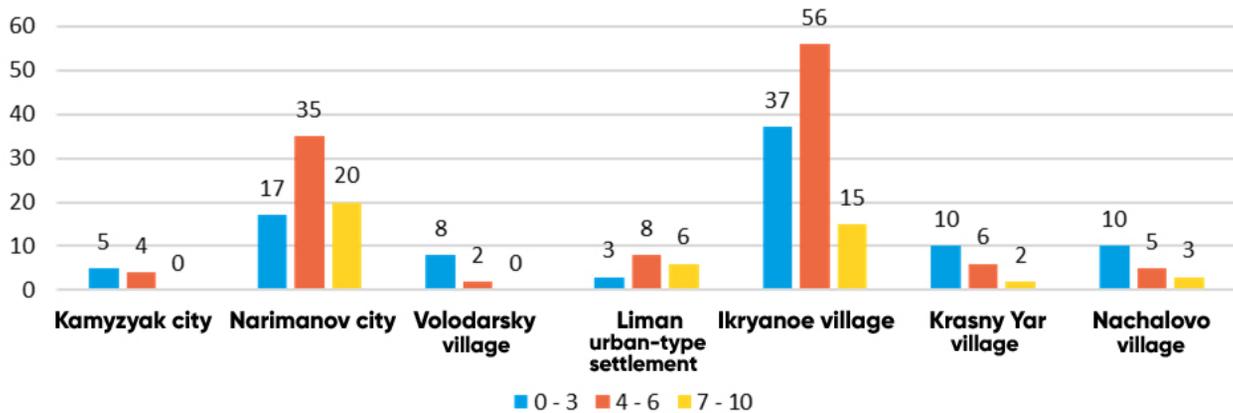


Fig. 226. Gradation of assessments of the level of satisfaction of transport accessibility from the place of residence to other localities



Residents of district centers rate the current quality of life in the cities and districts of Astrakhan region as low (up to 3 points) and medium (5-7 points). The lowest score was given by the residents of Volodarskiy village, Krasny Yar and Nachalovo villages.

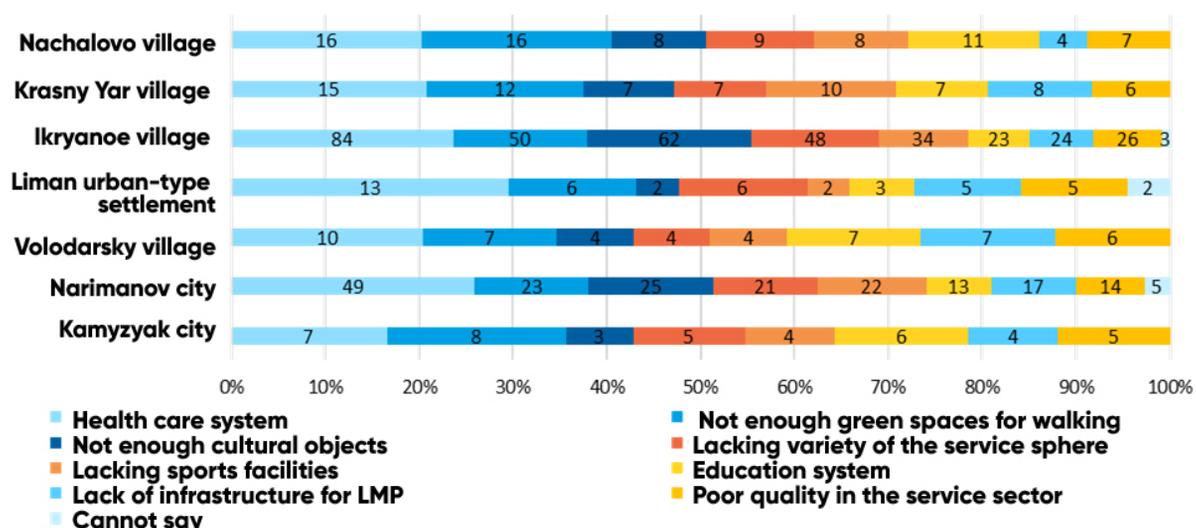
Fig. 227. Gradation of estimates of the level of living in the cities and districts of the Astrakhan region



From the point of view of the residents of all district centers, for their place of residence, the most common problem in the social sphere is the current health care system. Also, a lot of respondents noted the lack of green walking areas and cultural facilities. According to the results, the residents of Nachalovo village consider the education system as one of the main problems, whereas the residents of Liman settlement are concerned with the lack of diversity in the services sector, and the residents of Krasny Yar village complain about the lack of sports facilities.

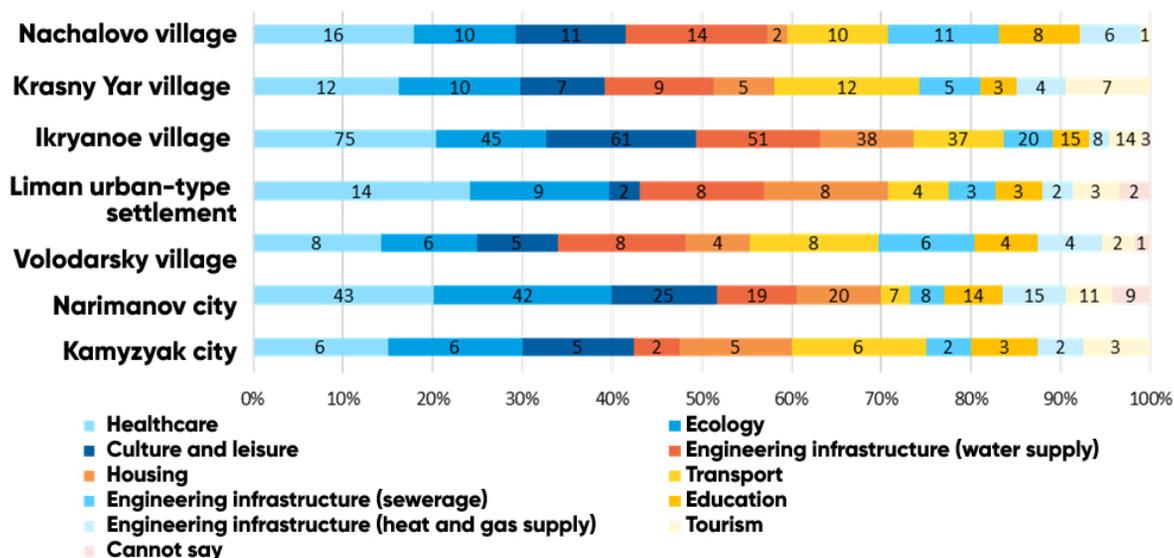


Fig. 228. Distribution of responses on specific social security issues



According to respondents, the most problematic areas of district center infrastructure are health care, environment, culture and leisure, and water supply. Residents of Krasny Yar village also expressed

Fig. 229. Distribution of responses about specific infrastructure problems

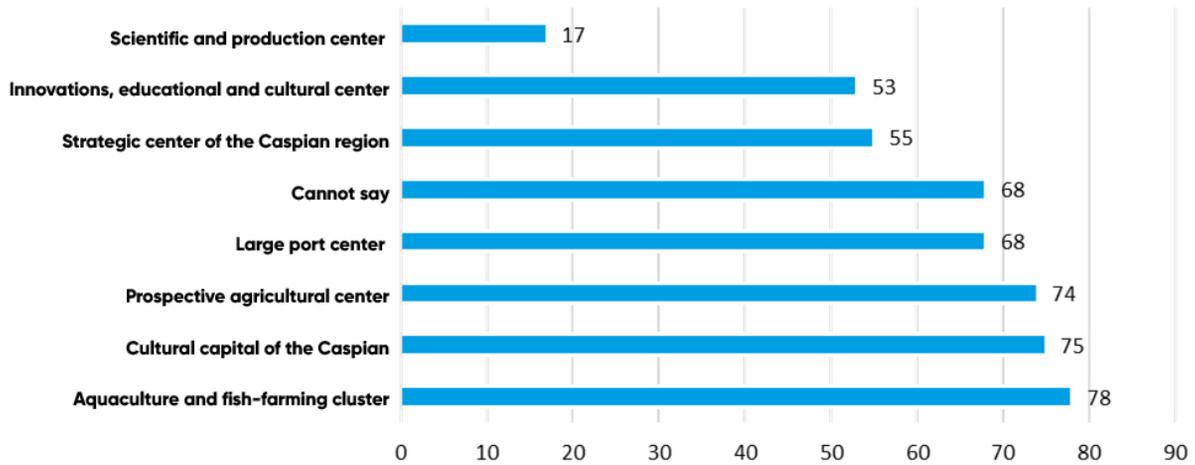


dissatisfaction with the transport infrastructure.

In response to the question about the key direction to be developed in Astrakhan, a large number of people chose the option of aquaculture and fishery cluster; the cultural capital of the Caspian region and a promising agro-industrial center were also popular answers. Only 3% of the residents living in the district centers surveyed considered the development in the direction of the research and production center promising. 14% of respondents found this question difficult to answer.

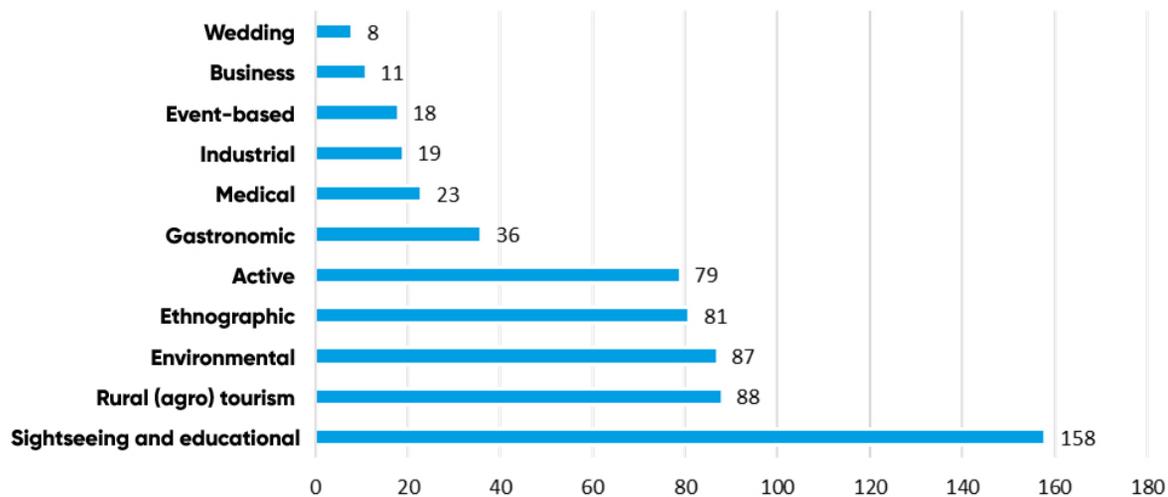


Fig. 230. Opinion of residents about the characteristic key direction of development for the city of Astrakhan



Most respondents chose the sightseeing and informative tourism as the most promising type of tourism to be developed in Astrakhan agglomeration. The least points (1%) were given to wedding tourism.

Fig. 231. Residents opinion on the most promising types of tourism for development in the Astrakhan agglomeration



Results of the survey of residents of other settlements of Astrakhan agglomeration

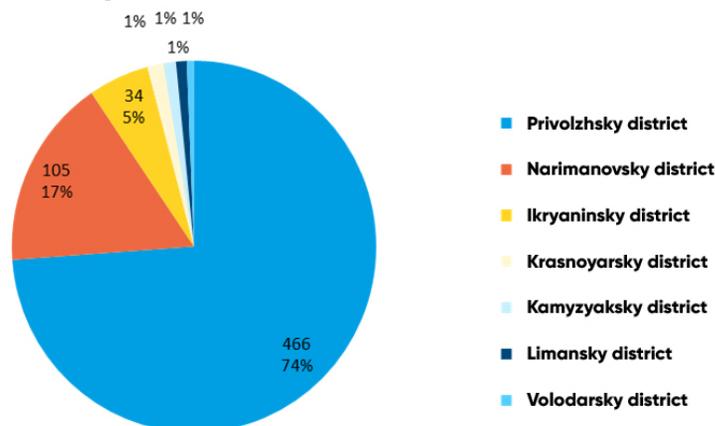
In total, there were 731 questionnaires. 99 questionnaires (14%) of the above were filled out by residents of the district centers in Astrakhan agglomeration, Astrakhan and other settlements of Astrakhan region, so this section does not cover them.

89% of the respondents surveyed belonged to employable individuals. The residents of a village in Ikryaninsky district participated most actively - 43%, 17% of questionnaires belonged to the residents of Narimanovsky district, and 5% were received from Privolzhsky district. The residents of Volodarsky, Kamyzyaksky, Krasnoyarsky and Limansky



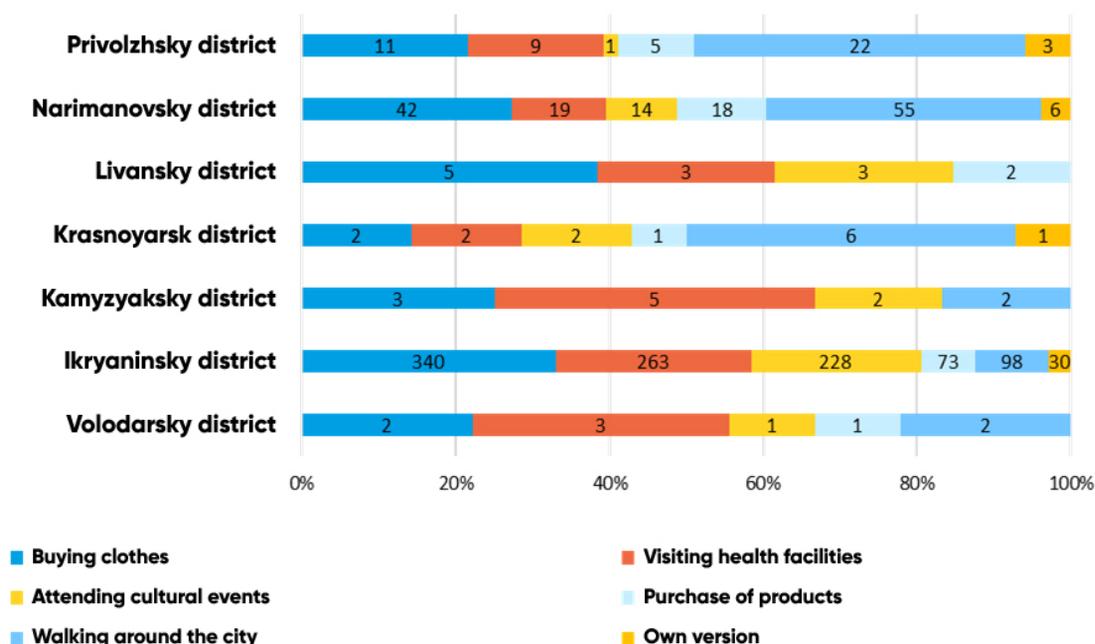
districts submitted very few questionnaires - only 1% of the total number of participants each.

Fig. 232. Respondents area of residence



Most of the respondents among the employed residents (92%) stated that their region of residence and work was the same. 6% of respondents work in Astrakhan, 2% in a different district of Astrakhan agglomeration, and 2% outside Astrakhan agglomeration. Most of the residents of Privolzhsky District surveyed noted that their place of work was in the capital of the region.

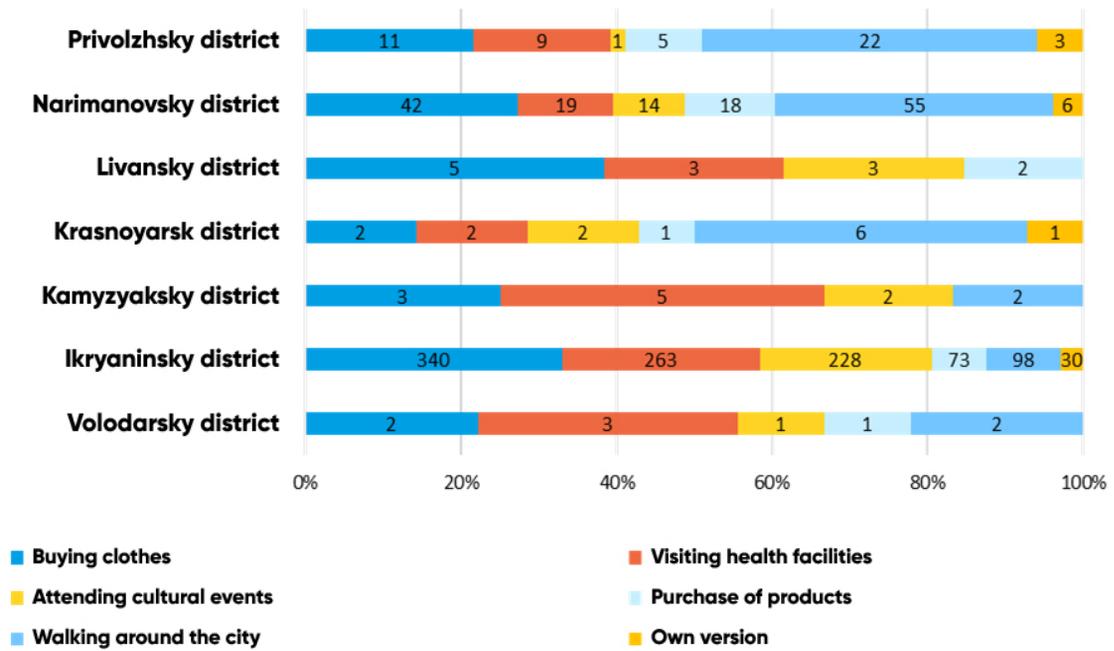
Fig. 234. Goals of visiting district centers among respondents



Among the surveyed population, the most popular purpose of visiting district centers was to attend health care facilities (405 responses). The least popular goal among all districts was walking around the city. The respondents also noted that they often visit district centers to buy groceries and clothes. The most common optional answer was "for work" (24 responses).

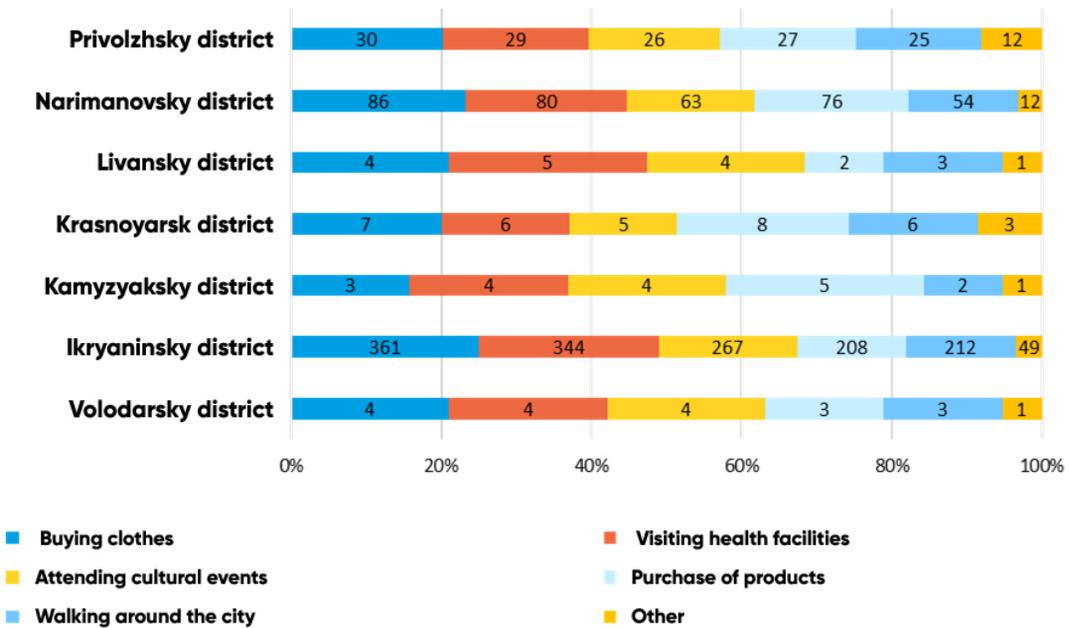


Fig. 234. Goals of visiting district centers among respondents



The responses regarding the purpose for visiting Astrakhan were distributed in roughly equal shares. The most popular goals listed in the questionnaire were buying clothes (495 responses) and attending health care facilities (472 responses).

Fig. 235. Goals of visiting Astrakhan among respondents

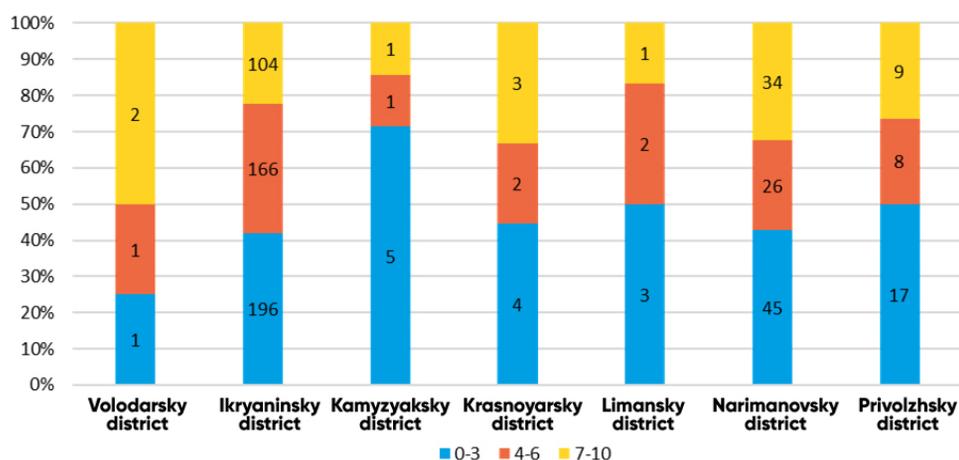


If there is a need to visit another settlement in Astrakhan agglomeration, 49% of respondents prefer to travel by a personal car, 43% choose public transport, and 8% choose other ways.



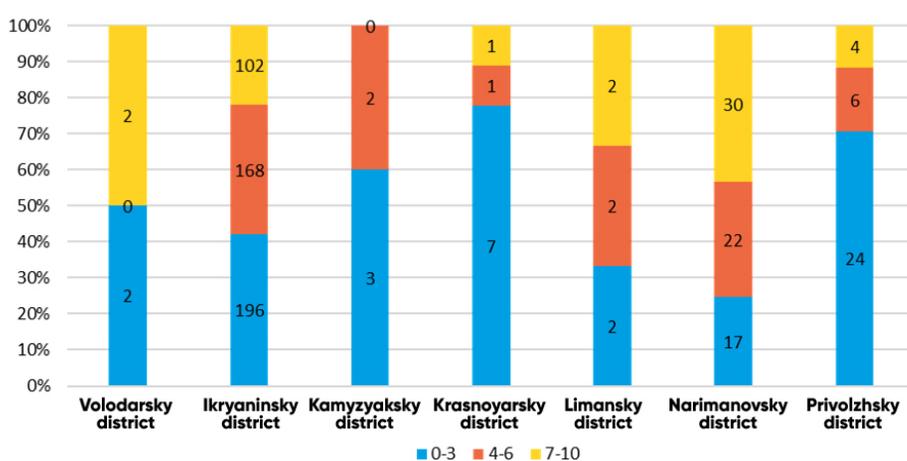
In general, the residents of the settlements in Astrakhan agglomeration rate the level of their satisfaction with transport accessibility to the district centers and to Astrakhan at 5 points. The lowest score was given by the residents of Narimanovsky district: here the most frequent answer was "0 points". The residents of Privolzhsky district rated the level of transport accessibility to Astrakhan slightly higher than to the district center. In the first case, the frequent score is "5 points", in the second instance - "0 points".

Fig. 236. Gradation of assessments of the level of satisfaction with transport accessibility from the place of residence of Astrakhan

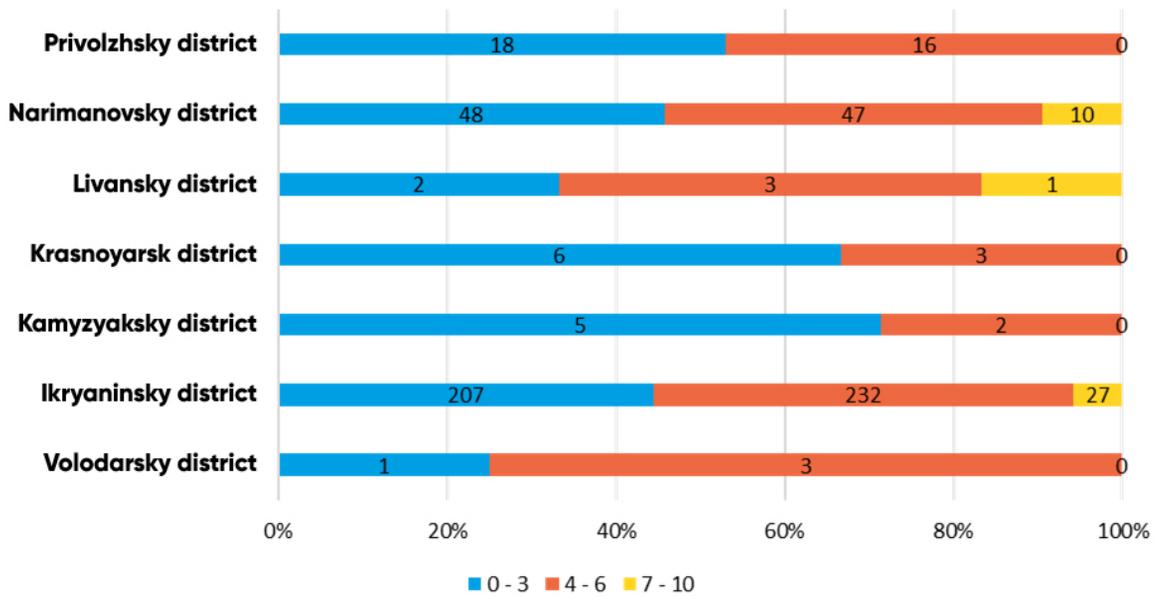


Based on their place of residence, residents of settlements rate the current quality of life in the cities and districts of Astrakhan region as low (up to 3 points) and medium (5-7 points). The lowest score was given by residents of Kamyzyaksky and Krasnoyarsky districts.

Fig. 237. Gradation of assessments of the level of satisfaction of transport accessibility from the place of residence to other localities

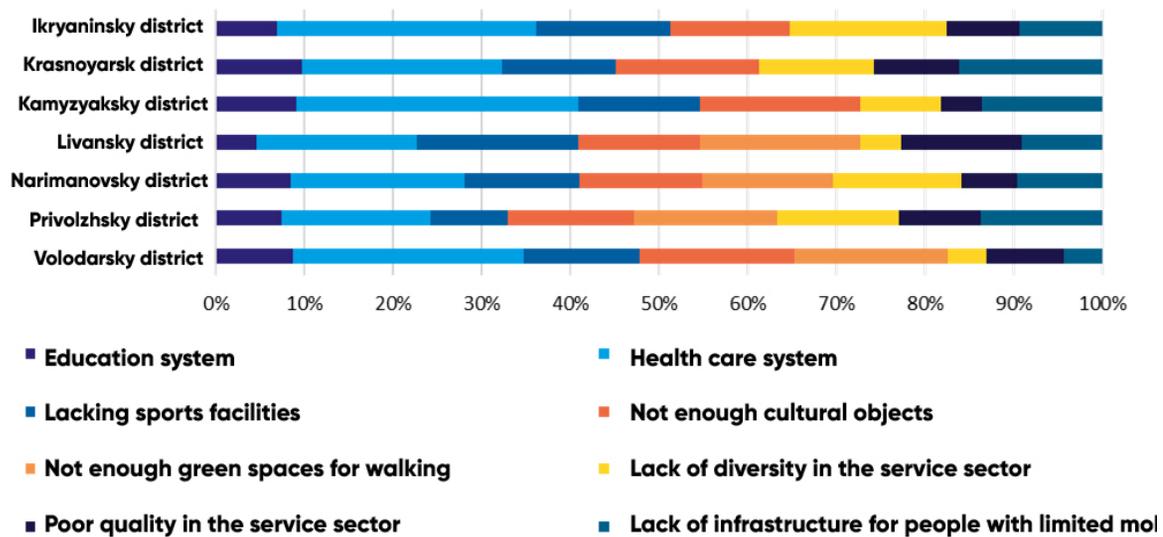


238. Gradation of estimates of the level of living in the cities and districts of the Astrakhan region



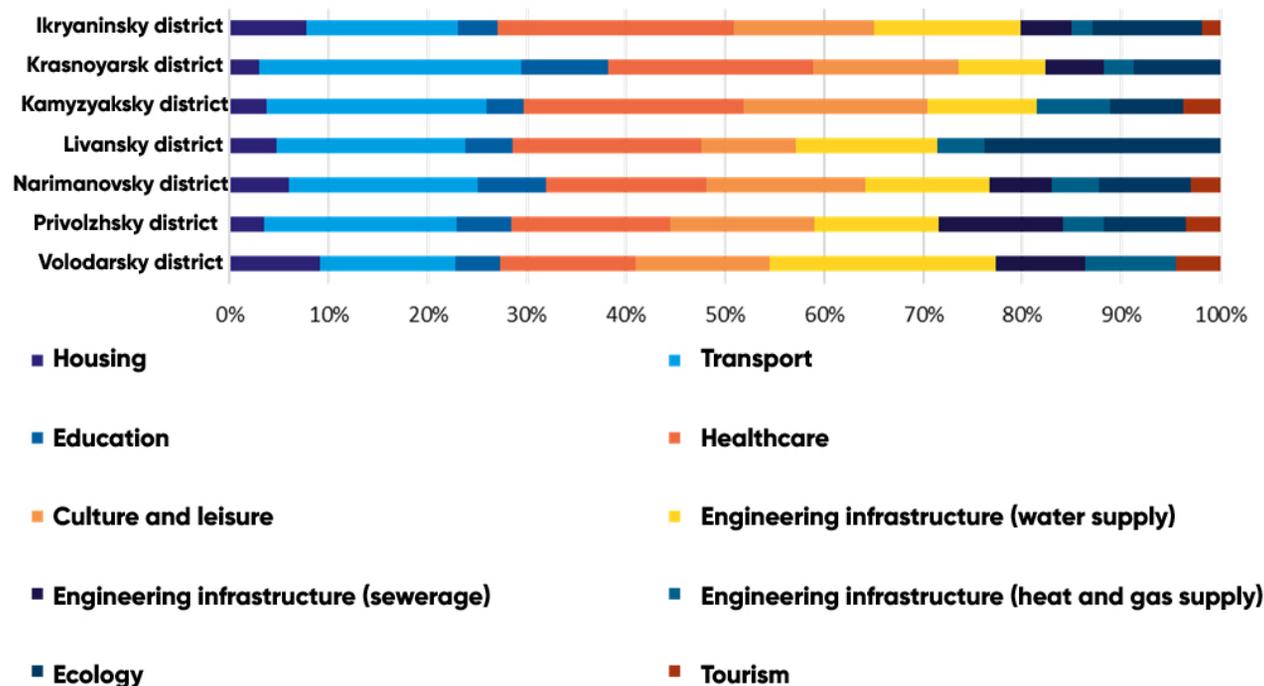
In general, the respondents from different districts rated the most common social welfare problems similarly. The most important problem for them was the health care system. The next problem is the lack of cultural and sports facilities. The lack of green spaces for walking is also an important problem. Except for Ikryaninsky, Krasnoyarsky and Kamyzyaksky districts, there were no respondents who chose this option.

Fig. 239. Distribution of responses on specific social security issues



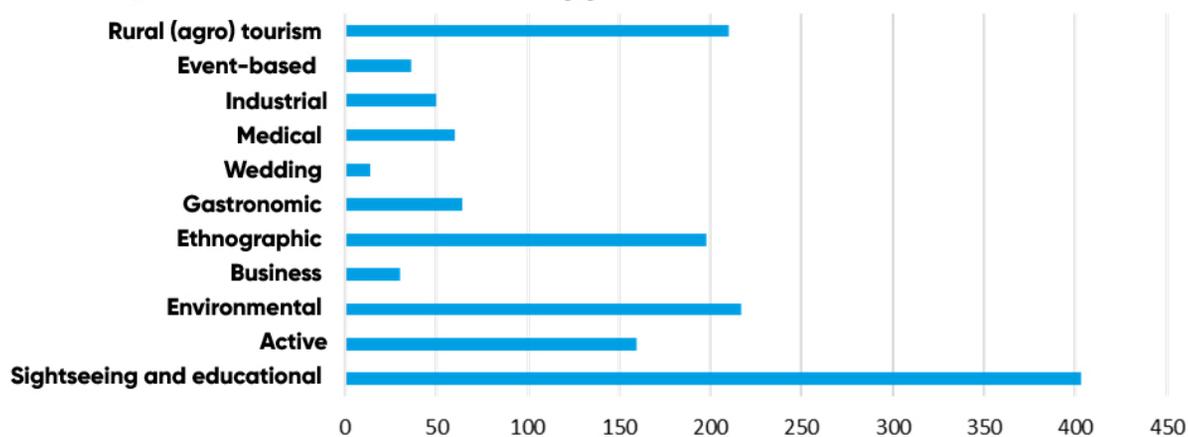
Residents of different districts also responded similarly to the question on typical infrastructural problems. Respondents see transport infrastructure as the most problematic, while health care infrastructure is slightly behind. The next most important issues for residents are cultural and recreational infrastructure, and water supply. In this situation, Limansky district is particularly noteworthy, since the most important problem for people there is the ecology problem.

Fig. 240. Distribution of responses about specific infrastructure problems



According to residents of settlements in the districts of Astrakhan agglomeration, the most promising type of tourism is sightseeing and informative tourism (403). The next most popular answers are ecological tourism (207), rural (agro) tourism (210) and ethnographic (198) tourism. Business and wedding destinations are the least popular.

Fig. 241. Residents opinion on the most promising types of tourism for development in the Astrakhan agglomeration



APPENDIX 3. OVERVIEW OF EXAMPLES OF DEVELOPMENT OF AREAS LOCATED IN RIVER DELTAS

1. The Sacramento River Delta - San Joaquin (California Delta), California, USA¹³⁰

Area - 2990 km², 2180 km² are occupied by agriculture. The population is about 500,000 inhabitants.

The delta comprises many meliorated islands and sections surrounded by 1,800 km of dikes that create 1,100 km of waterways.

73% of the area is devoted to agriculture, about 260 km² of the delta is used for construction, 300 km² consist of undeveloped land.

Today, most of the Delta region is below sea level, behind the dykes, that is why the region has the nickname "California Holland".

On March 12, 2019, the Sacramento-San Joaquin Delta was declared a National Heritage Area.



Economy

Agriculture. Starting from the middle of the 19th century, most of the region was gradually developed for agriculture. Initially, the land allotments in the delta were limited to 320 acres (1.3 km²) to one buyer, but this limit was cancelled in 1868, it made it possible for large agricultural entrepreneurs to occupy entire islands and carry out large-scale irrigation projects. About \$650 million a year (as of 1998-2004) is produced by the Delta, and it is one of the most productive agricultural regions in the U.S. with regard to the value of the crop per unit area. Agriculture provides more than \$2 billion to the local economy as a secondary benefit.

Water supply. Most of the water for Central and Southern California is supplied from the delta by pumps in the southern part of the delta. The pumps supply water for irrigation in the San Joaquin Valley and for urban water supply in Southern California.

Shipping (ports). The delta's waterways are major transportation corridors for agricultural produce - to the ports of Sacramento and Stockton.

¹³⁰ Sources:

https://ru.qaz.wiki/wiki/Sacramento-San_Joaquin_River_Delta
<https://ru.knowledgr.com/00428750/DeltaDiFiumeDiSacramentoSanJoaquin>
<https://www.slavicsac.com/2014/11/05/sacramento-river/>



Tourism. The delta is a popular recreational area: people use it for sailing, water-skiing, houseboat vacations, fishing and hunting. There are more than 100 marinas and 25 yacht clubs in the delta. According to a survey conducted by local authorities, more than 7 million sailing days were held on the delta in 2010. There are some state and regional parks in the delta, where many recreational activities are held.

Problems

Most of the issues in the area relate to the effects of the dyke system and freshwater diversion:

- sagging land;
- dykes failure;
- penetration of brackish water into the delta;
- reduction in freshwater volume;
- threat to water supplies in the Central Valley, which includes both irrigation water at a \$17 billion cost to its agricultural economy and drinking water for ~25 million people;
- threat of some fish species extinction;
- water quality deterioration (blooming of numerous cyanobacteria).

Developmental mechanisms

The measures being implemented are aimed at achieving a balance between the economy and the ecological situation:

- addressing environmental problems through legal regulation at all authority levels;
- Infrastructure modernization, along with application and development of "smart technologies";
- federal restrictions on the use of irrigation systems;
- programs to restore the delta landscapes.



2. Marseille, France¹³¹

The largest port in the country and the entire Mediterranean region, the administrative center of the Bouches-du-Rhône department, the arrondissement of Marseille. It is located on the shore of the Gulf of Lyon; near the mouth of the Rhone River the city is connected to by the channel.

The area of the city is 241 km², population - 900 thousand people.

The agglomeration area is 3,000 km². The population is 1.9 million people.

In 2013, it was the European Capital of Culture.

Economy

Cargo and passenger transportation. Major port complex. The Autonomous Port of Marseille, besides the port of East Marseille, includes a number of ports and harbors of the bay of Fos and the Étang de Berre lagoon. The total turnover of maritime cargo in the main port of Marseille reaches 110 million tons per year, in the Fos region - 73.2 million tons per year. International airport.

Oil refining, petrochemicals, shipbuilding and aircraft construction. Starting point of the trans-European oil pipeline to Strasbourg and Karlsruhe (FRG).

Currently, there is growth in employment in the service sector and a shift from a light industry to a high-tech and cultural economy. Thousands of companies have a presence in the Marseille region, 90% of these companies are small and medium-sized enterprises (less than 500 employees).

Tourism. Marseille spreads out in tiers on the coastal hills separating it from the rest of France. The seashore near Marseille is covered with quiet rocky harbors. There are excellent conditions for sailing, climbing, diving and swimming.

Problems

Difficulties in the industrial sector. The development of Marseille's economy was closely related to the overseas territories, especially the French colonies. Its industry was based solely on processing raw materials shipped from North and West Africa. After the colonies became independent, the processing industry collapsed, and Marseille suffered significant economic troubles for a long time.

The migrant influx and obsolete infrastructure. The independence of the colonies led to the mass migration of people to France, and many immigrants settled in major ports. Most of the immigrants have come



¹³¹ Sources:

<https://ru.qaz.wiki/wiki/Marseille>

<http://townevolution.ru/books/item/f00/s00/z0000013/st010.shtml>

<https://archi.ru/world/68064/bolshaya-peremena>



from Marseille, the number of its residents has almost doubled adding to the pressure on its deteriorating infrastructure and worsening the already acute housing shortage.

Degradation of the historical core and security issues. Marseille has expanded into a vast agglomeration with dormitory districts and satellite towns. With most of the construction taking place on the periphery, the center and old neighborhoods were neglected. The housing development degraded turning into crime-ridden slums, and the modernist reconstruction of neighborhoods and construction of highways "as is", though it helped solve local problems, accelerated the degradation of the historic core at the same time. In the 1960s, Marseille took on the dubious status of the criminal capital of France and the main transit point for drug trafficking.



Developmental mechanisms

The need to face foreign challenges and adapt to the current situation has made it necessary to reorient and develop new technologies, tourism and the service sector, and to implement an ecological scenario in urban development:

- development of new intellectual and high-tech activities;
- Euroméditerranée is a project for urban renewal implemented in Marseille to create an eco-area in the district of La Joliette.

One of the achievements of Euroméditerranée is renovating docks into offices, transforming a bunker into a theater, renovating Rue de la République, and erecting the CMA-CGM tower (33 floors, 147 meters high). The project budget is 7 billion euros in investment, 5 billion euros of which are private. Euroméditerranée eco-area hosts the Thassalia project, Europe's first geothermal marine power plant, which uses the waters of the Mediterranean Sea to cool buildings in summer and heat in winter.

Yangtze River Delta¹³²

The Yangtze runs into the East China Sea and makes a delta of about 80,000 km². It covers the city of Shanghai and the provinces of Jiangsu, Zhejiang and Anhui.

The urban development in this region created perhaps the largest concentration of contiguous metropolitan areas in the world. The area of the agglomeration is 99,600 km². More than 100 million people live in the Yangtze delta.

In 2018, GDP of the Yangtze delta was about \$2.2 trillion which is roughly the size of Italy's GDP.

The demonstration zone area is 2.3 thousand km².

Economy

Shanghai is the financial and commercial center of China. In 1990, the Shanghai Stock Exchange was established in Shanghai, first on mainland China. The stock market capitalization has increased dramatically since the stock market was reformed in 2005. Now the Shanghai Stock Exchange is a modern platform respected by investors. The Shanghai Futures Exchange is among the world's leading commodity exchanges by trading volume of crude rubber and copper futures contracts. The Shanghai Gold Exchange is China's largest exchange for precious metals trading.

Agriculture. The Yangtze delta is a fertile area for growing grains, cotton, hemp, and tea. The city authorities attract significant investment to "smart farms" that have a high level of production automation.

Cargo transportation. In 2005, Shanghai became the world's largest port by cargo turnover (443 million tons of cargo).

Industry. In Shanghai, there are Tesla and SAIC Motor automobile plants (including Shanghai Volkswagen and Shanghai General Motors) Shanghai Volkswagen and Shanghai General Motors plants), SMIC semiconductor plants, computer and household appliances plants Inventec and LG Electronics, Baosteel metallurgical plant, machine building plants Shanghai Electric Group and Shanghai Zhenhua Heavy Industries, ABB robotics plant, petrochemical and chemical plants Shanghai Petrochemical, BASF, Bayer, DuPont, Huntsman, Henkel Group and UOP, Ericsson and Nokia telecommunications equipment plants, Karl Storz and Covidien medical equipment plants, Sandvik road construction equipment plant, Bright Food and Want Want China dairy factories and International Paper paper factory.



¹³² Sources:

https://ru.qaz.wiki/wiki/Yangtze_Delta

<https://ru.wikipedia.org/wiki/Шанхай>

<https://moluch.ru/archive/114/30378/>

<https://news.rambler.ru/other/43097065-demonstratsionnaya-zona-zelenogo-razvitiya-v-deltayantszy-nachala-svoyu-rabotu/>

<https://prc-today.turbopages.org/prc.today/s/chto-oznachaet-integratsiya-delty-reki-yanczzy-dlya-biznesa-v-kitae/>

<http://www.demoscope.ru/weekly/2008/0343/analit05.php>



Problems

Problems of the region:

- ecological problem: overpopulation of the delta, concentration of factories, farms, and residential territories upstream, the Yangtze delta not only suffers a high anthropogenic load itself, but also represents the main cause of sea pollution;
- lack of a single sales market, which makes it difficult to sell the products produced in the delta area;
- imbalance in the quality of life of the population (rural and urban) and economic development;
- only large cities grow and develop;
- significant shortage of manpower with the necessary skills.



Developmental mechanisms

The government of the People's Republic of China has adopted a national program of action aimed at the integrated development of the Yangtze delta region, this program is aimed at consolidating and building a unified economic and social space zone. To implement the program, an umbrella plan to create a demonstration zone in the Yangtze River Delta based on a pollution-free development model ("green" economy, high-quality of life and sustainable growth) has been formulated. In accordance with the adopted documents, the main directions of development are:

- creation of a "green" development demonstration zone;
- creation of an innovative and environmentally friendly development mode;
- integration - formation of a single market and seamless internal circulation (peer-to-peer economy);
- new "dual circulation strategy" (DCS), a bilateral development strategy aimed at stimulating domestic demand in tandem with addressing export markets and setting up conditions that would allow domestic and foreign markets to boost each other;
- construction of a unified transport network;
- standardization of sales markets;
- environmental protection;
- elaboration of a unified information environment;
- financial cooperation and exchange of qualified personnel;
- development of high-tech industries with a high level of process automation;
- solution of environmental problems through the implementation of "smart" technologies.

APPENDIX 4. OVERVIEW OF MODERN ENGINEERING TECHNOLOGIES TO BE IMPLEMENTED UNDER SPECIAL CONSTRUCTION CONDITIONS

In order to optimize the application of engineering systems, passive methods, natural impact systems shall be used as much as possible.

The environmental approach to landscaping, which combines the general idea of using natural materials and solutions requiring no special maintenance in operation and possessing a minimal impact on the environment.

Elements of green infrastructure include water bodies, biological water collection systems, "green" roofs, dry ponds or streams, green areas, permeable hard surfaces, etc.

"Green" solutions beneficially affect the microclimatic conditions of the area, especially in the summer, when the air is cooled by the evaporation of accumulated moisture. For example, "green" roofs and rain gardens significantly reduce the "urban heat island" effect on a city and considerably relieve the city's stormwater network.

Rational choice of plants variety helps to restore the biodiversity of flora and fauna. Filtration of aerotechnogenic pollutants by green spaces creates a favorable environment for people and nature.

It costs 20-40% less to build green drainage solutions within the site, than similar classic systems. The savings are caused by the relatively simple works and prefabricated solutions. However, such savings need a free green area for landscaping, including the "green pie" over the slabs of parking lots, stylobates, and so on.





Fig. 242. Diagram of the wastewater system on Sønder Boulevard, Copenhagen

According to the conception of "green stormwater drainage", stormwater can be utilized by ecological ponds that can be used for landscape design (increased evaporation), clean water can be filtered into the ground, and stormwater can be used for irrigation and other household purposes. Sidewalks and walkways (where it is allowed by the ground and nearby buildings) can be made of permeable coatings (perforated tiles, natural stone, grids, a combination of grids and hard coatings) to filter water into the ground.

Water from hard surfaces (roads, parking lots, and so on), where rainwater may be polluted with petroleum products, should be diverted to storm water treatment facilities that may be local and installed to collect and purify storm water from a particular area to the discharge standards in the fishery pond or municipal sewer.

At some sites with little traffic, sorbent socks may be used in front of ecological swamps or collection "pots" to separate petroleum products.

With high groundwater, it is necessary to use local treatment plants made of rigid plastic, such as polypropylene. Rigid plastics do not delaminate, have a homogeneous structure, which guarantees no displacement of technological partitions during the entire time of operation and ensures the quality of treated water.

The use of local sewage plants based on film technology will help to reduce maintenance costs as it gives a better separation of the oil product-water mixture and allows to refuse coal or other sorbents having them replaced by non-woven fabric (very cheap material) stretched on the frame of the aftertreatment filter instead of expensive sorbent fillings.



Fig. 243. Sorbent socks with sorbent



Fig. 244. Drainage "pot"

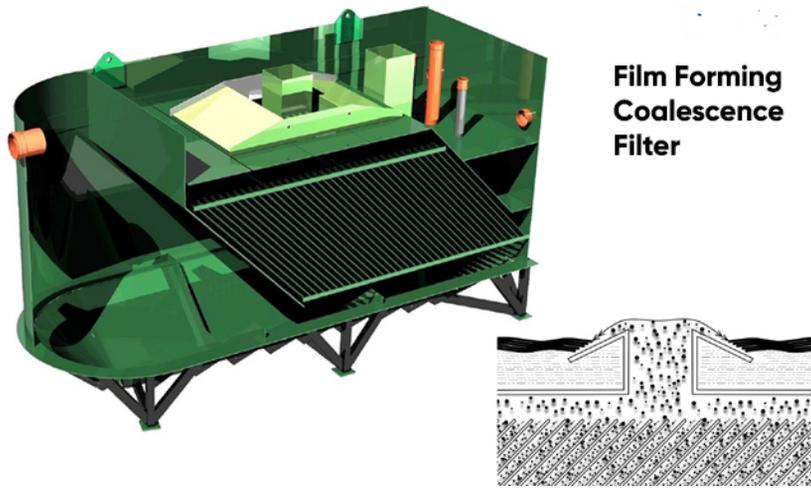
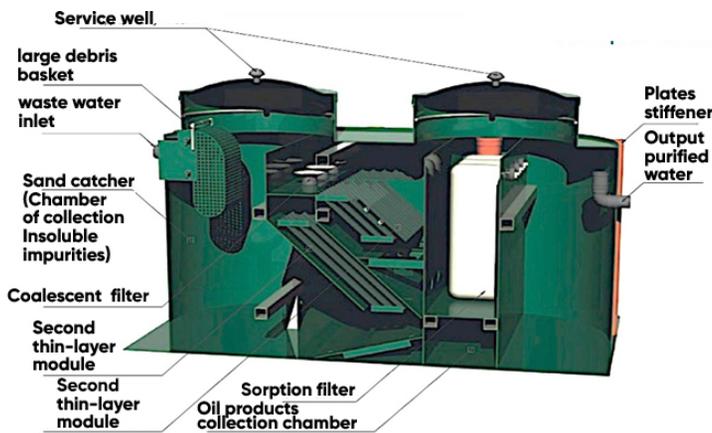


Fig. 245. Construction of a storm water station based on film technology

Fig. 246. Design of a station with a sorbent unit



If there is no potable water, local prefabricated block-modular water-intake facilities can be used for water purification. These facilities can be installed on any foundations including piles. Reverse osmosis technology should be used to treat water with a total salt content exceeding 1000 mg/dm³. Special membranes are used to desalinate seawater. Salt compaction membrane inhibitors are used to ensure proper operation of reverse osmosis systems. Membranes and inhibitors should be selected upon water analysis. Drainage water (salt concentrate) from the reverse osmosis system is considered waste of the 5th category. It is advisable to choose salt compaction membrane inhibitors based on ecotoxicity indicators - not classified as hazardous to the environment, and not classified as hazardous to animals and aquatic organisms.



Block-modular water-intake facilities can also be used in a simpler version (filtration, disinfection) to purify water from reservoirs and wells. The water-intake facilities do not have to be manned all the time. The trouble alarm system functions by SMS sent to the cell phone of the operating staff.



Fig. 247. Installation of the station for 250 m³ per day.

If there are high groundwater, shifting sandy soils, and so on, local sewage treatment plants with rigid polypropylene housings are used for domestic sewage treatment in settlements, small towns, private houses or other applications for sewage treatment in the amount from 1 to 6000 m³/day. The plants are delivered prefabricated in production blocks. The blocks are assembled at the installation site. Efficiency of sewage treatment is ensured by biotechnology based on the use of biofilm on a fastened biobank. The plant runs at 10% of load. It is possible to add extra units to increase the station performance. The treated sewage quality meets the standards for discharging into the fishery. The operation of commercial and industrial plants is controlled remotely. The dispatcher console program installed on a computer or laptop shows the plant's operating status and warns of accidents online. If needed, the plant reports the factory that there is an operating failure or service issue that has not been eliminated. There is a function "remote process engineer".

There are also innovative solutions for water treatment. The state environmental expertise for the water treatment plant ARCON-LOS has been obtained. The feature of the technology this plant is based on is that treated water keeps its natural mineralization, contaminants of 1st and 2nd hazard class are treated to meet the requirements of the fish farm in one technological cycle, sand, which cannot react with any chemicals and has no hazard class, is obtained after the treatment. Optimal performance rate for 1st and 2nd hazard class is 4 m³/h.

An additional advantage in providing energy efficiency of heat and hot water supply is conversion of coal and diesel-oil boilers to local energy sources, such conversion might be the production of pellets (fuel pellets) from agricultural processing waste or wood waste, also by separating municipal solid waste.

Modern pellet boilers are widely used and successfully operated in private households, commercial facilities, and actively applied in municipalities under state programs aimed at improving energy efficiency and environmental protection. The efficiency of these systems is at least 92%, and the fuel obtained from waste is not only CO-neutral, but also serves as a renewable energy source.



Fig. 248. Water-intake facility in dimensions for transportation by motor transport



Fig. 249. Biobank for biofilm

Solar generator is a device accumulating solar thermal energy (solar plant) transmitted by visible light and near-infrared radiation. Unlike solar panels that generate electricity, the solar collector heats the heat transfer material.

At the moment, **solar power plants** are the easiest and cheapest way to generate electricity.

For Astrakhan, the projected annual generation of solar power plant (SPP) is ~ 1460 kWh per kilowatt of installed capacity, which ensures a return on investment within 3-5 years at an electricity tariff above 6 rubles/kWh.

Depending on the issues to be addressed, a properly selected configuration of SPP makes it possible to achieve the desired effect through a combination of different components.

Network SPP is the most common type of solar power plants due to its low cost and quick payback period. It is a great option if the city has a permanent and reliable power grid.

Such a plant converts sunlight into electricity and supplies it to the consumer's network. If the solar cell power is insufficient, all of the missing part comes from the external grid. This way it allows to significantly save on electricity, and in some cases even earn money on its sale.

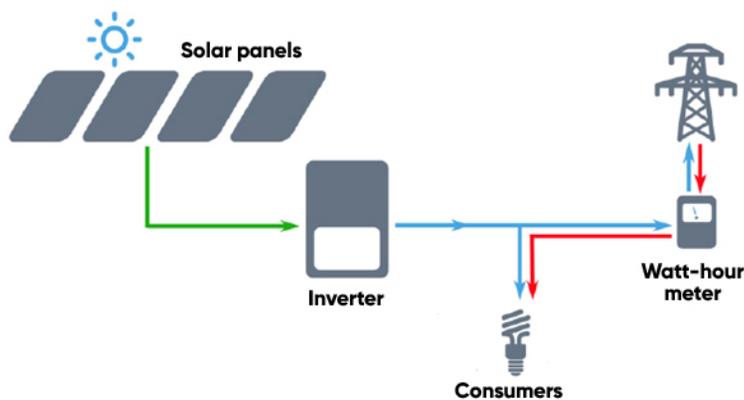


Fig. 250. Network SPP diagram

Hybrid SPP - unlike network SPP, it also has batteries that ensure uninterrupted operation or maximum independence from the city grid.



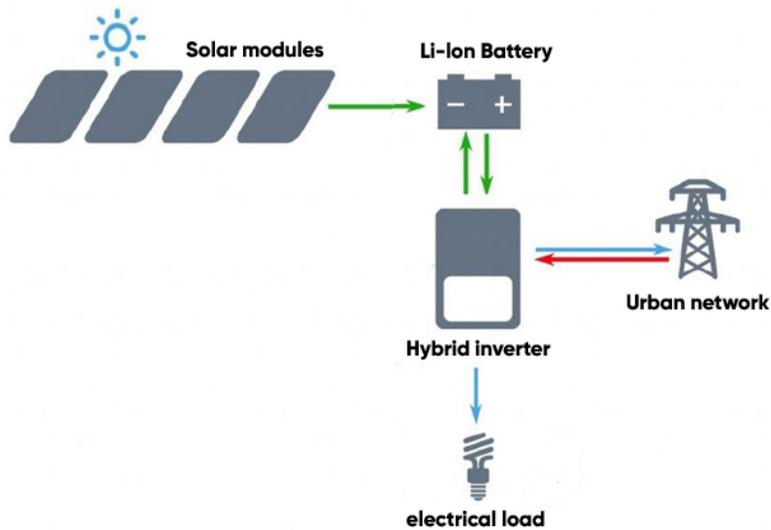


Fig. 251. Diagram of a hybrid SPP

An interesting area of SPP application is potential electrification of irrigation systems and water supply. It is a great example when there is no alternative to solar power in some cases. And given that solar panels' service life exceeds 30 years, this opens up great prospects for their use and has both environmental and economic effects.

Examples of implemented projects



Fig. 252. 102 kW solar power plant for Lisya Nora complex in Moscow Region



Fig. 253. 62 kW solar power plant in Novosibirsk region



Fig. 254. 117 kW solar power plant in Rybatsky hamlet, Rostov Region





Fig. 255. Solar power plant for an irrigation system and pumping station in Yemen

Innovative solutions in energy supply include implementation of small municipal power plants of uninterrupted power supply, which deliver heat, cold and electricity simultaneously to the grid in the proportions required by the consumer. Such power plants can be fueled by any type of waste from a broad list within the State Waste Classifier, or by any type of local fuel. The state environmental impact assessment, which allows processing waste of the 4th and 5th classes of environmental cleanliness in 25 m distance from the housing stock. Mutual integration of a multifuel environmentally friendly vortex furnace with units for power generation, refrigeration production and network solar power plant generates a low-cost municipal trigeneration thermal power plant for uninterrupted energy supply. Such plants do not require the classic hydrocarbon fuel. At the same time, the problem of disposal of small amounts of municipal solid waste and industrial waste of small municipalities is effectively solved.

The latitude of Astrakhan makes it possible to use innovative solar panels produced in Russia with an efficiency factor of 36-38%, which increases the efficiency of such a solar power plant compared to standard options for solar power generation by about two times.

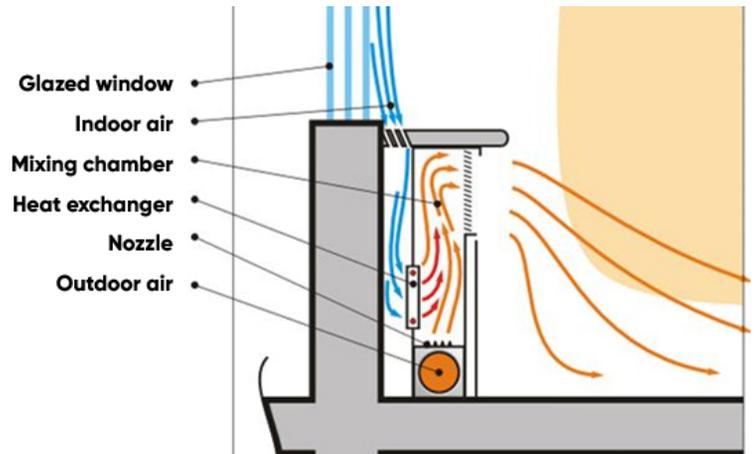
Modern approaches to designing lighting systems and modern climate systems play a very important role in reducing the carbon footprint and improving sustainability.

In particular, there are technical solutions to dramatically reduce the expenses on climatic stabilization of buildings and structures by 70-80% when designing or reconstructing facilities.

Such savings can be obtained by using injection units in combination with heat pumps integrated into the recovery processes of the supply and exhaust ventilation.

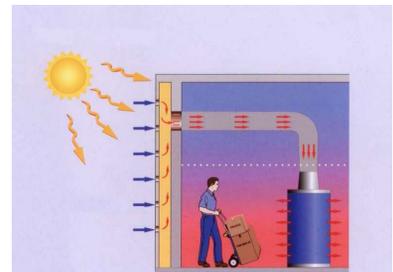


Fig. 256. Layout diagram of an active energy accumulating façade



The active energy accumulating facade is very effective.

Hollow optical light guides and their hybrid lighting complexes are also recommended for widespread use. Light guides reduce the area of atriums and skylights while maintaining ambient illumination up to 52 times, while saving almost 150 times as much energy on air conditioning.



The system for reducing the enterprises power consumption through compensation of high-frequency harmonics, reactive power and some other parameters of the power grid has shown excellent results. The figures of energy savings obtained at real facilities are up to 7-21%.

At the same time, the energy consumption of buildings requires a different, lower category of power supply. With this approach in relation to standard regulatory requirements, renewable energy sources become very cost-effective, and classic hydrocarbon energy complexes are not required.



Fig. 257. Examples of light guides



There are 13 solar power plants with a total capacity of 285.25 MW in Astrakhan region:

1. Zavodskaya SPP located in Volodarsky District. Commissioned in 2017. The rated capacity of the plant is 15 MW, the actual power generation was 20.7 million kWh in 2019. Owned by Sun Projects LLC.
2. Niva SPP located in Privolzhsky District. Commissioned in 2018. The rated capacity of the plant is 15 MW, the actual power generation was 20.7 million kWh in 2019. Owned by Green Energy Rus LLC.
3. Promstroyaterialy SPP located in Narimanovsky district. Commissioned in 2018. The rated capacity of the plant is 15 MW, the actual power generation was 20.4 million kWh in 2019. Owned by Sun Projects 2 LLC.
4. Tinaki SPP (Volodarovka SPP), located in Narymanovsky district. Commissioned in 2018. The rated capacity of the plant is 15 MW, the actual power generation was 20.4 million kWh in 2019. Owned by Energoeffekt DB LLC.
5. Yenotayevskaya SPP (Yenotayevka SPP), located in Yenotayevsky District. Commissioned in 2018. The rated capacity of the plant is 15 MW, the actual power generation was 20.7 million kWh in 2019. Owned by Energoeffekt DB LLC.
6. Funtovskaya SPP located in Privolzhsky District. Commissioned in 2018. The rated capacity of the plant is 60 MW, the actual power generation was 67.6 million kWh in 2019. Owned by Green Energy Rus LLC.
7. Akhtubinskaya SPP, located in Akhtubinsky District. Commissioned in 2019. The rated capacity of the plant is 60 MW, the actual power generation was 66.5 million kWh in 2019. Owned by Green Energy Rus LLC.
8. Elista Severnaya SPP, located in Narimanovsky District. Commissioned in 2019. The rated capacity of the plant is 15 MW, the actual power generation was 19.3 million kWh in 2019. Owned by Eco Energy Rus LLC.
9. Mikhailovskaya SPP located in Narimanovsky District. Commissioned in 2019. The rated capacity of the plant is 15 MW, the actual power generation was 17.2 million kWh in 2019. Owned by Eco Energy Rus LLC.
10. Limanskaya SES located in Limansky District. Commissioned in 2019. The rated capacity of the plant is 30 MW, the actual power generation was 1.8 million kWh in 2019. Owned by Green Energy Rus LLC.
11. Oktyabrskaya SES located in Chernoyarsky District. Commissioned in 2019. The rated capacity of the plant is 15 MW. Owned by Pyataya Proektnaya Kompaniya LLC.
12. Peschanaya SES located in Chernoyarsky District. Commissioned in 2019. The rated capacity of the plant is 15 MW. Owned by Shestaya Proektnaya Kompaniya LLC.
13. Narimanovskaya SPP located in Narimanovsky District. Commissioned in 2014. The rated capacity of the plant is 0.25 MW. Owned by Narimanovskaya SES LLC.



APPENDIX 5. ANALYSIS OF MAIN FACTORS OF NATURAL TERRITORIAL COMPLEXES (NTC) ANTHROPOGENIC TRANSFORMATION IN THE PART OF ASTRAKHAN AGGLOMERATION BY MEANS OF DIGITAL REMOTE SENSOR EQUIPMENT

General data on natural conditions and morphological structure of the researched part of Astrakhan agglomeration

The Volga delta that comprises most of Astrakhan agglomeration is bounded by two structural and tectonic areas, the boundary between which roughly coincides with Astrakhan's latitude. The northern part of the delta is located within the largest depression of the East European Craton, the Caspian Depression which territory coincides with the depression (syncline) of the same name located on the southeastern margin of the East European Craton. The Caspian syncline is distinguished by a complex combination of local tectonic disturbances - zones of uplifts and depressions. A large part of the Caspian Depression, especially in the east, is full of salt-dome structures that are associated with primary (chalky) rocks and rupture dislocations. The deep structure of the Volga delta and its foredelta is distinguished by the presence of the buried Hercynian fold structure that continues the Donbass folds and is called the Karpinsky Range. The range comprises several parallel zones of shaft-shaped uplifts and depressions: there are four uplift zones (Krasnoyarskaya, Astrakhanskaya, Novogeorgievskaya, Promyshlovo-Rakushechnaya) and depression zones (Buzanskaya, Bakhtemirskaya and Mumrinskaya) confirmed by deep drilling and seismic survey within the Volga delta and foredelta¹³³.

The so-called kultuk valley natural boundaries are widely spread in the investigated areas of Astrakhan agglomeration. Most likely, they began to form when the central part of the Volga delta separated, which occurred during the Uluchai phase of the Caspian Sea transgression. The kultuk valley natural boundaries that were formed during the complex interaction of sea and river waters, which caused the most complex processes of sedimentation, received a peculiar complex of sediments that constituted them. In general pattern, it includes sandy sediments of the foredelta, where kultuk formation began, loamy kultuk sediments, and sandy clayey floodplain sediments. During relatively mild sedimentation processes, the surface of the kultuk valley natural boundaries became flat, and today such natural systems often resemble huge football pitches (Fig. 258).

¹³³ Alexin et al., 1962; Leontiev and Foteeva, 1965; Malovitsky, 1970.



The formation of mid-level kultuk valley natural boundaries takes place on gray and dark gray loams, and less often on clays. Meander scars consist of gray or yellow-gray sandy clays of different mechanical composition. The soil cover is made up of moist meadow layered, meadow dark-colored, and meadow dark-colored compacted soils. Meander scar areas are often distinguished by meadow saturated soils. Wet and damp meadows are developed on the flat surface of these valleys, and in the depressions between the meander scars, which, during the flood season, are flooded for up to 2.5 months. Wet meadows are characterized by spike rush and carex, spike rush and poaceae, and carex and poaceae plant associations.



Fig. 258. Flat mid-level kultuk valley natural boundaries, 1.5 km southwest of Sakhma village, early spring.

Besides the group of kultuk valley natural boundaries, the group of channel boundaries shaped by a number of watercourses became widely spread. The presence of fine and medium sands and sandy clays, often clayey ones, in the core of these NTCs evidences this¹³⁴. The fluvial genesis of channel boundaries is proven by their configuration, where the length usually exceeds the width. The surface nature of these natural complexes varies from flat and semi-curved to meander like. In the latter case, formation of elongated elevations (meander scars) up to 1.5-2 m in height and up to several tens of meters in width took place during large channels shifts. Often migrating, minor creeks turned the surface appearance into a meander scar like in course of kultuk valleys channel reshaping. The relief involving small meander scars was also often formed when the floodplain sediments filled dried up channels, channel and channel-and-ilmens depressions, lowlands between the river bars channel flows, braid bars and so on¹³⁵ that had left the action zone.

The natural boundaries of Baer knolls, or knolls of Baer, have become widespread both in the Caspian Depression and in the Volga delta and, consequently, they are located virtually all over the area of Astrakhan agglomeration under study. The Baer knolls are in charge of the peculiar shape of the studied region's morphological structure as they play the role of a peculiar landscape reference point. In most cases, the knolls are surrounded by trails. The trails of Baer knolls are gently sloping plains that are of a knoll-like deluvium in origin. If the upper part of the trail comes in direct contact with the knoll body, then the lower part can interact with any boundary that surrounds the Baer knoll. Most often, the northern half of the trail adjacent to the steeper slope of the knoll is most clearly distinguished. The gentle southern slope turns into a trail very smoothly that often causes difficulties in diagnosing it. It is always problematic to determine the trail width. They trails may lie on or be covered by channel or kultuk sediments, which leads to fluctuations in this morphometric index.

The Baer knolls with the trails that surround them smoothly turn into inter-knoll depressions. In course of the long landscape genesis of the Volga delta, many of the depressions became a base for forming the kultuk valley and and channel natural boundaries, ilmens and other NTCs. That is why their area has been greatly reduced. In this study, the inter-knoll boundaries include those complexes that are clearly distinguished in the inter-knoll depressions not engaged in other geosystems. For these NTCs, as well as for the majority of other ones in the part of the Volga delta under study, a level intersubordination is typical.



Fig. 259. Yellowish-gray sands at the foundation of the meander scar boundaries shaped in place of sea islands, 2 km north of Obratsovo-Travino village.

¹³⁴ Krasnova, 1951; Bolyshev, 1962.

¹³⁵ Zanozin V. V., Barmin A. N., 2019.

Among the NTC of the central part of the Volga delta landscape, meander scar boundaries based on sea islands are the least widespread. They are quite well diagnosed by the yellowish-greenish and yellowish-gray sands and sandy clays that underlie them (Fig. 259).

In relief, these boundaries are manifested as positive forms of irregular, less often rounded or oval configuration with a relative height of up to 2-2.5 m. For the complexes in question, and for the main part of the central delta NTC, a level differentiation is typical. However, we believe that in this case, it is caused not by the boundaries position relatively to the low-water level in watercourses, but by their morphometric features. Due to lithological features, species of the xerophytic orientation represent the flora of these boundaries.

In total, 5 groups of boundaries can be distinguished in the studied area of Astrakhan agglomeration, and each group differs in its genesis: channel; kultuk; knolls; boundaries created from marine islands; hydrological boundaries (ilmens).

It was found that the total number of NTC types within the study area is 31, 11 of which are included in the group of channel boundaries; 7 are included in the group of kultuk boundaries; 5 are included in the group of knoll boundaries; 3 are included in the group of boundaries created from marine islands; and 5 are included in the group of hydrological boundaries (without rivers and watercourses).

The methodology for identifying the main factors of anthropogenic transformation of natural complexes in Astrakhan agglomeration by means of remote sensing data and geographic information systems

In order to analyze the present-day use of agricultural lands and the deposits condition in the studied area of Astrakhan agglomeration, the remote sensing method comprising the symbiosis of the data obtained from Sentinel-1A, Sentinel-2A and Sentinel-2B, and Landsat 8 remote sensing devices available in this study was primarily used. The method for recognition decoding of high-resolution images from Google Earth information system with their further registration on images and ground observation of areas was used as an auxiliary method.



Table 28. Basic features of Landsat 8 spectral channels

Channel number	Title	Landsat 8	
		spectrum range, μm	resolution, m
1	Coastlines and aerosols	0.433–0.453	30
2	Blue	0.450–0.515	30
3	Green	0.525–0.600	30
4	Red	0.630–0.680	30
5	Near infrared	0,845–0,885	30
6	Near infrared	1.560–1.660	30
7	Near infrared	2.100–2.300	30
8	Panchromatic	0.500–0.680	15
9	Cirrus clouds	1.360–1.390	30
10.11	Thermal	11000–13000	100

Landsat 8 data were obtained from the U.S. Geological Survey (USGS) archive via EarthExplorer. Landsat 8 materials were an additional source of spatial information.

Sentinel data

The project of the European Space Agency (ESA) Sentinel is intended to support the Copernicus program (formerly Global Monitoring for Environment and Security).

Sentinel-2A, 2B, a Sentinel project of the European Space Agency (ESA), is equipped with an optical-electronic multispectral sensor for surveys with a resolution from 10 to 60 meters in the visible, near infrared (VNIR) and short wave infrared (SWIR) spectrum zones that includes 13 spectral channels to ensure the display of differences in plants conditions, including temporal changes, and minimize the impact of atmosphere on the survey quality. The trajectory with an average altitude of 785 km, two satellites in the mission make it possible to conduct repeated surveys every 5 days at the equator and every 2-3 days at midlatitudes.

Sentinel 2 data is available for remote sensing data users primarily in three types: Level-1B, Level-1C, and Level-2A¹³⁶. The main array obtained by the users is provided by Level-1C that contains TOA reflectance, as was the case in most of this study. The thematic analysis of the data required the conversion of Level-1C data to Level-2A data that contains "bottom of atmosphere" (BOA, underlying surface) coefficient data.

Sentinel-2A and Sentinel-2B space images were obtained from the European Space Agency via free access to the image archive on the Copernicus program portal. The entire preprocessing cycle of Sentinel-2A and Sentinel-2B data was conducted in a freeware software package

¹³⁶ Sentinel 2 User Handbook.



SNAP. One level of data was converted into another level of data using Sen2Cor, a standalone plug-in for SNAP that provides the user with the final result in JPEG 2000 images in three different resolutions: 60, 20, and 10 m.

The radar mapping data obtained from Sentinel-1, along with data from the Copernicus program portal, were used in this work. The potential applications of multi-polarization and multi-temporal Sentinel-1 SLC and GRD radar data were reviewed. GRD is an amplitude radar image converted to a ground range projection. SLC level product is complex radar data (which contains both signal amplitude and phase) provided in a slant range distance projection. This level data is remarkable because it can be used in interferometric processing to get information on heights and displacements of the probed surface. The radar data were also processed in the freeware SNAP software package.

In the typology of agricultural plots, the first step was to identify their boundaries. Many of them were well identified both in the analysis of archival topographic maps and on satellite images. Drainage and irrigation channels, along with artificial embankments serve as field boundaries. The comparison of earlier topographic maps and modern satellite images demonstrates that these facilities have remained the same until today.

The optical data were based on Sentinel-2A and Sentinel-2B images, the overview images were obtained from Landsat 8 data. The main principle of the images use is the generation of color RGB-synthesis of images taken in different seasons: at the beginning (R), in the middle (G) and at the end of the vegetation period (B), which allows to determine the pattern of land use (Fig. 260). Data in the near-infrared channel (0.76-0.90 μm) was used for synthesis, since the contrast of growing plants, including crops, and areas without vegetation is the highest in this range.





d

Fig. 260. Color synthesis of Sentinel-2 images taken in different seasons, area of Privolzhsky district in Astrakhan region, part of the Volga delta central area: a - R-channel, late spring; b - G-channel, mid-summer; c - B-channel, early autumn; d - simulated image

Moreover, vegetation indices, such as NDVI which has proven to be a useful tool for analyzing agricultural areas in various regions, have also been used to determine the state of agricultural plots¹³⁷. The results of the index calculations were combined together into one multitemporal index.

In the framework of this study, the data obtained from Sentinel-1 radar, given that the use of this data in the global practice of agricultural land analysis is increasing¹³⁸, served as a supplement to the optical range data.

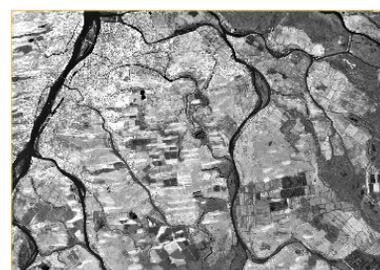
The image generation is based on specific features of the reflection of the emitted radar signal spreading by various types of surface. For agricultural tasks, the surface are crops and open ploughed soil. The cumulative final signal reflection intensity (pixel brightness) is affected by the biophysical properties of vegetation and the agricultural land condition. The moisture factor of the vegetation and topsoil cover plays a great role as it determines the dielectric permittivity of the soil.

In order to obtain clarity and facilitate visual perception, pseudocolor RGB composites were prepared; in this case, the red channel corresponds to an image in VV polarization, the green channel to an image in VH polarization, and the blue channel to a quotient of the VV and VH polarized images (Fig. 261a). Based on the practical experience of a group of researchers¹³⁹, multirate data have been created, this data has the information of different survey dates mutually coordinated both geometrically-wise and by the noise level (multitemporal filtering).

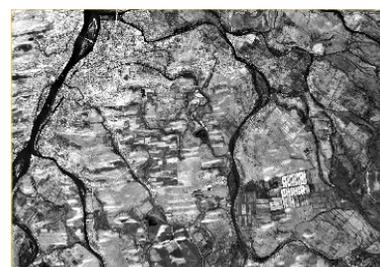
It should be noted that at the stage of land categories initialization (cultivated or fallow land), there was a rather serious problem. It is revealed with the inclusion of remote sensing data obtained in the spring period in the analysis. The analyzed images revealed that multitemporal



a



b



c

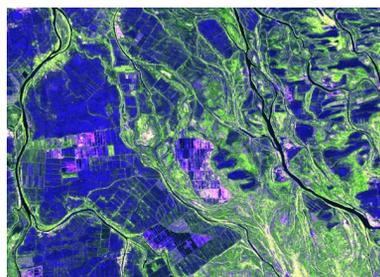


Fig. 261: a - sample of processed Sentinel-1A image on the Volga delta area. Composite RGB image

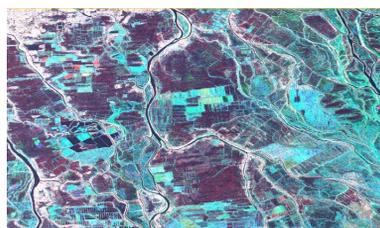


Fig. 261: b - fragment of the synthesized RGB radar image: R - late spring image, VV polarization; G - late summer image, VH polarization; B - mid-autumn image, VH polarization

¹³⁷ Tabunshchik et al., 2018; Terekhin, 2017.

¹³⁸ AgriSAR, 2011; Vreugdenhil et al., 2018; Filguerias et al., 2019; Bazi et al., 2019; Moser et al., 2019.

¹³⁹ Whelen, Siqueira, 2018; Sun et al., 2019.

synthesized images captured vegetation cover on those lands that could hardly be assigned to any particular type of land use in the beginning. Also, such plots have a strict, regular geometric shape. Despite that maximum annual NDVI values may be reduced on such plots, some of them were similar to the cultivated land in brightness characteristics, it is difficult to separate them visually, and they were classified in the same category during the automatic and manual categorization process. In order to rule out the error in land differentiation, some field route surveys were conducted.

Processing of remote sensing data to identify lands in inhabited areas for industrial and other special applications

Data (cloudless pictures) from "Landsat 8" and "Sentinel-2" cameras together with the data from "Sentinel-1" satellite were employed to explore the peculiarities of development in the area of Astrakhan agglomeration under study.

Optical spectrum data preprocessing comprised image passport scanning, composite image formation, color channel assignment, mosaic creation (based on Sentinel-2B data), image cropping along the boundaries of the Volga delta central part. Thematic image processing included analyzing images in pseudocolors and applying supervised classification to identify building areas. The definition of reference regions was based on the application of different channel combinations. For example, combinations of channels: 5-4-3 (artificial colors), 4-3-2 (natural colors), 7-5-3 - according to "Landsat 8" (OLI) satellite; 4-3-2 (natural colors), 12-11-4, 8-11-4 - according to "Sentinel-2B" satellite have been taken into account.

The possible use of multipolarization and multi-temporal radar data obtained from Sentinel-1 satellite has been considered for spatial analysis of urban and rural development (Fig. 262). Level of processing of images used: Single Look Complex (SLC), and Ground Range Detected (GRD); polarization - VV, VH. GRD level product is an amplitude radar image converted to a ground range projection. SLC level product is complex radar data (contains both signal amplitude and phase) provided in a slant range distance projection. The SLC level data is remarkable because it can be used in interferometric processing to get information on heights and displacements of the probed surface.



Identification of spatial location of artificial water bodies

Open water spaces were monitored by calculating Normalized Difference Water Index (NDWI)¹⁴⁰ and Modified Normalized Difference Water Index (MNDWI)¹⁴¹ predominantly using Sentinel-2 data. The estimated indices are presented in Table 29.

Table 29. Estimated NDWI and MNDWI indices

Index	General formula	Landsat 8 formula, (where B is channel number)	Sentinel-2 formula, (where B is channel number)
NDWI	$\frac{\text{Green} - \text{NIR}}{\text{Green} + \text{NIR}}$	$\frac{B3 - B5}{B3 + B5}$	$\frac{B3 - B8}{B3 + B8}$
Modified NDWI	$\frac{\text{Green} - \text{SWIR}}{\text{Green} + \text{SWIR}}$	$\frac{B3 - B6}{B3 + B6}$	$\frac{B3 - B11}{B3 + B11}$

Both natural water bodies and artificial (fish-breeding) ponds were clearly visible in the images: man-made facilities, leveed, as a rule, have a rectangular shape more often. An index value close to 1 (bright white) indicates the presence of a water body. As we can see on Figure 262, artificial water bodies (ponds) are located meridionally mainly in the south of the study area.

Statistical information on the state of agricultural lands, farmlands and fallows

The age of the lands that were irrigated in past plays an important role in the post-agrogenic development of ecosystems. The study assumes that "a fallow" is a natural ecosystem that was used for crop cultivation more than a year ago and has not been involved in the turnover since then, now the fallow is used for restoration of natural ecosystems through natural succession processes or artificial reclamation¹⁴².



a

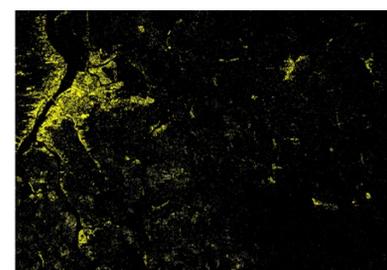
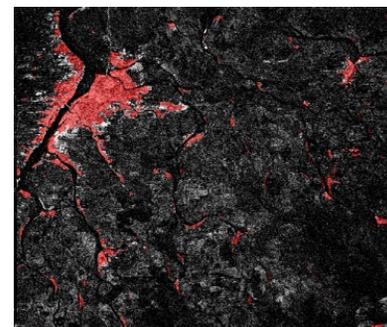


Fig. 262. The outcomes of data processing that have been received from Sentinel-1A satellite, SLC processing level: a, b - VV-, VH-polarization, respectively (the mapped vector data obtained by expert (manual) decoding are marked in red); c - result of radar data classification by Random Forest method

¹⁴⁰ McFeeters, 1996.

¹⁴¹ Ji et al., 2015.

¹⁴² Lurie D. I. et al, 2010.

The age of the fallow can be determined by the time span a particular plot was last cultivated. However, new fallow lands could reenter the cultivated land category and then leave this category again. Or vice versa, they could be returned to the category of cultivated land again.

It is difficult to record such lands because in this case the large time span available for research (e.g., Landsat image archive) should be analyzed, and it is often impossible to determine the age of both fallows and cultivated lands reliably because there is no proper documented information about the time when the cultivation ceased. However, the fallow age can be determined by the fallow plants composition. Yet the composition of fallow vegetation in the considered part of Astrakhan agglomeration is very diverse and is influenced by the following factors: duration of plowing, set of cultivated vegetation, nature of land cultivation, position of the previously plowed plot, type of natural vegetation on this and adjacent plots.

Thus, based on the results of the work performed in the studied part of the Astrakhan agglomeration, several types of agricultural land have been identified:

- territories used as farmlands (arable land; in some cases, greenhouses);
- fallow lands with absent or sparse cover of shrub natural-ruderal vegetation;
- fallow lands with a moderate cover of shrub natural-ruderal vegetation;
- fallow lands with high coverage of wood and shrub natural-ruderal vegetation, including with oleaster forests.

It has been revealed that some areas in the latter group may periodically get flooded by water, but these cases are quite rare and may be caused by failures in the drainage and irrigation system. In some areas, there was a tendency towards changing the type of use, for example, fishponds were used as croplands, and vice versa. This situation is observed to the south of Kamyzyak, and close to Nachalovo village, Kizan settlement and in other areas.

Territories previously used as croplands, with the assigned status of building land (according to the Public Cadastral Map, date of reference: May-June 2019), are classified as a separate group. Such lands are found mainly near Astrakhan and Nachalovo village, however, the area of these lands is very small. Summary description of agricultural land according to the study findings is given in Fig. 264.

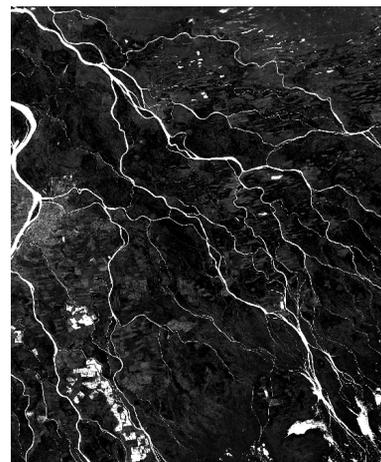


Fig. 263. Recording of artificial water bodies (ponds) in the territory of Astrakhan agglomeration, Modified NDWI.



Fig. 264. Characteristics of agricultural land, sq. km

The area indices of fallow and cultivated lands, ponds and residential areas for the administrative districts under consideration that are included in the part of Astrakhan agglomeration under study are presented in Tables 30-33.

Table 30. Area of Fallows

Name of district	Area of Fallows, km ²
Volodarsky	215.37
Kamyzyaksky	508.01
Ikryaninsky	100.07
Privolzhsky	260.145
Krasnoyarsky	199.98
Total¹⁴³	1283.57

Table 31. Cultivated land area

Name of district	Land area, ha
Volodarsky	510.984
Kamyzyaksky	4444.659
Ikryaninsky	475.846
Privolzhsky	5062.803
Krasnoyarsky	493.887
Total amount	10,988.179

¹⁴³ The total amount is 1,338.3 km². The rest 54.725 km² are in the bordering territories.

Table 32. Area of allocated artificial water bodies

Name of district	Area of water bodies, km ²
Volodarsky	5.682
Kamyzyaksky	8291.666
Ikryaninsky	1618.412
Privolzhsky	1962.271
Krasnoyarsky	57.155
Total amount	11,935.186

Table 33. Area of residential areas

Name of district	Developed area, km ²
Volodarsky	36.309
Kamyzyaksky	28.366
Ikryaninsky	26.399
Privolzhsky	49.624
Krasnoyarsky	31.356
Total¹⁴⁴	172.054

Based on the analysis and assessment results, the diagram "Types of economic use of natural territorial complexes in part of Astrakhan region area", has been presented by QGIS 3.16.0 software. OpenStreetMap data was added to the output materials. Data uploaded in January 2021.

Identified and clearly visible

boundaries of garden plots were considered as additional data. The category "Water Fund Lands" included water bodies which were obtained by combining information from both OpenStreetMap and the data presented in Table 18. The category "Forest Reserve Land" included identified areas of aquatic vegetation (cattail, reeds), and lands that can be attributed to willow forests. Such areas are mainly located in the south of the study area. It should be noted that these boundaries are conditional and may vary (based on the overflow level).

The lands included in the group "Lands of Specially Protected Areas and Objects" were categorized as such based on geospatial data provided by FSBI "Astrakhan State Reserve" and comprise the lands of Damchiksky, Trekhizbinsky and Obzhorovsky sections of the reserve, and the territory of the "Volga River Delta" wetland. The area of the reserve territories indicated in the map is 674.084 km², the area of the "Volga River Delta" wetland is 12,234.75 km².

¹⁴⁴ According to publicly available data, the area of Astrakhan is 208.181 km².



Conclusions and recommendations for the rational use of natural territorial complexes and agricultural land optimization

During long-term economic development of Astrakhan agglomeration, a large part of it has undergone significant anthropogenic changes. The above should be taken into account in the course of the development of planning decisions, development strategies for the study area, for further implementation of various types of economic activities in the area under study. To this end, proposals for the rational use of geosystems in the surveyed area have been developed.

The recommendations are elaborated with consideration of the main external landscape and environmental factors that affect the economic use of the Volga delta landscape. These factors are: hydrological regime of the Volga River and aqueous runoff; degree of natural territorial complexes antropogenic transformation; landscape diversity and patchiness; optimal types of economic activity (agriculture, extraction of natural resources); landscape and recreational potential of the surveyed region. The findings of a group of researchers from Lomonosov Moscow State University that contained 16 landscape planning rules were adopted as the foundation with the addition of some provisions for landscape planning of territories based on other works¹⁴⁵.

Regulation of water flow and planned water use;

The considered features of the region morphological structure have shown that the majority of natural boundaries had been formed under difficult conditions of interaction between the river and the sea. Their further development was in many ways associated with the natural regime of the Volga. The construction of reservoirs and water power plants had a significant impact on transformation of the Volga River hydrological regime: maximum flood levels decreased, flood wave rise and fall rates increased, periods of water supply of low and partly of middle level natural boundaries serving as floodplain spawning grounds shortened, high water stand time in reservoirs and watercourses of the delta decreased. The natural association between thermal and water regimes of water bodies has been disturbed. The water regime change has led to a significant transformation of vegetation and topsoil cover in most of the boundaries.



a - 2.5 km east of Chulpan village, Ikryaninsky District, Astrakhan Region;

b - 0.8 km south-west of Churkinskiy monastery, Volodarskiy district, Astrakhan region



Fig. 265. Parched watercourses in the central part of the Volga River delta landscape (a, b)

¹⁴⁵ Kazakov, 2007; Kolbovsky, 2008.

So, first and foremost, further optimal functioning of Astrakhan agglomeration and its economic use requires spring floods of appropriate levels and duration. Earlier, it was determined that in order to maintain high biological productivity and sustainability of landscapes in the Volga delta, the water passage to the Volgograd HPP downstream at 110-120 km³ in Q2 is necessary¹⁴⁶.

Observations made along with remote sensing data analysis have confirmed that at the moment there are a lot of dry or temporarily overflow channels in the studied part of Astrakhan agglomeration (Fig. 265).

In this regard, one of the recommendations aimed at optimizing Astrakhan agglomeration geosystems is possible restoration of waterways that have been destroyed by anthropogenic activities, especially by changing the hydrological regime of the Volga River.

The planned water use provides water supply and irrigation in required terms and volumes, ensures the most complete and rational use of land and water resources. However, the planned water use is based on irrigation systems. As it is shown by the study, the current drainage system is at a catastrophically low level (Fig. 266) due to low or missing capital investment standards.

That is why it is necessary to conduct a campaign aimed at drainage systems construction or restoration of the old ones for optimal use of natural complexes in the agricultural cluster. For example, it can be recommended to restore old or create new systems with the drainage depth of about 2.5 m separated from each other by a distance of up to 220 m for agricultural lands on kultuk boundaries groups. When creating these facilities based on NTC with sandy clay and light loam soils, the distance between the drains can be increased up to 300 m. The proposed open drainage systems shall be compliant with the applicable operating rules. The reason is that weeds and hygrophytes, particularly reeds, infestation together with siltation, slope slumping significantly reduces the performance. In the conditions of the central delta, it is recommended to clean the drains at least once every 2 years, in autumn or spring.

Hence, irrigation systems need to be constantly monitored and repaired, the repair activities are divided into running repairs and overhauls. The running repairs include systematic monitoring and control (for example, debris removal). Overhauls include the replacement of individual units, assemblies, and other works.



Fig. 266. Abandoned drainage and irrigation systems in the central part of the Volga delta

146 Barmin, 2002; Valov et al, 2019.



Minimization of impacts on natural complexes that have not been extensively altered by humans;

The adaptation of minimizing impacts on natural complexes that have been slightly damaged assumes that, in planning economic activities, the main works shall be directed to morphological units of natural complexes that have been already damaged, and the geosystems that underwent the least changes shall be preserved.

In order to effectively draw economic benefits from the boundaries modified by people, excluding those that still retain their ecological stability, it is necessary to address the reclamation of the boundaries of the first-type. The landscape approach should be applied as the basic principle of land reclamation and optimal use, in other words, the reclamation facility should be considered as a technogenic component of the natural geosystem formed as a result of natural resource use, anthropogenic impact¹⁴⁷.

The initial step in addressing this issue is to identify the main factors that have led to the disturbance of economic use facilities and the natural boundaries they are located in. One of the reasons the agricultural lands within the surveyed part of Astrakhan agglomeration had been taken out of turnover is their salinization after the plots embankment.

The high content of water-soluble salts in the topsoil can be explained by some natural reasons: formation of natural boundaries groups on initially saline parent rocks (Baer knolls, kultuk boundaries); close occurrence to the daylight surface of groundwater; climatic features (high total temperatures during the warm period, and high evaporation rate, as a result). The soil salinization can also be caused by irrigation. Excessive, random irrigation in shallow groundwater conditions and the lack of an effective drainage system accelerate this process.

Crop rotation combined with sowing of perennial grasses, repeated sowing of crops, soil cultivation, rational fertilizing help to prevent soil salinization.

The most effective method to solve the problem of salinization in the Volga delta can be considered construction of drainage and irrigation systems or restoration of the existing ones (as described above) with subsequent cleaning of soils. Cleaning in summer is reasonable with significant soil salinization and high sulfation content, when washing norms from 30 thousand m³/ha and more are required. It is easier to feed this amount of water in the summer than in the fall. Moreover, in the summer it is easier to clean chips and tails of Baer knolls. Cleaning in the autumn is carried out when the groundwater is relatively shallow, which is favorable for infiltration.

Following the rule of minimizing impacts on undamaged landscape elements, when disturbance is unavoidable, economic facilities shall be placed in the marginal part of the element with minimal fragmentation and preservation of the maximum possible undisturbed share¹⁴⁸. Such approach was previously used in economic development of the geosystems of the central part of the Volga delta landscape and is partially applied today. Agricultural lands within the low-level kultuk



Fig. 267. Example of minimizing impacts on slightly damaged landscape elements: agricultural land is located on the periphery of flat kultuk valley natural boundaries of low and middle levels (marked in yellow).

¹⁴⁷ Golovanov et al., 2015.

¹⁴⁸ Khoroshev, 2019, p. 77.

natural boundary, where most of the lands are located in the north and northwest of the geosystem, and the southern half of the geosystem remains slightly damaged can be taken as an example (Fig. 267).

An analysis of the loss of organic matter (humus) is needed for the reclamation of existing land in the agricultural cluster. Almost all the soil properties are tightly related to the content and composition of soil organic matter that consists of humus by 90% and constitutes an important criterion in assessing the soil fertility.

Humus comprises 60% of phosphorus, 90% of nitrogen and 80% of sulfur of their total content in the soil. The higher the humus content, the higher the content of active forms of potassium, phosphorus, calcium, copper, and zinc. Soils with a high content of humus are excellent energy material for soil microorganisms, which, in turn, are essential for good plant growth and fruiting.

However, the soils with very low and low humus content prevail in Astrakhan agglomeration. Brown semidesert loamy sandy soils are characterized by the lowest humus content. Surveys have indicated the need to replenish organic matter in large areas of Privolzhsky and Kamyzyaksky districts of Astrakhan region, keep its balance at a sufficiently high level, constantly monitor the dynamics of its change, carefully assess the factors that regulate the balance of organic matter in the soil.

Implementation of natural and economic adaptability and diversity of natural territorial complexes

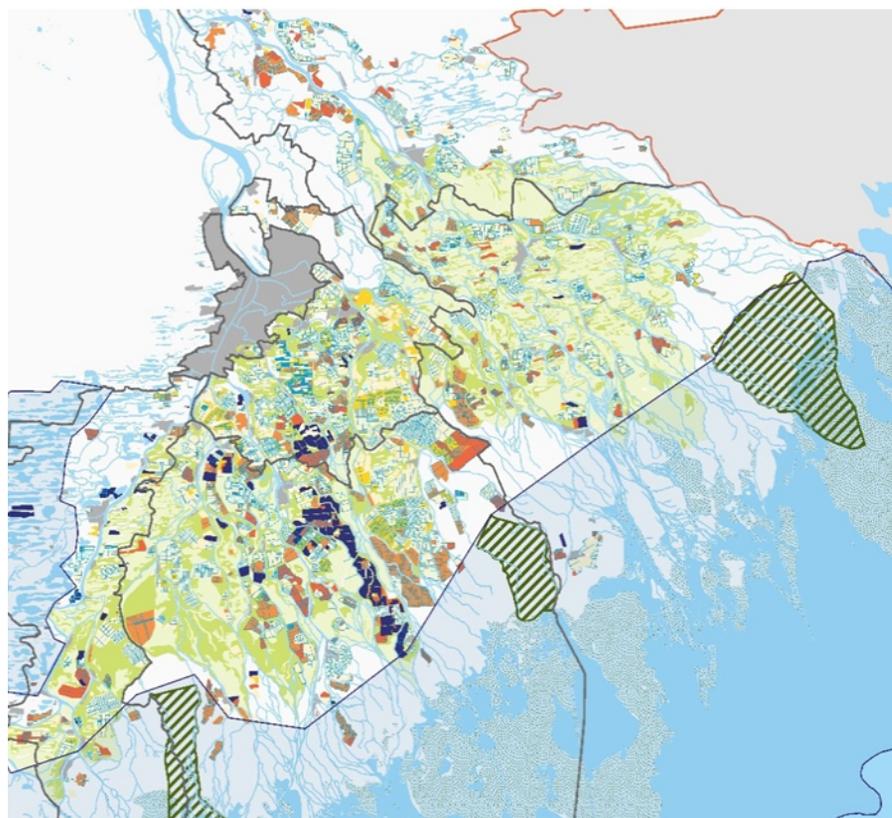
The conducted studies have revealed that the agricultural lands that are most widespread in the central delta and, consequently, in the center of Astrakhan agglomeration, are in most cases "integrated" into certain natural boundaries. This became possible due to proper landscaping and organizational work conducted in the last century, which, in turn, followed a large-scale scientific research. This provision is still being implemented, although only partially, today. For example, there is a tendency to use kultuk natural boundaries as optimal for farming in the first place. These geosystems are distinguished by appropriate area values, suitable topography and optimal soils. This condition does not contradict the principle of natural and economic adaptability aimed at aligning the structure and functioning of the anthropogenic landscape with the peculiarities of the local natural landscape. Man-made structures should be placed and arranged in accordance with the landscape morphological structure.

Based on the principle of natural and economic adaptability, it is suggested to completely exclude boundaries that have been based on sea islands and are located in the south of Astrakhan agglomeration (southern districts of Kamyzyaksky, Ikryaninsky and Volodarsky districts) from further economic use. The sandy, sandy-loam nature of their lithogenic base not capable of retaining soil moisture, and the low content of humus in the soil largely contributes to such proposal.

The outcome of analysis of natural territorial complexes (NTC) anthropogenic transformation main factors in part of Astrakhan agglomeration area is presented as a graphical appendix "Types of economic use of natural territorial complexes in part of Astrakhan region area" below (Fig. 268).



Diagram on A3 (Fig. 268)

**Symbol:**

- Borders of the Russian Federation
- Municipal district boundaries
- settlements
- Land for economic purposes:**
 - territories - meadows flooded with water
 - meadows rarely flooded
 - irrigation systems
 - artificial ponds
 - fields-arable land
 - fallow lands
- with no or sparse cover of natural-ruderal vegetation
- with the moderate cover of shrubby natural-ruderal vegetation
- with the high cover of woody-shrubby natural-ruderal vegetation
- with assigned status for building construction
- Forest fund lands:**
 - aquatic vegetation
- SPNA lands:**
 - ▨ Nature reserve territories
 - Boundaries of the Wetland "Volga River Delta"

APPENDIX 6. CONSOLIDATED LIST OF DIFFERENT EVENTS IN ASTRAKHAN AGGLOMERATION

Table 34. Summary list of events (winter)

	Winter		
	December	January	February
Astrakhan		1. Traditional New Year's run to promote a healthy lifestyle (January 1).	
Privolzhsky district			
Ikryaninsky district			
Kamyzyaksky district			
Volodarsky district			
Krasnoyarsky district			
Narimanovsky district			
Limansky district			
Astrakhan	1. Cultural event Music is a State of Mind. 2. The world through the prism of dance. 3. Interregional festival of Kazakh culture "Tugan Zher" (Homeland). 4. Citywide New Year's Eve events in the context of the Christmas Fair.	1. Regional thematic event aimed at the Cossack culture development "Atamanskaya Yolka". 2. Citywide New Year's Eve events in the context of the Christmas Fair	1. Regional folklore and ethnographic festival "Maslenitsa".
Privolzhsky district			



Ikryaninsky district	<ol style="list-style-type: none"> 1. Day of the Unknown Soldier. 2. "Winter's Tale" 1. "Oh, This Old New Year." 2. Epiphany fun games. 3. Christmas Miracle. 4. The New Year's Adventure of Father Frost. 5. New Year by the Door. 6. Fairy Tales and Riddles. 		
Kamyzyaksky district			
Volodarsky district	<ol style="list-style-type: none"> 1. Concert of the centre's dombra player Arman Baizullayev. 2. Shamsha Kaldayakov commemoration meeting. 	<ol style="list-style-type: none"> 1. Christmas celebration. 	<ol style="list-style-type: none"> 1. Happy Maslenitsa.
Krasnoyarsky district			
Narimanovsky district			
Limansky district			
Astrakhan	<ol style="list-style-type: none"> 1. "Modern bread making: new researches and projects". 2. Day of Kazakh culture. 3. Online Stories "Astrakhan through the Eyes of Travelers of the XIX Century". 4. "The World of Slavic Symbols by Oleg Gurenkov". 5. Dzhanibek's Readings. 6. interactive session "The Earth is Our Planet". 7. Caspian festival and contest of young masters "Golden Key". 		
Privolzhsky district			



Ikryaninsky district

1. We are proud of the heroes' glory - An hour of Courage, an exhibition of books and illustrations.
2. "Defender of the Russian Land".
3. Book fair "Deep in the Siberian mine..."
4. Book exhibition and review "Cossacks and glory".
5. Book fair "Your Happiness is Protected by Law".
6. The First Lady in English Literature.
7. Searching expedition game "Look it up in the Dictionary".
8. Exhibition of books and illustrations "Poetry of the Heart".

Kamyzyaksky district**Volodarsky district**

1. "The Deed of the Kazakh People."
2. Discussions, exhibition "We are Heirs of the Victory - We are Together".
3. Interethnic forum "Heirs of the Victory".

Krasnoyarsky district**Narimanovsky district****Limansky district**

Table 35. Summary list of events (spring)

	Spring		
	March	April	May
Astrakhan			
Privolzhsky district			
Ikryaninsky district			
Kamyzyaksky district			
Volodarsky district			
Krasnoyarsky district			
Narimanovsky district			
Limansky district			
Astrakhan	<ol style="list-style-type: none"> 1. Regional Festival of Youth Art "South Art" (March-April). 2. Ancient Kalmyk folk festival Tsagan-Sar (guests from Kalmykia). 	<ol style="list-style-type: none"> 1. Fishing Festival "Caspian Roach" 2. Regional festival of spring and nature renewal celebrated by the Persian and Turkic peoples - Nowruz. 3. Festival of national cultures "Ethnopodium" (not much information, the last for 2018). 4. Traditional regional holiday Nowruz (celebrated in March or April, different dates every year). 5. International Festival of Vocal Art named after V. Barsova and M. Maksakova. 	<ol style="list-style-type: none"> 1. Night of Museums 2. Regional holiday "Glory to Our Bright Language!" 3. Cultural and social project "Astrakhan Seasons" (May-September).
Privolzhsky district			
Ikryaninsky district			
Kamyzyaksky district			<ol style="list-style-type: none"> 1. Holiday "Semitsky Circle Dance" (culmination of the festival "Zelenye Svyatki").
Volodarsky district			
Krasnoyarsky district			



Narimanovsky district	1. Ancient Kalmyk folk festival Tsagan-Sar.
Limansky district	1. Ancient Kalmyk folk festival Tsagan-Sar.
Astrakhan	1. Healthy lifestyle promotion contest "The Best Healthy Lifestyle Promotion Team" - from March 10, 2020 to October 2020 (apparently, in all municipalities, currently held).
Privolzhsky district	
Ikryaninsky district	
Kamyzyaksky district	
Volodarsky district	
Krasnoyarsky district	
Narimanovsky district	
Limansky district	

Table 36. Summary list of events (summer)

	Summer		
	June	July	August
Astrakhan		1. Water Sports Festival.	1. Physical Education Day.
Privolzhsky district			
Ikryaninsky district			
Kamyzyaksky district			
Volodarsky district			
Krasnoyarsky district			
Narimanovsky district			
Limansky district			
Astrakhan	1. Zelenye Svyatki ("Trinity") — festival of folk culture and crafts. 2. Interregional festival "Zelenye Svyatki".	1. A Foam party on a city beach. 2. Fisherman's Day. 3. Navy Day. 4. Festival of Ukha (fish soup). 5. All-Russian Day of Family, Love and Fidelity ("Festival of Lovers, in	1. Gas Worker Day. 2. Interregional festival "The Volga United Us Forever". 3. All-Russian festival of children's and youth theater ensembles "The Mask" (had no support in 2018). 4. Watermelon Festival.



	<p>2020 it was called "Big Astrakhan Wedding").</p> <p>6. Regional holiday "Sabantuy" (Tatar holiday).</p> <p>7. Open festival and laboratory of theatrical art "I Believe" (perhaps, it should be moved to the educational events).</p>	<p>5. Festival "National Cohesion".</p> <p>6. Caspian Sea Day.</p> <p>7A. International project of the Astrakhan State Opera and Ballet Theater "Russian Operas in the Astrakhan Kremlin".</p>
Privolzhsky district		
Ikryaninsky district		
Kamyzyaksky district		<p>1. Astronomical Festival "Caspian Stars".</p> <p>In 2019, the "Kamyzyak-Antarctica" teleconference was held as part of the festival.</p>
Volodarsky district		<p>1. Regional holiday "Zholdastyk".</p>
Krasnoyarsky district		
Narimanovsky district		
Limansky district		
Astrakhan	<p>1. Festival of healthy lifestyle.</p>	
Privolzhsky district		
Ikryaninsky district		
Kamyzyaksky district		
Volodarsky district		
Krasnoyarsky district		
Narimanovsky district		
Limansky district		

Table 37. Summary list of events (autumn)

	Autumn		
	September	October	November
Astrakhan			<ol style="list-style-type: none"> 1. International contest festival of choreographic ensembles "Grace". 2. Cross country rally "Kagan's Gold" (start point from Astrakhan Kremlin, the route takes place along the Astrakhan region).
Privolzhsky district		1. Camel race.	
Ikryaninsky district			
Kamyzyaksky district			
Volodarsky district			
Krasnoyarsky district			
Narimanovsky district			
Limansky district			
Astrakhan	<ol style="list-style-type: none"> 1. All-Russian Street Film Festival. 2. Astrakhan City Day. 3. International ethno-tourism project "Ethno fair. Southern Bazaar". 4. International festival of puppet theaters "Caspian Coast" (held once in 2 years). 	<ol style="list-style-type: none"> 1. Festive event "Pokrov day - Wedding Time". 2. International jazz music festival "Delta Jazz". 	<ol style="list-style-type: none"> 1. International Festival of Folk Costume "Ethnostyle" and International Festival "Multinational Astrakhan". 2. International festival and contest of creative ensembles "Friendship Constellation".
Privolzhsky district			
Ikryaninsky district	1. Festive program for the 400th anniversary of Zhitnoye village;		1. National Day of Unity.
Kamyzyaksky district			
Volodarsky district			
Krasnoyarsky district	1. Regional holiday "Cossack Stanitsa".		
Narimanovsky district			1. Night of Arts.



Limansky district	
Astrakhan	<p>1. Educational ethno-cultural camp for youth "Etnomir" (held in different months).</p> <p>2. Gathering of activists from national and cultural public associations of Astrakhan region.</p> <p>1. Night of Arts.</p>
Privolzhsky district	
Ikryaninsky district	
Kamyzyaksky district	
Volodarsky district	
Krasnoyarsky district	
Narimanovsky district	
Limansky district	

	Sports and recreation
	Cultural and entertainment events
	Educational events



APPENDIX 7. LIST OF TOURIST ROUTES RECOMMENDED BY THE MINISTRY OF TOURISM AND CULTURE OF THE ASTRAKHAN REGION

Table 38. List of tourist routes recommended by the Ministry of Tourism and Culture of the Astrakhan region

Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
"Astrakhan Kremlin is an example of military-engineering architecture of the late XVI century"	Ensemble of the Kremlin, 2nd half of XVI - early XX century. Artillery Tower, Red Tower, armory, brig building, Assumption Cathedral, Prechistenskaya Bell Tower	Introducing visitors to the iconic, military and architectural monuments on the territory of the Astrakhan Kremlin	Astrakhan	Walking route
"Kosa"	Stock Exchange building, embankment of the Volga River, building of the Azov-Don Bank dated 1910, building of the Russian-Azov Bank dated the end of XIX century, City History Museum	Introducing visitors to the ancient district "Kosa", historical past and present conditions of Astrakhan, famous citizens, benefactors involved in construction of "Kosa", to architectural styles of the late XIX - early XX century.	Astrakhan	Walking route
"White City»"	The "Bratsk Garden" Square, the Governor-General's House (XVIII-XIX centuries), the Armenian Trade Yard (XVIII-XIX centuries), the Persian Trade Yard (end of the XVIII century), city institutions buildings 1901-1904, the "Sea Garden" square, the Annunciation nunnery dated the XVIII-XIX centuries.	Introducing visitors to the layout, formation, monuments of culture and history in the White City	Astrakhan	Walking route



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
"Trading Artery"	Merchant's mansions of the XIX century: The House of the Merchant Gubin, 1897, The Manor of Kh.E. Efremov, 1900-1902, The House of A.P. Maslov, XIX century, The House of the Merchant Tetyushinov, 1872, Budagov's House, the beginning of the XX century, Shelekhov's House, 1880, The House of Demidov Nikita Altufiev (from 1750 - The Guesthouse of the Merchant Tikhon Loshkarev), the beginning of the XVIII century.	Introduction to the historical district of the Kutum River embankment, history of Astrakhan merchants and their role in the development of social and cultural urban environment	Astrakhan	Walking route
"Granite shores"	Building of the Exchange 1906-1910, The Volga River Embankment, Peter's Fountain, sculptural ensembles and fountains on the Volga embankment, A.P. Guzhvin Avenue, Monument to Peter I.	Introducing visitors to the history, sights of the Volga River embankment	Astrakhan	Walking route
"The war is gone... The memory remains"	"Eternal Flame" monument in the "Bratsk Garden" park, Museum of Military Glory	The tour is military and patriotic. This excursion presents memorable places that were important in the Great Patriotic War and places that became silent witnesses of historical events	Astrakhan	Walking route
"Magic of the Cinema"	Nikolskaya Street, Volga River Embankment	The tour along the city streets where the famous films were shot such as "It Can't Be", "My Friend Ivan Lapshin", "Election Day-2" and others.	Astrakhan	Walking route
"The glory bequeathed by Peter"	The Volga River embankment, Swan Lake, Astrakhan Kremlin Dormition Cathedral, Astrakhan	The tour covers part of the city associated with Peter the Great	Astrakhan	Walking route



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
	Kremlin Nikolsky Gate, Local History Museum (exhibition complex dedicated to the time of Peter the Great)			
«Knowledge is Power»	The Kremlin ensemble of the 2nd half of XVI - early of the XX century, Orthodox Gymnasium named after St. Joseph, guesthouse and shops of the Armenian district school of Agababov, 2nd half of the XIX century, revenue house of M.A.D. Bagirov (since 1918 - the city welfare department), 1902, 1918-1928, the architect V.M. Anan'ev, city institutions buildings 1901-1904, former ensemble of the Mariinsky Gymnasium buildings, 1865–1910	Tour along Sovetskaya Street from the Astrakhan Kremlin to the Astrakhan State Conservatory. The story about the first Astrakhan schools and gymnasiums, about development of vocational education in the XIX - beginning of the XX century.	Astrakhan	Walking route
"Museum Block"	Astrakhan Art Gallery, House-Museum of B.M. Kustodiev, House-Museum of V. Khlebnikov, House-Museum of the Merchant G. V. Tetyushinov	Introduction to architectural monuments and branches of the Astrakhan Art Gallery named after P.M. Dogadin	Astrakhan	Walking route
"Musical and Theatrical Astrakhan"	Astrakhan Drama Theater, Astrakhan Conservatory, Astrakhan Philharmonic Hall	This tour tells about rich cultural traditions of Astrakhan region, emergence and development of theaters and musical salons of the end of XIX century.	Astrakhan	Walking route
"Merchants' Astrakhan"	House-Museum of the Merchant G. V. Tetyushinov, Krasnaya Embankment St., 1st May Embankment St.	Introduction to the history of Astrakhan merchants of the XIX century, exhibition of the Museum of the Merchant G. V. Tetyushinov (the only monument of wooden architecture of the XIX century left in the entire region of the Lower Volga)	Astrakhan	Bus and walking tour



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
"A History of Very Famous Province"	Peter the Great Square, Swan Lake, the Kremlin ensemble, the 2nd half of the of the XVI - beginning XX century. The building of the Russian and Asian Bank, late XIX century, Tower of the Transfiguration Monastery, beginning of the XVIII century, the Armenian cross-stone bow cross - Khachkar, monument to Kurmangazy Sagyrbayev, House of the Merchant Gubin, 1897.	Introduction to historical and architectural monuments of Astrakhan	Astrakhan	Bus and walking tour
"Embankments and Bridges of Astrakhan"	Along the channels of Astrakhan: Tetyushinov, Krasnaya Embankment St., 1st May Embankment St.	Stores about the bridges and channels of Astrakhan	Astrakhan	Bus and walking tour
"What Cities Say"	Sovetskaya St., Lenin St., Lenin Square, Krasnogo Znameni St., Tredyakovsky St., Esplanadnaya St., Kirov St.	Awareness of the history of Astrakhan's central streets	Astrakhan	Bus and walking tour
"Astrakhan in the rear during the War"	Ensemble of the Kremlin, 2nd half of XVI - early XX century, the "Bratsk Garden" Square, "Eternal Flame" monument, Museum of Military Glory, building of the Main Post Office, memorial sign "Place of the Ice Crossing", Garrison Naval Hospital of the Caspian Flotilla, Astrakhan College of Music named after M.P. Musorgsky, Astrakhan Clinical Hospital	It is a military and patriotic tour that tells people about peculiarities of Astrakhan's live in the lines and in the rear: culture, industry, health care, and so on. Introduction to work of the search parties	Astrakhan	Bus and walking tour



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
	named after Z.P. Solovyov, Boulevard of Victory, Monument to Fallen Ships			
"Theatrical Astrakhan"	Astrakhan Puppet Theater, Astrakhan Young Spectator Theater, Astrakhan Drama Theater, Astrakhan Opera and Ballet Theater	Introduction to the city theatrical life, history of Astrakhan theaters, their architecture, tours to dressing rooms and backstage	Astrakhan	Bus and walking tour
"Kustodiev's Places."	House-Museum of B.M. Kustodiev, Astrakhan Drama Theater, Astrakhan State Conservatory, Kremlin Ensemble	Introduction to city hallmarks associated with the artist's life and work	Astrakhan	Bus and walking tour
"Khlebnikov's Places"	Ensemble of the Kremlin, 2nd half of XVI - early of the XX century, H. Khlebnikov family home, V. Khlebnikov House, White Mosque, Persian Mosque, Wichman House, V. Khlebnikov House Museum	Visit to the V. Khlebnikov House Museum. Introduction to the city landmarks associated with life of the famous poet, his family and friends	Astrakhan	Bus and walking tour
"This man deserves a novel"	Ensemble of the Kremlin, 2nd half of XVI - early XX century, Channel of Varvakis, Monument to Varvakis	Introduction to the city hallmarks associated with life of the famous poet, his family and friends	Astrakhan	Bus and walking tour
Temples and churches of Astrakhan	Ensemble of the Kremlin, 2nd half of XVI - early XX century, Church of St. John Chrysostom, Cathedral of St. Prince Vladimir, Roman Catholic Church, Saint Hripsime Church	Introduction to history and architecture of temples and churches of Astrakhan	Astrakhan	Bus and walking tour
"City of All Religions"	Cathedral of St. Prince Vladimir, Armenian Apostolic Saint Hripsime Church, Church of the Assumption of the	Introduction to religious facilities of different denominations located in the city of Astrakhan	Astrakhan	Bus route



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
	Blessed Virgin Mary, White Mosque			
"Eupraxia" artisanal town house	The Center for Folk Culture "Eupraxia" artisanal town house	Introduction to culture and life of the Russian folk of the region. Games, ditties, songs, round dances that involve musical instruments and Russian costumes	Astrakhan region: Privolzhsky district, Evpraksino village	Bus route
"Cossack Freeman"	"Krug" Cossack Culture Center	Introduction to culture and lifestyle of Astrakhan Cossacks	Astrakhan region, Enotaevsky district, Kopanovka village	Bus route
"Astrakhan - the city of fishermen"	Museum of the Fishery History, Ikryanoe village, Museum of the Fishery History, Oranzherei village	Introduction to nature, history and fishery of Ikryaninsky district	Astrakhan region, Ikryaninsky district, Ikryanoye village, Oranzherei village	Bus route
"There are fishermen dragging their nets in Ikryanoye village near the river"				Bus route
"In the wake of the Golden Horde..."	Selitrennoye ancient settlement, Selitrennoye Ancient Settlement Museum, Saray-Batu Cultural Center	Introduction to archaeological monuments on the bank of the Akhtuba River in Kharabalinsky District. Arrival to Selitrennoye village, tour around the excavations, transfer to the reconstruction of Saray-Batu. A tour around the decoration town. Introduction to one of the largest centers of civilization - Sarya-Batu of the Golden	Astrakhan region: Kharabalinsky District, Selitrennoye village	Bus route
"Let's remember everyone by name"	Ensemble of the Kremlin, 2nd half of XVI - early XX century, the "Bratsk Garden" Square, "Eternal Flame" monument, Museum of Military Glory, memorial sign "Place of the Ice Crossing", Memorial to	The tour is military and patriotic, it tells about people of Astrakhan - soldiers in the Great Patriotic War.	Astrakhan, Khulkhuta, Yashkulsky district of the Republic of Kalmykia	Bus and walking tour



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
	the Fallen Soldiers of the 28th Army, Khulkhuta village.			
"His Majesty the Watermelon"	Russian Watermelon Museum, Aptekarsky garden of the State Scientific Institution	Introduction to the history of melon cultivation in the Lower Volga, to biological features of the melon crop -	Astrakhan - Kamyzyak	Bus route
"Gifts of the Fields"	All-Russian Research Institute of Irrigated Vegetable and Melon Growing	watermelon, to the work of the melon crops breeding and seed production laboratory of All-Russian Research Institute of Irrigated Vegetable and Melon Growing		
"The Striped King of Berries"				
Bogdinsko-Baskunchaksky Nature Reserve	Bogdo Mountain, Baskunchak Lake	Tours to the Bogdo Mountain and Baskunchak Lake with visiting the museum of the Bogdinsko-Baskunchaksky Nature Reserve	Astrakhan region: Akhtubinskiy district	Bus and walking tour
"The Magic World of Nature"	Astrakhan Biosphere Nature Reserve; Museum of Nature	Tour to the Damchiksky cluster of the Astrakhan Biosphere Nature Reserve with visiting the Museum of Nature, boating	Astrakhan region: Kamyzyaksky district	Bus and walking tour
"Where the Lotus Blooms..."	Trip to the Volga Delta, visiting lotus fields, fisherman's lunch, rest on the island	Ecological tour that shows the visitors nature and wildlife of Astrakhan region. Travel information from the guide during the trip	Astrakhan region: Kamyzyaksky district, Ikryaninsky district, Volodarsky district	Bus route
"Revived Sacred Places"	Monastery of Our Lady of Kazan in Ilyinka village, Church of St. Nicholas the Wonderworker in the former St. Nicholas - High Mountain Monastery, Alexander Nevsky Church in Razino village.	Introduction to places of worship in Volodarsky district	Astrakhan region: Volodarsky district	Bus route
"Road to the Temple"	Church in Vladimirovka village, Assumption Church in Kopanovka village, Buddhist	Tour around places of worship in Enotayevsky District and the Republic of Kalmykia	Astrakhan region: Enotayevsky district,	Bus route



Route name	Key points of the route	Brief description of the route	Residential place	Transportation method
	Khurul in Tsagan-Aman village (Republic of Kalmykia)		Vladimirovka village, Kopanovka village, Tsagan-Aman village (Republic of Kalmykia)	
"Sacred places of Krasnoyarsk Land"	Muslim Mosque; Christ the Savior Temple and Chapel with the Wonderworking Icon of Our Lady of Jerusalem;	Tour around the religious landmarks of Krasnoyarsk district	Astrakhan region: Krasnoyarsk district, Krasny Yar village, Maly Aral village	Bus route
"Along the Religious Paths"	Seid Baba Mausoleum and tomb of Bukei Khan			Bus route
Sacred places of Ikryaninsky and Limansky districts	Temple of Peter and Paul in Ikryanoye village, Trudfront village, Temple in Honor of Donskaya icon of the Mother of God, Khurul in Liman urban-type settlement	Introduction to places of worship in Ikryaninsky and Limansky districts of Astrakhan region	Astrakhan region, Ikryaninsky district, Ikryanoye village, Trudfront village, Limansky district, Liman urban-type settlement	Bus route
"The Exotics of the Astrakhan Steppe"	Kurmangazy Sagyrbaev Museum, Mausoleum of Kurmangazy Sagyrbaev	Introduction to the history of the Kazakh people and the work of the songwriter Kurmangazy Sagyrbaev	Astrakhan region: Volodarsky district, Altynzhar Village	Bus route

APPENDIX 8. ANALYSIS OF THE EXISTING CULTURAL HERITAGE PROTECTION SYSTEM IN ASTRAKHAN REGION

The areas of Astrakhan region and Astrakhan are significantly different in terms of the quality of historical and urban planning environment due to their climatic and historical specifics. This situation is reflected in the register of cultural heritage sites of the Astrakhan region.

Table 39. Distribution of cultural heritage sites by districts of the region¹⁴⁹:

Categories and types	Cultural heritage site of federal significance Listed buildings	Cultural heritage site of regional significance			Identified cultural heritage sites
		historical monuments	listed buildings	historical monuments (tombs)	
Astrakhan	41	4	555	29	39
Akhtubinsky district	–	–	8	22	–
Volodarsky district	–	–	4	2	–
Enotaevsky district	1	–	9	5	–
Ikryaninsky district	–	–	1	1	–
Kamyzyaksky district	–	–	0	9	–
Krasnoyarsky district	–	–	4	2	–
Limansky district	–	–	3	2	–

¹⁴⁹ According to the resolution of the Head of Astrakhan region dated 27.12.1993 No. 230 "On taking cultural and historical heritage sites under the state protection" (as amended by the resolutions of the Head of Administration of Astrakhan region No. 17 dated 25.01.1999, No. 343 dated 28.09.1999, the resolution of the Governor of Astrakhan region No. 481 dated 27.07.2005, No. 716 dated 29.11.2005, No. 603 dated 26.12.2006, No. 311 dated 17.07.2007, No. 71 dated 05.03.2011, No. 85 dated 10.09.2014, the resolution of the State Service for the Protection of Cultural Heritage of the Astrakhan region No. 05-p dated 09.02.2017).



Narimanovsky	–	–	2	2	–
Privolzhsky district	–	–	1	1	–
Kharabalinsky	1	–	1	3	–
Chernoyarsky district	–	–	13	8	–
Total	44	4	601	86	39

The area urban development was concentrated in Astrakhan, this city combined the functions of a fortress, an administrative center, and a commercial port. The livable areas of the arid, poor soil region were clustered along rivers and associated with fishing and processing. The migration of population due to the seasonal nature of work and the almost total lack of local building materials hindered the construction of permanent buildings outside the center.

The main objects of the region's cultural heritage are concentrated in Astrakhan - monuments of the 16th – 20th centuries that belong to the very diverse cultures. Ethnic diversity, active trade, specific climatic conditions, and no destructions from the last war contributed to the formation of a unique image of the city.

In 1970, the State Committee for Construction and the Ministry of Culture of the RSFSR approved the Regulation on Historic Cities. Astrakhan was included in the list of 115 historic cities¹⁵⁰, it was supposed to preserve the historical component in the design of urban development plans.

Order of the Ministry of Culture of the Russian Federation, the Ministry of Regional Development of the Russian Federation, dated July 29, 2010 No. 418/339. "On approval of the list of historical settlements". Astrakhan was included in the list of 41 cities as one of the historical settlements of federal importance.

In accordance with Article 59 of the Federal Law "On cultural heritage sites (historical and cultural monuments) of folk of the Russian Federation" No. 73-FZ dated 25.06.2002, historical settlements include not only towns or parts of towns where cultural heritage sites are located, but also the elements considered protected cultural heritage sites. In light of this article regarding protection of the historic settlement, Astrakhan certainly corresponds to this status.

Almost all, if not all, valuable facilities are under state protection as cultural heritage sites. The list of monuments includes buildings and ensembles dating back to the Soviet era.

The boundaries, protection objects and requirements for the regime to maintain territories and urban planning regulations of the historic settlement have been developed to date, but not approved yet.

¹⁵⁰ Resolution of the State Committee of the RSFSR Council of Ministers on Construction, the collegium of the RSFSR Ministry of Culture No. 36 dated 31.07.1970 "On the approval of the list of towns and other settlements of the RSFSR possessing architectural ensembles and complexes, the monuments of national culture, and preserved natural landscapes and the ancient cultural layer that are of archaeological and historical value".

The developed borders include areas - historical places considered as landmarks, taken under protection by virtue of the above-mentioned decision of the head of the regional administration No: 230 "On taking objects of historical and cultural value under state protection":

1. (217) Posad (between the Kutum and Varvatsievsky Canal), XVIII - early XX century. Within the boundaries of the streets: 1st May Embankment St., Krasnaya Embankment St., Admiralteyskaya St., Pobedy St. (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
2. (218) Spit ("Kosa"), XIX - early XX century. Within the boundaries of the streets: Admiralteyskaya St., Krasnaya Embankment St., M. Gorky St., Anatoly Sergeyev St. (the Volga River Embankment), Molodezhny Avenue (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
3. (219) Admiralty Spit ("Kosa"), XVIII - early XX century. Within the boundaries of the streets: Privolzhskovo Zatona St., Molodezhny Avenue, Shchekin Ave., Babef St.
4. (220) Zakutumye, XIX - early XX century. Within the boundaries of the streets: Krasnaya Embankment St., Admiralteyskaya St., S. Perovskaya St., Kakhovsky St., Yu. Selensky St., Savushkin St., Bolda River (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
5. (221) Soldier's settlement, XIX - early XX century. Within the boundaries of the streets:
Kakhovsky St., S. Perovskaya St., Dalnevostochnaya St., K. Marx Ave.
6. (222) Armenian settlement, XVIII - early XX century. Within the boundaries of the streets: 1st May Embankment St., M. Jalil St., Epishin St., Darwin St.
7. (223) Tatar settlement, XVIII - early XX century. Within the boundaries of the streets: 1st May Embankment St., Volzhskaya St., Pleshcheev St., M. Jalil St.
8. (224) Bezrodnaya settlement, XIX - early XX century. Within the boundaries of the streets: Terebilovka, 1st May Embankment St., Volzhskaya St., K. Liebknecht St., Khabarovskaya St., Privolzhskovo Zatona St.
9. (225) Gorodoforpostinskaya (Atamanskaya) village 1785 - early XX century. Within the boundaries: Chugunov Ave., along the bank of the Volga River, K. Marx St., Kalinin Ave.
10. (226) Bazaar "Bolshie Isady", XVIII - early XX century. Within the boundaries: 1st May Embankment St., Krasnaya Embankment St., Pobedy St.
11. (227) Tatar Bazaar, XIX - early XX century. Within the boundaries of the streets: Privolzhskovo Zatona St., Square of Freedom, Kotovsky St., Boevaya St.
12. (228) City Orthodox cemetery XIX–XX centuries. Within the boundaries: S. Perovskaya St., bank of the Kutum River.



The following protected architectural and urban complexes are located within the boundaries of the territories listed:

229. Parobichebugornaya St. (Tobacco Market, Policeiskaya St.) XIX — early XX century, Kirov St., within the boundaries from Krasnaya Embankment St. to N. Ostrovsky St.
230. Channel of Varvakis Embankments, XIX — early XX century 1st May Embankment St.
231. Kutum riv. embankments XVIII — early XX centuries Krasnaya Embankment St.
232. Volga River Embankment XIX — early XX century M. Gorky St., Anatoly Sergeev St.
233. Prodolno-Volzhsкая St., XIX — early XX century Uritsky St.
234. Nikolskaya St., XIX — early XX century Nikolskaya St. (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
235. Second Kremlin Street (Kremlin Exit), XIX — early XX century, E. Pugachev St.
236. Karpinskaya St. XIX — early XX century Fioletovaya St.
237. Cossack St. XIX — early XX century. — Ulyanovikh St.
238. Bolshaya Demodovskaya, Birzhevaya, Plotinnaya Streets, XIX — early XX century — Sverdlov St.
239. Staro-Agaryanskaya St., XIX — early XX century, Admiralteyskaya St. within the boundaries from Nikolskaya St. to the Commercial Bridge. (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
240. Parakhodnaya St., 2nd half of XIX — early XX century., Admiralteyskaya St. within the boundaries from the Commercial Bridge to H. Barbusse St. (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).
241. Rozhdenstvenskaya St., XIX — early XX century, Kommunisticheskaya St. within the boundaries from Lenin St. to the Sapozhnikovsky bridge.
242. Sapozhnikovskaya St., XIX — early XX century, Kommunisticheskaya St. within the boundaries from the Sapozhnikovsky Bridge to Akademika Koroleva St.
243. Staro-Multanovskaya St., XIX — early XX century, Kuibyshev St.
244. Kazanskaya St., XIX — early XX century, Chekhov St.
245. Complex of residential and administrative buildings with V.I. Lenin Square, 1950s. Within the boundaries of Admiralteyskaya St., Oktyabrskaya St. Lenin, (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).



246. V.I. Lenin Square (former Admiralteyskaya Square), Lenin Square, within the boundaries: Admiralteyskaya St., Oktyabrskaya St., dwelling house — Admiralteyskaya St., 4 (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011), dwelling house — Admiralteyskaya St., 6 (as amended by the resolution of the Governor of Astrakhan region No. 71 dated 05.03.2011).

The Decree of the Department of State Protection of Cultural Heritage of Astrakhan region dated 23.10.2019 No. 020-P. approved the boundaries of the boundaries of cultural heritage sites and landmarks boundaries. Landmarks are the above historical places and historical and architectural complexes. Most of the architectural and urban complexes do not have graphic diagrams of the area boundaries.

The same decree contains a "Description of the regime of use of the areas of cultural heritage sites located in Astrakhan" which stipulates the following:

"In order to preserve the cultural heritage sites of Astrakhan, a regime of scientific restoration is stipulated in order to use the areas of the sites.

The scientific restoration regime provides for:

- ban to erect capital construction objects within the boundaries of the cultural heritage site area, to change, destroy the protected objects of the cultural heritage site, to disturb the dimensions and other technical features of the historical monument building that have been developed historically, to disturb the composition of buildings and features of the natural landscape compositionally related to the cultural heritage site;
- possibility to perform restoration works, conservation and adaptation of the cultural heritage site, improvement and landscaping of the territory in accordance with the procedure prescribed by current legislation on cultural heritage sites protection; museumification and exhibiting of the monument building, ensure the preservation of the traditional visual perception of the cultural heritage site from the main viewing points, ensure conservation measures for the cultural heritage site, its fire safety, and protection from dynamic effects; compliance with fire safety requirements;
- restoration of lost building elements, reconstruction of utility networks and access roads without violating the integrity of cultural heritage sites and creating no threat of damage, destruction or demolition.
- These regulations do not apply to the facilities specified in paragraphs 1.1, 1.46-1.61, 1.157-1.179. These objects require separate urban planning regulations.

In 2018, the State Autonomous Agency of Astrakhan region Scientific Research Institution "Nasledie" (Heritage) prepared "Draft standard architectural solutions of capital construction objects to be erected within the boundaries of the historical settlement of federal significance "City of Astrakhan".

In the course of preparation of draft standard architectural solutions for capital construction projects, the data from the diagrams contained in the General Plan of Astrakhan, approved by the decision No. 35 dated 16.04.2015 "On Amendments to the General Development Plan of Astrakhan until 2025, approved by the City Duma of "Astrakhan City" municipality No. 82 dated 19.07.2007", have been considered. The work was based on the draft protection zones for historical and cultural landmarks developed by the institute "Spetsproektrestavratsiya" in 1993



and on the draft protection zones for historical and cultural landmarks developed by ASNRPM "Restavtor" (approved by the resolution of the Mayor of Astrakhan No. 4184-m dated 28.08.2009, currently, it is under correction due to the amendments following the public hearings results by virtue of the Resolution of the Head of the Government No. 4603 dated 07.08.17).

Historic and cultural reference plans were developed for each entity, diagrams of potential construction and renovation schemes for each construction block, regulations for urban planning activities in the area, including restrictions on the height and width of the building have been provided, and the deviation from cultural heritage sites has been specified. In determining the parameters, the main focus was to preserve or restore the integrity of the historic districts rather than to preserve or emphasize the historic urban dominants.

For each territorial formation (historical sites and historical and architectural ensembles), based on archival and field studies, proposals for typical architectural solutions of capital construction have been made. Typical solutions are based on an analysis of the facades and decor of the cultural heritage sites and valuable building elements in the specific area. Drawings of some architectural details were presented.

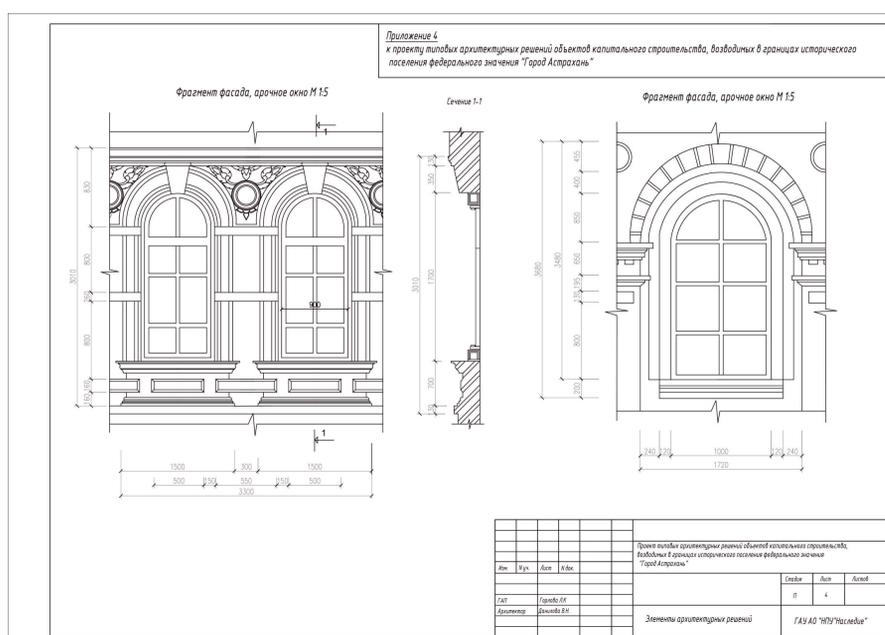


Fig. 269. Examples of typical solutions for the historical settlement

This work clarifies the places and details of new possible construction. This work based on an in-depth analysis of history and valid urban planning documents. From the architectural point of view, the main focus is given to designing facades by using historical style elements. Such a decision is based on modern legislation and documents of the Ministry of Culture of the Russian Federation. However, building in historic styles can lead to gradual replacement of authentic elements of the historical environment with their imitation. Moreover, the "urban fabric" will not receive elements reflecting modern building trends.

The main drawback of many prepared documents is the absence of a list of historically valuable urban elements as part of the historical settlement's protected elements. Accordingly, the problems of preservation of buildings representing the historical and town planning environment of the historic part of the city are not solved.

"The procedure for preparation and approval of urban planning project concerning the territory of the historical settlements of regional importance situated in Astrakhan region" is developed and approved by virtue of the Resolution of the Government of Astrakhan region on 22.01.2019 in accordance with the Law of Astrakhan region No. 66/2007-OZ dated 12.11.2007 "On certain issues of legal regulation of urban planning activities in Astrakhan region".

This resolution applies to the settlements in Astrakhan region, first of all to the settlements with the centers subject to state protection as landmarks of regional significance: Kapustin Yar, Cherny Yar and Krasny Yar.

Table 40. Places of interest of regional importance

District	Cultural heritage sites in the settlement	Place of interest of regional importance	photos
Akhtubinsky district	6	Historical and architectural complex of the historical center of Kapustin Yar village, Astrakhan region, Akhtubinsk district, Kapustin Yar village, Sovetskaya St. from Bogdan Khmel'nitsky St. to Oktyabrskaya St.	
Chernoyarsky district	5	The historical center of Cherny Yar, XVIII – early XX century, Astrakhan region, Chernoyarsky district, Cherny Yar village 50 let Oktyabrya St. Lenin St. Kirov St. Gagarin St.	





Krasnoyarsky district 4

Historical and architectural complex of the historical center of Krasny Yar village Astrakhan region, Krasnoyarsk district, Krasny Yar village: Sovetskaya St., General Tutarinov St., Molodezhnaya St.



The boundaries of the landmarks are not determined, valuable elements of historical buildings not covered by the state protection are not specified. The issue of whether the centers of the listed villages should be classified as historical settlements of regional significance has not been resolved.

2 cultural heritage sites of federal significance located on the territory of Astrakhan region should be specified. These are unique monuments of cult architecture of the first half of the XIX century. The boundaries of the cultural heritage sited are approved by the Decree of the Ministry of Culture of Astrakhan region No. 24-P dated 27.04.2015.

Trinity Cathedral, 1832-1840, architect I. I. Charlemagne, located in Enotaevsky district, Enotaevka village (Shkolnaya St., Leninskaya St.). There are 2 cultural heritage sites of regional significance and historical monuments (tombs) situated close to Lenin Street. Temporary zones for cultural heritage sites protection (protective zones) are located on the diagram of the General Plan of "Enotaevka Village" municipality — "The Diagram of Boundaries of Territories, Lands and Restrictions"¹⁵¹

¹⁵¹ <https://mo.astrobl.ru/seloenotaevka/>

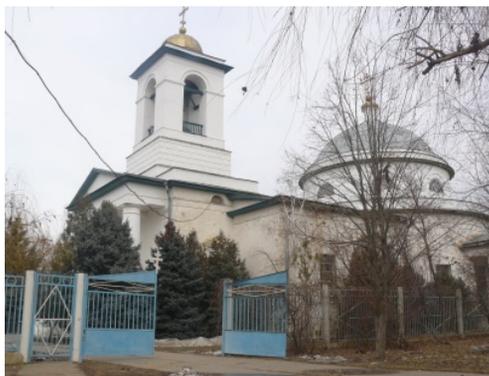


Kalmyk khurul, 1818 The temple was surrounded by several other religious buildings of suburgan and mani and servants' tents. All of these buildings formed the monasterial complex of Khosheutov Khurul. The chapel and the central tower have been preserved to this day. Only the area of the cultural heritage site is mapped on the General Plan diagrams of Rechnovsky Village Municipality. The protected zone is not marked¹⁵².

¹⁵² <https://mo.astrobl.ru/rechnovskijsejsovet/>



Enotaevsky district Trinity Cathedral, 1832-1840, architect I. I. Charlemagne, Enotaevsky district, Enotaevka village, Shkolnaya St., Leninskaya St. Monument
Monument of urban planning and architecture



Kharabalinsky district Kalmyk khurul, 1818, Kharabalinsky district, rural locality Rechnoye Monument
Monument of urban planning and architecture



"Tinaki" resort garden, end of the XIX — early XX centuries, Tinaki-1, right bank of the Volga River, Tinaki Mud Baths of the Welfare Board, end of the XIX century, 1900-1913. — Cultural heritage site of regional significance. The site is classified as a garden monument. This is the only this kind of monument in Astrakhan region. A special irrigation system was created to irrigate the garden.

Tinaki-1 is situated on the territory of "Solyansky Village Council" municipality in Narimanovsky district. This area is within the boundaries of the specially protected natural areas labeled as "Tinaki Lake Nature Monument" and "Tinaki Resort Dendropark Nature Monument" on the map of the municipality's settlements. Also, there are 3 icons on the General Plan diagrams: historical and cultural monuments and the boundaries of the historical and cultural monument¹⁵³.

The boundaries of the landmark have been approved by the Decree of the Department of State Protection of Cultural Heritage of the Astrakhan region dated 23.10.2019 No. 020-P.

¹⁵³ <https://narimanov.astrobl.ru/section/generalnye-planu>





Not preserved

The territory is located near the city of Astrakhan. The church building was handed over to the church members, and with allocation of the funds for its restoration.

On the territory of Limansky district next to Vyshka village, there is a cultural heritage site of regional importance "Lighthouse of the XVIII century" (probably built later). The lighthouse was built as a reference point for of the Volga-Caspian Navigation Channel fairway that connects the deep waters of the Bakhtemir River and the deep waters of the Caspian Sea through the shallow part of the Volga Delta in the late XIX century.



Lighthouse XVIII century, Astrakhan region, Limansky district, Vyshka village Monument of urban planning and architecture



Volga-Caspian Navigation Channel

The Astrakhan region is located at the ancient trade routes intersection that is why it is a very important region for archaeological research. The ancient history of Astrakhan region is determined by the connection of land and waterways, proximity to eastern countries, in couple with natural conditions favorable both for a settled and nomadic life. In ancient times, Huns, Cimmerians, Scythian-Sarmatians, then Pechenegs, Khazars, Kipchak-Cumans, Mongols, Tatars, and Russians dominated among the population of the Lower Volga region. Here was the center of the vast Khazar kingdom, the capital of the Golden Horde. In 1556, the Astrakhan Khanate was annexed to Russia.

There are only 120 archaeological monuments under state protection: for example, the archaeological complex "Selitrennoe Settlement" in the rural locality Selitrennoe, Kharabalinsky district. In the XIII-XV centuries here was the capital of the richest medieval state of the Golden Horde - Saray-Batu. The scientific started to research the monument in the XVIII century, and it has been studied up to this day. The items from the Selitrennoe settlement are included in the collections of the Astrakhan State United Historical and Architectural Museum-Reserve, the State Historical Museum, and the Hermitage.

The area of Astrakhan region is still understudied; any new construction can lead to archaeological discoveries, so it should start with the archaeologist's report.

Analysis of the historical and cultural value and the level of preservation of the historical context and its elements

Historical and urban planning environment

The construction of the central historical part of Astrakhan is quite well researched. However, a significant number of cultural heritage sites and components of the historical environment require conservation efforts. Among 560 registered cultural heritage sites, 52.41% is residential and 47.59% - non-residential. 12 sites are classified as dilapidated housing. In fact, the historical buildings preservation issue is more acute and involves two main factors:

1. Poor technical provision of the city central districts: lack of modern sewage, land water drainage. The lack of timely repairs and unauthorized redevelopment caused by the adaptation of housing to modern requirements lead the buildings to the emergency condition.

2. Astrakhan and the main settlements in the region were constructed from costly imported construction materials. Most of the buildings were built gradually, being expanded and improved as possible. In many ways, such a peculiarity of the ribbon building construction makes it difficult to carry out restoration and repair work.

Historical urban dominants

Astrakhan region suffered no damage during the Great Patriotic War, however, the losses of the Soviet period were quite significant. In January 1918, in Astrakhan, the battles between the Cossacks aligned with regular officers, and the Red Guards led by the Soviets had been taking place for two weeks. At first, the Kremlin was under fire, the Prechistenka Bell Tower, the Bishop's House, and the Assumption Cathedral were damaged.

The Russian Guest Court burned down in those days. The fire also took part of Moskovskaya Street adjacent to the Kremlin: the Repins' House, Bagirov's House, N.S. Shaverdova Gymnasium and the music store of the "Grammophone" society.

Later, the buildings destroyed by the fire were demolished, the Bagirov's House (now Sovetskaya St., 8) was rebuilt in 1918-1928 (architect V.M. Ananyev). The Gubernskiy Garden, renamed into the Bratskiy Garden, was expanded at the expense of the territory of the Russian Guest Court.

In the 1920s and 1970s, the following buildings were dismantled:

- Church of the Entry of Our Lord into Jerusalem (1703, 1800) was demolished in 1928, Sovetskaya St.
- Church of the Nativity of the Blessed Virgin (1709, 1722, 1758) was demolished in 1932. Pushkin's Square, the intersection of Soviet and Communist streets.
- The Church of St. Nicholas the Wonderworker (1721, 1755), the bell tower was lost in the 1920s, the church was demolished in 1971-1974. 3/4 Akhmatovskaya St.
- Church of the Exaltation of the Holy Cross (1734-1757, 1802) was demolished in 1930. The wasteland at the intersection of Kalinina and Natasha Kachuevskaya Streets.
- The Church of the Smolensk Icon of the Mother of God (1737, 1762, 1829, 1835) was demolished in 1930. Corner of Esplanadnaya St. and Shelgunov St., 30/10.
- Church of the Transfiguration in the Spaso-Preobrazhensky Monastery - seminary (XVIII century) was demolished in the 1930s. At the intersection of Kommunisticheskaya and Trusova Streets.
- Annunciation Monastery (corner of Sovetskaya St. and Kalinin St.):
- Annunciation Cathedral (1699);
- Church of St. John the Evangelist;
- Chapel of the icon of the Mother of God Life-giving Spring;
- Chapel of Nicholas the Wonderworker.
- The Armenian Assumption Cathedral (1730s). Destroyed in 1935. Round square at the end of Sovetskaya St.



- Completion of the Church of the Holy Sign-painter at 7 Lenin St.
- In 2010, the bell tower of the Annunciation Monastery was reconstructed based on old drawings and photographs.

The main historic urban dominant of the city - the Kremlin - has kept its importance in the city structure. The main Kremlin's canonical views in the city structure are revealed from the water area, from the island and opposite bank of the Volga River. New views due to the construction of the New Highway Bridge joined them.

Urban visual openings can be divided into 3 main types of inclusion of the Ensemble in urban views:

1. - from the area adjacent to the walls, a historical foothold turned into a system of squares;
2. — In the street viewpoint;
3. In buildings panoramas — by a silhouette — a kind of second plan or in a gap between the houses.

Dissonant building elements and missing elements of the plan

The cultural heritage sites include Soviet-era buildings, such as residential buildings of the 1920s and early 1930s that belonged to the Soviet avant-garde, administrative and residential buildings of the period of classical heritage in Soviet architecture (1930s-1950s). All buildings of these periods are distinguished by the high quality of architectural solutions and, in general, by the parameters comparable to the historical environment scale. At the same time, we should note the need for conservation and restoration of most of the buildings of the 1920s-1950s.

The relatively few buildings of the 1960s and 1980s, examples of the prefab construction, are among the dissonant elements of the area's development.

Significant transformations of the city historic fabric took place in the early XIX century. Such transformations were caused by the loss of entire neighborhoods of historic buildings and the construction of large-scale, brightly colored buildings. The planning and development of Anatoly Guzhvin Avenue and the Opera and Ballet Theater can be attributed to especially major urban planning activities. Despite the hypertrophied scale, the theater designed by Moscow architect and restorer A.M. Denisov was included in the panoramic views of the city.



APPENDIX 9. ANALYSIS OF THE TYPOLOGIES OF HISTORICAL BUILD-UP AREA AND THE PRINCIPLES OF THE VOLUMETRIC-SPATIAL ARRANGEMENT OF OBJECTS IN THE HISTORICAL ENVIRONMENT

Description of the main building typologies

In terms of typology, I propose to consider the development of the central districts of Astrakhan from three main points of view: historical (original) function, their architectural concept and reconstructive potential.

As for all historic cities and settlements, the central districts of Astrakhan are characterized by the quarterly formation of buildings based on the existing households boundaries. The plotting that has been historically formed and confirmed by capital buildings or firewalls is stable enough, despite the abolition of private ownership of land. The prevailing size of the plots largely determines the scale of the historical and urban planning environment and the distinctive features of the city's districts. The size of the plots is related to their place in the city structure and functional use.

As a rule, in Soviet times, the historical plotting was neglected during construction works. At first, this was due to the significant destruction caused by the urban battles in the first years after the revolution, and later - by increase in the scale of development.

The boundaries of historical estates determine the spatial build-up typology. In this regard, the typology of buildings and ensembles constructed before 1917 shall be considered separately from the Soviet-era buildings, most part of which also have historical and architectural value and covered by the state protection.

The functional typology is traditional: residential, commercial, public and industrial complexes or buildings.

Astrakhan development in the pre-revolutionary period

The **trade function** which largely determined the city development is the most varied. Capital buildings were constructed for trade, and this had an impact on the city planning.

The first developed and preserved stationary type is the town **national habitations** - trade mission (Moscow, Persia, India), which combined diplomatic, administrative, commercial, storage and dwelling (hotel) functions. In the habitations, the houses were distinguished by a perimeter composition of buildings, a peculiar multi-level space facing a closed courtyard, and the classical forms of facades which were later



acquired. Without any major changes, this type of development was adapted for new functions, including dwelling. However, in terms of its scale, location in the center structure, value, history, and attractiveness, it would be reasonable to place a hotel, artist workshops, or other socially significant function here.

The development of market trade led to the creation of trading complexes in different areas of the city and the construction of large commercial buildings. **Buildings of the markets** are large overlapping spaces with flexible planning. This is one of the most stable functions, and we believe it should remain so in the future.

Small-scale wholesale, special and retail trade required special trading and storage areas in the central densely populated areas of the city. One-story stone buildings along the red lines of **shop-and-warehouse** streets appeared. Driven by the trade function development in the city center, one-story buildings began growing more stories to accommodate counting rooms and hotels. Small volumes are naturally incorporated into the city. Warehouses and shops stand out by their architectural concept. Not all of them are used for their original purpose. If there is no need to preserve trade in these places, such buildings have significant potential to be turned into tourist agencies, information and exhibition centers, cafes, and stores.

In the late XIX - early XX centuries, comfortable **stores** with large showcases, and inside passages appeared in the White City and Kosa.

Massive commodity circulation, service of waterways and overland routes required the construction of special **office buildings and banks**. A unique building of the Stock Exchange was built in the Kosa territory. The buildings that met the new requirements were distinguished by the use of progressive methods of construction and original architectural design. The architecture of that time is distinguished by experiments and development of various modernist trends.

In some cases, the trade function displaced the residential function, and in some cases they coexisted. In the first place, the ground floors of residential buildings and hotels were used for stores.

The dwelling function is versatile and varies both in terms of the buildings and ensembles time of construction and in respect to the wealth and social status of the first owners. Additional research is needed to clarify the typology. The results of the conducted research show that the typologic affiliation was not always accurately determined when the buildings were given under governmental protection.

The complexes comprising two, as a rule, two-story buildings linked by an arched driveway with a gate have been placed under state protection as **city villas**. According to the composition, it is the main house and an outbuilding, but such designation might change over time. For example, a smaller house with a gable could be occupied by the owner, while a larger house was used for renting out apartments, or all the rooms were used as rental. This type of development easily adaptable to changing conditions outlines the development of the historic centers of most cities in the central part of Russia. Due to its flexibility and adaptability, it became so widespread and relatively well preserved.

Classic city villas with the main house along the red line and the hierarchical construction of the elements are less common. As in other cities, large estates were adapted to a public function.

Mansions of the late XIX and early XX centuries - comfortable detached houses with elaborate decor that reflect the time of construction, with compositional accents, towers, bay windows... The buildings are distinguished by the quality of construction materials, the exploitation of such buildings is not a problem in case they are used regularly and properly.

In the late XIX - early XX centuries, driven by the development of the Neo-Russian style, the wooden house with a mezzanine gets a more complex three-dimensional composition and decor. These are unique examples of author's houses.

1. Individual dwelling house. A wooden one-story house with 3-5 windows and a single pitched roof, hipped or with a small attic room is the most common outside the White City and Kosa. This type of development is the most vulnerable and endangered. In the composition of urban ensembles, it plays the role of a cohesive fabric, emphasizes the significance of urban dominants.

2. Rental houses. A common type of apartment building. The number of stories and materials used may vary.

In the Kosa and city center, you can find **4-5-storey rental houses** of the late XIX - early XX centuries, typical for the construction of that time and meeting all the comfort requirements. But unlike the houses built in other years, they were usually built within one or two small households and did not create significant parts of the territory.

Astrakhan is distinguished by two-story rental houses with open courtyard staircases, terraces, cook houses, and outbuildings in the courtyard. These houses may have been designed to be rented out to different tenants, or could also have been occupied by one family, later such houses were turned into communal apartment buildings. Most of this kind rental houses were not connected to the central sewerage system. The houses differ in the quality of architectural design and facade material, but still they belong to one functional type.

The residential houses often combined a residential function with trade or small craft production. A separate entrance from the street was necessary for stores, and window openings were eventually converted into shop windows.

Hotels are in between the trade and residential functions. Stores, offices and restaurants in their composition is much more organic than when such facilities are integrated in dwelling houses.

Apparently, large estates with gardens were quite uncommon in Astrakhan. The division of premises into embankments, streets, and public gardens was favorable. The preservation of galleries along the courtyard facade, the terraces facing the courtyard are typical for Astrakhan. The houses are built both in stone and wood, with cladding, stucco, open log or siding. The type is quite common, but the level of structural integrity may vary.



Public and government buildings

In the XVIII - XIX centuries, the original architectural concept was not peculiar to all types of buildings. The planning driven by functional requirements, the facades of administrative buildings, museums, gymnasiums, colleges, and hospitals typically repeat the tiered composition of rental houses of the second half of the XIX and early XIX centuries but differ by a larger scale. This refers to mainly unique buildings concentrated in the White City and evenly distributed throughout the rest of the historic center.

The **prison** built as a prison castle, is the only one in the city center that corresponds to the typology of Russian detention centers of the late XVIII - early XIX centuries.

Theater - the only one historical building of the theater that totally corresponds to the typology has been preserved. The function has been preserved and is now being developed.

Religious facilities of various denominations, monasteries and religious schools are among the unique buildings that play a special role in the city development plan.

Hospital Complex of the Welfare Board, 1825, Kubanskaya St., 1. It is located outside the historic settlement in the southern part of the city.

Public gardens and parks. There are small gardens in the city center - the Governor's, with a monument to Emperor Alexander II, the Police, Nikolayevsky, Podkremlevsky, and Tarasov Square. Beyond the city there were entertaining gardens with summer theaters, restaurants: "Arcadiya", "Otradnoe", "Cyclists' Park". The former peripheral parks are now located in the city limits and present varying degrees of preservation and improvement.

Industrial complexes and buildings

There are not many large historical industrial enterprises in the central part of the city.

The largest of them is the city power plant complex (1908-1916, Architect P.I. Korzhinsky, engineer I. Zaikovsky) on 36 Krasnaya Embankment St., on the historical territory of Posad.

Among large complexes, it is necessary to distinguish the Astrakhan Treasury Purification Warehouse (1898-1901, civil architect V. Gusev), located outside the planned boundaries of the historic settlement at the intersection of Akhsharumov and John Reed Streets. The cultural heritage site "Cyclists' Park" is nearby, and the hospital complex of the Welfare Board (1825, Kubanskaya St., 1) is a bit farther.

Ports located in the central parts of the city can be considered as industrial areas, however, their historical, cultural and reconstructive potential needs to be specially studied.

Development of Astrakhan in the 1920s-2000s.

Soviet-era buildings in the central part of the city are marked by residential houses, administrative buildings, and large stores.

Community centers were built a little farther away from the city center.

The Opera House, built in recent decades within the historic settlement, can be identified separately as a unique object.



The Soviet-era development consists of apartment buildings various in scale and architectural concepts.

Apartment buildings of the late 1920s and early 1930s were built within the boundaries of blocks with the lost development or in areas of historic estates where there were no capital buildings. The municipal department of the city was in charge of the construction. The buildings have different number of stories and architectural concepts. Some buildings fully follow the avant-garde trend of Soviet architecture, while others reveal the pre-revolutionary experience of their creators. Almost all of these buildings are protected by the government as cultural heritage sites.

Multi-apartment residential buildings of the late 1930s -1950s. These buildings are enlarged and have many stories, the monumental decoration in the wake of classical heritage and the postwar architecture is typical for them. In the central districts, the houses were located according to the historic red lines. In some projects, not always implemented in full, an intention to create comprehensive ensembles can be traced. Houses and ensembles constructed according to individual projects are protected by the government.

Large administrative buildings of the 1930-1950s; Such buildings represent the elements typical to architectural ensembles of that time, their architecture is consonant with the architecture of residential buildings.

The palaces of culture of the 1930s and 1950s are another type of Soviet-era development that had an impact on the city structure. Unlike the workers' clubs, the palaces are designed as a kind of symbiosis between a palace and a theater.

Houses, shopping malls, and administrative buildings peculiar to the prefab construction period are outside the historical typology. They are distinguished by the simplicity of volume construction and the enlarged scale of the structural elements.

A description of the advantages and disadvantages of each typology

Residential development. **Still operated rental, apartment houses,** stone mansions connected to the main utilities, which have retained their original function or have been re-equipped. Nothing threatens their preservation, and their preservation is not a high-priority task.

Single houses, elements of the city villas development, small rental houses built of wood or wood combined with brick fragments (mixed), not connected to the system of central sewage, rebuilt many times, may be lost if no preservation measures are taken. Even if we ignore their independent historical and cultural value, their loss will change the traditional perception pattern of urban dominants, the Astrakhan Kremlin, in the first place. Their preservation requires a comprehensive work that involves simultaneous engineering of the blocks or a series of adjacent blocks, restoration of existing cultural heritage sites and their adaptation for modern use, restoration repair of facades along with the reconstruction of historically valuable sites forming the city landscape and regeneration of the missing elements of the historical structure. In order to preserve the environment, the historic



residential function must be preserved and supplemented by hotels, service elements, museums, and showrooms.

Markets. Preservation of market trade in its former location, restoration of historic buildings and creation of new special trade facilities comparable to historic buildings in scale and furnished with modern equipment.

Adapted for modern purposes unused **industrial buildings, warehouse buildings** will yield a relatively quick return on investment, whereas their structure and quality of their materials provide for a variety of uses from public spaces to special residential areas.

The pre-trial detention facility that occupies the **prison building**, despite the succession of this function, is an alien element in the residential area located in close proximity to the central square and the Kremlin. In addition, the building value, a cultural heritage site of federal significance, cannot be fully perceived as the institution is of insular nature. The restoration and adaptation of the monument to accommodate a museum, community center, hotel, will create an extra point of attraction for the city tourists and residents and will improve the area.

Port territories. Revival of passenger water transport that assumes both large cruise routes and connection of Astrakhan with settlements and agglomeration zones. Creation of several passenger ports. Creation of an area for boat tours along the coast to extend the current embankment and to add public spaces to its new part.

Proposals for the fundamental zoning of Astrakhan territory

Requirements for site maintenance regimes and urban planning regulations in White City, Posad and Kosa are pending approval. These requirements have been considered in the description of the main zones. The zoning is based on the city tradition division and on the analysis of the traditional and urban environment preservation. Fundamentally, four main zones have been identified:

- The Kremlin.
- The city central part adjacent to the Kremlin: White City, Posad and Kosa.
- Parts of large settlements and Cossack villages with the traditional planning structure and building typology preserved.
- Protected natural landscape zone located on the island and on the opposite bank of the Volga River in relation to the old city.

Combined protective zone PZ

Preservation of historically valuable urban building elements.

Exceeding the height set for this zone, deviation from the traditional form of the roof and slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.



Demolition of temporary commercial and utility buildings and replacing them with movable facilities developed according to the city design code.

OZ-1 - territory adjacent to the Kremlin ensemble

Regeneration of the lost frontage along the red lines of the fragment of V. Trediakovsky St., fragments of Admiralteyskaya St., development of blocks limited by Uritsky St., Fioletov St., Pugachev St., Danton St., Enzelinskaya St. and the block limited by Maksim Gorky St. and Lieutenant Schmidt St. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and its slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-2 – White City Zone

Regeneration of the lost frontage along the red lines of Teatralny Lane (even side), the plot along the red line of Akhmatovskaya Street. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and its slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-3 is the northern part of the Posad historic settlement with a large concentration of cultural heritage sites and preserved historical and urban environment.

Regeneration of the lost frontage along the red lines of Sovetskoy Militsii St., Krasnaya Embankment St., Sverdlov St. and Molodaya Gvardiya St. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and its slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-4 regulation area, a fragment of the Posad southeastern part. A part of 1st May Embankment St. distinguished by a high concentration of cultural heritage sites and high level of preservation of the historical and urban environment.

Regeneration of the lost frontage along the red lines of the even side of Babushkina St. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°).



OZ-5 regulation area, a fragment of the Posad southeastern part shaped mainly by large-scale development of the Soviet era.

Regeneration of the lost frontage along the red lines of Shaumian St., Babushkina St. and Lenin St. Height limitation to 12 m from ground level to the eaves and 15 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and its slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-6 regulation area, a fragment of the Posad southeastern part shaped by multi-temporal and multi-scale development separated from the Kremlin by a complex of large residential buildings.

Regeneration of the lost fragment of the original historical environment of the part of the block between 1st May Embankment St. and the driveway parallel to Shaumian Square. Height limitation to 15 m from ground level to the eaves and 18-20 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and its slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-7 regulation area, the western part of Kosa with neighborhoods missing significant fragments of historic buildings.

Regeneration of the lost fragments of the original environment while preserving the views of the Kremlin ensemble dominant sites. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°). Exceeding this height, deviation from the traditional form of the roof and slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-8 regulation area, the northeastern part of Kosa with a large concentration of cultural heritage sites and the preservation of historical and urban environment.

Regeneration of the historical buildings elements within the parameters of the lost structures. The architectural solutions adopted for the buildings regeneration are subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites.

OZ-9 regulation area, the part of Kosa area shaped by two large residential buildings - dissonant elements of development that distort the silhouette of the city center.

Optimization of the architectural concept to reduce the negative impact of development.

OZ-10 regulation area, the territories of historical settlements occupied by individual residential buildings.

Regeneration of the historical buildings elements within the parameters of the lost structures. Height limitation to 8 m from ground level to the eaves and 10 m to the ridge of a roof with a traditional form of roofing (V-shaped or hip roof with a slope at 30-35°).

Special regulations on the use of territories and land plots, requirements for urban planning regulations within the boundaries of the zone of regulated housing development and economic activity - ZRHD

Preservation of historically valuable urban building elements:

- Exceeding the height set for this zone, deviation from the traditional form of the roof and slope angle is subject to urban planning analysis that includes a review of the parameters of the surrounding development and anticipated impact of the new structures on the valuable viewpoints on the cultural heritage sites;
- demolition of temporary commercial and utility buildings and replacing them with movable facilities developed according to the city design code.

Zone of regulated housing development and economic activity - ZRHD - a fragment of the city center missing its original planning structure and mostly formed by the buildings of the late XX - early XXI centuries.

Completion of the planning structure development considering the maintenance requirements for the cultural heritage site of regional significance "Garden of the passenger and goods pier of the steamship company "Kavkaz and Mercury", 2nd half of XIX — early XX century.

Limited new construction, taking into account the preservation of visual displays of the Kremlin ensemble's dominant landmarks. Height limitation to 15 m from ground level to the parapet of a flat roof or to the ridge of a pitched roof.

Special regulations on the use of territories and land plots, requirements for urban planning regulations within the protected natural landscape zone — PNLZ

Permission granted for:

- limited cutting of trees and shrubs to reveal view corridors to the cultural heritage site "Ensemble of the Astrakhan Kremlin" and to panoramas of the city center;
- installation of transport infrastructure facilities, stops for public transport and tourist buses, open flat ecoparking lots, arrangement of access roads;
- arrangement of water transport pier;
- creation of a network for cycling and walking paths that include pedestrian and cycle lanes with soft surfaces, wooden decking, and bridges for bicycles and pedestrians, including the ones on pile foundations;
- arrangement of observation, children's playgrounds, recreation areas, fences;



- laying of underground utilities, arrangement of engineering infrastructure facilities with subsequent recultivation of disturbed lands;
- sanitary cutting of trees and bushes;
- work on clearing bank slopes, the Volga River coastal reinforcement, installation of retaining walls and deepening of the bottom.

It is forbidden to:

- erect capital construction facilities;
- carry out any economic activity that disturbs the nature and appearance of the historic natural environment of cultural heritage sites, leads to pollution of the soil, air and water basins, or disturbance of the hydrological conditions (changes in the water table);
- disposal of production and consumption waste including the organization of landfills for household waste;
- laying of land and overhead utility lines, installation of mast designs including cellular towers;
- destruction of valuable green spaces;
- building of bonfires.



Table 41. The main types of development in Astrakhan

Residential	Commercial	Government, administrative	Public	Production
Private dwelling houses	National habitations	Administrative	Educational	Warehouses
				
	Markets		Charitable	Factory building
				
	Shops	Prison	Theaters	Power plant
				
Estates	Stores	Hospital	Museums	
				
Rental houses, 2nd half of XIX — early XX century.	Offices			
				
Dwelling house with shops	Banks			
				
Shop, hotel	Exchange			
				



**Apartment buildings of
1920s–1930s**



**Apartment buildings of
1930s–1950s**



Administrative



Palace of Culture



APPENDIX 10. PROPOSALS FOR TRACING THE ARCHITECTURAL ROUTE IN THE CITY OF ASTRAKHAN IN THE 1920S – 1950S.

Start of route at the Kremlin Bell Tower (intersection of V. Trediakovsky Str. and Sovetskaya Str.). Not all of the interesting Soviet period buildings are represented, not all of them fully fit into the stated framework and are placed under state protection. However, they are within walking distance and represent different stages in the development of architecture in the first half of the twentieth century.

1. A complex of residential buildings with shops on the ground floor, built in the early 1930s on the site of the building destroyed during the revolutionary battles (address: Sovetskaya Str. 2, 2/1, V. Trediakovsky Str., 7)



2. Soviet Square or Kirov Square. The square was rebuilt according to the design of architect A.M. Ananyev (1910-1988). Two flat symmetrical antiums have been built at the eastern end of the three-storey house (Bagirov House - Sovetskaya Street, 8/Chernyshevskogo Street, 7, Komsomolski Square). Opposite, on the site of the Men's Gymnasium, the Reidtanker Workers' House (1937-1942, Kirov Street, 20 /Chernyshevskogo Street, 3) was built. A monument to Kirov was erected in 1939 - a design by sculptor N.V. Tomsky (reapplication with some modifications).



3. House of the Municipal Building Department, 1927-1937, Sovetskaya Street, 11/Volodarskogo Street, 16 - cultural heritage object of regional significance.



4. Cultural and entertainment cinema complex "October" (former "Modern" with a winter garden, 1909, architect V. B. Waldovsky-Varganek, 1950, architect B.I. Chernyaev, 1970 "Astrakhangrazhdanproekt", architect A.I. Fedorchenko. Volodarskogo Str., 13, Molodaya Gvardiya Str.2, 16 Kommunisticheskaya Str., 16 - cultural heritage object of regional significance.



5. Russian Bank for Foreign Trade with Services, beginning of XX century — 1910, architect P.I. Balinskyi, since 1928 Astrakhan central library, since 1934 in the name of Krupskoi In 1987 a new volume was added to the building; Esplanadnaya Street, 14, cultural heritage object of regional significance.



6. Monument to Trusov, 1922. Architect P.I. Kotov. Alexander Yevdokimovich Trusov died on 13 April 1919 and a monument was unveiled on his grave on 28 August 1922. In the niche of the pedestal under the archway is a portrait of A.I. Trusov. A memorial plate is affixed under the niche.



7. Dwelling house of City welfare department, or the house of the first Soviet five-year-olds, 1928-1930. Architect N.N. Milovidov. A biological sewage treatment plant was provided at the house. Esplanadnaya Street, 36/Shelgunova Street, 9 /Molodaya Gvardiya Street, 15 - cultural heritage object of regional significance.



8. Monument to the sailors who died in 1919 and 1921, 1922. Astrakhan architect A.V. Nikolaev (1881–1949). Installed at the burial site of a military seamen's grave. The inscriptions on the memorial plates: "Here are buried the sailors of the Volga-Caspian war flotilla killed defending the city of Astrakhan in 1919-1921" and the words of S. M. Kirov, he said at a rally on 16 March 1919 at the funeral of the sailors: "Sleep well, glorious sons of the proletarian revolution. The act for which you have honestly laid down your heads will undoubtedly win. Police Garden, 2nd half. 19th - 20th centuries, the Sea Garden. Within the boundaries of Sovetskaya Street, Mikhail Aladyin Street, Molodaya Gvardiya Street, the wall of the former Annunciation nunnery - cultural heritage object of regional significance.

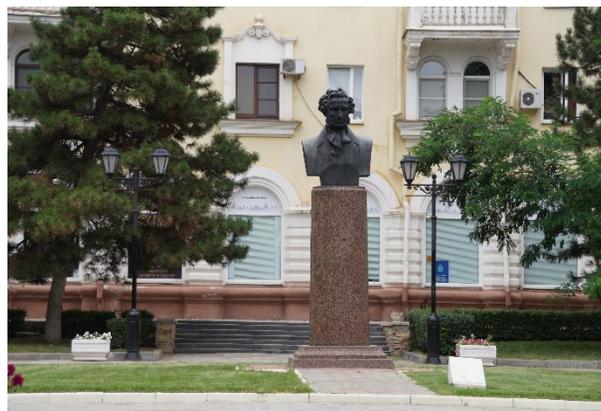


9. Residential home of the city's communal department, 1927–1937, arch. B.I. Chernyaev (1912-1992), Sovetskaya Street, 25/M. Aladyin Street, 10 - cultural heritage object of regional significance.



10. Apartment building with shop "Knigi", 1954

Architect A.M. Ananov (1910—1988). The architect lived in this house in the 1960s and 1980s. In front of the building there is a park in the name of A.S.Pushkin. The monument to the poet was executed by sculptor Z.I. Azgur.



11. Apartment building, 1930s. Babushkina street, 23 - cultural heritage object of regional significance; Lenina street, 24 - mid-20th century residential home.

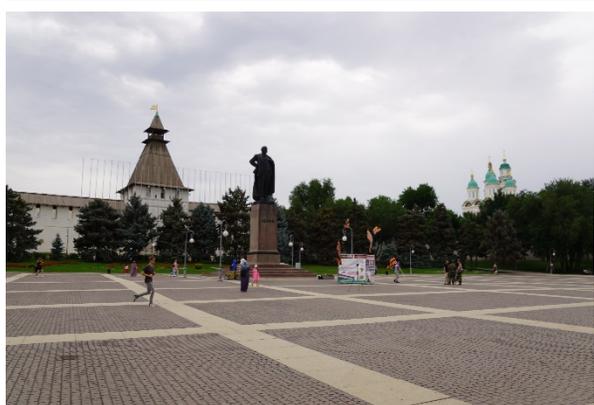


12. Apartment building, 1930s. Babushkina street, 23/Lenina street, 24 - cultural heritage object of regional significance.



13. Lenin square The square's layout was designed under the direction of the Astrakhan architect V. M. Ananyev (1910-1988). In 1958, a monument to Lenin was opened (Sculptor Z.I. Azgur, arch. V.M. Ananyev). The buildings were completed by 1959. Simultaneously with the organisation of the square under the direction of architect-restorer A.V. Vorobyov (1915-1993), the restoration of the Kremlin complex was begun. Complex of residential and administrative buildings with Lenin Square (former Mochazhnaya, Admiralteyskaya and Aleksandrovskaya), from the early 18th to the mid -20th centuries. Within the boundaries of the streets: Lenin Square 2, 4, 6, 8, 10, 12, 14, Admiralteyskaya Street 4, 6, 8, Trediakovsky Street 13, the southern walls of the Kremlin: Admiralteyskaya Street 4.

The apartment block complex - elements of an almost fully implemented blockhouse with a school and a kindergarten in the centre of the residential structure.



14. Administration building, 1937 Admiralteyskaya Street, 1/
Kostina Street cultural heritage object of regional significance. It is
located in the garden area.



End of the walk - Garden of the passenger and goods pier of the
steamship company "Kavkaz and Mercury", 2nd half of the 19th -
beginning of the 20th centuries. Park of 17th pier within the boundaries
of: Admiralteyskaya Street, Molodezhny Avenue, Volga Embankment,
Bulvarny Lane - cultural heritage object of regional significance.

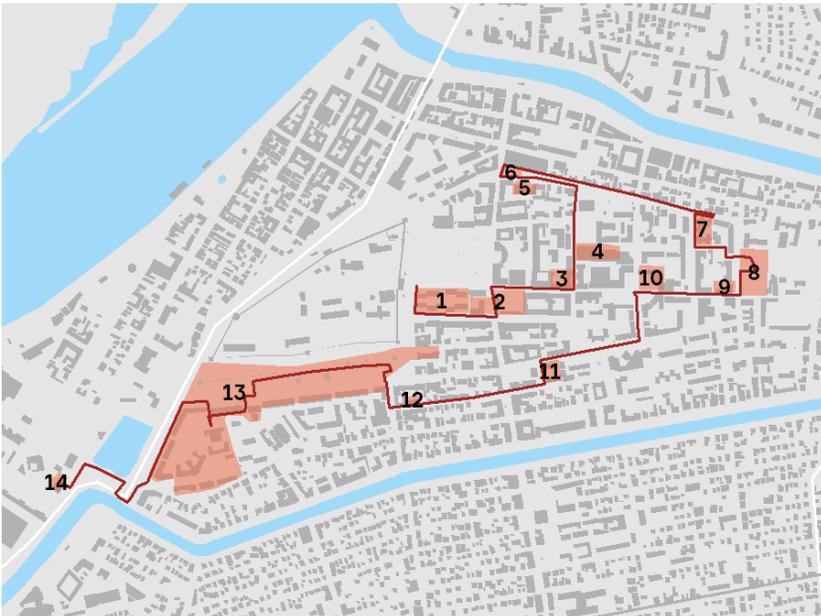


Fig. 270 Tracing the architectural route

APPENDIX 11. AN OVERVIEW OF PRACTICES IN DEALING WITH CULTURAL HERITAGE AND SYMBOLIC CAPITAL

Below we consider a number of trends relevant to the strategic objectives for Astrakhan region and city of Astrakhan, grouped into the following thematic blocks:

- programmes for the comprehensive revitalisation and regeneration of historic city centres;
- strategies for preserving the integrity and authenticity of the historical environment;
- institutional mechanisms in the development of socio-cultural projects based on local identity;
- promoting cultural and symbolic resources through interdisciplinary projects;
- archaeological and ethnographic tourism.

Many projects have been awarded the European Union Prize for Cultural Heritage / Europa Nostra Awards for the preservation and promotion of cultural heritage.

1. Programmes for the comprehensive revitalisation and regeneration of historic city centres¹⁵⁴

The following examples of heritage conservation, introduction of economic incentive mechanisms and phased implementation of regeneration/revitalisation measures have been selected for comprehensive sustainable development as a Historic Settlement of Federal Importance and to improve the image of the cultural capital of the Caspian Sea region.

Regeneration (from Latin). In the context of the historic urban environment - actions aimed at restoring, recreating, replenishing partially or completely lost elements and/or characteristics of the historical and urban and/or natural environment¹⁵⁵.

¹⁵⁴ References to the photo images used:

<http://www.architekt-weishaupt.de/sanierungs-projekte/leipzig-czermaks-sw6/>
<https://www.gdansk.pl/wiadomosci/dolne-miasto-i-stare-przedmiescie-odkrywane-na-nowo,a,83836>
<https://redeveloper.ru/articles/iz-rossii-s-re-irkutsk.htm>
<https://www.irkutsk.ru/allnews/12-social/16241-proekt-irkutskie-kvartaly-priznali-unikalnym>
<https://hraniteli-nasledia.com/articles/person/elena-peretyagina/elena-peretyagina-istoricheskoe-poselenie-ukrepit-oboronu-tomska/>

Clause 9 of the Regulation on buffer zones of heritage sites (historical and cultural monuments) of the peoples of the Russian Federation, approved by Resolution No. 972 of the Government of the Russian Federation of 12.09.2015.

¹⁵⁵ Clause 9 of the Regulation on buffer zones of heritage sites (historical and cultural monuments) of the peoples of the Russian Federation, approved by Resolution No. 972 of the Government of the Russian Federation of 12.09.2015.



Revitalisation (from Latin re - renewal, vita - life, literally: return to life) - increasing the functional significance by restoring lost or developing new non-destructive public functions.

Architectural heritage conservation in a housing development program, Leipzig, Germany¹⁵⁶

Leipzig is the largest city in Saxony and the 8th largest in Germany, with a population of over 560,000. And it is an economic, cultural, scientific and transport-logistics centre.

The historic environment of the city has a rich architectural heritage from the late 19th century. At the same time, since 1990, 3/4 of the residential stock has been abandoned. The current Urban Housing Development Plan consists of preserving buildings and quarters from the end of the 19th century (Gründerzeit period). The plan combines spatial and structural development strategies, redevelopment activities with redevelopment while preserving the original facilities.

The Leipzig Haushalten association was established in 2004 to implement the program, which cooperates with private initiatives and uses new approaches alongside traditional land use regulation, such as property consultation for homeowners, lease agreements, agreements with owners to create temporary public spaces on private property, etc.

The strategy of bringing owners and tenants together to reuse buildings is based on the Wächterhäuser scheme, which literally means "Keeper of the House", and is an initiative of the Leipzig HausHalten association.

The process of renovation or simple refurbishment is often uneconomical for owners, in which case the association looks for the potential to use these premises outside the normal rental market - by people looking for affordable accommodation and jobs, such as creative individuals with a request for small spaces and low rental rates.

The basic principle of the Wächterhäuser strategy is conservation through use. Users become 'guardians of the home'. Their presence helps prevent vandalism, limits weather damage and ensures general maintenance. Users take responsibility for the maintenance costs and repairs of the property. In most cases, landlords allow tenants to move in without paying rent. In this way, owners benefit from avoiding running costs and worrying about the day-to-day maintenance of the property.

The legal basis for Wächterhäuser is the agreement made between the house owner and the HausHalten association. This agreement specifies the rights of use that the association assumes from 5 to 10 years.

Similar projects operate in other German cities as well, e.g. in Chemnitz, the Agentur StadtWohnen Chemnitz agency was established to preserve and sustainably develop disused historic apartment buildings¹⁵⁷. Such institutions work outside the formal structure of the city government, but in direct liaison with the departments of urban planning, economy and finance, heritage conservation, housing and utilities, with non-commercial organizations, and social and cultural associations.



¹⁵⁶ http://www.haushalten.org/de/english_summary.asp
<http://remakingthecity.urbact.eu/guardian-houses-leipzig-germany--32.case>

¹⁵⁷ <http://remakingthecity.urbact.eu/public-consulting-agency-chemnitz-germany--40.case>

Based on the results of the implementation of this strategy, 7 steps can be identified as a step-by-step implementation:

- defining a list of priority sites;
- object data analysis;
- communication with property owners, clarifying their plans;
- if the owners agree, publishing information about the facility on the information portal;
- organising the presentation of the facility to interested parties;
- introducing potential tenants to the owner;
- GR-support of the project for coordination with municipal departments and other parties.

All of the agency's services listed are free of charge for owners and investors.

Revitalisation of Dolne Miasto, Gdańsk, Poland¹⁵⁸.

Gdańsk is the 6th most populous city in Northern Poland (470,907 inhabitants), a major port and industrial centre (shipbuilding, ship repair). Together with the neighbouring towns it forms the agglomeration of Tri-City with a total population of 747,637 inhabitants.

The Comprehensive Revitalisation Plan was adopted by the Gdańsk City Council in 2004 and provides a legislative framework for work in the Dolne Miasto area.

Dolne Miasto is a Lower Town consisting predominantly of apartment buildings. It is the only historic district in the city centre that was not destroyed during the Second World War. The development of industry in the 19th century had a significant impact on its appearance. Today, the area is experiencing a number of social, economic and infrastructural problems.



¹⁵⁸ Urbact Project Result, 2011 —
https://urbact.eu/sites/default/files/import/general_library/Rapport_Urbact_II.pdf
<https://www.unitearchitecture.com/post/symbiotic-city>



The revitalisation plan covers 3 areas from 2008 to 2025:

- buildings and infrastructure;
- local economy;
- the social life of the district.

Working with the sites involves preserving them and adapting them for office and retail space on the ground floors to activate the first pedestrian street frontage. The idea of the project, 'a neighbourhood for leisurely living and comfortable pedestrian accessibility of services', aims to increase jobs for local residents and boost the local economy.

The pilot initiative of the revitalisation strategy was a participatory design based on non-governmental youth associations. As a result, an advisory group was formed on the basis of the Youth Forum of a local university.

Loans have been made available to property owners from the central government to begin the process of revitalising the environment, covering the rehabilitation of historic buildings as well as the construction of new ones on vacant land. However, the money only applied to residential property.

It is noteworthy that the coordinating body was the City Museum and Cultural Heritage Department of the City Administration on the one hand, and the Residents' Council on the other. In doing so, the Urban Planning Department acted as an intermediary between the two parties.



Irkutsk Historical Centre Regeneration Project, Irkutsk Region

Irkutsk Historical Centre Regeneration Project, Irkutsk Region.

A phased regeneration project that began in 2009 with the revitalisation of quarter No. 130 (within the boundaries of 3rd July, Sedov, and Kozhov streets) as a pilot in preparation for the 350th anniversary of the city, and is now continuing as part of 'Irkutsk squares'.



The initiator of the project, the Irkutsk City Administration, developed the concept with the help of the leading design organisation, OAO "Irkutskgrazhdanproekt". Based on the concept, 42 lots were formed, and for each lot an investor was identified, who in turn identified the contractors for the project through a closed tender.

The pilot project envisaged a mixed-use system with a harmonious combination of functions from housing to offices for efficient use throughout the day. In addition to the objective of evenly distributed land use, the problems of accessibility and connectivity, permeability with the creation of a comfortable pedestrian environment along the perimeter and within the planning area, were solved.

Characteristics of the area: area of approximately 5.7 hectares, beginning of construction in the mid-18th century.

The volume of investment is 3.2 billion roubles. The project was implemented based on the PPP model, where 10% were budgetary funds (federal budget funds were used for resettlement from the emergency housing stock, municipal budget funds were used to provide the area with utilities) and 90% were private funds (big business funds were invested in the development of underground space, while other investors' funds were used for reconstruction and restoration of real

estate). The project was managed by the Foundation "Irkutsk Sloboda", set up specifically for the project.

Key success factors:

- preservation of architectural heritage, with particular attention to wooden architecture;
- establishing a balance between the interests of residents, businesses and authorities in the development of the area;
- creation of a unique architectural and landscape complex "Irkutsk Sloboda".

It is important to note that from a socio-cultural point of view, the project is primarily focused on meeting the needs of Irkutsk residents for various services, which is a factor in the integrated development of the area.



The territory of the 130th quarter is densely adjoined by the next phase, the Irkutsk Quarters project, which covers an area of 80 hectares. Eleven quarters of Irkutsk, bounded by Sedov Street, Timiryazeva Street, Karl Liebknecht Street, Gornaya Street, Podgornaya Street to the border with the Jerusalem complex and Kommunarov Street, are united into a single public space.

The project concept proposes infusing quarters with new activities where the city's historical heritage provides a competitive advantage and identity.

In October 2015, Irkutsk Quarters ANCO was established to support the historical centre regeneration project. The organisation's activities should ensure a uniform concept among the owners of existing, under-construction and renovation projects.

In 3 years, 14 facilities have been completed, 12 are under construction, 19 are under design, 11 are under urban with a total area of 97,126 m² and 35 new establishments have been opened. Work on cultural programming has begun. An organisational and activity game and a design thinking laboratory were held.

In 2017 Irkutsk Quarters ANCO initiated and organised the campaign Fasadnik¹⁵⁹. The Fasadnik involves the organisation of work to tidy up properties (including cultural heritage sites) - facades, fences and yards, involving citizens, residents and property owners, and representatives of city organisations. During the campaign, the facades and fences of 42 houses were painted over a two-month period. In 2018, the campaign became a city-wide event. A total of 73 houses have been tidied up.

The project won the PROESTATE&TOBY Awards in 2019. A year earlier, for this project, Irkutsk was awarded the Golden Badge for the first time in the Cities of Russia category of the Zodchestvo international architectural festival.

¹⁵⁹ <https://fasadnik.org/>



Tomsk practice: Preservation of monument houses¹⁶⁰

.In Tomsk, work to involve private businesses in the restoration of cultural heritage began in 2016. The impetus for this work was the presence of a significant number of resettled wooden buildings of historical and architectural value in the historical centre.

The new system involves leasing facilities to investors on favourable terms for 49 years. Tenant investors are required to rehabilitate the facility according to specifications.

Preservation, repair and reconstruction works on the leased property are carried out in accordance with the project documentation for the works prepared on the basis of the technical assignment (for wooden architecture objects the technical assignment is an appendix to the lease agreement, for cultural heritage objects it is issued by the Committee for Cultural Heritage Protection of Tomsk Region).

The deadline within which conservation, repair and reconstruction work must be carried out on leased properties is 5 years. However, tenants are interested in shortening this period.

After signing the lease agreement, the tenant pays a rent of 100% of the value determined by the tender for the property, but enjoys a concessionary rent for the land plot (0.001% of the cadastral value of the land plot) for 2 years from the signing of the lease agreement. Once the design documents have been developed and approved, the cost of renting the building is reduced to 10% and the land benefit is extended for another 2 years. Once the renovation work has been completed and the facility has been handed over, the land benefit (0.001% of the cadastral value of the land) is extended for the remainder of the lease term, and the rent for the building is set at a purely nominal fee of 1 RUB per year.

The Regulation on the establishment of concessionary rent and its amount in relation to the objects of cultural heritage (historical and cultural monuments) and objects of wooden architecture owned by the municipal entity "City of Tomsk" shall apply to the objects of cultural heritage included in the Unified State Register of Cultural Heritage Objects or identified objects of cultural heritage to be preserved, as well as to the objects of wooden architecture included in the list of objects of wooden architecture in accordance with the Decision No. 944 of State Duma of the Federal Assembly of the Russian Federation of 04.02.2014 "On establishment of a special legal regime in respect of the objects of wooden architecture owned by the municipal entity "City of Tomsk".

To date, 11 emergency wooden buildings have been leased under the scheme, five of which are already undergoing renovation work, and design documents are being prepared for the others.

The official website of the city administration has a section with information on each site - <http://torgi.admin.tomsk.ru/history>

¹⁶⁰ <https://hraniteli-nasledia.com/articles/person/elena-peretyagina/elena-peretyagina-istoricheskoe-poselenie-ukrepit-oboronu-tomska/>
<http://torgi.admin.tomsk.ru/content/%D0%BA%D1%80%D0%B0%D1%82%D0%BA%D0%BE-%D0%BE-%D0%BF%D1%80%D0%BE%D0%B3%D1%80%D0%B0%D0%BC%D0%BC%D0%B5-%C2%AB%D0%B0%D1%80%D0%B5%D0%BD%D0%B4%D0%B0-%D0%B7%D0%B0-1-%D1%80%D1%83%D0%B1%D0%BB%D1%8C%C2%BB>



Trends recommended for use:

- preserving the unique characteristics of the historical environment by adapting to contemporary use with a harmonious balance of functions;
- developing community initiatives and supporting participatory practices;
- the public authority as coordinator of the process of revitalising the historical environment (setting goals, direct funding and indirect incentives) and the individual association/development institute as project operator and catalyst for attracting investment;
- development of the institutional environment with regard to the regulation of volumetric and spatial characteristics of territorial development in the application of various forms of public-private partnership;
- Prioritising the inclusion of quarters in the conservation and development program, selecting a pilot site/first phase to start a comprehensive regeneration project and testing the methodological approach;
- open public dialogue and advisory support for owners, users and potential investors.

2. Strategies for preserving the integrity and authenticity of the historical environment

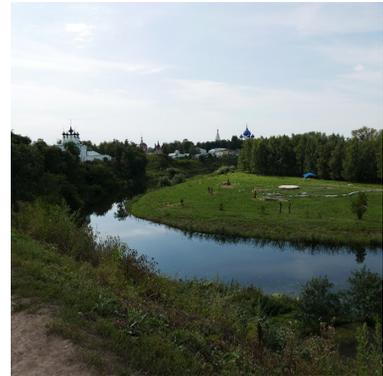
There are two main directions, two types of urban heritage conservation - integrated conservation or regeneration of lost buildings, aimed at the development of tourism or the preservation of traditional ways of life of settlements. Often these directions are developed in parallel.

2.1. Comprehensive conservation¹⁶¹

Conservation and development of the historical settlement Suzdal, Vladimir Region

In order to comprehensively conserve the historical urban fabric of Suzdal, a Master Plan for the city was drawn up in 1965-1967 and implemented until the end of the 1980s. The document was based on the priority of conservation of the cultural heritage and suggested ways of displaying monuments as part of the Suzdal tourist centre that was being formed. The most valuable objects of the city were handed over to the Vladimir-Suzdal Museum-Reserve. The Museum of Wooden Masterpieces was set up on the site of the Dmitrov Church, which was lost in the 1930s.

A tourist complex was built to accommodate visitors to the city (1970s, arch. M.A. Orlov, Yu.V. Raninsky and others) placed within walking distance of the main architectural ensembles of the city, taking into account the conservation of valuable urban panoramas. The complex was designed in the forms of modern architecture, but using traditional materials and incorporating works of arts and crafts into the structure. The variety and thoughtfulness of the landscaping of the complex draws attention. In the 1980s, a tourist-hotel complex was built on the grounds of Pokrovsky monastery. Some rooms were housed in specially built stylised huts (now the monastery cells).



¹⁶¹ All the photo images in the subsection belong to I.V. Krymova.

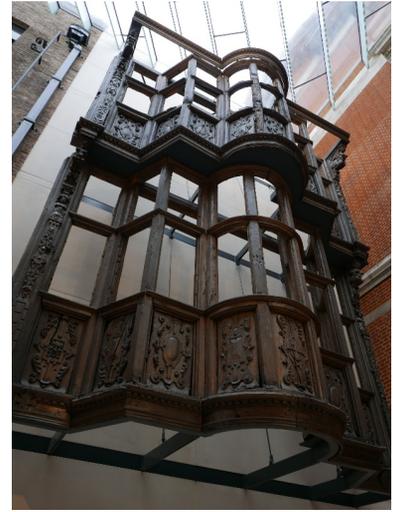


In Suzdal, as in Astrakhan, there is the problem of conserving wooden buildings. The Museum of Wooden Architecture in Suzdal was created, one of many being set up across the country at that time, to conserve the monuments found in the villages and hamlets of the Vladimir Region. The buildings have been stripped, moved, reassembled, restored and compiled into a composition that mimics the layout of the village. This is purely a museum technique that has nothing to do with the conservation of the historical and urban environment. It should be noted that the location of the museum is very well chosen.

For the urban environment, a combination of techniques can be used - moving single, valuable buildings from areas of significant loss to replace lost buildings in an area of good historic preservation.

Musefication of elements of identity

The option of conserving individual architectural elements in permanent exhibition is possible. To give you an example, here is the new exhibition at the Victoria and Alberts Museum. In 1890, during the demolition of Sir Paul Pindar's House (1666), the facade was declared an architectural rarity and given to the V&A. In 2009 the facade was studied, restored and moved to the new Medieval and Renaissance galleries. This last opportunity to preserve valuable wooden fragments should be used during deconstruction that could not be left in place.



"I Sassi di Matera" - the historic centre of Matera, Basilicata, Italy

Matera is partly referred to as the "stone town" because of its preserved morphology and distinctive architectural features integrated into the surrounding landscape.

The historic quarter of Sassi (Matera - Basilicata Italia) was a densely populated area until the mid-twentieth century. The number of families living in unhygienic conditions, with no sewage system and poor hygiene. As a result of the resettlement process in 1952, the cave entrances were walled up and the area became uninhabited.

In 1986 the restoration of the Stone City began, one of the largest cultural landscape restoration projects in the Mediterranean. The Sassi district became a UNESCO site in 1993.

The comprehensive revitalisation project included 4 basic themes, each consisting of a seasonal series of events:

- "Ancient Future" - aims to rethink the evolution of the city's development;
- "Continuity" - aims at sustainable development;
- "Reflecting interconnections" - aims to develop the city in the concept of "slow life" and to strengthen the role of scientific research in urban development planning;
- "Utopias and dystopias" - aims to test innovative urban solutions through the development of design thinking, foresight sessions and interdisciplinary dialogue;
- "Heritage Routes" - aims to improve the connectivity of major attractions and urban mobility.

The city became the European Capital of Culture in 2019. This status has promoted the development of rental property market, acquiring sites for restaurants, hotels, art galleries and residences.



The pragmatic use is almost exclusively related to catering for tourists, but the city is gradually developing and technical problems comparable in complexity to those of the centre of Astrakhan have been overcome.

Development of traditional architecture in the historic town of Alberobello, Puglia, Italy

The city is famous for its unique white-stone buildings - the trulli. The buildings usually have pyramidal, domed or conical roofs made of limestone slabs with ledges. Today Alberobello is the only town in the world where entire quarters with trulli have been preserved. This type of structure was completed only in 1925. The last building, an exception of sorts, was the Church of St Anthony (Chiesa Sant'Antonio, Via Monte San Michele), built between 1926 and 1927 at the expense from donations. The commune has been a UNESCO World Heritage Site since 1996.



The UNESCO Site Management Plan was adopted in 2011. It considers future strategies and actions to conserve integrity, balance preservation and development. Part of the Plan is a mechanism to convert heritage sites into hotel rooms, tourist offices, centres and souvenir shops.

Within the framework of studies it is important not to build in the old ways, which made the surviving buildings unique, and to organise hotels with administrative services in separate houses.

2.2. Restoration or regeneration of lost historic buildings

Historic town centre of Poznan, Poland

The historic town centre lost significant fragments of the urban fabric at the end of the Second World War, as did many European cities. Today, the market square is a combination of restored, reconstructed fragments and fragments that can be defined as reclaimed. In this case, the location, scale and shape of the roofs were regulated, but not the material and details of the style.



"New Old Town", Frankfurt am Main, Germany

In January 2008, Lederer Ragnarsdóttir Oei Architects (Stuttgart) won the international competition to build the museum. Two new buildings form the museum square. Their facades are made of sandstone, basalt and natural plaster, and their gable roofs are covered with natural slate. The traditional materials of historic Frankfurt are complemented by sculptures from the facades of lost houses and from the city's gardens. Without addressing the merits of the museum, we would like to point out the modernity of its form and the cleverness of its structure, with significant portions of the permanently accessible museum exhibition - sculptural fragments on the walls and the results of archaeological work.



The social movement "Citizens for Frankfurt" did much to 'revive' the old city, which had been destroyed by the 1944 bombing. Before the war, the attitude to old buildings in the city centre were ambiguous; they did not meet modern hygiene standards, were difficult to repair and were gradually replaced by new buildings. At the same time, the old buildings were surveyed and measured, just as in the Soviet Union architectural



monuments were surveyed and measured before they were demolished.

The value of the authentic elements was realised after the loss of the historic centre. Fragments of the buildings have been preserved in the museum's storerooms. The destruction was such that Frankfurt went the way of conserving the surviving buildings and new modern construction in free lands.. Thus new objects appeared on Market Square next to the old ones, fixing the historical boundaries of the square.

"Die neue Frankfurter Altstadt" has been recreated on the site of the demolished 1970s town hall building in the last decade. The work was carried out in a long and Germanic way, based on historical archival material. The commercial premises and the incredibly expensive flats were bought out in advance.

If we compare the recreated elements with old photographs, we can once again see that a complete recreation is impossible. Comparing the old and new photos, we see a historic, multi-layered city in the former, and a colourful mock-up in the latter. At the same time, the "new old town" is a successful commercial project, associated with remembering the pre-war past and overcoming difficult moments in history. It shows that modern life can be fitted into an old, high-density structure.



These requirements apply in all cases, but we would like to focus on the phrase "New Frankfurt", which is more familiar and has nothing to do with the old city. The residential areas of the 1920s emerged to overcome the shortage of affordable housing for workers as a contrast to the old city in the new territories on the outskirts. The districts have survived, remain residential and are considered reasonably comfortable with a variety of housing forms. Moreover, certain types of housing are reproduced in contemporary forms.



Similarly, the buildings of the Soviet avant-garde period in Astrakhan, located in the city centre, are for the most part placed under state protection. It should be a question of timely conservation work on valuable elements and the repair of engineering equipment. The workers' settlements on the outskirts of Astrakhan and the 1930s-1960s clubs and other public buildings in the settlements within the agglomeration as a whole also require attention.

Project for the adaptation and restoration of the Bauhaus building, Dessau, Germany

In Astrakhan, there are many remaining Soviet-era monuments and valuable buildings that also need conservatio.

It is worth referring to one of the first experiences of conservation in the 1920s, which stretched over several decades. This is a concept for the restoration and adaptation of the Bauhaus building and Walter Gropius's master (lead teacher) houses in Dessau, developed together with the client (Wüstenroth Foundation), the owner - City of Dessau, the conservation authorities and the architects, in cooperation with a scientific council appointed by the Wüstenroth Foundation.

The following requirements have been developed for the adaptation and restoration project:

- the building had to be brought into working order in terms of structural reliability;
- the original material substance and texture of the surfaces had to be conserved and fixed;

- The restoration of an authentic building had to include the conservation of later layers as well;
- adapting the building to modern functional requirements must not disturb the original image;
- the building can be supplemented with elements of modern design.

2.3. Redevelopment of industrial areas



There is a wealth of experience in adapting industrial buildings for modern use. It doesn't matter how old the building is, it's the characteristics of the space and the distinctive industrial aesthetic that count. Reference is made to this experience in connection with the need to restore and adapt the disused power plant complex (23/1 Volodarskogo St.).

For example is the Museum of Ancient Sculpture in Rome (Via Ostiense, 106), where the former thermal power plant Centraie Montemartini, situated on the banks of the Tiber, has found new use while retaining elements of its original function, having been refurbished several times but closed down as a result.

In Moscow, a successful example is the Vinzavod centre for contemporary art, which is based on the conservation of most of the buildings on the site and the careful treatment of historic spaces. The location of the centre in the disadvantaged area behind Kursk railway station led to the transformation of the entire neighbourhood, the creation of the ARTPLAY Design Centre and the ARMA business quarter.



2.4. New construction in the rural areas of the agglomeration

The use of traditional materials and construction techniques. For the Astrakhan Region - the use of reeds. For example - the thatched roofs of single-storey houses in the Dutch resort areas



Trends recommended for use:

- application of combined methods for the conservation of the historical and urban environment, prioritising the conservation of unique elements and fragments without radical transformation;
- conservation of properties from the 19th century and earlier, as well as buildings from the early 20th century and the 1930s-1960s, reflecting a particular stage in the history of the city;
- the adaptation of facilities for commercial, service and cultural/educational functions;
- rejection of stylisation in new construction in the historic environment;
- the regulation of the main parameters of the development in terms of location features on the site, scale, roof shape, length of the facade;
- the use of local finishing materials.

3. Institutional mechanisms in the development of socio-cultural projects based on local identity¹⁶²

In order to create a comfortable sociocultural space on the basis of Astrakhan traditions (the concept of "Astrakhanskost"), develop human capital and public institutions of the region, including the system of branches of the Astrakhan State United Historical and Architectural Museum-Reserve, the following examples were selected to conserve the style and character of historical everyday life in the Astrakhan thematic areas and to introduce institutional mechanisms for working with owners and users of historical objects.

**Project "Adopt a Monument", Tampere, Finland¹⁶³**

This grassroots project, facilitated by the Pirkanmaa Museum of Natural History, which is museum centre in Tampere, encourages citizens to 'appropriate' monuments of cultural and historical significance in their environment, care for them and adapt them for modern use.

"Adopt a monument" is a creative way to actively involve local people in the care and conservation of local heritage. The project is implemented by volunteers with the support of the museum community and professional experts in heritage and conservation on a public-private funding basis.

The project won the European Union Prize for Cultural Heritage/Europa Nostra Awards in 2016. As the best project in the category "Education, Training and Awareness Raising".

**Program for owners of historic properties, Tallinn, Estonia¹⁶⁴**

An educational program for owners of old rural buildings throughout the country was initiated by the Estonian Open Air Museum in 2008. Since

¹⁶² Links to photo images used:

<https://www.coe.int/en/web/culture-and-heritage/-/adopt-a-monument>

<https://www.facebook.com/EvmMaaarhitektuur/photos>

<https://www.guiding-architects.net/graz-european-cultural-city-2020/>

<https://theculturetrip.com/north-america/usa/california/articles/must-see-neighborhoods-in-san-francisco/>

¹⁶³ <https://adoptoimonumentti.fi/>

¹⁶⁴ <https://evm.ee/eng/home>

<https://maaarhitektuur.ee/>

most of the rural architecture is not listed as a monument, preservation is the sole wish of the owners. Users are usually in need of practical advice and expert assistance.

In order to create such a platform, the Rural Architecture Centre, a unit of the Estonian Open-Air Museum, has been initiated to study Estonian folk architecture, organise seminars for homeowners and provide individual counselling.

The focus of the research is both on individual buildings and on the cultural landscape and the special way of life in the countryside as a whole. The workshops explore the experience of traditional building skills and how they relate to modern technological solutions.

As of 1 January 2020, the collections of the Estonian Open Air Museum contain 76,172 museum items, including 78 old village buildings.

In the years since it was founded, the museum has organised more than 80 practical courses for more than 1,700 participants, published a guidebook, *The Values of the Old Rural Home* (2013), which looks at case studies, pros and cons from the perspective of an engineer, architect and heritage historian, and the official website contains training materials and guides with answers to the most common questions homeowners have.

The project won the European Union Prize for Cultural Heritage/Europa Nostra Awards in 2016. As the best project in the category "Education, Training and Awareness Raising".

Status of "Cultural Capital" and "City of Design" for the historic city of Graz, Austria¹⁶⁵

Graz is Austria's second largest city with a population of about 300,000 and the second largest agglomeration, an industrial, cultural and university centre. There are more than 40,000 students enrolled in the city's six universities. The city is ranked 13th out of 70 medium-sized European cities in the European Smart Cities list (European Smart Cities, 2013).

Its geostrategic position has influenced the formation of a multicultural environment and the granting of UNESCO World Heritage Site status in 1999 as one of the best-preserved historic centres in the world, representing a variety of cultural heritage typologies. Graz became the European Capital of Culture in 2003, a status which has led to the emergence of modern architecture and iconic buildings such as the new Museum of Contemporary Art - Kunsthaus Graz and the multifunctional "Exhibition Center Murinsel on an artificial island".

The Graz Cultural Capital project was an integral part of the long-term development strategy. In the year when Graz was the European Capital of Culture, 832,385 overnight stays were recorded. Since then, the number of visitors has grown steadily, with overnight stays totalling 984,780 in 2013.



¹⁶⁵

https://www.researchgate.net/publication/269730064_Graz_UNESCO_City_of_Design_and_Historical_Heritage



"Innovation, entrepreneurial spirit, cosmopolitan approach, creativity, quality housing, quality services and supplies, care for the environment and energy conservation are the key words that have shaped the current city structure" (2012).

The city is also a member of the UNESCO Creative Cities Network as "City of Design" since 2011. Modern development and the conservation of tradition are equally present here. The status highlights the role of the creative industries as a key focus of Graz's socio-economic development strategy.

UNESCO's World Network of Creative Cities comprises 41 cities and includes seven fields of creativity: film, design, craft, literature, media arts, music, folklore and gastronomy (Creative Cities Network, 2014). For Graz, a notable change since the listing has been the redevelopment of the Land district, which has become a hub for young and vibrant designers. The inflow of young creative people has benefited the whole area, as historically this part of town has always been less developed and known as a working class area.

The connection between economy and culture represents a basic principle for the sustainable development of a historic city.

Graz's various cultural events, platforms and festivals are directly linked to the creative community of the network "Design City". One of them is "Design forum" (an exhibition space for design projects, symposia, conferences and events). Other events include "Design Month in Graz" (an annual international design festival held every May since 2009), the "Designers in Art Residency" project and others.

Graz is a good example of how a preserved historic city can develop in a modern style without destroying its heritage. Graz has become a role model through its successful interpolation of history and modernity, using international approaches and its status as a UNESCO "Design City". In 2020 Graz is once again the European Capital of Culture with the motto "Culture creates the city's future".

Initiative "Cultural Districts", San Francisco, USA¹⁶⁶

..

San Francisco is a city made up of many districts, each with its own history and character. Today, there is a risk that some areas may lose their identity due to the intense process of gentrification. Initiative "Cultural Districts", led by the City Council and a group of city departments (Arts Commission, Planning Department, Mayor's Office of Housing and Community Development and Economic Development and Labour Office), has led to legislative support for five distinct cultural districts.

These districts include: SOMA Pilipinas (Filipino cultural heritage district), Calle 24 (Hispanic cultural district and birthplace of the San Francisco muralist movement), Japanese cultural heritage district (centre of San Francisco's Japanese-American community), etc.

Legal instruments include restrictions on land use, systematisation of spatial zoning, support for SMEs, and support for local residents who have lived and worked in these areas for decades.



¹⁶⁶ <https://sfplanning.org/cultural-heritage>

In addition, a city hall resolution introduces a taxation system that restores historic hotel tax deductions to fund arts and crafts, which is estimated to provide more than \$3 million in annual base funding for already established cultural districts.

Trends recommended for use:

- museum-reserve as an accelerating platform for initiative projects to conserve the cultural and symbolic capital of the territory;
- delegating responsibility for the implementation of conservation projects to local communities, volunteers, with the support of experts and professionals;
- the use of public-private partnership mechanisms;
- linking the strategic stakes and status of the Capital of Culture with image-building activities and socio-economic development areas;
- thematic zoning with the designation of specially protected areas based on historical, cultural and anthropological research;
- application of a combination of mechanisms, including spatial zoning, development limits, economic incentives for small businesses and tax breaks for owners of historic properties.

4. Promoting cultural and symbolic resources through interdisciplinary projects¹⁶⁷

In order to increase the significance and visibility of the Astrakhan Region, the following examples of the development of sustainable identification of the symbolic capital of the territory in the external environment have been chosen.

Project "Pathways of Greek Culture", Athens, Greece¹⁶⁸

"Pathways of Greek Culture" is a comprehensive interdisciplinary programme for the conservation of intangible cultural heritage, creating a unified route network and signposting in areas of special environmental or cultural significance in Greece. Its geographical coverage is extensive, with a total of 658 km of restored walking and cycling routes in 13 regions of Greece.

The program brings together academics from many fields (geographers, archaeologists, historians, teachers, ornithologists), institutional actors and representatives of business and the tourism industry.

The efforts and involvement of local communities are key to the success of the project. For school children and teenagers, the project is both educational and stimulating, as it creates new jobs and opportunities to receive grants for initiatives from sponsors. Future plans include more public participation, including a focus on children with autism spectrum disorders (ASD), as research has shown that walking can be of great benefit to them.



¹⁶⁷ References to the photo images used:

<https://www.europeanheritageawards.eu/winners/greek-paths-culture-athens-greece/>

<http://www.teart.by/ru/about/archive/brest-stories-guide.html>

<https://www.newkalinograd.ru/afisha/other/news/7648579-v-seti-poyavilas-elektronnaya-versiya-artgida-blizkiy-neznakomets.html>

¹⁶⁸ <https://www.monopatiapolitismou.gr/?lang=en>



The Greek Cultural Trails are an excellent example of a comprehensive project integrating cultural heritage and the surrounding natural landscape. Creating conditions for personal development is combined with attention to history, heritage and biodiversity, and the important link between culture and nature is emphasised. The various aspects of tangible and intangible cultural heritage assets are considered in a holistic approach to ecotourism development.

The project won the European Union Prize for Cultural Heritage/Europa Nostra Awards in 2016. As the best project in the category "Education, Training and Awareness Raising".

Project «Brest Stories Guide. A story told by the inhabitants", Brest, Belarus¹⁶⁹

Project «Brest Stories Guide» is a series of documentary audio plays in the city space. Although the theme of the project is primarily concerned with anti-Semitism and "forgetting memory" in relation to certain periods of history, the interdisciplinary nature of the project at the interface of art, tourism and cultural heritage preservation is important for Astrakhan.

The collaborative work of some twenty people, including historians, experts from Jewish organisations and the best actors from Brest theatres, has resulted in an innovative tourist and artistic product, as well as an authentic source for the study of the city's history.

An audio-performance - an excursion around 'non-existent' Brest - is based on archive material, books, photos, interviews with witnesses of the events of 1937-1942

The mobile app consists of an audio playback and a map that allows the user to freely navigate around the map with preserved heritage sites and event locations. Streets, buildings and courtyards become a stage for voices from the past. The theatre invites the spectator/listener to immerse themselves in history and to see how the outlines of the vanished old Brest can be seen through the face of today's city.

Art guide Kaliningrad¹⁷⁰.

The first art guide appeared in 2005. It was created jointly by Russian and foreign artists, writers, architects, musicians, photographers, journalists, historians, representatives of various subcultures, heritage and contemporary culture experts.

The second art guide "A Close Stranger: Gdańsk-Kaliningrad-Klaipeda" is a guide to the three cities, prepared by the Baltic Branch of the State Centre for Contemporary Art.

The guide is the result of an art expedition in 2013, when Lithuanian, Polish and Russian contemporary art and cultural figures travelled to



¹⁶⁹ <https://www.breststories.com/>

¹⁷⁰ <http://kaliningrad-old.ncca.ru/art-guide/>

https://issuu.com/ncca.kaliningrad/docs/artguide_ru_web

historical and cultural sites on the south-eastern coast of the Baltic Sea that are important from the point of view of regional identity.

The art guide "A Close Stranger" compiles more than 40 texts by Russian, Polish and Lithuanian artists, curators, writers, journalists, social researchers and art historians. The texts present different perspectives on what the people living in the neighbouring countries have in common. The publication also includes six general touristic routes and detailed information on cultural institutions and attractions in the region.

Such a project serves as a good basis for external positioning of the city and, in the case of Astrakhan, can contribute to the qualitative promotion of the diverse cultural and symbolic potential.

Trends recommended for use:

- an integrated approach in developing cultural and eco-routes by integrating cultural heritage and the surrounding natural landscape;
- establishment of a unified recreational framework as part of maintaining agglomeration intra-regional links;
- supporting cultural co-creation with the involvement of different age target audiences in the scenario planning of tourism routes and volunteer projects;
- launching media projects (creation of a mobile application, an interactive map, a website-archive of historical information, etc.)

5. Archaeological and ethnographic tourism¹⁷¹

In order to include the most iconic sites of the Astrakhan Region in ethnographic and culturally informative regional tourist routes and to promote the diverse typologies of the Astrakhan Region's heritage, the following examples of practices of archaeological and intangible cultural heritage have been selected.

Preserving Turkey's Archaeological Heritage (SARAT)¹⁷²

."Protecting Turkey's Archaeological Assets" (SARAT) is an educational and awareness-raising project that has had a significant impact on the protection and recognition of Turkey's unique archaeological heritage.

The project is designed and initiated by the British Institute in Ankara (BIAA) in partnership with the Anatolian Civilisations Research Centre at Koc University (ANAMED) and the International Council of Museums (ICOM UK) branch in the UK.

The four main areas of SARAT activity:

- certified online training programme "Protecting and rescuing archaeological artefacts"
- a sociological survey of residents' attitudes towards archaeological heritage and a series of workshops entitled "Archaeology in the local



¹⁷¹ References to the photo images used:

<https://www.saratprojesi.com/en>
<http://danubelimesbrand.org/sites/serbia/kostolac-viminacium/>
https://kareliya.ru/useful/karelia_about/dom_dubrovina.html

¹⁷² <https://www.saratprojesi.com/tr>



context", designed to share the results of the survey and propose ideas for enhancing the role of heritage among communities

- workshops with journalists to improve the quality and accuracy of archaeological news coverage;
- interviews with experts, archaeologists and museum collectors of Turkish antiquities. They were designed to raise awareness of the damage caused by looting and trafficking in archaeological sites, and to promote the scientific value of archaeological data.

Through an online course and public opinion survey, SARAT reached thousands of people throughout Turkey with different educational, vocational and social backgrounds. The success and popularity of the project can be attributed to its understanding of local needs, as well as the high-quality design of each event. The project has been designed as a model for the typical application of similar formats in Europe and beyond.

The project won the European Union Prize for Cultural Heritage/Europa Nostra Awards in 2016. As the best project in the category "Education, Training and Awareness Raising".



Domus Scientiarum Research Centre, Viminacium archaeological site, Serbia¹⁷³

The military camp site is the capital of the Roman province of Moesia, located in eastern Serbia, 12km from the town of Požarevac, the most important Roman settlement from the 1st to 6th centuries and part of the Via Militaris tourist route.

The archaeological site covers 450 hectares and contains ruined temples, streets, squares, an amphitheatre, theatre, palaces, hippodromes and Roman baths.

The Domus Scientiarum Research Centre in the Viminacium is a multi-purpose facility: the infrastructure and archives can be used by members of the professional scientific community in Serbia and elsewhere, as well as by students. It organises summer classes as well as conventions and scientific seminars, and can also accommodate tourists.

The idea behind the "archaeological tourism in an authentic Roman setting" project is a unique user experience scenario where the visitor can be anything they want - an archaeologist, a legionary, or an emperor.

It is the first archaeological park in the central Balkans to be open all year round. The project is financed from public sources as well as from tourism revenues. The funds received are directed in two main directions: a) to employ the local youth population and b) to continue the construction of the Domus.



Museum eco-village Bolshaya Selga, Olonetsky district, Republic of Karelia¹⁷⁴

Bolshaya Selga is a historical village located on the watershed of the Megrega and Olonka rivers, which has most fully preserved its individual

¹⁷³ <http://viminacium.org.rs/en/arheoloski-park/domus-scientiarum-viminacium/>

¹⁷⁴ New Models of Cultural Entrepreneurship: A Guide for Ethnic Communities. - Moscow: Faculty of Sociocultural Project Management at the Moscow School of Social and Cultural Sciences, 2011.

typological features, elements of traditional structure from the middle of the XIX century.

There are 28 permanent residents, mostly retired grandmothers, but in summer the population increases several times over, with people coming to visit their relatives, relax on the local pond and simply watch the authentic Karelian village.

Bolshaya Selga is a kind of "branch" of the Olonets National Museum, which runs various programmes for tourists here. The museum calls it an ethnographic site. But this is no ordinary ethnographic museum village made up of wooden architecture monuments from various places - it is still a living village, and the locals continue to live there. A special feature of this project is its strong ecological orientation: the museum staff are consciously trying to develop Bolshaya Selga as a living eco-museum, with the local community at its centre, rather than an emasculated tourist attraction.

The Bolshaya Selga museum project is an attempt to save and preserve objects of cultural heritage in their historical environment, as well as intangible forms of ethno-cultural heritage: customs, traditional ways of life.

Locals are directly involved in the programme by providing additional accommodation and catering services. Local women prepare traditional tea party cakes.

Bolshaya Selga is used as an internship base for students of the Petrozavodsk building-trade secondary school, as well as a base for a variety of summer youth camp programmes, including international camps.

The underlying concept behind the ecomuseum is sustainable development, based on the conservation of historical and cultural heritage and the involvement of the local community.

Trends recommended for use:

- the use of participatory design tools to engage local communities in project activities;
- media promotion and communications to promote heritage and change attitudes to "boring ruins";
- development of educational projects as part of a tourism development strategy;
- creating a shared infrastructure - scientific community, museum, tourists, students;
- the study of original artifacts and the reproduction of ethnic culture through socio-cultural projects.



APPENDIX 12 LIST OF SPNR IN ASTRAKHAN REGION

Table 42 List of SPNR in Astrakhan Region

Name of SPNR	Type	Meaning	Area (ha)	Location
Astrakhan State Biosphere Nature Reserve	SNS	Federal	66816	Volodarsky district, Ikryaninsky district
Bogdinsko-Baskunchaksky Nature Reserve	SNS	Federal	18478	Akhtubinsky district
Malyi Zhemchuzhnaya Island	NM	Federal	35	Kamyzyaksky district
Total area of federal SPNR			85329	
Baskunchak	NP	Regional	39423	Akhtubinsky district
Kapustinoyarsky land	NM	Regional	40	Akhtubinsky district
Volga-Akhtubinsky interfluve area	NP	Regional	194930	Akhtubinsky district/Chernoyarsky district
Total SPNR in Akhtuba District			234393	
Konnomogovsky land	NM	Regional	20	Volodarsky district
Marfinsky land	NM	Regional	20	Volodarsky district
Meshkovsky land	NM	Regional	20	Volodarsky district
Fat-melting plant	SNS	Regional	6300	Volodarsky district
Voshod calamiform land	NM	Regional	20	Volodarsky district
Bolshemoysky	NM	Regional	20	Volodarsky district
Dianowski spawning grounds	NM	Regional	7816	Volodarsky district
Yablonsky land	NM	Regional	20	Volodarsky district
Yamninsky land	NM	Regional	20	Volodarsky district
Zmeinyi hillock	NM	Regional	280	Volodarsky district



Staroigolkinsky	NM	Regional	6	Volodarsky district
Zelenginsky spawning grounds	NM	Regional	10362	Volodarsky district
Kalininsky spawning grounds	NM	Regional	3416	Volodarsky district
Razbugorinsky land	NM	Regional	20	Volodarsky district
Total SPNR in Volodarsky district			28340	
Kabanyi	SNS	Regional	2100	Enotaevsky district
Volzhanka	NM	Regional	350	Enotaevsky district
Seroglasoe breeding ground	NM	Regional	41.2	Enotaevsky district
Tsagan-Aman-Vetlyanskoye breeding ground	NM	Regional	21.4	Enotaevsky district
Yenotaevsky	SNS	Regional	3800	Enotaevsky district
Estacadny spawning grounds	NM	Regional	300	Ikryaninsky district
Chernyi hillock	NM	Regional	0	Ikryaninsky district
Teplushki	SNS	Regional	4700	Ikryaninsky district
Chertovo gorodyshche hillock	NM	Regional	15	Ikryaninsky district
Ikryaninsky	SNS	Regional	2900	Ikryaninsky district
Ilmenno-Bugrovyi	SNS	Regional	6900	Ikryaninsky district/Narymanovsky district
Total SPNR in Ikryaninsky district			14815	
Mininsky	SNS	Regional	200	Kamyzyaksky district
Krestovyi	SNS	Regional	7200	Kamyzyaksky district
Khazovsky	NM	Regional	6	Kamyzyaksky district
Gandurinsky	NM	Regional	5	Kamyzyaksky district
Uvarinsky	NM	Regional	0.1	Kamyzyaksky district
Total SPNR in Narymanovsky district			7411.1	
Lake "Lechebnoe"	NM	Regional	50	Narimanovsky district
Lake "Tinaki"	NM	Regional	18	Narimanovsky district
Rychansky land	NM	Regional	20	Narimanovsky district



Dendrological park "Tinaki-1"	NM	Regional	25	Narimanovsky district
Ilmenno-Bugrovyi	SNS	Regional	6900	Ikryaninsky district/Narymanovsky district
Total SPNR in Narymanovsky district			7013	
Zabuzansky spawning grounds	NM	Regional	10785.1	Krasnoyarsky district
Total SPNR in Krasnoyarsky district			10785.1	
Stepnoy	SNS	Regional	109400	Limansky district
Total SPNR in Limansky District			109400	
Novaya roshcha	NM	Regional	2	Privolzhsky district
Total SPNR in Privolzhsky district			2	
Stupinsky	NM	Regional	3	Chernoyarsky district
Dubovskoe breeding ground	NM	Regional	89	Chernoyarsky district
Bundinskaya dacha	NM	Regional	488	Chernoyarsky district
Vyasovskaya oak-wood	SNS	Regional	4300	Chernoyarsky district
Popereshnyi liman	NM	Regional	80.5	Chernoyarsky district
Buchovsky	SNS	Regional	9000	Kharabalinsky district
Orlovsky forest	NM	Regional	67	Kharabalinsky district
Peski-Berli	SNS	Regional	3064	Kharabalinsky district
Total SPNR in Kharabalinsky district			16511.5	
Total area of SPNR of regional significance			428663.3	

SNS - State natural reserve

NM - natural monument

NP- national park



APPENDIX 13 ANALYSIS OF TIES WITHIN AGGLOMERATION

Table 43 Key education and science, sport, culture and leisure facilities that form socio-cultural links of varying degrees of activity

	Facilities for higher and secondary vocational education	Facilities for research, development and innovation activities	Sports and cultural facilities	Health care facilities and health centers	Intensity
Astrakhan	38, including: <ul style="list-style-type: none"> ▪ universities (14), including three non-state institutions; ▪ secondary specialized educational institutions (24). 	12 <ul style="list-style-type: none"> ▪ Research Institute for Infectious Disease Agma Astrakhan State Medical University; ▪ Caspian research institute of fishfarm Federal State Budgetary Institution of Science; ▪ Shirshov Institute of Oceanology of Russian Academy of Sciences; ▪ Research Institute for Leprosy Research of Ministry of Health of the Russian Federation Federal State Budgetary Institution of Science; ▪ Design, Survey and Research Institute of Sea Transport; ▪ Research Institute for Infectious Disease; 	6 <ul style="list-style-type: none"> ▪ Astrakhan State Technical University sports complex; ▪ Sports and entertainment complex swimming pool "Zvezdnyi"; ▪ Astrakhan Gazprom Central Stadium; ▪ Autonomous institution of Astrakhan Region "Zvezdnyi sports complex"; ▪ City stadium of football team "Astrakhan"; ▪ Sports complex "Dynamo". 	21 <ul style="list-style-type: none"> ▪ Alexandro-Mariinsky regional Clinic Hospital State Budgetary Healthcare Institution of Astrakhan Region; ▪ Regional Children's Clinical Hospital in the name of N.N. Sylitseyov State Budgetary Healthcare Institution of Astrakhan Region; ▪ Regional Psychiatric Hospital State Budgetary Healthcare Institution of Astrakhan Region; ▪ Regional Infectious Diseases Clinic Hospital in the name of A.M. Nichogy, State Budgetary Healthcare 	77



- Research Institute for Caspian Sea;
 - Astrakhan Research and Technological Institute of Computing Devices;
 - Federal Service of Russia on Hydrometeorology and Monitoring of the Environment, Caspian Marine Research Centre;
 - Caspian scientific-research and analytic center of fishing industry LLC;
 - Caspian Institute of Sea and River Transport the affiliation of Volga State University of Water Transport, the Federal State Budgetary Educational Institution of Higher Education Wear research and materials testing laboratory;
 - National Medical Research Center for Otorhinolaryngology Federal State Budgetary Institution;
 - Research Geoinformation Centre.
- Institution of Astrakhan Region;
 - Regional Narcological Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Oncologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Clinic Antituberculosis Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Dermatovenerologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Cardiologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Exercise Therapy Centre State Budgetary Healthcare Institution of Astrakhan Region;
 - Republican Center on Prevention and Control of AIDS State Budgetary Healthcare Institution of Astrakhan Region;
 - Regional Clinic Dental Centre State Budgetary Healthcare Institution of Astrakhan Region;
 - Healthcare and Reproduction

- Center State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Regional Blood
Centre State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Medical Center of
Reserve
Mobilization
"Reserve", State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Medical Center for
Information and
Analysis State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Regional Centre
for Public Health
and Prevention
State Budgetary
Healthcare
Institution of
Astrakhan Region;
- Centre for
Disaster Medicine
and Emergency
Medicine State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Pathoanatomical
Bureau State
Budgetary
Healthcare
Institution of
Astrakhan Region;
- Office of the Chief
Medical Examiner
State Budgetary
Healthcare
Institution of
Astrakhan Region;
- Children's inter-
collective health
complex of the
sanatorium type in
the name of V.
Dubinina.



Closed Administrative Territorial Unit Znamensk	<ul style="list-style-type: none"> ▪ Branch Office of Astrakhan State University State Federal-Funded Educational Institution of Higher Professional Training in Znamenske of Astrakhan Region 	1
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Akhtubinsky	<ul style="list-style-type: none"> ▪ Branch Office "Vzlet" of Moscow Aviation University Federal State Budgetary Educational Institution of Higher Education in Akhtubinsk; ▪ Akhtubinsky Branch Office of Astrakhan Automobile and Road Construction College, State Budget Professional Educational Institution of Astrakhan Region ▪ Branch Office of Astrakhan Basic Medical College Professional Educational Organization State-financed Institution in Akhtubinsk; ▪ Astrakhan Art School (technical college) in the name of P.A. Vlasova State Budget Professional Educational Institution of Astrakhan Region 	<ul style="list-style-type: none"> ▪ State Proving Flying Centre of Ministry of Defence in the name of V. P. Chkalova; ▪ Technology Park of Cosmonautics "LINKOS" 	c.Akhtubinsk	<ul style="list-style-type: none"> ▪ Sports complex State Proving Flying Centre of Ministry of Defence in the name of V.P. Chkalova 	twp Nizhny Baskunchak:	<ul style="list-style-type: none"> ▪ "Baskunchak" sanatorium-preventorium. 	8
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Volodarsky	<ul style="list-style-type: none"> ▪ Volodarsky Branch Office of Astrakhan State Polytechnic College, State Budget Professional 	1
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Educational
Institution of
Astrakhan Region

Yenotaevsky	<ul style="list-style-type: none"> ▪ College. Enotaevsky Branch office of Astrakhan State University of Architecture and Civil Engineering State autonomous educational institution of Astrakhan Region of Military District 	1
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Narimanovsky	<ul style="list-style-type: none"> ▪ Narymanovsky Branch Office of Astrakhan State College of Professional Technologies State Budget Professional Educational Institution of Astrakhan Region 	v. Rassvet: <ul style="list-style-type: none"> ▪ Tinaki sanatorium. 	2
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Ikryaninsky	<ul style="list-style-type: none"> ▪ Krasnobarrikadinskii Branch Office of Astrakhan State College of Professional Technologi State Budget Professional Educational Institution of Astrakhan Region ▪ Ikryaninsky Branch Office of Astrakhan Technology College State Budget Professional Educational Institution of Astrakhan Region 	v. Ikryanoe: <ul style="list-style-type: none"> ▪ Sports and recreation centre, village Ikryanoe: 	3
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Kamyzyaksky	<ul style="list-style-type: none"> ▪ Kamizyaksky Agricultural College, State Budget Professional Educational Institution of Astrakhan Region 	<ul style="list-style-type: none"> ▪ All-Russian Scientific Research Institute of Irrigated Vegetable and Bacon Growing. 	<ul style="list-style-type: none"> ▪ Multifunctional stadium of Lyceum No. 1. 	3
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Krasnoyarsky	<ul style="list-style-type: none"> ▪ Branch Office of Astrakhan Agrotechnical Colleg State Autonomous Professional Educational institution of Astrakhan Region in village Krasnyi Yar 	<p>Krasnyi Yar:</p> <ul style="list-style-type: none"> ▪ Municipal institution "Yuzhny Sports Complex" 	2
Limansky	<ul style="list-style-type: none"> ▪ Limansky Branch Office of Astrakhan State Polytechnic College State Budget Professional Educational Institution of Astrakhan Region 	<p>twp Liman:</p> <ul style="list-style-type: none"> ▪ "Liman children's and youth sports school" sports complex 	2
Privolzhskiy	<ul style="list-style-type: none"> ▪ Federal Research Centre The N.I. Vavilov All-Russian Institute of Plant Genetic Resources (VIR). 	<p>v. Try potoka:</p> <ul style="list-style-type: none"> ▪ Hippodrom. <p>Near v. Yaksatovo:</p> <ul style="list-style-type: none"> ▪ A.S. Pushkin Health Centre; ▪ Dubravushka Health Centre; ▪ Aquatics and Rowing Centre under construction in v. Yaksatovo. 	5
Kharabalinsky	<ul style="list-style-type: none"> ▪ Kharabalinsky Branch Office of Astrakhan State University of Architecture and Civil Engineering State Autonomous Educational Institution of Astrakhan Region of Military District ▪ Kharabalinsky Branch Office of Astrakhan State Polytechnic College State Budget Professional Educational Institution of Astrakhan Region; 	<p>c. Khabarli:</p> <ul style="list-style-type: none"> ▪ Sports complex of the Kharabala District Children's and Youth Sports School. 	3



Chernoyarsky	▪ Chernoyarsk Guberniy College, State Autonomous Professional Educational institution of Astrakhan Region	▪ Kalmyk Research Institute of Agriculture in the name of M.B. Narmayev - Branch of Pre-Caspian Agrarian Federal Scientific Centre of the Russian Academy of Sciences, Federal State Budgetary Scientific Institution.	2
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List of public universities in the Astrakhan Region:

1. Astrakhan State University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training;
2. Astrakhan State Technical University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training;
3. Astrakhan State Technical Conservatory Branch Office of State Federal-Funded Educational Institution of Higher Professional Training;
4. Astrakhan State Medical University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training of Ministry of Health of the RF;
5. Caspian Institute of Sea and River Transport the affiliation of Volga State University of Water Transport, the Federal State Budgetary Educational Institution of Higher Education;
6. Astrakhan Branch Office of the Russian Presidential Academy of National Economy and Public Administration, Federal State Budget-Funded Educational Institution of Higher Education;
7. Astrakhan Branch Office of Saratov State Law Academy, Federal State Budget-Funded Educational Institution of Higher Education;
8. Astrakhan Branch Office of Institute of Social and Humanitarian Knowledge, Private Educational Institution of Higher Professional Education;
9. International Law Institute, Astrakhan Branch of Private Educational Institution of Higher Professional Education;
10. Branch Office "Vzlet" of Moscow Aviation University Federal State Budgetary Educational Institution of Higher Education in Akhtubinsk;
11. Astrakhan State University of Architecture and Civil Engineering, State Autonomous Educational institution of Higher Education of Astrakhan Region
12. Institute of World Economics and Finance educational autonomous not-for-profit organization of higher learning;
13. Branch Office of Astrakhan State University State Federal-Funded Educational Institution of Higher Professional Training in Znamenske of Astrakhan Region

List of non-state higher education institutions in the Astrakhan Region:

1. Astrakhan Branch Office of International Institute of Economics and Law Non-State Educational Institution of Higher Professional Education;
2. Astrakhan Branch Office of Moscow University of Finance and Industry "Synergy" Non-State Educational Institution of Higher Professional Education;
3. Astrakhan Branch Office of South Russian Humanities Institute Private Foundation of Higher Education.



List of secondary specialized educational institutions in Astrakhan Region (38), including in Municipality of Astrakhan (24)

1. Astrakhan State College of Professional Technology, State Budget Professional Educational Institution of Astrakhan Region;
2. Astrakhan Automobile and Road Construction College, State Budget Professional Educational Institution of Astrakhan Region;
3. Astrakhan College of Technology, State Budget Professional Educational Institution of Astrakhan Region;
4. Astrakhan State Technology College, State Budget Professional Educational Institution of Astrakhan Region;
5. Astrakhan Socio-Pedagogical College, State Autonomous Professional Educational institution of Astrakhan Region;
6. Astrakhan College of Computer Science, State Budget Professional Educational Institution of Astrakhan Region;
7. Astrakhan Province Technical College, State Budget Professional Educational Institution of Astrakhan Region;
8. Astrakhan College of Art and Fashion Indus, State Autonomous Professional Educational institution of Astrakhan Region
9. Astrakhan Agrotechnical Colleg, State Autonomous Professional Educational institution of Astrakhan Region
10. College. Astrakhan State University of Architecture and Civil Engineering, State Autonomous Educational institution of Higher Education of Astrakhan Region
11. Astrakhan College of Culture and Arts, State Budget Professional Educational Institution of Astrakhan Region;
12. Astrakhan College of Music in the name of M.P. Musorgsky, State Budget Professional Educational Institution of Astrakhan Region;
13. Astrakhan Cooperative College of Economics and Law, Private Professional Education and Training Institution;
14. Professional Educational Organisation "Astrakhan Basic Medical College", Private Professional Education and Training Institution;
15. Institute of World Economics and Finance educational autonomous not-for-profit organization of higher learning;
16. Astrakhan State Technical University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training;
17. Astrakhan State Medical University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training of Ministry of Health of the RF;
18. Astrakhan State University Branch Office of State Federal-Funded Educational Institution of Higher Professional Training;
19. Astrakhan Special Educational Institution of Closed Type, Federal State Budget Professional Educational Institution;
20. "Volga-Caspian Marine Fisheries College" of Astrakhan State Technical University Federal State-Funded Educational Institution of Higher Education;
21. Astrakhan Branch Office of Zhirnovsky Oil Technical School State Budgetary Professional Institution;
22. Astrakhan Branch Office of International Law Institute, Private Educational Institution of Higher Education;
23. College. Caspian Institute of Sea and River Transport the affiliation of Volga State University of Water Transport, the Federal State Budgetary Educational Institution of Higher Education;
24. Astrakhan State College of Professional Technologies, Privolzhsky office of State Budget Professional Educational Institution of Astrakhan Region
25. Kamizyasky agricultural college, State Budget Professional Educational Institution of Astrakhan Region
26. Chernoyarsk Guberniy College, State Autonomous Professional Educational institution of Astrakhan Region



27. Astrakhan Art School (technical college) in the name of P.A. Vlasova
State Budget Professional Educational Institution of Astrakhan
Region -;
28. Astrakhan Automobile and Road Construction College, Akhtubinsky
Office of State Budget Professional Educational Institution of
Astrakhan Region
29. Astrakhan State Polytechnic College, Volodarsky Office of State
Budget Professional Educational Institution of Astrakhan Region
30. Astrakhan State University of Architecture and Civil Engineering,
Enotaevsky Office of State Autonomous Educational Institution of
Astrakhan Region of Military District
31. Astrakhan Technology College, Ikryaninsky Office of State Budget
Professional Educational Institution of Astrakhan Region;
32. Krasnobarrikadinskii Branch Office of Astrakhan State College of
Professional Technologi State Budget Professional Educational
Institution of Astrakhan Region
33. Astrakhan State Polytechnic College, Limansky Office of State
Budget Professional Educational Institution of Astrakhan Region;
34. Astrakhan State College of Professional Technologies,
Narymanovsky Office of State Budget Professional Educational
Institution of Astrakhan Region
35. Astrakhan Agrotechnical College, Branch office of State Autonomous
Professional Educational institution of Astrakhan Region in village
Krasnyi Yar
36. Branch Office of Astrakhan Basic Medical College Professional
Educational Organization State-financed Institution in Akhtubinsk;
37. Astrakhan State University of Architecture and Civil Engineering,
Kharabalinsky Office of State Atonomous Educational Institution of
Astrakhan Region of Military District
38. Astrakhan State Polytechnic College, Kharabalinsky Office of State
Budget Professional Educational Institution of Astrakhan Region;



List of healthcare facilities of regional importance in the territory of the Municipality of Astrakhan

1. Alexandro-Mariinsky regional Clinic Hospital State Budgetary Healthcare Institution of Astrakhan Region;
2. Regional Children's Clinical Hospital in the name of N.N. Sylitseyvoy State Budgetary Healthcare Institution of Astrakhan Region;
3. Regional Psychiatric Hospital State Budgetary Healthcare Institution of Astrakhan Region;
4. Regional Infectious Diseases Clinic Hospital in the name of A.M. Nichogy, State Budgetary Healthcare Institution of Astrakhan Region;
5. Regional Narcological Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
6. Regional Oncologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
7. Regional Clinic Antituberculosis Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
8. Regional Dermatovenerologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
9. Regional Cardiologic Dispensary State Budgetary Healthcare Institution of Astrakhan Region;
10. Regional Exercise Therapy Centre State Budgetary Healthcare Institution of Astrakhan Region;
11. Republican Center on Prevention and Control of AIDS State Budgetary Healthcare Institution of Astrakhan Region;
12. Regional Clinic Dental Centre State Budgetary Healthcare Institution of Astrakhan Region;
13. Healthcare and Reproduction Center State Budgetary Healthcare Institution of Astrakhan Region;
14. Regional Blood Centre State Budgetary Healthcare Institution of Astrakhan Region;
15. Medical Center of Reserve Mobilization "Reserve", State Budgetary Healthcare Institution of Astrakhan Region;
16. Medical Center for Information and Analysis State Budgetary Healthcare Institution of Astrakhan Region;
17. Regional Centre for Public Health and Prevention State Budgetary Healthcare Institution of Astrakhan Region;
18. Centre for Disaster Medicine and Emergency Medicine State Budgetary Healthcare Institution of Astrakhan Region;
19. Pathoanatomical Bureau State Budgetary Healthcare Institution of Astrakhan Region;
20. Office of the Chief Medical Examiner State Budgetary Healthcare Institution of Astrakhan Region;



Table 44. Ranking of leading universities in Astrakhan Region

Name of university	Ranking by speciality	Share of international students
Astrakhan State University	73th place summative assessment D Russia's most in-demand universities - Rossiya Segodnya International News Agency among classical Universities	16%
Astrakhan State Technical University	81st place Russia's most in-demand universities - Rossiya Segodnya International News Agency among technical universities	
Astrakhan State University	132-134 places National ranking of universities (Interfax)	
Astrakhan State Technical University	4th liga National aggregate rating	
	113th place National ranking of universities (UniRank University)	
	summative assessment C Rating international recognition	
	351-400 places QS BESA University Rankings	

The development of promising high technologies, the implementation of scientific and technological priorities is one of the forms of scientific activity of the universities, serving as a form of support for fundamental and applied research carried out by temporary creative teams or individual scientists who are university employees.

An analysis of the scientific activities of educational organisations over the last five years shows **an increase in the number of publications of educational organisations**, so for the academic year 2019/2020 4,840 publications were published, which is 13.5% more than for the academic year 2016/2017.

The number of scientific researches in the 2020/2021 academic year¹⁷⁵ is 269, which is more than 30% lower than the same indicator for the 2019/2020 academic year (404).

¹⁷⁵ At the time of submission of the initial data by the Ministry of Education of the Astrakhan region.



Table 45. Key sites and industrial complexes in Astrakhan Region that form active labour (migration) relations

Name of enterprise	Officially registered	Total number of employees, people	Commuting labor migration
Astrakhan gas processing plant OOO "Gazprom Pererabotka"	Krasnoyarsky district		In total, about 12,000 people work at enterprises in the Krasnoyarsk district: 1. 60% come to work from Astrakhan. 2. 25% come from the local population; 3. 15% come to work from closed districts: Narimanov, Kharabalin and Privolzhsky.
OOO "Gazprom Dobycha Astrakhan"	the company operates mining operations in the Krasnoyarsk district	3000 ¹⁷⁶	
Production Division Astrakhangazgeofizika OOO "Gazprom Nedra"	Krasnoyarsky district	216	
Production Division Gazpom Geotechnologies Astrakhan OOO "Gazpom Geotechnologies"	Krasnoyarsky district	54	
Astrakhan branch office of OOO "Gazprotrans"	Krasnoyarsky district	623	
Yuznyi branch office of OOO "Gazprom energo"	Krasnoyarsky district	991	
Astrakhan branch office of the Astrakhan Catering Department of OOO "Gazprom pitaniye"	Krasnoyarsky district	327	
Astrakhanburenie branch office of OOO "Gazprom burenie"	Krasnoyarsky district	869	
Total number of employees at large enterprises in the Krasnoyarsk district		11 680	
Krasniye Barrikady Shipyard	Ikryaninsky district	800	The company employs a total of 800 people, including 30% come to work from Astrakhan.

¹⁷⁶ According to the information provided by the Administration of Krasnoyarsk district Municipality, however, given that the enterprise is not officially registered in the district and does not submit official reports, respectively, the data is presented as approximate.



Note.

1. There are two major enterprises in the Krasnoyarsk district of Astrakhan Region: the Astrakhan Gas Processing Plant OOO "Gazprom Pererabotka" (employing 5,600 people)¹⁷⁷ and OOO "Gazprom Dobycha Astrakhan" (about 3,000 people), as well as a number of auxiliary enterprises with a total number of 3,080 people.

TOTAL number of people working in the Krasnoyarsk district is around 12,000, of whom approx:

- 60% come to work from Astrakhan Municipality;
- 25% come from the local population;
- 15% come to work from neighbouring districts: Narimanov, Kharabalin and Privolzhsky.

2. In the Ikryaninsky district, the large shipbuilding plant Krasnye Barrikady, which employs 800 people, 30% of whom come from the Astrakhan Municipality, has resumed production activities since 2019.

Summary of SEZ and transport and logistics infrastructure development in the agglomeration area

The drivers of economic growth in Astrakhan Region will be the development of a transport and logistics complex, the creation of a port SEZ, and the development of the existing Lotos industrial production special economic zone which will promote the creation and promotion of export-oriented production and supply to other constituent entities of Russia.

LOTOS industrial production special economic zone

LOTOS industrial production special economic zone - an ongoing project of the region, set up to comprehensively address the following objectives

increasing industrial production in the Astrakhan Region;
the regional industry reaches a new level of development;
the emergence of new industries in the region.

Lotos industrial production special economic zone was created in the context of the beginning of the formation of core markets: components for the shipbuilding and oil and gas industries

Area of business of LOTOS industrial production special economic zone¹⁷⁸:

- shipbuilding and the production of components;
- production of oil and gas equipment and components;
- high-technology industrial construction.

2015

Cooperation agreement is signed between Lotos industrial production special economic zone and Enzeli FEZ - work started with the Iranian side to develop the North-South ITC

2020

Regulations on the organization of visits to the Khorgos International Centre for Border Cooperation were approved

7.5 billion roubles

planned investments

¹⁷⁷ According to information provided by the Administration of the Krasnoyarsk district Municipality.

¹⁷⁸ Official website of LOTOS industrial production special economic zone <https://www.sezlotos.ru/>



Table 46. Industrial profile of LOTOS industrial production special economic zone ¹⁷⁹

Current residents ¹⁸⁰		Potential residents for the next 2 years ¹⁸¹	
Lotos SEZ JSC	Civil and offshore shipbuilding, ship repair	IHC	dredging environment
OOO "ATEF RUSS"	production of electrical equipment	"Astrafлот"	grain processing plant
OOO "MedInTech"	injection syringes of 3rd generation	Oil and gas equipment	production of polypropylene products
OOO "Geksa-Lotos"	production of geosynthetic materials	"RASH logistic Group"	production of polypropylene fabric
OOO "Marine Composite Shipbuilding"	small ships made of composite material	"Volzhsky biotechnology"	pectin production
OOO "INPROJECT"	offshore autonomous unmanned vehicles	"TimePlit"	fluorspar production
OOO "Proteluks Lotos"	production of feed protein-vitamin concentrates	"AgroStroyInvest"	production of highly processed cereal crops
OOO "Stoyliderplus LOTOS"	ballast water treatment systems for ships of all types		
OOO "Gelios Systems"	solar panel production		
OOO "ASKA COMPOSITE"	fiberglass pipe production		
OOO "NAVAL DESIGN MEZHDUNARODNYI"	shipboard panel production		
OOO "Rosa"	household chemistry production		
OOO "Svoi"	production of drip irrigation tubing		
OOO "Astrakhan Medical Devices Plant"	production of disposable nitrile examination gloves		
Rybnye korma JSC	fry and production feed for aquaculture facilities		
Technology of XX century JSC	production of tool brushes and abrasives		

¹⁷⁹ Based on materials provided by the Ministry of Industry and Natural Resources of Astrakhan Region and Lotos SEZ JSC.

¹⁸⁰ Official website of LOTOS industrial production special economic zone
<https://www.sezlotos.ru/>

¹⁸¹ According to materials provided by Lotos SEZ JSC.



Expected effects of the LOTOS industrial production special economic zone:

- new high-tech locations;
- increasing regional budget revenues;
- improving the investment climate for business;
- integration into global technology chains.

850

planned jobs

The implementation of the Lotos industrial production special economic zone is a priority strategic project designed to develop the manufacturing sectors of the economy through the creation of modern industrial production complexes capable of producing high-tech products for advanced industrial processing on the territory of the SEZ.



PORT SEZ

The project is being implemented as part of comprehensive measures to develop the North-South International Transport Corridor (ITC) in Russia as a key area of transport infrastructure development.

Creation of a port SEZ (in the area around the Olya seaport), integrating it into the Caspian cluster with the Lotos industrial production special economic zones as the cargo base of the North-South ITC.

The implementation of the Port SEZ project is planned in 2 phases:
 Stage 1: Equipping berths No. 8, 9 of the Olya seaport with container handling equipment at the expense of a private investor.
 Stage 2: Construction of a new cargo area (8 km south of Olya seaport).

The establishment of a port SEZ will create conditions for the modernisation of port infrastructure as well as the development of the port area in terms of cargo handling and packaging to create a higher added value for the transported goods.

The Port SEZ is the first specialised container terminal in the Caspian Sea, with the following objectives¹⁸²:

- attracting cargo from India, China, South-East Asia, Africa, the Middle East and Europe on the North-South and West-East ITCs;
- increase in container cargo transshipment through the port SEZ infrastructure to 8 million tonnes by 2029;
- the emergence of new logistics facilities and processing industries.

The creation of a port SEZ contributes to the creation of favourable conditions for business, including foreign business.

At the same time, a logistics centre will be built on the adjoining territory of the port SEZ in Olya seaport to process agricultural products, arrange storage of fresh products and their packaging, as well as the use of "blast chilling" technology, and accommodate processing industries, wholesale trade facilities, infrastructure and services.

2020

Decree on the creation of a port SEZ and a Caspian cluster in the Astrakhan Region signed

2019

Agreement between the Government of Astrakhan Region and a private investor, OOO "PLC Caspiy", on the construction of a modern container terminal to handle cargo bound for the North-South ITC

8 million tons

Forecast for increase in port cargo turnover when both container terminals reach their design capacity

10,3 billion roubles

federal funds are provided for the implementation of the project

¹⁸² Based on materials provided by the Ministry of Industry and Natural Resources of Astrakhan Region and Lotos SEZ JSC.



Development of logistics center Sun Light Astrakhan LLC

OOO "Sunlight Astrakhan" has established a logistics hub at the Kutum railway station.

The hub has a temporary storage area of 8,800 square metres. The customs control area allows for the simultaneous clearance of goods in 2 trains (28 wagons, reefer sections and 50 truckloads).

Company partners:

- KDY Logistiks (Baku);
- AZIN TARABAR RAH AHJAM (Iran)
- KDY LOJISTIK VE NAKLIYAT ANONIM SIRKETI (Турция);
- KDY LOGISTICS GEORGIA LTD (Georgia);
- Ihab Karem Washk;
- OOO "Retail Import";
- "Sonom pro";
- OOO "Fil";
- OOO "Stroymontazh Sever";
- AO "Steel Industrial Company (Chelyabinsk)";
- OOO "Mild" and others

OOO "Sun Light Astrakhan" carries out cargo transportation by rail and road from Turkey, Azerbaijan, Georgia, Iran, Kazakhstan, Kyrgyzstan, Uzbekistan, China to Russia and vice versa.

In the long term: Afghanistan, Pakistan, India.

8,8 ths. k²

temporary storage area of the logistics hub at the Kutum railway station

36.4 ths. tonnes

the volume of cargo transported through the logistics hub at the Kutum railway station in 2020.

3000 positions

the project will additionally create jobs in the region

100 million per year

the project will generate additional tax revenues for the regional budget



APPENDIX 14. ESTIMATED PARAMETERS OF THE ASTRAKHAN AGGLOMERATION (URBAN RURAL)

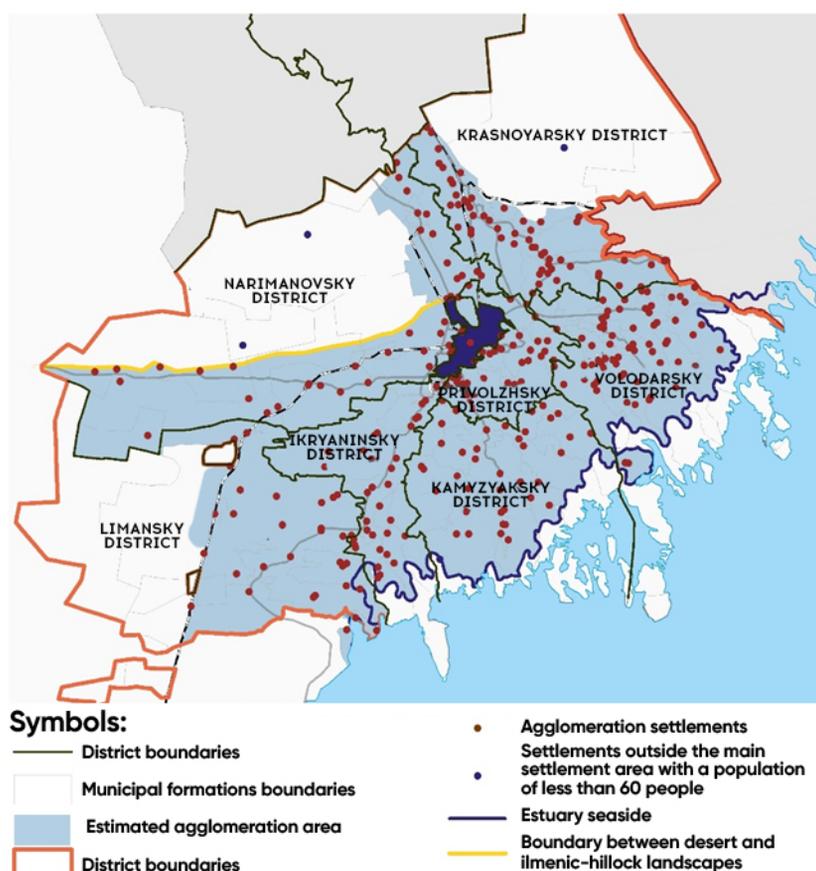


Fig. 271. Estimated area of Astrakhan agglomeration ("urban rural" agglomeration)

**13,2 ths.
km²**

calculated area of the agglomeration area

**307 ths.
people**

Estimated population of the agglomeration (minus core population)

**23.5
persons/
km²**

population density of the agglomeration



APPENDIX 15. A BRIEF DESCRIPTION OF THE AGGLOMERATION AREA

Table 47. Register of Astrakhan agglomeration municipalities

Name of district	Name of cities of district significance, urban settlements, village councils that are part of the district	Area of the municipality, sq km	Population of the municipality, people ¹⁸³	Population density of the municipality, people/sq km
Astrakhan	Astrakhan	208.70	529800	2538.6
Volodarsky municipal district	Aktyubinskiy village council	121.06	1755	14.5
	Altynzharsky village council	78.42	2446	31.2
	Bolshemoysky village council	192.38	1842	9.6
	Kalininsky village council	557.57	1407	2.5
	Kozlovsky village council	184.66	4695	25.4
	Krutovsky village council	21.86	745	34.1
	Makovsky village council	139.94	1052	7.5
	Marfinsky village council	52.43	3310	63.1
	Multanovsky village council	392.58	2068	5.3
	Novinsky village council	75.22	1120	14.9
	Novokrassinsky village council	478.05	510	1.1
	village settlement Vinnyi	36.45	727	19.9
	village settlement Volodarsky	27.23	9962	365.8
village settlement village Zelenga	117.26	2540	21.7	
Sizobugorsky village council	248.29	2815	11.3	

¹⁸³ Data are as of 01.01.2020.



	Sultanovsky village council	39.45	668	16.9
	Tishkovsky village council	672.19	1757	2.6
	Tuluganovsky village council	48.94	829	16.9
	Tumaksky village council	12.99	2382	183.4
	Khutorsky village council	38.76	1193	30.8
	Tzvetnovsky village council	541.65	2411	4.5
	Total	4077.40	46234	11.3
Ikryaninsky municipal district	Bakhtemirskiy village council	134.51	3595	26.7
	municipal settlement Ilyinka	20.43	5076	248.5
	municipal settlement Krasniye Barrikady	12.30	6397	520.1
	Zhitninsky village council	157.49	2742	17.4
	Ikryaninsky village council	599.87	11853	19.8
	Mayachninsky village council	84.36	1645	19.5
	Mumrinsky village council	396.81	3138	7.9
	Novo-Bulgarinsky village council	26.44	538	20.3
	Orangereininsky village council	13.74	6118	445.4
	Sedlestinsky village council	55.21	1026	18.6
	village settlement village Trudfront	35.78	2609	72.9
	Sergievsky village council	91.75	737	8.0
	Chulpansky village council	318.05	969	3.0
	Total	1946.72	46443	23.9
Kamizyasky municipal district	Verkhnekalinovsky village council	101.02	1300	12.9
	municipal settlement Volga- Kaspiysky	4.71	2242	476.4
	municipal settlement Kamizyak	41.05	15749	383.7
	municipal settlement Kirovsky	8.31	2064	248.5



	Zhan-Aulsky village council	64.35	998	15.5
	Ivanchugsky village council	110.05	1779	16.2
	Karalatsky village council	431.18	1749	4.1
	Karaulsky village council	276.41	2204	8.0
	Nikolo-Komarovsky village council	81.19	1323	16.3
	Novotuzukleisky village council	254.73	2877	11.3
	Obraztsovo-Travinsky village council	775.18	5018	6.5
	Razdorsky village council	693.09	2203	3.2
	Samosdelsky village council	283.33	1515	5.3
	Chagansky village council	154.76	2583	16.7
	Semibugorinsky village council	130.31	2492	19.1
	Total	3409.67	46096	13.5
Krasnoyarsky municipal district	Akhtubinsky village council	396.40	3118	7.9
	Baibeksky village council	740.36	3462	4.7
	Buzansky village council	302.36	5324	17.6
	Vatazhensky village council	252.15	3919	15.5
	Janaisky village council	67.37	1533	22.8
	Krasnoyarsky village council	202.66	17072	84.2
	village Krasnyi Yar			
	Seitovsky village council	61.13	1455	23.8
	Total	2022.45	35883	17.7
	Limansky municipal district	Basinsky village council	1313.20	1092
municipal settlement Liman		2327.58	17108	7.4
Zenzelinsky village council		59.87	3033	50.7
Olinsky village council		171.11	3390	19.8
Promyshlovsky village council		612.64	1439	2.3
Yandykovsky village council		467.27	3130	6.7



	Total	4951.68	29192	5.90
Narymanovsky municipal district	Astrakhan village council	889.24	2806	3.2
	Akhmatovsky village council	111.61	1301	11.7
	Baranovsky village council	141.54	973	6.9
	Volzhsky village council	1653.68	3734	2.3
	municipal settlement Narymanov	35.17	10764	306.0
	Lineininsky village council	698.67	2396	3.4
	Nikolsky village council	704.18	4858	6.9
	Prikaspiyskiy village council	992.67	1917	1.9
	Raznochinovskiy village council	572.98	1728	3.0
	Rassvetsky village council	243.00	2069	8.5
	Solyanskiy village council	549.43	8098	14.7
	Starokucherganovskiy village council	205.12	10061	49.0
	Total	6797.30	50705	7.5
	Privolzhsky municipal district	Biryukovskiy village council	70.09	2666
Yevpraksinskiy village council		50.41	2483	49.3
Kilinchinsky village council		121.61	3650	30.0
Nachalovskiy village council		132.70	12756	96.1
village Nachalovo				
Novorychinsky village council		98.14	1513	15.4
village settlement, village Karagali		23.01	2806	122.0
village settlement, village Osipnoy Bugor		14.79	3865	261.3
village settlement, village Ractopulovka		29.66	2463	83.0
Tatarobashmakovskiy village council		66.33	4974	75.0



Trekhprotoksky village council	43.74	5353	122.4
Funtovsky village council	75.70	5301	70.0
Yaxatovsky village council	65.10	4949	76.0
Total	791.28	52779	66.7
Total (without the city of Astrakhan)	23996.49	307332	12.81



Table 47 continued. Register of Astrakhan agglomeration municipalities.

Name of district	Name of cities of district significance, urban settlements, village councils that are part of the district	Rural population	Number of village settlements in the municipality	Average population in the village settlements of the municipality	Share of rural population in the total population of the municipality	The proportion of the district's population in the agglomeration's population
Astrakhan	Astrakhan					
Volodarsky municipal district	Aktyubinskiy village council	1755	6	292.5	3,8%	
	Altynzharsky village council	2446	6	407.7	5,3%	
	Bolshemoysky village council	1842	8	230.3	4%	
	Kalininsky village council	1407	6	234.5	3%	
	Kozlovsky village council	4695	9	521.7	10,2%	
	Krutovsky village council	745	1	745	1,6%	
	Makovsky village council	1052	1	1052	2,3%	
	Marfinsky village council	3310	3	1103.3	7,2%	
	Multanovsky village council	2068	4	517	4,5%	
	Novinsky village council	1120	4	280	2,4%	
	Novokrassinsky village council	510	3	170	1,1%	
	village settlement Vinnyi	727	1	727	1,6%	
	village settlement Volodarsky	9962	1	9962	21,5%	
	village settlement village Zelenga	2540	1	2540	5,5%	
	Sizobugorsky village council	2815	5	563	6,1%	
	Sultanovsky village council	668	3	222.7	1,4%	
Tishkovsky village council	1757	3	585.7	3,8%		
Tuluganovsky village council	829	1	829	1,8%		



	Tumaksky village council	2382	1	2382	5,2%
	Khutorsky village council	1193	2	596.5	2,6%
	Tzvetnovsky village council	2411	5	482.2	5,2%
	Total	46234	74	624.8	100%
					15,04%
Ikryaninsky municipal district	Bakhtemirskiy village council	3595	3	1198.3	7,7%
	municipal settlement Ilyinka				
	municipal settlement Krasniye Barrikady				
	Zhitninsky village council	2742	3	914	5,9%
	Ikryaninsky village council	11853	8	1481.6	25,5%
	Mayachninsky village council	1645	3	548.3	3,5%
	Mumrinsky village council	3138	3	1046	6,8%
	Novo-Bulgarinsky village council	538	1	538	1,2%
	Orangereininsky village council	6118	5	1223.6	13,2%
	Sedlestinsky village council	1026	3	342	2,2%
	village settlement village Trudfront	2609	1	2609	5,6%
	Sergievsy village council	737	2	368.5	1,6%
	Chulpansky village council	969	1	969	2,1%
	Total	34970	33	1059.7	75,3%
					15,11%
Kamizyasky municipal district	Verkhnekalinovskiy village council	1300	3	433.3	2,8%
	municipal settlement Volga-Kaspiysky				
	municipal settlement Kamizyak				
	municipal settlement Kirovsky				



	Zhan-Aulsky village council	998	2	499.0	2,2%	
	Ivanchugsky village council	1779	2	889.5	3,9%	
	Karalatsky village council	1749	3	583	3,8%	
	Karaulsky village council	2204	6	367.3	4,8%	
	Nikolo-Komarovsky village council	1323	3	441	2,9%	
	Novotuzukleisky village council	2877	4	719.3	6,2%	
	Obraztsovo-Travinsky village council	5018	7	716.9	10,9%	
	Razdorsky village council	2203	5	440.6	4,8%	
	Samosdelsky village council	1515	5	303	3,3%	
	Chagansky village council	2583	3	861	5,6%	
	Semibugorinsky village council	2492	3	830.7	5,4%	
	Total	26041	46	566.1	56,5%	15%
Krasnoyarsky municipal district	Akhtubinsky village council	3118	5	623.6	8,7%	
	Baibeksky village council	3462	5	692.4	9,6%	
	Buzansky village council	5324	8	665.5	14,8%	
	Vatazhensky village council	3919	8	489.9	10,9%	
	Janaisky village council	1533	5	306.6	4,3%	
	Krasnoyarsky village council	17072	8	2134.0	47,6%	
	village Krasnyi Yar					
	Seitovsky village council	1455	8	181.9	4,1%	
	Total	35883	47	763.5	100%	11,68%
Limansky municipal district	Basinsky village council	1092	2	546.0	3,7%	
	municipal settlement Liman	8842	20	442.1	30,3%	

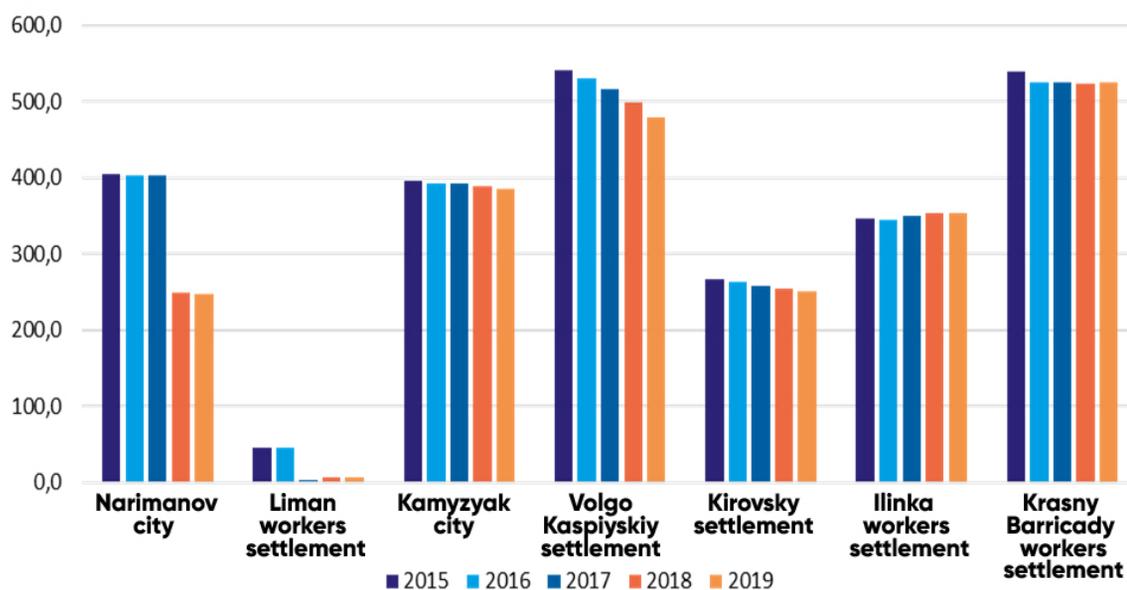
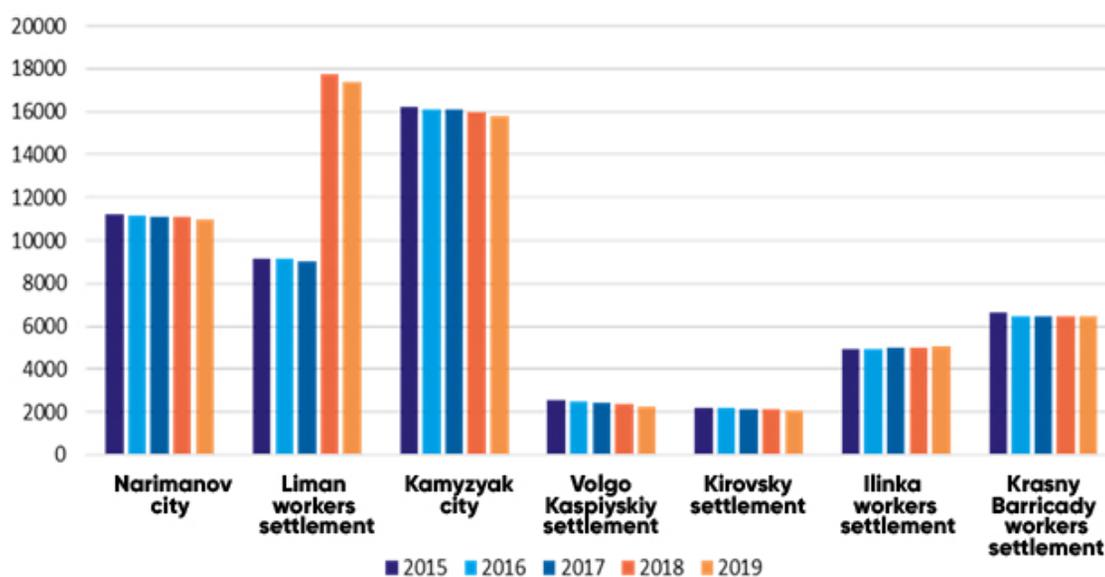
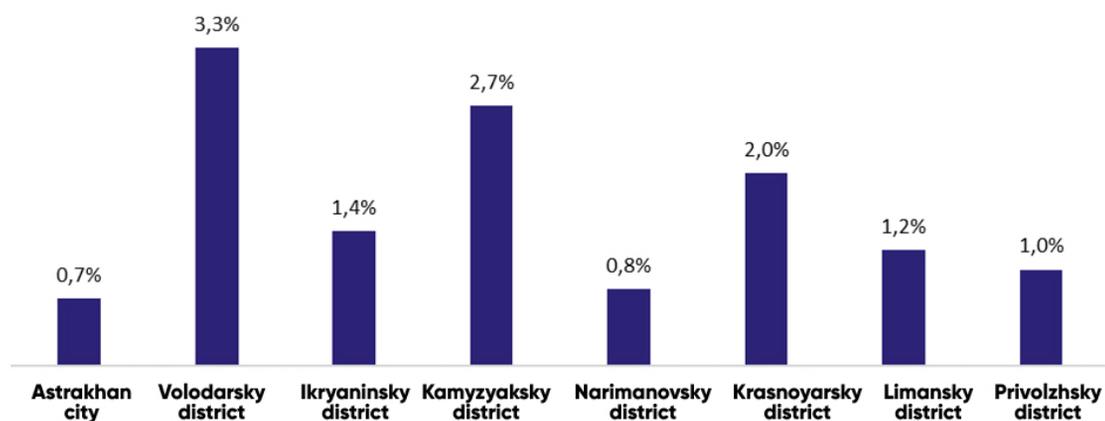


	Zenzelinsky village council	3033	1	3033.0	10,4%	
	Olinsky village council	3390	3	1130.0	11,6%	
	Promyshlovsky village council	1439	2	719.5	4,9%	
	Yandykovsky village council	3130	2	1565.0	10,7%	
	Total	20926	30	697.53	71,7%	9,5%
Narymanovsky municipal district	Astrakhan village council	2806	6	467.7	5,5%	
	Akhmatovsky village council	1301	4	325.3	2,6%	
	Baranovsky village council	973	2	486.5	1,9%	
	Volzhsky village council	3734	3	1244.7	7,4%	
	municipal settlement Narymanov					
	Lineininsky village council	2396	6	399.3	4,7%	
	Nikolsky village council	4858	1	4858.0	9,6%	
	Prikaspiyskiy village council	1917	5	383.4	3,8%	
	Raznochinovsky village council	1728	5	345.6	3,4%	
	Rassvetsky village council	2069	4	517.3	4,1%	
	Solyanskiy village council	8098	6	1349.7	16,0%	
	Starokucherganovsky village council	10061	5	2012.2	19,8%	
	Total	39941	47	849.8	78,8%	16,5%
	Privolzhsky municipal district	Biryukovsky village council	2666	3	888.7	5,1%
Yevpraksinskiy village council		2483	3	827.7	4,7%	
Kilinchinsky village council		3650	4	912.5	6,9%	
Nachalovsky village council		12756	7	1822.3	24,2%	
village Nachalovo						



Novorychinsky village council	1513	1	1513.0	2,9%	
village settlement, village Karagali	2806	1	2806.0	5,3%	
village settlement, village Osipnoy Bugor	3865	1	3865.0	7,3%	
village settlement, village Ractopulovka	2463	1	2463.0	4,7%	
Tatarobashmakovsky village council	4974	7	710.6	9,4%	
Trekhprotoksky village council	5353	4	1338.3	10,1%	
Funtovsky village council	5301	3	1767.0	10%	
Yaxatovsky village council	4949	4	1237.3	9,4%	
Total	52779	39	1353.3	100%	17,17%
Total (without the city of Astrakhan)	256774	316	812.58	83,55%	



Fig. 272. Population density, people per km²**Fig. 273. Population size****Fig. 274. Unemployment rate, 2019, %**

Brief socio-economic characteristics of the agglomeration area

Table 48. Economic specialisations of the municipalities included in the agglomeration

	Astrakhan	Akhtubin sky district	Volodar sky district	Enotaev sky district	Ikryanin sky district	Kamizyak sky district
Agriculture, forestry, hunting, fishing and fish farming	0,51%	2,22%	8,88%	0,00%	6,94%	8,11%
Production output	2,99%	0,00%	0,00%	0,00%	0,00%	0,00%
Manufacturing industries	5,69%	5,12%	2,49%	0,00%	18,78%	0,00%
Electricity, gas and steam supply; air conditioning	5,09%	2,69%	0,00%	2,88%	2,07%	1,31%
Water supply; wastewater disposal, waste management, pollution abatement activities	2,85%	3,34%	1,14%	5,48%	4,58%	4,99%
Construction	1,69%	2,15%	0,00%	0,00%	2,09%	0,00%
Wholesale and retail trade; repair of motor vehicles and motorbikes	6,60%	2,99%	1,33%	2,68%	1,15%	0,99%
Transport and storage	8,65%	4,75%	3,66%	7,82%	4,12%	2,78%
Hotels and catering establishments activities	0,62%	1,02%	0,00%	1,98%	0,51%	0,16%
Information and communication activities	1,93%	0,64%	0,00%	0,62%	0,00%	0,00%
Financial and insurance activities	3,16%	0,19%	0,13%	0,12%	0,10%	0,16%
Real estate activities	0,50%	3,74%	0,95%	0,00%	0,75%	0,32%
Professional, scientific and technical activities	2,71%	9,30%	0,00%	2,76%	1,71%	2,37%
Administrative activities and related ancillary services	1,87%	2,45%	1,22%	4,41%	1,39%	2,53%
Public administration and military security; social security	18,66%	28,16%	16,62%	14,41%	7,92%	15,67%



Education	15,48%	17,72%	39,66%	27,50%	27,37%	33,87%
Health and social services activities	17,69%	12,11%	21,02%	26,88%	19,00%	25,11%
Cultural, sporting, recreational and entertainment activities	2,86%	1,21%	2,49%	1,89%	1,17%	1,17%
Provision of other services	0,44%	0,20%	0,40%	0,58%	0,34%	0,47%

Table 48 continued. Economic specialisations of the municipalities included in the agglomeration

	Krasnoyar sky district	Naprimanov sky district	Liman sky district	Chernoyar sky district	Privolzh sky district	Kharabalinsky district
Agriculture, forestry, hunting, fishing and fish farming	1,45%	4,95%	3,70%	3,88%	0,00%	23,43%
Production output	7,79%	6,34%	0,00%	0,00%	0,00%	0,00%
Manufacturing industries	45,41%	12,23%	0,00%	0,00%	3,15%	0,00%
Electricity, gas and steam supply; air conditioning	4,49%	0,53%	0,00%	2,53%	0,00%	1,84%
Water supply; wastewater disposal, waste management, pollution abatement activities	4,25%	1,49%	3,47%	3,46%	3,92%	3,29%
Construction	2,08%	7,25%	0,00%	19,92%	2,83%	3,17%
Wholesale and retail trade; repair of motor vehicles and motorbikes	0,65%	1,08%	1,05%	2,71%	3,56%	2,02%
Transport and storage	7,99%	12,04%	25,31%	1,82%	0,80%	10,22%
Hotels and catering establishments activities	2,16%	0,59%	0,00%	0,00%	3,18%	0,32%
Information and communication activities	0,00%	0,00%	0,00%	0,00%	0,00%	0,91%

Financial and insurance activities	0,08%	0,03%	0,13%	0,00%	0,00%	0,12%
Real estate activities	0,03%	0,51%	0,00%	0,61%	9,89%	1,65%
Professional, scientific and technical activities	2,08%	3,76%	3,78%	6,91%	3,68%	0,00%
Administrative activities and related ancillary services	3,88%	1,25%	1,45%	2,92%	0,00%	2,10%
Public administration and military security; social security	3,94%	13,90%	13,98%	12,54%	14,28%	8,87%
Education	8,26%	12,32%	24,85%	22,95%	37,72%	22,57%
Health and social services activities	4,42%	18,47%	19,34%	14,79%	12,51%	17,81%
Cultural, sporting, recreational and entertainment activities	0,86%	0,57%	2,68%	4,56%	4,30%	1,45%
Provision of other services	0,18%	2,70%	0,26%	0,39%	0,18%	0,24%

Table 49. Key indicators of the socio-economic development of municipalities

District	Demography and settlement system					GVA/ person	Average wage
	Population	POPG	HHI	U/P	C/P		
Akhtubinsky district	61 630	more than 3 of reduction	3 793	76%	59%	76.4	30451.6
Volodarsky district	46 234		674	0	21%	17.6	22842.9
Enotaevsky district	24 749		1 384	0	31%	132.7	44336.2
Ikryaninsky district	46 443		912	25%	22%	15.3	23889.3
Kamyzyaksky district	46 096		1 297	44%	34%	36.6	24259.4
Krasnoyarsky district	36 641	3	1 362	0	33%	284.5	64730.6
Narimanovsky district	47 547	1	976	23%	23%	117.8	45954.1



Limansky district	29 192		1 094	28%	28%	62.0	33196.7
Chernoyarsky district	18 488		1 987	0	41%	58.8	29031.9
Privolzhsky district	52 779		584	0	10%	26.1	27554.4
Kharabalinsky district	39 489		2 252	0	44%	32.6	26138.1

District	Agriculture			Handling	Small business
	Area of agriculture fields, ha	Agriculture production, thsd. rub.	Agriculture production per 1 ha, thsd. rub.	Number of enterprises (OKVED D)	Number of small and medium-sized business entities
Akhtubinsky district	262,105.57	6 196 945	23.6	15	1758(2019)
Volodarsky district	95 566,31	3 392 289	35.5	12	1072(2020)
Enotaevsky district	43 342,61	4 619 711	106.6	2	63 (2018)
Ikryaninsky district	62 569,53	1 807 012	28.9	21	-
Kamyzyaksky district	12 402,79	3 305 920	266.5	17	904 (2019)
Krasnoyarsky district	405,435.44	3 185 910	7.9	12	744 (2017)
Narimanovsky district	11 243,25	3 782 242	336.4	42	1 489 (2020)
Limansky district	201,713.67	4 142 245	20.5	7	963 (2018)
Chernoyarsky district	259,418.1	5 580 631	21.5	2	-
Privolzhsky district	23 326,05	5 629 979	241.4	33	1 558 (2018)
Kharabalinsky district	563,765.23	8 056 803	14.3	4	1 293 (2020)

Symbols for table 49

HHI is Herfindahl-Hirschman index; shows the level of population concentration in the settlement network of the municipality area.

U/P is the level of urbanisation of the area. *Source:* Calculation based on the indicators of Database of Indicators of Municipal Entities.

C/P is the proportion of the district's population concentrated in its largest population centre. *Source:* Calculation based on the indicators of Database of Indicators of Municipal Entities.

GVA/person is the gross value added created in the municipal area, calculated per inhabitant in the area. Gross value added is calculated as the sum of the wage fund organisations in the district and their financial result. *Source:* Calculation based on the indicators of Database of Indicators of Municipal Entities.

POPG is an indicator of the rate of population growth in an area. Red - if the population has fallen for more than 3 consecutive years, yellow - for less than 3 consecutive years, green - there has been an increase in the



last year. *Source:* Calculation based on the indicators of Database of Indicators of Municipal Entities.

Average wage is the average monthly wage of employees of enterprises (excluding small enterprises) in 2019. *Source:* Database of Indicators of Municipal Entities.

Number of small and medium-sized business entities - the number of small and medium-sized business entities registered in the district at the reporting date. *Source:* reports and proceedings of the heads of municipalities presented on the websites of municipal administrations.

Number of enterprises (OKVED D) - number of enterprises (excluding small enterprises) registered in the district as at the reporting date, operating in the field of manufacturing industry in 2019. *Source:* Database of Indicators of Municipal Entities.

Agricultural production , thsd. rub. - agricultural production in 2019 *Source:* Database of Indicators of Municipal Entities.

Area of agricultural fields, ha - area of agricultural fields. *Source:* Analytical Centre of Ministry of Agriculture of RF.



Table 50. Crop yield, hundred kilograms per hectare of the harvested acreage (according to the 2019 data)¹⁸⁴

Crops	Akhtubin sky	Volodar sky	Enotaev sky	Ikryanin sky	Kamizyak sky	Krasnoyar sky	Naprimanov sky
Grain and grain legumes - total	11.6				38.4		
Winter wheat	0.7				4		
Winter rye	13.8						
Spring barley	12.5	14.8	10.8		26.8		
Potatoes	302.1	261.9	374.3	330.4	140.3	210.8	229.8
Vegetables - total	574.9	345.8	507.9	343.8	413.2	432.2	456.4
All sorts of cabbage	346.8	338.8	338.8	322.9	230.6	420	406.2
Cucumbers	305.6	372.9	373.2	344.8	286.5	360.5	300.2
Tomatoes	618.1	365.7	508.2	366.9	467.8	449.9	451.9
Red beet	387.3	433.7	387.5	348.6	381.4	27.9	608.8
Garden carrot	434.8	434	586.8	214.6	552.8	338.3	421.4
Onion	620.2	254.1	563.3	586.9	154.5	483.4	556.4
Garlic	192.1	192.2	192	192.1	192.1	192	192
Pumpkin	325.3	325.3	325.3	220	325.3	325.3	336.9
Marrow squash	325.3	325.3	220.5	325.3	277.8	520.8	585.1
Food cucurbits	511.1	289.2	537.4	206.7	339	310.7	404.4
Root feed crops		111.3			111.4		
Feed cucurbits	122.9	79.6			133.3		
Fruits and berries	76	79.6	70.5	87.9	77	78	83
Pomaceous fruits	39.6	39.7	39.7	68.8	39.4	39.6	39.6

¹⁸⁴ Source: Database of Indicators of Municipal Entities.



Stone fruits	102	102	102.2	102	99.6	101.7	102
Nucicultures	54.4	54.7	57	55	55.1	56.1	55.1
Berry-fields	104	103.7	61.4	104.1	106.7	104.6	129.4
Grape plantings	173	174.1	163.4	173.3	138.9	176.8	169.3
Annual haylage	16.8	39.1					9.8
Annual soilage	37	24.9			37		37
Perennial grasses - total for hay	21	13.8	20		24.6	11.5	18
Perennial coverless grasses	20.2	4.9			70.4	34	

Table 50 (continued). Crop yield, hundred kilograms per hectare of the harvested acreage (according to the 2019 data)

Crops	Limansky	Chyornoyarsky	Privolzhsky	Kharabalinsky
Grain and grain legumes - total	30.9	17.6	39.2	26.7
Winter wheat	30.1	17.4		37
Winter rye		14.8		10.2
Spring barley	35		38.8	28
Potatoes		183.6	308.5	294.7
Vegetables - total	521.6	536.8	511.5	717.2
All sorts of cabbage	188.4	532	575.7	361.1
Cucumbers	358.7	390.2	415.8	376.2
Tomatoes	580.8	596.6	536.9	762.3
Red beet	358.1	387.3	494.3	522.8
Garden carrot	410	532.3	356.2	539.9
Onion	586	782.5	453.6	629.7
Garlic	192.1	192	192.1	192



Pumpkin	382.2	448.7	430.1	312.5
Marrow squash	325.3	455.6	609.6	325.5
Food cucurbits	410.7	459.4	369.7	255.6
Root feed crops		1000		
Feed cucurbits				
Fruits and berries	70.9	55.3	72.5	76
Pomaceous fruits	38.6	30.7	35.7	60.5
Stone fruits	84.7	84.9	80.8	102.1
Nucicultures	55.8	58.7	55.1	51
Berry-fields	104.1	104.5	104	96
Grape plantings	155.5	142.2	165.5	175
Annual haylage	54.1	20		21.9
Annual soilage		37		52.6
Perennial grasses - total for hay	99.4	30.9	23	56.2
Perennial coverless grasses	39.6		57	55.5



Table 51. Brief characteristics of the municipal districts of Astrakhan agglomeration considering the potential economic growth¹⁸⁵

MU of Astrakhan agglomeration	Potential economic growth	Description, area of development
Privolzhsky district	Conditionally depressed zone	<p>Agricultural sector (crop production) prevailing.</p> <p>Convenient location in close proximity to the “core” of the agglomeration from the point of view of infrastructure communications.</p> <p>However, this is simultaneously a deterrent of the economic development.</p> <p>Low manageability of economic processes prevents efficient use of economic potential of the zone and improvement of the quality of life of the population</p>
Krasnoyarsky and Narimanovsky districts	zone of prospective development	<p>Hydrocarbon raw materials production prevailing (gas, gas condensate, sulfur).</p> <p>The Astrakhan gas condensate deposit has been in commercial development since 1986. The investment plan of Gazprom Production Astrakhan LLC and Gazprom Processing LLC supposes the further production development considering the creation of the polyethylene production complex, the construction of additional “dry” sulfur granulation facilities, the reconstruction of process units, etc.</p> <p>The prospective development is also related to the development project of the special economic zone of industrial and production type “Lotos”. It is supposed that the territory of the SEZ “Lotos” will include both the production facilities with small initial investment and capital-intensive enterprises (for example, ship- and crane-building, machine-building plants, service centers).</p>
Volodarsky and Kamyzyaksky districts	current zone	<p>Fishery and fish-farming and related fish and fish products processing prevailing.</p> <p>To a lesser extent, food production (vegetable products processing, baking industry), agricultural sector (vegetables, rise, potato, cattle breeding), tourism.</p> <p>Favorable geographical position and location along the Volga delta are particularly attractive for tourists.</p> <p>The main kinds and areas of tourism are fishing, hunting, spearfishing, winter fishing, excursions to lotus fields. There is a potential for development of ethno- and event-related tourism.</p>
Ikryaninsky and Limansky districts	zone of prospective development	<p>Industrial production (ship-building), transport logistics activity prevailing, to a lesser extent - agricultural sector (vegetable growing, potato growing, melon growing, dairy and beef breeding, sheep breeding and poultry breeding), fishery and tourism (recreational potential).</p>

¹⁸⁵ According to the Ministry of Economic Development of Astrakhan region.



Availability of the main ship channel, the single access to the Caspian Sea for large-capacity vessels, allows for arranging the large ships manufacturing facilities and other technical facilities for exploration and operation of carbon resources of the Caspian Sea. It is supposed to develop the production activities of the Krasnye Barrikady Shipbuilding Plant.

The development of the International Transport Corridor “North-South” (hereinafter - the ITC “North-South”) is considered as the key development area of the transport infrastructure.

The arrangement of the port-based special economic zone will create conditions for modernization of the port infrastructure, as well as the development of the port-side territory in terms of cargo handling, prepackaging for creation of higher value-added cost of the transported goods. Favorable conditions for business, including foreign, for creation of the port-based logistics center.



Socio-demographic research results

Kamyzyaksky district

Fig. 275 Population of the Krasnoyarsk region

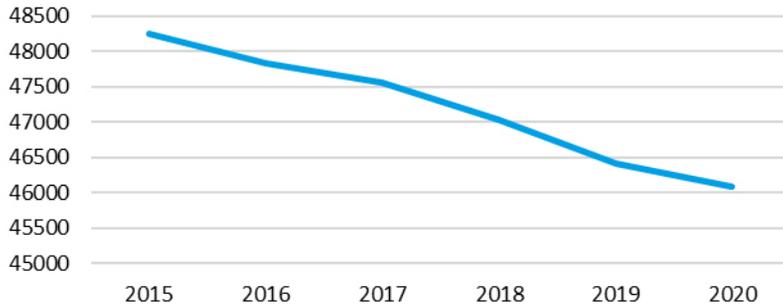


Fig. 276 Demographic load coefficient

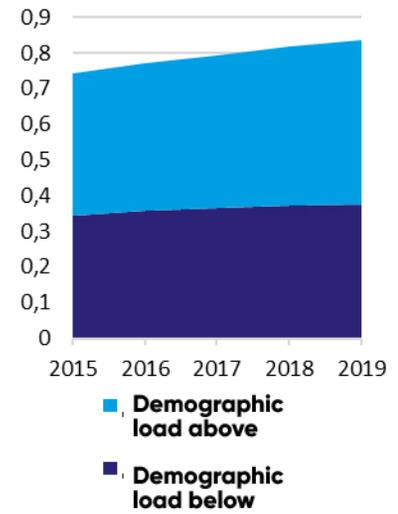


Fig. 277 Population growth (decline) and its components

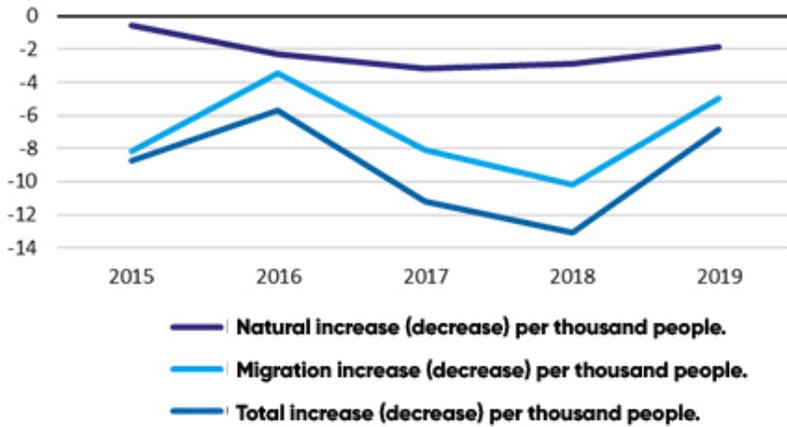
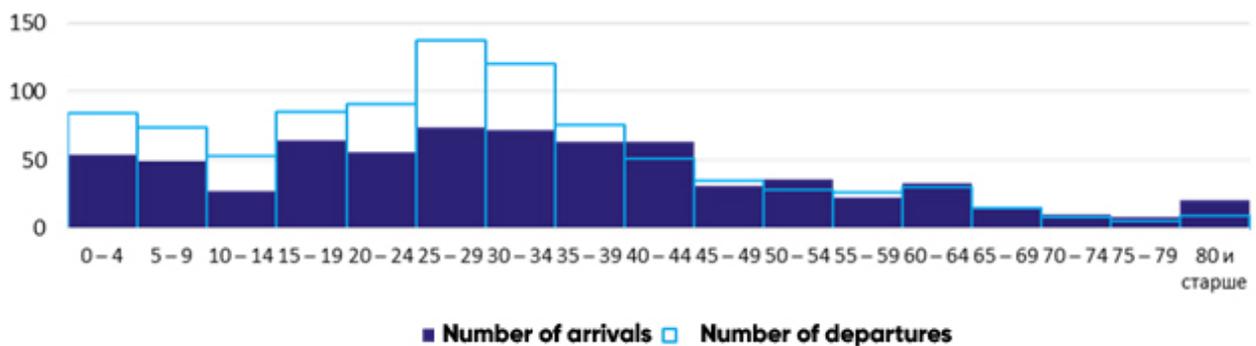


Fig. 278 Age structure of migration



Stable reduction in the population is observed in the district that is, mainly, due to the migration outflow of the population. At this, the district is attractive for people nearing pension age and of pension age that further aggravates the situation with the ageing of the population; for the last 5 years, the demographic burden coefficient has increased from 7.5 to 8.5, like in Astrakhan, due to increase in the aged population; this is one of three districts of the agglomeration where the demographic burden coefficient from upper limit is higher than the demographic burden coefficient from lower limit.



Krasnoyarsky district

Fig. 279 Population of the Krasnoyarsk district

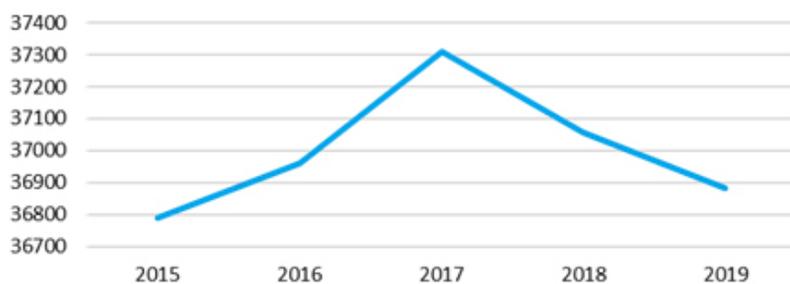


Fig. 281 Population growth (decline) and its components

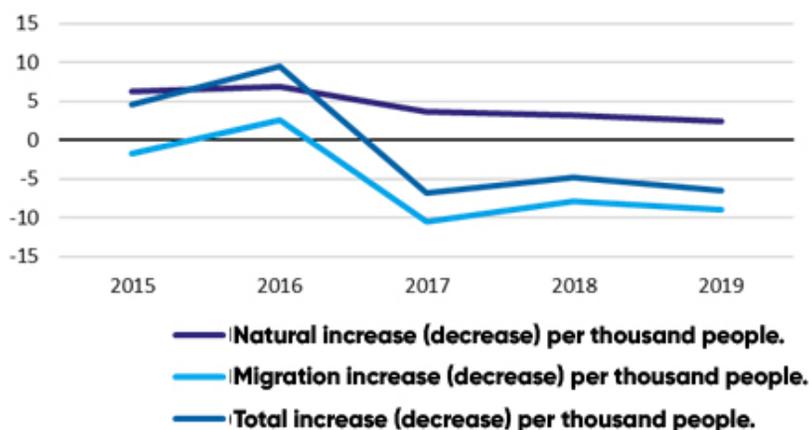


Fig. 280 Demographic load coefficient

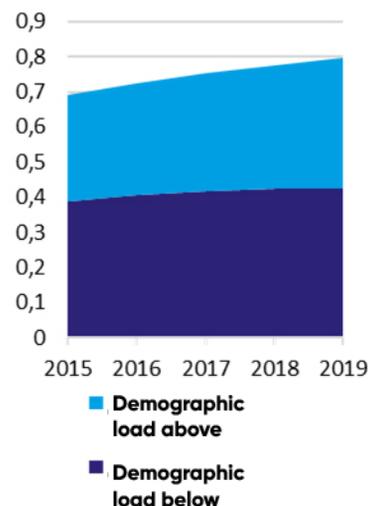
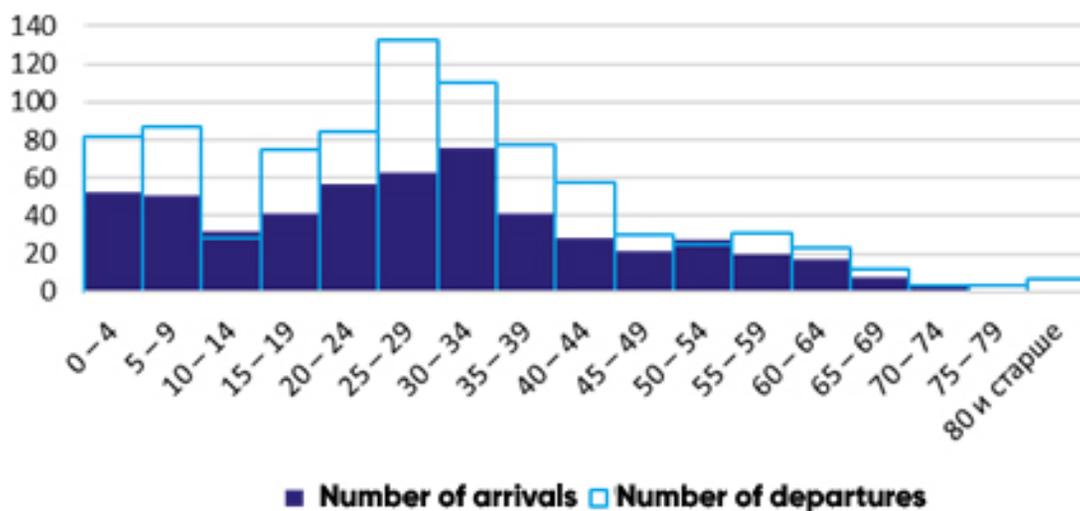


Fig. 282. Age structure of migration



The unstable population size is due to the unstable migration inflow and outflow. The natural population growth that balanced the migration outflow in 2015 downtrends. The migration inflow in two age groups is rather a statistical error than an explainable trend. Also, there is a trend to ageing of the population, if the demographic burden with the under-working age population has not practically changed, the burden with the over-working age population has increased and become equal to the burden from lower limit.



Ikryaninsky district

Fig. 283 Population of the Ikryaninsky district

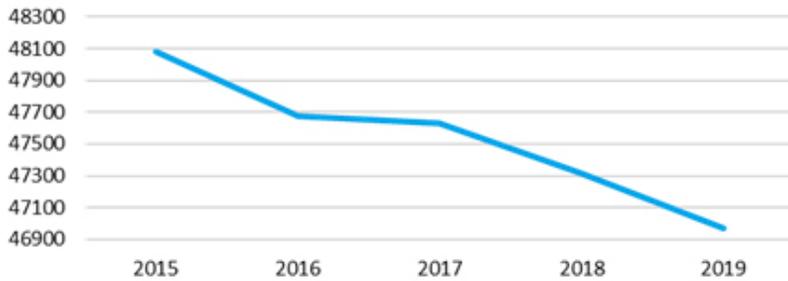


Fig. 285 Population growth (decline) and its components

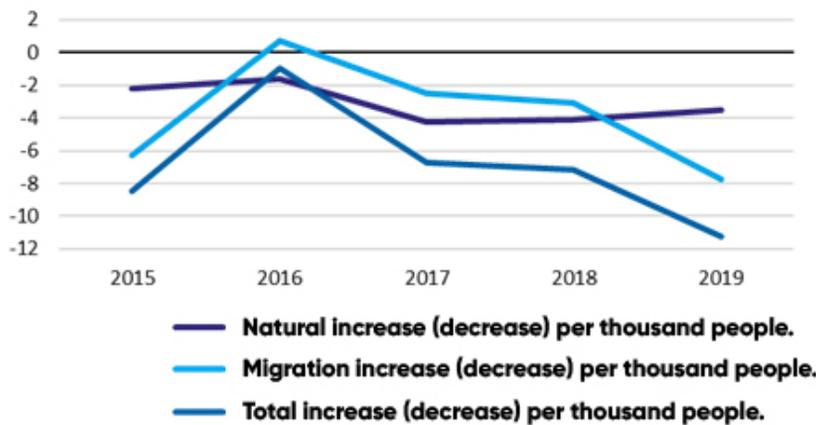


Fig. 280 Demographic load coefficient

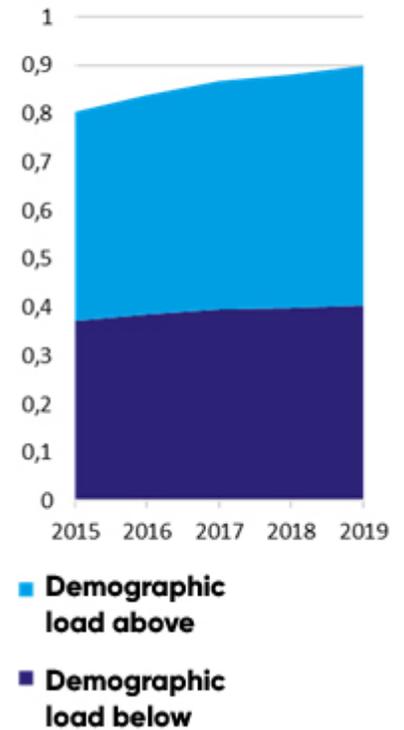
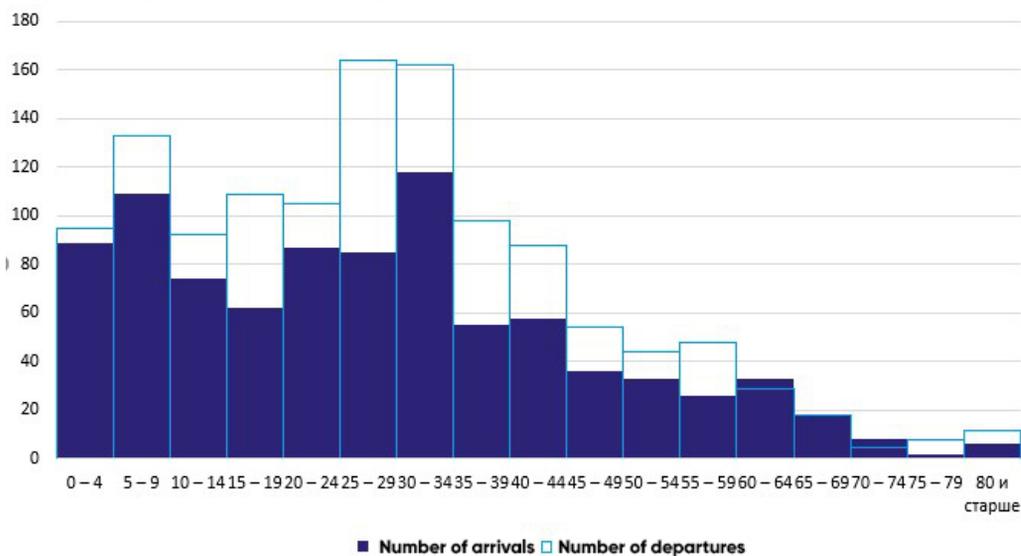


Fig. 286. Age structure of migration



Ikryaninsky district is characterized by stable decrease in the population size. The increase in the natural population loss and migration outflow in all age groups, except the over-working age people, leads to rapid ageing of the population, as a result, this is one of the oldest districts of the agglomeration from the point of view of the ratio of the over-working age population to the working age population, this is the second district where the demographic burden coefficient from the upper limit is more



than the demographic burden coefficient from the lower limit.



Volodarsky district

Fig. 287. Population of Volodarsky district

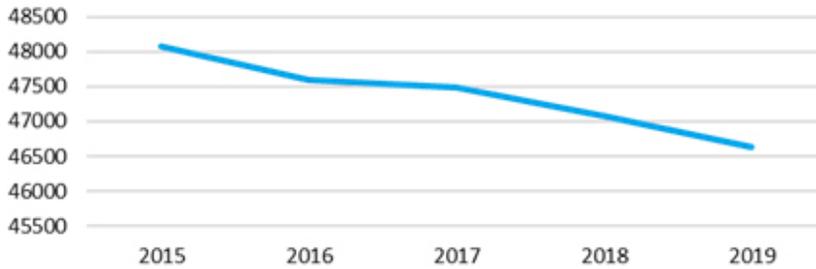


Fig. 288 Demographic load coefficient

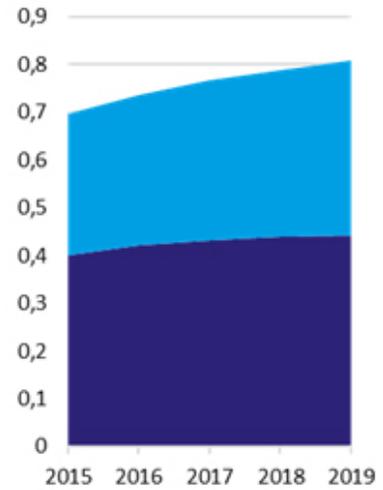
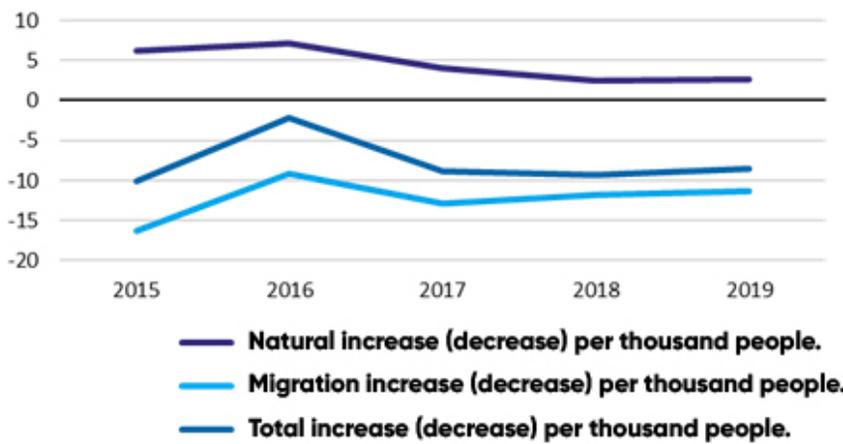
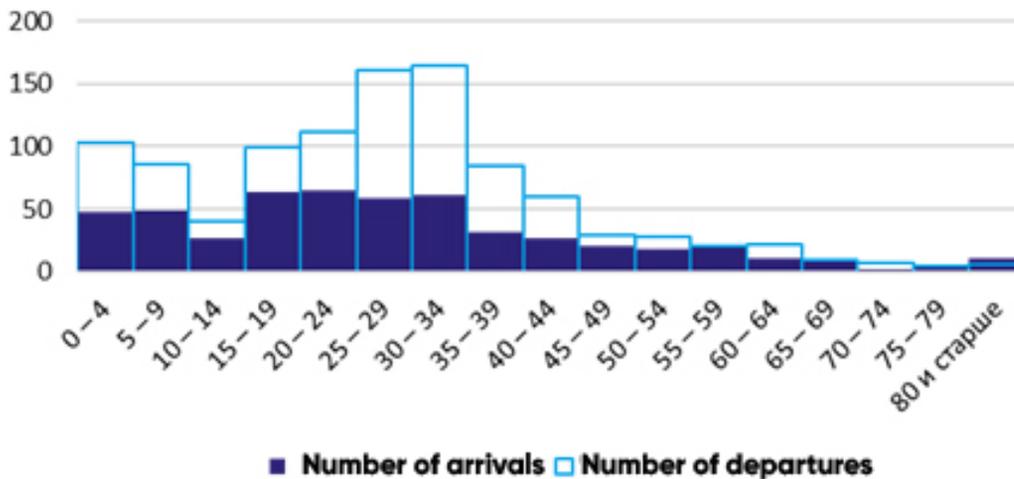


Fig. 289. Population growth (decline) and its components



Stable reduction in the population is due to the migration outflow in all age groups, especially in the group of 25-34 years old. Decrease in the natural population growth and increase in the demographic burden coefficient from the lower limit occur simultaneously.

Fig. 290. Age structure of migration



Narimanovsky district

Fig. 291. Population of Narimanovsky district

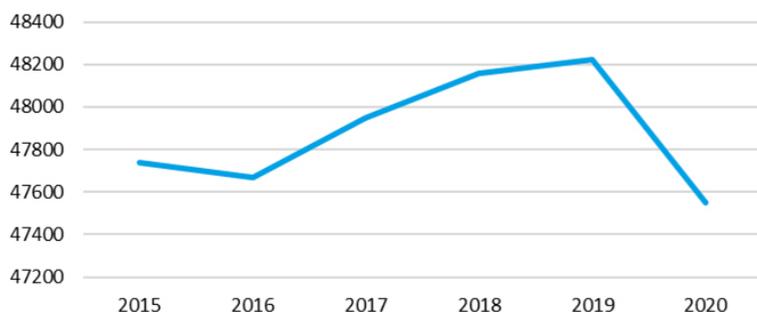


Fig. 292 Demographic load coefficient

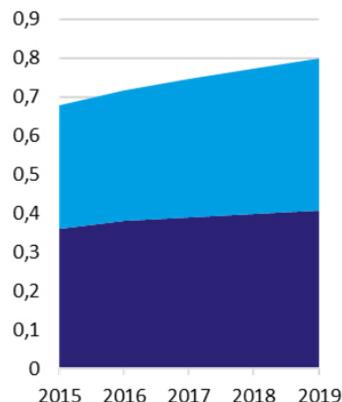
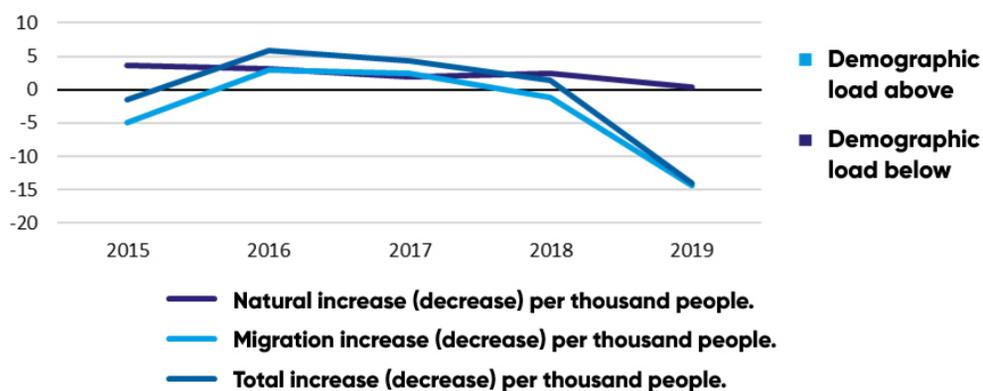
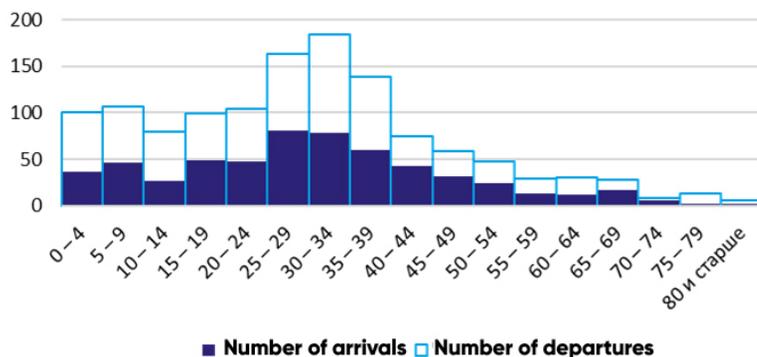


Fig. 293. Population growth (decline) and its components



2 years of stable population growth have changed to the population loss due to migration outflow, and this is in all age groups, especially of the working age groups; this also results in ageing of the population (the demographic burden coefficient has increased from the upper limit).

Fig. 294. Age structure of migration



Privolzhsky district

Fig. 295. Population of Privolzhsky district

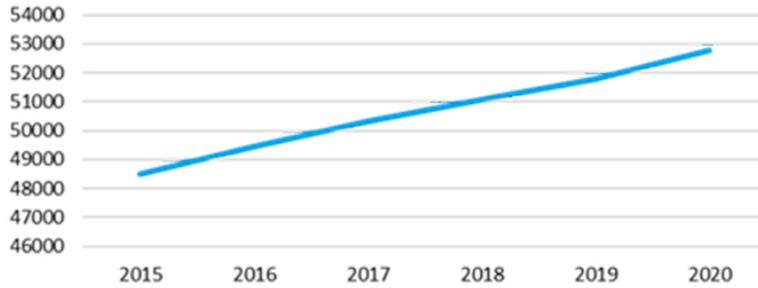


Fig. 296 Demographic load coefficient

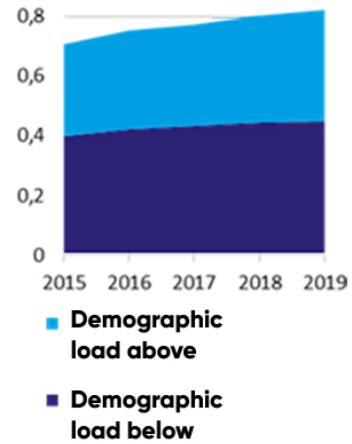


Fig. 297. Population growth (decline) and its components

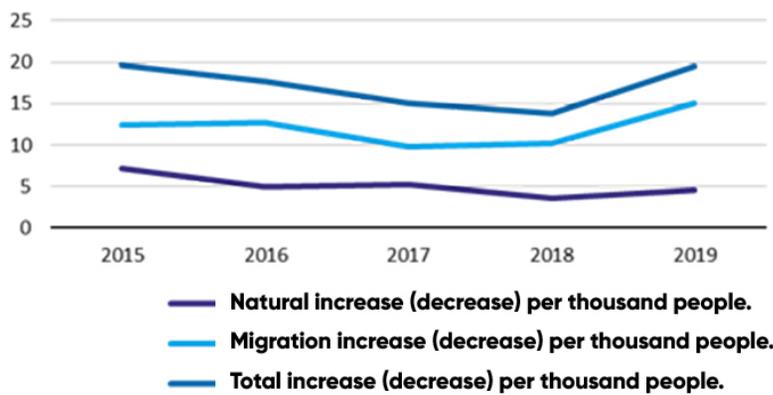
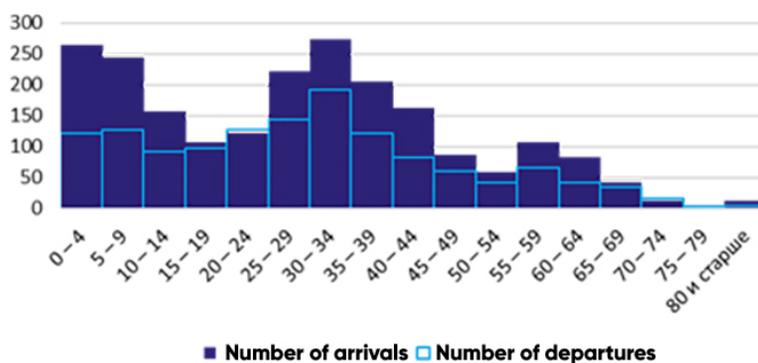


Fig. 298. Age structure of migration



Privolzhsky district is characterized by the best demographic situation in the agglomeration. Stable migration and natural population growth, positive migration balance in all age groups of the population, all this evidences the positive situation in the district. Nevertheless, like in the other districts, trend to ageing of the population persists.



Limansky district

Fig. 299. Population of Limansky district

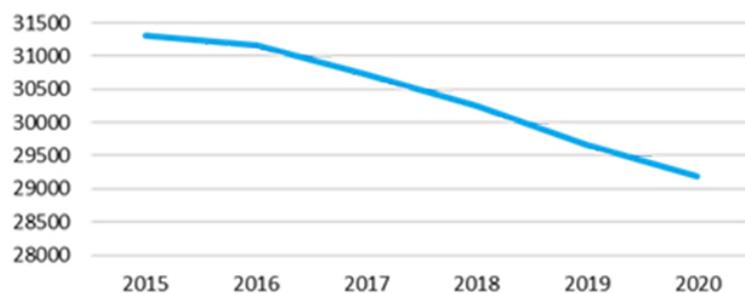


Fig. 300. Demographic load coefficient

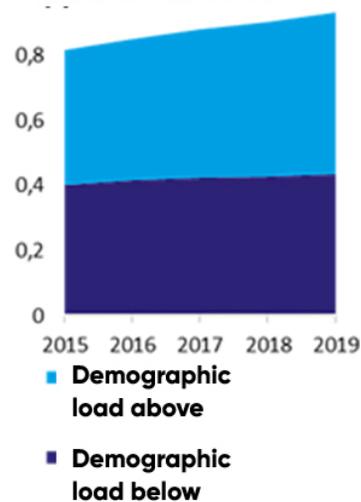


Fig. 301. Population growth (decline) and its components

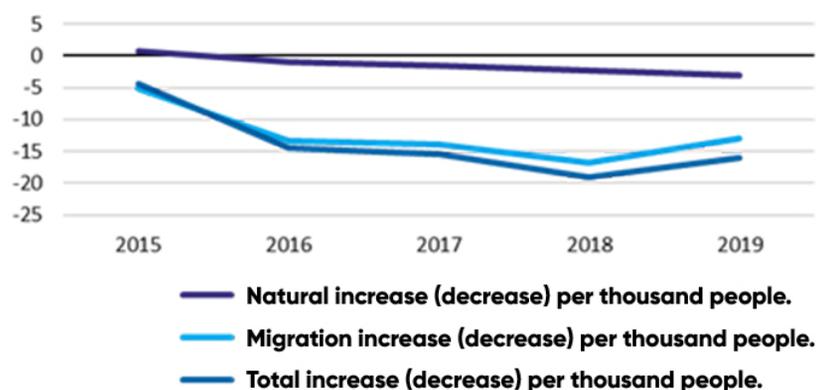
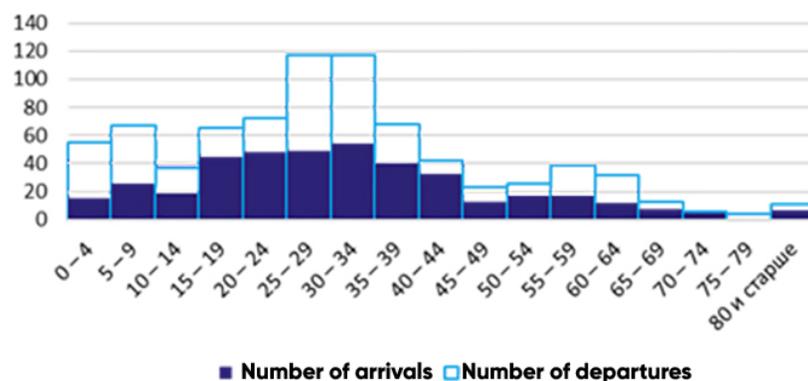


Fig. 302. Age structure of migration



Limansky district shows the worst demographic situation in the agglomeration, in addition to the migration and natural population loss, outflow of the working-age population, this is the oldest district from the point of view of the percentage of the over-working age people, and also the highest burden on the working-age people with the unemployable age population is observed here. This is the third district where the demographic burden coefficient from the upper limit is more than the demographic burden coefficient from the lower limit.

APPENDIX 16. BRIEF CHARACTERISTICS OF THE URBAN DEVELOPMENT OF THE AGGLOMERATION

Table 53. Analysis of the housing development rates in Astrakhan

Municipal units	2014	2015	2016	2017	2018	2019
Astrakhan	361.7	306.2	339.8	273.9	170.3	119.0
incl. Individual housing construction	147.0	124.7	169.1	79.7	83.7	38.1
incl. Multi-unit apartment buildings	214.7	181.5	170.7	194.2	86.6	80.9

Table 54. Analysis of rates of housing construction in the territory of Astrakhan agglomeration.

Municipal units	2014	2015	2016	2017	2018	2019
Astrakhan	361.7	306.2	339.8	273.9	170.3	119.0
incl. Individual housing construction	147.0	124.7	169.1	79.7	83.7	38.1
incl. Multi-unit apartment buildings	214.7	181.5	170.7	194.2	86.6	80.9
Privolzhsky district	93.4	54.2	111.7	76.1	59.8	65.5
incl. Individual housing construction	93.4	44.9	111.7	74.3	59.8	65.5
incl. Multi-unit apartment buildings	0.0	9.3	0.0	1.8	0.0	0.0
Narimanovsky district	24.6	36.1	15.3	3.5	11.2	40.3
incl. Individual housing construction	11.1	36.1	15.3	3.5	7.3	28.8
incl. Multi-unit apartment buildings	13.5	0.0	0.0	0.0	3.8	11.6
Krasnoyarsky district	19.9	14.3	10.8	16.7	13.5	9.5



incl. Individual housing construction	17.0	13.1	9.1	15.7	13.0	9.2
incl. Multi-unit apartment buildings	2.9	1.2	1.7	1.0	0.5	0.3
Ikryaninsky district	8.1	6.1	4.2	7.3	8.9	13.7
incl. Individual housing construction	8.1	5.6	2.9	4.0	5.7	10.9
incl. Multi-unit apartment buildings	0.0	0.5	1.3	3.3	3.2	2.8
Volodarsky district	17.0	16.9	8.8	11.0	6.2	3.9
incl. Individual housing construction	11.8	16.9	8.6	8.8	5.1	2.6
incl. Multi-unit apartment buildings	5.2	0.0	0.2	2.2	1.1	1.3
Kamyzyaksky district	21.0	20.5	24.9	12.4	5.4	16.3
incl. Individual housing construction	17.6	18.2	12.8	9.8	5.4	16.3
incl. Multi-unit apartment buildings	3.4	2.3	12.1	2.6	0.0	0.0
Limansky district	9.1	3.2	5.2	2.0	5.4	3.4
incl. Individual housing construction	9.1	2.9	4.8	2.0	3.4	3.1
incl. Multi-unit apartment buildings	0.0	0.3	0.5	0.0	2.0	0.3
TOTAL	554.8	457.5	520.8	403.0	280.6	271.5
incl. Individual housing construction	315.1	262.4	334.3	197.8	183.3	174.4
incl. Multi-unit apartment buildings	239.6	195.1	186.4	205.2	97.2	97.1

Table 55. Information about development companies in Astrakhan region ¹⁸⁶

Item No.	Name of the project developer	Area of the facilities under construction, sq.m
1	DK Progress LLC	85,314
2	RAZUM LLC	59,130
3	PKF Nizhvolzhskaya Construction Company LLC	23,997
4	Regionkapstroy LLC	14,764
5	Buran LLC	13,213
6	SIK Development-Yug LLC	12,663
7	REGIONELITSTROY LLC	11,518
8	Managing Construction Company Stroykompleks LLC	11,464
9	VKRK LLC	10,068
10	ZHSK Tamansky LLC	9,383
11	Firm Lutan-StroyServis LLC	5,005
12	SK Invest-Stroy LLC	4,466
13	SK Kvartal LLC	2,778

Table 56. Breakdown of the housing stock of Astrakhan by periods of construction

Year of construction	Living area, ths. sq. m
2010-2019	972.1
2000-2009	923.8
1990-1999	853.3
1980-1989	1693.8
1970-1979	1245.5
1960-1969	880.9
1950-1959	75.4
1940-1949	0.0
1930-1939	40.2

¹⁸⁶ Source - Unified Register of Construction Developers.

1920-1929	6.2
Before 1919	46.3

Table 57. Breakdown of construction pattern of the main settlements of the agglomeration by types of housing

Municipal units	Total area of ¹⁸⁷ housing, ths. m ²	Multi-unit apartment buildings, ths. m ²	including distressed	Individual housing construction, ths. m ²
Astrakhan	13798.3	6738.2	103.6	7060.1
Volodarsky district	1046.9	12.8	0.0	1034.1
Volodarsky	238.5	12.8	0.0	225.7
Other settlements	808.4	0.0	0.0	808.4
Ikryaninsky district	1069.1	56.6	0.0	1012.5
Ikryanoye (village)	292.8	16.4	0.6	276.4
Krasnye Barrikady	149.2	39.5	0.0	109.7
Ilyinka	106.2	0.7	0.0	105.5
Other settlements	520.9	0.0	0.0	520.9
Kamyzyaksky district	1184.8	129.2	0.0	1055.6
Kamyzyak	406.9	129.2	27.7	277.7
Other settlements	777.9	0.0	0.0	777.9
Krasnoyarsky district	780.2	45.6	0.0	734.6
Krasny Yar (village)	398.4	45.6	1.6	352.8
Other settlements	381.8	0.0	0.0	381.8
Limansky district	808.3	27.4	0.0	780.9
Liman (village)	520.2	27.4	0.0	492.8
Other settlements	288.1	0.0	0.0	288.1
Narimanovsky district	1067.5	198.7	0.0	868.8
Narimanov	215.3	197.9	4.4	17.4
Solyanka (village)	231.4	0.8	0.0	230.6

¹⁸⁷ According to the data of the Ministry of Construction of Astrakhan region for 2020



Starokucherganovka (village)	200.4	0.0	0.0	200.4
Other settlements	420.4	0.0	0.0	420.4
Privolzhsky district	1658.9	8.8	0.0	1650.1
Nachalovo (village)	409.8	8.8	0.0	401.0
Other settlements	1249.1	0.0	0.0	1249.1



APPENDIX 17. BRIEF CHARACTERISTICS OF THE INFRASTRUCTURE OF THE AGGLOMERATION

Transport infrastructure

125 settlements (with the population of about 15.8 ths. People) of Astrakhan region are not provided with accesses from the hard-surface motor roads. The length of the motor roads without hard surface that lead to the settlements makes 863 km.

A specific feature of the road network of Astrakhan agglomeration is its location in the Volga delta, as a result, there are no fixed bridges, pontoon bridges and ferry lines are in operation in a number of directions. The most significant section having no constant motor road connection is the western part of Kamizyasky district in the direction of Karagali-Volga-Caspian-Zhitnoe. It is connected with the road network by ferry lines in the area of Volgo-Kaspiysky and Ikryanoye.

The road network of Astrakhan agglomeration is based on the radial principle, there are practically no cross connections that is restrained by complex hydrographic network and low population density in the Volga Delta.

The details of the road condition in the territory of Astrakhan region is given in Table 58.

2 sea ports operate in the territory of Astrakhan agglomeration: Olya and Astrakhan. The cargo turnover of Astrakhan and Olya ports for January-December 2020 made 3126.6 ths. tons of cargo. When reaching the project capacity, the port SEZ will ensure increase in the cargo turnover of the port by 8 mln. tons.

In general, 195 bridges and overpasses with the total length of more than 19 ths. m are in operation in the public roads of regional or intermunicipal significance. The bridge facilities are mostly made of reinforced concrete (151 pcs.). The remaining bridges are metal (43 pcs.) and wood (1 pc.).

There are 17 ferry lines on the public roads of regional or intermunicipal significance in the territory of the region. 44 ferry lines are owned by municipal or private units.

61

ferry line in the territory of Astrakhan region

195

bridge facilities in the territory of Astrakhan region



The risks of accidents on the motor roads and bridges of the city as a result of the unsatisfactory technical condition.

Emergency condition of the most of the bridge facilities, need in capital repair and reconstruction.

Main pipelines

The main oil pipeline system is represented by the oil pipeline Tengiz-Novorossiysk laid transversally and providing transit of the Kazakh oil to the Black Sea ports. The oil pipeline installation corridor is through the external periphery of Astrakhan agglomeration.

The oil pump station OPS 4A is located in the territory of Krasnoyarsky district, and OPS 5A - in the territory of Narimanovsky district.

The main gas pipeline system is represented by the main oil pipeleines Makat - Northern Caucasus, AGPP-Kamysh-Burun, Yermolinskoe-Astrakhan in the territory of Astrakhan agglomeration that provide gas transportation from the Astrakhan field to the unified gas pipeline system, transit of the Kazakh natural gas, as well as gas supply for consumers in the territory of Astrakhan agglomeration.

Table 58. Characteristics of the motor road condition in the territory of Astrakhan region

Districts	Length of public roads, km						Of the total length of public roads, km	
	total	including hard-surfaced		with improved surface among them		Length of roads non-conforming to the regulatory requirements		
	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year
Total for AG	4597.4	4512.8	1622.7	1544.8	1030.3	1031.4	3170.9	3357.7
Akhtubinsky	1169.1	1169.1	131.2	131.6	122.4	91.6	1120.9	1107.5
Rural settlements of Akhtubinsky district	615.3	615.3	50	50	41.2	10	615.3	605.3
Volodarsky	422.4	422.4	165.5	165.5	6.7	6.7	317.8	314.7
Rural settlements of Volodarsky district	422.4	422.4	165.5	165.5	6.7	6.7	317.8	314.7
Yenotaevsky	110	167.6	35	53.6	18.9	18.9	28.7	94.5



Rural settlements of Yenotaevsky district	110	167.6	35	53.6	18.9	18.9	28.7	94.5
Ikryaninsky	243.6	250	102.5	117	71.8	66.8	210.4	229.5
Rural settlements of Ikryaninsky district	187.5	187.5	78.1	78.1	54.8	54.8	178.7	178.7
Kamyzyaksky	363.2	361.9	106.5	93.5	49.7	88.9	326.8	348.1
Rural settlements of Kazymyaksky district	278.7	277	78.7	60.9	26.2	60.6	258	277
Krasnoyarsky	257.9	263.7	65.6	80.4	31	32.1	173.8	172.3
Rural settlements of Krasnoyarsky district	257.9	263.7	65.6	80.4	31	32.1	173.8	172.3
Limansky	88.8	86.9	59.4	54.2	55.4	54.2	38.9	37.2
Rural settlements of Limansky district	67.8	65.9	38.4	33.2	34.4	33.2	25.9	24.2
Narimanovsky	304.6	321.1	67.8	62	38.4	38.4	94.6	263.7
Rural settlements of Narimanovsky district	297.5	314	60.7	54.9	31.3	31.3	94.6	263.7
Districts	Length of public roads, km						Of the total length of public roads, km	
	total		including hard-surfaced		with improved surface among them		Length of roads non-conforming to the regulatory requirements	
	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year	as of the end of the previous year	as of the end of the reporting year
Privolzhsky	184.8	184.8	126.8	126.8	16.9	16.9	172	170.8
Rural settlements of Privolzhsky district	184.8	184.8	126.8	126.8	16.9	16.9	172	170.8
Kharabalinsky	461.5	294.8	185.3	85.3	42	42	228.9	162.3
Rural settlements of Kharabalinsky district	373.9	191.3	153.5	53.5	13.7	13.7	205.7	123.1

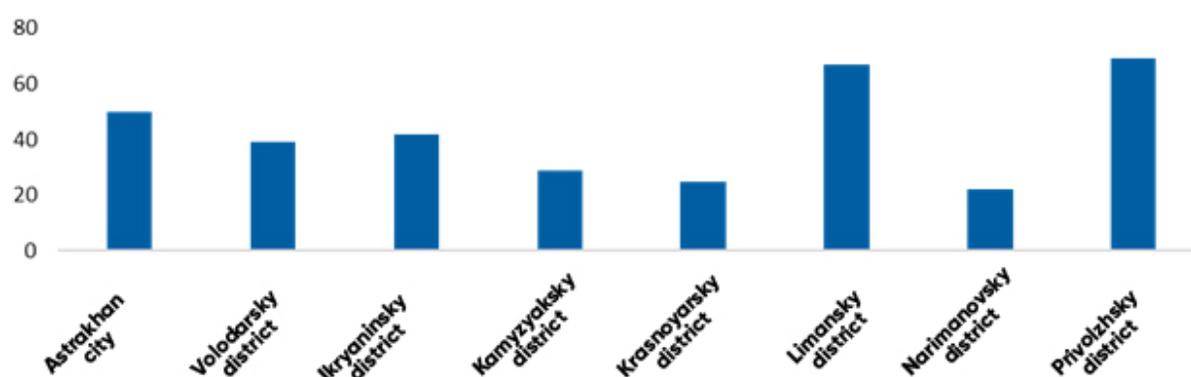


Chernoyarsky	124.2	121.8	123.3	121.8	123.3	121.8	33.9	29.8
Rural settlements of Chyornoyarsky district	124.2	121.8	123.3	121.8	123.3	121.8	33.9	29.8
Astrakhan	823.8	825.1	410.8	410.1	410.8	410.1	415	415

Table 59. Characteristics of the hard-surfaced roads of Astrakhan region

	Total	including			
		of federal significance	of regional and intermunicipal significance	of local significance	governmental and private
Total length of motor roads	76311.6	577.9	2203.0	4512.8	347.2
including					
hard-surfaced	4522.9	577.9	2062.3	1544.8	337.9
with improved surface among them	3582.4	569.2	1656.7	1031.4	325.1
Percentage of motor roads non-conforming to the regulatory requirements, % of the total road length	-	-	57.2	74.4	-



Fig. 303. Availability of paved roads, beginning of 2019 (%)

Social infrastructure

Astrakhan

Existing characteristics of the educational facilities

In the framework of the national project “Demography”, when the 100-percent availability of preschool education for children under 3 years old is achieved by 2021, for satisfying the existing need of the population of the municipal unit “City of Astrakhan” in preschool educational services, it is necessary to create additional places for children at the age from 1.5 to 3 years old.

As of 28/01/2020, the number of children who need the services of the municipal educational institutions that implement the preschool educational programs and are located in the territory of the municipal unit “City of Astrakhan” (actual demand) at the age from 1.5 to 3 years old makes 2938 persons. To ensure this need, it is necessary to build in total 7 (seven) kindergartens, for 330 children each.¹⁸⁸

According to the results of systematization of data provided by the Ministry of Education, the total actual capacity of the educational establishments in Astrakhan makes 26668 places that does not exceed the total design capacity of the preschool educational establishments, i.e. 26868 places.

The deficit of kindergartens in the restrained conditions is the most critical in Babaevsky microdistrict, Svobodny village in Leninsky district of Astrakhan, Kulikov St. in Kirovsky district of Astrakhan, Admiral Nakhimov St. in Sovetsky district of Astrakhan.

¹⁸⁸ – additional information of the Construction, Architecture and Urban Development Department of the administration of the MU “City of Astrakhan”. From the letter of the Department of Education of the administration of the municipal unit “City of Astrakhan” No. 01-08-75 dated 28/01/2020.

According to the results of systematization of data provided by the Ministry of Education, the total actual capacity of the educational establishments in Astrakhan makes 61153 places that does not exceed the total design capacity of the schools of the city, i.e. 52315 places.

Therefore, it is required to build at least 12 schools, for 1000 pupils each, in the territory of the municipal unit “City of Astrakhan”.¹⁸⁹

Current activities¹⁹⁰

Construction of the school for 1000 places in the 3rd Zeleginskaya St., Nikitinsky Bugor-2 microdistrict in Kirovsky district, land plot No. 30:12:010068:163. The object is currently at the stage of preparation for putting into operation.

Planned activities on the educational facilities construction in Astrakhan:

1. Construction of the school for 1000 places in Granovsky Lane, Trusovsky region.
2. Land plot No. 30:12:000000:8384 (2021–2022).
3. The general school for 1000 places at the location of the building of the Municipal Budgetary General Education Institution of Astrakhan “Lyceum No. 2 named after Razuvaev” in 52 Podedy St., Land plot No. 30:12:010055:580 (2023-2024).
4. Construction of the school for 1000 places in Babaevsky microdistrict, Leninsky district (2021–2022).
5. Construction of the school for 1000 places in 8th Zheleznodorozhnaya St., Babaevsky microdistrict, Leninsky district (2023-2024).
6. Construction of the additional building with the gym to the Municipal Budgetary General Education Institution of Astrakhan “General Secondary School No. 56 named after A.S. Pushkin” in 8 Tatishchev St., Leninsky district, Land plot No. 30:12:020309:48 (2023–2024).
7. Construction of the additional building to the Municipal Budgetary General Education Institution of Astrakhan “General Secondary School No. 74 named after G. Tukay” for 600 places in 3 Admiral Nakhimov St., Sovetsky district, Land plot No. 30:12:030154:6 (2022-2023).
8. Reconstruction of the school for 900 places in 80 Akhsharumov, Sovetsky district. Land plot No. 30:12:030787:7 (2022-2023).
9. Construction of the school for 600 places in Sabans-Yar St., Sovetsky district (2022–2023).

¹⁸⁹ From the letter of the Department of Education of the administration of the municipal unit “City of Astrakhan” No. 01-08-75 dated 28/01/2020.

¹⁹⁰ In 2019, the Agreement on provision of the grant from the state budget to the budget of Astrakhan region for co-financing of expenditure commitments of the subjects of the Russian Federation arising from implementation of the state programs by the subjects of the Russian Federation, related to implementation of the activities on creation of additional places for children in the educational establishments that perform the educational activity according to the preschool educational programs, in the framework of the state program of the Russian Federation “Development of Education”, was concluded between the Government of Astrakhan region and the Ministry of Education of the Russian Federation. In view of the above, for 2020-2021, 2420 additional places for children at the age from 1.5 to 3 years old will be created, as well as by the end of 2020, it is planned to create 550 places for children at the age from 2 months to 3 years old in the preschool educational establishments.



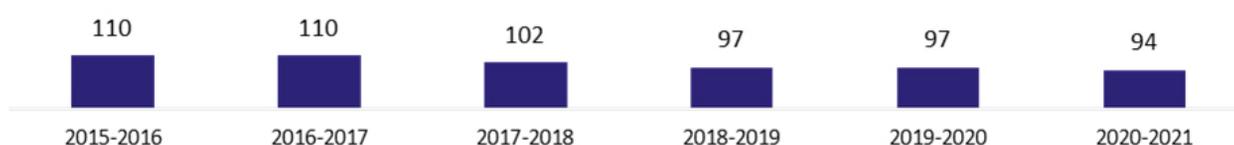
- The municipal unit “City of Astrakhan” includes the microdistricts where there is a need in construction of new general educational establishments but there are no land plots to build them on:
 - microdistrict in Pleshcheev - Bakinskaya St. - 1300 places;
 - microdistrict “Avtogorodok” - 1300 places;
 - Porokhovaya St. - 1300 places;
 - Medikov St. (General Secondary School No. 24 to General Secondary School No. 66) – 1100 places;
 - Microdistrict of TRZ plant - Tsarev Embankment - Airport Highway - 1100 places;
 - Yablochkov - Markin St. - 1100 places.

Astrakhan region

300 school buildings, about 33% of them require capital repair.

94 general educational establishments (about 30%) study with the second shift.

Fig 304. Number of educational organizations engaged in the second shift in the Astrakhan region



Item No.	Name of district of Astrakhan agglomeration	Number of places in the educational establishments (schools and kindergartens)		
		Planned (design)	Actual	including the 2nd shift
1	Volodarsky district	8724	8797	1481
2	Ikryaninsky district	9887	7355	882
3	Kamyzyaksky district	9777	6350	1163
4	Krasnoyarsky district	9278	9232	477
5	Limansky district	8467	5312	411
6	Narimanovsky district	10213	7085	879
7	Privolzhsky district	9819	11218	1106

According to the results of systematization of data provided by the Ministry of Education of Astrakhan region, the total actual capacity of the preschool and general educational establishments in the districts of the agglomeration, excluding Privolzhsky and Volodarsky (considering the second shift), is less than the total design capacities. The total

deficit of preschool educational establishments/ schools of 293 places has been identified in Privolzhsky district.

And according to the availability analysis, significant deficit is observed in particular settlements and profit in the others.

At the level of preparation of the urban development documents, it is necessary to specify the need in construction of the educational facilities in the territory of particular village districts, including with due regard to the transport and walking normative distance to the educational facilities.

Planned construction activities on the educational facilities in Astrakhan region according to the 2035 Economic Development Strategy:

In the this framework, it is supposed to build 35 new schools for the purposes of creation of more than 21 thousand new places, including by the districts of the region:

- Astrakhan in 2020-2024 - 3 schools (with 3000 places in total), in 2025-2035 - 8 schools (with 8000 places in total).
- Akhtubinsky district in 2025 - 1 school (675 places),
- Privolzhsky district in 2019 - 1 school (800 places), in 2023 - 1 school for 220 places, in 2025 - 1 school for 220 places, in 2028 - 1 school for 220 places.
- Volodarsky district in 2023 - 1 school (220 places), in 2025 - 1 school (1000 places).
- Yenotaevsky district in 2025 - 1 school (220 places), in 2026 - 1 school (220 places), in 2027 - 2 schools (with 440 places in total).
- Ikryaninsky district in 2026 - 1 school (675 places).
- Kamyzyaksky district in 2020 - 1 school (220 places), in 2025 - 1 school (220 places), in 2027 - 1 school (250 places), in 2028 - 1 school (250 places).
- Krasnoyarsky district in 2023-2026 - 3 school (with 1570 places in total).
- Limansky district in 2022 - 1 school (675 places).
- Narimanovsky district in 2020 - 1 school (220 places), in 2021 - 1 school (220 places), in 2028 - 1 school (220 places).
- Kharabalinsky district in 2026 - 1 school (600 places), in 2029 - 1 school (130 places), in 2030 - 2 school (with 230 places in total), in 2031 - 1 school (130 places).

Information on creation of places in preschool and general educational establishments

In 2019, the Agreement on provision of the grant from the state budget to the budget of Astrakhan region for co-financing of expenditure commitments of the subjects of the Russian Federation arising from implementation of the state programs by the subjects of the Russian Federation, related to implementation of the activities on creation of additional places for children in the educational establishments that perform the educational activity according to the preschool educational programs, in the framework of the state program of the Russian Federation "Development of Education", was concluded between the Government of Astrakhan region and the Ministry of Education of the Russian Federation.

In view of the above, for 2020-2021, 2420 additional places for children at the age from 1.5 to 3 years old will be created, as well as by the end of



2020, it is planned to create 550 places for children at the age from 2 months to 3 years old in the preschool educational establishments.

In addition, 224 additional places was created in the territory of Astrakhan region in the framework of implementation of activities on creation of additional places (groups) for children at the aged from 1.5 to 3 years old in the subjects of the Russian Federation of any field of activity, in organization that realize the educational activity (excluding state, municipal) and in individual entrepreneurs that realize the educational activity according to the preschool educational programs, including adapted, and child minding in the framework of implementation of the state program of the Russian Federation "Development of Education".

In the framework of the project "Modern School" of the national project "Education" on creation of new places in the general educational establishments for the purposes of cancellation of the second shift, on 25/03/2020, the object "General School for 800 Pupils in 1 Pridorozhnaya St., Nachalovo, Privolzhsky district, Astrakhan region" was created.

In 2019, the construction of the general school for 1000 pupils in 3rd Zeleginskaya St., Nikitinsky Bugor-2 microdistrict, Kirovsky district, Astrakhan, was started. The object is currently at the stage of preparation for putting into operation.

Also, for the purposes of modernization of the general educational infrastructure, agreement No. 073-09-2019-223 dated September 05, 2019, on provision of the grant for capital construction projects "Construction of the School for 220 Places in Karalat, Kamyzyaksky district", "School for 220 Places in Mirny, Narimanovsky district" was concluded between the Ministry of Education of the Russian Federation and the Government of Astrakhan region.

One more important is that with the existing demand in construction of the preschool educational establishment or general educational establishment in one microdistrict of the municipal unit, there is no opportunity to construct it due to no land plot, and such an opportunity exists in the microdistrict that does not need it (as a rule, the remote districts). This makes trouble for the population.

In view of the above, there is a need in the regulatory establishment of requirements for the residential area development projects, as well as the investment development projects of the municipal units. It is also necessary to establish the liability of the local authorities that, on the land plot preparation for housing development, must provide for possible construction of socially significant facilities (kindergarten, school) based on the relevant need of the corresponding municipal unit, as well as establish the liability of the developer that, in the course of the housing development, must create the above facilities in the framework of investment agreement.



Healthcare

Astrakhan

Table 60. Existing characteristics of the healthcare facilities

Item No.	Name of the district (city), healthcare organization	Number of visits to polyclinic per shift according to the reports for 2019	
		Planned (design)	Actual
Municipal children's/adults' polyclinics			
1	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 1"	327	455
2	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 2"	676	707
3	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 3"	805	692
4	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 5"	848	727
5	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 8"	660	805
6	State Budgetary Healthcare Institution JSC "Municipal Polyclinic No. 10"	725	1060
7	State Budgetary Healthcare Institution JSC "Municipal Children's Polyclinic No. 1"	480	491
8	State Budgetary Healthcare Institution JSC "Municipal Children's Polyclinic No. 3"	427	661
9	State Budgetary Healthcare Institution JSC "Municipal Children's Polyclinic No. 4"	81	243
10	State Budgetary Healthcare Institution JSC "Municipal Children's Polyclinic No. 5"	108	261
		5137	6102
Total municipal children's and adults' polyclinics			
Specialized municipal and regional healthcare institutions			
11	State Budgetary Healthcare Institution JSC "Dental Care Clinic No. 3"	192	101
12	State Budgetary Healthcare Institution JSC "Dental Care Clinic No. 4"	358	89
13	State Budgetary Healthcare Institution JSC "Regional Clinical Dental Center"	1471	544



14	State Budgetary Healthcare Institution JSC "Regional Center for AIDS Control"	187	106
15	State Budgetary Healthcare Institution JSC "Family Healthcare and Reproduction Center"	113	134
16	State Budgetary Healthcare Institution JSC "Regional Public Healthcare and Prevention Treatment Center"	117	256
17	State Budgetary Healthcare Institution JSC "Municipal Clinical Hospital No. 2 named after the Gubin brothers"	148	247
18	State Budgetary Healthcare Institution JSC "Municipal Clinical Hospital No. 3 named after S.M. Kirov"	8	58
19	State Budgetary Healthcare Institution JSC "Maternity Clinical Hospital"	141	132
20	State Budgetary Healthcare Institution JSC "Aleksandro-Mariinskaya Regional Clinical Hospital"	720	468
21	State Budgetary Healthcare Institution JSC "Regional Children's Clinical Hospital named after N.N. Silishcheva"	524	345
22	State Budgetary Healthcare Institution JSC "Regional Clinical Hospital for Infectious Diseases named after A. M. Nichoga"	26	8
23	State Budgetary Healthcare Institution JSC "Regional Clinical Mental Hospital"	110	572
24	State Budgetary Healthcare Institution JSC "Regional Narcological Center"	125	300
25	State Budgetary Healthcare Institution JSC "Regional Oncology Center"	200	170
26	State Budgetary Healthcare Institution JSC "Regional Exercise Therapy Center"	65	587
27	State Budgetary Healthcare Institution JSC "Regional Dermatovenerologic Clinic"	1284	390
28	State Budgetary Healthcare Institution JSC "Regional Cardiology Center"	155	190
29	State Budgetary Healthcare Institution JSC "Regional Tuberculosis Clinic"	371	165

29 healthcare facilities are located in the territory of Astrakhan, including 10 children's/adults' municipal polyclinics with the total capacity of 5137 visits per shift. The municipal polyclinics availability for 1 ths. people of Astrakhan makes 9.7 visits per shift that is virtually thrice less than the standard indicator¹⁹¹.

¹⁹¹ 27.6 - standard by the number of visits per shift for 1 ths. residents to the outpatient clinics according to the Regional Urban Development Standards for housing area planning of the settlements of Astrakhan region approved by Decree of the Government of Astrakhan region No. 24-П dated 03/02/2014.



The required standard total capacity of polyclinics for Astrakhan is 14622 visits per shift.

Considering the planned activities on construction of healthcare institutions, including municipal polyclinics with the total capacity of 4500 visits per shift, the municipal polyclinics availability for 1 ths. people of Astrakhan will make 18.12 visits per shift.



Planned activities on the healthcare facilities construction in Astrakhan:

- construction of the Regional Vascular Center of the State Budgetary Healthcare Institution JSC “Aleksandro-Mariinskaya Regional Clinical Hospital” at the address: 2 Tatishchev St., Astrakhan;
- construction of the phthisiological building for 100 beds in the territory of Hospital No. 1 of the State Budgetary Healthcare Institution JSC “Regional Tuberculosis Clinic”;
- construction of the adults’ and children’s polyclinic for 1000 visits per shift in Sovetsky district, Astrakhan;
- construction of the adults’ and children’s polyclinic for 1000 visits per shift in Leninsky district, Astrakhan;
- construction of the adults’ and children’s polyclinic for 1000 visits per shift in Kirovsky district, Astrakhan;
- construction of the adults’ and children’s polyclinic for 500 visits per shift in Trusovsky district, Astrakhan, branch of the State Budgetary Healthcare Institution JSC “Municipal Polyclinic No. 10”;
- construction of the adults’ and children’s polyclinic for 500 visits per shift in Trusovsky district, Astrakhan, ACCP microdistrict, branch of the State Budgetary Healthcare Institution JSC “Municipal Polyclinic No. 10”;
- construction of new 7-storey surgical building for 290 beds for the State Budgetary Healthcare Institution JSC “Regional Children’s Clinical Hospital named after N.N. Silishcheva” at the address: 6 Medikov St., Astrakhan, including design works (budgetary investment), as well as construction of the take-off and landing area in the territory of JSC “Regional Children’s Clinical Hospital named after N.N. Silishcheva”;
- construction of the diagnostic and treatment building with the use of hightech management methods for oncological patients in the State Budgetary Healthcare Institution JSC “Regional Oncology Center” at 57 B. Alekseev St., Astrakhan;
- construction of the polyclinic for 500 visits per shift to provide healthcare services to the adult and children population in Babaevsky microdistrict, Leninsky district of Astrakhan.

In addition, in the framework of instructions given by the President of the Russian Federation No. 215Пп dated 14/02/2019, it is planned to build the Perinatal Center of the State Budgetary Healthcare Institution JSC “Aleksandro-Mariinskaya Regional Clinical Hospital”. Deadline: 2020-2022. Scope of finance: 1.2 billion RUB. The land plot is available. Currently, 1241.6 mln. RUB is factored into construction of the Perinatal Center, the tender procedure for construction companies is in progress.



Astrakhan Region/ Astrakhan agglomeration

Table 61. Existing characteristics of the healthcare facilities (Capacity of outpatient clinics (departments) in the territory of the districts of Astrakhan agglomeration

Item No.	Name of the district (city), healthcare organization	Number of visits to polyclinic per shift according to the reports for 2019		Actual availability for 1 ths. people
		Planned (design)	Actual	
districts of Astrakhan agglomeration				
1	Volodarsky district	900	489	31.3
2	Ikryaninsky district	1780	482	38.3
3	Kamyzyaksky district	1037	547	22.5
4	Krasnoyarsky district	782	322	21.3
5	Limansky district	705	293	21.4
6	Narimanovsky district	1329	450	28.0
7	Privolzhsky district	1527	466	28.9
Total for Astrakhan agglomeration		19512	14013	

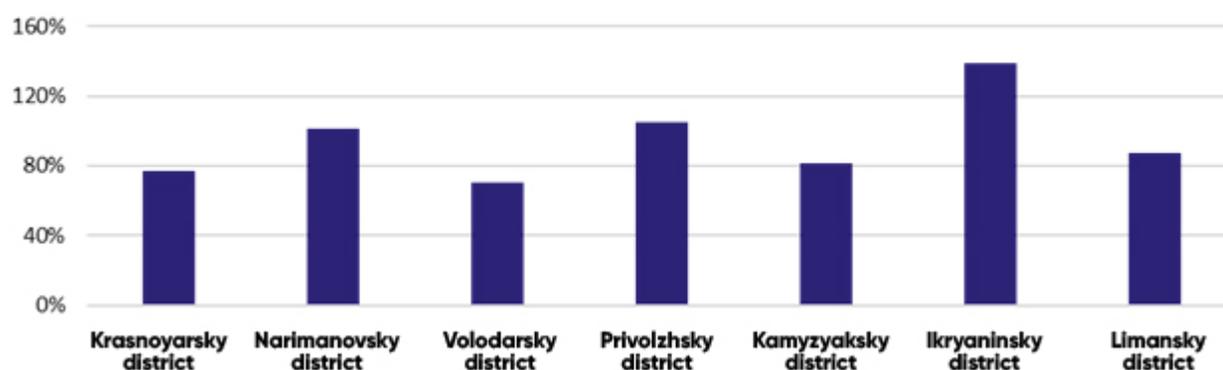
The municipal polyclinics availability for 1 ths. people of the administrative districts Volodarsky, Kamyzyaksky, Krasnoyarsky and Limansky is less than the standard indicator¹⁹².

Deficit of the polyclinic capacity in the districts:

Volodarsky - 376 visits per shift;
 Kamyzyaksky - 235 visits per shift;
 Krasnoyarsky - 229 visits per shift;
 Limansky - 204 visits per shift.

¹⁹² 27.6 - standard by the number of visits per shift for 1 ths. residents to the outpatient clinics according to the Regional Urban Development Standards for housing area planning of the settlements of Astrakhan region approved by Decree of the Government of Astrakhan region No. 24-П dated 03/02/2014.



Fig. 305. Share of the regulatory provision of healthcare facilities, %

The planned on construction of healthcare institutions in the territory of the agglomeration will solve the deficit in 3 districts: Volodarsky, Kamyzyaksky and Limansky. In addition to the previous decisions, it is necessary to provide the construction of the polyclinic for 250 visits per shift in Krasnoyarsky district.

Planned activities on the healthcare facilities construction/reconstruction in Astrakhan region:

- construction of polyclinic for 350 visits in Nachalovo, Astrakhan region;
- construction of polyclinic for 350 visits in Kamyzyak, Astrakhan region;
- construction of polyclinic for 350 visits in Volodarsky, Astrakhan region;
- construction of polyclinic for 350 visits in Liman, Astrakhan region, including design works (budgetary investment);
- reconstruction of the hospital complex at the address: Astrakhan region, Ikryaninsky district, Krasnye Barrikady (budgetary investment).

Including outside Astrakhan agglomeration:

- construction of the polyclinic for 350 visits in Akhtubinsk, Astrakhan region;
- construction of the hospital of the State Budgetary Healthcare Institution JSC "Kharabalinsky District Hospital", Kharabali.

Sports

Astrakhan Region/ Astrakhan agglomeration

Table 62. Existing characteristics of the sports facilities of Astrakhan agglomeration¹⁹³

Name/ type of the sports facility	Astrakhan region	Ikryaninsky district	Kamyzyaksky district	Volodarsky district	Krasnoyarsky district	Narimanovsky district	Limansky district	Privolzhsky district
Stadiums with grandstands for 1500 seats and more	16	1	0	0	1	1	1	0
Plate structures	739	44	100	27	44	26	27	28
Among them, football fields	188	12	41	1	10	3	10	5
Gyms	532	22	28	16	18	40	28	17
Indoor sports facilities with synthetic ice	3	0	0	1	0	0	0	0
Tracks	3	0	0	0	0	0	0	0
Among them, athletic tracks	1	0	0	0	0	0	0	0
Swimming pools	25	0	1	2	0	4	2	0
Shooting sports facilities	51	0	6	0	1	0	16	1
Including shooting rooms	38	0	6	0	1	0	5	1
stand	13	0	0	0	0	0	11	0
Rowing bases and channels	2	0	0	0	0	0	0	0
Other sports facilities	293	0	3	18	0	0	32	0
Other municipal and recreational facilities adapted for physical training and sports	166	10	0	0	0	30	0	0
Including multipurpose playground	102	7	0	0	0	28	0	0
Area with device for physical exercises	57	2	0	0	0	1	0	0
Skating rink	7	1	0	0	0	1	0	0

¹⁹³ the information is given on the basis of the data provided by the municipal units of Astrakhan region in the framework of Federal Statistical Monitoring No. 1-ФК "Information about Physical Education and Sports" as of 31/12/2019. The information on the results of 2020 is generated until February 10, 2021.



Planned activities on the sports facilities construction in Astrakhan region:

- construction of sports facilities (multifunctional sport venues, facilities for sports reserve preparation, sports and recreation centers (SRC), outdoor sports and recreation centers (OSRC), swimming pools, stadiums).

Planned activities on the sports facilities construction in the territory of the municipal unit “City of Astrakhan”:

- handball sports and recreation center;
- rhythmic gymnastics center;
- sports and recreation center with swimming pool and multipurpose gym;
- sports and recreation center with skating rink and multipurpose gym;
- archery area;
- sports and recreation centers (SRC);
- outdoor sports and recreation centers (OSRC),
- football fields.

Culture

547 state and municipal cultural establishments with the divisions, as well as 37 organizations of other forms of ownership operate in the territory of Astrakhan region, including:

- 212 state and municipally owned cultural and entertainment establishments (among them, 193 in rural areas), including 1 cultural and entertainment establishment of other forms of ownership - Cultural and Sports Center of Gazprom Production Astrakhan LLC;
- 241 public libraries (among them, 197 in rural areas);
- 23 children’s schools of the art (among them, 6 in rural areas) with 24 divisions (among them, 23 in rural areas);
- 3 secondary specialized institutions (and 1 branch in Akhtubinsk), 1 conservatory:
 - 19 museums (among them, 7 in rural areas);
 - 4 concert halls;
 - 5 theaters (among them, 1 non-profit organization Theater Association “PublicTheater “Periphery”);
 - 16 cinemas and movie halls in Astrakhan region;
 - 3 archive facilities;
 - 4 professional artistic associations: composers’, theatrical workers’, artists’, writers;
 - 7 other organizations.

As of 01/01/2020, 59 buildings are in operation of the state cultural establishments, among them, 22% require capital repair, and 3.3% are in emergency condition.

227 buildings of the cultural centers are located in the territory of the municipal units of Astrakhan region, among them, 34 cultural centers require capital repair, and 77 - require current repair.

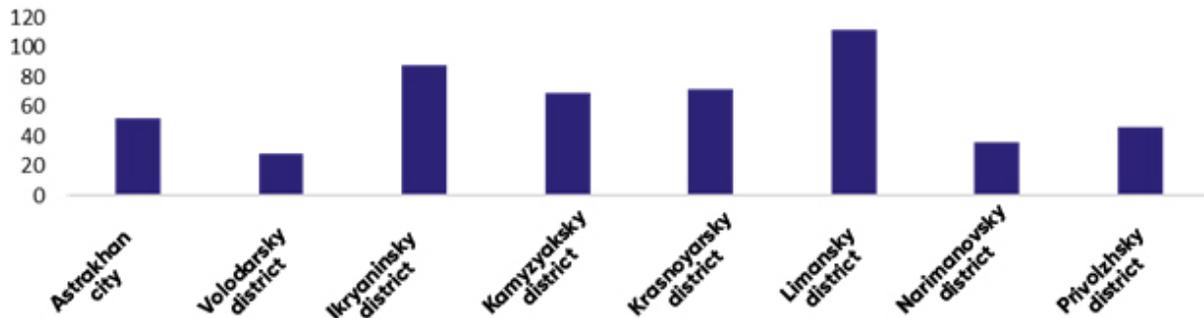
Currently, 18 cultural centers are to be built, among them, in:

- Municipal unit “Ikryaninsky district” - 1 cultural center;
- Municipal unit “Kamyzyaksky district” - 5 cultural centers;
- Municipal unit “Krasnoyarsky district” - 3 cultural centers;
- Municipal unit “Narimanovsky district” - 1 cultural center;
- Municipal unit “Privolzhsky district” - 5 cultural centers;



- Municipal unit “Kharabalinsky district” - 1 cultural center;
- Municipal unit “Chernoyarsky district” - 1 cultural center;
- Municipal unit “Volodarsky district” - 1 cultural center.

Fig. 306. Share of the normative provision of cultural and leisure-type activities, %



Information on construction of municipal cultural facilities in Astrakhan region

For the period of 2018-2019, 3 cultural centers were built at the expense of the federal budget:

- Cultural Center in Kilinchi, Privolzhsky district (2018);
- Cultural Center in Marfino (2019);
- Cultural Center in Tsvetnoe, Volodarsky district (2019).

In 2020, the Cultural Center in Dzhanay, Krasnoyarsky district, was put into operation. 4 cultural centers will be built in the framework of the national project “Culture”:

- in Volzhskoe, Yenotaevsky district;
- Novourusovka, Krasnoyarsky district;
- Karaulnoe, Kamyzyaksky district;
- Zubovka, Chernoyarsky district.

In 2021, it is planned to build the Cultural Center in Poldnevoe, Kamyzyaksky district, the construction of the Cultural Center in Bishtyubinka, Narimanovsky district, is to be completed.

In 2022, in the framework of the national project “Culture”, it is planned to build the cultural centers in:

- Tri Pritoki, Privolzhsky district;
- Raznochinovka, Narimanovsky district;
- Ikryanoye, Ikryaninsky district;
- Tishkovo, Volodarsky district;
- Verkhny Buzan, Krasnoyarsky district.

In the framework of the 2035 Economic Development Strategy, it is planned to build:

In 2020-2035, 18 municipal cultural centers:

- Ikryaninsky district - 1 center;
- Kamyzyaksky district - 5 centers;
- Krasnoyarsky district - 3 centers;
- Narimanovsky district - 1 center;
- Privolzhsky district - 5 centers;
- Kharabalinsky district - 1 center;
- Chernoyarsky district - 1 center;
- Volodarsky district - 1 center.



The number of the repaired cultural establishments in the districts of the region will make:

in 2020-2024 - 23 centers:

- Akhtubinsky district - 4 centers;
- Volodarsky district - 4 centers;
- Yenotaevsky district - 2 centers;
- Ikryaninsky district - 2 centers;
- Kamyzyaksky district - 5 centers;
- Limansky district - 2 centers;
- Narimanovsky district - 1 center;
- Privolzhsky district - 1 center;
- Kharabalinsky district - 1 center;
- Chernoyarsky district - 1 center.

in 2025-2035 - 36 centers.

List of activities provided by the land-use planning scheme of Astrakhan region for healthcare facilities development, social protection establishments and sports facilities development.

Among the most significant transport infrastructure development projects are:

- Development of Olya sea port;
- Reconstruction of the railway line "Trubnaya - Aksaraiskaya" with branch lines to Astrakhan and Kazakhstan.
- Reconstruction of the federal highway M-6.
- Construction of the motor road Severny Obkhod in Astrakhan with bridge crossing over Volga.
- Completion of construction of the motor road Vostochny Obkhod in Astrakhan.
- Construction of the motor road Yuzhny Obkhod, including
 - km 20+035 Astrakhan - Kamyzyak - ferry line in the area of Volgo-Kaspiysky with the length of 7.25 km with the bridges over Kizan and Yerik Mansur¹⁹⁴;
 - removal of the ferry line in Volgo-Kaspiysky with the length of 1.35 km with access to the existing road;
 - from the existing road Volgo-Kaspiysky - Nikolskoe - Dolgy to km 36+835 of the motor road Astrakhan - Makhachkala with the length of 6.3 km with the bridges over Volga and Chilimnaya (closes the ring of the Vostochny Obkhod);
 - capital repair (reconstruction) of the section of the existing road Volgo-Kaspiysky - Nikolskoe - Dolgy with the length of 6.35 km.
- Combination of the motor road Astrakhan - Krasny Yar - border of the Republic of Kazakhstan with the construction of the bridge over Buzan in Krasny Yar.
- Construction of the motor road with three bridge crossings Ikryanoe - Kamyzyak.
- Construction of the motor road with the bridge crossing and cross-over Krasnye Barriady - Ikryanoe, access road to Trudfront from the motor road Astrakhan - Makhachkala with the construction of the berthing facilities in Bakhremir, access road to Novobulgary, Beketovka in Ikryaninsky district.
- Construction of the belt highway in Kamyzyak.
- Construction of the belt highway in Narimanov.

¹⁹⁴ Will make it possible to create a duplicate route in Volgo-Kaspiysky and in Chagan by-passing the city road network.



- Construction of the bridge crossing over Algarka in the highway Seitovka - Vatazhnoe - border of Kazakhstan.
- construction of the bridge over Staraya Volga.
- reconstruction of the public road of regional significance Astrakhan - Tri Potoka - Nachalovo in the road section 4 km - 7 km with the construction of the crossing on different levels at the railway crossing Astrakhan - Makhachkala.

Including the transport development activities in the territory of the municipal unit “City of Astrakhan”:

- construction of the motor road from Nakhimov St. to Khmelnitsky St. with the bridge over Tsarev;
- construction of the roundabout crossing from B. Khmelnitsky St. to the south-east passage;
- construction of the tunnel under the body of the railroad in the wing of Latyshev St.;
- construction of the railroad overpass in the wing of Kulikov St.

The activities on the healthcare facilities development include:

- Construction of the building of the Regional Clinical Hospital for Infectious Diseases named after A.M. Nichoga, surgical building of the Regional Children’s Clinical Hospital named after N. N. Silishcheva, Regional Vascular Center of the Aleksandro-Mariinskaya Regional Clinical Hospital, Regional Perinatal Center, diagnostic and treatment building of the Regional Oncology Center, Positron-Emission Tomography Center, physiological building in the territory of the Regional Tuberculosis Clinic, several polyclinics in Astrakhan.
- Construction of the polyclinic in Volodarsky, 13 rural medical posts in the villages of Volodarsky district.
- Construction of 11 rural medical posts in the villages of Ikryaninsky district.
- Construction of the polyclinic in Kamyzyak, out-patient department in Semibugry and rural medical posts in 24 villages of Kamyzyaksky district.
- Construction of 7 rural medical posts in the villages of Krasnoyarsky district.
- Construction of the polyclinic in Liman.
- Construction of the out-patient department in Narimanovsky, 5 rural medical posts in the villages of Narimanovsky district.
- Construction of the polyclinic in Nachalovo, out-patient departments in Biryukovka, Tri Potoka, Tatarskaya Bashmakovka, 10 rural medical posts in the villages of Privolzhsky district.

The activities on the social care facilities development include:

- Construction of the additional building to the JSC “Regional Social and Rehabilitation Center for Juveniles “Istok” in Astrakhan;
- Construction of the additional building to the medical unit of the Rehabilitation Center for Disabled Children and Adolescents “Correction and Development” in Astrakhan;
- Construction of the residential building for the Staro-Volzhsky Psychoneurological Care Facility in Staro-Volzhsky, Ikryaninsky district.
- Construction of the department of the Narimanovsky Psychoneurological Care Facility.

The land use engineering activities include:

- Construction of the bank stabilization of the arm of Tsarev in Sovetsky district, Astrakhan.
- Construction of the dam with solid wharfs in Marfino, Sorochye of Volodarsky district.



- Construction of the bank stabilization facilities in Bakhtemir, Fedorovka, Ilyinka, Ikryanoe, Mumra, Tovarny of Ikryaninsky district.
- Construction of the bank stabilization facilities in Novorussova, Baibek of Krasnoyarsky district.
- Construction of the bank stabilization facilities in Pervoe Maya of Privolzhsky district.

The activities on the sports facilities development include:

- Construction of the Wrestling Arena, Artistic Gymnastics and Acrobatics SRC, indoor football arena, Trampoline SRC, SRC with swimming pools, Mass Sport Center, administrative and amenity block of the Football Academy in Astrakhan.
- Construction of the Water and Rowing Sport Center in Yaksatovo of Privolzhsky district.

Planned activities on the social care facilities construction in Astrakhan agglomeration:

- Construction of the social department in the territory of the Narimanovsky Psychoneurological Care Facility;
- Construction of the 2nd building of the Astrakhan Nursing Home.



Utility infrastructure

Power supply

Power generating capacities. The energy system of Astrakhan agglomeration is based on the heat power plants:

- Astrakhan HPP-2 (power capacity of 380 MW, heat capacity of 910 Gcal-hr). It is located in the territory of Privolzhsky district near Tri Protoka village near the administrative border with Astrakhan;
- Astrakhan CCP-2 (power capacity of 235 MW, heat capacity of 132 Gcal-hr). It is located in the northern part of Astrakhan near the highway of Severny Obkhod near crossing with Avtozaprovchnaya St.;
- Astrakhan HRPP (power capacity of 121 MW, heat capacity of 66 Gcal-hr, virtually no power is generated) is located in Astrakhan by the side of river Pryamaya Bolda near the bridge at Yablochkova St.;
- Severnaya HPP (power capacity of 8 MW, heat capacity of 68 Gcal-hr) is located by the right side of river Vilga in the northern part of Trusovsky district in the industrial area of the paper mill.

All power plants operate on the natural gas, provided with the modern equipment, and controlled by Lukoil company.

Recently, a number of solar power facilities has been commissioned in the territory of Astrakhan agglomeration: in Privolzhsky (2 facilities), Volodarsky (1 facility), Narimanovsky (5 facilities), and Limansky districts (1 facility).

Astrakhan region is the solar power leader in Russia. The solar power facilities cover 20% of the rated output power of Astrakhan agglomeration.

The integrated power grid of Astrakhan agglomeration is based on SS 500 kV Astrakhan located in Narimanovsky district near Rassvet settlement. OHLs 220 kV are laid from it to the SS Rassvet, Barrikadnaya (Krasnye Barrikady), Liman, Astrakhan CCP-2, Astrakhan GPP and Tyagovaya (in the area of Aksaraiskaya plant). The master substation for power supply of consumers of Astrakhan is SS 110 kV central power distribution station located near Astrakhan HPP-2 and connected at 110 kV to the main generating and electric grid facilities of Astrakhan power system. Its reconstruction is underway. Roadside clear zones and protective zones that make 30 m for OHL 500 kV, 25 m for OHL 220 kV, 20 m for OHL 110 kV are provided from the overhead lines.

According to the Prospective Development Scheme and Program for Power Generating Industry of Astrakhan region for 2021–2025 approved by Order of the Governor of Astrakhan region No. 226-p dated 20/04/2020, it is reported about the planned location in the territory of Astrakhan agglomeration of SS 220 kV Lotus with the transformation capacity of 150 MVA (Narimanovsky district) connected to the passing OHL 220 kV Oil pipeline - Astrakhan. Construction of the generating facilities is not provided.

Gas supply

Gas supply for consumers in the territory of Astrakhan agglomeration is provided from the single gas supply system. The



gasification level of the housing stock exceeds 90%. The master gas distribution stations for Astrakhan are the gas distribution station 1A in the south-eastern suburb of the city, gas distribution station 4 in the northern suburb, gas distribution station 2 in the south-western suburb of the right-bank part of Astrakhan, gas distribution station 3A in the north-western suburb of the right-bank part of Astrakhan. According to the land-use planning scheme of the Russian Federation for the pipeline transport area, it is planned to reconstruct gas distribution station 4 located in Privolzhsky district to the north of Astrakhan. The design average annual gas transportation volume makes 730 mln. m³. The reconstruction is to be completed in 2022. The facility is included in the investment program of Gazprom PJSC. The Socio-Economic Development Strategy of Astrakhan region provides the construction of the gas distribution station of SEZ Lotus for gas supply of consumers of the special economic zone near Narimanov. The sanitary protection zones are established in the distance of 300 m from the gas distribution stations.

Water supply

The territory of Astrakhan agglomeration is supplied by drinking water from the surface sources - Volga and its arms in the delta. The water supply and water discharge operator is "Astrvodokanal".

The water supply of Astrakhan is provided according to the divided zone-based scheme. The left-bank part of the city is supplied with the drinking water from the treatment facilities of the water pipeline located on the left bank of Volga, at the mouth of Pryamaya Bolda near the "Central" stadium. Babaevsky microdistrict is provided by separate power supply source, the treatment facilities are located in the northern part of Astrakhan near the crossing of Severny Obkhod and railway line. The right-bank part of Astrakhan is supplied with the drinking water from 3 treatment facilities of the water pipeline located on the right bank of Volga. There is no hydraulic connection between the water supply systems of the left-bank and right-bank parts of the city. The water supply systems operate independently. In addition to Astrakhan, the municipal networks provide water supply to a number of settlements of Narimanovsky district (Solyanka, Tinaki-1, Tinaki-2, Mirny, Starokucherganovka, Bishtubinovka, Trusovo), as well as of Privolzhsky district (Nachalovo, Tri Protoka, Osypnoy Bugor, Karagali).

A number of group water pipelines supplying drinking water to several settlements from the single water intake facility are in operation in the territory of municipal districts included into the agglomeration. The water supply scheme of Astrakhan region provides for their reconstruction and integration into the district group water pipeline system.



Fig. 307. Availability of engineering infrastructure [%]

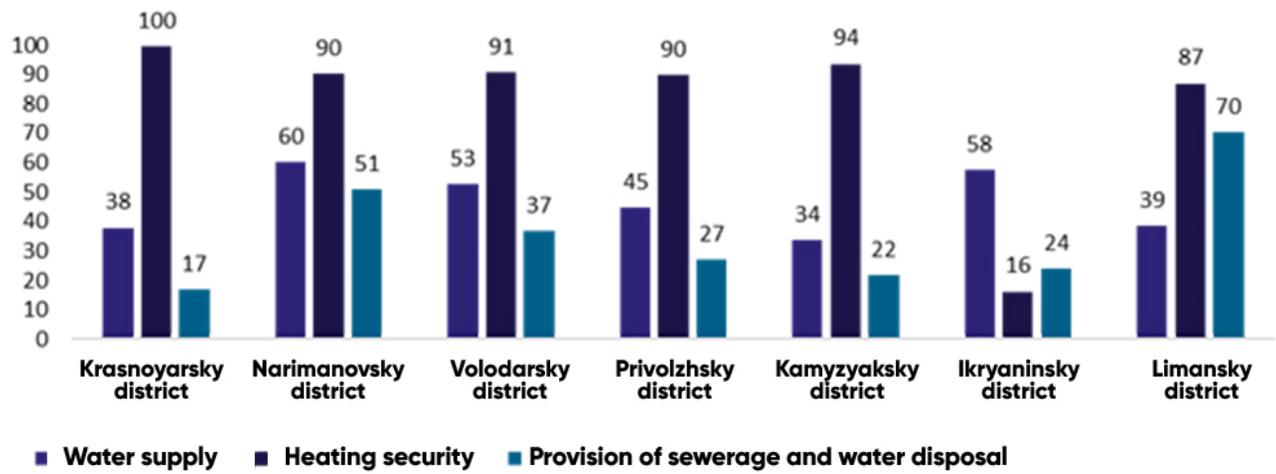


Fig. 308. Deterioration of engineering infrastructure [%]

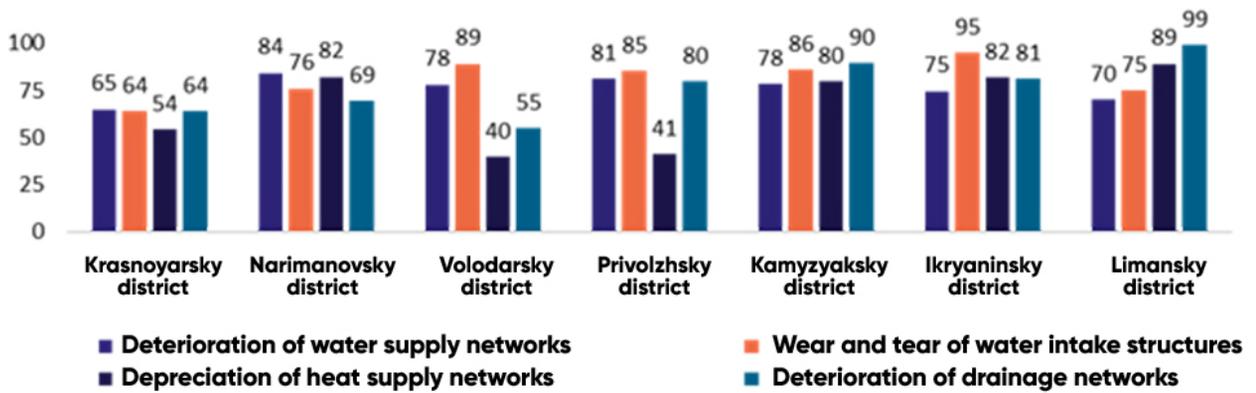


Table 63. List of master water pipeline and sewerage facilities of Astrvodokanal (Astrakhan water supply company) of the MU "City of Astrakhan"

Name	Address/location	Capacity	Degree of wear	Remark
Treatment facilities of the water pipeline POSV-1	Trusovsky district 	54 ths.m3/day	50-75%	The process equipment of the treatment facilities needs complete modernization and reconstruction.
Treatment facilities of the water pipeline POSV-2	39 Balkanskaya St. 	20 ths.m3/day	50-80%	To reduce operating costs, improve energy efficiency and reliability of the process equipment and facilities as a whole, provide drinking water complying with the SanPin requirements, it is necessary to perform the following: <ul style="list-style-type: none"> ▪ replace the pump equipment and shut-off valves at the first and second stage pumping stations; ▪ equip the pumping units with the sets of variable-frequency electric drives; ▪ perform capital repair with the replacement of shut-off valves and reloading of filtering material in filters; ▪ construct a new clear-water reservoir 3 ths.m3/day in view of the lacking drinking water in summer, reconstruct the old ones.
Treatment facilities of the water pipeline POSV-3	 In the territory of the plant named after the III International, located in its territory	6.6 ths.m3/day	80-90%	Equipment to be replaced
Southern treatment facilities for YOSK sewerage	Astrakhan, Sovetsky district (Airport Highway)	100 ths.m3/day	10-100%	Some equipment to be replaced

Left-bank treatment facilities for water pipeline (LOSV)



272
ths.m3/day

-

Priority plan of actions:

- replacement of the pump equipment and shut-off valves at the first and second stage pumping stations;
- equipment of the pumping units with the sets of variable-frequency electric drives;
- replacement of the oil circuit-breakers with the vacuum ones in closed switchgears Nos. 1; 2; 3 of the LOSV pumping stations;
- capital repair with the replacement of the shut-off valves and reloading of filtering material of high capacity filters on the treatment facility units of 1967; 1973; and 1988;
- replacement of the outmoded boiler units made in the 1960s in the LOSV boiler facility with the electric steam generators.

**Water pumping station
Privolzhye**

Privolzhye
1a Tyan-Shan St.
2 Volzhskie Zori
Embankment St.
25 Trudovoykh Rezervov St.

-

80%

of the water pumping stations has fully used its productive resource:

- the pump equipment and all process pipelines are in satisfactory condition;
- there is no sewage system;
- there is no process river water treatment;
- the turbine hall building is in emergency condition.



**Water
treatment
facility**

of Babaevsky microdistrict 100
ths.m³/day



In the normal mode, it is necessary to:

- replace all pumping units at the first stage pumping station;
- develop the design documentation for installation of a new crib cap;
- restore the microfilter serviceability;
- perform capital repair (13 pcs.) in the contact flocculator unit, replace the drain distribution, air systems, shut-off valves, filtering layers, etc.; replace the pipeline for clarified water discharge to the clear-water reservoir $\text{дy}1000$ and shut-off valves;
- replace the water-packed machines;
- repair the clear-water reservoirs;
- replace the pumping units and shut-off valves at the second stage pumping station and adjacent pipelines with new ones;
- repair the reaction and service reservoirs, replace the feed pumps and chemical pumps in the chemicals section with new ones;
- replace all pumping units with new ones at the sewerage pumping station;
- mount the flow meters in front of the microfilters and on the wash water pipeline for accurate water records.

**Waste water
treatment
facilities**

Privolzhsky district,
twp 1 Severnaya St. 45
ths.m³/day.

Water discharge source - river Krivaya Bolda.

In the framework of implementation of the regional project "Rehabilitation of Volga" of the national project "Ecology" for 2021-2024, the waste water treatment facilities planned for reconstruction are:

- construction project of the household wastewater treatment facilities with the capacity of 140 ths.m³/day provides for complete wastewater biological treatment.

POSK-1

14A Abakanskaya St.,
Astrakhan 13.65
ths.m³/day

Water discharge source - river Volga.

Construction project of the household wastewater treatment facilities with the capacity of 32 ths.m³/day provides for complete wastewater biological treatment

POSK-2	2 Perestrochnaya St., Astrakhan.	11-12 ths.m ³ /day.	-	<p>Equipment to be replaced, areas for arrangement of additional silt detention ponds to be increased.</p> <p>In the framework of implementation of the regional project "Rehabilitation of Volga" of the national project "Ecology" for 2021-2024, it is planned to switch the waste waters from POSK-2 to POSK-1 (14a Abakanskaya St.) with the removal of the POSK-2 treatment facilities.</p> <p>As of today, the scope of finance has not been determined.</p>
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APPENDIX 18. ASSESSMENT OF PARTICIPATION OF THE REGION IN CONGRESSES AND EXHIBITIONS AND SPORT EVENTS

Table 64. List of congresses and exhibitions and other events in the form of mice tourism of regional, interregional, federal and international level held in the territory of Astrakhan region, Republic of Dagestan and Republic of Kalmykia for 2018-2019

year	Item	Name	Venue
Astrakhan region			
2019	1	International Scientific and Practical Forum "The Caspian region in the era of digital economy".	Astrakhan, Astrakhan State University, Astrakhan Branch of the International Law Institute
	2	Commercial and Industrial Exhibition of the Caspian states with the participation of 30 companies from Iran, Azerbaijan and Kazakhstan, as well as 15 representatives of the Russian regions.	Astrakhan, Zvezdnyi sports complex
	3	The First International Educational Project for specialists in the field of media industry, PR and advertising "Caspian Media School-2019".	Astrakhan, Astrakhan State University
	4	Days of Indian Culture in Astrakhan region organized by the Cultural Center named of Jawaharlal Nehru of the Indian Embassy in Moscow.	Astrakhan, Astrakhan State Opera and Ballet Theater
	5	Presentation of the collection of essays of the winners of the competition "The Great Patriotic War in the History of My Family" held in 2018 among the Russian countrymen living in the CIS.	Astrakhan, Hall of Military Fame
2018	1	The XXIII Orthodox Christian Youth International Festival "Brothers".	Vozhanka recreation camp, Rastopulovka
	2	The III International Conference of the Caspian states "Relevant Issues of the Modern Medicine".	Astrakhan, Astrakhan State Medical University
	3	The VI International Puppet Theater Festival "Caspian Coast".	Astrakhan, Astrakhan Puppet Theater
	4	The International Forum "Astrakhan - Azerbaijan: Forum of Women's Entrepreneurship".	Astrakhan, residency of the Governor of Astrakhan region
Republic of Dagestan			



2019	1	The III International Literature and Historical Forum	Makhachkala, National Literature
	2	The II International Gastronomic Festival "VISIT DAGESTAN 2019". 31 experts and 123 participants from 16 countries of the near and far-abroad countries took part in the festival: Azerbaijan, Italy, Armenia, Serbia, Slovenia, Mauritius, Croatia, Iceland, Ukraine, Estonia, Macedonia, Germany, France, UAE, Georgia, 12 guests of honor and participants from the regions of Russia.	Makhachkala, Cookery Training Center VIP Cookery
	3	The International Theater Festival of Caspian Sea Countries. 18 theater teams from Karachay-Cherkessia, Kabardino-Balkaria, North Ossetia, Chechnya, Ingushetia, Kalmykia, Dagestan, Tatarstan, as well as from Kazakhstan and Azerbaijan took part in the festival.	Makhachkala, State Budgetary Institution State Republican Russian Dramatic Theater named after M. Gorky
	4	The XII International Port of Petrovsky Assembly Music Festival where the representatives of a number of regions of Russia, as well as Great Britain, USA and Czechia.	Makhachkala, Dagestan State Philharmonic named after T. Muradov
	5	The First International Festival "Magic World of BRICS Puppet Show" where the teams of five entities of the Russian Federation, as well as Brazil, India, China and South Africa was held in the framework of the Year of Theater.	Makhachkala, State Budgetary Institution State Republican Russian Dramatic Theater named after M. Gorky
	6	The Day of the Republic of Azerbaijan organized by the Ministry of National Policy and Religious Affairs of the RD with the participation of the Azerbaijan guests.	Makhachkala, State Budgetary Institution Friendship Centre
	7	International Forum "Development of the Tea Road Infrastructure" where the representatives of a number of entities of the Russian Federation, as well as China and Mongolia took part.	Kaspiysk, Cultural and Entertainment Center "Moscow"
	8	Business Weekend "Makhachkala.Travel".	Makhachkala, Dagestan State Technical University
	9	The IX International Folklore and Traditional Culture Festival "Hill People" with the participation of the teams from 14 regions of Russia, as well as from Azerbaijan, India, Iran, Kazakhstan, Serbia, Slovakia, Uzbekistan and the Czech Republic.	Makhachkala, Avar Music and Drama Theater named after G. Tsadasy
	10	Federal "Sabantuy" with the participation of the delegations from 11 regions of Russia and near-abroad countries.	Nogaisky district, Kunbatar
		The Days of Indian Culture with the participation of the Indian guests headed by Deputy Director of the Cultural Center named after Jawaharlal Nehru R. Kumar.	Makhachkala (Dagestan State Philharmonic named after T. Muradov), Derbent (territory of the Citadel of Naryn-Kala)
	11	The XXXIII International Literature Festival "White Cranes" (under the guidance of UNESCO) devoted to the creative work of the Dagestan Peoples Poet R. Gamzatov. Poets, writers and other workers of culture from the different regions of Russia, as well as Azerbaijan, Belarus and Syria arrived to participate in it.	Makhachkala, R. Gamzatov Avenue, Avar Music and Drama Theater named after G. Tsadasy



12	Forum of Young Countrymen where more than 60 delegates from 20 countries of the world took place: Azerbaijan, Georgia, Iran, Iraq, Syria, USA, Turkey, Germany, etc.	Makhachkala, Historical Park "Russia - My History"
13	The VII International Youth Forum of Caspian states 2019, More than 700 young people from 34 entities of Russia and 17 countries of the world took part in the Forum.	Makhachkala, Dagestan recreation center
14	Gastronomic Festival "G. A. of the RD" with the participation of the best cooks of Georgia, Azerbaijan and Dagestan.	Makhachkala, Trade House "Kirgu"
15	International Forum of Beekeepers 2019	Makhachkala, Lezet recreation center
16	International Scientific and Technical Conference "Computer Technology and Modeling in Science, Technology, Economics, Education and Management: Trends and Development" where the representatives of the organizations from 32 regions of Russia and 13 countries of the world took part (Vision Engineer Crane Currency Nashua, NH (CША); Nashua NH, (CША); Honeywell International Inc, (CША); Azerbaijan Medical University (Azerbaijan); Baishev University (Kazakhstan); Kazar University (Azerbaijan); Centre Lasers Intenseset Applications, Université Bordeaux 1, Talencecedex (France); SOCAR Scientific Research and Design Institute SOCAR (Azerbaijan); Heydar Aliyev Oil Refinery, SOCAR (Azerbaijan); Azerbaijan State Oil and Industry University; Yokogawa Electric Corporation (Japan); General Manage Hypertino S.ar.I-S (Luxemburg); Rapid RTC Winnipeg (Canada).	Makhachkala, Dagestan State Technical University
17	The II International Tourism Forum "OPEN DAGESTAN 2019" where more than 600 persons from the different regions of Russia, as well as Azerbaijan, Bulgaria and Kazakhstan took part.	Makhachkala (Historical Park "Russia - My History"), Kizilyurtovsky district, Miatli, Glavryba recreation camp
18	The International Scientific and Educational Conference with the participation of the representatives of the state authorities, religious organizations from the whole country, as well as the guests from foreign countries who discussed the spiritual heritage of the Muslim theologs in the context of the XXI century's problem.	Makhachkala, Historical Park "Russia - My History"
19	The II International Urban Forum "Designing the Future"	Makhachkala, Historical Park "Russia - My History"
20	The VI International Scientific and Practical Conference "National and Cultural Traditions of the Education: History and Modernity". The participants of the event were students and lecturers of the Dagestan State University, scientists of the Dagestan Federal Research Center of the RAS, as well as the guests from Belarus and Kazakhstan.	Makhachkala, Dagestan State University
21	The International Theater Forum "Multicultural Theater Space in Russia and the World" The speakers were the leading Russian and foreign experts from the regions of Russia, Egypt, Italy, South Korea.	Makhachkala, State Budgetary Institution State Republican Russian Dramatic Theater named after M. Gorky



	22	The V International Scientific and Practical Conference “Countering the Extremism and Terrorism in the Digital World”.	Kumtorkalinsky district, Tyube, Conference Hall of Business Hotel Sarykum
	23	The International Scientific and Practical Conference “Countries. Languages. Culture”. Students, undergraduates, graduate students and lecturers of Dagestan universities, as well as foreign students and representatives of educational institutions and organizations from the USA, India, Cote d'Ivoire, Nigeria, Ukraine, Belarus, Azerbaijan, Kazakhstan, Uzbekistan, etc. took part in the conference.	Makhachkala, Dagestan State Technical University
2018	1	The International Cookery Festival and Championship “Vizit Dagestan - 2018”	Makhachkala, Trade House “Kirgu”
	2	The Day of the Islamic Republic of Iran” where the representatives of national communities and national cultural autonomies, lecturers and students of the Faculty of Oriental Studies of the Dagestan State University, members of the Public Council “Friendship” took part. The issues of the establishment and development of the Iranian nation-building, economic and cultural relations of Russia and Iran were discussed in the course of work.	Makhachkala, State Budgetary Institution Friendship Centre
	3	The VIII International Folklore and Traditional Culture Festival “Hill People”. Creative teams from Azerbaijan, India, Poland, Romania and Slovakia took part in the festival.	Makhachkala, Republican Arts Centre of the Ministry of Culture of the Republic of Dagestan
	4	The International Scientific and Practical Conference “Migration in the Regions of Caucasus: Trends and Consequences” attended by the representatives of Belarus, Norway, Great Britain, Japan, Tajikistan, etc.	Makhachkala, Dagestan State University (DSU), Dagestan State University of National Economy (DSUNE)
	5	The International Festival of Extreme Tourism “Yarydag - 2018” where the representatives of 14 regions of Russia, as well as Azerbaijan, Belarus and Israel took part	Dokuzparinsky district, near Kurush
	6	Youth Historical Forum “Caucasus: Heritage” where 45 entities of Russia and several foreign countries took part.	Karabudakhkentsky district, Lastochka (Swallow) Children's Recreational and Educational Base
	7	The V International Youth Forum “Caspian Region - 2018” where about 250 young people from 28 entities of Russia, as well as Azerbaijan, Egypt, Kazakhstan, Turkmenistan and the Republic of Moldova took part	Karabudakhkentsky district, Manas
	8	The XI International Port of Petrovsky Assembly Festival. The artists from Dagestan, Moscow, St. Petersburg, Azerbaijan, Turkey and Spain took part in the festival.	Makhachkala, State Budgetary Institution State Republican Russian Dramatic Theater named after M. Gorky
	9	The V International Festival of Russian Theaters of the Republics of the Northern Caucasus, Black and Caspian Sea countries, near and far-abroad countries.	Makhachkala, - State Budgetary Institution State Republican Russian Dramatic Theater named after M. Gorky;



		- Dagestan State Puppet Theater; - Kumyk Theater named after A.P. Salavatov
10	The V International Interreligious Youth Forum. The Forum's participants were more than 150 young people from the regions of Russia, as well as India, Georgia, Palestine and Azerbaijan	Karabudakhkentsky district, "Sunny Beach" recreation camp
11	Meeting of the Strategic Vision Group "Russia - Islamic World". The state, public and religious leaders from Russia and more than 25 foreign countries took part in the summit: Turkey, Iraq, Egypt, Iran, Indonesia, Saudi Arabia and others.	Kaspiysk, Cultural and Entertainment Center "Moscow"
12	The X International Scientific and Practical Conference "Countries. Languages. Culture". Students and representatives of educational institutions from the USA, India, Cote d'Ivoire, Nigeria, Ukraine, Belarus, Azerbaijan took part in the conference.	Makhachkala, Dagestan State Technical University
13	The International Developer Conference "DevFest"	Makhachkala, Dagestan State Technical University
14	The Russian-Azerbaijani Youth Forum	Makhachkala, Dagestan State University

Republic of Kalmykia

2019	1	The International Scientific and Practical Conference "Socio-Economic and Ecological Development Aspects of the Caspian Region" (May);	Elista, Kalmyk State University
	2	The III International Scientific Forum "Network Oriental Studies: Interaction of Mongolian and Turkic Ethnic Groups in Time and Space" with the participation of linguists, historians and orientologists from Azerbaijan, Hungary, Germany, Kazakhstan, China, Republic of Korea, Kyrgyzstan, Mongolia, Poland, Turkey, Uzbekistan, Finland, Czech Republic and Japan (November);	Elista, Kalmyk State University
	3	The All-Russian Festival of Foreign Students "Dialogue of Cultures" with the participation of over 100 people from 31 countries of the world (November).	Elista, Elista, Kalmyk State University
2018	1	Visiting session of the Petersburg International Economic Forum "Regions of Russia: New Points of Growth. Investment to Real Sector". (May)	Elista, Large Meeting Hall of the Government of the Republic of Kalmykia



Table 65. List of sport events held and planned in the MU "City of Astrakhan" for 2017-2021

year	Item	Name	Venue
Astrakhan region			
2017	1	The International Tournament among the junior teams of the CIS devoted to the Victory Day and to the memory of the Great Patriotic War participants Reserve on Water Polo named after I.I. Gladilin, young males born in 2004-2005	Astrakhan
	2	The International Handball Tournament among young women's team devoted to the memory of V.I. Sizov - the President of HC "Astrakhanochka"	Astrakhan
	3	The International Russian Draughts Competitions among men, women and veterans devoted to the memory of A.M. Dadashyan	Astrakhan
2018	1	The International Tournament among the junior teams of the CIS devoted to the Victory Day and to the memory of the Great Patriotic War participants Reserve on Water Polo named after I.I. Gladilin, young males born in 2004-2005;	Astrakhan
	2	The International Tournament among young males for prizes of Merited Master of Sports Rinat Fayzrakhmanovich Dasayev;	Astrakhan
	3	The International Tournament: Open Cup of the SFD/ NCFD devoted to the memory of player of the USSR team and Moscow "Torpedo", holder of the USSR Cup, Vasily Mikhailovich Zhupikov, among young males born in 2005, 2006, 2007, 2008, 2009 and 2010;	Astrakhan
	4	The International Futsal Tournament The Caspian Cup 2018	Astrakhan
2019	1	The International Seminar (T. Ezra, 7th dan, Sikhon AIKIKAI, UK);	Astrakhan
	2	The International Handball Tournament devoted to the memory of A.A. Akishin among national teams of young people born in 2002-2003;	Astrakhan
	3	The International Handball Tournament among youth teams devoted to the memory of V.I. Sizov - the President of HC "Astrakhanochka";	Astrakhan
	4	The Open International Kyokushin Kaikan Competitions of the Caspian Sea states The Caspian Cup among children, young males and young females, junior males and junior females, men and women in kumite, kata, breaking;	Astrakhan
	5	The International Football Festival "Lokoball - 2018 - Russian Railway" (preliminary stage) ("Volgar - 2008 - 2010");	Astrakhan
	6	The International Tournament: Open Cup of the SFD/ NCFD devoted to the memory of player of the USSR team and	Astrakhan



		Moscow "Torpedo", holder of the USSR Cup, Vasily Mikhailovich Zhupikov, among young males;	
	7	The International Futsal Tournament among the national teams of the Caspian Sea states The Caspian Cup 2019;	Astrakhan
	8	The International Football Festival The Caspian Cup among young males born in 2007;	Astrakhan
	9	The International Chess Tournament "Caviar cup";	Astrakhan
2020	1	The International Seminar (T. Ezra, 7th dan, Sikhan AIKIKAI, UK);	Astrakhan
	2	The Cup of the Caspian Sea states "International Wrestling Tournament";	Astrakhan
	3	The International Handball Tournament among young women's team devoted to the memory of V.I. Sizov - the President of HC "Astrakhanochka";	Astrakhan
	4	The International Kyokushin Kaikan Competitions The Caspian Cup (8-11 years old, 12-17 years old, 18+ years old), classes of weight, kata, kata-groups, breaking. Kyokushin discipline;	Astrakhan
	5	The International Futsal Tournament The Caspian Cup;	Astrakhan
	6	The International Chess Tournament "Caviar cup";	Astrakhan
	7	The XV International Astrakhan Chess Festival;	Astrakhan
2021 195	1	The International Seminar (T. Ezra, 7th dan, Sikhan AIKIKAI, UK);	Astrakhan
	2	The Cheer Sports Cup of the Caspian Sea states;	Astrakhan
	3	Team Box World Cup;	Astrakhan
	4	The International Kyokushin Kaikan Competitions The Caspian Cup (8-11 years old, 12-17 years old, 18+ years old), classes of weight, kata, kata-groups, breaking. Kyokushin discipline;	Astrakhan
	5	The International Futsal Tournament The Caspian Cup 2021;	Astrakhan



Table 66. List of sport events held in the territory of Astrakhan region, Republic of Dagestan and Republic of Kalmykia.

Item	Name	Venue
Astrakhan region		
1	The International Aikido Seminar (T. Ezra, 7th dan, Sikhon AIKIKAI, UK), (Astrakhan);	Astrakhan
2	The International Handball Tournament devoted to the memory of A.A. Akishin among national teams of young people born in 2002-2003 (Astrakhan);	Astrakhan
3	The International Handball Tournament among youth teams devoted to the memory of V.I. Sizov - the President of HC "Astrakhanochka" (Astrakhan);	Astrakhan
4	The Open International Kyokushin Kaikan Competitions of the Caspian Sea states The Caspian Cup among children, young males and young females, junior males and junior females, men and women in kumite, kata, breaking (Astrakhan);	Astrakhan
5	The International Football Festival "Lokoball - 2018 - Russian Railway" (preliminary stage) ("Volgar - 2008 - 2010") (Astrakhan);	Astrakhan
6	The International Tournament: Open Cup of the SFD/ NCFD devoted to the memory of player of the USSR team and Moscow "Torpedo", holder of the USSR Cup, Vasily Mikhailovich Zhupikov, among young males (Astrakhan);	Astrakhan
7	The International Futsal Tournament among the national teams of the Caspian Sea states The Caspian Cup - 201 (Astrakhan);	Astrakhan
8	The International Football Festival The Caspian Cup among young males born in 2007 (Astrakhan);	Astrakhan
9	The International Chess Tournament "Caviar cup" (Astrakhan);	Astrakhan
Republic of Dagestan		
1	The VII International Youth Wrestling Tournament devoted to the memory of Surakat Asiyatilov;	Kaspiysk
2	The AIBA International Tournament devoted to the memory of M-S.I. Umakhanov (06/2019);	Kaspiysk
3	The International Boxing Tournament devoted to the memory of M-S.I. Umakhanov;	Kaspiysk
4	The International Judo Tournament devoted to the memory of Master of Sports of International grade D. Barkalaev;	Kaspiysk
5	The X International Free-Style Wrestling Tournament for prizes of Yusup Abdusalamov;	Botlikh
6	The International Tournament (Free-Style Wrestling) - Contest for Wrestling Coach-Trainer;	Khasavyurt



Republic of Kalmykia

- | | | |
|----------|--|--------|
| 1 | The II Open Tournament with the participation of foreign teams among juniors of 17-18 years old for prizes of two-time European and World champion, silver and bronze Olympic medalist, Honored Boxing Master Raimkul Malakhbekov in (Elista); | Elista |
| 2 | The II Open Tournament with the participation of foreign teams among young males of 15-16 years old for prizes of two-time European and World champion, silver and bronze Olympic medalist, | Elista |



APPENDIX 19. STATE PROGRAMS OF ASTRAKHAN REGION

Table 67. List of national projects included in the state programs of Astrakhan region

National project	Related regional projects in Astrakhan region	Financing in 2020 (mln. RUB)	Financing from 2019 till 2024 (mln. RUB)	Sources (2020)		Sources (2019-2024)	
1 Demography 2019-2024 (01/01/2019-31/12/2024)	“Financial support of families after a birth”	2 291,14	13273.68	Federal budget	3253.83	Federal budget	13761.96
	“Elderly Generation”	228.60	724.09	Regional budget	764.68	Regional budget	4886.88
	“Sport - the style of life”	161.29	1568.87				
	“Promotion for women’s employment - creation of conditions for preschool education for children under 3 years old”	1385.32	3383.69				
	“Formation of the system of citizens’ motivation to the health style of life”	0	1.1				
2 Safe and quality motor roads 2019-2024 (03/12/2018-31/12/2024)	“Road network”	1,793.31	8404.9	Federal budget	800	Federal budget	2768.23
	“General activities on public roads development”	120.3	360.3	Regional budget	1373.91	Regional budget	8480



	"Traffic safety"	260.31	2483.07				
3 Demography 2019-2024 (01/01/2019- 31/12/2024)	"Modern School"	1,098.42	2752.6	Federal budget	1247.65	Federal budget	3288.24
	"Teacher of the Future"	7.68	93.08	Regional budget	120	Regional budget	323.91
	"Young Professionals"	24.7	112.91				
	"Digital Educational Environment"	126.72	165.78				
	"Success for Every Child"	101.21	475.51				
	"Social Activity"	8.89	11.74				
	"Support of Families with Children"	0	0.26				
4 Healthcare 2020-2024 (01/01/2019- 31/12/2024)	"Development of the Primary Healthcare System"	181.50	446.43	Federal budget	1001.28	Federal budget	2870.09
	"Cardiovascular Disease Control"	212.86	1055.75	Regional budget	106.21	Regional budget	480.21
	"Oncology Disease Control"	320.89	914.12				
	"Development of Children's Healthcare, including Creation of the Modern Medical Care Infrastructure"	120.18	294.26				
	"Medical Staff of Astrakhan Region"	19.65	96.96				
	"Healthcare Digital Contour"	252.41	542.78				
	"Medical Services Export Development"	0	0				
4 Ecology 2019- 2024 (01/10/2018- 31/12/2024)	"Rehabilitation of Volga"	401.38	13718.38	Federal budget	336.49	Federal budget	17132.03
	"Clean Water"	135.36	1841.55		261.78		781.19



	“Unique Water Bodies Conservation”	0	60.88	Regional budget		Regional budget	
	“Integrated Solid Municipal Waste Management System”	0	121.92				
	“Clean Country”	25.1	1914.4				
	“Forest Conservation”	32.39	221.63				
	“Biological Diversity Conservation and Ecological Tourism Development”	4.08	34.45				
5 Housing and urban environment 2019-2024 (01/01/2019-31/12/2024)	“Housing”	0.00	0	Federal budget	347.25	Federal budget	1432.4
	“Sustainable Reduction of the Uninhabitable Housing Stock”	189.2	1377.4	Reform Promotion Fund of Housing and Utility Infrastructure	186.09	Reform Promotion Fund of Housing and Utility Infrastructure	1353.65
				Regional budget	55.76	Regional budget	332.3
	“Formation of Comfort Urban Environment”	399.9	1740.95				
6 Culture 2019-2024 (03/12/2018-31/12/2024)	“Cultural Environment”	147.9	596.5	Federal budget	107.8	Federal budget	445.1
	“Creative People”	1.13	18.03	Regional budget	1.13	Regional budget	17.23
	“Digital Culture”	0	9.38				
7 Small and Medium Business Entities and Support for Individual Entrepreneurial	“Creation of Favorable Conditions for Activities of the Self-Employed Persons” (2021-2024)	-	23.28			Federal budget	22.58
						Regional budget	0.7



Initiatives 2019-2024 (01/01/2019-31/12/2024)	“Greater Access of Small and Medium Business Entities to Finance Resources, Including Concessionary Financing” (2019-2020)	182.4	367.4	Federal budget	176.9	Federal budget	356.4
				Regional budget	5.5	Regional budget	11
	“Acceleration of Small and Medium Business Entities”	88.62	651.98	Federal budget	85.96	Federal budget	632.42
				Regional budget		Regional budget	
	“Popularization of Entrepreneurship”	8.18	16.18		2.66		19.56
			Federal budget		Federal budget		
	“Improvement of Conditions for Business Activities”	0	0	Regional budget	7.94	Regional budget	15.7
					0.24		0.48
	“Creation of Conditions for Easy Start-Up and Comfort Business” (2021-2024)	-	161.97			Federal budget	157.11
						Regional budget	4.86
8 International cooperation and export 2019-2024 (01/01/2019-31/12/2024)	“Agricultural Products Export”	43.11	662.62	Federal budget	41.82	Federal budget	443.17
	“Industrial Export”	130	840	Regional budget	71.29	Regional budget	611.94
				Off-budgetary sources	60	Off-budgetary sources	384
9 Digital economy of the Russian Federation 2019-2024 (17/07/2019-31/12/2024)	“Information Infrastructure”	0.0074	180.53	Federal budget	4.93	Federal budget	180.04
	“Cyber Security”	0	0	Regional budget	0.16	Regional budget	5.58
	“Digital State Administration”	5.08	5.08				
	“Digital Technology”	0	0				
	“Staff for Digital Economy”	0	0				



APPENDIX 20. REGISTER OF INITIAL DATA PROVIDED BY THE EXECUTIVE BODIES OF ASTRAKHAN REGION, MUNICIPAL UNIT “CITY OF ASTRAKHAN” AND OTHER MUNICIPAL UNITS OF ASTRAKHAN AGGLOMERATION

Table 68. Register of initial data provided by the executive bodies of Astrakhan region, municipal unit “City of Astrakhan” and other municipal units of Astrakhan agglomeration

1 Ministry of Economic Development			
1.1. Socio-economic development strategies officially adopted and having the project status			
1.1.1. Strategy of Astrakhan region according to cl. 1.1 of section 1.			
1.1.2. Concerning amendments to Resolution of the Government of Astrakhan region No. 427-П dated 07/10/2014.			
1.1.3. Concerning lists of villages of Astrakhan region and rural agglomerations of Astrakhan region as of 10/03/2020			
1.1.4. Socioeconomic Development Strategy of the MU “Kharabalinsky district” for 2017-2026			
1.2. Forecast socioeconomic development indicators developed for 2020 and next years			
1.2.1. Astrakhan region / Areas and districts	1.2.1.1. Astrakhan	1.2.1.1.1. Resolution No. 2744-p dated October 31, 2019 “On approval of the updated socioeconomic development forecast for the municipal unit “City of Astrakhan” for 2020 and planned period of 2021-2022	1.2.1.1.1.1. On approval of the updated socioeconomic development forecast for the municipal unit “City of Astrakhan” for 2020 and planned period of 2021-2022 as of 31/10/2019 - .DOC format
			1.2.1.1.1.2. On approval of the updated socioeconomic development forecast for the municipal unit “City of Astrakhan” for 2020 and planned period of 2021-2022 as of 31/10/2019 - .TIF format



		1.2.1.1.2. Resolution of the administration of the municipal unit "City of Astrakhan" No. 88 dated April 31, 2020 "Development of small and medium businesses and improvement of investment attractiveness of Astrakhan"	
		1.2.1.1.3. Resolution of the Mayor of Astrakhan No. 12412-м dated December 29, 2011 "On Approval of Development Strategy of the Municipal Unit "City of Astrakhan" 2021"	
		1.2.1.1.4. Resolution of the Mayor of Astrakhan No. 12412-м dated 29/12/2011, revised on 27/07/2017	
	1.2.1.2. Akhtubinsk	1.2.1.2.1. Effective	1.2.1.2.1.1. Municipal program "Integrated Development of the Utility Infrastructure System"
			1.2.1.2.1.2. Municipal program "Development of Physical Education and Mass Sports, Recreation and Sport Events in the municipal unit "City of Akhtubinsk" for 2018-2020"
			1.2.1.2.1.3. Resolution "On Approval of municipal program "Traffic Safety Improving in the territory of the municipal unit "City of Akhtubinsk" for 2018-2020"
			1.2.1.2.1.4. Socioeconomic Development Strategy of Akhtubinsky municipal district of Astrakhan region 2020.
			1.2.1.2.1.5. Draft Socioeconomic Development Strategy of the municipal unit "Akhtubinsky district" of Astrakhan region 2035
		1.2.1.2.2. Resolution No. 581 dated 03/08/2020	
		1.2.1.2.3. Resolution No. 713 dated 09/11/2018	
		1.2.1.2.4. Resolution No. 539 dated 09/12/2016	
		1.2.1.2.5. Resolution No. 1743 dated 13/11/2014	
		1.2.1.2.6. Resolution No. 770 dated 19/11/2017	
		1.2.1.2.7. Resolution No. 474 dated 22/07/2019	

		1.2.1.2.8. Resolution No. 1127 dated 23/09/2015	
		1.2.1.2.9. Socioeconomic development forecast for the municipal unit "Akhtubinsky district" for 2021-2023	
		1.2.1.2.10. Decision "On Approval of Socioeconomic Development Strategy of the municipal unit "Akhtubinsky district" of Astrakhan region 2020" dated 25/04/2013	
		1.2.1.2.11. Socioeconomic Development Strategy of Akhtubinsky municipal district of Astrakhan region 2020	
		1.2.1.2.12. Draft Socioeconomic Development Strategy of the municipal unit "Akhtubinsky district" of Astrakhan region 2035	
	1.2.1.3. Volodarsky	1.2.1.3.1. Effective	1.2.1.3.1.1. Socioeconomic development forecast for the municipal unit "Volodarsky district" for 2020-2024
			1.2.1.3.1.2. Program "Formation of the modern urban environment in the territory of the MU Volodarsky district for 2018-2022"
		1.2.1.3.2. List of municipal programs adopted from 2011 till now.	
	1.2.1.4. Closed Administrative Territorial Unit Znamensk	1.2.1.4.1. Effective	1.2.1.4.1.1. Integrated social infrastructure development program of Znamensk for 2017-2028 as of 24/08/2017
			1.2.1.4.1.2. Integrated transport infrastructure development program of Znamensk for 2017-2028 as of 13/04/2017
		1.2.1.4.2. Socioeconomic development strategy of Znamensk 2025 as of 20/10/2016	
		1.2.1.4.3. Socioeconomic development forecast of Znamensk 2020 as of of Znamensk 2025 as of 07/11/20196	
		1.2.1.4.4. List of municipal programs for 2016-2020 as of 14/07/2015	



		1.2.1.4.5. List of municipal programs of Znamensk for 2019-2023 as of 31/07/2018
		1.2.1.4.6. Information about demographic situation in Znamensk (Appendix 5 to the letter of the Znamensk administration) as of 17/12/2020
		1.2.1.4.7. Economic indicators on Znamensk (Appendix 6 to the letter of the Znamensk administration) as of 17/12/2020
1.2.1.5. Ikryaninsky	1.2.1.5.1. Effective	1.2.1.5.1.1. Resolution of the administration of the municipal unit "Ikryaninsky district" of Astrakhan region No. 730n dated July 31, 2019 "On socioeconomic development forecast for the municipal unit "Ikryaninsky district" for the medium term until 2024"
1.2.1.6. Kamyzyaksky	1.2.1.6.1. Effective	1.2.1.6.1.1. Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030
		1.2.1.6.1.2. Budgetary forecast of the municipal unit "Kamyzyaksky district" for the long term until 2022
		1.2.1.6.1.3. Action plan on implementation of the Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030 as of 19/07/2019
		1.2.1.6.1.4. Decision "On Approval of Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030"
		1.2.1.6.1.5. Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030

		1.2.1.6.2. Demographic situation	1.2.1.6.2.1. Visualization files of the gender and age pyramid as of 01/01/2020 - 2 .htm files
		1.2.1.6.3. List of municipal programs of the MU "City of Kamyzyak" for 2014-2020	1.2.1.6.3.1. List of municipal programs of the MU "City of Kamyzyak" in 2014
			1.2.1.6.3.2. List of municipal programs of the MU "City of Kamyzyak" in 2015
			1.2.1.6.3.3. List of municipal programs of the MU "City of Kamyzyak" in 2016
			1.2.1.6.3.4. List of municipal programs of the MU "City of Kamyzyak" in 2017
			1.2.1.6.3.5. List of municipal programs of the MU "City of Kamyzyak" in 2018
			1.2.1.6.3.6. List of municipal programs of the MU "City of Kamyzyak" in 2019
			1.2.1.6.3.7. List of municipal programs of the MU "City of Kamyzyak" in 2020
		1.2.1.6.4. List of municipal programs of the MU "City of Kamyzyak" for 2010-2020	1.2.1.6.4.1. List of municipal programs of the MU "Kamyzyaksky district" for 2015
			1.2.1.6.4.2. List of municipal programs of the MU "Kamyzyaksky district" for 2016
			1.2.1.6.4.3. List of municipal programs of the MU "Kamyzyaksky district" for 2017
			1.2.1.6.4.4. List of municipal programs of the MU "Kamyzyaksky district" for 2018



			1.2.1.6.4.5. List of municipal programs of the MU "Kamyzyaksky district" for 2019
			1.2.1.6.4.6. List of municipal programs of the MU "Kamyzyaksky district" for 2020
			1.2.1.6.4.7. List of district special-purpose and municipal programs of the MU "Kamyzyaksky district" for 2014
			1.2.1.6.4.8. List of district special-purpose programs of the MU "Kamyzyaksky district" for 2013
			1.2.1.6.4.9. List of district special-purpose programs of the MU "Kamyzyaksky district" for 2010
			1.2.1.6.4.10. List of district special-purpose programs of the MU "Kamyzyaksky district" for 2011
			1.2.1.6.4.11. List of district special-purpose programs of the MU "Kamyzyaksky district" for 2012
		1.2.1.6.5. Forecast socioeconomic development indicators of the municipal unit "City of Kamyzyak" for 2021 and planned period of 2022-2023	1.2.1.6.5.1. Forecast socioeconomic development indicators of the municipal unit "City of Kamyzyak" of Astrakhan region for 2021 and planned period of 2022-2023
		1.2.1.6.6. Socioeconomic development forecast of the municipal unit "Kamyzyaksky district" of Astrakhan region for the medium term until 2024	1.2.1.6.6.1. Socioeconomic development forecast of the municipal unit "Kamyzyaksky district" of Astrakhan region for the medium term until 2024
		1.2.1.6.7. Information about the number and payroll budget of employees of the organizations of the municipal units in	1.2.1.6.7.1. Information about the number and payroll budget of employees of the organizations (large, medium, including those with the number of

		Kamyzyaksky district for January-December 2019	employees not exceeding 15 persons) of the municipal units in Kamyzyaksky district for January-December 2019
		1.2.1.6.8. Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030	1.2.1.6.8.1. Decision "On Approval of Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030"
			1.2.1.6.8.2. Socioeconomic Development Strategy of the municipal unit "Kamyzyaksky district" 2030
		1.2.1.6.9. Number of the employed population of Kamyzyaksky district	1.2.1.6.9.1. Number of the employed population of Kamyzyaksky district as of 01/01/2020
		1.2.1.6.10. Number of the employed population of the MU "City of Kamyzyak"	1.2.1.6.10.1. Number of the employed population of the MU "City of Kamyzyak" 01/01/2020
		1.2.1.6.11. Extract from the report "On achieved indicators for performance assessment of the local authorities of the MU "Kamyzyaksky district" of Astrakhan region for 2014 and planned 3-year indicators"	
		1.2.1.6.12. Share of working-age population	
		1.2.1.6.13. Indicators characterizing the condition of economics and social sphere of the municipal unit "Kamyzyaksky municipal district" for 2019-2020	
		1.2.1.6.14. Makeup and assessment of the number of population of the municipal unit "Kamyzyaksky district" of Astrakhan region as of 01/01/2020	
	1.2.1.7. Krasnoyarsky	1.2.1.7.1. Effective	1.2.1.7.1.1. Investment strategy of the municipal unit "Krasnoyarsky district" of Astrakhan region 2020
		1.2.1.7.2. Socio-economic development strategies officially adopted and having the project status and forecast socioeconomic development indicators developed for 2020 and next years	



		1.2.1.7.3. List of municipal programs of the municipal unit “Krasnoyarsky district” adopted since 2010
1.2.1.8. Limansky	1.2.1.8.1. List of municipal programs of the municipal unit “Limansky district” 2024	
	1.2.1.8.2. Socioeconomic development forecast of the municipal unit “Limansky district” for the medium term until 2023	
	1.2.1.8.3. Socioeconomic Development Strategy of the municipal unit “Limansky district” for 2017-2025	
1.2.1.9. Narimanov	1.2.1.9.1. Effective	1.2.1.9.1.1. Resolution of the administration of the MU “Narimanovsky district” of Astrakhan region No. 2661 dated November 28, 2014 “On Approval of municipal program “Development of Agricultural Sector of Narimanovsky district” (amended and supplemented).
		1.2.1.9.1.2. Resolution of the administration of the municipal unit “Narimanovsky district” of Astrakhan region No. 1126 dated June 30, 2015 “On amendments to the municipal program “Development of Agricultural Sector of Narimanovsky district”
		1.2.1.9.1.3. Socioeconomic development forecast for the municipal unit “Narimanovsky district” for 2020-2024
1.2.1.10. Privolzhsy	1.2.1.10.1. Effective	1.2.1.10.1.1. Decision of the Council of the municipal unit “Privolzhsy district” of Astrakhan region No. 211 dated September 27, 2018 “On Approval of Socioeconomic Development Strategy of the municipal unit

			“Privolzhsky district” 2030”
		1.2.1.10.2. List of municipal programs, governmental special-purpose programs of the municipal unit “Privolzhsky district”.	
		1.2.1.10.3. Resolution “On amendments to the Resolution of the administration of the municipal unit “Privolzhsky district” No. 1126 dated 31/08/2017”.	
		1.2.1.10.4. Socioeconomic development forecast for the medium term until 2023.	
	1.2.1.12. Kharabali	1.2.1.12.1. Effective	<p>1.2.1.12.1.1. Strategy, forecast:</p> <ul style="list-style-type: none"> ■ 1.2.1.12.1.1.1. Socioeconomic development forecast for the MU “Kharabalinsky district” for 2020-2022; ■ 1.2.1.12.1.1.2. Socioeconomic development forecast for the MU “Kharabalinsky district” for 2021-2023; ■ 1.2.1.12.1.1.3. Socioeconomic Development Strategy of the MU “Kharabalinsky district” for 2017-2026
			1.2.1.12.1.2. Investment strategy of the municipal unit “Kharabalinsky district” of Astrakhan region 2020.
			1.2.1.12.1.3. Resolution of the administration of the MU “Kharabalinsky district” of Astrakhan region No. 1217 dated December 25, 2017 “On Approval of Action Plan on implementation of the Socioeconomic Development Strategy of the MU “Kharabalinsky district” for 2017-2026”
			1.2.1.12.2.1. List of municipal programs of the



		1.2.1.12.2. List of municipal programs for 2016-2021	MU "Kharabalinsky district" for 2017
			1.2.1.12.2.2. List of municipal programs of the MU "Kharabalinsky district" for 2018
			1.2.1.12.2.3. List of municipal programs of the MU "Kharabalinsky district" for 2019
			1.2.1.12.2.4. List of municipal programs of the MU "Kharabalinsky district" for 2020
			1.2.1.12.2.5. List of municipal programs of the MU "Kharabalinsky district" for 2021
			1.2.1.12.2.6. List of municipal programs financed from the budget of the MU "Kharabalinsky district" for 2016
			1.2.1.12.2.7. Summary annual report about the progress and performance assessment of the municipal programs of the MU "Kharabalinsky district" for 2019
		1.2.1.12.3. Projects	1.2.1.12.3.1. Municipal program "Integrated Development of the Utility Infrastructure System of the MU "Kharabalinsky district"
			1.2.1.12.3.2. Socioeconomic Development Strategy of the MU "Kharabalinsky district" for 2017-2026
		1.2.1.13. Chernoyarsky	1.2.1.13.1. Socioeconomic development forecast for the MU "Chernoyarsky district" for the medium term until 2023
1.2.1.13.1.2. Explanatory Note to the			

			socioeconomic development forecast for the MU “Chernoyarsky district” for the medium term until 2023
			1.2.1.13.1.3. Socioeconomic development forecast for the medium term until 2023
		1.2.1.13.2. Socioeconomic Development Strategy of the municipal unit “Chernoyarsky district” 2030	1.2.1.13.2.1. Decision “On Approval of Socioeconomic Development Strategy of the municipal unit “Chernoyarsky district” 2030”
			1.2.1.13.2.2. Socioeconomic Development Strategy of the municipal unit “Chernoyarsky district” 2030
		1.2.1.13.3. Land-use planning scheme of the MU “Chernoyarsky district” of Astrakhan region	1.2.1.13.3.1. Decision “On Approval of the land-use planning scheme of the municipal unit “Chernoyarsky district” of Astrakhan region”
			1.2.1.13.3.2. Land-use planning scheme of the MU “Chernoyarsky district” of Astrakhan region.
1.2.2. Laws and Orders	1.2.2.1. Law of Astrakhan region No. 11_2020-03 dated February 10, 2020 “On agricultural development in the territory of Astrakhan region”.		
	1.2.2.2. Order of the Governor of Astrakhan region No. 813-p dated December 28, 2019 “On Introduction of the Competition Development Standard in Astrakhan region”		
	1.2.2.3. Order of the Governor of Astrakhan region No. 247-p dated Tuesday, April 30, 2019 “On Prospective Development Scheme and Program for Power Generating Industry of Astrakhan region for 2021–2024”		
	1.2.2.4. Order of the Government of Astrakhan region No. 266-Пр dated July 11, 2014 “On the Concept of Industrial Policy of Astrakhan region for 2014-2020”		
1.2.3. Socioeconomic development forecast for Astrakhan region for the medium term until 2022 -2023	1.2.3.1. Order “On Socioeconomic Development Forecast for Astrakhan Region for the Medium Term until 2022 (Order No. 464-Пр)		
	1.2.3.2. Order “On Socioeconomic Development Forecast for Astrakhan Region for the Medium Term until 2023 ”(Order No. 408-Пр)		



1.2.4. Socioeconomic Development Strategy of Astrakhan region 2035.	1.2.4.1. Socioeconomic Development Strategy of Astrakhan region 2035.	
	1.2.4.2. Information about "Socioeconomic Development Strategy of Astrakhan region 2035"	
1.3. Statistical data about demographic situation		
1.3.1. Astrakhan region	1.3.1.1. Migration	1.3.1.1.1. External migration in Astrakhan region and in the Russian Federation for January-December 2019
		1.3.1.1.2. External migration in Astrakhan region and in the Russian Federation for January-September 2020
		1.3.1.1.3. Migration in Astrakhan region by age for January-December 2019
		1.3.1.1.4. Migration in Astrakhan region by age for January-September 2020
	1.3.1.2. Sex-age structure	1.3.1.2.1. Population makeup according to sex and age as of 01/01/20 in Astrakhan region
		1.3.1.2.2. Number of population by sex and age in Astrakhan
	1.3.1.3. Population forecast	1.3.1.3.1. Basic indicators provided for the socioeconomic development forecast for Astrakhan region for medium term until 2023
		1.3.1.3.2. Population forecast 2032
	1.3.1.4. Makeup and assessment of the number of population in the municipal units of Astrakhan region	1.3.1.4.1. Astrakhan as of 01/01/2020
		1.3.1.4.2. Akhtubinsky as of 01/01/2020
		1.3.1.4.3. Volodarsky as of 01/01/2020
		1.3.1.4.4. Yenotaevsky as of 01/01/2020
		1.3.1.4.5. Ikryaninsky as of 01/01/2020
		1.3.1.4.6. Kamyzyaksky as of 01/01/2020
		1.3.1.4.7. Krasnoyarsky as of 01/01/2020
		1.3.1.4.8. Limansky as of 01/01/2020
		1.3.1.4.9. Narimanovsky as of 01/01/2020
1.3.1.4.10. Assessment of the number of the standard population as of 01/01/2020 by municipal units		
1.3.1.4.11. Privolzhsky as of 01/01/2020		
1.3.1.4.12. Kharabalinsky as of 01/01/2020		
1.3.1.4.13. Chernoyarsky as of 01/01/2020		
1.3.1.5. Share of working-age population and employed population in Astrakhan region		

	1.3.1.6. Employed population by the kinds of activity in Astrakhan region			
1.3.2. Urban areas and districts	1.3.2.1. Astrakhan	1.3.2.1.1. Share of working-age population, share of population employed in economic sector		
		1.3.2.1.2. Sex-age structure of the standard population in terms of one-year age intervals		
		1.3.2.1.3. Population forecast 2035		
		1.3.2.1.4. Distribution of migrants by sex and age groups in 2017-2019; main results of the population migration in Astrakhan by migration flows		
		1.3.2.1.5. Distribution of population by workplaces		
		1.3.2.1.6. Number of population		
	1.3.2.2. Kamyzyak	1.3.2.2.1. Kamyzyak	1.3.2.2.1.1. Sex-age structure of Kamyzyak	
			1.3.2.2.1.2. Number of the employed population of the MU "City of Kamyzyak" 01/01/2020	
		1.3.2.2.2. District	1.3.2.2.2.1. Sex-age structure: 1.3.2.2.2.1.1. Files of sex-age pyramid 1.3.2.2.2.1.2. as 01.01.2020 sex-age	
			1.3.2.2.2.2. Number of the employed population of Kamyzyaksky district as of 01/01/2020	
		1.3.2.2.3. Share of working-age population		
		1.3.2.2.4. On achieved indicators for performance assessment of the local authorities of the municipal unit "Kamyzyaksky district" of Astrakhan region for 2014 and planned 3-year indicators.		
		1.3.2.2.5. Information about the number and payroll budget of employees of the organizations of the municipal units in Kamyzyaksky district for January-December 2019		
		1.3.2.2.6. Makeup and assessment of the number of population of the municipal unit "Kamyzyaksky district" of Astrakhan region as of 01/01/2020		
		1.3.2.3. Chernoyarsky	1.3.2.3.1. Total results of population migration for January-December 2019 Chernoyarsky district	
			1.3.2.3.2. Total results of population migration for January-December 2020 Chernoyarsky district	



		1.3.2.3.3. Makeup and assessment of the number of population of the municipal unit “Chernoyarsky district” of Astrakhan region as of 01/01/2020
		1.3.2.3.4. Number of population by sex and particular age groups as of 01/01/2020
1.3.3. Main indicators, migration	1.3.3.1. Population makeup according to sex and age as of January 01, 2020, in Astrakhan region	
	1.3.3.2. Employed population by the kinds of activity in Astrakhan region	
	1.3.3.3. External migration in Astrakhan region and in the Russian Federation for January-December 2019	
	1.3.3.4. External migration in Astrakhan region and in the Russian Federation for January-September 2020	
	1.3.3.5. Migration in Astrakhan region by age for January-December 2019.	
	1.3.3.6. Migration in Astrakhan region by age for January-September 2020	
	1.3.3.7. Basic indicators provided for the socioeconomic development forecast for Astrakhan region for medium term until 2023 (Option 1)	
	1.3.3.8. Basic indicators provided for the socioeconomic development forecast for Astrakhan region for medium term until 2023 (Option 2)	
	1.3.3.9. Number of population by sex and age in Astrakhan	
1.3.4. Makeup and assessment of the number of population in the municipal units of Astrakhan region as of 01/01/2020	1.3.4.1. Population makeup according to sex and age as of January 01, 2020, in Astrakhan region	
	1.3.4.2. Assessment of the number of the standard population as of January 01, 2020, by municipal units	
	1.3.4.3. Makeup and assessment of the number of population of the municipal unit “Akhtubinsky district” of Astrakhan region	
	1.3.4.4. Makeup and assessment of the number of population of the municipal unit “Volodarsky district” of Astrakhan region	
	1.3.4.5. Makeup and assessment of the number of population of the municipal unit “City of Astrakhan” of Astrakhan region	
	1.3.4.6. Makeup and assessment of the number of population of the municipal unit “Yenotaevsky district” of Astrakhan region	
	1.3.4.7. Makeup and assessment of the number of population of the municipal unit “Ikryaninsky district” of Astrakhan region	
	1.3.4.8. Makeup and assessment of the number of population of the municipal unit “Kamyzyaksky district” of Astrakhan region	
	1.3.4.9. Makeup and assessment of the number of population of the municipal unit “Krasnoyarsky district” of Astrakhan region	
	1.3.4.10. Makeup and assessment of the number of population of the municipal unit “Limansky district” of Astrakhan region	

	1.3.4.11. Makeup and assessment of the number of population of the municipal unit “Narimanovsky district” of Astrakhan region
	1.3.4.12. Makeup and assessment of the number of population of the municipal unit “Privolzhsky district” of Astrakhan region
	1.3.4.13. Makeup and assessment of the number of population of the municipal unit “Kharabalinsky district” of Astrakhan region
	1.3.4.14. Makeup and assessment of the number of population of the municipal unit “Chernoyarsky district” of Astrakhan region
1.4. Statistical data on socio-economic indicators	
1.4.1. Statistical data on small and medium businesses	1.4.1.1. Information about previous studies of investment and business climate
	1.4.1.2. Scope and structure of income of population by revenue sources in Astrakhan region
	1.4.1.3. Basic indicators provided for the socioeconomic development forecast for Astrakhan region for medium term until 2023
	1.4.1.4. List of the most significant investment projects being implemented and planned for implementation in Astrakhan region
	1.4.1.5. List of the investment business planned for implementation
	1.4.1.6. Support of small and medium business entities
	1.4.1.7. Socioeconomic development strategy of Astrakhan region for 2009-2020
	1.4.1.8. Number of small and medium business entities
1.4.2. Report of the economic and social status of Akhtubinsky district in 2018	
1.4.3. Report of the economic and social status of Volodarsky district in 2018	
1.4.4. Report of the economic and social status of Yenotaevsky district in 2018	
1.4.5. Report of the economic and social status of Ikryaninsky district in 2018	
1.4.6. Report of the economic and social status of Kamyzyaksky district in 2018	
1.4.7. Report of the economic and social status of Krasnoyarsky district in 2018	
1.4.8. Report of the economic and social status of Limansky district in 2018	
1.4.9. Report of the economic and social status of Narimanovsky district in 2018	
1.4.10. Report of the economic and social status of Privolzhsky district in 2018	
1.4.11. Allocation of investment to the capital asset of Astrakhan region for 2018	
1.5. List the largest trade companies	
1.5.1. List the largest trade companies located in the territory of Astrakhan region	
1.6. List the medium and small trade companies	
1.6.1. List the medium and small trade companies located in the territory of Astrakhan region	



2 Ministry of Construction		
2.1. Utility infrastructure		
2.1.1. Water supply and water discharge	2.1.1.1. Water supply - graphs	2.1.1.1.1. General water supply graphs - 2 .pdf and .jpg files
		2.1.1.1.2. General drinking water supply graphs - 2 .pdf and .jpg files
		2.1.1.1.3. General water supply graphs for Chernoyarsky district - 2 .pdf and .jpg files
		2.1.1.1.4. General water supply graphs for Akhtubinsky district - 2 .pdf and .jpg files
		2.1.1.1.5. General water supply graphs for Yenotaevsky district - 2 .pdf and .jpg files
		2.1.1.1.6. General water supply graphs for Kharabalinsky district - 2 .pdf and .jpg files
		2.1.1.1.7. General water supply graphs for Narimanovsky district - 2 .pdf and .jpg files
		2.1.1.1.8. General water supply graphs for Limansky district - 2 .pdf and .jpg files
		2.1.1.1.9. General water supply graphs for Ikryaninsky district - 2 .pdf and .jpg files
		2.1.1.1.10. General water supply graphs for Kamyzyaksky district - 2 .pdf and .jpg files
		2.1.1.1.11. General water supply graphs for Privolzhsky district - 2 .pdf and .jpg files
		2.1.1.1.12. General water supply graphs for Volodarsky district (as amended) - 2 .pdf and .jpg files
		2.1.1.1.13. General water supply graphs for Krasnoyarsky district (as amended) - 2 .pdf and .jpg files

	2.1.1.2. Updated graphs	2.1.1.2.1. Akhtubinsky.pdf
		2.1.1.2.2. Volodarsky.pdf
		2.1.1.2.3. Yenotaevsky.pdf
		2.1.1.2.4. Ikryaninsky.pdf
		2.1.1.2.5. Kamyzyaksky.pdf
		2.1.1.2.6. Krasnoyarsky.pdf
		2.1.1.2.7. Limansky.pdf
		2.1.1.2.8. Narimanovsky.pdf
		2.1.1.2.9. General. Astrakhan region.pdf
		2.1.1.2.10. Privolzhsky.pdf
		2.1.1.2.11. Kharabalinsky.pdf
		2.1.1.2.12. Chernoyarsky.pdf
		2.1.1.3. Letter addressed to Ivannikov A.A. - List of the planned main water supply facilities, utility infrastructure development plans (App.)
	2.1.1.4. Water supply and water discharge facilities	
	2.1.1.5. List of the main water supply and water discharge facilities	
	2.1.1.6. List of the main water supply and water discharge facilities	
	2.1.1.7. Statistical data on the wear of the water supply and water discharge system as of 01/12/2020	
2.1.2. Heat supply	2.1.2.1. Schematic diagram of location of heat power sources of Akhtubinsk	
	2.1.2.2. Existing heat supply scheme of Znamensk	
	2.1.2.3. Heat supply scheme of Liman	
	2.1.2.4. Heat supply scheme of Oranzhereya	
	2.1.2.5. Heat supply scheme of the MU "Volgo-Kaspiysky village" of Kamyzyaksky district, Astrakhan region	
	2.1.2.6. Heat supply scheme of the municipal unit "Vostochinsky village council"	
	2.1.2.7. Heat supply scheme of Krasnye Barrikady 2029	
	2.1.2.8. Heat supply scheme of Yenotayevka	
	2.1.2.9. Heat supply scheme of Sasykoli	
2.3.1. Gas supply	2.1.3.1. Gas supply scheme of Astrakhan region (2013)	
2.1.4. Power supply	2.1.4.1. Development schematic map of electric grids 100 kV and more in Astrakhan region for 2020	



	2.1.4.2. Performance report on the gas distribution stations of Astrakhan Linear Production Gas Pipeline Department of Gazprom Transgaz Stavropol LLC, page 1		
	2.1.4.3. Performance report on the gas distribution stations of Astrakhan Linear Production Gas Pipeline Department of Gazprom Transgaz Stavropol LLC, page 2		
	2.1.4.4. List of the main power supply facilities of the municipal area “City of Astrakhan”		
2.1.5. Utilities - the list for Astrakhan region			
2.2. Documents on strategic planning, land-use planning and urban development zoning			
2.2.1. Land-use planning scheme of Astrakhan region	2.2.1.1. STP of Astrakhan region 2019 (Effective) (31 .dwg, jpg and .pdf files)		
	2.2.1.2. STP of Astrakhan region 2020 (33 .dwg, jpg and .doc files)		
	2.2.1.3. STP of Akhtubinsky district (24 .dwg, .pdf, .docx and .sig files)		
	2.2.1.4. STP of Volodarsky district (11 .tif and .doc files)		
	2.2.1.5. STP of Yenotaevsky district (4 .jpg, .pdf, .doc files)		
	2.2.1.6. STP of Kamyzyaksky district (11 .tif and .doc files)		
	2.2.1.7. STP of Krasnoyarsky district (13 .jpg files)		
	2.2.1.8. STP of Limansky district (14 .tif, .doc, .jpg files)		
	2.2.1.9. STP of Narimanovsky district (2 .jpg files)		
	2.2.1.10. STP of Privolzhsky district (14 .tif, .doc, .bmp files)		
	2.2.1.11. STP of Kharabalinsky district (6 .jpg files)		
	2.2.1.12. STP of Chernoyarsky district (20 .sig and .pdf files)		
	2.2.1.13. STP of Ikryaninsky district (9 .jpg and .doc files)		
2.2.2. Other information about previously developed projects and concepts	2.2.2.1. FS, 2011 Industrial Park Zaboldinsky	2.2.2.1.1. 23_08_2011 r_ N 319-П INDUSTRIAL TRADE PARK ZABOLDINSKY.mht	
		2.2.2.1.2. Plot plan.jpg	
		2.2.2.1.3. Plot plan.jpg	
		2.2.2.1.4. FS External grids part 1.tif	
		2.2.2.1.5. FS External grids part 1.tif	
		2.2.2.1.6. General Layout Drawing, FS Zaboldinsky.png	
	2.2.2.2. Streets of the White City 2021	2.2.2.2.1. Teatralny Lane	2.2.2.2.1.1. Teatralny.pdf
		2.2.2.2.2. Volodarsky St.	2.2.2.2.2.1. Volodarsky St. - Public Garden.pdf
		2.2.2.2.3. Kirov St.	2.2.2.2.3.1. KIROV promenade zone.pdf

			2.2.2.2.3.2. Kirov St. from N. 1-Go Maya to Sovetskaya Eksplikasia.pdf
			2.2.2.2.3.3. Kirov St. from N. 1-Go Maya to Sovetskaya.pdf
			2.2.2.2.3.3. Kirov St. - Eksplanadnaya-Krasnaya Embankment - sect.3.pdf
		2.2.2.2.4. Krasnogo Znameni St.	2.2.2.2.4.1. Krasnogo Znameni.pdf
		2.2.2.2.5. Lenin St.	2.2.2.2.5.1. Lenin St. - Trediakovsky St. - Kommunisticheskaya.pdf
			2.2.2.2.5.2. Lenin St. - Kommunisticheskaya - M. Aladyins.pdf
		2.2.2.2.6. Sovetskaya St.	2.2.2.2.6.1. Sovetskaya part one.pdf
			2.2.2.2.6.2. Sovetskaya part two.pdf
		2.2.2.2.7. Trediakovsky St.	2.2.2.2.7.1. Trediakovsky.pdf
		2.2.2.2.8. Chernyshevsky St.	2.2.2.2.8.1. Chernyshevsky St.pdf
	2.2.2.2.9. Eksplanadnaya St.	2.2.2.2.9.1. Eksplanadnaya 1 UPDATED.pdf	
		2.2.2.2.9.2. Eksplanadnaya 2 part.pdf	
	2.2.2.10. Astrakhan Regional Design Center - design documentation (16 .pdf files)		
	2.2.2.3. Center (prospective)	2.2.2.3.1. HC Atmosfera +Bekhterev RZT.jpg	
2.2.2.3.2. HC Nasledie.jpg			
2.2.2.3.3. Zotkin, Base.jpg			
2.2.2.3.4. Final map of the central part.jpg			
2.2.2.3.5. Pustovalov (Menzhinsky).jpg			
2.2.2.3.6. Integrated quarter in Bakinskaya.jpg			



2.3.2. General layout of the MU “City of Astrakhan”	2.2.3.1. Conclusion about the results of public discussions on draft amendment to the General Development Plan of Astrakhan 2025		
	2.2.3.2. Map of the boundaries of the municipal unit “City of Astrakhan”.jpg		
	2.2.3.3. Map of the functional zones of the municipal unit “City of Astrakhan”.jpg		
	2.2.3.4. Substantiation materials.doc		
	2.2.3.5. Proposals and remarks made by the participants of public discussions on draft amendment to the General Development Plan of Astrakhan 2025 during the period from 15/05/2019 till 17/06/2019		
	2.2.3.6. Decision of the City Duma of the MU “City of Astrakhan” “On amendments to the General Development Plan of Astrakhan 2025”		
	2.2.3.7. Agreed by Ageev A.A. N 1913_05-14 dated 09/08/2019		
	2.2.3.8. Agreed by Nikiforov N.V. N 13966-12-02 dated 02/09/2019		
2.2.4. Land-use and Development Rules of the MU “City of Astrakhan”	2.2.4.1. Conclusion about the results of public discussions on draft decision of the City Duma of the municipal unit “City of Astrakhan” “On Approval of Land-use and Development Rules of the municipal unit “City of Astrakhan”		
	2.2.4.2. Urban development zoning map.jpg		
	2.2.4.3. Integrated and sustainable land development map.jpg		
	2.2.4.4. Map of restricted areas for urban planning activities.jpg		
2.2.5. Approved, developed land and linear facilities planning projects	2.2.5.1. Integrated transport scheme	2.2.5.1.1. Demonstration drawings	2.2.5.1.1.1. Passenger transport development scheme.JPG
			2.2.5.1.1.2. Road network development scheme.jpg
	2.2.5.1.2. Project “Integrated transport scheme of Astrakhan”_Volume 1		2.2.5.1.2.1. Contents
			2.2.5.1.2.2. Section 1. General characteristics of Astrakhan and its transport system
			2.2.5.1.2.3. Section 2. Road network
			2.2.5.1.2.4. Section 3. Interurban transport
			2.2.5.1.2.5. Section 4. Municipal passenger transport
			2.2.5.1.2.6. Section 5. Priorities of the transport system project

			2.2.5.1.2.7. Passenger transport development scheme.png
			2.2.5.1.2.8. Road network development scheme.png
		2.2.5.1.3. Project “Integrated transport scheme of Astrakhan”_Volume 2	2.2.5.1.3.1. Cross profiles: <ul style="list-style-type: none"> ■ 2.2.5.1.3.1.1. Cross profile sheets.300.dwg; ■ 2.2.5.1.3.1.2. Cross-section planogram.png
			2.2.5.1.3.2. Schemes of units: <ul style="list-style-type: none"> ■ 2.2.5.1.3.2.1. Unit sheets.10000.dwg; ■ 2.2.5.1.3.2.2. Units planogram.png.
			2.2.5.1.3.3. Explanatory Note
		2.2.5.1.4. Project “Integrated transport scheme of Astrakhan”_Volume 3_Appendices 1,2,3,4,5,6	2.2.5.1.4.1. Appendix 1.doc
			2.2.5.1.4.2. Appendix 2.doc
			2.2.5.1.4.3. Appendix 3.doc
			2.2.5.1.4.4. Appendix 4.doc
			2.2.5.1.4.5. Appendix 5.doc
	2.2.5.1.4.6. Appendix 6.doc		
	2.2.5.1.4.7. Title sheets.doc		
	2.2.5.1.5. Project “Integrated transport scheme of Astrakhan”_Volume 4_Приложение 7	2.2.5.1.5.1. Appendix 7 Rev.2.doc	
		2.2.5.1.6. On approval of the project “Integrated transport scheme of Astrakhan”	
	2.2.5.2. Concepts on development and improvement of public spaces for physical training and sports	2.2.5.2.1. Appendices to Order 2323-p (62 numbered .odt and .pdf files)	
	2.2.5.3. Integrated and sustainable development concept	2.2.5.3.1. Schemes 1-12 (12 .pdf files)	
		2.2.5.3.2. Territory No. 1 (2 .pdf files)	
2.2.5.3.3. Territory No. 2 (2 .pdf files)			



		2.2.5.3.4. Territory No. 3 (2 .pdf files)
		2.2.5.3.5. Territory No. 4 (2 .pdf files)
		2.2.5.3.6. Territory No. 5 (2 .pdf files)
		2.2.5.3.7. Territory No. 6 (2 .pdf files)
		2.2.5.3.8. Territory No. 7 (2 .pdf files)
		2.2.5.3.9. Territory No. 8 (2 .pdf files)
		2.2.5.3.10. Territory No. 9 (2 .pdf files)
		2.2.5.3.11. Territory No. 10 (2 .pdf files)
		2.2.5.3.12. Territory No. 11 (2 .pdf files)
		2.2.5.3.13. Territory No. 12 (2 .pdf files)
		2.2.5.3.14. Territory No. 13 (2 .pdf files)
		2.2.5.3.15. Territory No. 14 (2 .pdf files)
		2.2.5.3.16. Territory No. 15 (2 .pdf files)
		2.2.5.3.17. Territory No. 16 (2 .pdf files)
		2.2.5.3.18. Territory No. 17 (2 .pdf files)
		2.2.5.3.19. Territory No. 18 (2 .pdf files)
		2.2.5.3.20. Territory No. 19 (2 .pdf files)
		2.2.5.3.21. Territory No. 20 (2 .pdf files)
		2.2.5.3.22. Territory No. 21 (2 .pdf files)
		2.2.5.3.23. Territory No. 22 (2 .pdf files)
		2.2.5.3.24. Territory No. 23 (2 .pdf files)
		2.2.5.3.25. Territory No. 24 (2 .pdf files)
		2.2.5.3.26. Territory No. 25 (2 .pdf files)
		2.2.5.3.27. Explanatory Note “Documentation on insuring the integrated and sustainable development of the territory of the MU “City of Astrakhan”
		2.2.5.3.28. Summary table of performance indicators
		2.2.5.3.29. General schematic map of the territories of the integrated and sustainable development in Astrakhan
		2.2.5.3.30. Resolution on agreement of documentation
		2.2.5.3.31. Gas, water, hear and power demand

	2.2.5.4. Astrakhan Development Concept - Strelka Design Bureau.	2.2.5.4.1. Concept of location of entertainment facilities in the northern part of the island		
		2.2.5.4.2. Concept of location of entertainment facilities in the southern part of the island		
		2.2.5.4.3. Functional zoning. Location concept		
		2.2.5.4.4. Functional programming. Zoning and seasonality		
	2.2.5.5. Unapproved documentation	2.2.5.5.1. Land use plan and boundary-setting plan within the 2nd Zheleznodorozhny Lane, 8th Zheleznodorozhnaya St., Prazhskaya, Rumynskaya St.	2.2.5.5.1.1. Demonstration materials 09092020-22102020: <ul style="list-style-type: none"> ■ 2.2.5.5.1.1.1. Boundary-setting plan materials (main and approved part) - 8 .doc and .pdf files ■ 2.2.5.5.1.2. Land use plan materials (main and approved part) - 14 .doc and .pdf files 	
			2.2.5.5.2. Boundaries for development of the land planning documentation.mid	
		2.2.5.5.3. Boundaries for development of the land planning documentation.mif		
		2.2.5.5.4. List of unapproved land planning documentation (as of 14/12/2020).doc		
	2.2.5.6. Land use plan for reconstruction and extension of S.Perovskaya St. from Studencheskaya St. to Yeril Kazachy Embankment in Kirovsky and Leninsky districts of Astrakhan	2.2.5.6.1. Volume 1	2.2.5.6.1.1. Land use plan (main part) - 2 .doc and .pdf files	
			2.2.5.6.1.2. Land use plan (provision on linear facility location)	
2.2.5.6.2. Volume 2		2.2.5.6.2.1. Land use plan (substantiation materials) - 2 .docx and .pdf files		
		2.2.5.6.2.2. Land use plan (explanatory note)		
2.2.5.6.3. Order "On approval of land use plan for reconstruction and extension of S.Perovskaya St. from Studencheskaya St. to Yeril Kazachy Embankment in Kirovsky and Leninsky districts of Astrakhan" No. 5501-p dated December 28, 2018				
2.2.6. Topographic base for the territory of Astrakhan agglomeration in	2.2.6.1. Astrakhan region (90 .mif, .mid, .dat, .tab files)			
	2.2.6.2. Astrakhan region.wor			



vector format Scale 1:100 000		
2.2.7. Vector scheme with old and emergency housing stock, integrated development territories.	2.2.7.1. KURT and RTZ.mid	
	2.2.7.2. KURT and RTZ.mif	
	2.2.7.3. Map of prospective territories.mid	
	2.2.7.4. Map of prospective territories.mif	
	2.2.7.5. Map of old housing distribution.mid	
	2.2.7.6. Map of old housing distribution.mif	
	2.2.7.7. Prospective territories of Astrakhan.jpg	
	2.2.7.8. Territories of the cultural heritage object.mid	
	2.2.7.9. Territories of the cultural heritage object.mif	
2.2.8. Total scope of the housing stock by municipal units of Astrakhan region in dynamics 2013-2020 PP	2.2.8.1. Housing stock of Astrakhan region_11.01.2021.jpg	
	2.2.8.2. Scope of the housing stock 2010-2020	
	2.2.8.3. Problem of unsatisfactory technical condition of cultural heritage objects used multi-apartment residential buildings	
2.2.9. Vector data, Astrakhan	2.2.9.1. Use-restricted zones	2.2.9.1.1. Sanitary protection zone_II_belt.mid
		2.2.9.1.2. Sanitary protection zone_II_belt.mif
		2.2.9.1.3. Protective zones.mid
		2.2.9.1.4. Protective zones.mif
		2.2.9.1.5. Aerodrome environs of the Astrakhan airport.mid
		2.2.9.1.6. Aerodrome environs of the Astrakhan airport.mif
		2.2.9.1.7. Aerodrome environs.mif
		2.2.9.1.8. Aerodrome environs.mid
		2.2.9.1.9. SPZ.mid
		2.2.9.1.10. SPZ.mif
		2.2.9.1.11. runway.mid
		2.2.9.1.12. runway.mif
		2.2.9.1.13. water conservation zones.mid
		2.2.9.1.14. water conservation zones.mif
		2.2.9.1.15. Zone of historical district of the city General layout 2015(for Zolotareva).mid

	2.2.9.1.16. Zone of historical district of the city General layout 2015(for Zolotareva).mif
	2.2.9.1.17. protective zone of the reference weather station.mif
	2.2.9.1.18. protective zone of the reference weather station.mif
	2.2.9.1.19. noise zone airport.mif
	2.2.9.1.20. noise zone airport.mif
	2.2.9.2. Urban development passports.mid
	2.2.9.3. Urban development passports.mif
	2.2.9.4. Land planning and boundary-setting documentation.mid
	2.2.9.5. Land planning and boundary-setting documentation.mif
	2.2.9.6. Land plot contour.mid
	2.2.9.7. Land plot contour.mif
	2.2.9.8. Potential map North.mid
	2.2.9.9. Potential map North.mif
	2.2.9.10. PAT Privolzhsky and PAT Narimanovo (subzones 4 and 7).jpg
	2.2.9.11. Functional zones.mid
	2.2.9.12. Functional zones.mif
	2.2.9.13. Approved red (2 .mid and .mif files)
	2.2.9.14. Buildings, facilities, construction in progress (2 .mid and .mif files)
2.2.10. List of unapproved land use and boundary-setting plans	
2.2.11. List of construction in progress 2021	
3 Ministry of Transport and Road Infrastructure	
3.1. Integrated transport scheme of Astrakhan, 2009	
3.1.1. Demonstration drawings	3.1.1.1. Passenger transport development scheme.jpg
	3.1.1.2. Road network development scheme.jpg
2.1.3. Project "Integrated transport	3.1.2.1. Contents
	3.1.2.2. Section 1. General characteristics of Astrakhan and its transport system



scheme of Astrakhan” - Volume 1	3.1.2.3. Section 2. Road network	
	3.1.2.4. Section 3. Interurban transport	
	3.1.2.5. Section 4. Municipal passenger transport	
	3.1.2.6. Section 5. Priorities of the transport system project	
	3.1.2.7. Passenger transport development scheme.png	
	3.1.2.8. Road network development scheme.png	
3.1.3. Project “Integrated transport scheme of Astrakhan” - Volume 2	3.1.3.1. Passenger station (3 .jpg and .dwg files)	
	3.1.3.2. Cross profiles	3.1.3.2.1. Cross profile sheets.300.dwg
		3.1.3.2.2. Cross-section planogram.png
3.1.4. Project “Integrated transport scheme of Astrakhan” - Volume 3 (Appendices 1-6)	3.1.4.1. Appendix 1 - Inspection of traffic and passenger flows	
	3.1.4.2. Appendix 1 - Inspection and forecast of population mobility in Astrakhan	
	3.1.4.3. Appendix 3 - Inspection of cargo flows	
	3.1.4.4. Appendix 4 - Inspection of walking flows	
	3.1.4.5. Appendix 5 - Quality assessment of passenger transport network	
	3.1.4.6. Appendix 6 - Preliminary assessment of transport flow change at the stage of the General Layout preparation	
3.1.5. Hard-surfaced roads development schemes (49 .png files)		
3.1.6. Project “Integrated transport scheme of Astrakhan” - Volume 4 (Assessment of passenger and traffic flow change in the road network according to the General Layout - Appendix 7)		
3.1.7. On approval of the project “Integrated transport scheme of Astrakhan”		
3.2. Additional data on the route network of Astrakhan		
3.2.1. Letter addressed to Ivannikov A.A. No. 30-02-04-13 dated 18/01/2021 – Information note on routes and total number of rolling stock (App.)		
3.2.2. Register of municipal regular transportation routes in the MU “City of Astrakhan”		
3.3. Transport infrastructure development plans (information on the planned and implemented infrastructure projects) for the MU “City of Astrakhan”		
3.4. Data on the district public transport routes (page 1)		
3.5. Data on the district public transport routes (page 2)		
3.6. Register of municipal regular transportation routes in the municipal unit “City of Astrakhan”		
3.7. Data on passenger flows of the Astrakhan bus service station of and the airport (page 1)		
3.8 Data on passenger flows of the Astrakhan bus service station of and the airport (page 2)		
3.9. Information note about the project “City Train”		

3.10. Order No. 3179-p dated 25/12/2019 “On amendments to the Register of municipal regular transportation routes in the municipal unit “City of Astrakhan”
4 Ministry of Education and Science of Astrakhan region
4.1. Information notes on the educational facilities
4.1.1. Information notes on the extended daycare groups
4.1.2. Information on the need in extending the network of the educational institutions that implement the preschool educational programs. are located in the territory of the municipal unit “City of Astrakhan”, subordinated to the Department of Education of the administration of the municipal unit “City of Astrakhan”.
4.1.3. Information on the primary school - kindergarten, extended daycare groups
4.1.4. Information on the average number of teachers in the subordinate municipal educational institutions of Astrakhan for 2019-2020
4.1.5. List of municipal budgetary further education establishments of Astrakhan with the specified location coordinates and planned capacities/actual attendance
4.1.6. Calendar schedule of sport and physical training events of the municipal unit “City of Astrakhan”
4.1.7. List of municipal budgetary preschool education establishments of Astrakhan with the specified location coordinates and planned capacities/actual attendance
4.1.8. Load of teachers engaged in further education
4.1.9. Prospective plan for construction of schools, additional buildings to the existing schools in the territory of the MU “City of Astrakhan” until 2024 for the purposes of creation of additional pupils places and transition to single-shift learning schedule
4.1.10. Action Plant (Road Map) for creation of additional places in the municipal preschool educational establishments of Astrakhan No. 3852-p dated 24/08/2018 (revised on 21/10/ 2020 under No. 1885-p)
4.1.11. List of educational facilities to the repaired and having no gyms
4.1.12. Information note on constriction of sports facilities for 2014-2020
4.2. List of the existing preschool and school educational facilities
4.3. Letter addressed to Bogomolov M.V. No. 07-16014 dated 22/12/2020 – List of educational institutions by districts and information on the educational infrastructure development
4.4. Program of REC in prospective studies of the Caspian macroregion
4.5. Concept of the scientific and educational campus of Astrakhan
4.6. Prospective school construction plan
4.7. Information about staff number by categories
4.8. Number of pupils (children) in the establishments subordinated to the Department of Education of the MU “City of Astrakhan”
4.9. Information on the average number of teachers in the municipal educational institutions of Astrakhan subordinated to the Department of Education of the MU “City of Astrakhan”



4.10. Information on average load on a teacher and pupil/teacher ratio in the general educational establishments.
4.11. Information on creation of places in preschool and general educational establishments
4.12. Concept of creation of the inter-university scientific and educational campus in Astrakhan
4.13. Data on actual capacities of the educational establishments
5 Ministry of Health
5.1. Information about capacity and beds, staff number of Astrakhan region for 2010-2020 as of 11/01/2021
1.1.5. Information about capacity and beds in the medical establishments subordinated to the Ministry of Health of Astrakhan region for 2010-200 (part 1)
5.1.2. Information about capacity and beds in the medical establishments subordinated to the Ministry of Health of Astrakhan region for 2010-200 (part 2)
5.1.3. Information about capacity and beds in the medical establishments subordinated to the Ministry of Health of Astrakhan region for 2010-200 (part 3)
5.1.4. Information about staff number of location coordinates of the medical establishments subordinated to the Ministry of Health of Astrakhan region for 2010-2020 (part 1)
5.1.5. Information about staff number of location coordinates of the medical establishments subordinated to the Ministry of Health of Astrakhan region for 2010-2020 (part 2)
5.1.6. Information about staff number of location coordinates of the medical establishments subordinated to the Ministry of Health of Astrakhan region for 010-2020 (part 3)
5.2. List of the existing healthcare facilities in Astrakhan and in the territory of agglomeration with the specified design and actual capacities
5.3. List of the planned healthcare facilities in the territory of Astrakhan and Astrakhan region
5.4. Information about progress of the state program “Healthcare development in Astrakhan region” for 2019
6 Ministry of Culture and Tourism
6.1. List of cultural establishments
6.1.1. Information note about the State Autonomous Institution of Culture of Astrakhan Region “Astrakhan State Opera and Ballet Theatre”.
6.1.2. Information note about the State Autonomous Institution of Culture of Astrakhan Region “Astrakhan Drama Theatre”.
6.1.3. Information note about the State Autonomous Institution of Culture of Astrakhan Region “Astrakhan Puppet Theatre”.
6.1.4. Information note about the State Autonomous Institution of Culture of Astrakhan Region “Youth Theatre”
6.1.5. Information on visits to the municipal cultural establishments, part 1

6.1.6. Information on visits to the municipal cultural establishments, part 2
6.1.7. Lost of cultural establishments, Astrakhan
6.2. Information on the social support organizations for 2010-2020
6.2.1. Information on the educational and sport establishments with the specified power, staff number and location coordinates
6.2.2. Information on the social support organizations for (2010-2020)
6.3. List of the effective state programs
6.3.1. Initial data for field "Culture"
6.3.2. Information on the effective state programs
6.4. Explanatory Note on the state programs implementation
6.4.1. Explanatory Note on the progress of the state program "All-Russian civil identity and ethnocultural development of the peoples of Russia in the territory of Astrakhan region" for 2019
6.4.2. Explanatory Note on the progress of the state program "All-Russian civil identity and ethnocultural development of the peoples of Russia in the territory of Astrakhan region" for 9 month of 2020
3.4.6. Explanatory Note on the progress of the state program "Development of culture and tourism the peoples of Russia in the Astrakhan region" for 2019
6.4.4. Explanatory Note on the progress of the state program "Development of culture and tourism the peoples in the Astrakhan region" for 9 2020
6.5. Information on planned construction of municipal cultural facilities in Astrakhan region
6.5.1. Information on construction of municipal cultural facilities in Astrakhan region
6.6. Cultural events in Astrakhan region
6.6.1. Cultural events in Astrakhan region
6.7. Data on design capacities of the existing and planned cultural facilities in Astrakhan and Astrakhan region
6.7.1. Data on design capacities of the existing and planned cultural facilities in Astrakhan and Astrakhan region
6.8. Marketing research results of the tourist services market
6.8.1. Information that can be provided by mobile operators (MTC, Beeline, Megaphone) and Sberbank with the use of BigData
6.2.8. Marketing research report on the tourist services market of Astrakhan region
6.9. Information about tourist routes of the Astrakhan State Incorporated Historical and Architectural Reserve Museum
6.9.1. Data on tourist routes of the Astrakhan State Incorporated Historical and Architectural Reserve Museum
6.9.2. Caspian Sea cruise route scheme.png



7. Ministry of Physical Culture and Sport		
7.1. List of the existing physical culture and sports facilities in Astrakhan, children's and youth sports school		
7.2. List of the existing physical culture and sports facilities in Astrakhan, children's and youth sports school		
7.3. List of the existing physical culture and sports facilities in Astrakhan, children's and youth sports school		
7.4. Letter addressed to Ovchinnikov D.E. - Information not on the problems of finance and control of mass sports and sports facilities in Astrakhan region (App.)		
8. State Protection Service for Cultural Heritage Objects		
8.1. Astrakhan region		
8.1.1. List of cultural heritage objects of federal significance		
8.2. Astrakhan		
8.2.1. List of cultural heritage objects in Astrakhan and municipal districts of Astrakhan region	8.2.1.1. Information on regional objects	8.2.1.1.1. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 1-62.docx
		8.2.1.1.2. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 63-112
		8.2.1.1.3. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 113-158
		8.2.1.1.4. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 159-244
		8.2.1.1.5. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 245-306
		8.2.1.1.6. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 307-377
		8.2.1.1.7. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 307-377
		8.2.1.1.8. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 497-560
		8.2.1.1.9. List of cultural heritage objects of regional significance in the territory of the MU "City of Astrakhan" No. 159-244 (Duplicate)

8.2.1.2. Orders on confirmation of boundaries	of regional significance “Ensemble of Astrakhan Public Purification Wine Warehouse 1898-1901”
	8.2.1.2.2. No. 04-П Resolution On establishment of boundaries of the cultural heritage objects located in the territory of Astrakhan region
	8.2.1.2.3. No. 09-П dated 30/11/2018 Resolution On establishment of boundaries of the cultural heritage objects located in the territory of Astrakhan region
	8.2.1.2.4. No. 15-П dated 29/12/2017 Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
	8.2.1.2.5. No. 19-п Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
	8.2.1.2.6. No. 21-п dated 09/04/2015 Resolution On establishment of boundaries of the cultural heritage objects located in the territory of Astrakhan region
	8.2.1.2.7. No. 24-п dated 27/04/2015 Resolution On establishment of boundaries of the cultural heritage objects located in the territory of Astrakhan region
	8.2.1.2.8. No. 26-п Resolution On establishment of boundaries of the cultural heritage objects of regional significance “Palace of Culture of the Municipal Electric Power Plant”
	8.2.1.2.9. No. 27-п Resolution On establishment of boundaries of the cultural heritage object of regional significance “Orphanage House of Yelizaveta 1896-1898, architect Korzhinsky P.I.”
	8.2.1.2.10. No. 24-п dated 03/07/2014 Resolution On establishment of boundaries of the cultural heritage objects of regional significance located in Astrakhan
	8.2.1.2.11. No. 28-п On establishment of boundaries of the cultural heritage object of regional significance “Mansion of Storozhev V.E. 1909”
	8.2.1.2.12. No. 28-п Resolution On establishment of boundaries of the cultural heritage objects of federal significance located in Astrakhan.
	8.2.1.2.13. No. 29-п On establishment of boundaries of the cultural heritage object of regional significance “Tenement Building of Kononov I.I. 1887”
	8.2.1.2.14. No. 35-п Resolution On establishment of boundaries of the cultural heritage object of regional significance “House of Repin A.A. and his successors, mid- 19th century”



		8.2.1.2.15. No. 36-п Resolution On establishment of boundaries of the cultural heritage object of regional significance “Residential House, late 19th century”
		8.2.1.2.16. No. 42-п Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
		8.2.1.2.17. No. 43-п Resolution On establishment of boundaries of the cultural heritage objects of federal significance located in Astrakhan
		8.2.1.2.18. No. 45-п Resolution On establishment of boundaries of the cultural heritage objects of regional significance located in Astrakhan
		8.2.1.2.19. No. 46-п Resolution On establishment of boundaries of the cultural heritage objects of federal significance “Kremlin Ensemble, 16th-early 19th century”
		8.2.1.2.20. No. 46-п Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
		8.2.1.2.21. №46-п dated 30/12/2016 Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
		8.2.1.2.22. No. 54-п dated 12/12/2014 Resolution On establishment of boundaries of the cultural heritage objects of regional significance located in Astrakhan
		8.2.1.2.23. No. 58-п dated 17/11/2015 Resolution On establishment of boundaries of the cultural heritage objects located in Astrakhan
8.2.2. List of cultural heritage objects located in the territory of the municipal unit “City of Astrakhan”	8.2.2.1. Information on federal objects	8.2.2.1.1. List of cultural heritage objects of federal significance in the territory of the MU “City of Astrakhan”
	8.2.2.2. Information on the identified objects Table	8.2.2.2.1. List of the identified cultural objects in the territory of the MU “City of Astrakhan”
	8.2.2.3. List of the identified cultural objects in the territory of the MU “City of Astrakhan”	
8.2.3. Design materials “Project of the integrated protection zone of the cultural heritage object of federal significance “Kremlin Ensemble, 16th - early 19 century”	8.2.3.1. Integrated zone project Astrakhan Kremlin (5 .pdf files)	

8.2.4. Photo images	8.2.4.1. 2015 (26 .jpg files)
8.3. Problem of unsatisfactory technical condition of cultural heritage objects used multi-apartment residential buildings.	
9. Ministry of Industry and Natural Resources	
9.1. State program implementation reports	
9.1.1. SEZ Lotus	9.1.1.1. Unified regulation of internal documents of JSC "MC SEZ International Border Cooperation Center "Khorgos" on visits and movements
	9.1.1.2. On Approval of the Framework Agreement between the Government of the Republic of Kazakhstan and the Government of the Peoples' Republic of China concerning creation of the International Border Cooperation Center "Khorgos"
	9.1.1.3. On Approval of the Agreement between the Government of the Republic of Kazakhstan and the Government of the Peoples' Republic of China concerning regulation of activity of the International Border Cooperation Center "Khorgos"
	9.1.1.4. Presentation of SEZ with the Maslow's hierarchy of needs
	9.1.1.5. Preliminary examination of the "Caspian Sea" port project
	9.1.1.6. Information note about SEZ International Border Cooperation Center "Khorgos"
9.1.2. Presentation "Development concept of the international transport corridor (ITC) "North-South"	
9.1.3. Explanatory Note to the "Development concept of the international transport corridor (ITC) "North-South"	
9.1.4. Presentation and Explanatory Note "Action plan on transition from the mining industry to the processing development"	
9.1.5. Information note on the international transport corridor "North-South"	
6.1.9. No.П9-8098 dated 18/02/2020 Appendix "A complex of measures on the transport potential development of the ITC "North-South" No. 1166п-П9 dated February 14, 2020	
9.1.7. Passport of the federal project "Transport and logistics center"	
9.1.8. Information note on export activity of Astrakhan region	
9.1.9. Export in 2019 and 2020	
9.2. List of the current and planned state programs launched since 2020	
9.2.1. Information note "On creation of the industrial shipbuilding cluster"	



9.2.2. Information note “Development of logistics center Sun Light Astrakhan LLC”
9.3. List of the largest industrial enterprises with the specified annual goods turnover, annual revenue, location coordinates and number of employees (2018-2020)
9.3.1. List of export products of the enterprises supervised by the Ministry of Industry and Natural Resources of Astrakhan region
9.3.2. List of shipbuilding and ship-repair companies
9.3.3. Development scheme of the Caspian oil province as of 01/01/2021
9.3.4. Characteristics of the mineral carbon raw base in the Caspian Sea shelf as of 01/01/2021
9.4. List of investment projects: implemented and planned (period of implementation, scope of investment, payback period)
9.4.1. Information about soft loan receivers from the Industrial Development Fund of Astrakhan region
9.4.2. Information about receivers of grant for industrial enterprises for upgrading and technical retrofitting of the production facilities for 2018-2020
9.4.3. List of investment projects
9.4.4. Reference information on investment projects
9.4.5. Materials of the Ministry of Industry of Astrakhan region
9.4.6. Concept of creation of innovative agricultural complex in Limansky district
9.4.7. Business plan of agricultural complex in Limansky district
10. Ministry of Agriculture and Fishery Industry
10.1. List of the implemented and planned investment projects
10.1.1. Investment platforms for implementation of investment project in agriculture
10.1.2. Planned investment projects in fish-farming.
10.1.3. Planned investment projects in processing.
10.1.4. Planned investment projects in livestock husbandry.
10.1.5. Planned investment projects in crop farming.
10.1.6. Planned investment projects in construction and modernization of storage facilities
10.1.7. Information on investment projects (12 .xlsx and .doc files)
10.2. Results of the implemented state programs in agriculture and fishery industry as of 2019-2020
10.2.1. Reports by municipal districts (12 .xlsx, .doc and .docx files)
10.2.2. Contacts of producers interested in cooperation with OK LLC
10.2.3. Report on the results of the implemented state program “Development of Agriculture, Food and Fishery Industry in Astrakhan region for 9 months of 2020”



10.2.4. Presentation “Results of the implemented state program “Development of Agriculture, Food and Fishery Industry in Astrakhan region for 9 months of 2020”
10.2.5. Crop farming dynamics forecast 2025
10.2.6. Livestock husbandry dynamics forecast 2025
10.2.7. Information on the unused agricultural lands as of 01/01/2020
10.2.8. Information on the agricultural sector of Astrakhan region at the end of 2019
10.2.9. Information on the vegetables shipment for 2008-2020
10.2.10. Information on the crop products shipment for 2020
10.2.11. Agricultural performance indicators (11 .xlsx and .doc files)
10.3. List of the current and planned state programs
10.3.1. Law No. 115_2020-O3 dated 25/12/2020 “On Socioeconomic Development Strategy of Astrakhan region 2035”
10.3.2. List of target indicators of the agricultural sector development in the municipal units of Astrakhan region for 2018
10.3.3. Draft Socioeconomic Development Strategy of Astrakhan region 2035
10.4. List of the largest agricultural and fishery enterprises
10.4.1. Information on the number of business entities registered and acting in the territory of Akhtubinsky district by kinds of economic activity
10.4.2. Contacts of the heads of municipal units, heads of the agricultural departments and main agricultural producers
10.4.3. List of large enterprises of Astrakhan region
10.4.4. List of large enterprises
10.4.5. Information on the available agricultural products storage capacities
10.4.6. Information on processing companies (9 .xlsx, .doc and .docx files)
10.4.7. List of large agricultural producers in livestock husbandry
10.4.8. List of producers interested in cooperation with OK LLC
10.5. List of small and medium agricultural and fishery enterprises
10.5.1. Contacts of aquaculture enterprises 2020
11. Program documents and reports
11.1. Reports on the implemented special-purpose programs for 2010-2020
11.1.1. Reports for 2010 (31 .xls files)
11.1.2. Reports for 2011 (29 .xls files)



11.1.3. Reports for 2012 (30 .xls files)		
11.1.4. Reports for 2013 (47 .xls files)		
11.1.5. Reports for 2014 (38 .xls files)		
11.1.6. Reports for 2015 (23 .xls files)		
11.1.7. Reports for 2016 (24 .xls files)		
11.1.8. Reports for 2017 (24 .xls files)		
11.1.9. Reports for 2018 (24 .xls files)		
11.1.10. Reports for 2019 (23 .xls files)		
11.1.11. Reports for 2020 (23 .xls files)		
11.2. Municipal programs of urban areas and districts of Astrakhan region		
11.2.1. Astrakhan	11.2.1.1. Municipal programs	11.2.1.1.1. Information on the list of municipal programs adopted since 2010
		11.2.1.1.2. List of municipal programs of the MU Astrakhan since 2016
	11.2.1.2. Reports	11.2.1.2.1. Annual report on the progress and performance of the municipal programs for 2018
		11.2.1.2.2. Annual report on the progress and performance of the municipal programs for 2019
		11.2.1.2.3. Information on the report of the implemented municipal programs adopted since 2010
		11.2.1.2.4. Annual report on the progress and performance of the municipal programs for 2016
		11.2.1.2.5. Annual report on the progress and performance of the municipal programs for 2017
11.2.2. Kamyzyaksky	11.2.2.1. List of municipal programs for Kamyzyak	11.2.2.1.1. List of municipal programs for Kamyzyak for 2016
		11.2.2.1.2. List of municipal programs for Kamyzyak for 2017
		11.2.2.1.3. List of municipal programs for Kamyzyak for 2018
		11.2.2.1.4. List of municipal programs for Kamyzyak for 2020
		11.2.2.1.5. List of municipal programs for Kamyzyak for 2014
		11.2.2.1.6. List of municipal programs for Kamyzyak for 2015

		11.2.2.1.7. List of municipal programs for Kamyzyak for 2019
	11.2.2.2. List of municipal programs for Kamyzyaksky district	11.2.2.2.1. List of municipal programs for Kamyzyaksky district for 2020
		11.2.2.2.2. List of district programs for Kamyzyaksky district for 2010
		11.2.2.2.3. List of district programs for Kamyzyaksky district for 2012
		11.2.2.2.4. List of district programs for Kamyzyaksky district for 2013
		11.2.2.2.5. List of municipal programs for Kamyzyaksky district for 2018
		11.2.2.2.6. List of municipal programs for Kamyzyaksky district for 2019
		11.2.2.2.7. List of municipal programs for Kamyzyaksky district for 2011
		11.2.2.2.8. List of municipal programs for Kamyzyaksky district for 2014
		11.2.2.2.9. List of municipal programs for Kamyzyaksky district for 2015
		11.2.2.2.10. List of municipal programs for Kamyzyaksky district for 2016
		11.2.2.2.11. List of municipal programs for Kamyzyaksky district for 2017
11.2.3. Krasnoyarsky	11.2.3.1. List of municipal programs for Krasnoyarsky district	
11.2.4. Limansky	11.2.4.1. List of municipal programs for Limansky district	
11.3. List of district special-purpose programs for Astrakhan region for 2010-2020		
12. Ministry of Social Development and Labor		
12.1. Letter addressed to Ovchinnikov D.E. - Information on the problems of the social sphere development and the provision of social infrastructure in terms of the powers of the Ministry of Social Development and Labor of Astrakhan Region (App.)		
12.2. Letter addressed to Ivannikov A.A. - Information on the social care establishments with the specified capacity, staff number and location coordinates / Information on social infrastructure development (on the planned facilities and construction in progress for educational, healthcare, social care and sports spheres) (App.)		
13. District passports		
13.1. Astrakhan	13.1.1. Passport of the MU Astrakhan	
	13.1.2. Report on the socio-economic situation in Astrakhan (2019-2020) – 9 .doc files	



13.2. Akhtubinsky district	13.2.1. Report on the socio-economic situation in Akhtubinsky district (2019-2020)
13.3. Volodarsky district	13.3.1. Passport of Volodarsky district (2020)
	13.3.2. Report on the socio-economic situation in Volodarsky district (2019-2020)
13.4. Ikryaninsky district	13.4.1. Report on the socio-economic situation in Ikryaninsky district (2019-2020)
13.5. Kamyzyaksky district	13.5.1. Report on the socio-economic situation in Kamyzyaksky district (2019-2020)
	13.5.2. Passport of Kamyzyaksky district (2019)
13.6. Krasnoyarsky district	13.6.1. Report on the socio-economic situation in Krasnoyarsky district (2019-2020)
	13.6.2. Passport of the socio-economic development of Krasnoyarsky district (2019)
	13.6.3. Explanatory note to the existing situation in Krasnoyarsky district
13.7. Limansky district	13.7.1. Report on the socio-economic situation in Limansky district (2019-2020)
13.8. Narimanovsky district	13.8.1. Passport of Narimanovsky district (2019)
	13.8.2. Report on the socio-economic situation in Narimanovsky district (2019-2020)
	13.8.3. List of agricultural organizations
13.9. Privolzhsky district	13.9.1. Passport of Privolzhsky district (2018)
	13.9.2. Report on the socio-economic situation in Privolzhsky district (2019-2020)
13.10. Kharabalinsky district	13.10.1. Report on the socio-economic situation in Privolzhsky district (2019-2020)
13.11. Chernoyarsky district	13.11.1. Report on the socio-economic situation in Chernoyarsky district (2019-2020)
13.12. Allocation of investment to the capital asset of Astrakhan region	
14. Additional information by sectors	
14.1. Economy	14.1.1. Information from Astrakhan on the program ДОМ.РФ "Review of the national city policy of the Russian Federation"
	14.1.2. National investment climate rating (4 .pdf and .docx files)
	14.1.3. Statistical data on socio-economic indicators of the districts of Astrakhan region 2018-2020 (35 .doc files)

	14.1.4. Speech “On the level of the subsistence minimum”
	14.1.5. Speech “On the indexation rate”
	14.1.6. List the medium and small trade companies located in the territory of Astrakhan region
	14.1.7. Information on the financial support of the national projects in 2020
14.2. Industry	14.2.1. Letter addressed to Bogomolov M.V. No. 01-15/8655 dated 17/12/2020 – List of gas distribution stations and power supply facilities (App.)
	14.2.2. Report on technical and economic performance of Astrakhan Linear Production Gas Pipeline Department of Gazprom Transgaz Stavropol (1 page)
	14.2.3. Report on technical and economic performance of Astrakhan Linear Production Gas Pipeline Department of Gazprom Transgaz Stavropol (2 page)
	14.2.4. Schematic map of electric grids 100 kV and more for 2020 in Astrakhan region
	14.2.5. Energy capacity performance according to the gas chemical facility questionnaire form
	14.2.6. Gas supply scheme of Astrakhan region (2013)
	14.2.7. Letter addressed to Fomina O.A. No. 12-Φ-7/5922 dated 10/09/2020 – Technical characteristics for location of gas chemical facility for polyethylene production (App.)
	14.2.8. Design work on solving the regional task: “Astrakhan region - transition from the mining to the processing economy”
	14.2.9. Information note On creation of the industrial shipbuilding cluster
	14.2.10. Overview map of the location of objects of the unallocated and allocated subsoil hydrocarbons fund in Astrakhan region
	14.2.11. Overview map of the location of objects of the unallocated and allocated subsoil hydrocarbons fund of the Russian sector of the Caspian Sea
14.3. Construction and housing and utility infrastructure	14.3.1. Main facilities - pimp, treatment, water supply (9 .doc files)
	14.3.2. Map of emergency housing facilities of Astrakhan
	14.3.3. Register of capital construction permits
	14.3.4. Land improvement concept of public garden “Selenskie Isady”



	14.3.5. Roadmap for piloting the Standards of civic participation on the object “Selenskie Isady” in Astrakhan
	14.3.6. List of long term construction projects in the territory of Astrakhan
	14.3.7. Information on the housing stock areas of Astrakhan region (2016-2020)
	14.3.8. Letter addressed to Ivannikov A.A. No. 03-14768 dated 17/12/2020 – Information note on the landscaped territories and forest divisions
	14.3.9. List of emergency multi-unit apartment buildings
	14.3.10. Summary list of the water supply and water discharge facilities
	14.3.11. Letter addressed to Babushkin I.Yu. No. 829-ME/06 dated 15/01/2021 – Information note on the results of the city economy digitalization competition “Smart City” (App.)
	14.3.12. Area of emergency residential buildings (2019)
	14.3.13. Utility infrastructure development plans in Astrakhan region.
	14.3.14. Information note on power supply capacity of the South Branch
14.4. Transport and road communication	14.4.1. Main problems of the transport provision
	14.4.2. Table of the motor road length and quality (page 1)
	14.4.3. Table of the motor road length and quality (page 2)
	14.4.4. Register of municipal regular transportation routes in the municipal unit “City of Astrakhan”
	14.4.5. On the state program “Public roads development in Astrakhan region”
	14.4.6. Information note on construction of Severny Obkhod (northern bypass) in Astrakhan
	14.4.7. Letter addressed to Georgievsky S.A. No. 0541 dated 02/02/2021 – Passenger flows and transport infrastructure development (App.)
	14.4.8. Development of logistics center Sun Light Astrakhan LLC
	14.4.9. Astrakhan Airport - passenger flows
	14.4.10. Construction documentation for Vostochny Obkhod (eastern bypass) of Astrakhan (2 .pdf files)
	14.4.11. Location scheme of the the “railway bus” transfer platform

	14.4.12. Letter addressed to Ivannikov A.A. No. 2802 dated 28/12/2020 – On traffic safety activities (App., page 1)
	14.4.13. Letter addressed to Ivannikov A.A. No. 2802 dated 28/12/2020 – On traffic safety activities (App., page 2)
	14.4.14. Scheme of aerodrome environs of Astrakhan
	14.4.15. Concept of stop station locations (95 .pdf files)
	14.4.16. Concept of stop stations and parking locations (95 .pdf files)
14.5. Cultural heritage objects and specially protected natural areas	14.5.1. Full list of cultural heritage objects (290 .doc and .jpg files)
	14.5.2. Substantiation materials for typical architectural decisions for capital construction within the historical settlement (15 .pdf files)
	14.5.3. Protective zone project of Astrakhan (72 .doc, .pdf, .jpg files)
	14.5.4. Historical-cultural plot plan
	14.5.5. Reports on the implemented state program “Environmental protection of Astrakhan region” for 2015-2019 (5 .xlsx files)
	14.5.6. Resolution on establishment of boundaries of the protective territory
	14.5.7. List of specially protected natural areas (4 .doc and .xlsx files)
	14.5.8. Concept of parking locations in the historical center of Astrakhan with due regard to the cultural heritage objects
	14.5.9. Information of the Reserve Museum “Astrakhan Kremlin”
	14.5.10. Proposals on implementation of the renovation program of the historical center of Astrakhan
	14.5.11. Reports of the nature management and environmental protection service of Astrakhan region
14.6. Culture and tourism	14.6.1. Data on tourist flow and operators
	14.6.2. List of collective means for tourist accommodation
	14.6.3. Information note on the cultural establishments of Astrakhan region
	14.6.4. Information note on creation of the art residency
	14.6.5 Draft passport of tourist product



14.7. Medicine and demography	14.7.1. Information note on medical needs of Astrakhan region
	14.7.2. Number of population for 1991-2020
	14.7.3. Population makeup for 2010-2015
	14.7.4. Population makeup for 2016-2020
14.8. Sports	14.8.1. Reports on the progress of finance of the long-term special-purpose program "Development of physical culture and sports in Astrakhan region" (8 .xls files)
	14.8.2 Sports facilities in the districts of Astrakhan region (13 .pdf, .doc, .docx, .jpg files)
	14.8.3. Information on the sports facilities in the municipal unit "City of Astrakhan"
	14.8.4. Information note on the sports situation in the territory of Astrakhan region
	14.8.5. List of the planned sports facilities in the territory of Astrakhan region
	14.8.6. Information on the existing physical culture and sports facilities
	14.8.7. About sport infrastructure capacities of Astrakhan region
	14.8.8. About sport infrastructure capacities of Astrakhan
	14.8.9. List of outdoor sport venues
14.9. Education	14.9.1 Information note on the number of the university students
	14.9.2. Information note on the number of the university students (Table)
	14.9.3. List of educational establishments of Akhtubinsky district
	14.9.4. Information on the need in the educational establishments
14.10. Agriculture	14.10.1. Statistical collection of key performance indicators of agricultural sector (2015-2019)
	14.10.2. Fishery and fish-farming for 2019
14.11. Presentations and information notes	14.11.1. Order "On approval of Methodological recommendations for preparation of urban design standards"
	14.11.2. Presentation "Results 2020 - 100 significant corrections for construction sector"

	14.11.3. Article “ITC “North-South”
	14.11.4. Article “Peculiarities of organization of the hierarchical structure of the agglomerations in the South of Russia”
	14.11.5. Article “Peculiarities of the natural resource potential, their rational use in the economy of Astrakhan region on the example of the Southern industrial resource region”
	14.11.6. Information “On the current state and prospects of international activities of the Astrakhan region”
	14.11.7. Strelka Design Bureau - Presentation “Astrakhan” (P.1)
	14.11.8. Strelka Design Bureau - Presentation “Astrakhan” (P.2)
	14.11.9. Presentation “Bolshie Isady Market”
	14.11.10. Bill draft on the integrated development territories
	14.11.11. Information on creation of the cultural and educational complexes in the regions of Russia
	14.11.12. Article “North-South Corridor: Contradictions Boost Cooperation”
	14.11.13. General issues of the MU Krasnoyarsky district
	14.11.14. Presentation of the Astrakhan State Technical University and university projects
	14.11.15. Presentation of ВЭБ.РФ
	14.11.16. Presentation of Terma project
	14.11.17. Demographic forecast for the Russian Federation
	14.11.18. Examination of the Caspian Sea port project
	14.11.19. ““Formation of Comfort Urban Environment” in 2020 by the entities of the Russian Federation
	14.11.20. Information Note “Raw material base of Astrakhan region”
	14.11.21. Information note about SEZ International Border Cooperation Center “Khorgos”
15. Land-use planning and urban zoning	
15.1. Latest changes in the General Layout of Astrakhan (7 .pdf, .doc, .jpg files)	



15.2. Old general layout versions of Astrakhan 2007-2018 (53 .pdf, .doc, .jpg files)		
15.3. Land development activities of Astrakhan region (10 .pdf files)		
15.4. Narimanovo aerodrome (31 .pdf, .doc, .sig, .xml, .jpg files)		
15.5. Land planning documents	15.5.1 Kamyzyaksky district	15.5.1.1. Land use and development rules Kamyzyak (1 explanatory note, 2 schemes .jpg)
		15.5.1.2. Land use and development rules Karaulinsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.3. Land use and development rules Nikolo-Komarovsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.4. Land use and development rules Kirovsky (1 explanatory note, 1 map .jpg)
		15.5.1.5. Land use and development rules Verkhnekalinovsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.6. Land use and development rules Zhan-Aulsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.7. Land use and development rules Ivanchugsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.8. Land use and development rules Karalatsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.9. Land use and development rules Novotuzukleisky village council (4 schemes .jpg)
		15.5.1.10 Land use and development rules Volgo-Kaspiysky village council (1 explanatory note, 2 schemes .jpg)
		15.5.1.11. Land use and development rules Razdorsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.12. Land use and development rules Samosdelsky village council (1 explanatory note, 4 schemes .jpg)
		15.5.1.13. Land use and development rules Semibugorinsky village council (4 schemes .jpg)
		15.5.1.14. Land use and development rules Chagansky village council (1 explanatory note, 4 schemes .jpg)
	15.5.2. Land use plan and boundary-setting plan	15.5.2.1. Land use plan and boundary-setting plan Gas pipeline (2 title sheets, 2 volumes .pdf)
15.5.2.2. Land use plan and boundary-setting plan Reconstruction of motor road in Tuzukley (3 .pdf and .doc files)		

		15.5.2.3. Land use plan and boundary-setting plan Access road (21 .pdf files)		
		15.5.2.4. Land use plan Water pipeline Razdor-Tuzukley (36 .sig, .xml, .pdf files)		
		15.5.3. STP Kamyzyaksky district	15.5.3.1. Graphic materials (18 .tif, .wor files)	
			15.5.3.2. PP STP Kamyzyaksky district	
			15.5.3.3. Project scope	
			15.5.4. Summary of the land-use planning documents of Kamyzyaksky district	
	15.5.2. Krasnoyarsky district	15.5.2.1. Summary on the MU Krasnoyarsky district (Part 1)		
		15.5.2.2. Summary on the MU Krasnoyarsky district (Part 2)		
		15.5.2.3. Information on the available official data on the land-use plans of Krasnoyarsky district (1)		
		15.5.2.4. Information on the available official data on the land-use plans of Krasnoyarsky district (1) (2)		
15.5.3. Limansky district	15.5.3.1. General Layout of the MU Olinsky village council	15.5.3.1.1. Volume 1. Approved part (5 .tif and .pdf files)		
		15.5.3.1.2. Substantiation materials (4 .tif and .pdf files)		
		15.5.3.1.3. Sheet of measured points of three villages included in the village council		
		15.5.3.1.4. Decision on General Layout approval		
	15.5.3.2. Land use and development rules MU Olinsky village council	15.5.3.2.1. Volume 1 (3 .tif and .doc files)		
		15.5.3.2.2. Volume 2. Substantiation part		



	15.5.4. Narimanovsky district	15.5.4.1. STP materials (MAP INFO)	15.5.4.1.1. Territorial boundaries ADMG (36 .mif, .tab, .id, .dat files)
			15.5.4.1.2. Functional zones (265 .mif, .tab, .id, .dat files)
			15.5.4.1.3. Capital construction objects CCO, planned and in progress (54 .mif, .tab, .id, .dat files)
			15.5.4.1.4. Capital construction transport infrastructure objects OKS_TRANSP planned (60 .mif, .tab, .id, .dat files)
			15.5.4.1.5. Capital construction utility infrastructure objects OKS_ING planned (78 .mif, .tab, .id, .dat files)
			15.5.4.1.6. Road network objects OBJ_DOR_NP, planned (12 .mif, .tab, .id, .dat files)
			15.5.4.1.7. Use-restricted zones ZON_OS_USL planned (24 .mif, .tab, .id, .dat files)

			15.5.4.1.8. Numbering of planned facilities (18 .mif, .tab, .id, .dat files)
			15.5.4.1.9. Numbering of the municipal unit facilities (18 .mif, .tab, .id, .dat files)
			15.5.4.1.10. Street names (12 .mif, .tab, .id, .dat files)
			15.5.4.1.11. TERR_ZON (276 .mif, .tab, .id, .dat files)
			15.5.4.1.12. Abstracts from Land use and development rules (30 .mif, .tab, .id, .dat files)
			15.5.4.1.13. Additional tables (79 .mif, .tab, .id, .dat files)
			15.5.4.1.14. Planned location map
			15.5.4.1.15. Planned location map (2)
			15.5.4.1.16. Territorial zones as per the Land use and development rules
			15.5.4.1.17. Territorial zones as per the Land use and



			development rules (2)
			15.5.4.1.18. Functional zones
			15.5.4.1.19. Functional zones (2)
	15.5.5. Privolzhsky district	15.5.5.1. General Layout of the MU Nachalovsky village council (2 .tif and .doc files)	
		15.5.5.2. General Layout of the MU Funtovsky village council	15.5.5.2.1. Volume 1. Main part (6 .pdf files)
			15.5.5.2.2. Substantiation (1 .pdf file)
			15.5.5.2.3. Decision on approval of changes to the General Layout of the MU Funtovsky village council

APPENDIX 21. GRAPHIC MATERIALS ILLUSTRATING THE ASSESSMENT RESULTS OF THE URBAN PLANNING POTENTIAL OF THE MU "CITY OF ASTRAKHAN" AND A NUMBER OF MUNICIPAL UNITS OF THE AGGLOMERATION

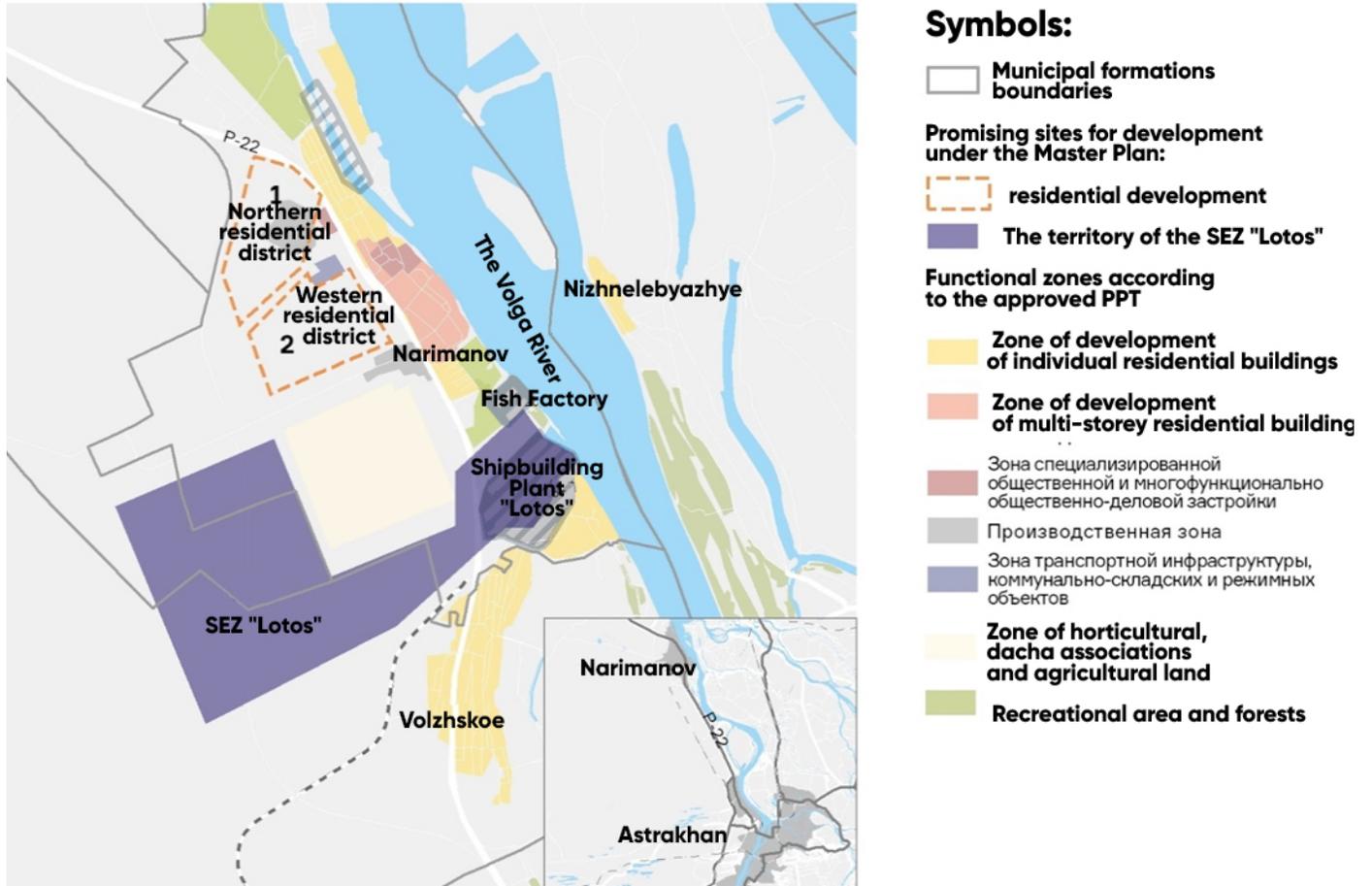


Fig. 1. Prospective development areas in Narimanov (Narimanovsky district).



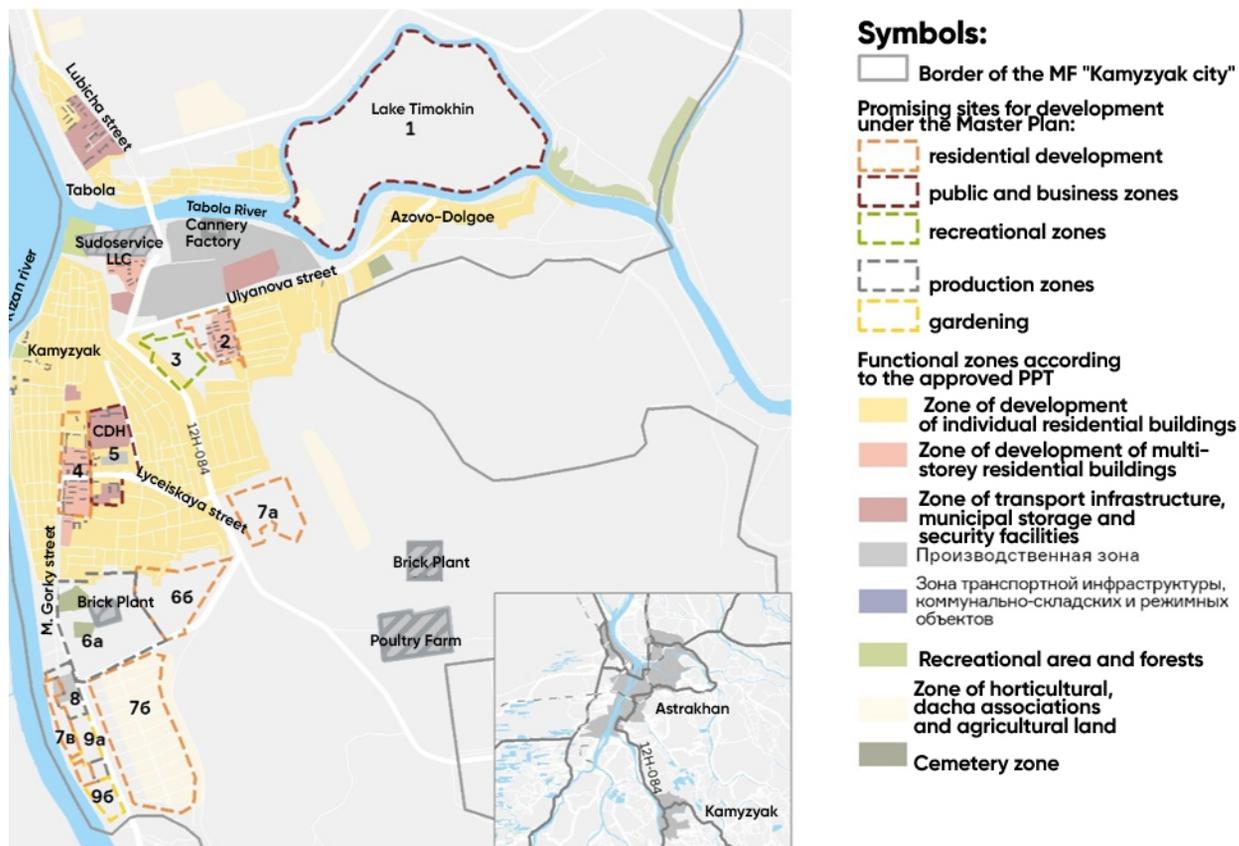


Fig. 2. Prospective development areas in Kamyzyak (Kamyzyaksky district).

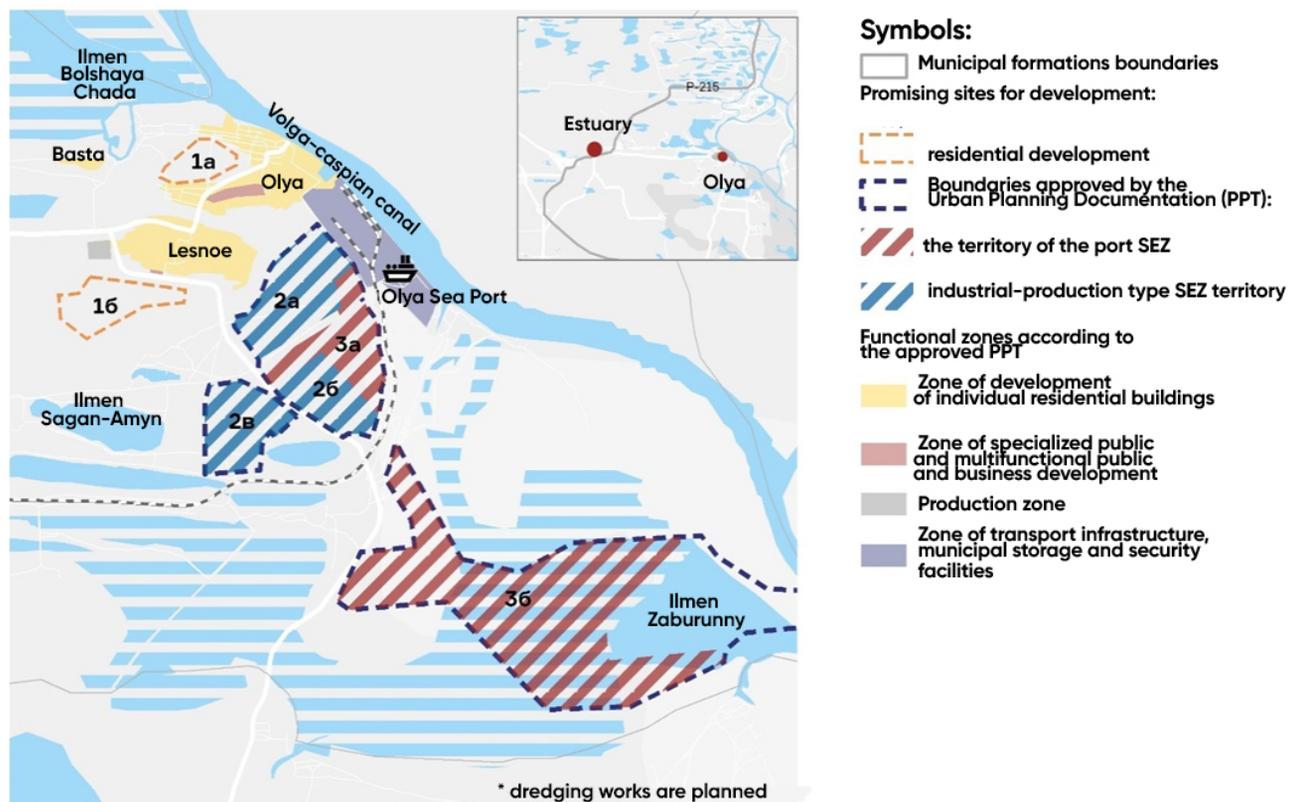


Fig. 3. Prospective development areas in the territory of Olinsky village council (Limansky district).

Table 69. Broad estimates of the performance indicators of new construction in the territory of the municipal unit "City of Astrakhan"¹⁹⁶.

	Type of the planned construction	Recommendations on changes to the General Layout (including functional zoning scheme)	Development area, ha				Total new construction area, ths. sq.m					Design number of population, ths. people			Design housing density, ths. sq.m/ha ¹⁹⁷	
			Total	including step 1	including step 2	including step 3	Total	including non-residential part	construction stage ¹⁹⁸			Total	including step 1	including step 2		including step 3
									1	2	3					
Northern planning district	Development area with private houses	–	400	0	200	200	560	56	0	280	280	12	0	6	6	1.4
	Development area with low-rise residential buildings	–	130	0	60	70	481	48	0	222	259	10	0	5	5	3.7
	Multifunctional public and business zone	–	50	0	30	20	350	35	0	200	150	7	0	4	3	7.0
	Recreational zone	–	100	0	50	50	-									
Babaevsky planning district	Multifunctional public and business zone	including development area with high-rise residential buildings	9	9	0	0	65.7	20	65.7	0	0	1	1	0	0	7.3
	Low-rise and private housing	Development area with high-rise residential buildings	26	26	0	0	189.8	19	189.8	0	0	4	4	0	0	7.3
	Zone of restricted access facilities	changed according to the permitted use of land plot No. 30:12:20060:380 ¹⁹⁹ for location of the inter-university campus	30	15	15	0	140	140	70	70	0	0	1	0	0	4.7
	Multifunctional public and business zone	including development area with high-rise residential buildings	75	50	25	0	562.5	169	375	187.5	0	9	8	3	0	7.5
	Low-rise housing	–	146	50	56	40	1095	219	375	420	300	20	8	8	6	7.5

¹⁹⁶ Prospective indicators of new construction are determined in accordance with the current documents on the land-use planning and other urban development documents and are of a recommendatory nature.

¹⁹⁷ As per the Regulations of the General Layout of the municipal unit "City of Astrakhan":

- for high-rise developments in the free territories, 7200 sq.m/ha, within 7500 - 6800 sq.m/ha;

- for reconstruction districts - in average 5800 sq.m/ha (from 5500 sq.m/ha to 7300 sq.m/ha - depending on the construction district);

- for low-rise multi-apartment construction - 3700 sq.m/ha;

- for individual with private garden spaces - 1400 sq.m/ha.

¹⁹⁸ The indicators for the construction steps are specified according to the results of the selected development scenario and according to the results of a more detailed consideration of the features and limitations of the territory.

¹⁹⁹ in case of location of the inter-university campus for the formation and development of the scientific and educational campus "Caspian Sea"



North-Eastern planning district (residential area Moshkarikha)	Private housing	–	78	78	0	0	109.2	11	109.2	0	0	2	2	0	0	1.4
Central part of the city	development area with high-rise residential buildings	–	10	10	0	0	55	6	55	0	0	1	1	0	0	5.5
	development area with high-rise residential buildings	–	27.3	27.3	0	0	150	30	150	0	0	3	3	0	0	5.5
	development area with high-rise residential buildings ²⁰⁰		114	24	50	40	627	125	132	275	220	12	3	5	4	5.5
	Multifunctional public and business zone ²⁰¹		13	0	13	0	71.5	71.5	0	71.5	0	0	0	0	0	5.5
	Multifunctional public and business zone,		63	Regeneration of historical environment in the territory of Kosa, scaled construction												
	development zone with high-rise residential buildings		28	Regeneration of historical environment in the territory near the Opera and Ballet Theater, scaled construction												
	production area	Multifunctional public and business zone	21.4	0	21.4	0	149.8	150	0	150	0		0	0	0	7.0
	Recreational zone ²⁰²	Territory of urban forests	250	125	125	0	-									
	forest zone		60	0	0	60	-									
Aerodrome environs	Multifunctional public and business zone	–	18	18	0	0	90	90	90	0	0	0	0	0	0	5.0
Territory of Trusovsky district	Development area with private houses	–	11	11	0	0	15.4	2	15.4	0	0	0.3	0.3	0	0	1.4
Implementation of the central part redevelopment projects	Multifunctional public and business zone, production	changes ²⁰³	140	0	30	110	1050	315	0	0	825					7.5
	Total		1390				4712		1627.3	1876	1209					
	including housing development		1166				4961		1467	1385	1884					

²⁰⁰ Including creation of the creative cluster in the distillery area

²⁰¹ Territory of "Steklovolokno" plant

²⁰² Territory of urban forests according to the Forest management regulations of Astrakhan

²⁰³ If decided on the production zones reorganization



Table 69 (continued). Broad estimates of the performance indicators of new construction in the territories of Privolzhsky and Narimanovsky districts adjacent to Astrakhan**Territories of Privolzhsky district adjacent to Astrakhan**

territory near POSK-2	Development area with private houses	—	Individual housing construction	550	150	250	150	770	77	210	350	210	16.2	4.4	7	4	1.4
territory near railway station "Kutum"	production area		Production territory near HPP-2	450				2250					53	0	0	0	5.0
	production area	changed according to the permitted use of land plot No. 30:9:100204:13 allotted for arrangement of the leisure centre	OD development	67	30	37		335		150	185		8	0	0	0	5.0
	Development area with private houses		Individual housing construction	76	40	36		106.4	11	56	50.4		2.2	1.2	1	0	1.4
Total				1143				3461		416	585.4	210					
including housing development				626				876		266	400.4	210					

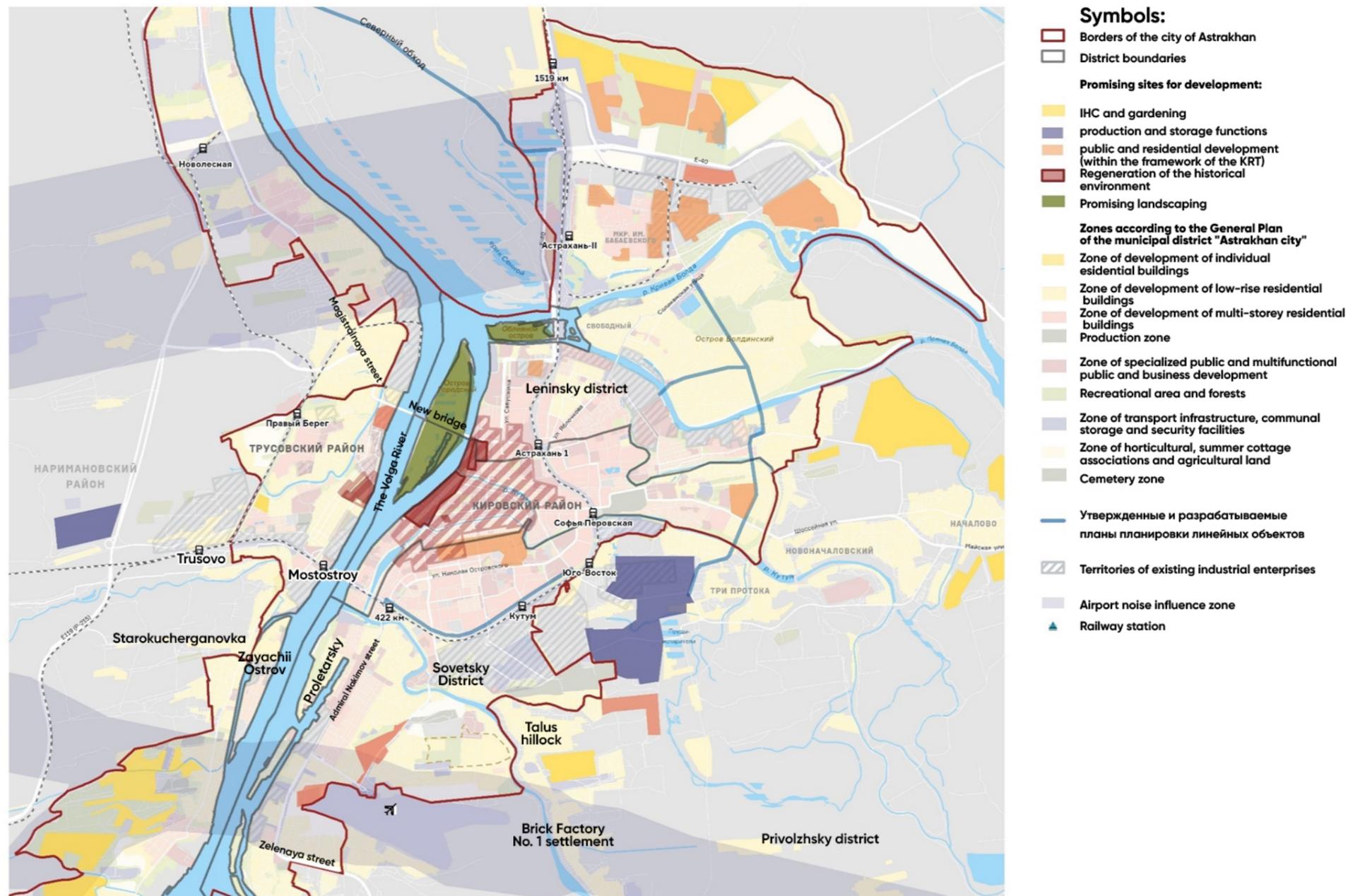
Territories of Narimanovsky district adjacent to Astrakhan

Territory near E 119 highway	production area		Production territory	111				410.7	411	0	410.7	0					3.7
territory of Starokucherganovka	Development area with private houses, horticulture area		Individual housing construction	80				112									1.4
Total				191				523									
including housing development				80				112									



Fig. 4. Prospective development territories in the MU Astrakhan and adjacent territories of Privolzhsky and Narimanovsky districts

204



204 Figures 5-10 give the additional graphic materials illustrating the broad estimates of the urban planning potential of particular municipal units of the agglomeration



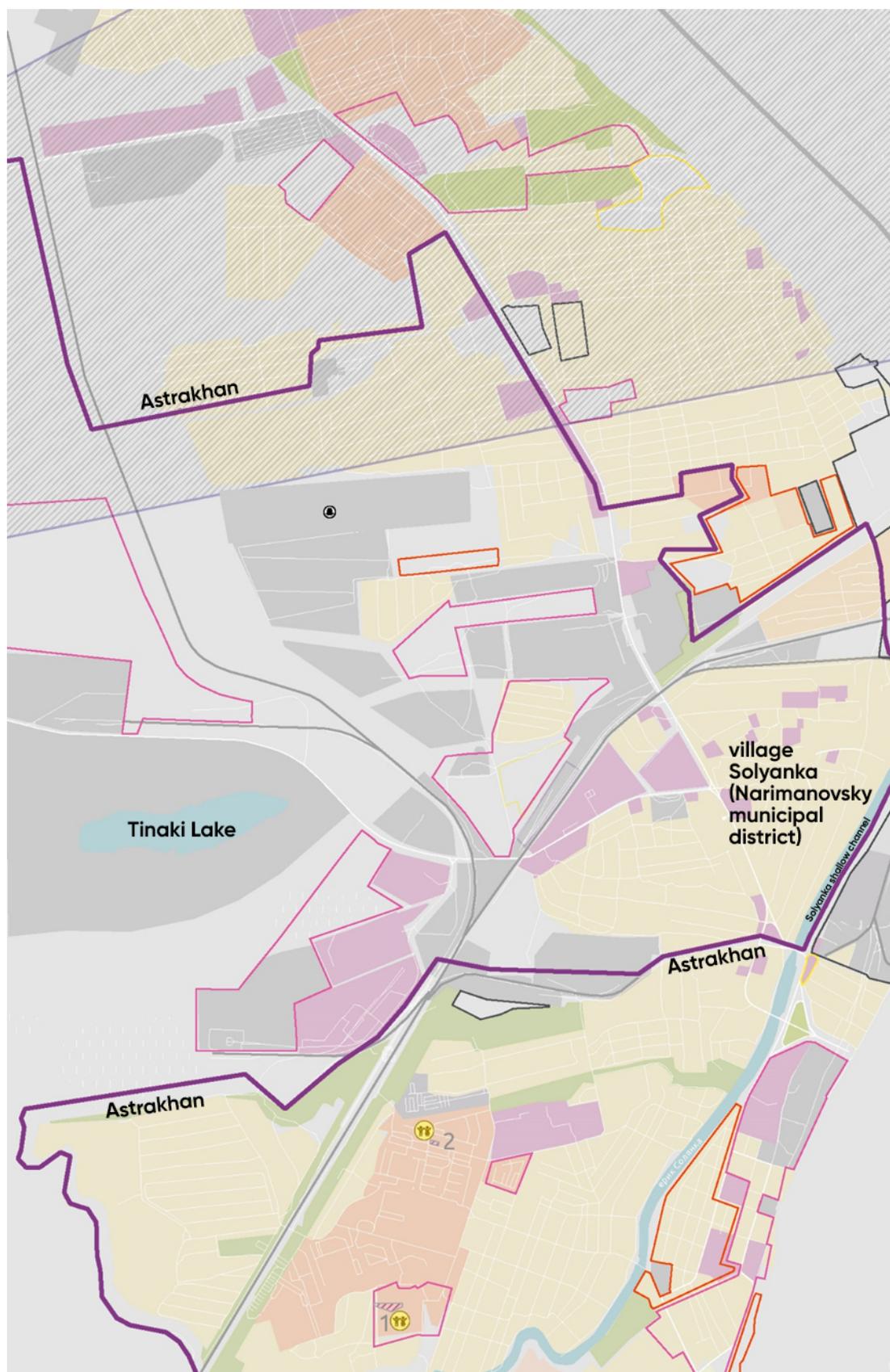


Fig. 5. Territories of Astrakhan. Right bank. Solyanka

The territory is characterized by mixed industrial and residential development, located in the suburb of the city and has numerous development restrictions.



Table 70. Broad estimates of the performance indicators of new construction Astrakhan. Right bank. Solyanka

Plot No.	Formed zone	Area, ha	Basis for allocation	Location	Current use	Housing density, ths. sq. km/ha	Potential scope of housing, ths. sq. km	Specific cost, ths. RUB / sq.m.	Potential investments, bln. RUB	Employment rate, workingnt places per 100 sq.m	Employe rate, ths. people
TOTAL	101						725		29.7		0.69
Step 1	0						0		0.0		0.00
Step 2	0						0		0.0		0.00
Step 3	101						725		29.7		0.69
unnumb.	High-rise housing	75	General layout	Trusovsky district of Astrakhan	Individual housing construction, low-rise housing	8.8	660	40	26.4	0.3	0.20
unnumb.	Production building	26	General layout	Trusovsky district of Astrakhan	No building	2.5	65	50	3.3	7.5	0.49



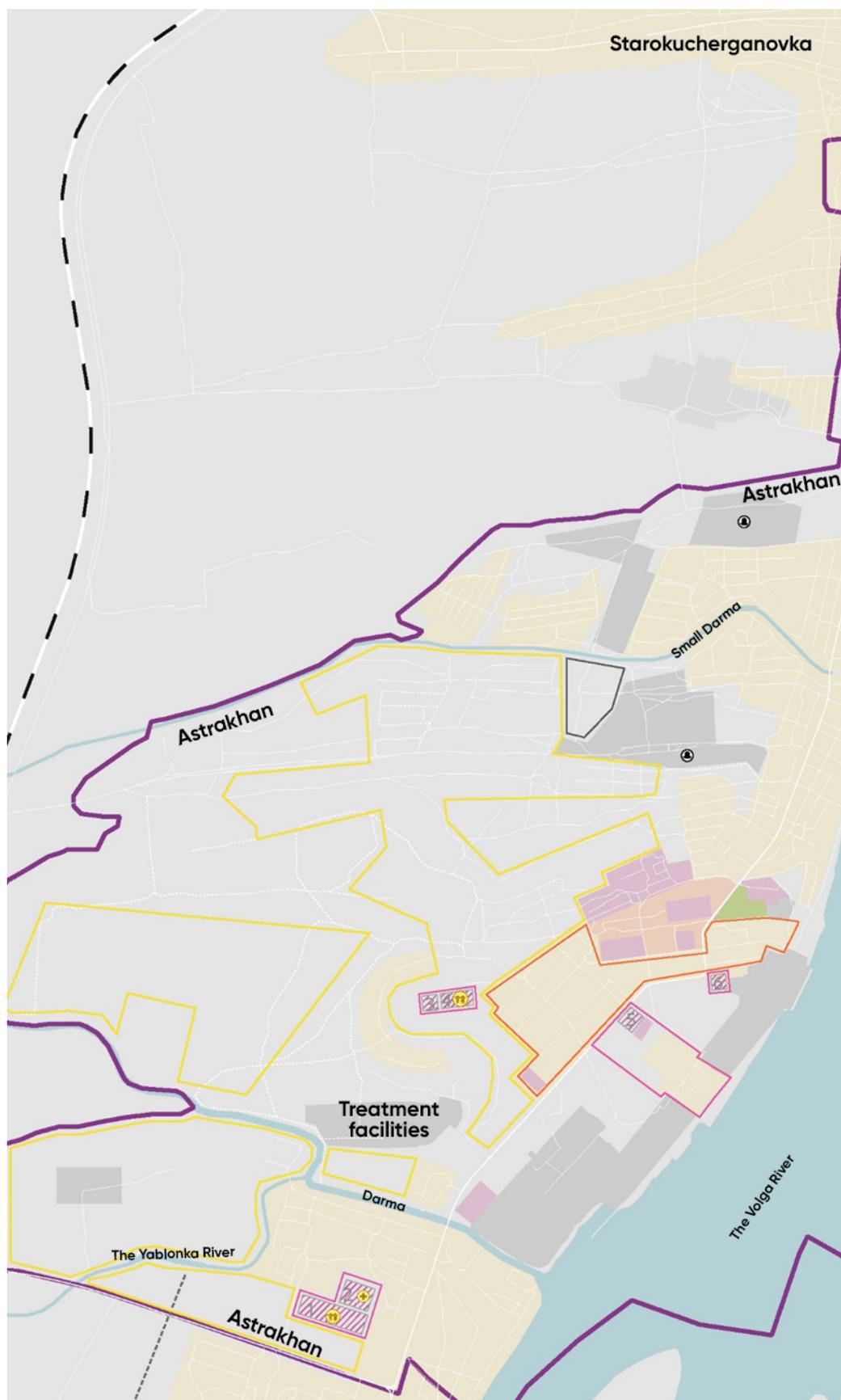


Fig. 6. Astrakhan. Right bank. Starokucherganovka

In the southwestern periphery of Astrakhan, there are significant opportunities for the development of individual housing construction and gardening.



Table 71. Broad estimates of the performance indicators of new construction Astrakhan. Right bank. Starokucherganovka

Plot No.	Formed zone	Area, ha	Basis for allocation	Location	Current use	Housing density, ths. sq. km/ha	Potential scope of housing, ths. sq. km	Specific cost, ths. RUB / sq.m.	Potential investments, bln. RUB	Employment rate, working places per 100 sq.m	Employment rate, ths. people
TOTAL		374					405		11.3		0.33
Step 1		20					16		0.4		0.01
unnumb.	Private housing	20	General layout, land use plan	Trusovsky district of Astrakhan, in the area of Akmolinskaya St.	No building	0.8	16	25	0.4	0.5	0.01
Step 2		70					56		1.4		0.03
unnumb.	Private housing	70	General layout, cadastre	Trusovsky district of Astrakhan, in the area of P-216 highway	No building	0.8	56	25	1.4	0.5	0.03
Step 3		284					333		9.5		0.29
unnumb.	Private housing	230	General layout	Trusovsky district of Astrakhan	No building	0.8	184	25	4.6	0.5	0.09
unnumb.	Low-rise housing	46	General layout	Trusovsky district of Astrakhan, 3rd International	Individual housing construction	2.8	129	30	3.9	0.4	0.05
unnumb.	Production building	8	General layout	Trusovsky district of Astrakhan	No building	2.5	20	50	1.0	7.5	0.15





Fig. 7. Ikryaninsky district. Iskryanoye

Opportunities for the territory development generally correspond to the existing demand for housing and land plots.



**Table 72. Broad estimates of the performance indicators of new construction
Ikryaninsky district. Iskryanoye**

Plot No.	Formed zone	Area, ha	Basis for allocation	Location	Current use	Housing density, ths. sq. km/ha	Potential scope of housing, ths. sq. km	Specific cost, ths. RUB / sq.m.	Potential investments, bln. RUB	Employment rate, working places per 100 sq.m	Employment rate, ths. people
TOTAL		67					74		3.0		0.31
Step 1		7					14		1.0		0.14
1	Specialized public and business development zone	3	General layout, cadastre	In the western part of Ikryanoe	No building	2	7	70	0.5	10	0.07
2	Specialized public and business development zone	2	General layout, cadastre	In the central part of Ikryanoe	No building	2	3	70	0.2	10	0.03
4	Specialized public and business development zone	2	General layout, cadastre	In the southern part of Ikryanoe	No building	2	4	70	0.3	10	0.04
Step 2		20					16		0.4		0.01
unnumb.	Private housing	20	General layout	North and south-west of Ikryanoe	No building	0.8	16	25	0.4	0.5	0.01
Step 3		40					45		1.6		0.16
unnumb.	Private housing	37	General layout	North and south-west of Ikryanoe	No building	0.8	30	25	0.7	0.5	0.01
unnumb.	Multifunctional public and business development zone	3	General layout	South-west of Ikryanoe	No building	5	15	60	0.9	10	0.15



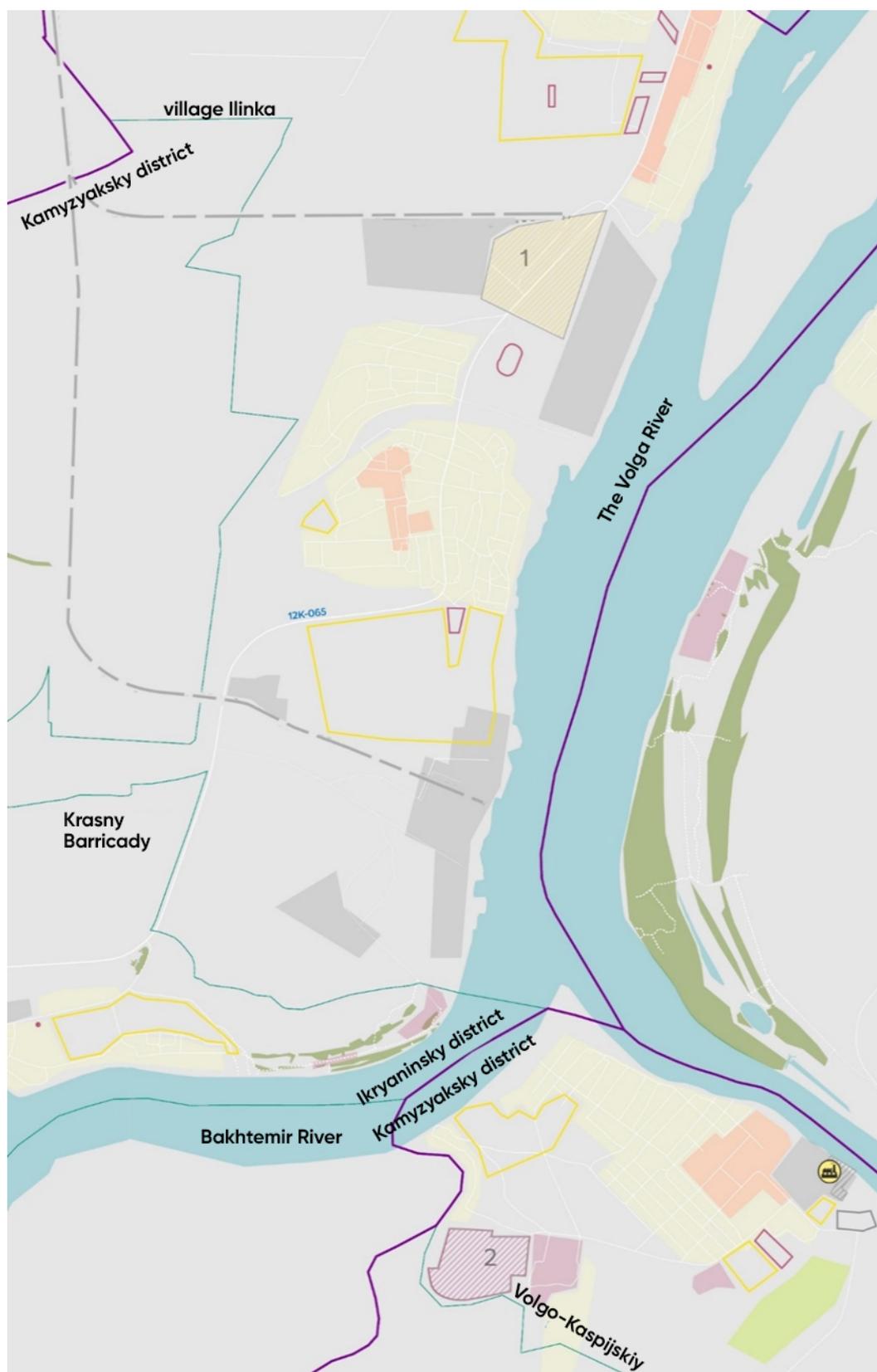


Fig. 8. Ikryaninsky district. Ilyinka

Ilyinka is the most important oil terminal. Along with high-paying jobs, there is potential for the territory development for individual housing construction.



Table 73. Broad estimates of the performance indicators of new construction Ikranyinsky district. Ilyinka

Plot No.	Formed zone	Area, ha	Basis for allocation	Location	Current use	Housing density, ths. sq. km/ha	Potential scope of housing, ths. sq. km	Specific cost, ths. RUB / sq.m.	Potential investment, bln. RUB	Employment rate, working places per 100 people sq.m	Employment rate, ths.
TOTAL		103					101		3.9		0.34
Step 1		0					0		0.0		0.00
Step 2		43					53		2.7		0.32
1	Private housing	28	General layout	In the northern part of Ilyinka	No building	0.8	22	25	0.6	0.5	0.01
2	Specialized public and business development zone	15	General layout, cadastre For location of vacation house	in Volgo-Kaspiysky	No building	2	31	70	2.1	10	0.31
Step 3		60					48		1.2		0.02
unnumb.	Private housing	60	General layout	in Ilyinka, Volgo-Kaspiysky	No building	0.8	48	25	1.2	0.5	0.02



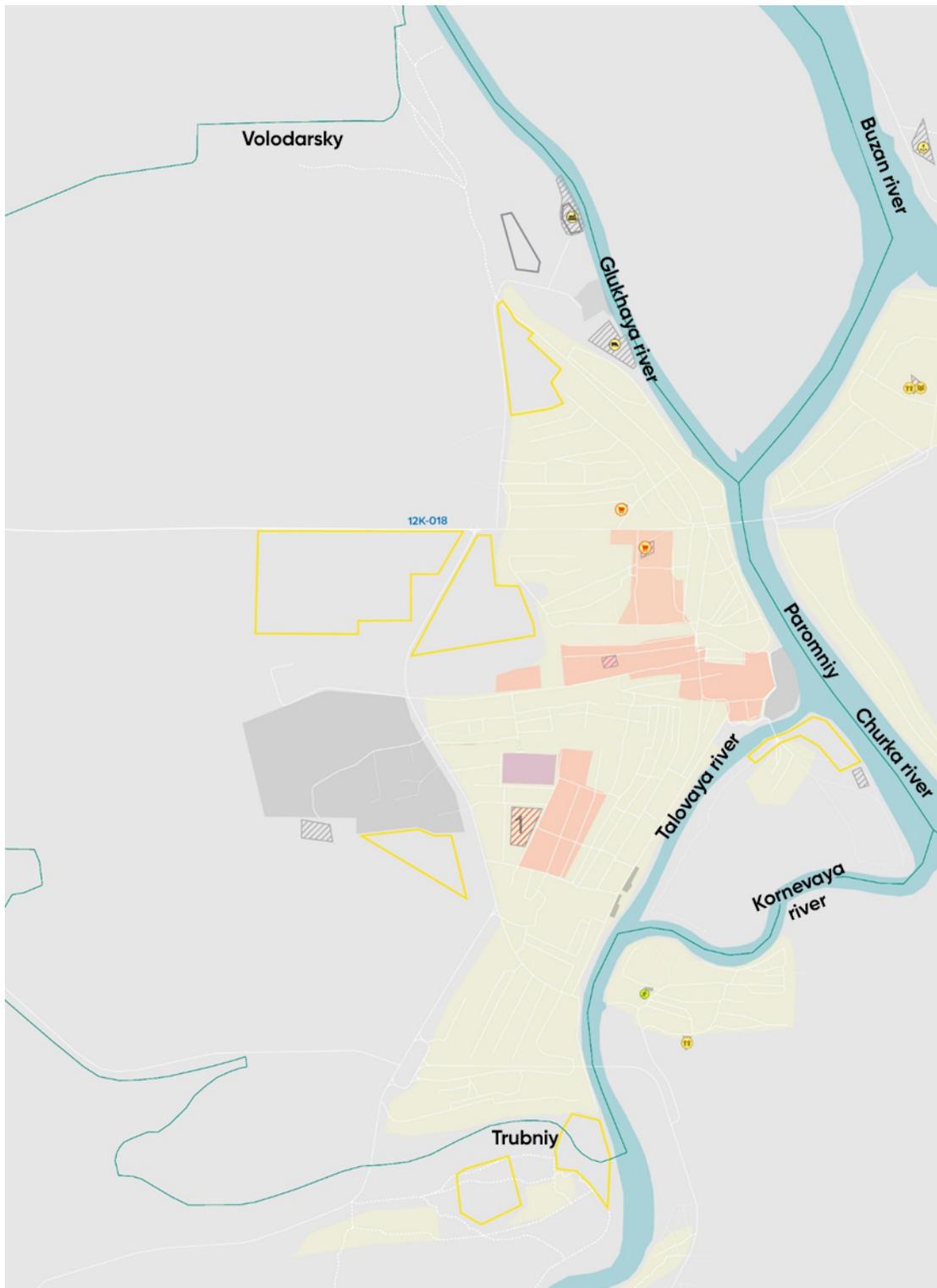


Fig. 9. Volodarsky district. Twp Volodarsky

Opportunities for the territory development of Volodarsky are related to the development of the individual housing construction.



Table 74. Broad estimates of the performance indicators of new construction Volodarsky district. Twp Volodarsky.

Plot No.	Formed zone	Area, ha	Basis for allocation	Location	Current use	Housing density, ths. sq. km/ha	Potential scope of housing, ths. sq. km	Specific cost, ths. RUB / sq.m.	Potential investments, bln. RUB	Employment rate, working places per 100 sq.m	Employment rate, ths. people
TOTAL		118					104		2.8		0.10
Step 1		22					22		0.6		0.01
1	Low-rise housing	2	General layout, cadastre	twp Volodarsky	No building	2.8	6	30	0.2	0.4	0.00
unnumb.	Private housing	20	General layout	twp Volodarsky	No building	0.8	16	25	0.4	0.5	0.01
Step 2		33					32		1.0		0.07
unnumb.	Private housing	30	General layout	twp Volodarsky	No building	0.8	24	25	0.6	0.5	0.01
unnumb.	Production building	3	General layout	twp Volodarsky	No building	2.5	8	50	0.4	7.5	0.06
Step 3		63					50		1.3		0.03
unnumb.	Private housing	63	General layout	twp Volodarsky	No building	0.8	50	25	1.3	0.5	0.03



Fig. 10. Symbols to Figures 5 - 9 of Appendix 21

	I уровень Существующая застройка, дорожно-тропиночная сеть + зоны, объединенные одной функцией	II уровень Планируемые зоны (Генплан)	III уровень Выделенные участки под развитие (КУРТы, Кадастровая карта, ПЗЗ)	IV уровень Планируемые объекты
Жилая застройка:				
ИЖС				
Многоквартирная малоэтажная застройка				
Многоквартирная многоэтажная застройка				
Общественно-деловая застройка:				
Зона коммерции, административно деловой застройки				
Образование/Медицина				
Спорт/Культура				
Зона развлекательного назначения, отдыха				
Производственная зона, животноводство; особая экономическая зона				
Транспортная инфраструктура				
Ж/Д пути				
Зеленые территории:				
Зона озелененных территорий, зоны отдыха и рекреации				
<hr/>				
Границы населенного пункта				
Ветхое жилье, стихийные гаражи, складские территории				



APPENDIX 22. FRAMEWORK TERMS OF REFERENCE FOR DEVELOPMENT OF GENERAL LAYOUT OF ASTRAKHAN AGGLOMERATION, ASTRAKHAN REGION

About Competition

Format of the Competition

- open;
- international;
- two-stage.

Object of the Competition

Territory of the competitive bid - southern and central part of Astrakhan region: Astrakhan and 7 municipal districts (Privolzhsky, Volodarsky, Kazymyaksky, Ikryaninsky, Limansky, Narimanovsky, and Krasnoyarsky).

Goal of the Competition

Selection of the optimum master plan of Astrakhan agglomeration that implements the territory development scenario with due regard of the identified potential and prospective areas of integration.

Participants

Professional organizations in the integrated territory development and master planning, city planning, architecture, engineering and design, and development of public space concepts that work in the territory of Russia and are capable of involving a team of specialists in economy, finance, content programming.

Finalists

According to the first stage results, on the basis of the relevant portfolio and essay, 3 finalists will be selected to develop the competitive bids.

Winner

The winner will be an author of the best competitive bid selected by the intersectoral jury.



Stages

At the first stage of the Competition, the participants will provide:

- the portfolio consisting of 5 relevant implemented projects²⁰⁵;
- essay with the description of key ideas of strategic development of the urban district and approaches to the master plan development with the stated spatial development approaches (5000-7000 characters);
- graphic part is made up by schematic diagrams, models (at option).

At the second stage of the Competition, the finalists will provide the materials according to this Terms of Reference:

- albums, including explanatory note and visualization materials of the offered solutions;
- tablets;
- presentation;
- video with 3D-modeling elements;
- other materials at the participants' option necessary to substantiate the competitive ideas.

Principles of development of the competitive bid according to the master plan of Astrakhan agglomeration

When developing the competitive bid according to the master plan of Astrakhan agglomeration, the following basic principles should be taken into account.

1. compliance with the documents on strategic planning of the Russian Federation, Southern Federal District, Astrakhan region and MU "City of Astrakhan".

The competitive bids should correspond to the strategic development priorities of Astrakhan region set out by the following documents:

- Spatial Development Strategy of the Russian Federation 2025;
- Tourism Development Strategy of the Russian Federation 2035;
- Socioeconomic Development Strategies of the Southern Federal District 2020;
- Socioeconomic Development Strategy of Astrakhan region 2035;
- Development Strategy of the Municipal Unit "City of Astrakhan" 2021.

²⁰⁵ Relevant expertise of the participant means the portfolio that includes the existing developed social and economic development strategies of the subjects of the Russian Federation and municipal units, land planning documents and master plans of urban agglomerations, urban districts and other municipal units.



2. Approach to master planning as to the mechanism of development.

The competitive bids should be based on understanding the spatial development as a system of actions determining the allocation, intensity and efficiency of spatial use of the tangible and intangible resources by means implementing the policies aimed at creating the environment for the human vital activity.

Such approach to spatial development in the master plan implementation requires not only the proposals on land planning and on material infrastructure provision but also on institutional activities and mechanisms of their implementation.

3. Use of agglomeration development benefits.

The competitive bids should provide for optimal use of the available territorial, natural (including agroclimatic), financial resources, accumulated scientific and symbolic capital, transport logistics and tourist potential of Astrakhan agglomeration.

The master plan concept of Astrakhan agglomeration should provide for improving the quality of environment in the urban and rural settlements of the agglomeration, efficient joint operation of transport and utility infrastructure, create the conditions for development of the competitive industries and improve the investment climate, activate the use of the attractions (growth points ") in the territory of Astrakhan agglomeration that generally should lead to decrease in disproportions of the spatial and socioeconomic development.

4. Strengthening the role of Astrakhan as the multifunctional agglomeration center.

The competitive bids should provide for strengthening the role of the core of Astrakhan agglomeration as the active multifunctional economic and innovative center, site for efficient interaction of the authorities, business and community, making Astrakhan as the active center of the south of the Russian Federation and Caspian region.

The master plan should include the activities to ensure development of Astrakhan as the center of innovation technology in various spheres that generates cash flows in the territory of the agglomeration and the region, create the comfort sociocultural space for development of human capital and public institutions successfully functioning and demanded by economy.

The competitive bids should provide for creating the environment of new quality, conditions for active use of the unique cultural heritage, historical settlement of federal significance of Astrakhan.



4. Creation of conditions for diversification of economy.

The competitive bids should create conditions for diversification of economy of Astrakhan agglomeration and provide for activities to ensure development of the prospective sectors of economy in the nearest future, including modernization of the sectors that are traditional for the region, formation of the postindustrial sector of economy, with priority of creation of conditions for the sectors of economy having maximum agglomeration effect.

The master plan should provide for a complex of interrelated organizational, institutional, financial and urban development solutions that jointly ensure the creation of investment sites, optimization of transport logistics frame and utilities, specialized infrastructure and other necessary activities.

5. Preservation of the universal integrity of the Volga Delta landscapes and reduction of anthropogenic load on the vulnerable desert, semi-desert, plain and delta landscapes.

The competitive bids should be developed taking into account the conservation significance of the geosystem of the Volga Delta, formed system of specially protected natural territories and vulnerability of the landscapes of Astrakhan region.

The master plan should provide for reduction of anthropogenic load on the ecosystems in any kinds of activity, as well as offer the land development solutions allowing for maintaining the balance between the economy and economic situation. The offered infrastructure and other solutions should meet the world ecological standards.

The competitive bids should include the activities to ensure formation of the demonstration site of the ecosystemic interaction within Astrakhan agglomeration as a new image component of the region.

7. Preserving the integrity and authenticity of the historical environment.

The competitive bids should meet the world trends in handling with the cultural heritage and symbolic capital of the territory combined with the development of the institutional environment, use of mechanisms of the public and private partnership, integration with thematic tourist routes and image events.



8. Stages of achieving the strategic goals and tasks of development.

The competitive bids should provide for stage-by-stage implementation of the activities that lead to consistent solving of the following tasks in the course of formation of:

- by 2024 - agglomeration poised for change;
- by 2027 - economically sustainable agglomeration;
- by 2032 - agglomeration competitive at the macroregional level²⁰⁶.

General requirements for competitive bid development

1. Compliance with the Terms of Reference.
2. Compliance with strategic socioeconomic development documents, documents on land planning and urban development zoning of Astrakhan region.
3. Compliance of the master plan concept with strategic purposes and objectives of the agglomeration development, including:
 - formation of Astrakhan agglomeration as the active center of influence in the Caspian region;
 - dynamic development of the territory of Astrakhan agglomeration;
 - positioning of Astrakhan as the city of opportunities and active multifunctional center of the south of Russia;
 - Astrakhan agglomeration as the demonstration site of the ecosystemic interaction.
4. The development scenarios of the priority zones in the territory of the agglomeration, including in the territory of the municipal unit "City of Astrakhan" and other settlements, provided by the master plan should provide for activation of the available resources and synergy of the agglomeration development.
5. Integrated approach to and reasonable use of the territory of Astrakhan agglomeration with the formation of the tourist route system, diversified entertainment-recreational and service infrastructure being attractive for various target audiences.
6. The scenarios of priority zones for development of the historical center of Astrakhan provided by the master plan should provide for active use of the cultural heritage objects and capitalization of the historical environment as a whole.
7. The practicability of the master plan proposals, availability of particular measures and mechanisms of its implementation as the parts of the competitive bid.
8. Investment attractiveness, socioeconomic and budget effectiveness of the solutions provided by the master plan for 2021-2032.

²⁰⁶ The implementation of the acceleration scenario is recommended as basic. Once reasonably justified, the participant can offer an alternative.



Contents of the competitive bid

1. Schematic development model of Astrakhan agglomeration on the basis of the specified agglomeration development potential.

- 1.1. Sociocultural, urban development and other prerequisites determining potentials and constrains for development of Astrakhan agglomeration and MU “City of Astrakhan”.
- 1.2. Assessment of the resource potential of development.
- 1.3. Assessment of the provision of infrastructure of Astrakhan and other municipal units of the agglomeration, including utilities and transport services.
- 1.4. Analysis of residents’ proposals on development of the MU “City of Astrakhan” and Astrakhan agglomeration.
- 1.5. Key problems of socioeconomic and territorial development of the agglomeration, including key problems of development of the municipal units included.
- 1.6. Consolidated problems of spatial development of the MU “City of Astrakhan” as the agglomeration center.
- 1.7. Existing and potential growth points.
- 1.8. Schematic development model of Astrakhan agglomeration.

2. Spatial development scenario of Astrakhan agglomeration for 2021–2032.

- 2.1. Specification of the key idea of spatial development of the agglomeration based on the offered agglomeration development model, resources, socioeconomic and spatial restrictions for development, external and internal risks, opinions and proposals received from the residents of Astrakhan agglomeration, stakeholders.
- 2.2. Priorities and tasks of spatial development of the agglomeration as a whole and its municipal units in particular, including:²⁰⁷
 - agglomeration development;
 - development of the municipal units of the agglomeration;
 - intermunicipal development.
- 2.3. Priorities and tasks of spatial development of the MU “City of Astrakhan” as the agglomeration core.
- 2.4. Areas of strengthening the internal agglomeration relations, including economic, transport, economic, sociocultural
- 2.5. Activities to implement the development scenario of the agglomeration²⁰⁸ in the following areas:

²⁰⁷ The list of preliminary activities on agglomeration development, including with due regard to the approved Socio-Economic Development Strategy of Astrakhan region 2035 and other materials and documents provided by the executive authorities of the region as the source information is given in Appendix 1 to the Terms of Reference.

²⁰⁸ The list of basic activities on the agglomeration development, including strengthening the agglomeration core, is given in Appendix 2 to the Terms of Reference.



- formation of the living-attractive environment;
- formation of the youth-attractive environment;
- formation of the business-attractive environment;
- creation of conditions for diversification of economy;
- changes in the management system and institutional sphere;
- creation of conditions for formation of the innovative economy and economy of knowledge;
- development of tourist destinations, a system of integrated routes and recreational complex with the creation of the basic and commercial support infrastructure;
- international integration.

2.6. Activities to ensure strengthening the agglomeration core, the MU “City of Astrakhan”, in the framework of implementation of the development scenario.

2.7. Proposals on formation of the unique event program for image promotion of symbolic and cultural capital of the districts of the agglomeration at the international and interregional levels.

2.8. Proposals on comprehensive development of the tourist product of the territory of the agglomeration.

2.9. Proposals on optimization of management and maintenance of the territory of the historical settlement of federal significance of Astrakhan, including institutional activities and activities in the public and private partnership.

2.10. Determination of the prospective development indicators of the agglomeration as a whole and its municipal units in particular, by the chosen areas with the stage reference:

- 2021-2022²⁰⁹;
- 2022-2024;
- 2024-2027;
- 2027-2032.

2.11. Determination of the prospective development indicators MU “City of Astrakhan” as the agglomeration development center.

2.12. Summary list of activities on implementation of the adopted development scenario of Astrakhan agglomeration with breakdown by stages and reference to the development indicators.

3. Land planning activities to implement the offered spatial development scenario of Astrakhan agglomeration for 2021–2032.

3.1. Land planning activities for the agglomeration as a whole and its particular municipal units, including the MU “City of Astrakhan”, with due regard to the chosen spatial development scenario, aimed at forming the living-, youth- and business attractive environment; creation of conditions for diversification of economy, formation of the innovative economy and international integration, by the following areas:

- development of transport, utility and other infrastructure of regional and interregional significance;

²⁰⁹ The spatial, institutional and other activities that should and can be implemented in the first years of the master plan implementation should be provided for in the competitive bid.



- development of transport and utility infrastructure, sociocultural and municipal-domestic service infrastructure of municipal and intermunicipal significance;
- optimization of the road traffic and transport service system, including modernization of the street and off-street passenger transport system;
- housing development;
- optimized use of the natural and recreational potential;
- preservation of the historical and cultural heritage;
- development of the system of public spaces;
- development of tourist infrastructure;
- environmental measures;
- other areas of the agglomeration development.

3.2. Assessment of the urban development potential of the territory of the agglomeration with the allocated prospective development sites and sites for the facilities of various functional purpose which implementation will provide for the planned areas of the spatial development and have maximum agglomeration effect.

3.3. Assessment of the urban development potential of the territory of the MU "City of Astrakhan" with the allocated prospective development sites and sites for the facilities of various functional purpose which implementation will provide for strengthening the agglomeration core and achieving the maximum agglomeration effect in future.

3.4. Proposals on location of the prospective development territories, including location of the innovative, industrial and logistics sites, tourist and recreational infrastructure facilities, street retail facilities and other significant commercial facilities and small business infrastructure.

3.5. Proposals on amendments to the land planning documents of Astrakhan region necessary to implement the activities provided by the master plan.

3.6. Proposals on amendments to functional zoning and boundary development parameters of the MU "City of Astrakhan" according to the effective General Layout of the MU "City of Astrakhan" for the purposes of further accounting in preparation of the new General Layout of the city.

4. Proposals on architectural and space-planning design of the key development territories and facilities of interregional and regional significance. Consistent approaches to organization of the environment of the settlements of the agglomeration (typical situations)

4.1. Justification of the selection of the key territories and facilities of interregional and regional significance for development of the architectural and space-planning and landscape architectural decisions setting out the directions for transformation of urban development environment within Astrakhan agglomeration.

4.2. Consistent approaches to architectural and space-planning and landscape architectural design of the key development territories and facilities of interregional and regional significance with visualization of the architectural and space-planning decisions of the development territories and location of the key facilities (locations of 3-5 facilities, at 2 of them are located in Astrakhan).



4.3. Detailed space-planning decisions by the territories of the prospective sites to be developed (2-3 decisions) with the representation of the functional space-planning decisions by the capital facilities and their location territories, conceptual decisions on creation of the architectural and urban development image, design solutions, etc.

4.4. Consistent decisions on development of the system of public spaces in the territory of the Municipal Unit "City of Astrakhan" (1-2 decisions with the representation of the key idea and the used landscape-architectural techniques).

4.5. Typology of settlements of the agglomeration. Consistent approaches to organization of the environment of the settlements of the agglomeration (at least 3 typical situations).

5. Financial and economic development model of the agglomeration ensuring sustainable development of the territory with the use of the efficient finance mechanisms promoting for future creation of the multiplier effect in different sectors of economy.

5.1. Organizational operational scheme of the agglomeration: legal status of the agglomeration, management body and legal form of organization, finance scheme of the management body of the agglomeration.

5.2. Feasibility study and assessment of investment attractiveness of the "breakthrough" growth points of economy of the territory, the most significant priority projects capable of attracting stable investment flow and improving the competitiveness of the territory in the conditions of diversification of economy.

5.3. Financial and economic development model of the territory of the agglomeration ensuring sustainable development of the territory with the use of the efficient co-finance mechanisms²¹⁰, promoting for future creation of the multiplier effect in different sectors of economy.

5.4. Priority industry and inter-industry projects aimed at master plan implementation, with the specified amount of investments, incomes and operating expenditures of the project, payback period and expected positive socioeconomic effects on the agglomeration.

5.5. Road map and network schedule of the stage-by-stage implementation of the master plan activities for 2021-2032 with the specification of the activities implemented during 2021-2024, 2025-2028, 2029-2032 and of the possible mechanisms of implementation and finance source (public programs, development institutions, national projects, federal and regional support activities, federal and regional development institutions, bank financing, PPP schemes).

5.6. Assessment of economic, social and budgetary effects from the project implementation (increase in the working-age population, decrease in migration outflow, GRP growth and change in the GRP structure, job

²¹⁰ It is recommended widely to use the most efficient and modern financial instruments and mechanisms to implement the bid solutions, namely, to use the mechanisms of private-public partnership, inclusion into additional public programs, national projects, federal and regional support activities, bank financing, use of financial mechanisms initiated by the Development Institutes (ДОМ.РФ "Infrastructure Bonds", ВЭБ.РФ - bond-secured loans, financing of high-technology industry projects, Russian Expert Center, MSP Corporation, WEB Infrastructure, National Center for PPP), and so on.



growth, small business development indicators in the framework of the agglomeration, gain in innovative production, tax revenues, etc.) and economic, social and budgetary efficiency of implementation of the offered developed scenarios for:

- 2021-2024;
- 2024-2027;
- 2027-2032.

5.7. Budget and finance sources, including calculation of the amount of investments to the master plan activities, including capital expenditures, management and operating costs, etc.

5.8. Broad estimates of the socioeconomic and budgetary efficiency of development of th first-step site.



Contents of the bid materials

Album, including explanatory note with visualization materials

Illustrative, table and other materials according to the contents of the Competitive Bid compiled by the master plan sections.

Explanatory note containing detailed description of the Competitive Bid according to the contents of the master plan sections.

Tablets

Tablets containing the information revealing the content of the Competitive Bid

Presentation

It contains a brief version of the materials of the Album: key schemes, illustrations, visualization, tables, infographic.

Video with 3D-modeling elements

(duration is from 2 to 5 minutes)



Content of the initial data

- Spatial Development Strategy of the Russian Federation 2025²¹¹.
- Tourism Development Strategy of the Russian Federation 2035²¹².
- Socioeconomic Development Strategy of the Southern Federal District 2020²¹³.
- Socioeconomic Development Strategy of Astrakhan region 2035²¹⁴.
- Development Strategy of the Municipal Unit “City of Astrakhan” 2021²¹⁵
- Draft Federal Law “On Urban Agglomerations”²¹⁶.
- Town-Planning Code of the Russian Federation No. 190-FZ dated 29/12/2004 (rev. on 30/12/2020) (amended on 10/01/2021).
- Law of Astrakhan region No. 67/2006-O3 dated October 04, 2006 “On administrative and territorial structure of Astrakhan region”.
- Resolution of the Government of Astrakhan region No. 184-P dated 01/06/2006 “On approval of the State Cadastre of Specially Protected Natural Areas of Astrakhan Region”.
- Law of Astrakhan region No. 67/2006-O3 dated October 04, 2006 “On administrative and territorial structure of Astrakhan region”.
- Territorial waste management scheme, including solid household waste in the territory of Astrakhan region²¹⁷.
- Law of Astrakhan region No. 11/2020-O3 dated February 10, 2020 “On agricultural development in the territory of Astrakhan region”.
- The Government of Astrakhan region, Ministry of Natural Resources and Ecology of the Russian Federation, Resolution No. 353-Пp/57-p dated October 14, 2009 “On delimitation and approval of Statement on the wetland “The Volga Delta, including the state biosphere reserve “Astrakhan” that is of international significance mainly as the swimming bird habitat area”.
- Resolution of the Government of Astrakhan region No. 138-П dated May 03, 2006 “On the concept of the industry-specific purpose-oriented program”.
- Municipal program of the MU “City of Astrakhan” No. 177 dated March 14, 2018 “Formation of the modern urban environment for 2018-2022” approved by the administration of the MU “City of Astrakhan”.
- Forest management regulations of the urban forests of Astrakhan²¹⁸.
- Municipal program of the municipal unit “City of Astrakhan” “Development of small and medium businesses and improvement of investment attractiveness of Astrakhan”²¹⁹.
- Geophysical basis of Astrakhan region, scale 1:100 000. (STP materials, *tab).
- Tablets with the displayed topographic base (archival topography) for the territory of the MU “City of Astrakhan”, jpg format
- Analytical Research of the Strategic Development Agency “CENTER” “Comprehensive Assessment of Potential Development of Astrakhan Agglomeration, Astrakhan Region”.

²¹¹ approved by Resolution of the Government of the Russian Federation No. 207-p dated February 13, 2019

²¹² approved by Resolution of the Government of the Russian Federation No. 2129-p dated Friday, September 20, 2019

²¹³ Approved by Resolution of the Government of the Russian Federation No. 1538-p dated September 05, 2011

²¹⁴ Approved by Duma of Astrakhan region on December 22, 2020

²¹⁵ Approved by Resolution of the Mayor of Astrakhan No. 12412-м dated December 29, 2011.

²¹⁶ <https://regulation.gov.ru/projects#departments=6&npa=107906>

²¹⁷ <https://minstroy.astrobl.ru/site-page/territorialnaya-shema-obrashcheniya-s-othodami-v-tom-chisle-tverdymi-kommunalnymi-othodami>

²¹⁸ <http://www.astrgorod.ru/podrazdeleniya/raznoe>

²¹⁹ Approved by Resolution of the administration of the municipal unit “City of Astrakhan” No. 88 dated April 13, 88



- Design documents, statistical, analytical and other data provided by the executive authorities of Astrakhan region, municipal unit “City of Astrakhan” and other municipal units of Astrakhan agglomeration





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