

Environmental Assessment Items for Environment-friendly Residential Land Development Projects

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Abstract: Land development project is planned to provide spaces for constructing residential, industrial, and educational facilities, etc. Environmental-friendly development plan should be implemented by considering various factors on environment from the planning stage to the maintenance stage. Some residential land development projects in Korea have an adverse influence on environment for not having been satisfied various environmental requisites.

We breaks land development project life cycle down into four stages in this paper, that is, district designation stage, planning and design stage, construction stage, and maintenance stage. Environmental review items were derived from investigating environmental policies and regulations of Korea, and some EIA(Environmental Impact Assessment) reports which were conducted by Korea Environment Institute. Environmental review items were categorized 5 living environment sections such as air quality, water quality, soil, noise/vibration, waste.

The environmental review items suggested in this paper are expected to support decision maker of every stage for implementing residential land development project with environmental-friendly and sustainable way.

Keywords: Environment-friendly, Residential Land Development Project, Environmental Review

1. INTRODUCTION

Increasingly stringent environmental management and assessment standards, both in Korea and abroad, call for an increase in the environment-friendly nature of residential land development works. In Korea, preliminary environmental assessment and environmental impact assessment systems already in place are designed to examine in advance the environmental impact of various development projects. Gil-Sang Lee (2006), Dae-Hong Goh (2004), and Sang-Do Lee (2003) stressed the need for minimizing or reducing environmental impact and pollution in the planning and construction stage as a means of assessing and managing the environmental impact of residential land development projects.

This study was conducted based on the following methods and procedures:

The promotion procedure of residential land development projects was examined along with the preliminary environmental assessment and environmental impact assessment systems.

The project promotion stage was assigned based on the timing of environmental assessment. The direction for environmental assessment at each stage of a project was also determined based on a literature review and the outcomes from expert interviews.

Environmental assessment factors selected based on the assessment direction for each of the residential land development project stages were analyzed and summarized in order to determine the environmental assessment items for each project stage under the 5 environment categories.

Environmental assessment items were determined based on environment-related regulations and laws covering air quality, water quality, soil quality, noise/vibration, and waste as well as the 8 preliminary environmental assessment reports and 8 environmental impact assessment reports prepared by the Korea Environment Institute (KEI).

2. STAGES OF THE RESIDENTIAL LAND DEVELOPMENT PROJECT AND DIRECTION OF ENVIRONMENTAL ASSESSMENT

2.1. Direction of Environmental Assessment for Each Project Stage

In the zone designation stage, site characteristics were studied through the field survey. Likewise, location suitability, land use plan, activity restrictions, soil environmental assessment, and possibility of compliance with the discharge regulation and standards for facilities construction and operation were considered in order to decide whether or not a given project is appropriate.

In the basic and detailed design stage, activity restrictions and pollution and discharge volume restrictions reviewed at the zone designation stage were re-reviewed.

The required environment-related authorization details for the construction work were examined, and the means for compliance with the pollutant discharge restrictions and related regulations, environment-friendly waste processing measures, and pollution reduction and prevention plans, were implemented in preparation against civic complaints.

In the operation and maintenance stage, compliance was confirmed with pollutant discharge restrictions and related regulations in facilities operation. Measures were implemented for the environment-friendly facilities operation, waste minimization and recycling, and suitable waste processing as well as for environmental impact minimization during facilities demolition.

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3. ENVIRONMENTAL ASSESSMENT FACTORS

3.1. Analysis of Environment-related Laws

This study reviewed and analyzed Korean environmental law including the Basic Environmental Policy Act related to air quality, water quality, soil quality, noise/vibration, and waste, in order to determine the appropriate factors in the environmental assessment of a residential land development project.

3.2. Case Study

Table 1 categorizes and summarizes the outcome of preliminary environmental assessment and environmental impact assessment reports by KEI analysis according to 5 areas: air quality, water quality, soil quality, noise/ vibration, and waste.

4. ENVIRONMENTAL ASSESSMENT ITEMS

Table 1. Analysis of Environmental Assessment Works in Residential Land Development Projects

		4.1. Air Quality															
Category	Environmental Assessment Item	Preliminary Environmental Assessment Subject								Environmental Impact Assessment Subject							
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Air quality	Current air quality and impact prediction based on characteristics specific to the site and project	•	•	•	•	•	•	•								•	
	Construction impact prediction and fugitive dust reduction plan		•									•				•	
	Air quality impact prediction and pollution reduction plan for facilities operation			•						•						•	
	Odor source survey and reduction plan	•	•	•	•	•	•						•				
Water Quality	Sewage processing plan	•		•	•		•	•	•						•	•	
	Review of sewage processing facilities capacity	•					•	•	•	•					•	•	
	Contamination prevention measure for underground water				•		•					•		•	•	•	
Soil quality	Soil outflow prevention during the land preparation stage											•		•			
	Soil pollution-causing facilities survey			•	•				•		•			•			
	Soil pollution survey and purification plan	•		•	•				•		•			•			
Noise/ Vibration	Noise prediction and reduction plan for automobiles, trains, and airplanes		•	•				•			•						
	Status review for facilities requiring sound-proofing						•										
	Noise/Vibration reduction plan during the construction period				•	•	•				•		•	•		•	
	Impact prediction and pollution reduction plan for blasting works						•						•				
	Impact prediction and pollution reduction plan for facilities operation		•			•	•	•		•	•	•	•	•			
Waste	Construction waste processing plan											•	•		•	•	
	Commissioned processing plan for construction waste		•	•									•		•		
	Residential waste processing plan														•	•	

Table 2 categorizes and summaries the environmental assessment items related to air quality. To prepare for any negative impact that was expected in the process of construction and/or operation, pollution reduction facilities were installed and operated. If there were odor-causing facilities within the project site, odor intensity was measured and a reduction plan was established.

Table 2. Environmental Assessment Items Related to Air Quality

Project Stage	Assessment Category	Assessment Item
Zone designation	Site characteristics review	Referring to regulations on air quality control and special management zones Verification of compliance with the regulated air pollution capacity in the subject site (air quality status and impact prediction) Confirmation of odor management zone designation of the subject site Confirmation of the presence of the designated odor-causing materials and emission facilities at the subject site
Basic and detailed design	Fuel choice review	Low-sulfur fuel choice Non-low-sulfur fuel choice Clean fuel choice
	Air pollution reduction design	Air pollution reduction plan for the use of different fuels (heating, cooking, vehicle) in operation
	Fugitive dust prevention design	Fugitive dust prevention facilities plan and damage prevention plan
Construction	Authorization and registration	Authorization and registration of fugitive dust-causing construction projects
	Air pollution prevention plan	Installation of fugitive dust prevention facilities and damage prevention plan
Operation and maintenance	Emission and prevention facilities management	Suitable operation of emission and prevention facilities (compliance with guidelines and regulations related to calibration device attachment and operation) Authorization and registration of fugitive dust-causing construction projects Fugitive dust prevention facilities and damage prevention plan for dismantling and demolition

4.2. Water Quality

Table 3 categorizes and summaries the environmental assessment items related to water quality. If the waste-

water and sewage generated from the project were to be sent to the existing sewage processing and treatment facilities, the discharge volume was predicted and confirmed based on the processing capacity of the facilities.

Table 3. Environmental Assessment Items Related to Water Quality

Project Stage	Assessment Category	Assessment Item
Zone designation	Site characteristics review	Referring to restrictions regarding water source protection, special management, and waterfront zones
Basic and detailed design	Project characteristics review	Decision on the processing method for discharge materials Decision on discharge and prevention facilities installation
	Discharge facilities and prevention facilities study	Referring to regulations for each type and size of discharge facilities Water pollutant reduction plan for construction and usage
	Authorization and registration	Verification of registration and authorization for discharge and prevention facilities Verification of registration and authorization for underground water development
Construction	Pollutant processing	Soil outflow prevention Appropriate processing plan for sewage and wastewater
	Underwater-related details	Confirmation of excavation work that can affect the quality of underground water Reporting of underground water development and usage Restoration of the underground water system following the facilities installation
	Traffic control for the preservation of water source	Traffic control in water source protection, special management, and waterfront zones
Operation and maintenance	Environment-friendly facilities operation and management	Confirmation of standards and regulations compliance Referring to key details for the operation of the facilities Appointment of environmental managers
	Closing of discharge facilities	Details to be considered for the dismantling and demolition of discharge/ prevention facilities

4.3. Soil Quality

Table 4 categorizes and summarizes the environmental

assessment items related to soil quality. The presence of facilities that would cause pollution to the soil was confirmed, and the level of soil contamination in the project site and its vicinities was studied.

Table 4. Environmental Assessment Items Related to Soil Quality

Project Stage	Assessment Category	Assessment Item
Zone designation	Site characteristics review	Soil environment survey at and near the subject site
		Confirmation of soil preservation zones within the project site
Basic and detailed design	Soil pollution prediction and prevention plan	Impact prediction and reduction plan for the soil pollution source and related facilities
		Soil pollution prediction and reduction plan for the construction process
Construction	Soil contamination survey	Soil pollution survey and purification
	Soil pollution prevention for the construction process	Soil pollution prevention for the construction process Referring to activity restrictions in soil preservation zones
	Prevention facilities installation for pollution-causing facilities	Installation of soil pollution prevention facilities
Operation and maintenance	Referring to activity restrictions at the subject site	Soil pollution prevention for facilities operation
	Management of specific soil pollution-causing facilities	Management of soil pollution prevention facilities Soil pollution survey, leakage study, and purification
	Facilities closing registration and soil pollution assessment and purification	Reporting, pollution survey, and purification
	Soil pollution prevention at the time of dismantling and demolition	Pollutant discharge prevention

4.4. Noise/Vibration

Table 5 categorizes and summarizes the environmental assessment items related to noise/vibration. A study was carried out of the status of facilities that require sound-proofing from street, railroad, and airplane noises. The level of noise and vibration generated in the construction stage was predicted, and a related reduction plan was es-

tablished.

Table 5. Environmental Assessment Items Related to Noise/Vibration

Project Study	Assessment Category	Assessment Item
Zone designation	Survey of subject site and vicinity condition	Referring to facilities installation restrictions
		Confirmation of status of facilities requiring sound-proofing
Basic and detailed design	Noise/Vibration reduction plan for facilities operation	Installation of individual and communal prevention facilities Installation of noise and vibration prevention facilities
	Noise/Vibration reduction plan for construction	Confirmation of the possibility of compliance with regulations Environmental impact prediction and minimization plan Engineering technique and machinery selection Execution process and schedule decision Suitable arrangement of noise/vibration-causing equipment Transport route selection Means for blasting work preparation Installation of noise/vibration prevention facilities
Construction	Registration and authorization	Pre-registration for specific construction works Authorization for the use of explosives
	Site management	Site organization and transport route maintenance Equipment checkup and maintenance Confirmation of compliance with regulation standards
Operation and maintenance	Satisfying the regulation standards	Compliance with residential noise/vibration regulation/standards Compliance with traffic noise/vibration regulation/standards

4.5. Waste

Table 6 categorizes and summarizes the environmental assessment items related to waste. The assessment of waste focused on the management and processing of construction wastes that are generated during the construction stage.

Table 6. Environmental Assessment Items Related to Waste

Project Stage	Assessment Category	Assessment Item
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Zone designation	Project characteristics review	Prediction of waste discharge volume Residential waste processing plan
Basic and detailed design	Discharge and processing	Review of the local government office's processing plan Processing and recycling plan for each waste category Construction waste processing plan Incineration facilities installation plan
Construction	Construction waste	Processing/Management of construction waste Construction waste reduction plan
Operation and maintenance	Discharge and processing	Collection/Transport/Storage of waste materials Referring to the processing standards Residential waste processing methods
		Waste processing work Commissioning of waste processing work
	Waste processing company	Training of employees in charge Record keeping of waste processing details

5. CONCLUSIONS

In this study, the direction of environmental assessment in each stage of a residential land development project was determined based on a literature review, a study of environment-related laws, and interviews with experts. Environmental assessment factors were extracted from environment-related laws and regulations as well as the 16 preliminary environmental assessment and environmental impact assessment reports on past residential land development projects of Korea.

The lifecycle of a residential land development project is divided into 4 stages: zone designation, basic and detailed design, construction, and operation and maintenance. Environmental assessment categories and items

were presented for each of the 5 areas related to life environment: air quality, water quality, soil quality, noise/vibration, and waste.

In this study, 9 experts provided their input in determining the direction of the environmental assessment and verified the suitability of the environmental assessment categories and items. It should be noted, however, that the objectivity of the outcomes could not be clearly verified. Therefore, there was a need in this study for the actual application of the environmental assessment categories and items presented and for a continuous effort to refine them.

This study ultimately sought to present to the public environmental assessment items in order to facilitate environment-friendly residential land developments. Those would be achieved by ensuring compliance with environment-related regulations and by reviewing the impact of some different projects on the environment prior to project execution.

ACKNOWLEDGMENT

The work presented in this paper was supported by the Korea Science and Engineering Foundation, Grant No R01-2006-000-10748-0.

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