Concept and role of environmental expert review during the construction of real estate

E A Baskakova, T V Bliznukova, E M Giliazitdinova, N G Konokotin and O O Vedmanova
State University of Land Use Planning, 15, Kazakova Street, Moscow, 105064, Russia
E-mail: info@guz.ru

Abstract. In Russia an investment construction project is considered a time-limited investment enterprise, which is aimed at the creation of a new, unique real estate property. The availability and use of such a property is necessary to achieve investment objectives. However, it is necessary to take into account all the necessary research at the stage of business planning. It is necessary to carry out environmental research during the construction of real estate in order to maintain safety and improve the comfort of people’s lives, as well as to use rationally natural resources of our planet. At the business planning stage, such aspects as pollution of the air basin, soil and water bodies, reduction of biological diversity, use and disposal of hazardous and toxic waste, salinization and bogging of lands and the impact of noise exposure from the sources of the facility on the state of the air environment are considered.

1. Introduction
Nowadays the importance and significance of the procedure of environmental expert review during the construction of real estate is extremely significant. Thus, D.A. Masserov and E.I. Kruchinkina believes that “environmental assessment allows not only the determination and prediction of the environmental impact of planned projects and existing facilities, but also provision of scientifically proved recommendations for their subsequent refinement from environmental, social, technical and economic positions in specific environmental conditions” [1]. Z.F. Abrarova suggests that “preventing pollution of the environment is four-five times cheaper than eliminating the negative consequences of environmentally unjustified decisions” [2].

If we combine these two opinions, we can conclude that the environmental expert review during the construction of real estate takes into account not only the safety of life of the population and the rational use of the natural resources of our planet, but also allows preserving the material resources of real estate developers in the future.

2. Research statement
Nowadays the investment and construction process is a logical and sequential series of stages of the investment and construction project, consisting of an investment plan, financial planning, business planning, design, construction, operation, disposal or reconstruction of a property.
The concept of real estate is quite multifaceted. Thus, according to Article 132 of the Federal Law of November 30, 1994 No. 51-FL “Civil Code of the Russian Federation”, it is an enterprise, in general, recognized as a property complex used for entrepreneurial activity [3].

The main features of real estate are shown in Figure 1.

![Image of real estate features]

**Figure 1. Indicators of real estate**

Stationarity and immobility characterize the strong physical connection of the property with the surface and the impossibility of moving it in space without physical destruction and damage, as this makes it unacceptable for subsequent use.

Materiality is determined by the fact that a real estate always operates in natural-material and value forms. The physical parameters of a real estate include data on its size and shape, inconvenience and dangers, environment, access roads, utilities, surface and subsoil, land topography. The combination of
all these parameters dictates the usefulness of the physical object, which forms the basis of the value of a real estate. However, utility alone does not reveal value. Any physical object has a value, possessing in varying degrees such parameters as suitability and the limited nature of the proposal. Limited supply implies the increase in value. Social ideals and standards, economic activity, laws, government decisions and actions, natural forces has influence on people's behavior, thereby determining the change in the value of the property.

The longevity of real estate is considered to be higher than the longevity of all other goods. Thus, for example, according to the existing construction standards of Russia, residential tasks, depending on the material of their main structures are divided into 6 groups with normative time frames of action from 15 to 150 years. The duration of the earth’s circulation with its rational use is endless, and non-compliance with operating standards leads to irreparable losses.

In addition to the main generic characteristics of real estate, private indicators are also distinguished. They are determined by indicators depending on the type of objects.

According to V.A. Sekisov, real estate can be classified into large groups according to the following set of indicators:

- by type of entity;
- for functional purpose;
- by specialization;
- by profitability [4].

The increased economic value of real estate is determined by the fact that it is intended for long-term use, which means that its construction and further operation must ensure a favorable microclimate of the territory and increase comfort for population.

In scientific research N.S. Solovieva and Yu.V. Khalturin the idea that “the systematization of measures necessary to ensure the normal functioning of the property will reduce operating costs and extend its life cycle” is given [5].

### 3. Results

Recently, the issues of the effectiveness of environmental control and management occupy one of the fundamental positions in society. The main role here is played not only by the implementation of the prescribed norms and principles for environmental protection at each stage of the implementation of the facility, but also by the detection of possible negative effects on humanity. Undoubtedly, it is necessary to determine the main methods of activity, as well as adopt technological and technical conclusions, before putting the object into operation during the development of documentation. At this stage it is necessary to evaluate the future impact of the planned activity on the objects of nature and man, and also find ways that will make it possible to minimize the negative sides of the impact. For this purpose, an environmental assessment of real estate is carried out in order to prevent possible adverse effects on the surrounding natural space and the various related consequences.

In scientific work of V.V. Erofeeva it is noted that environmental expert review is an “autonomous type of environmental control and monitoring,” and its purpose is “to identify and prevent potential environmental hazards” [6].

The main principles of environmental expert review in construction are as follows:

- the presumption of the potential environmental hazard of the studied object;
- the mandatory examination prior to the construction process;
- a set of environmental expert review of a construction object;
- indispensable consideration of environmental safety requirements during environmental research;
- the authenticity and content of the detailed data on the object of study;
- the autonomy of experts in their activities;
- the evidence of the results of examination [7].
According to the Federal Law “On Environmental Expertise” this study is carried out in a rigorous manner for all construction projects. The Russian legislation provides the execution of environmental assessments of two types: state and public.

The procedure of State Environmental Expertise is presented below:
1. The transfer of materials to the Ministry of Natural Resources or its territorial bodies;
2. The registration, verification of the authenticity of the submitted materials;
3. The creation of a commission of state environmental expertise;
4. The formation of individual, group conclusions and the summary conclusion of the state environmental review;
5. The approval of the conclusion of the state environmental review.

The subjects of the state environmental review are three persons: a customer, a contractor and a consumer.

The objects of environmental expert review are documents that precede economic activities that adversely affect nature, as well as the above mentioned activities and its products (Figure 2).

**Figure 2.** The structure of subjects and objects of state environmental expert review

Public environmental expert review is not generally regulated and is entirely dependent on the decision conducting the state review of the body giving legal effect to the conclusion of public environmental review. It is carried out at the request of citizens, public organizations and local authorities. The expert review is carried out in relation to objects of state environmental expert review.
The exception is those objects the data of which represent state, commercial and other secret protected by law.

In Russia, there are departmental, scientific, and commercial environmental expert reviews, which are not regulated by law.

In departmental environmental expert review, the technological direction often prevails. It substantiates the environmental safety of the project involved by any agency. Together with other materials, the conclusion of the departmental expert review is sent to the state environmental expert review. Scientific environmental review is also carried out in order to verify any scientific facts. Commercial environmental assessment is carried out optionally, in order to identify how safe this or that object is for the population and the environment. Commercial environmental assessment is rather demanded service provided by specialized organizations.

In general, all the studied data can be divided into three main groups: physical, chemical, microbiological.

3.1 Physical
During the course of such a study, the radiation level, noise level and various vibrations are determined, electromagnetic radiation is studied, as well as the degree of illumination and the nuances of the microclimate.

For example, sanitary regulation is carried out in accordance with SN 2.2.4 / 2.18.562-96 “Noise at workplaces, public and residential buildings”, Moscow, 1997, taking into account the operating mode and exposure to noise sources.

For public buildings, the maximum permissible sound levels are regulated by GOST 12.1.036-81 “Occupational safety standards system. Noise. Permissible levels in residential and public buildings.” Noise is considered permissible if the measured or calculated noise levels are below the maximum permissible values specified in the regulatory documents. To assess the possible adverse effect of noise of different levels and durations, the equivalent noise level is used. This is the calculated noise level, which over the course of 8 hours would cause the same harmful effect as noises of various levels and durations acting on a person for 8 hours.

In accordance with the recommendations, the equivalent noise level is determined by the formula 1:

$$Leq = 10 \times \lg N + 13,3 \times \lg V + 8,4 \times \lg P + 9,5$$

(1)

where: $Leq$ - equivalent noise level of transport, dBA; $N$ - traffic intensity, auto / h; $P$ - the share of freight traffic, %; $V$ - average speed, km / h.

3.2 Chemical
In this study, the specialists identify the amount of chemical contamination using laboratory devices. Water is also being studied, which may be contaminated with oil products, have exceeded levels of salts, iron, chlorine and manganese, etc.

According to the methodology of Order No. 273 of June 6, 2017 “On the Approval of Calculation Methods for the Dissipation of Emissions of Harmful (Polluting) Substances in the Atmospheric Air”, significant influence on atmospheric pollution, which requires the calculation of surface concentrations, is provided by those substances for which the following inequality:

$$M / MAC < \Phi,$$

where: $\Phi = 0,01H$ at $H > 10$ m;

$\Phi = 0,1H$ at $H \leq 10$ m.

During the calculation of atmospheric pollution at a surface concentration of a harmful substance, we consider the amount of pollutant in 1 m$^3$ of air in the surface layer of the atmosphere. The surface layer of the atmosphere is at altitude of 2 m from the surface of the earth.
H (m) — average altitude of emission sources is determined by the formulas 2 and 3:

\[
H_j = \frac{5M_{(0-10)}j + 15M_{(11-20)}j + 25M_{(21-30)}j + \cdots}{M_j}
\]

\[
M_j = M_{(0-10)}j + M_{(11-20)}j + M_{(21-30)}j + \cdots
\]

where: \(M_{(0-10)}j\), \(M_{(21-30)}j\) total emissions of the \(j^{th}\) substance in the range of source altitude up to 10 m inclusive, 11-20 m, 21-30 m etc.

3.3 Microbiological

Microbiological research studies the presence of bacteria in the air and water that carry diseases, mold spores and various other biological contaminants.

The authors T.I. Karavaeva and V.P. Tikhonov write that “methodological approaches to the research of the ecological function of soils include a set of theoretical foundations of the functioning of microbial communities and organizational and methodological methods for the assessment of their living conditions according to the quality of microbiological respiration”, and “the development of effective express-diagnostic systems of soil is a fundamental task that allows monitoring research and engineering surveys at a modern level” [8].

The time frame for the environmental expert review during construction is determined by the characteristics of the research object. Thus, for simple objects, they are up to 30 days; for objects of medium complexity - up to 60 days and for complex objects they can reach 120 days.

4. Conclusion

Ecological expert review is a multifaceted set of activities. It includes both laboratory research and measurements using special instruments. The specialists of various fields participate in it - biologists and chemists, physicists and ecologists. Both managed and unmanaged indicators are subject to verification.

A building licensing is issued only when the expert commission gives a positive conclusion that all environmental safety standards will be taken into account, nature will be protected from negative impact and all measures for environmental safety will be observed in relation to population. The builders are required to comply with the requirements established in the Federal Law of January 10, 2002 N 7-FL “On Environmental Protection” and the Federal Law of March 30, 1999 N 52-FL “On the Sanitary and Epidemiological Well-Being of Population”.

Negative expert opinion implies the refusal of state or municipal authorities to issue licenses for the construction of a facility.

The main reasons of refusal may include:
• the contradiction of the technical documentation with the requirements of the legislation in the field of environmental protection and safety;
• the insufficient study and characterization of the state of nature in the area of the planned construction;
• the failure to provide data on possible adverse effects on the environment and the population as a result of the construction and operation of the property;
• the lack of a program on problem solution that may arise in the field of environmental safety.

Moreover, if serious violations are identified in the documentation of the construction project, with deliberate falsification of documents and non-compliance with the requirements of Russian legislation in the field of environmental safety, responsibility for such documentation is laid on the customers. It can be administrative, material, civil or even criminal responsibility.

Thus, during the environmental study, an expert finds out whether the construction and operation of this property is possible, and whether this activity will harm the surrounding space and public health.
In the era of not just scientific and technological progress, but in the postindustrial era, environmental protection is of particular importance, since during development people actively influence nature. This leads to overuse of natural resources, pollution of the biosphere and climate change.

There are many environmental impact methods and experts select an appropriate research methodology for each specific case individually, taking into account the features and complexity of the research objects. All of them have a clear structure, consistency and are approved at the legislative level.

As the number of construction companies is growing, environmental assessment is becoming an increasingly popular service over time. Thus, during the construction of real estate, it is necessary to comply with all the norms and standards established by law in particular of an environmental nature.

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