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2012 Modularization of Korea's Development Experience:

Environmental Impact Assessment

2013

MINISTRY OF ENVIRONMENT

Korea Environment Institute

2012 Modularization of Korea's Development Experience:

Environmental Impact Assessment

2012 Modularization of Korea's Development Experience

Environmental Impact Assessment

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Prepared by	Korea Environment Institute (KEI)
Author	Kongjang Cho, Korea Environment Institute (KEI), Senior Research Fellow Junkyu Choi, Korea Environment Institute (KEI), Chief Research Fellow Kyunghee Shin, Korea Environment Institute (KEI), Senior Research Fellow Iljoo Yang, Korea Environment Institute (KEI), Research Specialist
Advisory	Moon Hyung Lee, Korean Society of Environmental Impact Assessment, President Hyungna Oh, Korea Development Institute (KDI), Fellow
Research Management	KDI School of Public Policy and Management
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Preface

The study of Korea's economic and social transformation offers a unique opportunity to better understand the factors that drive development. Within one generation, Korea has transformed itself from a poor agrarian society to a modern industrial nation, a feat never seen before. What makes Korea's experience so unique is that its rapid economic development was relatively broad-based, meaning that the fruits of Korea's rapid growth were shared by many. The challenge of course is unlocking the secrets behind Korea's rapid and broad-based development, which can offer invaluable insights and lessons and knowledge that can be shared with the rest of the international community.

Recognizing this, the Korean Ministry of Strategy and Finance (MOSF) and the Korea Development Institute (KDI) launched the Knowledge Sharing Program (KSP) in 2004 to share Korea's development experience and to assist its developing country partners. The body of work presented in this volume is part of a greater initiative launched in 2010 to systematically research and document Korea's development experience and to deliver standardized content as case studies. The goal of this undertaking is to offer a deeper and wider understanding of Korea's development experience with the hope that Korea's past can offer lessons for developing countries in search of sustainable and broad-based development. This is a continuation of a multi-year undertaking to study and document Korea's development experience, and it builds on the 40 case studies completed in 2011. Here, we present 41 new studies that explore various development-oriented themes such as industrialization, energy, human resource development, government administration, Information and Communication Technology (ICT), agricultural development, land development, and environment.

In presenting these new studies, I would like to take this opportunity to express my gratitude to all those involved in this great undertaking. It was through their hard work and commitment that made this possible. Foremost, I would like to thank the Ministry of Strategy and Finance for their encouragement and full support of this project. I especially would like to thank the KSP Executive Committee, composed of related ministries/departments, and the various Korean research institutes, for their involvement and the invaluable role they played in bringing this project together. I would also like to thank all the former public officials and senior practitioners for lending their time, keen insights and expertise in preparation of the case studies.

Indeed, the successful completion of the case studies was made possible by the dedication of the researchers from the public sector and academia involved in conducting the studies, which I believe will go a long way in advancing knowledge on not only Korea's own development but also development in general. Lastly, I would like to express my gratitude to Professor Joon-Kyung Kim and Professor Dong-Young Kim for his stewardship of this enterprise, and to the Development Research Team for their hard work and dedication in successfully managing and completing this project.

As always, the views and opinions expressed by the authors in the body of work presented here do not necessary represent those of the KDI School of Public Policy and Management.

May 2013

Joohoon Kim

Acting President

KDI School of Public Policy and Management

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Chapter 2

Summary

This report studies a series of The Environmental Impact Assessment system in Korea pursued over a 40-year period during its development era (1970s-2010s). It has been gradually developed as a system that helps establish environmentally conscious plans beyond just conservation as various environmental problems occurred and environmental awareness such as sustainable development was raised.

This report consists of four parts: the changes in Environmental Impact System, the background of the Prior Environmental Review, operation status, cases and outcomes.

Korea promoted economic growth through Five-Year Plans of Economic Development. Along with the rapid economic growth, the problems of environmental pollution in the neighboring areas of heavy and chemical industrial estates were recognized as side effects of economic development. Therefore, the Environmental Office was established in 1980, and the introduction of the Environmental Impact Assessment system, the emission charges system and fundraising for the prevention of environmental pollution were promoted on the basis of instituting economic principles to challenge economic problems and prevention of environmental pollution.

The characteristics of Korea's Environmental Impact Assessment system are largely described as the Prior Environmental Review, and the Korea Environment Institute, the professional review institution. The Prior Environmental Review System is the system in which environmental reviews such as the validity of a plan are assessed in advance at the early stage of the plan before implementation is confirmed. It was introduced in 1999 and started being implemented in 2006 as the related regulations were taking shape and the time for environmental considerations were largely advanced to the planning stage due to the

Prior Environmental Review. The Prior Environmental Review reduces trial and error in the process of projects and it is a very effective system in terms of economics, as the consultation period is shortened, design changes are minimized and it contributes to establishing environmentally conscious plans. Second, the Korea Environment Institute makes objective and fair review possible based on the professional knowledge as a reviewing institute for Prior Environmental Review and Environmental Impact Assessment; in addition, it takes the lead as of a source of knowledge in relation to the Environmental Impact Assessment.

The purpose of this report is to extract lessons that can benefit policy makers in the developing world. The Environmental Impact Assessment system in Korea is different from that of developed countries where the awareness of environmental problems is realized after economic development, and it can suggest many implications for developing countries where rapid economic growth and environmental problems are realized at the same time. In particular, as environmental problems arise from industrialization and urbanization without environmental considerations and the change processes and cases of Environmental Impact Assessment introduced for preventing and handling them, we can recommend a sustainable model to operate Environmental Impact Assessments for developing countries in the future.

2012 Modularization of Korea's Development Experience
Environmental Impact Assessment

Chapter 1

Introduction

Introduction

The Environmental Impact Assessment system began with the Environmental Preservation Act in 1977 as various environmental issues occurred along with economic growth in the 1970s in Korea. When the Environmental Impact Assessment system was introduced, it was implemented in a passive way for the purpose of environmental conservation and to prevent environmental problems. However, it has been gradually developed into a system that helped establish environmentally conscious plans beyond just conservation as various environmental problems occurred and environmental awareness such as sustainable development was raised.

The characteristics of Korea's Environmental Impact Assessment system are largely described as the process of Prior Environmental Review, and the Korea Environment Institute, the professional review institution. The Prior Environmental Review System is the system in which environmental reviews such as the validity of a plan are assessed in advance at the early stages of a plan, before implementation is confirmed. It was introduced in 1999 and implemented in 2006 as the related regulations were taking shape and the time for environmental considerations were largely moved to the planning stage due to the Prior Environmental Review, which contributes greatly to the establishment of environmentally conscious plans.

The Environmental Impact Assessment system in Korea is different from that of developed countries where the awareness of environmental problems are realized after economic development, and it can suggest many implications for developing countries where rapid economic growth and environmental problems are realized at the same time. In particular, as environmental problems arise from industrialization and urbanization without environmental considerations, change processes and cases of Environmental Impact Assessment introduced for preventing and handling them, we can recommend a sustainable model for to operate Environmental Impact Assessments for developing countries in the future.

2012 Modularization of Korea's Development Experience
Environmental Impact Assessment

Chapter 2

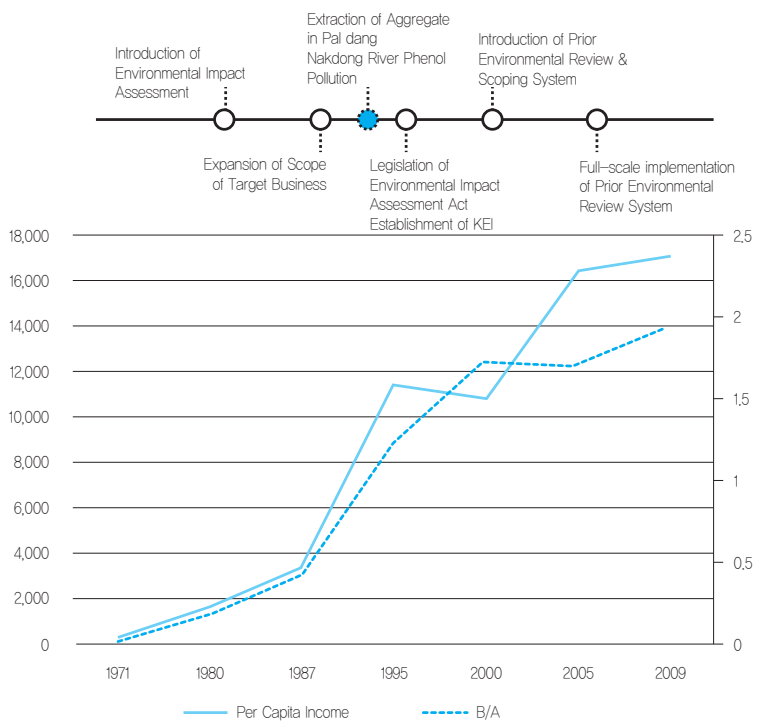
Economic Growth and the Changes in Environmental Impact Assessment

1. Economic Growth and Environmental Issues, Environmental Impact Assessment System
2. Changes in Environmental Impact Assessment System

Economic Growth and the Changes in Environmental Impact Assessment

1. Economic Growth and Environmental Issues, Environmental Impact Assessment System

Table 2-1 | The Relation between Environment Budget and Economic Development



Year	GDP (unit: billion)	Per Capita Income (unit: $)	Budget(A) (unit: billion)	Environmental Budget(B) (unit: billion)	B/A (unit: %)
1971	802.6	290	555.3	0.05	0.009
1980	9,057.5	1,645	6,466.8	12.05	0.186
1987	27,369.2	3,321	16,059.5	67.08	0.418
1995	96,797.6	11,432	74,534.4	920.0	1.234
2000	148,379.6	10,841	125,179.2	2,174.4	1.737
2005	211,590.3	16,413	167,933.2	2,855.7	1.700
2009	253,527.0	17,041	217,472.3	4,210.1	1.936

Source : Ministry of Environment (2010: 114), 「Three decades of environmental policies in Korea」, the Statistics Korea homepage(http://kostat.go.kr)

1.1. 1970s

Korea promoted economic growth through Five-Year Plans of Economic Development, the first in 1962, and the second plan in 1967. National land development was implemented in order to expand the lack of social overhead capital such as transportation, electricity and communication, which are needed for economic development. Along with the rapid economic growth, the problems of environmental pollution in the neighboring areas of heavy and chemical industrial estates, such as Changwon Machinery Industrial Complex, Yeochun Petroleum Chemical Complex and Gumi Electronic Industrial Complex, were recognized as side effects of economic development. The strategic positioning development of heavy and chemical industry caused waste disposal problems as it concentrated industrial facilities and population in certain metropolitan areas and the Southeastern part of the country. Soil and water were polluted with heavy metals such as lead, cadmium, manganese and steel.

Therefore, the focus on the environment expanded from sanitation problems to the prevention of environmental pollution and in 1973, the pollution department was established in the sanitation bureau of the Ministry of Health and Society. The Environmental Preservation Act, which was the basis of the introduction of Environmental Impact Assessment, was legislated in 1977. According to Article 5 of the Environmental Preservation Act, national projects such as urban development, creating industrial sites and energy development require consultation with the minister of Health and Society in advance; however, detailed regulations were not established and the concept of Environmental Impact Assessment was not directly introduced at that time.

1.2. 1980s

In the 1980s, land needed to be developed and managed more systematically on the foundations of the accumulated economic power, industry and social structure of the 1960s to 1970s. Unbalanced growth in urban areas and rural areas, the disorder of land usage, speculation in real estate, disordered urban sprawl of cities, excessive encroaching of farmland and the damage of natural resources were identified as problems of national projects in this period. Therefore, in the second national development plan, goals were set for local area settlement for population, expanding of developmental possibility, enhancing the welfare of people and preservation of national natural environment. However, these were not implemented in the actual policy promotion process, and environmental pollution spread nationwide as industrialization and urbanization accelerated with the speculation in land. The water pollution in rivers, lakes and seas was serious; the inland pollution sources such as factories and sewage increased, and water pollution worsened due to the construction of coastal industrial complexes. In addition, air pollution increased because of the pollution produced by industries of chemicals, petrochemistry, refining metals and power plants, and it resulted in an acid rain problem. Therefore, in the 1980s, as environmental pollution caused by industrialization were visible problems by various media and channels, public awareness of environmental preservation increased.

Box 2-1 | Nakdong River Phenol Pollution Case

페놀수사-환경대책 강력반발

야당·시민단체 검찰졸속처리 미봉책 되풀이 분노

대통령 사과·관련장관 경질요구

'시민협'에 24개 단체 참여…환경장관·두산 대표 고발

오늘 기초의회 투표

당선자 내일 오전중 판명될듯

○ Date: 14 March, 1991

○ Location: Raw water resource, Nakdong River, Daegu

○ Details of case

: As the pipe connecting a Phenol storage tank at Doosan Electronics, located in Gupo-dong, Gumi-si, Gyeongsangbuk-do, to the phenol production line burst, 30 tons of phenol flowed into the water intake that was the water source of Daegu through Ogyecheon, and then it polluted tap water for eight hours. The water intake tank was reported by the locals saying that odors were detected in the tap water, but they input a large amount of chloric acid without finding the cause, and it deteriorated. Due to this case, not only could citizens not use the tap water, but food companies where water is needed were damaged.

○ The results of this case:

1) 13 people were arrested including seven civil servants of the Environmental Office in Daegu and six staff members of Doosan Electronics, and disciplinary actions were taken for 11 related officers.

2) Fact finding committee was held in the National Assembly.

3) Civic groups organized a meeting for measures of phenol pollution and expanded a boycott against products made by Doosan.

○ Influence of this case

1) Increase public interest related to environmental preservation

2) Reinforcement of legislation and regulations related to the environment (legislate special measures related to the penalty of environmental crimes, reinforcement of environmental standards of factory establishment, and organize environmental management committee by basins in order to manage four major rivers by water system)

Therefore, from the fifth Five-Year Plan of Economic Development (1982-1986), plans related to environmental issues were separately established. The main essentials for the plans of environmental preservation were to promote measures for environmental management for environmentally influenced areas, improve the effectiveness of pollution regulations, reinforce the comprehensive control capability of environmental preservation work, and organize local environmental management organizations. The Environmental Office was established in 1980, and the introduction of the Environmental Impact Assessment system, the emission charges system and fundraising for the prevention of environmental pollution were promoted on the basis of application of economic principles to challenge economic problems and prevention of environmental pollution due to the revision of the Environmental Preservation Act in 1981. In 1986, the Environmental Preservation Act was revised to expand target projects of Environmental Impact Assessment, and the scope expanded from the public sectors to private sectors as large-scale development projects actively prospered in the private sectors.

1.3. 1990s

In the 1990s as the nation became much more stable and mature as it overcame political, economic and social fluctuations of the 1980s, the people wanted a better quality of life. In particular, large and small environmental pollution cases in the beginning of the 1990s successfully raised public awareness of the environment. As there was not sufficient investment in basic environmental facilities such as landfills, refuse incineration plants, and terminal disposal plants of sewage, the Nakdong River phenol pollution case occurred in 1991, and the permission for the dredging and aggregate extraction project of Paldang Lake, the largest water source of the metropolitan area, created controversy regarding water source pollution in 1989. Therefore, opposition from various civic groups intensified, and as it became more closely related to real-life aspects such as drinking water, the public forced the government to develop measures to address environmental pollution. In 1993, 10 specific-use districts were decreased to five by the full revision of the Act on the Utilization and Management of the National Territory. As the development restrictions of developing areas were eased through dividing the limitations on land usage into development and preservation purposes, the sprawling development was promoted in Yongin-si and Hanam-si. Therefore, the government introduced various policies and systems to effectively cope with this situation, reduced environmental loads due to economic development, and promoted an environmentally friendly economic developmental system, as well as expanded basic environmental facilities to improve effectiveness.

As the interest in the environment increased, and the environmental problems deteriorated, the related department, which was elevated from the environmental office to the environmental department in 1990, was elevated to the Ministry of Environment in 1994. The elevation meant that the Ministry can participate in Cabinet meetings as a completely independent administrative department, and plan and enforce policies independently; therefore, the authority of the environmental department increased significantly. In addition, local environmental branch offices were reorganized to local environmental offices, and the system was established to develop and implement environmental policies independently. The deposit refund system in 1991, the environmental improvement charges in 1992, the waste charges in 1994, and the volume-rate garbage disposal system in 1995 were fully implemented.

In relation to the Environmental Impact Assessment system, the Basic Environmental Policy Act was legislated to handle environment-related laws and suggest environmental policies with a long-term vision. Section 4 of the Basic Environmental Policy Act includes the writing, review and follow-up of the environmental impact statement. In addition, the collection of residents' opinions was implemented at the time of Environmental Impact Assessment, and the draft was to be written based on resident concerns. In 1993, the "Environmental Impact Assessment Act" was legislated, the framework of Environmental Impact Assessment system was established, and the KEI as a professional review institution for statement reviews was formed in 1997. This was the period of maintaining the system of Environmental Impact Assessment.

Box 2-2 | Water Source Pollution due to Aggregate Extraction in Pal dang

八堂골재 채취로 上水源 오염

바다쌓인 腐敗物 녹아

진흙엔 인산염 평균치 萬倍나 함유

서울大 미생물 생태研究室 조사

팔당호 준설중단 강력 요구

시민·학계 "시민건강 심각한 위협"

정부관계자 "문제발생땐 공사 중단"

각계 대표 어제 공청회

○ Date: April 1990

○ Location: Paldang Lake

○ Details of case

: According to the vitalization of housing construction, on April 17, 1990, the government permitted aggregate extraction in Paldang and Imjin River due to the scarcity and price increase from the supply shortage of main construction materials. The controversy of water pollution arose because of the plans for aggregate extraction and dredging in Paldang Lake, the water source for the metropolitan area. According to the Environmental Impact Assessment Statement of Paldang Lake dredging, the water pollution caused by heavy metals and agricultural chemicals, eutrophication in the lake, and the increase of turbidity were expected.

○ Results of this case:

The test dredge was decided; however, as negative public opinions were formed by experts and the public, the alternate supplies from Misari, Namhan River, and Anyang Seoksan were made for substitution.

○ Influence of this case

1) The increase of public interest related to environmental preservation

2) Reinforcement of Environmental Impact Assessment system (prepare the enforcement ordinances of Basic Environmental Policy Act-target businesses were largely expanded from 44 businesses in 11 areas to 68 businesses in 20 areas; the authority of temporary suspension of business was given to the minister of the Department of Environment; the minister of the Department of Environment must establish the medium comprehensive plan regarding environmental preservation)

1.4. 2000s

As the themes of globalization, global environmental problems, sustainability, quality of life, innovation, knowledge economy, dispersion and decentralization came to the forefront in the 2000s, the political factors in consideration of national territory development greatly increased. Therefore, the fourth National Land Plan was expanded to maximize the potential of the Korean Peninsula in Northeast Asia, and all aspects of land planning considered environment by priority as a land green plan. In addition, the expectations regarding quality of life were accepted, and in the institutional aspect when implementing national land plans and software of operation, consumer aspects were emphasized. As the demand for improving the quality of life increased, "environmental health" policies and policies for sustainable use and preservation of environmental resources such as water and ecology resources were enhanced. Moreover, economic activities related to the environment and environmental policies incorporated environmental considerations, and the effective and a comprehensive environmental management system was instituted to avoid hindering economic activities and promoting pollution prevention.

At the same time, the importance of an environmental assessment system started to become a focus, preventative environmental management policies were prepared beyond the existing follow-up of management, and the targets of management were subdivided by media. Although the combined operation of assessment system was attempted from the legislation of Impact Assessment Act for Environment, Transportation and Disaster, it was adjusted to the Environmental Impact Assessment Act due to implementation and operation. In the 2000s, prevention was reinforced to consider the environment from the early stages of planning through the introduction of scoping system and Prior Environmental Review.

Box 2-3 | Implementation of Environmental Assessment in Small Private Development (Prevention of Sprawling Development)

○ Revision of enforcement ordinances of Basic Environmental Policy Act (August 2000)

○ Causes:
Development projects were actively promoted for local development and competitive development among local governments as the era of local government in 1995. The problems of sprawling development near metropolitan areas were serious due to the unplanned bedroom communities around densely populated metropolitan areas. The problems of environmental damage occurred due to flooded apartments, hotels and restaurants nationwide as well as specific metropolitan area such as Paldang, Yongin and Hanam. Therefore, the Ministry of Construction and Transportation provided measures for the sprawling development on May 23, 2000.

○ Main contents:
The Prior Environmental Review System was introduced for small and medium private development projects (development projects more than 5,000m^2 in natural environmental preservation areas, more than 7500m^2 in agricultural and forestry areas, more than 10,000m^2 in semi agricultural and forestry areas, and more than 10,000m^2 in green areas) which were excluded for Environmental Impact Assessment as they needed prior consultations with environmental authorities from the planning stage in the special measures area of water quality preservation near Paldang Lake and Daecheong Lake.

Table 2-2 | Economic Growth and Environmental Issues, and Environmental Impact Assessment System

Period	Periodical Situations	Directions of Economy and Development of National Territory	Environmental Issues	Environmental Impact Assessment System Related Legislation & Main Characteristics
1970s	- Increased efficiency but exposed social imbalance due to the changes of industrial structure promoted in 1960s	- Effective use of national territory - Environmental preservation - Control the concentration of population in big cities - Build a base of heavy chemistry industry	- Pollution in neighboring areas due to the heavy chemistry industry - Increased mercury residuals in agricultural products	Environmental Preservation Act - Legislation on December 31, 1977 · The definition of Environmental Impact Assessment was not concrete(a concept of "prior consultation") · Implement in partial national projects

Period	Periodical Situations	Directions of Economy and Development of National Territory	Environmental Issues	Environmental Impact Assessment System Related Legislation & Main Characteristics
1980s	- Achieve high-degree economic growth - Concentration of population in big cities - Intensified sprawling due to development and speculation in real estate	- Expansion of development possibility - Decentralization of population - Natural environment conservation - Balanced development of national territory and decentralization of industry	- Environmental problems accumulated in the rapid growth process - Rapid increase of industrial waste and dairy waste - Deterioration of water and air pollution due to increase in disposal of sewage, waste and excrements - Acid rain due to the increase of fossil fuels	Environmental Preservation Act - Partial revision on December 31, 1986 · Create clauses about assessment agents · Expansion of scope of business operators (→ general business)
1990s	- Deepening in the imbalance of land development - Increase in land value - Spread of environmental pollution - Poor infrastructure	- Control of dense population in the metropolitan area and local gap settlement - Environmental conservation - Enhancement of national competitiveness - Expansion of national infrastructure - Building a base of high-tech industry - Diversification of site types - Relaxed regulations on-site - Simplification of industrial complex development - Increase individual sites	-Expansion of environmental infrastructure to improve environmental management -System implemented for waste charges, environmental mark, volume-rate garbage disposal system, and system for environmental improvement charges, etc. - Separate legislation of Environmental laws	Basic Environmental Policy Act - Legislation on Aug. 1, 1990 · Collection of residents' opinions & the draft of assessment statement · Follow-up management clauses Environmental Impact Assessment Act - Legislation on June 11, 1993 · The framework of Environmental Impact Assessment system was prepared (definition, targets, fields and items). - Partial revision on March 7, 1997 · Establishment of KEI · Designation of assessment agents Impact Assessment Act for Environment, Transportation and Disaster - Legislation on December 31, 1999

Period	Periodical Situations	Directions of Economy and Development of National Territory	Environmental Issues	Environmental Impact Assessment System Related Legislation & Main Characteristics
2000s	- The era of diversity - The era of high-tech and knowledge hierarchy - The era of globalization - Emphasis on environment and the quality of life - Localization - Expansion of exchange of South and North Korea - Required global competitiveness - Global environmental problems and energy resources crisis	- Liberalization of global competition and active response to the growth of Northeast Asia - Preparation of developmental strategy to meet localization - Creation of land conditions suitable for knowledge hierarchy - Organization of national territory for stable growth period - Low carbon and green territory - Expansion of knowledge-based industrial site base	- Transition to sustainable development paradigm due to changes in weather as well as climate change and environmental problems - Pursuit of the quality and comfort of living environment by income increase - Legislate the Framework Act on Sustainable Development - Promote low carbon and green growth policy	Environmental Impact Assessment Act - Full revision on March 28, 2008 · Separate the system by Environmental Impact Assessment Act · Change in main agent of reflecting consultation contents (→ head of approval institution) · Combined impact assessment system · Introduction of scoping system · Opinion collection can be omitted for some projects that have already passed Prior Environmental Review

Source: Committee for compilation for 60 years of Korean Economy (2010). 「60-year History of Korean Economy」, Shin Kyung hee, (2010). 「Phased result analysis of development projects of housing site and industrial complex」

2. Changes in Environmental Impact Assessment System

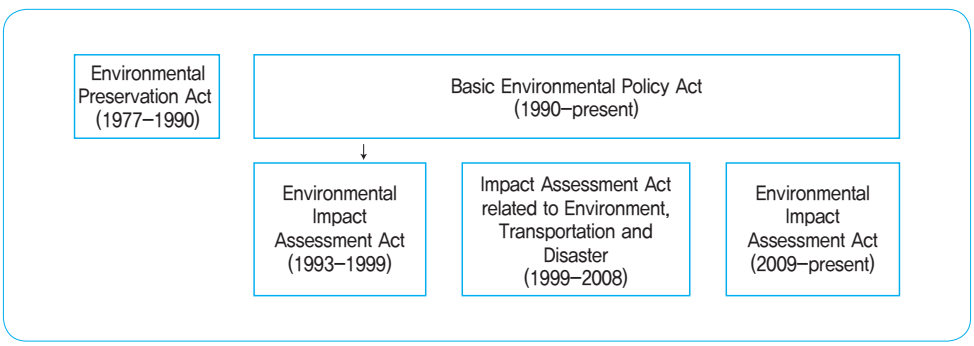
2.1. Environmental Impact Assessment Act and Related Regulations

Legislation related to the environmental assessment system includes the Environmental Preservation Act (1977-1990), Basic Environmental Policy Act (1990-1993), Environmental Impact Assessment Act (1993-1997, 2008-present), and Impact Assessment Act related to Environment, Transportation and Disaster (1999-2008). The Environmental Preservation Act was legislated in 1977 for environmental management and preservation as the early stage of environmental problems were quickly spread. However, the Environmental Preservation Act was frequently revised after the 1980s because the pollutant factors, influences and measures of

air, water, noise and vibration differed from one another, the Environmental Preservation Act was abolished in December 1989, and the environment-related legislation became specialized in the Basic Environmental Policy Act, Environmental Pollution Damage Dispute Adjustment Law, Clean Air Conservation Act, Noise-Vibration Regulation, Water Quality Conservation Act, and Toxic Chemicals Control Act.

The regulations related to environmental assessment were separated from the Basic Environmental Policy Act in 1993, and legislated as the Environmental Impact Assessment Act, and later, in 1999, it was reformed and legislated as the Impact Assessment Act related to Environment, Transportation and Disaster, which includes impact assessments of transportation, disasters and population. Now it has been revised to the Environmental Impact Assessment Act, which eliminates the areas of environment, transportation and disasters.

Figure 2-1 | Change of Legislation



The main changes in the environmental assessment system according to the revisions of legislation were that the scope of business was expanded to the private sectors by the revision of the Environmental Preservation Act in 1986, and the legislation of the Basic Environmental Policy Act in 1990 included the collection of public opinion and follow-up management. Along with the legislation of the Environmental Impact Assessment Act in 1993, the framework of the environmental impact assessment system was established. In particular, the Prior Environmental Review System was introduced to challenge the problems of sprawling development for small and medium-sized private development projects that were excluded from the environmental impact assessment. The introduction of the assessment agent allocation system and regulations of charges secured the effectiveness of environmental assessment, and increased the quality of assessment to establish the professional review institution according to the revision of law in 1997.

The related guidelines when applying environmental impact assessment in actual situations based on legislation have experienced many changes. The related guidelines were

created in the form of notifications, decrees and rules. They were legislated for the purpose of notifying the contents related to assessment and making unified standards every time legislation was created and revised as there were many necessary parts for actual operation as they were concretized and the framework was established. For example, Regulations on Strategic Environmental Impact Assessment was legislated by the Ministry of Construction and Transportation, rather than the Ministry of Environment, which indicates changes of attitude toward environmental assessment.

The regulation of writing assessment statements was regulated as the notification of the Ministry of Environment; it was legislated as the Regulation of Writing Assessment Statement (notification of Environmental Office No.1981-4). It was revised 14 times after its legislation in 1981. The main revised content of the regulation of writing assessment statement are listed chronologically in <Table 2-3>. According to the legislation of the Basic Environmental Policy Act, the draft including the collection of local opinions, and the regulations were reorganized in accordance with the legislation of the Environmental Impact Assessment Act.

Table 2-3 | Regulation Changes Regarding the Legislations, Related Guidelines and Assessment Statements

Year	Legislation	Main Contents and Related Guidelines
1977	Legislation of Environmental Preservation Act	- Prior consultation with the Ministry of Health and Social Affairs
1979	Partial revision of Environmental Preservation Act	- Expansion of assessment targets - New consultation process: The head of Environment Office requests adjustments and addition of project plan to heads of administrative agencies with consultation of central environmental consultation committee
1981	Partial revision of Environmental Preservation Act	- Expansion of business: Heads of administrative agencies → heads of administrative agencies, public organizations and government-invested institutions - Establish assessment agents: national research institutes and government-funded research institutes can act as a proxy ■ Work guidelines for review of environmental assessment statement
1983	Partial revision of enforcement ordinances	- Expansion of assessment targets
1986	Partial revision of Environmental Preservation Act	- Expansion of business: Heads of administrative agencies and public organizations → organizations where assessment projects are implemented

Year	Legislation	Main Contents and Related Guidelines
1989	Abolition of Environmental Preservation Act	
1990	Legislation of Basic Environmental Policy Act	- Environmental Impact Assessment of the fourth chapter of Basic Environmental Policy Act - Follow-up: the minister of the Department of Environment should check the implementation of content - Expansion of assessment targets - Expansion of the scope of assessment agents: national research institutes, government-funded research institutes, environment-related research institutes in universities, technology service business related to environment, and other corporate entities for the purpose of environmental protection - Submission of approved content and implementation plan - Establish systems for objection and re-discussion
1992		- Regulation on allocation of Environmental Impact Assessment agents
1993	Legislation of Environmental Impact Assessment Act	- Establishment of system framework: definitions, target projects, assessment fields and items, assessment criteria, targeted areas of Environmental Impact Assessment system - System of allocation for assessment agents (the head of the Department of Environment allocates) - Management and supervision of agreed contents: heads of verification institutions take responsibility. (Previously the head of consultation organization took responsibility.) - Follow-up environmental impact review - Establishment of regulations on penalties and charges ■ Work regulation regarding Environmental Impact Assessment review and agreement
1995		- Calculation standards for writing costs (agent costs) of Environmental Impact Assessment statement
1997	Partial revision of Environmental Impact Assessment Act	- Establishment of Korea Environment Institute as a professional institution for reviewing assessment statements - Impose excessive charges over approved standards
1999	Legislation of Impact Assessment Act on Environment, Transportation and Disaster	- Combine impact assessment system - Introduction of scoping system ■ Work guidelines related to agent registration and management of Environmental Impact Assessment ■ Operation guidelines for Environmental Impact Assessment system ■ Regulation on excessive charges over approved standards

Year	Legislation	Main Contents and Related Guidelines
2001		■ Work regulations for environmental impact reassessment ■ Regulation for prior environment review and consulting committee for Environmental Impact Assessment
2004	Partial revision of Impact Assessment Act on Environment, Transportation and Disaster	- Supplement scoping system (collect public opinion) - Environmental impact reassessment after construction - Add regulations for research institutes to research impact assessment technology ■ Regulation for council of impact assessment adjustment
2005		■ Post Environmental Impact Assessment statement in the information network system ■ Work guidelines related to review of Environmental Impact Assessment results ■ Work guidelines related to Environmental Impact Assessment agreement and management of agreed contents (work guidelines related to Environmental Impact Assessment agreement) ■ Regulations on writing of Environmental Impact Assessment statement plan and the writing methods
2006		■ Regulation on writing prior environment review
2007		■ Regulations of core prior environment review items and review methods of golf course development ■ Environmental Impact Assessment guidelines for environmentally friendly dam construction ■ Work regulation on prior environment review agreement and agreed contents management
2008	Full revision of Environmental Impact Assessment Act	■ Separation of impact assessment system ■ Operational guideline for information support system of Environmental Impact Assessment
2011		■ Work regulation for strategic environmental assessment (decrees of Ministry of Land, Transport and Maritime Affairs
2012	Full revision of Environmental Impact Assessment Act	- Transfer Prior Environment Review System of Basic Environmental Policy Act to Environmental Impact Assessment Act - Combine council of prior environment review and council of Environmental Impact Assessment - Change prior environment review → strategic Environmental Impact Assessment

Source: Shin Kyung hee, (2010:32). 「Phased result analysis of development projects of housing site and industrial complex」

2.2. Contents Changes in Environmental Impact Assessment System

2.2.1. Expansion of Target Projects

Table 2-4 | Expansion of Target Projects for Environmental Impact Assessment

1. Urban development 2. Creating industrial location 3. Energy development	1. Urban development 2. Creating industrial location 3. Energy development 4. Harbor construction 5. Road construction 6. Water resource	1. Urban development 2. Creating industrial location 3. Energy development 4. Harbor construction 5. Road construction 6. Water resource 7. Railroad construction 8. Airport construction 9. Usage & development of river 10. Reclamation & land development project 11. Development of tourist facilities complex 12. Sports facilities 13. Forest development 14. Development of certain areas 15. Waste treatment facilities & excrement disposal facilities 16. Projects' influence on environment	1. Urban development 2. Creating industrial location 3. Energy development 4. Harbor construction 5. Road construction 6. Water resource 7. Railroad construction 8. Airport construction 9. Usage & development of river 10. Land development & public water reclamation 11. Development of tourist facilities complex 12. Forest development 13. Development of certain areas 14. Sports facilities 15. Waste treatment facilities & other facilities 16. Projects' influence on environment, transportation, disaster and population	1. Urban development 2. Creating industrial location 3. Energy development 4. Harbor construction 5. Road construction 6. Water resource 7. Railroad 8. Airport construction 9. Usage & development of river 10. Land development & public water reclamation 11. Development of tourist facilities complex 12. Forest development 13. Development of certain areas 14. Sports facilities 15. Waste treatment facilities 16. National defense & military facilities 17. Projects for collection of avalanches, sand, gravel and mineral 18. Facilities' influence on environment
Environmental Preservation Act (1977.12.31)	**Basic Environmental Policy Act (1990.8.1)**	**Environmental Impact Assessment Act (1993.6.11)**	**Impact Assessment Act for Environment, Transportation and Disaster (1999.12.31)**	**Environmental Impact Assessment Act (2008.3.28)**

Source: Shin Kyung hee, (2010:32). 「Phased result analysis of development projects of housing site and industrial complex」

The target projects were gradually expanded from the Environmental Preservation Act in 1977 to the Environmental Impact Assessment Act in 2008. The target projects were stated in legislation and enforcement ordinances, and the assessments for the wide range of projects were applied considering the unit projects by different fields in each target projects. <Table 2-4> shows the aspects of expanding target projects for assessment based on projects stated in legislation. It is the table of projects set in the legislation only, not considering cases that are set in the enforcement ordinances; however, it can still show the fragmentary aspects of expansion. The process of expansion of target projects for assessment, three fields of urban development, creating industrial location and energy development are provided in the Environmental Preservation Act. After the revision of law, creating industrial complex, industrial harbor, road building and water resource development were added in 1979, and through the enforcement ordinances of this law in 1980, railroad construction, airport construction, reclamation, harbor dredging and apartment development were added, therefore, a total of 10 fields were included in the target projects. In addition, as the large-scale development in the private sector, through the revision of the enforcement ordinances of this law in 1983, the projects expanded to 11 fields (32 unit projects) as the development projects implemented in the private sector, including a tourist facilities complex. As of 2010, the target projects were expanded to 18 fields (46 unit projects) through this expansion process.

2.2.2. Collection of Residents' opinions

The system of resident opinion collection was introduced with the first and main drafts of the environmental impact assessment statement as the Basic Environmental Policy Act was legislated in 1990. According to the Basic Environmental Policy Act and its enforcement ordinances, residents' opinions should be included in the environmental impact assessment statement. When the project operators wish to collect the opinions, they should prepare the first draft of environmental assessment statement, which includes the project outline, the current status of the environment, influence analysis and reduction methods to environment. They should submit this to the heads of related administrative agencies, then display and announce the environmental assessment statement to the residents. Resident opinions should be collected during the first draft, and the main draft should include this information.

As the environmental assessment system gradually developed, the scope and the methods of soliciting resident participation were expanded. In the Environmental Impact Assessment Act in 1993, it is required to not only to display and announce the first draft of the environmental impact assessment statement, but to also host a mandatory information session, as well as a resident hearing when requested. In the Impact Assessment Act for Environment, Transportation and Disaster in 1999, areas having large conservation eco-

systems, such as conservation areas of natural environments, natural park, wetland protection areas and wetland neighboring areas, were included after hearing opinions from external sources. With the 2003 revision, it was possible to implement and set the scope and items of environmental impact assessment; when the committee for the assessment items and confirmation of scope has decided its need, the opinions can be heard. In the Environmental Impact Assessment Act in 2012, non-government experts such as representatives of resident and civic groups should be included in the council of environmental impact assessment, setting the items and scope of assessment.

2.2.3. Legislation of Environmental Impact Assessment Act

The environmental assessment system was regulated as one chapter of the Basic Environmental Policy Act, and then the Environmental Impact Assessment Act was legislated as a law in June 1993. As the act was legislated, the framework of the environmental impact assessment system was established.

First, the purpose and the definition of environmental impact assessment was clearly stated, and the target projects, assessment fields and items, assessment standards and targeted areas were also set so more systematic environmental impact assessment was able to be implemented. In addition, the implementation of environmental impact assessment and follow-up management were reinforced, and the follow-up environmental impact investigation was established. After the agreement of environmental impact assessment, the authorized head takes responsibility to supervise and manage the implementation of approved content during the construction phase. The project operator should prepare the management list, and a manager should be allocated to check and report the status of the project. Moreover, the follow-up environmental impact investigation should be implemented to investigate the environmental influence by each item to prevent damage possibly caused by construction of the project, and notify the minister of the Department of Environment and authorized head.

2.2.4. Establishment of Professional Review Institution

One of the biggest characteristics of Korea's environmental assessment system is the existence of a professional review institution. Based on the Environmental Impact Assessment Act, the Korea Environment Institute was established in 1997 to review the environment assessment statements in an objective and fair way.

Before the Korea Environment Institute was established, consultations were requested from experts such as professors for each project. However, the opinions of each individual professional were too varied, and sometimes the reviews were very different even for similar projects depending on which experts review them, and it did not help the agreement

process with related administrative agencies because the level of understanding of projects and environmental impact assessment was low or experts put emphasis on their own specializations. Therefore, the Korea Environment Institute, which consisted of experts in each field, was established and it was a major development in terms of consistency of reviews and professionalism. The role of the institute has been expanding from not only reviews of the environmental impact assessment but also the environmental impact assessment system and technology research.

Currently, the Prior Environmental Review and environmental impact assessment are submitted to the Ministry of Environment, and then the ministry requests the review to the Korea Environment Institute (KEI). KEI submits the review opinions of assessment statement, and finally the ministry adjusts, supplements or approves the project plans based on reviews.

2.2.5. Introduction of Prior Consultation System

The prior consultation system was introduced to improve problems caused by the project implementation stage after plans were being confirmed without including a feasibility study and as a result, the law was revised in 1999. In the past, environmental aspects were not considered before, therefor social problems and economic loss including cancellation of projects and conflicts with residents at the implementation stage after confirmation of plan were occurring. In addition, as the damage to national land, water pollution and traffic congestion due to the sprawling development were raised as social problems, the prior consultation for prevention of sprawling development was needed. (Byun Ju dae, 2003). When the prior consultation system was introduced, the feasibility of sites and harmony with neighboring environments were reviewed not only to find eco-friendly rational alternatives, but also to shorten the consultation period and increase effectiveness.

Although the prior consultation system has existed by decree of the prime minister since 1993, it excluded target projects by the Environmental Impact Assessment Act and the effectiveness of this was insufficient because it was a decree by the prime minister, not regulated by law. To solve this problem, the regulation of prior consultation was added for maintaining environment standards set by Article 11 of the Basic Environmental Policy Act. When development projects were approved, permitted, licensed, decided and designated or the administrative plans which influence the environment were implemented and confirmed, prior consultation with the minister of Environment or local environmental office, reflection of agreed opinions of related administrative heads and duties of project operator's understanding were made. Through the revision in 2002, the name was changed from "prior consultation" to "Prior Environmental Review consultation". The licensing institutions are not permitted to approve projects before the completion of the Prior Environmental Review

process, and the institutions' notified opinions had to report the results or plans to the head of the consultation institution within 30 days. The target projects were expanded (from 38 administrative plans and 20 development projects to 46 administrative plans and 22 development projects). If additional development projects were implemented for the area connected to permit areas, and the sum of two areas is increased by more than 30% of the minimum Prior Environmental Review consultation, it is included in the target projects.

2.2.6. Full-scale Implementation of Prior Environmental Review System

The introduction of the Prior Environmental Review System before the Environmental Impact Assessment was in 1999, but the practical framework of the present Prior Environmental Review System was established in 2006. Before 2006, the project operators submitted related documents such as land usage status or project content to consultation institutions, and the heads of related administrative agencies provided opinions. However, after the revision of the Basic Environmental Policy Act, the process and methods of the Prior Environmental Review System were more concrete and clear. In order to conduct the Prior Environmental Review consultation properly, the council of Prior Environmental Review is encouraged to operate, the first draft is written based on the opinions of residents and council, and the consultation process is repeated with the main draft. In addition, the items to review are clearly stated such as feasibility of the plans and the validity of sites.

When related administrative agencies or project operators are writing the Prior Environmental Review, the participation of experts and residents guarantees a sufficient review statement. There were frequent cases of insufficient review statements because legal procedures not being in agreement on Prior Environmental Review, opinions not being reflected, and not implementing the approved content. To organize councils and regulate review items properly, the consultation institutions can properly and transparently examine review statements.

2.2.7. Scoping

The scoping system is a selection of core assessment items that must be implemented in the impact assessment considering the characteristics of the target project of environmental assessment. As the legislation of the Environmental Impact Assessment Act in 1993, the grounds were first founded upon designation and notification of core assessment items by the minister of the Department of Environment.

In 2003, the revision of the Impact Assessment Act for Environment, Transportation and Disaster, the Committee of Assessment Items and Scope Confirmation, not the minister of Department of Environment, selected assessment items. During this time, scoping was optional, not mandatory, the Committee of Assessment Items and Scope Confirmation

decided after deliberation upon project operators' requests. The Committee consisted of civil servants in approval institutions, officers in consultation institutions, employees of the Korea Environment Institute, and experts recommended by civic groups. After the legislation was revised to the Environmental Impact Assessment Act in 2009, the scoping system became mandatory, and in 2012, the Committee of Environmental Impact Assessment, formerly the Committee of Assessment Items and Scope Confirmation, performs this role.

2.2.8. Expansion of Assessment items

The items of environmental impact assessment are implemented in 21 items of six fields such as natural environment, living environment and socioeconomic environment. Before 2008, in the Regulations of writing environmental impact assessment statement, a total of 20 items were assessed and the fields were not divided. In the attached form of the enforcement ordinance of 2008, the fields were classified and the greenhouse gas item was added in the atmospheric environment.

Table 2-5 | Assessment Items of Environmental Impact Assessment

Fields	Assessment items			
Natural ecology environment	1) Animals and plants	2) Natural environment assets		
Atmospheric environment	1) Weather	2) Air quality	3) Odor	4) Greenhouse gases
Water environment	1) Water quality	2) Vein of water, sluice	3) Marine environment	
Land environment	1) Land usage	2) Soil	3) Topography, Geology	
Living environment	1) Eco-friendly resource circulation	2) Noise & vibration	3) Recreation & landscape	4) Hygiene & public health
	5) Electronic hindrance	6) Sunshine hindrance		
Socioeconomic environment	1) Population	2) Housing	3) Industry	

Source: Enforcement Ordinance of Environmental Impact Assessment Act'

Chapter 3

Introduction Background of Prior Environmental Review System

Introduction Background of Prior Environmental Review System

1. Changes in Prior Environmental Review System

1.1. Summary

The Prior Environmental Review System was introduced from the case of aggregate extraction in Paldang Lake in 1990. In 1990, as the development of 2 million units of housing was enforced without prior agreement with the Department of Environment for construction, the process of extracting construction materials (gravel and sand, etc.) from Paldang Lake evoked public criticism due to environmental damage. Therefore, the PERS (Prior Environmental Review System) was implemented as a decree of the prime minister to prevent similar acts from causing environmental damage. The legal grounds were founded as the Regulations on environmental review of administrative plans and projects was legislated as a decree of the prime minister according to Clause 2 of Article 3 of the enforcement ordinance of Basic Environmental Policy Act on January 7, 1993.

The environmental review system that was implemented as a decree of the prime minister made foundations for implementing more detailed environmental reviews when various administrative plans and projects were established, according to the revision of the Basic Environmental Policy Act in December 1999.

Table 3-1 | Legislation Changes of Prior Environmental Review

	Main contents
1993.1	Prior consultation system was implemented for administrative plans promoted by public organizations by regulations of the environmental review of administrative plans and projects. (No. 270 of the decree by the prime minister)
2000.8	Legislation on the grounds of prior consultation in the Basic Environmental Policy Act
2003.7	Create three clauses regarding Prior Environmental Review consultation in the Basic Environmental Policy Act * Consultation targets and process, supervision and management of implementation, prohibition on prior permission to development projects, etc.
2006.5	Improve strategic environmental assessment system to examine the feasibility of plans and validity of sites in terms of environment through alternative settings and analysis when establishing administrative plans * Expansion of consultation targets, alternative settings, operation of environmental review council, introduction of scoping system, mandatory collection of residents' opinions, and creating re-consultation (change) regulations, etc.
2012.7	The environmental assessment is implemented under the name of strategic Environmental Impact Assessment as the Prior Environmental Review system and Environmental Impact Assessment system combined.

The Prior Environmental Review System was recognized as just an administrative process, as it was not operating as a preventative function to encourage sustainable development by reviewing the planning process of environmental impacts like strategic environmental assessments in foreign countries. To improve the problems of the environmental review system, implemented as a decree of the prime minister, social conflicts deepened due to the issues of Cheonseongsan, the strategic environmental assessment system was introduced by the revision of the Basic Environmental Policy Act in 2006. It included expansion of administrative plans and mandatory collection of residents' opinions.

The Prior Environmental Review System and the Environmental Impact Assessment system were combined and fully revised as a combined Environmental Impact Assessment Act as of July 22, 2012, and the environmental assessment on administrative plans was implemented as the name of strategic environmental impact assessment.

1.2. Prior Environmental Review System by Decree of the Prime Minister

The Prior Environmental Review was created when the government decided to extract aggregates from Paldang to build 2 million housing units and it became a social problem. The public development project group of Gyeonggido requested the Department of Environment (now called the Ministry of Environment) an environmental impact assessment to extract aggregates from Paldang Lake; it was deferred on May 24, 1990. The Department of Environment suggested that the test dredging was possible if preceded by the installation of pump-type facilities to extract aggregates, two-layered silt protectors, an oil fence, open-storage area and settling tank to distribute and precipitate aggregate sediment layers. However, the public development project group of Gyeonggido gave its approval to eight companies within just two weeks of the application announcement on March 5, 1990, before the environmental impact assessment was consulted. The public development project group of Gyeonggido said it needed to expedite its timeline to meet the supplies due to the rainy season as the Department of Construction (currently, the Ministry of Land, Transport and Maritime Affairs) required the supply of 3 million tons of aggregate in 1990. Therefore, the dredging began, and if any environmental problems occurred, measures would be taken to rectify the situation. The public development project group of Gyeonggido decided on the dredging if necessary measures taken for water pollution based on the results of environmental impact assessment by the Department of Environment and results of test dredging, and eventually, due to this, social problems occurred (Article from Hankyoreh newspaper on June 1, 1990).

The government implemented the prior consultation system as a decree of the prime minister as the importance of prior consultation was highlighted by the social problem of aggregate extraction in Paldang Lake.

As systematic measures were taken to minimize negative effects on the environment, the establishment of administrative plans and project execution related to environment, and to balance development and environment preservation, “The regulations on environmental review of administrative plans and projects” as a decree of the prime minister was legislated on January 7, 1993 (revision on June 24, 1994) according to Clause No. 2 of Article No. 3 of the Basic Environmental Policy Act.

The Environmental Review System by the decree of prime minister required consultation with the Ministry of Environment for public projects below environmental impact assessment targets or where there were no regulations. The reasons for this are based on Clause 2 of Article 3 of the enforcement ordinance of the Basic Environmental Policy Act.

Prior consultation regulation is the Prior Environmental Review System for projects over a certain size or development plans in ecologically important or vulnerable areas. Projects requiring approval are in seven conservation areas such as Act on the Utilization and Management of the National Territory, the Town Planning and Zoning Act, Water Supply and Waterworks Installation Act, and the Forest Law as the designation of developmental projects. Also included are expected areas accompanying trait change of land and administrative plans in six fields such as local integrated development plans, industry, transportation, tourism, energy development, and agriculture and forestry policy. For decisions regarding administrative plans or implementation or before the decision or approval was given, consultation was required from the minister of the Ministry of Environment in the case of central administrative agencies, and in other cases, consultation with the environmental management officers. If development plans were established in ecologically important or vulnerable areas (wetlands, habitats for migratory birds, primeval forests, and habitats for rare wild animals) or in development projects over 1,000 square meters , environmental reviews should be implemented. The yearly performance according to the regulations on this prior consultation can be seen below.

Table 3-2 | Yearly Performance of Prior Consultations by Each Institution

(Unit: case)

Classification	Total	Headquarters	Han River	Nakdon River	Yeongsan River	Geum River	Daegu	Wonju	Jeonju
Total	528	8	126	78	90	99	46	55	26
'93	64	4	9	8	15	11	13	4	-
'94	127	1	31	15	29	20	12	19	-
'95	158	3	30	31	30	36	11	13	4
'96	179	-	56	24	16	32	10	19	22
'97	208	-	52	39	25	34	18	21	19
'98	189	-	76	15	22	27	15	18	16
'99	178	-	62	18	24	26	17	21	10

Source: Han Sang wook, The status and task for Environmental Impact Assessment

There was a system of environmental review in which related departments consulted with the Ministry of Environment according to the regulations of legislation, as a similar type of consultation system, but not targets under the prior consultation system by decree of the prime minister. In case the related departments requested the designation of expected housing sites, industrial complex, land usage plan, urban general plan and designation of

tourist complex for 62 administrative plans, the process and content were similar to the environmental review system for administrative plans and projects as it was reviewed in terms of environmental aspect, and decided upon the results.

This allowed the central administrator (including governors) who is responsible for planning projects, establishing basic plans, and designation of development project areas to listen to the opinions of the minister (local environmental officers) of Environment regarding the related plans and project. Disagreements, reduction, adjustment and pollution reduction methods of project plans should be recommended and reflected upon after the environmental review. The yearly performance according to the regulations of legislation is below.

Table 3-3 | Consultation Performance by Related Legislation

(Unit: case)

Classification	Total	Act on the Utilization and Management of the National Territory	Natural Environment Conservation Act	Natural Parks Act	Prevention of Marine Pollution Act
Total	3,964	3,415	72	102	375
'94	553	353	22	23	155
'95	742	458	37	27	220
'96	748	715	13	20	-
'97	681	673	-	8	-
'98	547	535	-	12	-
'99	693	681	-	12	-

Source: Han Sang wook, The status and task for Environmental Impact Assessment

1.3. Prior Environmental Review by Basic Environmental Policy Act

The environmental review system by decree of the prime minister and the environmental review system by legislation were targeted for administrative plans. However, as the sprawling development in Yongin-si became a social problem, the implementation of the environmental review system by decree of the prime minister was difficult to control and difficult to develop concrete regulations even though it was not implemented, because it had weak legal enforcement. Therefore, related regulations were created in the Basic Environmental Policy Act, which was the grounds of decree by the prime minister and

prepared for the legal background, and then implemented the Prior Environmental Review in December 1999.

The sprawling developments in Yongin-si were divided into private and public housing development projects. In late 1999, housing that could accommodate a population of 400,000 was developed into 18 housing developing projects by the Korea Land Corporation and Korea Housing Corporation, and 89 apartment complexes by private companies. The development was implemented with the doubled size of Budang, without urban infrastructure.

The sprawling development of private housing development projects was implemented by building housing in farmlands and mountain regions using the natural environment and the accessibility of transportation without infrastructure plans or "free riding" of the infrastructure of existing housing complexes. Private construction companies preceded the developments of free riding of infrastructure in housing complexes such as Suji district, Sanghyeon-lee near Shinbong district, Seongbok-lee and Shingal district, Eonam-lee near Guseong district, Mabuk-lee and Gugal district and Bora district, by considering the geographic location of Yongin-si, which was a one hour distance from Seoul.

The developments by designating housing complex by governmental organizations such as Korea Land Corporation, Korea Housing Corporation and local governments were public developments, but they also had many problems. They produced housing complexes justifying that their developments were better planned and systematic compared to the small private developments in terms of housing development methods.

This sprawling development caused problems and vulnerability to disasters such as shortage of infrastructure, large-scale damage of green areas, destroying natural landscapes, encroaching on farmland, and flood damage.

As the sprawling development caused social problems, the environmental review system by decree of the prime minister was legislated, and the implementation grounds on the business handbook of Prior Environmental Review System prepared in August 2000, based on the Basic Environmental Policy Act are suggested as below.

o The current environmental impact assessment system has limitations on inducing fundamental eco-friendly development such as validity of sites because the reduction methods are examined at the implementation stage after the confirmation of projects, not combining project with validity analysis.
  - Social problems and losses such as canceling projects at the implementation stage after the confirmation of projects because environmental aspects were not considered at the time of validity analysis (Donggang Dam, Lake Shihwa).

o The need for Prior Environmental Review for development projects was increased as social problems such as damage to the national territory, water pollution and traffic congestion occurred due to the current sprawling development of national territory.
  - Environmental damage is accelerated due to the expansion of development projects for securing tax revenues and voters after the implementation of local selfgoverning systems.
  - The need for eco-friendly development is promoted in the green areas, limited development districts and semi-agricultural land through the environmental review for private development projects.

The targets for Prior Environmental Review were largely divided into administrative plans and development projects; the environmental review report should be submitted for the administrative requiring consultation with the Ministry of Environment in legislation.

Ten administrative plans were targeted, including the designation of industrial complexes in rural areas by Article 8 of Industrial Sites and Development Act, as administrative plans influenced by the environment and plans which have no grounds of prior consultation by legislation. For the targets for environmental review of development projects, development projects over certain sizes in conservation use districts below environmental impact assessment are targeted for project sizes over 5,000-50,000 square meters in 20 conservation use districts such as agricultural lands, limited development districts and ecosystem conservation zones.

In addition, the administrative plans that require consultation with a related administrator by legislation at the time of establishing plans, and plans that need to prepare required documents set by the enforcement ordinance of Basic Environmental Policy Act, the 29 plans such as the land usage plan set by Article No. 2 of the Act on the Utilization and Management of the National Territory, the details other than required documents like process and period are implemented in accordance with regulations of legislation.

The numbers of Prior Environmental Review during this period are below.

Table 3-4 | Consultation Performance of Prior Environmental Review (2001-2005)

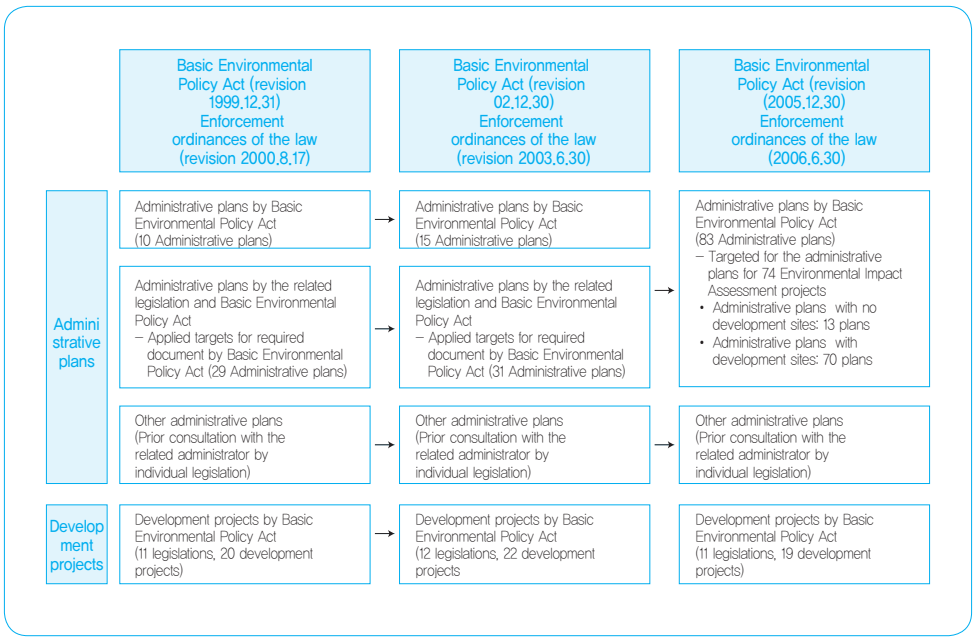
Consultation year	Administrative plans	Other administrative plans (Individual legislation)	Development projects	Total
2001	46	136	800	982
2002	77	297	1,153	1,527
2003	69	233	1,646	1,948
2004	88	129	1,679	1,896
2005	89	307	1,662	2,058
Total	369	1,102	6,940	8,411

Source: Environmental Impact Assessment Support System (http://www.eiass.go.kr/)

1.4. Prior Environmental Review as Strategic Environmental Assessment

As the implementation of Prior Environmental Review by the Basic Environmental Policy Act, considerations for environment have been increased for to establish administrative plans that have no consideration for the environment and small development projects. However, the projects such as the Saemangeum land reclamation project, the beltway around Seoul passing Sapyesan, and Gyeongbu Expressway passing Cheonseongsan became social problems, and they faced much opposition from NGOs and the public.

Figure 3-1 | Changes for Targets of Prior Environmental Review



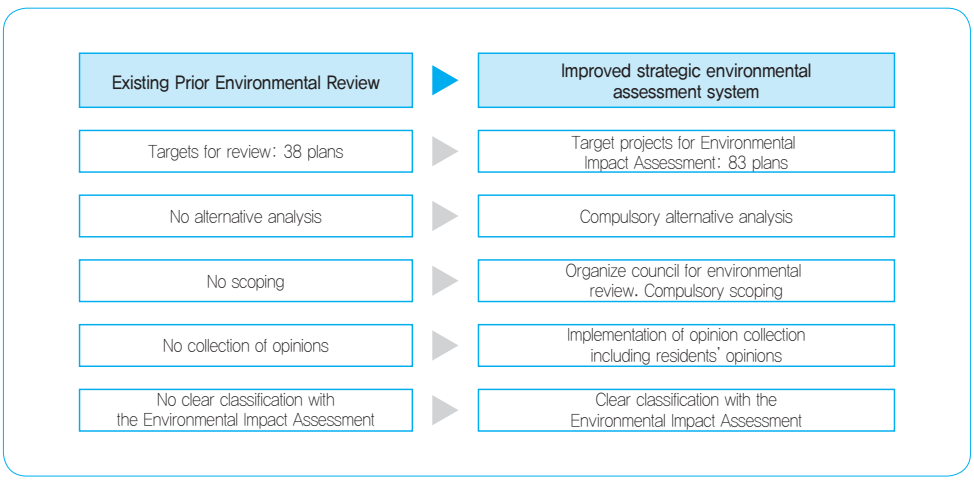
Source: Cho Kongjang (2008) Performance analysis and development direction for 30 years of environmental assessment system

For the Gyeongbu Expressway passing Cheonseongsan, the opposed parties were very worried about destroying the ecosystem due to the swamp depletion caused by breaking the water vein because of the tunnel. In particular, they highlighted the destruction of salamander habitats existing in the 22 high-rise swamps in Cheonseongsan. The Korea Rail Network Authority, the project operator, insisted that various research studies verified that the tunnel method had no negative impacts on the surface ecology, and the tunnel excavation work had little possibility of impacting the ecosystem because the distance separating the areas (Kim Jongho, 2004, Research on the types of environmental conflicts and solutions).

These conflicts led Buddist monk Jiyul to do a "three steps, one bow pilgrimage" and hunger strike on Sept. 27, 2002, and it became a larger social problem as public interest increased. The government revised the Basic Environmental Policy Act and its enforcement ordinances and made a framework of strategic environmental assessments from the Prior Environmental Review System. A presentation for residents of the Prior Environmental Review and administrative plans was made mandatory, in an attempt to reduce the social conflicts through public participation before the environmental impact assessment.

The targets consisted of 13 administrative plans that had no concrete development sites, 70 administrative plans that had development sites, and 19 small development projects below environmental impact assessments in preservation areas. In addition, administrative plans which were regulated to consult with related administrators such as the approval of the urban general plan by the regulation of Article No. 22 of the National Land Planning & Utilization Act and the designation and cancellation of limited development district by the regulation of Article No. 3 of the Designation and Management of Limited Development District Act, these administrative plans applied for the required documents, process and methods set by the legislation.

Figure 3-2 | Main Improvements for Prior Environmental Review



Source: Ministry of Environment (2006). Work manual for prior environment review

The implementation process of the Prior Environmental Review System, which started in 2006, was revised by requiring the collection of residents' opinions compulsory. To improve the social conflicts of Saemangeum, Cheonseongsan and Sapyesan, public opinions must be heard even in the upper plans. For this process, opening the council, writing the first draft, and collection of residents' opinions were included.

The changes in the process improved the existing Prior Environmental Review System for sustainable development and resolving the conflicts between preservation and development, and improved the investigation of the feasibility of plans and validity of sites through the alternative setting and analysis from the establishment stage of plans introducing the strategic environmental assessment system. The administrative plans for review were expanded from 38 to 83 plans, and alternate assessment, scoping and public participation through the presentation for residents were added.

The numbers of Prior Environmental Review during this period are as below.

Table 3-5 | Consultation Performance of Prior Environmental Review (2006-2009)

Consultation year	Administrative plans	Other administrative plans (Individual legislation)	Development projects	Total
2006	250	731	2,260	3,241
2007	1,405	340	3,140	4,885
2008	1,702	219	3,362	5,283
2009	750	157	2,087	2,994
Total	4,107	1,447	10,849	16,403

Source: Environmental Impact Assessment Support System (http://www.eiass.go.kr/)

2. Limitation on Environmental Impact Assessment

The Environmental Impact Assessment is assessed by the detailed plan in the implementation planning stage of confirmed projects from the upper plan, where concrete influence is expected and reduction methods are established by each item. Social conflicts were induced because many cases required project cancellations in the process of environmental impact assessment after the confirmation of projects. Some examples projects that were not national issues, but experienced local conflicts include the Gyeongbu High Speed Railway, the Saemangeum project, a beltway around Seoul, the Gyeongin Canal and the Hantan river dam.

2.1. The Conflict Cases of Gyeongbu High Speed Railway Passing Cheonseongsan

The case of the Gyeongbu High Speed Railway passing Cheonseongsan was a conflict with public concerns during the construction stage after the completion of the environmental impact assessment. The Gyeongbu High Speed Railway began construction in April 1992 and opened to the public in November 2010. This railway construction project introduced travel speeds of 300km/hr from Seoul to Busan and spanned a distance of 423.9km.

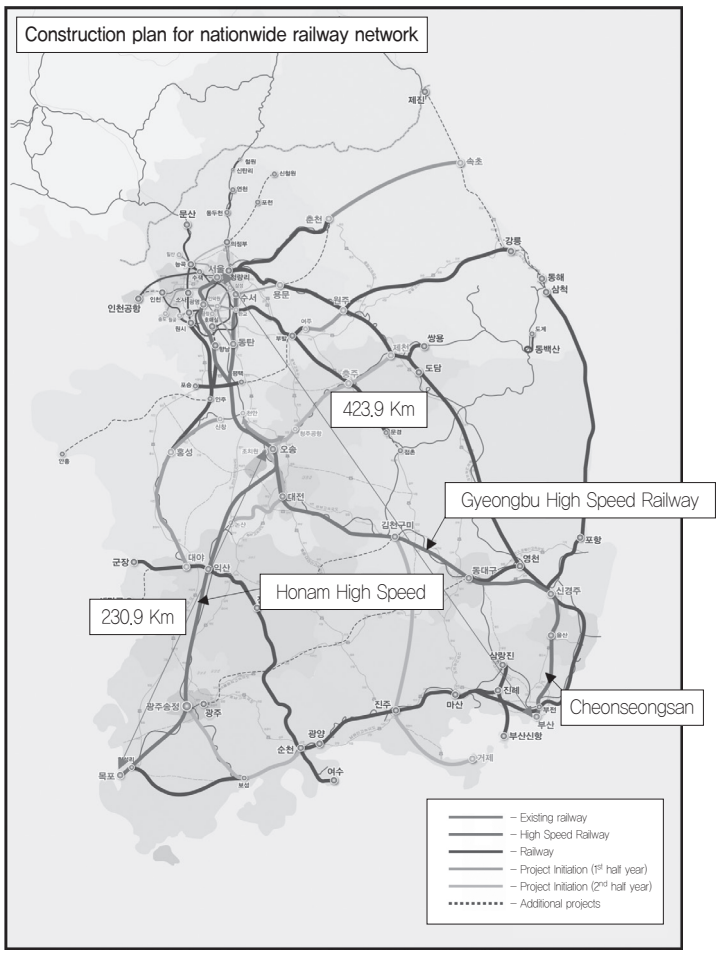
The consultation of environmental impact assessment was completed by the Ministry of Environment, implementing the assessment from the Research Institute of Donga University and Yusin design construction in October 1994. After the consultation, after news coverage featured on KBS and MBC on November 8, 2001, public interest increased for

the potential risk of a railway collapse during construction. Private environmental groups such as the Wetlands Conservation Solidarity, and citizens concerned with the preservation of Cheonseongsan increased the opposition, and public interest nationwide was garnered through Jiyul's "three steps, one bow" pilgrimage and hunger strike.

Those opposing the project worried about destroying the ecosystem due to the depletion of underground water, mineral water and swamps because of the destruction of an underground vein of water and ground subsidence if this type of long tunnel was constructed (Kim Jongho, 2004, KEI). In particular, they claimed that 22 high-rise swamps and more than 30 species of animals and plants that were protected existed in Cheonseongsan, and also in the Geumjeongsan, 59 species of bird inhabitants, and there were temple cultural assets like Beomeosa, Mandeoksaji and Gukcheongsa.

In response, the project operators, the Korea Rail Network Authority, insisted that various research verified that forest areas removed by the tunnel construction method were very small compared to general engineering works, with no influence on the surface ecology, and that the tunnel excavation work had little possibility of affecting the ecosystem because the vertical distance from the swamp and tunnel was 320m and the horizontal distance was 880m. In addition, the project operators claimed that the eco-friendly design was already made based on the analysis of the stratum structure and the conditions of underground water in this area. They concluded that the construction would be implemented without any effects due to tunnel construction by analyzing stratum structure by investigation agencies and technicians.

Figure 3-3 | Route Map of Gyeongbu High Speed Railway



Source: Kim Jongho(2004). A Study on Environmental Conflict Resolution Policy. KEI

The main issue for the conflict was safety and economic feasibility. First, stability was a concern because Cheonseongsan and Geumjeongsan are located between the Dongrae fault and Yangsan fault which are active fault lines. However, the Korea Rail Network Authority insisted that they had completed geologic investigations and public safety was verified as tunnel methods had already been used for Unju tunnel during the first section (Yeongigun in Chungnam, 4,020m), Hwanghak tunnel (Youngdong to Gimcheon, 9,975m), the number two subway line in Seoul and Busan and traversing Suyoung River, and also being used for the Euro tunnel passing the Strait of Dover.

Table 3-6 | Comparison between Advantages and Disadvantages of three Alternatives of the Daegu-Busan Route

Alternatives	Advantages	Disadvantages
Alternative 1 (Railway passing Gyeongju as the initial alternative –Basic alternative)	① Open all sections at the same time ② The route most in demand ③ Total running time of 116 minutes (assuming the speed of 300Km/h)	① The project costs would be 63 trillion won more than that of alternative three (assuming the total costs of 17 trillion won). ② Opening all sections would be postponed to November 2005.
Alternative 2 (Making a straight route stopping in Milyang)	① Energy efficiency as the running distance is reduced by 377km compared to alternative 1 ② The running time is reduced by approximately 8 minutes compared to alternative 1 (assuming speed of 300Km/h). ③ The project costs for railway are reduced by 16 trillion won compared to alternative 1 (assuming construction costs of 42.8 billion won/km).	① Opening all sections would be postponed to November 2005. ② The demand would be reduced by 20% compared to alternative 1. ③ Difficult construction conditions due to the mountainous terrain surrounding Daegu-Milyang, and the soft ground of Milyang-Busan. ④ Large SOC investment would be required to structure the transferring traffic network if Milyang was designated an intermediate station.
Alternative 3 (The construction of this route being deferred, and make Gyeongbu railroad high speed)	① July 2003: the earliest opening time ② The project costs for railway are reduced by 63 trillion won compared to alternative 1 (excluding the costs of making existing railway subways, assuming the construction costs of 42.8 billion won/km).	① The running time would take 44 minutes more than that of alternative 1. ② The costs would be 361.9 billion won for the connecting line for an early opening and 468.7 billion won for making existing lines to subways (standard price of the year 1997). ③ Temporary route

Source: Lee Byungin 2002, "The problems of Environmental impact and Environmental Impact Assessment with the Gyeongbu High Speed Railway passing Geumjeongsan and Cheonseongsan"

In terms of economic feasibility, the opposition claimed that the straight route from Daegu to Busan without stopping at Gyeongju was 382km, which was 30km less than the transferring route of 412km. If this was converted into construction costs, it would be 1 trillion won, and they insisted on the route change as the traveling time also would take 10 to 25 minutes more than the straight route.

2.2. The Conflict Case of Youngdeok-Yangjae (Currently Yongin-Seoul) Expressway

The Youngdeok-Yangjae expressway was a project funded by private investment, to ease the traffic congestion in the northwest areas of Yongin formed by sprawling development in the Yongin area promoting "Prevention measures to sprawling development in the metropolitan area" and "Detailed promotion plans for improving traffic congestion in the southern area of the metropolitan area". This 22.9km expressway construction project connected Yongin to Seoul with traveling speeds of 100km/hr.

Table 3-7 | Details of Youngdeok-Yangjae Expressway Project (Plan Made during Assessment)

Classification	Details of project	
1) Distance	○ Total of 22.9Km	
2) Width	○ 6-4 lanes	
3) Design speed	○ 100Km/hr	
4) Facility plans	○ Intersections: 6 IC, 1 JCT ○ Tunnels: 10 tunnels/8,174m ○ Bridges: 20 bridges/3,615m (Main bridge) ○ Business office: 2 main offices, 1 IC office	
5) Details of promoting project	○ 1997.04.10	· Legislation of the Special Act on Intraregional Traffic Management (Legislation No. 5333)
	○ 2000.05	· Announced measures for improving traffic in southern areas of the metropolitan area
	○ 2000.12	· Research of Youngdeok-Yangjae road building project (Korea Land Corporation)
	○ 2001.12	· Establish intraregional traffic network in the metropolitan area
	○ 2002.09.16	· Submit private investment project proposal of Gyeongsu Expressway Corp. (tentative name)
	○ 2002.12.30	· Prior consultation of route (Korea Land Corporation Gyeongin Regional Environmental Office)
	○ 2003.02	· Write the third party announcement (Ministry of Construction and Transportation)
	○ 2003.12.18	· Designate prior consultation target (Ministry of Construction and Transportation)
	○ 2004.04.19-2004.11.22	· Presentations for residents and hearings of environment and traffic impact assessment
	○ 2005.01.10	· Make implementation agreement and designate a project operator
	○ 2005.02.15	· Additional hearings held for environment and traffic impact assessments (all sections)
	○ 2005.04.28	· Completion of Environmental Impact Assessment

Source: Gyeongsu Expressway Corp. 2004 Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

Figure 3-4 | Route Map of Youngdeok-Yangjae Expressway

Source: Gyeongsu Expressway Corp (2004). Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

The foundation of this project was the Special Act on Intraregional Traffic Management, and it was a privately proposed project by conducting the designing research of Youngdeok-Yangjae Expressway as a measure to improve traffic in southern areas of the metropolitan area. In 2002, the prior consultation of routes with the Regional Environmental Office was completed and the environmental impact assessment started in 2004. This expressway passes two metropolitan councils and five primary local governments, Seocho-gu, Gangnam-gu, Seongnam-si, Yongin-si and Suwon-si. Therefore, presentations for residents were made five times by five primary local governments, but the presentation was deferred by Suwon-si, so an additional presentation was done for Suwon-si. As social conflicts were created by public announcement and presentations, four hearings were held. The environmental impact assessment was implemented as the process experienced difficulties including deferred presentations of Suwon-si and cancelled hearings in Seongnam-si and Suwon-si.

Table 3-8 | Details of Presentations and Hearings

Date	Details		Remarks
April 19, 2004	Presentations for residents	- Gangnam-gu and Yongin-si	Project operator
April 20, 2004		- Seongnam-si and Suwon-si (The presentation for Suwon-si was not held due to the refusal of announcement and provision of venue for presentation.)	
April 21, 2004		- Seocho-gu	
June 30, 2004	First hearing	- Auditorium in the Saemaeu Movement training center - Result: It did not proceed favorably due to reasons outside the project operator's control.	Project operator
September 16, 2004	Presentations for residents in Suwon-si	- Conference room in the Gyeonggi Small and Medium Business Center - Result: It did not proceed favorably due to reasons outside the project operator's control.	Project operator
October 8, 2004	Second hearing	- Auditorium in the Korea Housing Corporation - Result: It did not proceed favorably due to reasons outside the project operator's control.	Project operator
November 22, 2004	Additional hearing (the third hearing)	- Auditorium in the Korea Housing Corporation (except for Suwon-si)	Project operator
February 15, 2005	Additional hearing (the fourth hearing)	- Auditorium in the Korea Housing Corporation (All sections)	Project operator

Source: Gyeongsu Expressway Corp(2004). Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

During the route and environmental impact assessment process, project operators, designers and environmental assessment organizations visited NGOs in Suwon-si on six separate occasions and two times to NGOs in Seongnam-si. In addition, project operators, designers and environmental assessment organizations explained the route and on-site investigations by visiting 26 times or holding meetings to reach an agreement with local residents in Seongnam-si, where the opposition was the strongest. The Ministry of Construction and Transportation, the responsible authority during this time, tried to resolve conflicts by contacting NGOs in Seongnam-si, NGOs in Suwon-si and local residents four times.

Table 3-9 | Details of Opinions of Residents and NGOs

Classification	Targets	Main agent for collecting opinions	Numbers of times	Main requirements
Presentations for residents		Project operator	26	Opposition to route passing near town, require separate hearings
	NGO	Project operator	2	Opposition to route passing through, Organization of committee for route selection, etc.
		Ministry of Construction and Transportation	1	Organization of committee for route selection, etc.
Hearings	Local residents	Project operator	1	Opposition to route passing Cheongmyeongsan
	NGO	Project operator	5	Opposition to route, Questioning the need for the road
		Ministry of Construction and Transportation	2	Opposition to route passing Gwanggyosan

Source: Gyeongsu Expressway Corp. 2004 Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

The conflicts of this project showed that the opinions of primary local governments were split regarding approval or disapproval of the project compared to the conflicts between opposition solidarity and Korea Rail Network Authority for Gyeongbu Expressway passing

Cheonseongsan. The main conflict arose between Yongin-si standing on the affirmative side and Suwon-si and Seongnam-si on the opposing side, and Seocho-gu and Gangnam-gu showed concerns about traffic congestion of Heolleung-ro and air pollution.

Suwon-si opposed the route passing Gwanggyosan and Woncheon amusement park because it would have an environmental impact, and Seongnam-si requested a route change because the route passing through rural housing areas would be affected by noise, landscapes and air quality. However, the project operator claimed that it was the optimal route considering the functions of the road and the budget plan, and the route that opposition requested would still impact the natural environment in a similar way. On the contrary, Yongin-si insisted that the early beginning of construction should be made because the traffic network was not expanded due to the sprawling development in Yongin-si, and in response, the project operators argued they would advance the construction as soon as possible after the project approval, as soon as the environmental impact assessment was completed.

One of the reasons of conflict was the fact that residents were not aware of the project up until the presentations of environmental impact assessment or the process being made. It also became difficult to adjust because the interest of residents who would be harmed by the road building and residents who would benefit from it, including solving the traffic congestion, was mixed.

Table 3-10 | Main Requirement by Each Region

Regions	Main requirements	Reasons
Suwon-si	Opposed to the route passing Woncheon amusement park	Require the connecting route with other projects in Suwon-si
Seongnam-si	Change to a route detouring Seongnam-si	No benefits for traffic in Seongnam-si, it would only be influenced by it.
Yongin-si	Early beginning of construction	Ease the traffic congestion
Seocho-gu	Concerns of traffic congestion of Heolleung-ro and air pollution	Increased traffic volume at the end
Gangnam-gu	Concerns of traffic congestion of Heolleung-ro and air pollution	Increased traffic volume at the end

Source: Gyeongsu Expressway Corp (2004). Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

Figure 3-5 | Photos of Residents' Hearings

Affirmative side (Yongin-si)
Photo of requiring early beginning of construction

Opposition side
(Suwon and Seongnam-si)
Photo of requiring opposition of project

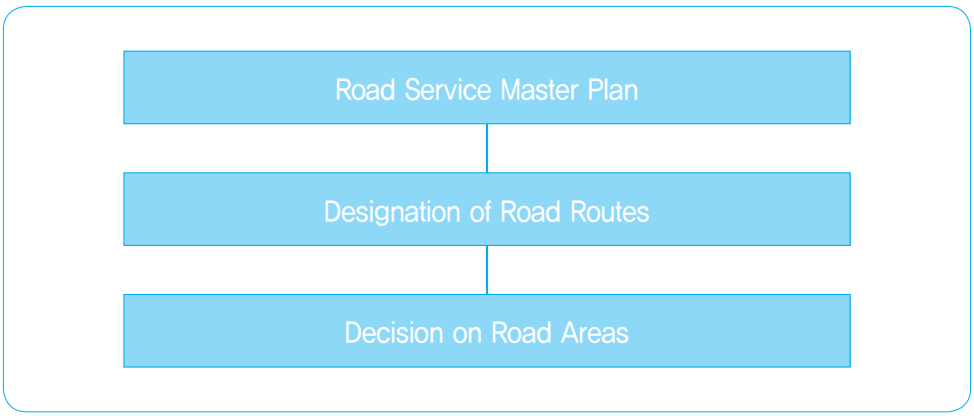
Source: Gyeongsu Expressway Corp (2004). Environmental Impact Assessment of Youngdeok-Yangjae Expressway private investment project

3. Necessity for Prior Consultation System of Road Routes

3.1. Administrative Process

The prior consultation of administrative plans was completed in the process by each stage in accordance with related regulations. Therefore, the process of administrative activities of a road should be followed by the prior consultation of road projects. The administrative process of road projects is implemented in the stages of a road service master plan, designation of road routes, and decision on road areas.

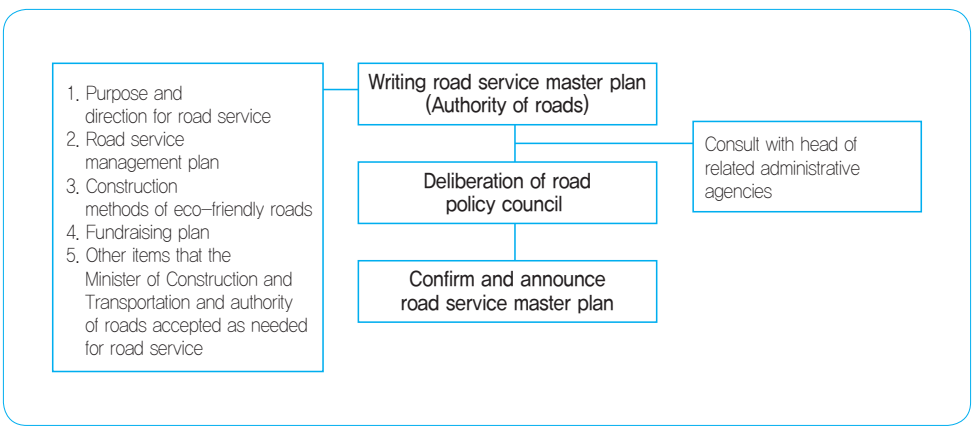
Figure 3-6 | Process of Administrative Activities of Road Route Decision of Road Projects



Source: Korean Society of Civil Engineers (2009). Guideline of Plan of Road Construction

The stages of administrative process of road projects are as follows. The road service master plan is a comprehensive plan recommending plans for long-term road networks and the long-term service direction of roads. Therefore, the plan period is a 10-year base and the feasibility is examined every five years.

Figure 3-7 | Process of Road Master Plan

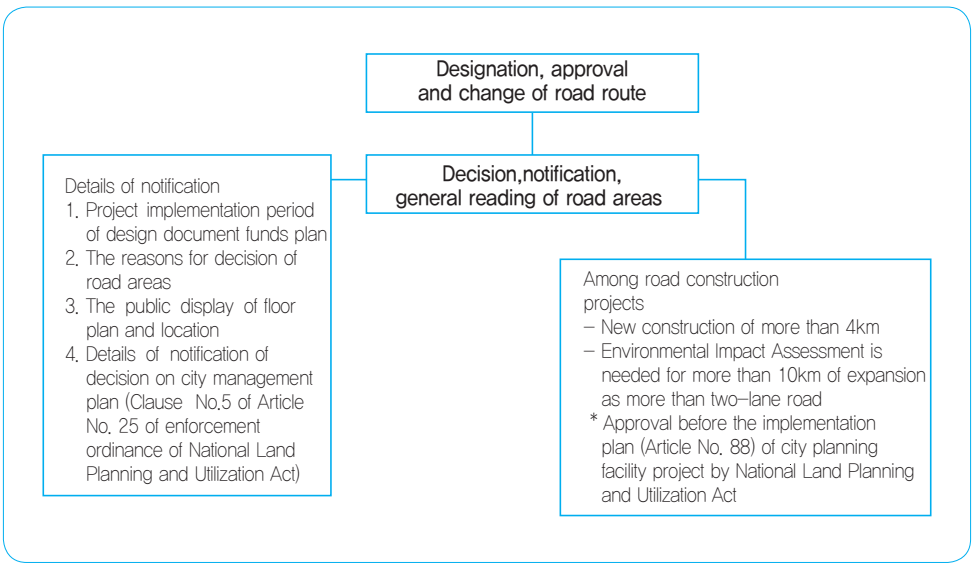


Source: Korean Society of Civil Engineers (2009). Guideline of Plan of Road Construction

The designation of road routes is the simple administrative plan assigning road numbers to origin and destination roads. The authority for roads should decide on road areas when there is recognition or change of road routes, and then write a detailed plan of road

construction including the location map of roads, the ground plans for roads, reports, lot numbers and land categories of land usage, the statements for feasibility rights and other rights. The concrete plan of routes is made in the stage of decision on road areas.

Figure 3-8 | Process of Designation of Road Routes and Decision on Road Areas



Source: Korean Society of Civil Engineers (2009). Guideline of Plan of Road Construction

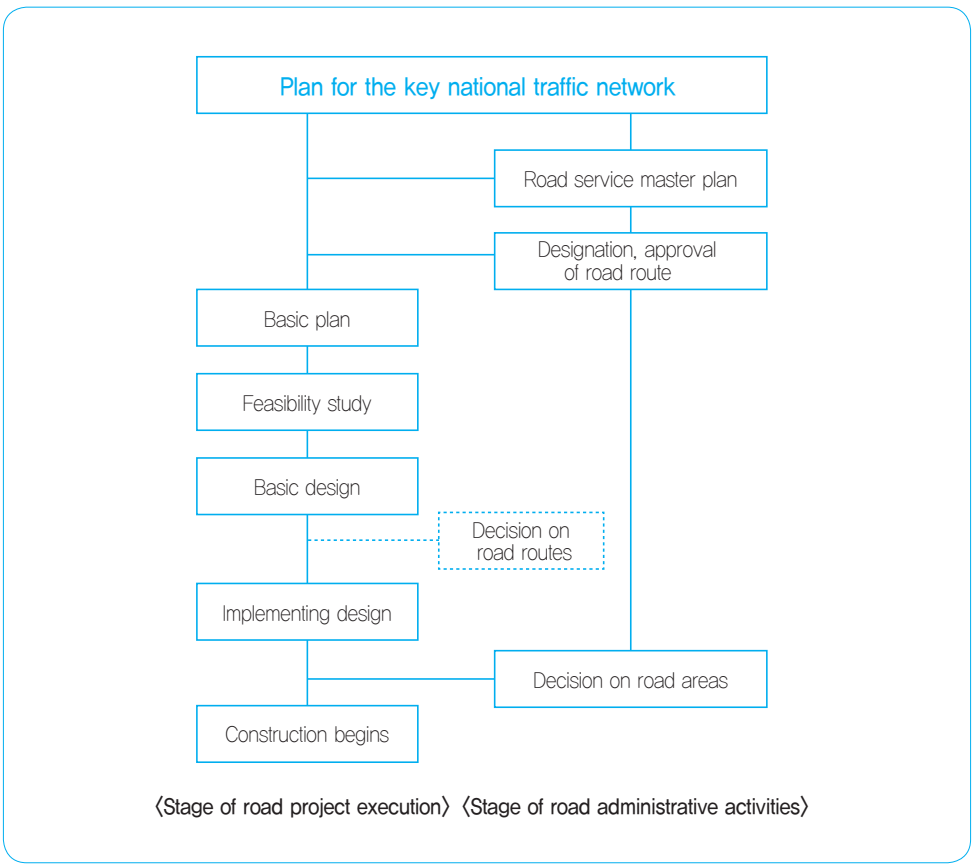
3.2. The Necessity of Prior Consultation

Prior consultation for road routes was not included in the Prior Environmental Review System because the prior consultation system implemented by decree of the prime minister before 1999 and were new related regulations in the Basic Environmental Policy Act in December, 1999 and made it as its legal base at that time.

Prior consultation should be implemented when the road routes were confirmed, but the designation of road routes by the Road Act was being decided only by the origin and destination, and the stage of road master plan was just an administrative plan which did not make concrete road routes, therefore, prior consultation could not be done. The concrete road routes were decided between the process of the designation of road routes and the decision of road areas in terms of administrative standards. Due to this reason, the Prior Environmental Review of road routes was excluded in the Basic Environmental Policy Act implemented in December 1999.

However, problems came out as the demands for route changes were frequent at the time of environmental impact assessments of road projects. There were no administrative plans of the Prior Environmental Review in the Road Act, and changes were demanded for already confirmed routes in the process of confirming routes and implementing the environmental impact assessment of the practical plan and design phase. However, there were many situations that could not change routes in the implementing design phase of the road project process as many works including on-site investigation, consultations with related institutions and working designs were already done.

Figure 3-9 | Design Stage of Administrative Activities of Road Project



Source: Korean Society of Civil Engineers (2009). Guideline of Plan of Road Construction

There were many suggestions for reviewing road routes again from environmental offices in the executed projects before and after 2000 when no prior consultations of road projects were made.

For the environmental impact assessment of construction for the substitute bypass of the national highway (Shinjeon-Gaheung) in Yeongju-si implemented by Busan Construction and Management Administration in October 1998, consultation was accepted with the Daegu Regional Environmental Office and the Department of Environment suggested overall alternative routes considering planned routes, connecting routes and the selection of optimal intersections. For the environmental impact assessment of road expansion and paving work between Dupo and Cheoncheon implemented by Seoul Construction and Management Administration in December 1998, consultation was accepted with the Han River Basin Regional Environmental Office and the route using existing roads was recommended because the planned routes would damage the land and surrounding natural environments.

Table 3-11 | Assessment Opinions of Routes before Prior Consultation of Road Routes

Classification	Case 1	Case 2	Case 3	Case 4	Case 5
Project title	Substitute bypass of national highway (Shinjeon-Gaheung) in Yeongju-si	Road expansion and paving work between Dupo and Cheoncheon	Road expansion and paving work between Miro and Samcheok	Two-lane construction of Line 59 (Cheongam-Samjang) of government funded prefectural road	Road expansion and paving work between Ehwa and Samgye
Project operator	Busan Construction and Management Administration	Seoul Construction and Management Administration	Wonju Construction and Management Administration	Busan Construction and Management Administration	Gyeonggido
Consultation institution	Daegu Regional Environmental Office	Han River Basin Regional Environmental Office	Wonju Regional Environmental Office	Nakdong River Basin Regional Environmental Office	Ministry of Environment
Acceptance date	October 15, 1998	December 14, 1998	December 15, 1999	October 30, 2000	October 22, 2001
Consultation days	565 days	208 days	163 days	476 days	258 days
Opinions about routes	Suggest overall alternate routes considering planned routes and connecting routes and the selection of optimal intersections	Suggest routes using existing roads because the planned routes would bring much damage to land and natural environment.	Actively review alternate routes	Review other environmentally couscious alternatives of suggested routes in assessment statements or build a tunnel	Suggest optimal alternatives with comprehensive reviews minimizing damage to the environment

Source: http://www.eiass.go.kr

The Ministry of Construction and Transportation, where road projects were most implemented, asked for environmental review opinions from the Ministry of Environment, and after approvals, inter-ministerial prior consultations began. The following figure shows the first draft review of the Han River Basin Regional Environmental Office in the environmental impact assessment of road expansion and paving work between Dupo and Cheoncheon on the Environmental Impact Assessment Support System.

Review opinions of Environmental Impact Assessment draft of road expansion and paving work between Dupo and Cheoncheon

〈General suggestion〉

- Since the majority of planned routes are creating new roads rather than expansion and paving of existing roads, recommendations to find ways to adjust planned routes using existing roads rather than creating new roads in order to minimize the changes in land and soil and damage to nature.

〈 Land and soil 〉

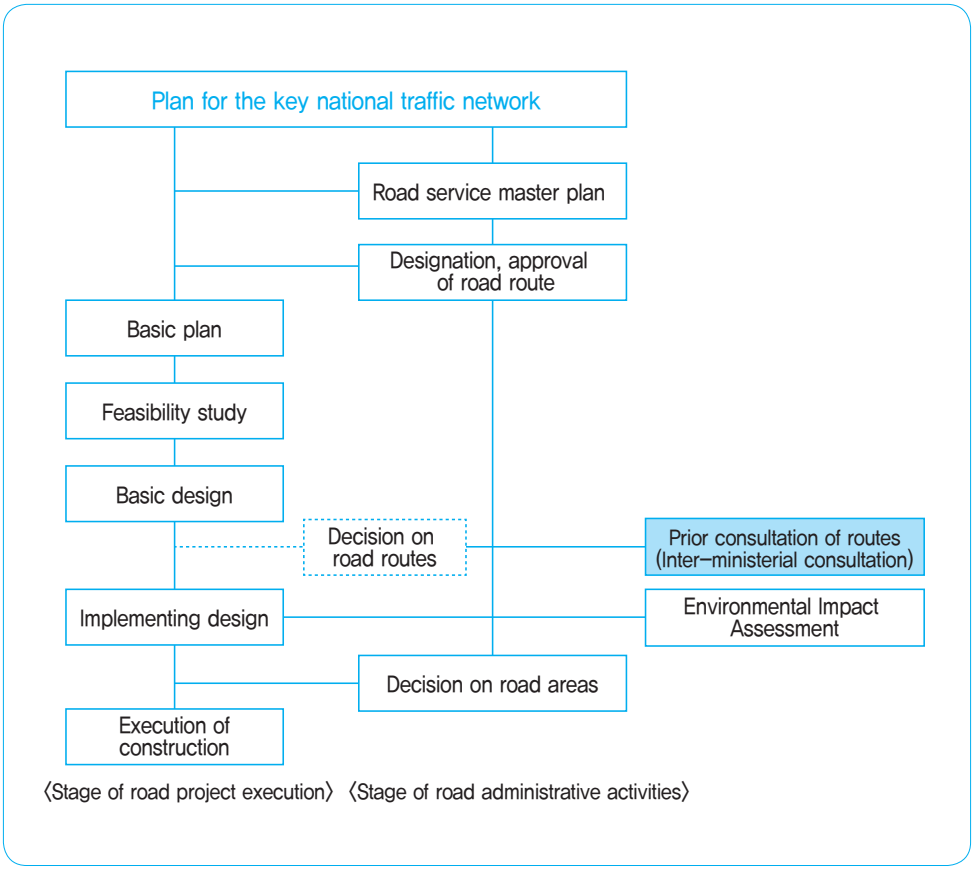
- Due to this project implementation, the geological mapping (indicating geological structures such as flexures, foliations and joints) is recommended by detailed geological survey for areas influenced by the project and neighboring areas.

3.3. Prior Environmental Review of Road Projects

The Ministry of Construction and Transportation eventually came to require the reviews of routes in terms of environmental impacts from the Ministry of Environment after the implementation of the Prior Environmental Review System by the Basic Environmental Policy Act in 1999. The Ministry of Construction and Transportation required an inter-ministerial agenda from the Ministry of Environment that there would not be any changes for routes in the stages of implementing and environmental impact assessment. This meant that the routes were decided upon the opinions of the Ministry of Environment before environmental impact assessment. Therefore, the prior review of road routes was not the target of Prior Environmental Review by the Basic Environmental Policy Act, but it was implemented by inter-ministerial agreement in official documents.

The Prior Environmental Review was implemented based on revised legislation of the Basic Environmental Policy Act as follows (December 18, 2004) while the prior consultations were implemented by inter-ministerial agreement by the Ministry of Construction and Transportation and Ministry of Environment.

Figure 3-10 | Road Promotion System and Period for Prior Consultation of Routes



Source: Korean Society of Civil Engineers (2009). Guideline of Plan of Road Construction

According to the Prior Environmental Review System regarding the administrative plans, collecting residents' opinions became compulsory in 2006, after the prior consultation of road routes was legislated as a target of Prior Environmental Review of the Basic Environmental Policy Act. The framework of strategic environmental assessment was prepared as the collection of residents' opinions became compulsory at the time of prior consultation of road routes, and included the road service master plan and administrative plan before the decision of road route, and was included in the target of Prior Environmental Review during this period.

Table 3-12 | Prior Environmental Review Target of Road Routes (Dec. 18, 2004)

Classification	Types of administrative plans	Time for review
1.6. Large-scale construction projects	(1) Construction projects with total construction costs of more than 50 billion won (for road construction, only limited to construction of national expressways) which the government or local governments conduct a feasibility study in accordance with Clause No. 6 of Article No.38 of the enforcement ordinance of Construction Technology Management Act	When the appropriateness of feasibility study is reviewed in accordance with Clause No. 6 of Article No. 38 of the enforcement ordinance of Construction Technology Management
	(2) Road construction project plans (excluding national expressways) in accordance with the articles and rules of Clause No. 13 of Article No. 2 of the National Land Planning and Utilization Act	Road route selections of basic design and Implementing design in accordance with Clause No. 11 of Article No. 38 of the enforcement ordinance of the Construction Technology Management Act

*The attached table of enforcement ordinance of Basic Environmental Policy Act (Clause No.1 of Article No.7)

Table 3-13 | Prior Environmental Review Target of Road Routes (May 30, 2006)

Classification	Types and sizes of administrative plans	Time for review request
1.5. Road construction	(1) Road service master plan in accordance with Clause No. 2 of Article No. 23 of the Road Act	When the management offices consult with the head of related administrative agencies in accordance with Clause No. 4 of Article No. 23 of the Road Act
	(2) Road construction project plans (excluding national expressways) in accordance with Clause No. 13 of Article No. 2 of the National Land Planning and Utilization Act and Article No. 2 of the Road Act	When Road route selections of basic design and Implementing design in accordance with Clause No. 9 of Article No. 38 or Clause No. 11 of Article No. 38 of the enforcement ordinance of the Construction Technology Management Act are made.

*The attached table of enforcement ordinance of Basic Environmental Policy Act (Clause No.1 of Article No.7)

4. Conclusion

The Prior Environmental Review System (PERS) in Korea started as a decree of the prime minister due to the aggregate extraction of Paldang, and underwent changes through social conflicts such as the sprawling developments in Yongin-si and Cheonsseongsan. As the Environmental Impact Assessment Act was revised as a combined law of the Prior Environmental Review System and Environmental Impact Assessment in July 2012, the Prior Environmental Review for administrative plans became a strategic environmental impact assessment, and the Prior Environmental Review for small-sized development projects became a small-sized environmental impact assessment. The Prior Environmental Review examined in this chapter looks at the administrative plans, and is applied to the strategic environmental impact assessment of the current Environmental Impact Assessment Act.

The conflict cases in the stage of environmental impact assessment as shown earlier, the environmental impact assessment of Gyeongbu Expressway was the project without the Prior Environmental Review, and the Youngdeok-Yangjae Expressway implemented the Prior Environmental Review but it was executed before the compulsory collection of residents' opinions. The conflict in the Gyeongbu Expressway project occurred after environmental impact assessment. In addition, although the prior consultation was made for routes for the Youngdeok-Yangjae Expressway, problems arose as public opinions of residents and NGOs were collected at the last phase of implementing the approved plan.

In implementing the road route prior consultation system among special cases of prior consultation system, the Ministry of Construction and Transportation (currently, Ministry of Land, Transport and Maritime Affairs), the project operating agencies and approval agencies cooperate with the Ministry of Environment regarding environmental aspects and smooth project promotion of road projects. This was an attempt to prevent wasting time and economic loss as the route change was required in the stage of environmental impact assessment like the cases without prior consultation of road routes. And in this case, the design of the planned route and consultation with related agencies needed to be completed again.

The Prior Environmental Review System (now known as the strategic environmental impact assessment) is an important system for securing the stability of administrative plans and environmental performance for sustainable development. It is implemented to stabilize administrative plans and the environmental performance of upper plans, overcoming environmental impact assessment after reviewing the background of introduction of Prior Environmental Review System, conflicts of environmental impact assessment, and prior consultations of road routes.

2012 Modularization of Korea's Development Experience
Environmental Impact Assessment

Chapter 4

System and Operation Status

1. Grounds and Process of Prior Environmental Review
2. Practice Cases of Prior Environmental Review

System and Operation Status

1. Grounds and Process of Prior Environmental Review

1.1. Target Projects

The Prior Environmental Review is specified to be implemented for 78 administrative plans that have decided locations and 14 administrative plans that do not have locations. These include the Distribution Industry Development master plan in accordance with Article 5 of the Distribution Industry Development Act among 92 administrative plans proposed in Clause 2 of Article 25 of the Basic Environmental Policy Act and Clause 1 of Article 7 of the same legislation, which are the grounds of Prior Environmental Review by administrative plans.

Table 4-1 | Target Projects for Prior Environmental Review

Classification		Types of policy plans
Policy plans (15 plans in eight fields)	Urban development (2 plans)	Distribution Industry Development master plan, Distribution Industry Development implementation plan
	Road construction (1 plan)	Road service master plan
	Development of water resources (1 plan)	Long-term plan for dam construction
	Railway construction (1 plan)	National railroad system construction plan
	Development of tourism complexes (3 plans)	Tourism development master plan, Regional tourism development plan, Hot springs development master plan
	Development in mountainous areas (4 plans)	Erosion control master plan, Basic forest plan, Forestry culture and recreation plan, Mountainous villages development basic plan
	Development in special areas (2 plans)	Farming and fishing village service master plan, Agricultural production infrastructure improvement plan
	Waste, excreta, livestock excretion treatment facility installation (1 plan)	Waste treatment basic plan
Basic development plans (86 plans in 17 fields)	Urban development (15 plans)	Construction project plan, Urban and military management plan, Designation of redevelopment promotion areas, Redevelopment promotion plan, Distribution complex development plan and Designation of housing areas
	Create industrial site and complex (10 plans)	Designation of factory construction district, Designation of national industrial complex and Designation of urban high-tech industrial complex
	Energy development (1 plan)	Designation of power supply development project area
	Harbor construction (7 plans)	New harbor construction basic plan, Designation of new harbor construction district and Designation of fishing ports
	Road construction (2 plans)	Basic plan for farming and fishing village roads, Road construction plan
	Development of water resources (1 plan)	Basic plan for dam construction

Classification		Types of policy plans
Basic development plans (86 plans in 17 fields)	Railway construction (1 plan)	Urban railway basic plan, Railway construction basic plan
	Airport construction (2 plans)	New airport construction basic plan, airport development basic plan
	Usage and development of river (3 plans)	Small river maintenance master plan, Small river maintenance implementation plan, River basic plan
	Cultivation and public water reclamation (1 plan)	Public water reclamation basic plan
	Development of tourism complex (5 plans)	Designation of tourist attraction, Designation of hot spring protection area, Hot spring development plan, Decision on provincial park plan, Decision on county park plan
	Development in mountainous areas (3 plans)	Forestry development promotion plan, Mountain village development plan, Mid- and long-term plan for supply and demand of cemetery
	Development in special areas (27 plans)	Free economic zone development plan and designation of free economic zone, Agricultural production infrastructure improvement project basic plan, Living environment improvement plan, Research and development special zone promotion master plan and Designation of underdeveloped area development promotion
	Installation of sports facility (2 plans)	Designation of youth center district, Sports facility project plan
	Waste, excreta, livestock excretion treatment facility installation (2 plans)	Site selection for water treatment facility, Livestock excretion management basic plan
	National defense and military facility installation (2 plans)	National defense and military project plan and designation of military base and facility as protection areas
	Collection of rock materials, sand, gravel, and mineral	Designation of aggregate extraction area

1.2. Main Participating Agents

The main participating agents of the Prior Environmental Review include the heads of related administrative agencies, project operators, the council for environmental review, local residents, and writing agents of Prior Environmental Review Statement, and their roles are as follows.

Table 4-2 | Participating Agents and their Roles in Prior Environmental Review Statement

Participating agents	Main role
Head of related administrative agencies	- As a heads of administrative agencies where the administrative plans or development projects for Prior Environmental Review are established or approved, they are main agents for writing the Prior Environmental Review Statement. (The head of central administrative agency concerned or affiliated organization, governors, mayors, heads of governing districts) ※ If the organizations establishing administrative plans are not administrative agencies, then these would be the heads of administrative agencies in charge of approvals.
Project operators	- When the head of central administrative agency requests consultation, the project operators can submit the review statement.
Council for environmental review	- The heads of administrative agencies write a draft of the Prior Environmental Review Statement considering opinions of council for environmental review in advance. - The types of alternatives, the detailed contents of examining items and methods are reviewed.
Interested parties such as local residents	- Local residents, experts, environmental groups, civic groups, etc. - Read the draft of Prior Environmental Review Statement of administrative plans and submit opinions
Writing agents of Prior Environmental Review Statement	- There are no special limitations on agents of writing review statement. * The legislation will be revised as only registered review agents will be writing review statement based on classifying the types of business of review agents.

Source: National legislation information center (http://www.law.go.kr), enforcement ordinance of Basic Environmental Policy Act (No.22768 of Presidential decree)

In the Prior Environmental Review System, the Council for Prior Environmental Review is organized and operated in order to collect environmental information and reflect the opinions in plans through consultations with experts and related agencies of

project plans. The Council for Prior Environmental Review is organized when the Prior Environmental Review begins in the planning stage and the establishment and permission of administrative plans. If administrative agencies are not the agencies of planning or establishing administrative plans for consultation targets, and the administrative agencies or organizing agents are comprehensive administrative agencies (such as local governments) for permission, etc., the departments responsible (such as the city-planning section) for the planning, establishment and permission of current administrative plans are responsible. The councils can be temporarily organized and the expert formed and operated considering work effectiveness if organizing councils is the administrative weight whenever the Prior Environmental Review is needed.

Table 4-3 | Rules of Council for Prior Environmental Review

Classification	Contents
Number of people	Fewer than 10 people
Organization	- One chairperson: the heads of related administrative agencies designate affiliated officers in the agencies. - Members of council: fewer than 10 people ○ People with expertise and experience related to concerned administrative plans (fewer than six people) ○ Affiliated civil officers recommended by the heads of consultation agencies (one to two people) ○ Affiliated civil officers recommended by the heads of related administrative agencies (two to three people) ○ Other people in need recognized by the heads of related administrative agencies
Decision methods	- The chairperson collects councils, and the majority of the current members need to be present and a decision is made by the majority of those in attendance. ○ Review in writing: The heads of related administrative agencies can make decisions on the cases including that the sizes of development projects of administrative plans were smaller than the targets of Environmental Impact Assessment or areas with minor environmental impact or no need for adjusting review opinions.

Source: National legislation information center (http://www.law.go.kr), enforcement ordinance of Basic Environmental Policy Act (No.22768 of Presidential decree)

1.3. Process

The organizations establishing administrative plans (project operators) submit the first preparation of draft to authorization agencies in accordance with No. 2 of Article 8 of the enforcement ordinance of the Basic Environmental Policy Act when the administrative plans are made. Then, the authorization agencies host the Council for Prior Environmental Review and review the plans with the types of alternatives, details of review items and review methods and other elements that the heads of related administrative agencies recognize as necessary. Finally, the authorization agencies notify the results after the decision is made by the majority of those in attendance.

The project operators submit plans to the heads of related administrative agencies and authorization agencies after writing the draft review with the reflection of the opinions of the Council for Prior Environmental Review. The heads of related administrative agencies announce the review draft, the date and venue for public display, the date and venue for presentation and submission period, and methods of submitting opinions in the local daily newspapers in the target areas and in the major national daily newspapers more than one time. The recommended period for public display is to be more than 20 days.

In case residents require the opening of public hearings after the completion of residents' opinion collection, it is recommended that the authorization agencies should announce the date and venue for the draft review and public hearings in the local daily newspapers in the target areas and in the major daily newspapers more than one time at least 14 days before the scheduled date.

In case of the completion of residents' opinion collection, the heads of related central administrative agencies submit to the minister of Environment if permission, approval, authorization, licensing, decision and designation are done for the administrative plans of development projects, or establishing and confirming administrative plans by the head in accordance with Clause 2 of Article 7 of the enforcement ordinance of the Basic Environmental Policy Act. If the heads of low ranking administrative agencies or governors or mayors, county governors and heads of district establish and confirm or permit the plans, then the main draft of review statement should be submitted to the head of local environment office, and then a request for consultation is made.

The minister of Environment and the head of the local environment office must notify opinions (consultation opinions) regarding the Prior Environmental Review within 30 days after the receipt of request according to Article 9 of the enforcement ordinance of the Basic Environmental Policy Act. However, if there are any unavoidable reasons, the period can be extended by 10 days.

For the effective supervision and management of the implementation of Prior Environmental Review consultation, the authorization agencies must notify the results of measures to the chairperson of the council within 30 days of notification in accordance with Article 10 of the Basic Environmental Policy Act. The heads of consultation agencies can then check implementation status of the results from the heads of authorization agencies or project operators if needed in order to check whether or not the implementation is being made.

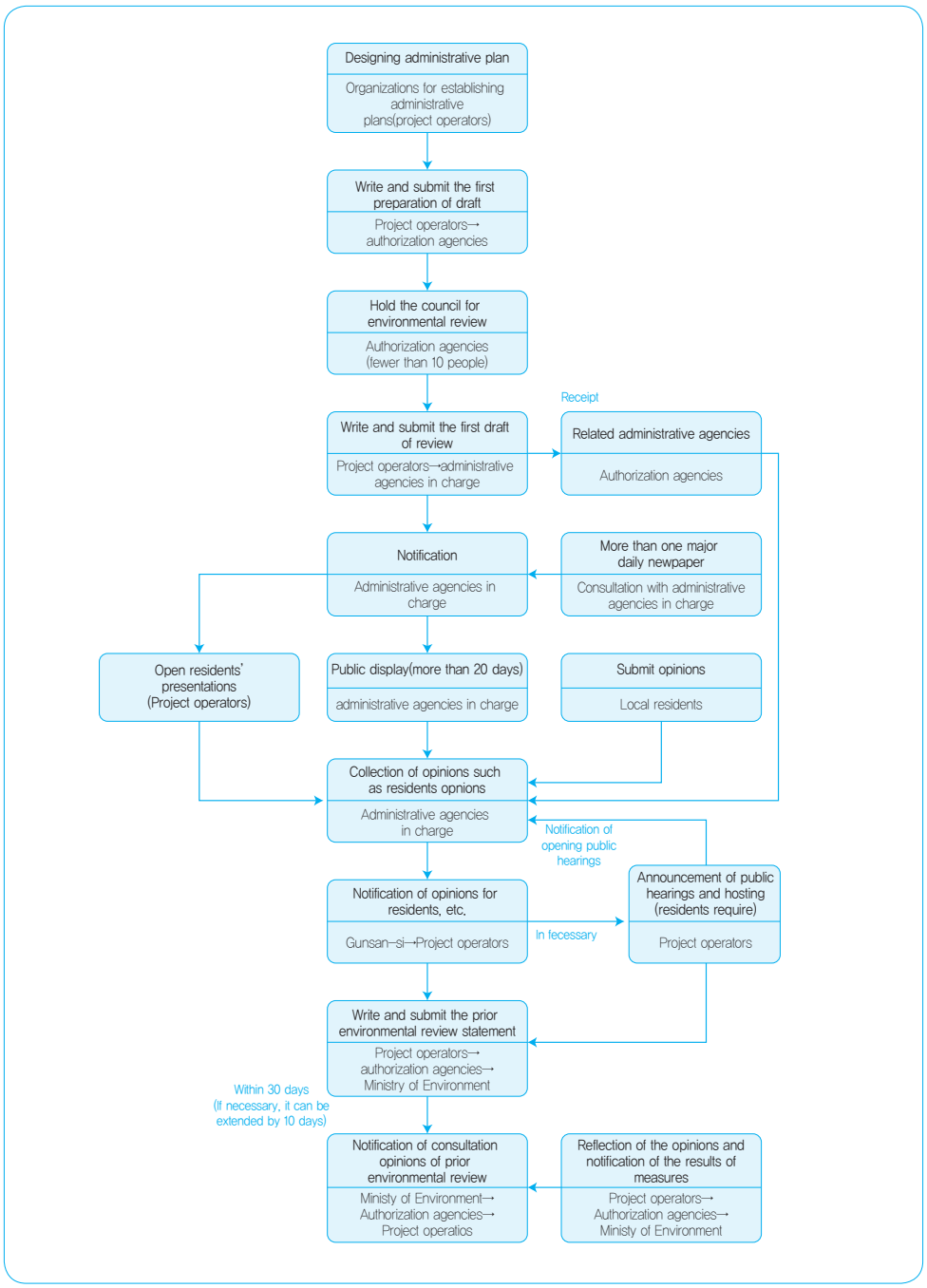
The content that should be included in the Prior Environmental Review Statement in accordance with "Notification No. 2009-173 of the Ministry of Environment, Regulations for writing Prior Environmental Review Statement, August 24, 2009, Ministry of Environment" are as follows:

Table 4-4 | Contents Included in the Prior Environmental Review Statement

A. Materials for the ecological characteristics such as development status in neighboring areas, and vegetation in target areas
B. Current level of pollution and status of pollution sources in target areas
C. Alternatives and results and the direction of impact reduction of environmental impact review (results and the direction of impact reduction of environmental impact review of project plan for development projects)
D. The location map with the scale of 1:25,000 in target areas
E. The land usage plan with the scale of 1:3,000 or 1:25,000 in target areas
F. Other necessary characteristics for Prior Environmental Review

Source: Notification No. 2009-173 of the Ministry of Environment, Regulations for writing Prior Environmental Review Statement, August 24, 2009, Ministry of Environment

Figure 4-1 | Procedure Chart for Prior Environmental Review



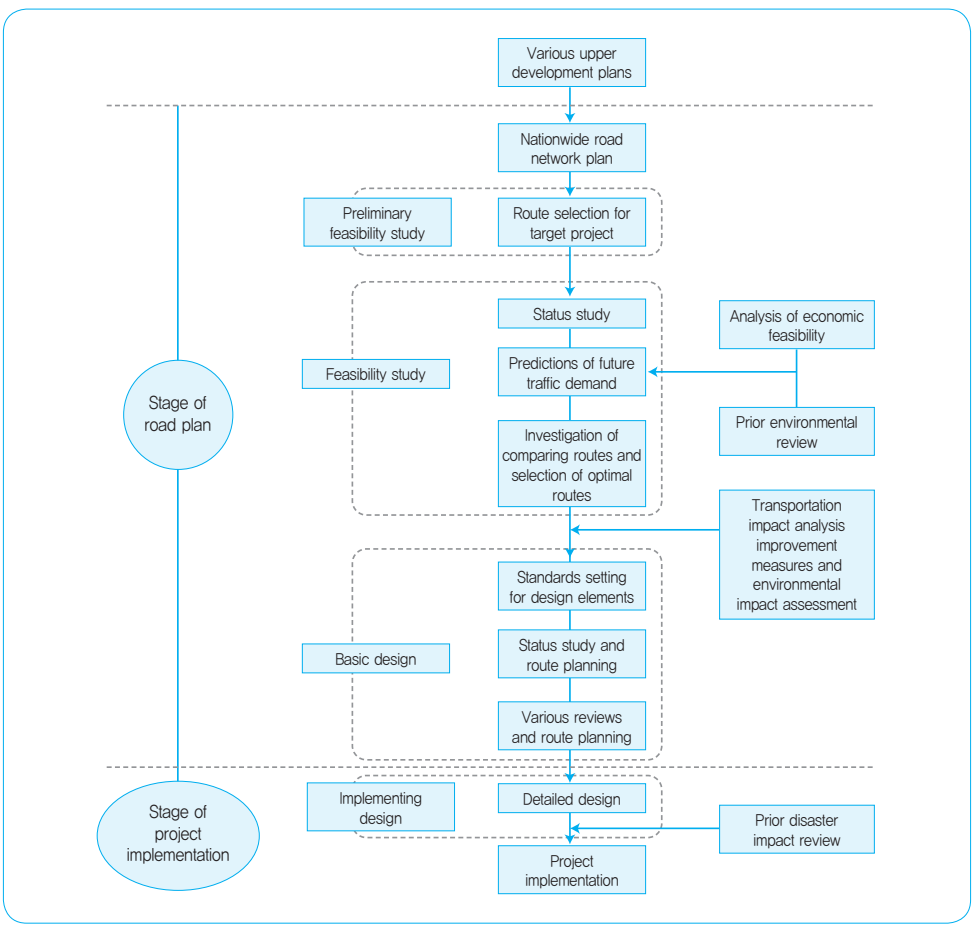
Source: Notification No. 2009-173 of the Ministry of Environment, Regulations for writing Prior Environmental Review Statement, August 24, 2009, Ministry of Environment

2. Practice Cases of Prior Environmental Review

The routes for project targets are selected by the preliminary feasibility study implemented in the various upper plans in the procedures of railway and road projects. The alternative routes are compared and investigated through the predictions of status study and future traffic demand at the time of the feasibility study. The Prior Environmental Review is processed based on the selected alternatives at the time, and then the optimal routes are selected upon the consultation results of Prior Environmental Review.

Here is the practical operation as shown below by implementing case analysis of target project for Prior Environmental Review of "The Prior Environmental Review for Aphae-Amtae road construction basic plan, September 2008, Iksan Construction and Management Administration".

Figure 4-2 | Diagram for Road Project Promotion



Source: Outline of road planning, 2009, the Korea Highway Corporation

Table 4-5 | Target Project of Case Analysis

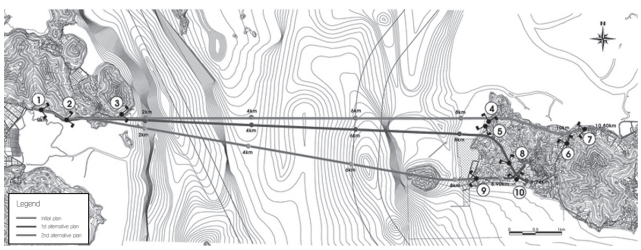
Project title	Prior Environmental Review for Aphae-Amtae road construction basic plan
Length	- L=10.8km, B=11.5m (two lanes in each direction)
Administrative areas	- Aphae-myeon and Amtae-myeon in Sinan-gun
Project operator	- Iksan Construction and Management Administration
Details of main promotion	- September 2005: feasibility study service - November 2007-September 2008: basic plan service

Source: Ministry of Land, Infrastructure and Transport (2008). The Prior Environmental Review of the feasibility study and basic plan for Aphae-Amtae road construction basic plan

The Prior Environmental Review for Aphae-Amtae road construction basic plan, September 2008, Iksan Construction and Management Administration.

Figure 4-3 | Planned Route for Target Project of Case Analysis

Alternative routes for Aphae-Amtae road construction basic plan



Source: Ministry of Land, Infrastructure and Transport (2008). The Prior Environmental Review of the feasibility study and basic plan for Aphae-Amtae road construction basic plan

2.1. Case Summary: Aphae-Amtae Road Construction Basic Plan

2.1.1. Implementing Schedule

Since the feasibility study and basic plan began in November 2007, the process of Prior Environmental Review proceeded from January 2008 and the status study was conducted through February to March 2008.

The first draft preparation of Prior Environmental Review Statement was completed on June 13, 2008, and the review in writing was done by June 23, 2008. After the draft was submitted to Shinan-gun, the administrative agency in charge, the public announcement for the collection of residents' opinions was implemented on July 7, 2008.

The presentations for residents were held in Aphae-myeon on July 16, 2008, and in Sinan-gun on July 15, 2008, and collecting residents opinions after the public display was completed on July 26, 2008. The review process was completed on October 27, 2008, after requesting consultation of main draft of Prior Environmental Review Statement with the Ministry of Environment on September 22, 2008.

It took approximately 130 days for the Prior Environmental Review from the time of writing the first draft preparation, and it took 10 months from the time of status study.

Table 4-6 | Schedule of Prior Environmental Review for Aphae-Amtae Road Construction Basic Plan

Date	Content
November 2007	Begin feasibility study and basic plan
June 13, 2008	Submit the first draft preparation of Prior Environmental Review (Iksan Construction and Management Administration)
June 23, 2008	Organize and operate a council for environmental review (Iksan Construction and Management Administration; Members of council: 10 people-Review in writing)
July 2008	Write and submit the first draft review (Iksan office, Sinan-gun)
July 7, 2008	Announce public display for residents (Iksan Construction and Management Administration)
July 15-16, 2008	Presentations for residents (Sinan-gun, Aphae-myeon)

Date	Content
September 22, 2008	Write and submit main review (Iksan office, Yeongsan River Basin Environmental Office)
October 27, 2008	Completion of review (Yeongsan River Basin Environmental Office, Iksan office)

Source: Ministry of Land, Infrastructure and Transport(2008). The Prior Environmental Review of the feasibility study and basic plan for Aphae-Amtae road construction basic plan Mnistry of Land, Infrastructure and Transport(2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

2.1.2. Alternatives and Review Items

Alternatives can be divided into the comparison of plans, means, demand and supply, location, time and order, and other items according to the Iksan Construction and Management Administration, 2008. The three alternatives submitted to the council for environmental review for the Aphae-Amtae road construction basic plan were selected and then requested including comparison of plans and location, and suggested reasons for not selecting as alternatives for the others.

For the review items, six items were selected as emphasized items for review, which include terrain and geological features, flora and fauna, air quality, water quality, noise and vibration, and recreation and landscape. In addition, four items for status study were selected, including weather, land usage, eco-friendly resource circulation and population.

Table 4-7 | Reasons for Selection or Non-selection of Alternatives

Types of alternatives	Selected or not selected	Reasons for selection or non-selection
Comparison of plans	Selected	○ Three alternatives were selected and then reviewed based on selected routes conducted by preliminary feasibility study in 2006.
Means	Not selected	○ Alternative selection was unnecessary because this project was implemented for the purpose of improving accessibility of transportation from sea to land, quality of living by providing road service balanced with national standards, development of tourism resources and basic transportation for local residents.
Demand and supply	Not selected	○ Alternative selection was unnecessary because the demand and supply of routes were validated at the time of preliminary feasibility study of Route 2 of the Aphae-Amtae road construction.

Types of alternatives	Selected or not selected	Reasons for selection or non-selection
Location	Selected	○ Three alternatives were selected and then reviewed based on selected routes conducted by preliminary feasibility study in 2006.
Time and order	Not selected	○ Alternative selection was unnecessary because related upper level plans of Yeonruk, Yeondo Bridge and Marine tourism infrastructure expansion basic plan were included.
Others	Not selected	○ No opinions of related administrative agencies

Source: Ministry of Land, Infrastructure and Transport(2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

Table 4-8 | Selection of Review Items

Classification	Emphasized items for review	Other items for review
Air environment	Air quality	Weather
Water environment	Water quality	-
Land environment	Terrain and geological features	Land usage
Natural and Ecological environment	Flora and fauna	-
Life environment	Noise and vibration, recreation and landscape	Eco-friendly resource circulation
Socioeconomic environment	-	Population

Source: Ministry of Land, Infrastructure and Transport(2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

2.1.3. Hold the Council for Environmental Review and Opinion Analysis

The members of council for environmental review for the Aphae-Amtae road construction basic plan consisted of 10 people including one from the Yeongsan River Basin Environmental Office as a consultation institution, one from KEI as a review institution, two from Jeollanam-do and one from Sinan-gun as related administrative agencies, two professors from Mokpo National Maritime University as environmental experts, and one engineering technician and two from Iksan Construction and Management Administration as the administrative plan establishment institution.

The council mostly had opinions that adopting an initial plan was reasonable as it did not pass Yeokdo, specialized islands, and it shortened the access time due to the straight line of the road and reduced construction costs. For the opinions of review items, the necessity of project and the appropriateness of plan were required for review as the project did not have economic feasibility. Also, other opinions included the propriety evaluation for passing vessels in main channels, plans for damage prevention at the time of vessel collision such as oil outflow, establishment of environmental damage prevention in the neighboring fisheries and villages, maximizing wild animal protection, minimizing damage to natural landscape when expecting landscape changes, and selecting road routes by considering accompanying environmental effects.

Table 4-9 | Opinion Analysis of the Council for Environmental Review

Classification	Opinions
Review opinions of alternative routes	- Adopt an initial plan that is reasonable.
	- Compare road route alternatives including No Action alternative with other alternatives.
	- Write reports on the appropriateness of sites, alternative review and the scope of environmental impact review for future development projects in the Prior Environmental Review and consult with the Ministry of Environment (Yeongsan River Basin Environmental Office).
Review opinions of review items	- The necessity of project and the appropriateness of plan were required to review.
	- Propriety evaluation for passing vessels set for 320,000DWT in main channels is needed.
	- Environmental review is needed in case of vessel collision considering issues such as oil outflow.
	- Consider measures for environmental damage from neighboring fisheries and villages as civil complaints are expected.
	- Establish measures to solve civil complaints and prevent expected environmental damage when the construction is implemented.
	- Minimizing damage to natural landscape when expecting landscape changes and selecting road routes.
	- Maximizing wild animal protection and considering accompanying environmental effects by road opening.
	- Connecting road construction is necessary between Songkong-ri and neighboring villages and developing areas in the future.

Source: Ministry of Land, Infrastructure and Transport(2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

2.1.4. Analysis of Residents' opinions

For the collection of residents' opinions in the draft of Prior Environmental Review for the Aphae-Amtae road construction basic plan, the announcement of public display and schedule of presentations were published in the Seoul Newspaper, a major national daily newspaper, and Mudeung Ilbo, a local daily newspaper, on July 7, 2008. The presentations were held for residents of Aphae-myeon and Amtae-myeon in Sinan-gun on July 15-16, 2008, and opinions of local residents were collected from July 7-26, 2008 through the public display of the draft.

In the presentations for residents, 22 people participated in Sinan-gun and 67 people participated in Amtae-myeon. They mainly required the reasons of reduction of construction costs compared to that of the preliminary feasibility study, making expansion for four lanes of bridge and excavation sections, building water and sewage when constructing bridge, and constructing pavement for bridge and excavation sections. The project operator, Iksan Construction and Management Administration, responded that constructing two lanes was appropriate as a result of prediction of traffic volume, it would consult with Sinan-gun for building water and sewage facilities, and explained constructing pavement was impossible but would use pavement shoulders.

Table 4-10 | Outline of Collection of Residents' Opinions

Presentations for residents			Public display for residents		Deadlines for opinion submission
Date	Venue	Number of participants	Venue	Period for public display and newspaper for announcement	
10:30 am July 15, 2008	Meeting room in Sinan-gun office	22	Island development department in Sinan-gun office, Aphae-myeon office	July 7-26, 2008 Seoul Newspaper, Mudeung Ilbo	Within seven days from the end of public display (August 4, 2008)
2:00 pm July 16, 2008	Meeting room in Amtae-myeon office	67	Amtae-myeon office		

Source: Mnistry of Land, Infrastructure and Transport (2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

Table 4-11 | Summary of Collection of Residents' Opinions

Items	Opinions
Feasibility of project	- Review the appropriateness of reduction on construction costs compared to that of the preliminary feasibility study
	- Review the possibility of expansion of Songkong port to the Aphae-myeon office and making expansion for four lanes for excavation section
Water quality	- Building water and sewage facilities when constructing the bridge
Transportation	- Securing pavement for bridge and excavation sections

Source: Ministry of Land, Infrastructure and Transport (2010). The Environmental Impact Assessment for Aphae-Amtae road construction basic plan

Figure 4-4 | Photos of Presentation for Residents

2.2. Assessment Details

2.2.1. Methods of Prior Environmental Review

a. Methods of Alternative Analysis

According to the Ministry of Environment, 2010, the role of the Council for Prior Environmental Review of Prior Environmental Review Statement by administrative plans is played as the emphasized review of the appropriateness of plans and the feasibility of sites depending on the types and characteristics of administrative plans, therefore the setting of alternatives is crucial.

In accordance with the regulations of writing the Prior Environmental Review Statement of the Ministry of Environment, 2008, the methods of alternative setting included investigating and suggesting the goals of environmental preservation and measures for achieving environmental standards set by environmental preservation policies in case of policy plans. The alternatives achieved for environmental standards are set by connecting with necessary alternatives of "development means, demand and supply".

In case of the development basic plan, it reviews and recommends the types of alternatives including the development site, emphasizing review items, and land usage plans (or routes). As for determining alternatives for development sites, alternatives for two to three sites should be reviewed and recommended after adjusting such sites and adjunct areas. When it comes to alternatives for emphasized review items, two to three alternatives should be reviewed and suggested by items determined by scoping. It is regulated that alternatives for three land usage or routes should be determined after selecting and considering emphasized review items and "development means and adjustment of sites".

Table 4-12 | Types of Alternatives and Selection Methods

Types of alternatives	Selection methods of alternatives
Comparison of plans	○ Select alternatives for possible situations when the administrative plans are not established (No action), and possible situations when administrative plans are established.
Means	○ Select various methods as alternatives to achieve administrative goals.
Demand and supply	○ Select alternatives by changing conditions of demand and supply (size) in case of plans deciding demand and supply in regard to development.
Location	○ Select alternatives by adjusting target areas or parts of boundary in case of plans deciding target development sites.
Time and order	○ Select alternatives by changing conditions of implementation period and proceeding order in case of plans deciding period and order.
Other	○ Alternatives considering all the above alternatives or alternatives that the heads of related administrative agencies decide are necessary considering the characteristics and details of plans.

Source: Work manual of Prior Environmental Review, December 2010, Ministry of Environment

In addition, the detailed review items for environmental impact are stipulated in No. 1 and 2 of Clause 2 of Article 8 of the enforcement ordinance of the Basic Environmental Policy Act to analyze the appropriateness of plans and feasibility of sites, and also regulated as in

the following tables in the regulations of writing Prior Environmental Review Statement of Ministry of Environment (2009).

Table 4-13 | Review Items for Appropriateness of Plans

Detailed review items	Review contents
A) Coincidence with environmental goals of plans	1) Coincidence with international environmental trends, agreements and standards 2) Coincidence with national environmental standards and plans 3) Coincidence with local environmental standards and plans
B) Soundness and sustainability of plans	1) Soundness of environmental plans 2) Coincidence with sustainability
C) Consistency of plans	1) Vertical consistency 2) Connectivity to other administrative plans
D) Other	

Source: Notification No.2009-173 of Ministry of Environment. Regulations on writing prior environmental review statement, Ministry of Environment

Table 4-14 | Review Items for Feasibility of Sites

Detailed review items	Review contents
A) Impact on natural environment	1) Effects on ecological soundness 2) Effects on biological diversity and habitat 3) Effects on natural landscapes
B) Impact on living environment	1) Effects on maintenance and achievement of environmental standards 2) Effects on maintenance of pleasant living environment 3) Effects on eco-friendly land usage
C) Other	

Source: Notification No.2009-173 of Ministry of Environment. Regulations on writing prior environment review statement, Ministry of Environment

b. Methods of Item Selection

The route selection is the most important stage of all stages of road construction. If the route selection goes wrong, it is impossible to reverse at the stages of design and construction; therefore, after selecting as many alternatives as possible, the route is selected by assessing social, economic, technological and environmental aspects of each alternative (Choi, Jun Kyu, 2002).

Table 4-15 | Detailed Review Items for Route Stand

Review items	Review content
Social aspects	- Review the meaning brought to local community by improving traffic network by expressway - Review the effects brought to the area considering other development projects - Consider negative social effects ○ Relationship between urban area and village (Analysis according to route passing) ○ Relationships among schools, hospitals and housing (adverse effects of noise, vibration, air pollution, and environmental problems such as sunshine, area division and scenery disturbance) ○ Relationships among heritages such as historical remains, buried cultural assets, temples and cemeteries (destruction by route passing) ○ Relationship with natural landscapes and ecology (destruction of natural environment) ○ Changes in natural conditions (flood damage and cold weather damage caused by changes in irrigation and weather)
Economic aspects	- Quantitative assessment of investment aspects such as construction costs and maintenance costs and economic benefit from the investment ○ Review economic factors in the stage of outline plans ○ Review economic factors in the stage of route selection ○ Review economic feasibility in the stage of road design
Technological factors	- Traffic technological aspect to deal with traffic flows and structure technological aspect to correspond to the natural conditions for structural settlement
Environmental aspects	- Be proactive with potential damage to be in harmony with natural environment ○ Consider aspects of natural environment and living environment ○ Selection of routes that minimize encroaching on farmlands and remnants of farmland ○ Routes that can be preserved considering terrain and geological features with value for conservation and landscapes of the area ○ Selection of routes using landscape by separating slow-vehicle lane and rapid-vehicle lane when passing areas with excellent landscapes

Source: Essentials of road design, 2009, the Korea Highway Corporation

The environmental review items are selected with reference to the Work manual of Prior Environmental Review (2010, Ministry of Environment), guidelines of eco-friendly road construction (2010, Ministry of Land, Transport and Maritime Affairs), guidelines of eco-friendly railway construction (2007, Ministry of Land, Transport and Maritime Affairs), and

writing guidelines and manual of environmental impact review with review opinions of KEI in case of usual projects of alignment of road, and the environmental assessment items and assessment details suggested by Choi Jun Kyu are as follows:

Table 4-16 | Environmental Assessment Items and Assessment Details of Route Selection

Items	Investigation details by items
Terrain and geological features	The degree of damage to unique terrain with academic, cultural and scenic values Expansion of cutting section of more than 20m Expansion of fill-up ground section of more than 10m
Flora and fauna	The degree of damage to habitat of flora and fauna with legal protection and ecological axis Damage area of areas above eight on the scale of the Degree of Green Naturality Damage area of areas above seven on the scale of the Degree of Green Naturality
Land usage	Expansion of usage section of existing routes Damage areas of preservation and protection areas
Air quality	Number of households exceeding environmental standards for the target year
Water quality	Passing basin of water supply protection area or not and flow distance
Noise and vibration	Number of households exceeding environmental standards for the target year

Source: Choi Jun kyu, Quantitative assessment method development for eco-friendly road route selection, 2002, Doctoral dissertation, Konkuk University

c. Route Selection Methods

When making decisions regarding route selection of railways and roads, it is important to secure objectivity of considering factors. If the considering factors are quantitative and metric, various alternatives can be compared and decided in a relatively straightforward manner; however, the decision-making issues related to the environment are mostly qualitative, so quantitative comparisons between factors are very difficult in this issue. Therefore, many studies have been done to overcome this problem, and Choi Jun Kyu suggested the decision-making results of the Delphi technique for weighted value by review items based on the expert survey using AHP (Analytic Hierarchy Process) methodology.

Although this method was much used in the beginning of Prior Environmental Review, now it is not used much because there are no standardized measures for the diversity of review items and weighted value by each item, so decisions are made based on review results together by each item.

Table 4-17 | Decision-making Results of Delphi Technique for Weighted Value by Items

Classification	Terrain and geological features	Flora and fauna	Land usage	Air quality	Water quality	Noise and vibration	Weighted value
Terrain and geological features	1	1/5	4	3	2	4	0.22
Flora and fauna	5	1	5	3	2	3	0.38
Land usage	1/4	1/5	1	1/2	1/3	1/2	0.05
Air quality	1/3	1/3	2	1	1/2	1	0.09
Water quality	1/2	1/2	3	2	1	2	0.16
Noise and vibration	1/4	1/3	2	1	1/2	1	0.09

Note) Fitness (C.I.): 0.072, fitness rate (C.R): 0.058

Source: Choi Jun Kyu, Quantitative assessment method development for eco-friendly road route selection, 2002, Doctoral dissertation, Konkuk University

d. Prediction Technique by Review Items

For prediction techniques and comparison items by each alternative for the Prior Environmental Review, a relatively simple screen model is used among various prediction techniques using an environmental impact stage, or comparing methods by each alternative calculating pollution load volume or emission using all sorts of basic units.

Table 4-18 | Prediction Techniques and Review Items used for Writing Prior Environmental Review Statement

Items	Prediction techniques
Air quality (odor)	Use recommended models such as AERMOD, CALINE3 Whether or not exceeding environmental standards in the environmentally sensitive area (residential area)
Greenhouse gas	Use various national basic units or IPCC basic unit Comparison of emissions and absorption after prediction of sources of carbon absorption, storage and emission such as energy, tree and soil
Flora and fauna	Investigation of degree of ecological naturality and degree of green naturality Investigation of protected flora and fauna Extension of the first grade degree of ecological naturality and the sixth and seventh grade degree of green naturality
Water quality	Apply rational method and all sorts of basic units Whether or not passing all protected areas including water supply protected area Rain water efflux volume, comparison of pollution load volume when constructing and operating
Marine environment	Use numerical models (EFDC, etc.) Comparison of sea water circulation Comparison of spread range of suspended loads and hot waste water
Terrain and geological features	Use design materials (earth volume, sand volume) Comparison of earth volume, sand volume, cutting height and banking height Comparison of unique protected terrain and geological features
Eco-friendly resource circulation	Apply all sorts of basic units Comparison of forest tree waste discharge volume and building removal waste discharge volume
Noise and vibration	Noise prediction formula (National Institute of Environmental Research formula, use numerical models including SOUND_PLAN) Comparison of noise and vibration excessive areas
Recreation and landscape	Use sketch method - Comparison of numbers of large cut slopes and embankment slopes and structure installation sections

Source: Notification No.2009-173 of Ministry of Environment. Regulations on writing prior environmental review statement, Ministry of Environment

2.2.2. Review Cases by Alternatives

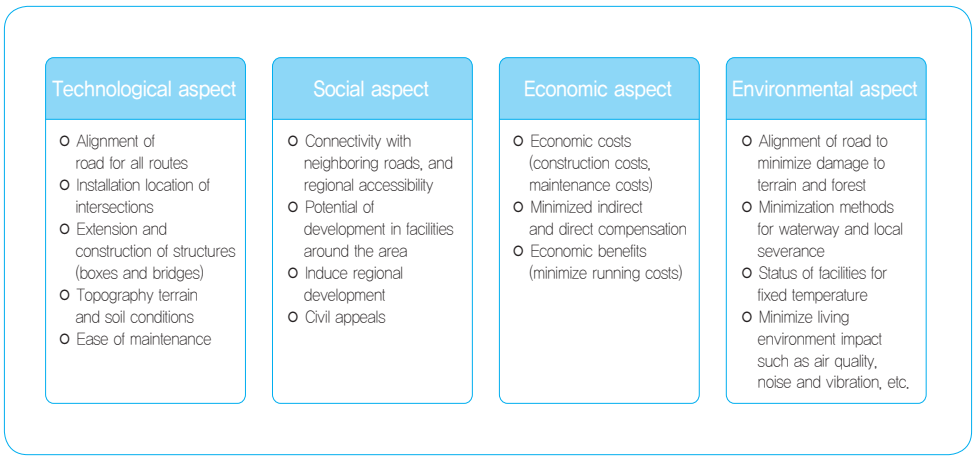
The selection of routes on the Prior Environmental Review Statement of the Aphae-Amtae road construction basic plan were reviewed in terms of technological, economic, social and environmental aspects by setting detailed comparing routes needed for the review of design standards.

As a result of review by alternatives of design and economic aspects, the first alternative was satisfactory even though horizontal alignment was rather disadvantageous. It could minimize damage to the living environment by detouring Songgong village and the Songgong coastal port, ease traffic congestion and risk of accidents due to urbanization, and prevent the polarized regions arising from the development of neighboring areas of Songgong coastal port and road building. In terms of environmental aspects, although the second and third alternatives were somewhat more satisfactory in terms of living environment (air quality, noise, and vibration) than the first alternative, they were similar to the other alternatives in terms of the living environment. The third alternative route was passing the specialized island, Yeokdo, and endangered animals (eagle owls) and plant species were found along the planned route, and the first alternative was environmentally more satisfactory because the natural environment and social and economic environment are more favorable.

Therefore, the first alternative was selected as the most appropriate route as a result of comparing and analyzing factors in terms of design and economic aspects and environmental aspect by each alternative.

In addition, the appropriateness of plans and the feasibility of sites were reviewed by alternatives considering detailed items (hereinafter "detailed review items") for environmental review stipulated in the attached <Table 2> of Article 3 of "Regulations for writing Prior Environmental Review Statement" of Notification of Ministry of Environment, No. 2006-105, and Article 8 of the enforcement ordinance of the Basic Environmental Policy Act. As a result, the first alternative was relatively satisfactory according to the national and local environmental preservation policies. It considered the ecological axis and green network, and prevented the polarized regions caused by the development of neighboring areas of Songgong coastal port and road building. For the review result of the feasibility of sites, all alternatives except for the third alternative, which was impossible to implement because it would pass the specialized islands, were similar. The first alternative was selected as it had relatively low damage to the living environment by detouring the specialized islands and facilities for fixed temperature and minimizing encroaching of farmlands.

Figure 4-5 | Considering Factors for Route Selection



Source: Ministry of Land, Infrastructure and Transport (2008). The Prior Environmental Review of the feasibility study and basic plan for Aphae-Amtae road construction basic plan

2012 Modularization of Korea's Development Experience
Environmental Impact Assessment

Chapter 5

Cases/Outcomes/Assessments

1. Road Projects
2. Housing Site Project
3. Conclusion

Cases/Outcomes/Assessments

1. Road Projects

1.1. Project without Implementation of Prior Environment

1.1.1. Outline of Case Project

The fourth beltway construction project of Seongseo Industrial complex – Jicheon – Eupnae-dong was planned to expand roads for improving transportation, as the volume of road service in Daegu was limited due to the increase of traffic volume by industrial development and the expansion of economic size. The Prior Environmental Review was not implemented for the project, and only the environmental impact assessment was implemented based on Article 4 of the Environmental Impact Assessment Act and Clause 2 of Article 2 of the enforcement ordinance of the same legislation.

Table 5-1 | The Fourth Beltway Construction of Seongseo Industrial Complex – Jicheon – Eupnae-dong

- Project name: The fourth beltway construction of Seongseo Industrial complex – Jicheon – Eupnae-dong
- Location
  - First construction section (Seongseo Industrial complex – Jicheon)
    - Origin: Gura-ri, Hwawon-eup, Dalseong-gun, Daegu (south end of Seongseo Industrial complex)
    - Destination: Yongsan-ri, Jicheon-myeon, Chilgok-gun, Gyeongsangbuk-do
  - Construction section (Jicheon- Eupnae-dong)
    - Origin: Yongsan-ri, Jicheon-myeon, Chilgok-gun, Gyeongsangbuk-do
    - Destination: Eupnae-dong, Buk-gu, Daegu
- Project operator: Daegu Metropolitan City Mayor
- Project details
- Project period: December 1997-2002
- Necessary budget: 767.6 billion won
- Project size

Construction section	Full length (km)	Breadth of road (m)	Number of lanes	Designed speed (km/hr)	Intersection (numbers of site)
First construction section (Seongseo Industrial complex-Jicheon)	12.80km	30-37	6-8 lanes	100	4
Second construction section (Jicheon- Eupnae-dong)	8.80km	28.0	6 lanes	80	3

Source: Ministry of Daegu Metropolitan City (2001). The Environmental Impact Assessment for The Fourth Beltway Construction of Seongseo Industrial complex – Jicheon – Eupnae-dong

Table 5-2 | Details of Project and Environmental Impact Assessment Promotion

- December 1994-February 1997: Establishment of basic plan
- April 25, 1997: Route selection approval in accordance with Road Act (Notification of Daegu, No. 1997-143)
- December 1997: Begin basic design and implementing design
- March 14, 1998: On-site investigation of advisory committee
- April 24, 1998: Report of route selection
- July 1998: Submit the first draft of Environmental Impact Assessment
- July 1998: Presentation for residents regarding the Environmental Impact Assessment
- September 1999: Submit the main draft of Environmental Impact Assessment
- January 2000: Submit supplementation of Environmental Impact Assessment
- September 2000: Submit re-Environmental Impact Assessment
- September 1, 2001: Submit supplementation of Environmental Impact Assessment

Source: Ministry of Daegu Metropolitan City (2001). The Environmental Impact Assessment for The Fourth Beltway Construction of Seongseo Industrial complex – Jicheon – Eupnae-dong

Figure 5-1 | Alternative Routes

Source: Ministry of Daegu Metropolitan City (2001). The Environmental Impact Assessment for The Fourth Beltway Construction of Seongseo Industrial complex – Jicheon – Eupnae-dong

1.1.2. Main Review Opinions and Agreements by Stages

The review opinions of the environmental impact assessment were suggested three times: the first draft, supplementation and re-supplementation. The review opinions of the first draft included requiring various measures to minimize environmental damage due to the cutting and embankment of slopes. For the second construction section, the opinions included requiring review with comparing alternatives of sandy soil, slopes and environmental damage. The route selection and change were more strongly requested in the supplementation opinions than the opinions of the first draft, and constructing tunnels and bridges were mainly reviewed due to the route with huge damage to the environment arising from cutting and embankment of slopes. The re-supplementary opinions were suggested because supplementary opinions were not sufficiently satisfactory in the re-supplementation stage. The supplementary opinions mainly included cutting slopes and the instability of slopes, and a location alternative of a toll gate was required to be reviewed.

In this project, the numbers of supplementation came to three including additional materials after submitting the main draft, and the review days spent for supplementation were up to 118 days. The days for supplementation were 457 days, the days for agreement were 575 days, and the writing period for review statement was 39 months. This was because the route changes and movements were continuously requested for the routes passing large cutting, sandy soil and instable slope areas as there was no prior route selection stage at the time of assessment, therefore, the responses and design review became extended.

1.2. Project with Implementation of Prior Environmental Review (Administrative City – Jeongan IC Road Construction)

1.2.1. Outline of Case Project

Table 5-3 | Project Outline for Administrative City – Jeongan IC Road Construction

- Project name: Administrative city – Jeongan IC road construction
- Location: Gwangjeong-ri, Jeongan-myeon Gongju-si – Susan-ri, Nam-myeon, Yeongi-gun
- Project operator: Director of Multifunctional Administrative City Construction Agency
- Project details
  - Project period: December 2007-December 2013
  - Project extensions

Classification	Length (Km)	Main structures
First alternative	15.26	- 22 bridges (2,495m), four tunnels (3,184m)
Second alternative	14.56	- 12 bridges (2,015m), four tunnels (4,970m)
Third alternative	14.83	- 10 bridges (1,455m), four tunnels (5,500m)

Source: Multifunctional Administrative City Construction Agency (2008). The Prior Environmental Review statement for Administrative City-Jeongan IC Road Construction

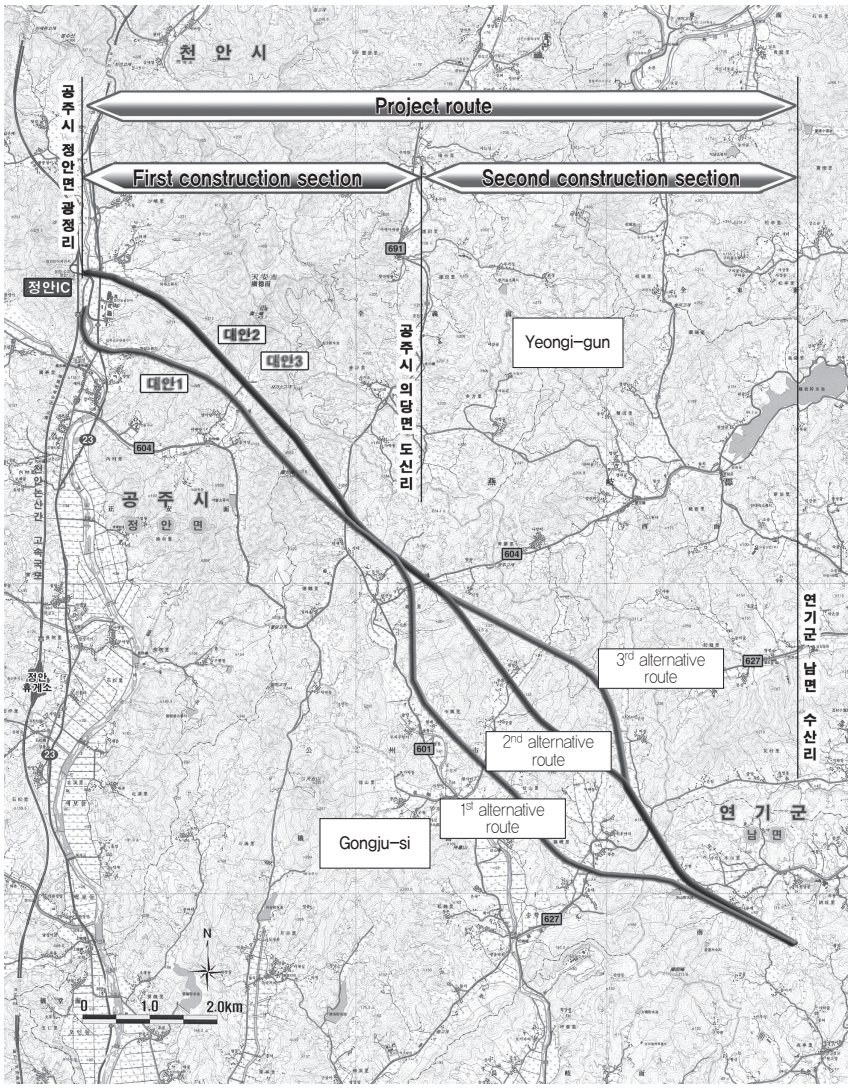
The road construction for the administrative city to Jeongan IC was implemented in order to improve accessibility to neighboring areas including main cities nationwide as the influx of the population was expected to move into the new village in the Multifunctional Administrative City (2010-2011) and the relocation of central governmental agencies (2012-2014). The Prior Environmental Review and environmental impact assessment were implemented as follows based on Clause 2 of Article 25 of the Basic Environmental Policy Act and Article 7 of the enforcement ordinance of the same legislation as it was needed for Prior Environmental Review.

Table 5-4 | Details of Prior Environmental Review and Environmental Impact Assessment Promotion

- Prior Environmental Review
  - May 14, 2008: Hold council of environmental review for the administrative city – Jeongan IC road construction
  - June 2008: Submit the first draft of Prior Environmental Review of the administrative city – Jeongan IC road construction
  - June 11, 2008-June 30, 2008: Implement the public display of Prior Environmental Review
  - June 18, 2008: Hold a presentation for residents regarding the Prior Environmental Review of the administrative city – Jeongan IC road construction
  - July 2008: Submit the main draft of the Prior Environmental Review of the administrative city – Jeongan IC road construction
  - September 8, 2008: Submit the supplementary draft of Prior Environmental Review of the administrative city – Jeongan IC road construction
  - September 25, 2008: Prior Environmental Review for the administrative city – Jeongan IC road construction (completed consultation)
- Environmental Impact Assessment
  - October 7, 2008: Submit the first draft of Environmental Impact Assessment of the administrative city – Jeongan IC road construction
  - October 22, 2008-November 10, 2008: Implement the public display of the Environmental Impact Assessment for the administrative city – Jeongan IC road construction
  - October 30, 2008: Hold the presentation for residents regarding the Environmental Impact Assessment of the administrative city – Jeongan IC road construction
  - October 7, 2008: Environmental Impact Assessment for the administrative city – Jeongan IC road construction (completed consultation)

Source: Multifunctional Administrative City Construction Agency (2008). The Prior Environmental Review statement for Administrative City-Jeongan IC Road Construction

Figure 5-2 | Alternative Routes



Source: Multifunctional Administrative City Construction Agency (2008). The Prior Environmental Review statement for Administrative City-Jeongan IC Road Construction

1.2.2. Comparison of Alternative Routes

For the construction of the connecting route from Jeongan IC to Multifunctional Administrative City, three alternative routes were selected and then environmental impacts were reviewed in terms of natural environment, living environment and socioeconomic environment. The first alternative was finally chosen considering technological, environmental and social aspects.

1.2.3. Main Review Opinions and Consultations by Each Stage

The Prior Environmental Review for the Jeongan IC to Multifunctional Administrative City road construction completed consultation after one supplementation. The opinions of the first supplementation included recalculation of load volume related to the total water pollution volume and additional investigation of the fauna, and no opinions of sites of routes. There were not any specific opinions in relation to the route selection in the consultation opinions, and opinions including the detailed impact predictions and reduction measures were needed to be prepared at the time of the environmental impact assessment.

In the first draft of environmental impact assessment, there were opinions of requirements of the detailed impact predictions and reduction measures, and the opinions of minimizing environmental damage to find and implement separate reduction measures, except for suggested reduction methods in the consultation opinions and review statement, in case of any unexpected situations that could negatively impact the neighboring areas caused by road construction or the assessment process of operation in the main draft consultation.

As the Jeongan to Multifunctional Administrative City road construction project passed the consultation stage of Prior Environmental Review, there were not any supplementary opinions of route selection except for the opinions of the recalculation of load volume related to the total water pollution volume and additional investigation of the fauna. The consultation was completed in a short period of time without supplementation as implementing predictions and appropriate reduction measures on the basis of the confirmed route during the implementation of environmental impact assessment.

2. Housing Site Project

2.1. Project without Implementation of Prior Environment Review (Urban Development Project for the 12th District (Yangsan) of Gwangju)

2.1.1. Outline of Case Project

The urban development project for the 12th district of Gwangju was targeted for urban development to prevent urban sprawl, develop the area, create a pleasant living environment and improve public welfare. As this project accepted the reorganization of the urban basic plan and urban plan of upper plans, it induced planned urban development and the division standardization of undeveloped areas, and expanded rational land usage and infrastructure. As the area size of the project was 765,895m^2, it was not included for the environmental impact assessment or Prior Environmental Review.

Table 5-5 | Details of Project Promotion

- March 4, 1998: Decide the land readjustment project district of the 12th district (Yangsan) of Gwangju
- July 1999: Expand the land readjustment project district of the 12th district (Yangsan) of Gwangju
  - Already decided: 627,820m^2 (189,916 pyeong), Changes: 769,143m^2 (232,666 pyeong), Increase: 141,323m^2 (42,750 pyeong)
- December 1999: Decide project plan
- March 2000: Submit the first draft of Environmental Impact Assessment
- March 23-April 29, 2000: Public display of Environmental Impact Assessment
- March 31, 2000: Hold presentations for Environmental Impact Assessment
- July 12, 2000: Submit the main draft of Environmental Impact Assessment
- July 2000: Submit the supplementation of Environmental Impact Assessment
- March 7, 2001: Complete the consultation of Environmental Impact Assessment

Source: Gwangju Metropolitan City (2000). The Environmental Impact Assessment for Urban development project for the 12th district (Yangsan) of Gwangju

Table 5-6 | Project Outline

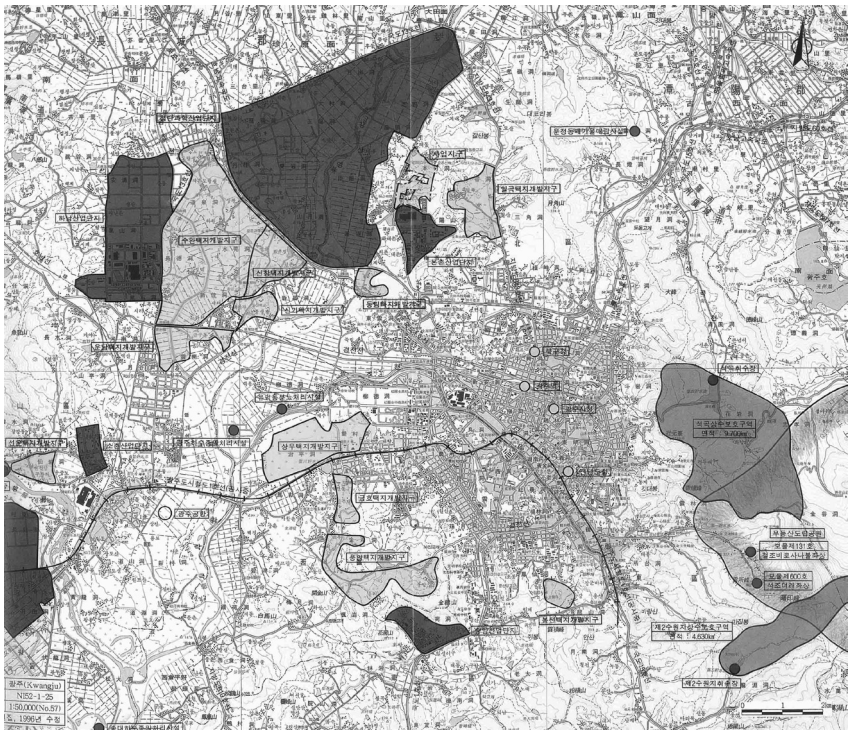
- Project name: Land re-adjustment project district of the 12th district (Yangsan) of Gwangju
- Location: The whole area of Yangsan-dong, Bonchon-dong, and Yongdu-dong, Buk-gu, Gwangju
- Project size: 765,895㎡ (231,683 pyeong)
- Project operator: The mayor of Gwangju
- Project period: 1999-2003
- Project details

- Land usage plan (overall)

Classification	Initial plan (First draft assessment)			Current (Final assessment)		
	Size		Component ratio (%)	Size		Component ratio (%)
	m²	Pyeong		m²	Pyeong	
Total	765,895	231,683	100.0	765,895	231,683	100.0
Housing sites	518,175	156,748	67.7	515,234	155,858	67.3
Detached houses	338,498	102,396	44.2	338,465	102,386	44.2
Apartment houses	179,677	54,352	23.5	176,769	53,472	23.1
Commercial property	18,636	5,637	2.2	18,576	5,619	2.4
Site for public facilities	229,085	69,298	29.9	232,085	70,206	30.3
Roads	189,363	57,282	24.7	191,619	57,965	25.0
Parks	23,176	7,011	3.0	23,921	7,236	3.1
Schools	11,000	3,328	1.4	11,000	3,328	1.5
Governmental office buildings	900	272	0.1	900	272	0.1
Parking lots	4,645	1,405	0.6	4,645	1,405	0.6

Source: Gwangju Metropolitan City (2000). The Environmental Impact Assessment for Urban development project for the 12th district (Yangsan) of Gwangju

Figure 5-3 | Location Map of Expected Project Districts



Source: Gwangju Metropolitan City (2000). The Environmental Impact Assessment for Urban development project for the 12th district (Yangsan) of Gwangju

2.1.2. Main review Opinions and Consultations by Each Stage

After reviewing the first draft of the environmental impact review, damage to natural landscapes and wildlife habitat was a concern when high-rise apartment buildings were developed, as the right side of the project district had forests and fields with plenty of wooded areas connecting Ilgok park. Therefore, opinions recommended that this area should be excluded from development or measures to retain original conditions should be found. In addition, the green plans such as green space mainly with the forest in order to secure comfort in the districts and an ecological connection to forests and fields should be established and recommended as there were almost no plans for parks or green space in the district of project plan. Also, the introduction of various methods of small ecological systems including green roofs and walls of buildings such as governmental offices, and

ecological ponds needed to be found. Moreover, even though the securing ratio of green space satisfied the legal standard of 3%, it was only the minimum standard; therefore, modification of the land usage plan was recommended after considering opinions on the flora and fauna to secure additional green space.

However, as it was the district of the land re-adjustment project in 1988 (general housing area), the exclusion of the area was not reflected in the opinions because sprawling development was expected due to civil complaints after the decision on the usage as a general housing area. Keeping the original conditions was not reflected as the reduction rate of house lot sizes would be more than 50%, which the land owner needed to pay in case of constructing of parks to keep the original conditions. The apartment complex was created to minimize damage to natural landscapes and wildlife habitat by installing a greenbelt in the area connecting Ikgok park, and placing an apartment building next to Ilgok park.

According to the calculation of damage size in the project area by each degree of green naturality, although the seventh graded area of the degree of green naturality was up to 1.9% before the project implementation, it was all damaged. Therefore, the opinions suggested using parks and green areas by retaining its original state. The same opinions were again suggested for the seventh graded area of the degree of green naturality in the environmental impact review supplementation opinions.

Therefore, the recommendation of changing the rate for parks and green area from the initial 3.1% (23,921m^2) to 3.7% (28.585m^2) was accepted in order to expand the green area on the border of Bonchon industrial complex, the southern part of the district, as the original conditions were kept as moving the existing parks into some of the seventh graded area in the project district, and planting the remaining damaged trees were planned. The initial rate for parks and green area was raised from 3.1% to 3.7% because the reduction rate of house lots meaning that the costs are paid by lands for securing expenses and the land of public use necessary for the project implementation in accordance with the related legislation, and could not exceed the maximum of 50%.

In spite of this, the opinions required measures for securing additional buffer green areas as the plan for the buffer green area was not enough in the review opinions of re-supplementation. Finally, the opinions were reflected in the design creating the 3.8% of total project size as parks and green areas, and creating the fifth park and seventh park as keeping original conditions. For the southeastern part of the expected school area in the project area, the consultation opinions were not reflected in the design as trees would be planted in the parks and green areas as the damage was inevitably predicted.

This project implemented the environmental impact assessment without prior consultation of the environmental review. Constant supplementary opinions were recommended as the

project operator did not reflect the opinions as business reasons, as the main supplementary opinions included keeping original conditions in the forested areas, the increase of green area ratio and securing buffer green areas. Therefore, the consultation took longer than other projects as the number of supplementations came to two, there were 96 review days spent for supplementation, 103 days for the days spent for review and the days for agreement were 199 days.

Table 5-7 | Required Days for Case Project by Stages

Types of project		Prior Environmental Review				Environmental Impact Assessment			
		Numbers of supplementation	Days of supplementations	Days of review	Days of consultation	Numbers of supplementation	Days of supplementations	Days of review	Days of consultation
Roads	Administrative city – Jeongan IC	-	-	25	49	-	-	40	40
	The fourth beltway construction (Seongseo Industrial complex – Jicheon – Eupnae-dong)	-	-	-	-	2	96	103	199
Housing (Urban areas)	Wau district of Gwangyang	-	-	22	22	1	45	45	45
	The 12th district (Yangsan) of Gwangju	-	-	-	-	2	96	103	199

Source: Gwangju Metropolitan City (2000). The Environmental Impact Assessment for Urban development project for the 12th district (Yangsan) of Gwangju

2.2. Project with Implementation of Prior Environment Review (Urban Development Project in Wau District of Gwangyang)

2.2.1. Outline of Case Project

The Madong area, designated for the first stage (2006-2010) of expected urbanization of the 2025 Gwangyang city basic plan, was designated as an urban development area. A stable supply of housing was required in order to improve residence stability and housing conditions

for residents of Donggwangyang region due to the increase of the population influx by the development of Gwangyang bay area and expansion of the facilities of Gwangyang Iron Co. As the urban development project was applied to the urban development plan, the Prior Environmental Review was implemented.

Table 5-8 | Details of Project Promotion

- December 2002: 2025 Gwangyang city basic plan
  (Wau village area: expected urbanization area)
- November 2005: Decide on changes in Gwangyang city management plan
  (Wau district unit plan)
- July 2009: Notification of Decision on changes in Gwangyang city management plan
  (Reorganization)
- October 2009: Hold the council of Prior Environmental Review
- January 15-February 4, 2010: Public display of Prior Environmental Review
  (first draft)
- July 2011: Apply designation of development plan
- September 2011: Designation and notification of development plan
  (Review of City Planning Commission)
- June 2012: Submit the first draft of Environmental Impact Assessment for urban development project in Wau district
- July 2012: Hold a presentation for residents regarding Environmental Impact Assessment for urban development project in Wau district
- October 2012: Submit the main draft of Environmental Impact Assessment for urban development project in Wau district
- October 2012: Submit the supplementation of Environmental Impact Assessment for urban development project in Wau district

Source: Gwangyang City (2011). The Prior Environmental Review statement for Urban development project in Wau district of Gwangyang

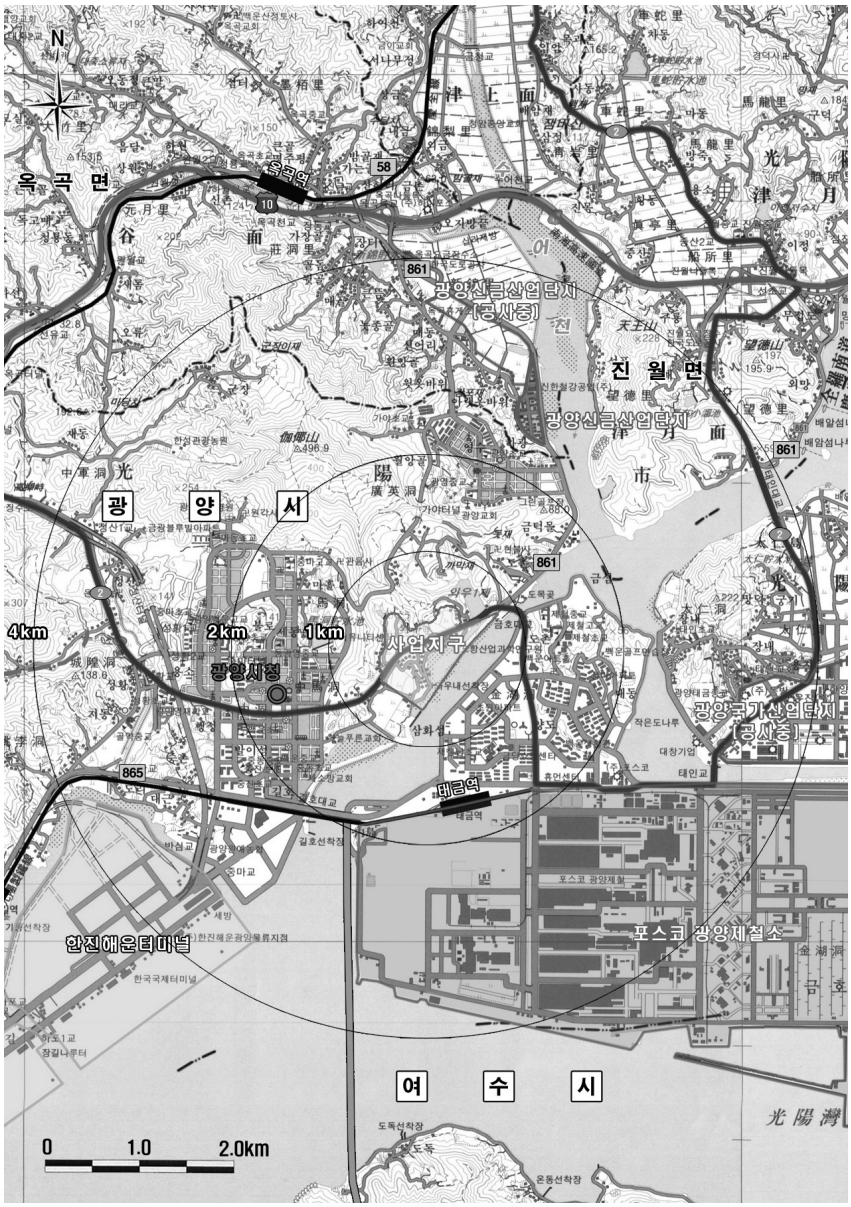
Table 5-9 | Project Outline

- Project name: Urban development project in Wau district
- Project operator: Mayor of Gwangyang-si
- Project approval authority: Jeollanam-do
- Population projection: 10,969 persons (4,062 households/2.7 persons per household)
- Land usage plan

Classification		Prior Environmental Review		First draft		Main draft	
		Size (m^3)	Component ratio (%)	Size (m^3)	Component ratio (%)	Size (m^3)	Component ratio (%)
Total		698,357	100.0	624,895	100.0	636,550	100.0
Residential sites		352,204	50.4	317,216	50.8	314,878	49.5
Infrastructure sites	Subtotal	346,153	49.6	307,679	49.2	321,672	50.5
	Roads	177,391	25.4	164,299	26.3	166,733	26.3
	Parks	47,808	6.8	36,929	6.0	38,773	6.0
	Green areas	88,366	12.7	73,546	11.7	83,202	13.1
	Educational facilities	25,032	3.6	27,152	4.3	27,152	4.2
	Parking lots	7,556	1.1	7,556	5,753	0.9	5,812

Source: Gwangyang City (2011). The Prior Environmental Review statement for Urban development project in Wau district of Gwangyang

Figure 5-4 | Location Map of Expected Project Districts



Source: Gwangyang City (2011). The Prior Environmental Review statement for Urban development project in Wau district of Gwangyang

2.2.2. Comparison of Alternatives

The first alternative was selected for the final version as the damage of seventh graded area of degree of green naturality was low, and the maintenance ratio of areas needed for the prior preservation. As a result of comparing and reviewing each alternative to achieve the goals of the plan, the quality of the plan and the feasibility of sites in the process of Prior Environmental Review. In the environmental impact assessment, the areas required to be kept in its original conditions were excluded by reflecting the consultation opinions of Prior Environmental Review, and although the initial project size was 624,895m^2 at the time of first draft assessment, the land usage plan was changed to 636,550m^2 including green areas by additionally designating areas of public water reclamation.

2.2.3. Main Review Opinions and Agreements by Stages

The consultation opinions in the Prior Environmental Review included that the favorable green areas and steep slope areas were kept as they were due to the project implementation, and creating some parts of public water as a waterfront ecological park, and there were no supplementary opinions. Therefore, the project size when the Prior Environmental Review was implemented was 698,357m^2, but the land usage plan was changed to keep the area as original conditions reflecting the opinions of minimizing damage to vegetation and terrain including the seventh graded area of degree of green naturality (more than 20 degrees of slope) in the northern parts of the project district. After the change, the project size decreased to 624,895m^2.

The review opinions of the first draft of environmental impact assessment included that there were no special opinions regarding the appropriate nature of sites, and the detailed impact predictions and reduction measures required to prepare during the environmental impact assessment. In the supplementary opinions, they included mostly technological issues such as the accumulated risk assessment, the investigation of pollution sources, the calculation of water supply and calculation of ecological size, and there were no opinions on the appropriateness of sites. Finally, only reduction measures of environmental impact during construction and operation were included in the consultation opinions.

As this project had passed the stage of Prior Environmental Review consultation, the required period for writing the assessment statement and consultation was rather shorter than that of other projects because there was no supplementation required during the Prior Environmental Review. The opinions of environmental impact assessment included mostly risk assessment and the investigation of pollution sources as industrial complex was widely spread in the project district, and there were no opinions of changing the plan or reviewing the appropriateness of sites.

3. Conclusion

We examined the assessment review opinions and consultation opinions of projects conducting the environmental impact assessment both with and without the Prior Environmental Review in the cases of road projects and housing development projects. As a result, in the projects that did not conduct the Prior Environmental Review, not only did the review opinions continuously require route changes and movement in the road projects, but also the design review period of the project was extended as there were three supplementations, along with additional materials, and the required days of more than 100 days of review. In the housing development projects, the supplementary opinions constantly suggested that the project operator did not reflect the opinions in the project with business reasons such as the preservation of forest areas to be retained in its original condition, the increase of green area ratio and securing buffer green areas at the time of project confirmation. Therefore, the consultation period became extended over a long period of time as in the road projects.

On the contrary, the projects conducting the consultation of Prior Environmental Review did not require many supplementations during the environmental impact assessment, and there were no suggestions of changing the plans or raising problems of the appropriateness of sites. Therefore, the required period for writing assessment statement and consultation was very short.

The Prior Environmental Review is a stage of reviewing the appropriate nature of sites and feasibility of projects before the decision on the projects, it reduces trial and error in the process of projects and is a very effective system in terms of economics as the consultation period is shortened and design changes are decreased.

2012 Modularization of Korea's Development Experience
Environmental Impact Assessment

Chapter 6

Conclusion

Conclusion

This report studies a series of The Environmental Impact Assessment system in Korea pursued over a 40-year period during its development era (1970s-2010s). It has been gradually developed as a system which helps to establish environmentally friendly plans beyond just conservation as various environmental problems occurred and increased environmental awareness such as sustainable development.

This report consists of four parts: the changes in the Environmental Impact System, the background of the Prior Environmental Review, operation status, cases and outcomes.

Korea promoted economic growth through Five-Year Plans of Economic Development. Along with the rapid economic growth, the problems of environmental pollution in the neighboring areas of heavy and chemical industrial estates were recognized as side effects of economic development. Therefore The Environmental Office was established in 1980, and the introduction of the Environmental Impact Assessment system, the emission charges system and fundraising for the prevention of environmental pollution were promoted on the basis of application of economic principles to challenge economic problems and prevention of environmental pollution.

The characteristics of Korea's Environmental Impact Assessment system are largely described as the Prior Environmental Review, and the Korea Environment Institute, the professional review institution. The Prior Environmental Review System means the system in which environmental reviews such as the validity of a plan are assessed in advance at the early stages before implementation is confirmed. It was introduced in 1999 and fully implemented in 2006 as related regulations were taking shape from 2006 and the time for environmental considerations was largely advanced to the planning stage due to the Prior Environmental Review. The Prior Environmental Review reduces trial and error in the process of projects and it is a very effective system in terms of economics as the consultation

period is shortened and the design changes are decreased. And it contributes greatly to the establishment of environmentally friendly plans. Second, the Korea Environment Institute makes objective and fair reviews possible based on the professional knowledge as a reviewing institute for Prior Environmental Review and Environmental Impact Assessment; in addition, it takes the lead as of a source of knowledge in relation to the Environmental Impact Assessment.

The purpose of this report is to extract lessons that can benefit policy makers in the developing world. The Environmental Impact Assessment system in Korea is different from that of developed countries where the awareness of environmental problems is realized after economic development, and it can suggest many implications for developing countries where rapid economic growth and environmental problems are realized at the same time. In particular, as environmental problems arising from industrialization and urbanization without considering environmental aspects and the change processes and cases of Environmental Impact Assessment introduced for preventing and managing them, we can suggest a good model for operating an Environmental Impact Assessment for developing countries in the future.

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www.ksp.go.kr

Ministry of Strategy and Finance, Republic of Korea

339-012, Sejong Government Complex, 477, Galmae-ro, Sejong Special Self-Governing City, Korea Tel. 82-44-215-2114 www.mosf.go.kr

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