

Preliminary investigation and analysis of soil pollution in a certain urban village reconstruction project

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Abstract

According to the "Technical Guidelines for the Investigation of Soil Pollution Status of Construction Land" (HJ25.1-2019), this survey is a preliminary survey. The surveyed land is a village-in-city reconstruction project with a total land area of 8,618m². The current land use status of the project plot includes cultivated land, forest land, transportation land, water area and water conservancy facilities land, towns and villages, industrial and mining land, and other land. The site has been demolished and the land leveled during the survey of the project plot. The future planning nature of the project plot is residential land, urban road land and green space. The results of pollution identification, site survey, and personnel interviews are: the surrounding area is mainly residential land and schools, there is no industrial pollution activity, and there is basically no impact on the soil environment of the local land. . Since the plot is changed to a temporary parking lot, there will be potential pollution such as car oil leakage. The nature of land use has changed from the original urban, village and industrial and mining land to residential land, urban road land and green land. The second phase of the investigation is needed. Through sampling and laboratory testing and analysis of the plot, a clear conclusion is made whether the plot is contaminated. The test results of soil samples showed that there were 7 items of five heavy metals (cadmium, lead, copper, nickel, arsenic, mercury, and hexavalent chromium), 27 items of volatile organic compounds (VOC), 11 items of semi-volatile organic compounds (SVOC), petroleum A total of 46 items of hydrocarbons (C10-C40) have no soil environmental pollution exceeding the standard, and meet the requirements of the first type of land use screening value in the "Soil Environmental Quality Construction Land Soil Pollution Risk Control Standard (Trial)" (GB36600-2018). There are no possible pollution sources in the area around Block 5 at present and in history, and after uncertainty analysis, no further investigation is required. It is believed that the second phase of soil pollution investigation work can be completed, and no further detailed investigation and risk assessment work is required.

Keywords

Reconstruction of villages in cities; investigation of soil pollution status; sampling; soil; groundwater.

1. Project background and source of tasks

A In order to strengthen soil pollution prevention and control and gradually improve soil environmental quality, the State Council, Shaanxi Province, and Xi'an City respectively issued the

"Soil Pollution Prevention and Control Action Plan" and a series of proposals to improve soil environmental quality as the core, and to use soil safety and soil risk control as the main line, Taking the protection of agricultural products and human settlements as the starting point, carry out soil environmental pollution prevention and control work.

According to the "Soil Pollution Prevention and Control Law" and the "Notice on Comprehensively Strengthening the Investigation of the Soil Pollution Status of Construction Land and the Management of Soil Environmental Access" of the Shaanxi Provincial Department of Ecology and Environment, the use of land is changed to residential, public management and public service land. Provides for the investigation of soil pollution status.

Due to the village reconstruction project, the land is planned to be changed to public management and public service land. In order to reduce the environmental problems that may be caused during the subsequent development and utilization of the surveyed plots of this project, and to ensure the safety of people in contact with the subsequent land, the development company commissioned the preliminary investigation of the soil pollution status of the site.

2. Investigation purpose and principles of investigation

2.1 Purpose of the investigation

In accordance with the requirements of the Soil Pollution Prevention and Control Law, the current nature of plot 1, plot 2, plot 3, plot 4, and plot 5 of Zaoyuan Village, Weiyangong Street, Weiyang District, Xi'an City is cultivated land, forest land, transportation land, Land for waters and water conservancy facilities, land for towns and villages, industrial and mining land, and other land. The nature of the future planning is residential land, urban road land and green land. In accordance with the requirements of the Soil Pollution Prevention and Control Law, it is necessary to carry out soil pollution investigations.

Through data collection and analysis, on-site surveys, personnel interviews, etc., preliminary identification of possible pollution sources, possible types of pollutants, potential polluted areas and potential pollutant diffusion pathways of the plot, conduct on-site investigations, soil and groundwater based on the results of pollution identification Sampling and analysis, based on the sample monitoring data, evaluate whether the site is polluted, and provide a basis for the next development and utilization of the plot.

The main tasks include the following two points:(1) The first stage of site pollution identification: through data collection and analysis, site surveys, personnel interviews, etc., to understand the past and current use of the site, collect relevant information that may cause soil and groundwater pollution, and determine the soil pollution of the plot Possibility, and identify potential contaminated areas, types of pollutants and pollution diffusion pathways.(2) Verification of site pollution in the second stage: master and describe in detail the geological and hydrogeological conditions of the site through on-site investigation and survey; take soil samples, analyze and test the content of relevant soil monitoring factors, and compare and evaluate the results of analysis and testing with corresponding soil quality standards Soil environmental quality, based on the original enterprise's production process, products, and test results, determine the degree of soil pollution and the potential environmental risks of the soil environment in the survey plot, and determine whether the plot requires detailed investigation and risk assessment.

2.2 Investigation principles

The investigation process must be carried out in accordance with certain principles to ensure the accuracy and reliability of the investigation results. The investigation process is carried out in strict accordance with national standards, and the investigation work is carried out in accordance with the principles of pertinence, standardization and operability. The specific content of the investigation principles as follows: (1) Pertinence principle: According to the characteristics of the plot and the characteristics of potential pollutants, conduct pollutant concentration and spatial distribution surveys to provide a basis for the environmental management of the plot. (2) Normative principles: use

procedural and systematic methods to standardize the investigation process of soil pollution status to ensure the scientificity and objectivity of the investigation process. (3) The principle of operability: Comprehensive consideration of factors such as investigation methods, time, and funding, combined with current scientific and technological development and professional skills, make the investigation process practical and feasible. (4) The principle of synergy: timely coordinate the work of survey participants and consult relevant departments to ensure the efficiency of the survey work.

3. Plot Overview

3.1 Basic situation of the plot

The project plot is located in the Guanzhong Plain area with a gentle terrain. From top to bottom, the geological structure is composed of fill, loess, ancient soil, silty clay, silt, medium-fine sand, medium-coarse sand, etc. The terrain of the proposed site is flat, and artificial soil mounds can be partially seen during the survey. The elevation of the orifice of the exploration point is between 393.12~399.37m. The landform unit of the proposed site is at the junction of the second-level terrace and the first-level terrace on the right bank of the Weihe River. The groundwater of the site is mainly pore diving. The survey period is a period of low water level, with a stable water level depth of 15.50~19.90m and a corresponding elevation of 376.79~381.02m. Groundwater on the site is mainly recharged by atmospheric precipitation, surface water infiltration, and lateral rivers. The excretion method of diving is mainly artificial mining or lateral runoff, supplemented by evaporative excretion. The dominant wind direction in the project area is northeast wind.

3.2 Sensitive targets

According to this survey of surrounding sensitive targets, it is counted that there are 19 sensitive targets surrounding the surveyed plots, of which 16 are residential quarters, 1 middle school, 1 comprehensive building, and 1 automobile trading company (Figure 3-6, table) 3-2). Because the survey plots and surrounding plots used to be agricultural and forestry land and were not used as land for industrial and mining enterprises, the plot itself has limited environmental impact on surrounding human settlements. Considering that there are a large number of relatively mature commercial, residential and educational supporting facilities in the surrounding area, combined with site survey and data integration analysis, it is determined that the sensitive targets of the site are mainly the surrounding commercial and residential buildings, schools and related people.

3.3 Current status of the site

Plot 5 belongs to the fifth group of Zaoyuan Village. The east side is Gongyuan Mei'an residential area, the south side is Hongshimingyuan residential area, the west side is Honglin Mingyuan residential area, and the north side is Fangxin South Road. It will be used as a rural homestead before July 2020, and the ground will be residential houses of Zaoyuan villagers. The ground building was demolished in July 2020, and construction waste was piled inside the plot. The north side of the plot is occupied by Fangxin South Road, with an area of about 2,000 square meters, and the south side is the Zaoyuan Village Public Cemetery, with an area of about 1,200 square meters. The remaining part was changed from the fifth group of Zaoyuan villagers to a temporary parking lot in April 2021, with brick walls on the east, west, south, and north sides. There is a mobile board house at the entrance of the temporary parking lot with an area of about 6 square meters, mainly for the temporary residence of the parking lot care staff. The ground on the south side of the temporary parking lot is paved with construction waste and gravel. The area is about 3,500 square meters, the thickness is about 20cm, and the particle size is 2-8cm. Weed cover. The temporary parking lot stores about 50 vehicles. It has been open for about 2 months. Most of them are private cars. The risk of oil pollution is low. The project plot does not involve industrial production. There has been no change in the plots since the commission was accepted and the report was issued (Figure 3-7e).

3.4 History of the site

Plot 5 will be used as urban residential land and other land before 2020. No structures will be demolished after 2020, and there will be small temporary parking lots.

4. Data analysis, site survey and personnel interviews

According to on-site surveys and personnel interviews, investigations and analysis, there is no record of environmental pollution accidents and complaints in the historical use stage, and no soil or groundwater environmental investigation and monitoring work has been carried out. The specific investigation conclusions are as follows: ①The plot has not been involved in industrial and mining production, large-scale aquaculture and other purposes that may pollute the soil in history. ②The history of the plot did not involve the storage and transportation of toxic and hazardous substances, the stacking or landfilling of hazardous wastes, the stacking of solid wastes or landfilling environmental pollution accidents. ③There is no soil pollution risk from surrounding pollution sources and external pollution (except pesticides and fertilizers) and other situations that may cause soil pollution in the history of the plot. ④In the history of the plot, there was no application of toxic and harmful conditioners and other chemical substances. ⑤ There is no sign of contamination in the current situation of the plot.

There are currently and historically no possible sources of pollution in and around the plot. Because it has been changed to a temporary parking lot, there will be potential pollution such as car oil leakage and car exhaust. The investigation work requires the second stage of the investigation of the site, and the conclusion of the pollution identification stage shall be verified through the analysis of the test results.

5. Sampling distribution situation

5.1 Layout of soil sampling points

The five plots of this survey have an area of 8618.18 m², of which urban roads are 2833.35 m² without sampling analysis. According to the site survey, bricks and tiles and other construction waste were buried in the northern area of the plot, and no ground cracks and obvious contaminated areas were found on the site. The plot is currently in operation as a temporary parking lot, all of which are small private cars. According to the professional judgment method, 1 point is arranged at the entrance and exit of the parking lot of the plot, 3 points are arranged at the centralized parking area, and 1 point is arranged at the parking aisle. Since petroleum hydrocarbons are easily migrated pollutants, they are located in the underground water flowing direction of the plot. Set up 1 point (that is, the north side of the plot except the roads in the town of Daizheng), and set up 6 sampling points. In the upwind direction of the project area, a control point is set up, and a total of 7 soil columnar sampling points are set up.

5.2 Distribution of groundwater sampling points

The geotechnical survey data of the plots within the 100-200m range of the survey plots show that there is no shallow groundwater above the paleosol layer, and the groundwater below the paleosol layer is mainly pore water. The engineering geological profile of the surrounding plots (Figure 5-2), it can be seen that the depth of the upper surface layer of the ancient soil is about 9.8~10.4m underground.

But to prevent the influence of other factors, our company conducted drilling verification on the groundwater condition of the site. The actual drill holes of this survey showed that there was no shallow water above the paleosol layer, and the depth of the upper surface layer of the paleosol was 9.5m, which was consistent with the geotechnical survey data. The palaeosol layer has a strong function of blocking pollutants, which can limit the migration of pollutants to the aquifer. When the palaeosol layer is encountered, groundwater drilling is stopped, and groundwater wells are no longer continued. In summary, it is judged not to carry out groundwater monitoring.

6. Results analysis and evaluation

According to the detection results of different points in the soil, the plot includes 7 items of five heavy metals (cadmium, lead, copper, nickel, arsenic, mercury, and hexavalent chromium), 27 items of

volatile organic compounds (VOC) and semi-volatile organic compounds (SVOC) 11 items, 46 items of petroleum hydrocarbons (C10-C40), all of which meet the requirements of the first-class land use screening value in the "Soil Environmental Quality Construction Land Soil Pollution Risk Control Standards (Trial)" (GB36600-2018).

7. Conclusion

According to the "Technical Guidelines for the Survey of Soil Pollution Status of Construction Land" (HJ25.1-2019), this survey is a preliminary survey. The surveyed land is a village-in-city reconstruction project with a total land area of 8,618m². The current land use status of the project plot includes cultivated land, forest land, transportation land, water area and water conservancy facilities land, towns and villages, industrial and mining land, and other land. The site has been demolished and the land leveled during the survey of the project plot. The future planning nature of the project plot is residential land, urban road land and green space. The results of pollution identification, site survey, and personnel interviews are: the surrounding area is mainly residential land and schools, there is no industrial pollution activity, and there is basically no impact on the soil environment of the local land. . Since the plot is changed to a temporary parking lot, there will be potential pollution such as car oil leakage. The nature of land use has changed from the original urban, village and industrial and mining land to residential land, urban road land and green land. The second phase of the investigation is needed. Through sampling and laboratory testing and analysis of the plot, a clear conclusion is made whether the plot is contaminated. The test results of soil samples showed that there were 7 items of five heavy metals (cadmium, lead, copper, nickel, arsenic, mercury, and hexavalent chromium), 27 items of volatile organic compounds (VOC), 11 items of semi-volatile organic compounds (SVOC), petroleum A total of 46 items of hydrocarbons (C10-C40) have no soil environmental pollution exceeding the standard, and meet the requirements of the first type of land use screening value in the "Soil Environmental Quality Construction Land Soil Pollution Risk Control Standard (Trial)" (GB36600-2018). There are no possible pollution sources in the area around Block 5 at present and in history, and after uncertainty analysis, no further investigation is required. It is believed that the second phase of soil pollution investigation work can be completed, and no further detailed investigation and risk assessment work is required.

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