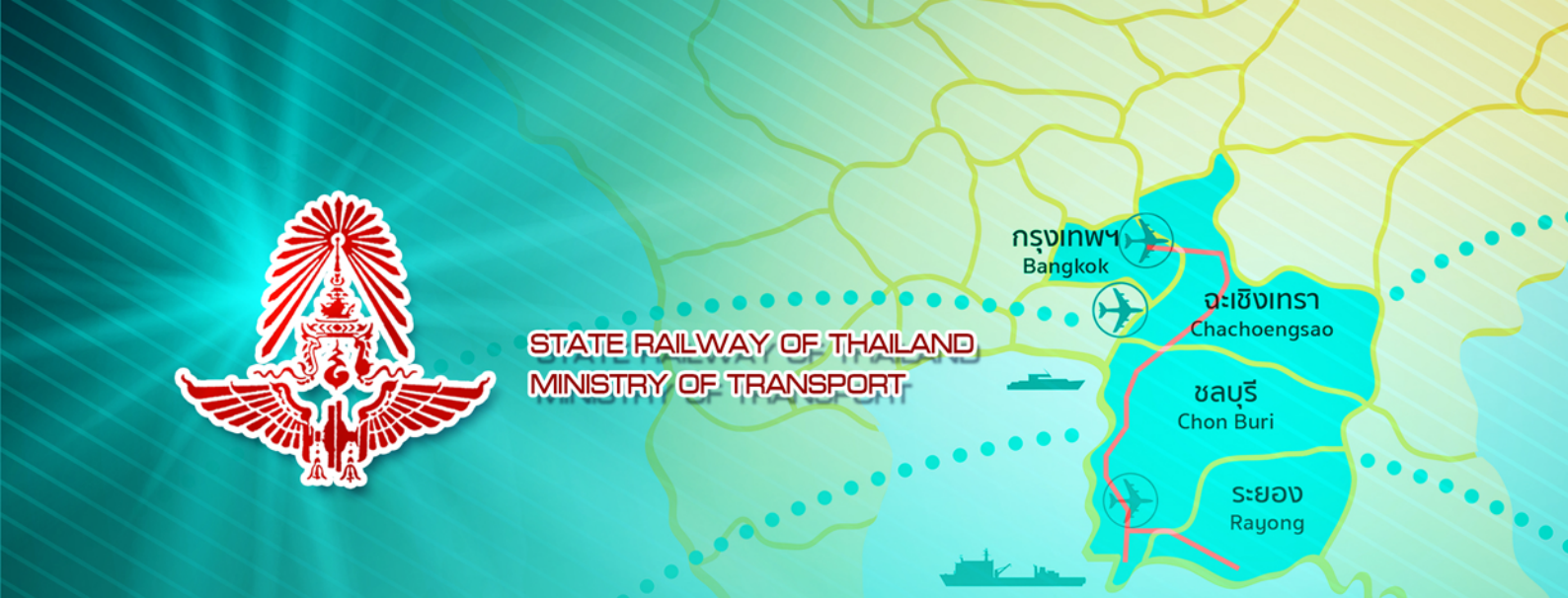
STATE RAILWAY OF THAILAND
MINISTRY OF TRANSPORT



THE HIGH-SPEED RAIL LINKING THREE AIRPORTS PROJECT

REQUEST FOR PROPOSAL

VOLUME 2 : SRT'S REQUIREMENTS

VOLUME 2/2 : THE TRANSIT-ORIENTED DEVELOPMENT OF THE PROJECT

AEC Sasin

Asian Engineering Consultants Corp., Ltd.
TEAM Consulting Engineering and Management Co., Ltd.
Sasin Graduate Institute of Business Administration of Chulalongkorn University

JUNE 2018

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INSTRUCTIONS FOR THE REAL ESTATE DEVELOPMENT FOR THE ENHANCEMENT OF THE TRAIN OPERATION AND PROVIDE SERVICES TO PASSENGERS SURROUNDING OF THE MAKKASAN AIRPORT RAIL LINK STATION AND THE SRIRACHA HIGH-SPEED TRAIN STATION

1. PREAMBLE

The real estate development for the enhancement of the train operations and passenger services in the areas surrounding of the Makkasan Airport Rail Link Station ("Makkasan Station") and the Sriracha High-Speed Train Station ("Sriracha Station") is the development based on principles of the Transit-Oriented Development, TOD. The development objections are to provide services for the increasing numbers of passengers traveling through the stations and to create lifestyles promoting more use of rail transportation.

Especially for the development in the surrounding area of Makkasan Station, it should include the development principle of EEC Gateway or the Gateway to the Eastern Economic Corridor. The development at Makkasan is mandated to become the central linkage between Bangkok and provinces in the Eastern Economic Corridor ("EEC"), namely, Chachoengsao, Chonburi, and Rayong. The developer shall provide office spaces for governmental agencies those coordinating with EEC. The real estate development shall be mixed-use stereotype comprising of residences, offices, retailers, and community services.

1.1 Form and Mandates of the Public Private Partnership in the development of for the Enhancement of the train operation and provide services to passengers Surrounding of the Makkasan Airport Rail Link Station and the Sriracha High-Speed Train Station

1.1.4 The real estate development for train operations and passenger services support shall be in form of Build – Operate – Transfer, known as BOT. The development areas shall be on the land plots of the State Railways of Thailand ("SRT") to which giving the rental rights to the developer for 50 years from the date of receiving the Notification to Proceed. The developer shall embrace the development metaphor of Transit-Oriented Development and the EEC Gateway to create the Development Master Plan with details of the plan for land use, property use, combination of building and structures, and infrastructures, construction plan, development phasing, and development plan. The potential co-investor shall submit the Development Master Plan to SRT during the selection process. The Development Master Plan submitted shall be imparted to be a part of the partnership contract.

1.1.2 The Private Co-investor shall obligate to pay rental fee to SRT at rate specified at Annex 10 of the Instruction to Tenderers. If the Private Co-investor fails to pay rent as scheduled, the Private Co-investor shall subject to pay for fine for not paying rent in according with terms and conditions indicated in the Partnership Contract.

1.1.3 Once the duration of rent is expired, 50 years from the date of receiving the Notification to Proceed, the Private Co-investor shall have the duties to transfer all buildings, structures, and properties affixed to the land with worth as indicated in the partnership contract. In an event that the Private Co-investor fails to transfer buildings, structures, and properties affixed to the land, or transfer such buildings, structures, and properties with lesser value than indicated in the partnership contract, the Private Co-investor shall pay fine in lieu of the shortage in values of the buildings, structures, and properties. The calculation of the fine is indicated at 1.1.4.

1.1.4 The fine in lieu of the shortage in values of the buildings, structures, and properties shall be calculated from the differentiate of the worth of the buildings, structures, and properties as indicated in the Partnership Agreement and the worth of the buildings, structures, and properties transferred to SRT when the contract term is lapse (50 years) after deduct depreciation.

Emphasizing that the depreciation shall be calculated based on age of the buildings and money value of the differentiate of the worth of the real estates as indicated in the Partnership Agreement and those transferred to SRT when the rental term is lapse. It shall be straight-line depreciation.

1.1.5 The Private Co-investor shall be responsible for registration fees and charges occurred in the commencing of the Partnership Agreement, local maintenance tax, property taxes, other taxes (exclude revenue tax of the Private Co-investor), and all other expenses attached to the land and properties in the project of real estate development to support the train operation and passenger services in the areas of Makkasan and Sriracha Stations. In an event that SRT pays taxes and fees on behalf of the Private Co-investor, the Private Co-investor shall reimburse to SRT within 30 days from the date of receiving SRT's written notice. If such duration of reimbursement passes, the Private Co-investor agrees pay surcharge fee at rate of 2 percent a month of the unpaid reimbursement continuing until the reimbursement received in full amount. The fraction of a month shall be counted as one month.

2. PHYSICAL APPEARANCE OF THE LAND PLOTS AND REQUISITE PREPARATIONS FOR TENDERERS

2.1 The Land Plot at the Makkasan Airport Rail Link Station, approximately 150 Rais

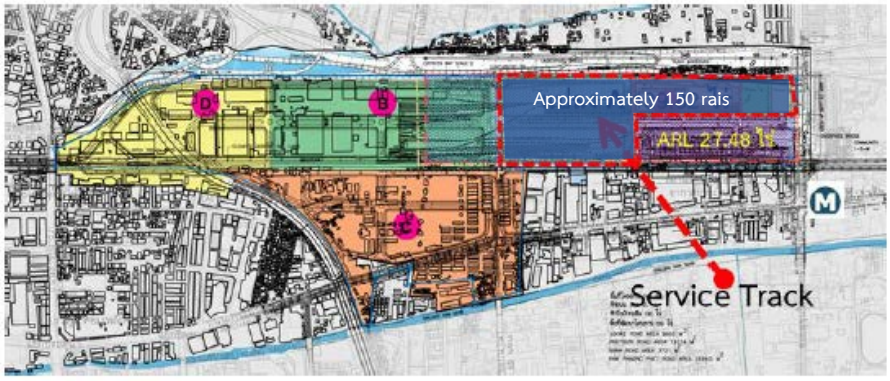
The Land Plot surrounding the Makkasan Airport Rail Link Station ("Makkasan Land Plot") owned by SRT is eligible for real estate development purposes. The land size is approximately 150 Rais (Land Plot A, Diagram 2-1), including the area of Makkasan Station in the old project linking downtown and Suvarnabhumi Airport. The land plot boundaries are designated below:

North: Chaturatis Road and Makkasan Pond

East: Asoke-Dindaeng Road

South: Kampaengpech 7

West: SRT's Area for maintenance operation



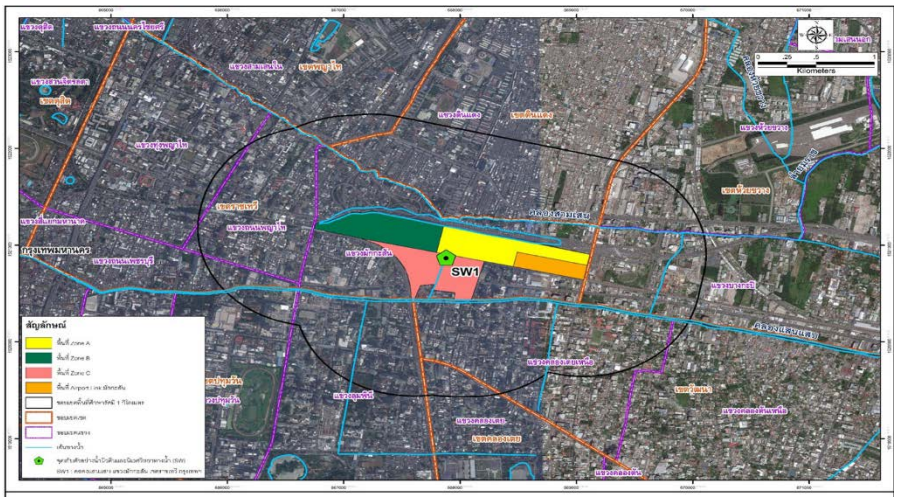


Diagram 2-1: Makkasan Land Plot

2.2 The Land Plot at the Sriracha High-Speed Train Station

The land plot surrounding the Sriracha High-Speed Train Station belongs to SRT and it shall be eligible for real estate development. The land size is approximately 25 Rais. The land plot boundaries are designated below:

North: Highway No. 3241

East: land of an individual

South: Sriracha-Nongyaiboo Road

West: Land of an individual

Diagram 2-1: Sriracha Land Plot

3. Output Specifications and Level of Services

The tenderers shall submit a conceptual design for real estate development of the land plots with purposes to support train operation and passenger services. When chosen, the selected tenderer shall arrange for detailed designs and implement the project to ultimately get these following output specifications at the end of contract term of the Partnership Agreement (50 years from signatory date of the Partnership Agreement).

3.1 Output Specifications Commencing the End of Contract Term

3.1.1 Real Estate Development to Support Train Operation and Passenger Services at the Makkasan Airport Rail Link Station

Land Use	(1) It shall be mixed-use to which include residential, commercial, work, and other activities such as sports, recreation, education and public health. (2) It shall have total building spaces of no less than 850,000 square meters with investment worth in the building, structures, and affixed properties at the time the proposal submitted of no less than 42,000 million baht (not include land value). The worth of buildings, structures, and affixed properties shall calculate at actual investment at the time the constructions are complete by not deducting money devaluation and depreciation. (3) It shall have at least one attraction structure expressing the project identity and prominent feature located at the outdoor activity ground. (4) It shall have outdoor and indoor activity grounds to which connecting the High-Speed Train Station conveniently by foot. (5) It shall have sustainably green areas that sufficient and appropriate for land use and accessible by foot and bicycle lanes. (6) For the distance between the building's and the Station's entrances is more than one kilometer, it shall have a public feeder to provide better access to the Station with walking distance of not over 500 meters. (7) It shall implement the project in accordance with the laws and public moral.

The network of roads, sidewalks and bike lanes	(1) It shall provide the linkage among the Makkasan Airport Rail Link Station, Chaturatis Road, Asoke-Dindaeng Road, Kampangpetch 7 Road, and all buildings in the project area. (2) The Project main roads shall allow access to the adjacent land plots of SRT when SRT proceeds for land development in the future.
The Flyover Road (Build on SRT's land, not at the 150 -Rais Project area, for getting the project area connected)	It shall build a flyover road connecting the project area with Rama IX road heading Phetchaburi Road. Remark: SRT is responsible for coordination to get the construction permission form the Bangkok Metropolitan Administration. If the Bangkok Metropolitan Administration does not allow the flyover construction, the Private Co-investor shall be relieved from its obligation under this clause and shall not be subject to a fine in replacement of the flyover construction.
Parking (In distance of at least100 meters from the edge of the Makkasan Airport Rail Link Station's terminal at entrance gate)	(1) Parking spots for at least 80 bicycles (2) Parking spots for at least five buses of the size 20 passengers (3) Parking spots for at least ten public vans (4) Parking spots for at least ten taxis (5) At least 1,000 square meters parking space for the feeder to connect the project area (150 Rais) and SRT's future development area
Infrastructures	It shall have electricity, water supply, information technology, telecommunication, waste water management, drainage system (to which capable of connecting the drainage system to the future development area of the SRT), solid waste management and sewage management

Security System	It shall have security system covering throughout the project area that is capable of motion recording and back checking of information if needed. It shall have a central security center in the project area.
System for Accidental Prevention	It shall have a system for fire prevention.

3.1.2 Real Estate Development to Support Train Operation and Passenger Services at the Sriracha High-Speed Train Station

Land Use	(1) It shall have total building spaces of no less than 20,000 square meters with investment worth in the building, structures, and affixed properties at the time the proposal submitted of no less than 300 million baht (not include land value). The worth of buildings, structures, and affixed properties shall calculate at actual investment at the time the constructions are complete by not deducting money devaluation and depreciation. (2) It shall build a residential building on a designated area for SRT's employees of 85 households to replace the old residential building.
The network of roads, sidewalks and bike lanes	It shall improve roads for the better connection of Highway Road No. 3241, Sriracha – Nongyai Boo Road, and the Sriracha Station to the sufficient and appropriate for riders in the project area.
Parking (In distance of at least100 meters from the edge of the Makkasan Airport Rail Link Station's terminal at entrance gate)	(1) Parking spots for at least 40 bicycles (2) One Parking spot for a bus of the size 20 passengers (3) Two parking spots for public vans (4) Two parking spots for taxis

Infrastructures	It shall have electricity, water supply, information technology, telecommunication, waste water management, drainage system, solid waste management and sewage management to which provide connection to the newly built residential building for SRT's employees.
Security System	It shall have security system covering throughout the project area that is capable of motion recording and backchecking of information if needed. It shall have a central security center in the project area.
System for Accidental Prevention	It shall have a system for fire prevention.

3.2 Level of Services

When the high-speed train services are commencing, SRT expects that the Private Co-investor shall operate the real estate development projects to support the train operation and passenger services at areas surrounding the Makkasan Airport Rail Link Station and the Sriracha High-Speed Train Station up to level of services designated below:

3.2.1 Pedestrian ways connecting the Stations to other public transportations and public roads outside the project areas shall open for at least 15 hours a day.

3.2.2 At least 75 percent of pedestrian ways inside the project areas shall cover by shades from the buildings, trees, or sun shield.

3.2.3 Roads inside the project areas (within 500 meters from the edge of the stations' terminals at entrance gate) shall restrict vehicle speed at not exceeding 15 kilometers per hour. (Speed limit for design).

4. TRANSIT-ORIENTED DEVELOPMENT (TOD)

The real estate development by utilizing TOD principles shall provide the developing facilities surrounding the station within the walking radius or approximately 500 meters to not over 1 kilometers from the stations. For traveling from the project areas to the Stations, the design shall embrace the development by discouraging the use of vehicles, and fascinating to walk or biking. The road networking design of the development project shall be at the utmost priority to safety and convenience of pedestrians and cyclists. There shall be the connectivity to other public transportations at least in range of 100 meters from the stations' entrances. In any event the distance between the buildings and the stations' entrances is

more than 1 kilometer, a feeder, or known as secondary transportation system, shall be provided for passengers' convenience. Walking distance traveling to and from the stations and residential or business areas shall not farer than 500 meters.

Buildings close to the stations shall not be too large. There should have an atmosphere to encourage pedestrian walking. For example, pedestrians will be more enjoy walking when there are retail stores along the walkway. The buildings shall be mixed-use for residential, works, community services, and commercial areas to generate passengers and customers during daytime and nighttime. Also, it shall specify the supreme utilization of the land the create a maximum population that causes the flow of passengers and customers to make it become the hub for rail transportation.

Principles of TOD Development may be designated below:

4.1 Walkway

It shall have walkways for simultaneously walking from the buildings to the stations

Pedestrian crosswalks, while approaching the crosswalks, the road shall be designed for decreasing of vehicle speed for pedestrian safety such as road bumps. Speed limit for vehicles shall be not exceeding 15 kilometers per hour.

Approximately 50-90 percent alongside the walkways length shall have stores.

At least 75 percent of the walkways shall have shades from the buildings or trees.

4.2 Bicycle Paths

It shall have networking of bicycle paths covering at least 90 percent of the development areas.

It shall have bicycle parking spaces within distance of 100 meters from every station entrances and exits.

Approximately 95 percents of buildings in the development area shall have safe parking for bicycles.

4.3 Continuing

The continuing in this means is for walkway. If the buildings are too big and too many, it is not friendly to pedestrians. Typically, the walking radius shall not be exceeding 500 meters from the station, and the building designed under TOD concepts shall have maximum length of 150 meters. Also, the roads injuncting with crosswalks shall not cause any inconvenience or dangers to the pedestrians.

4.4 Connecting the Development Area with Walkways or Public Transportation

Walking distance from the buildings to the secondary transportation for connecting to the stations shall be between 500 to 1,000 meters.

4.5 Mixed-Use and Population Density

(1) Land use of the development area shall not be less than 90 percent of the Floor Area Ratio (FAR). It shall be mixed-use for residentials, works, and commercials to create population for nighttime and daytime in under the Town Planning Law. For Makkasan Station, FAR is 8:1, and Open Space Ratio or OSR is four percent.

(2) The access to sources of food (retails/restaurants) shall be 80 percent of the buildings and shall be in distance of 500 meters from the building doors.

(3) It shall have affordable housing at least 5 percent of total residential areas.

(4) Population density in radius of 500 meters surrounding the stations shall not lower than 5 percent as indicates in the law.

5. LAWS, REGULATION, AND ORDERS Concerning the Real Estate Development for supporting the Rail Operation and Passenger Services at the Makkasan Airport Rail Link Station and the Sriracha High-Speed Station

The Private Co-investors shall comply strictly with existing laws and regulations governing the design, construction, buildings, and structures, including the control and preservation of environment, and environmental impact assessment. Example of those laws are:

- The Eastern Economic Corridor Act of B.E. 2561
- The Building Control Act of B.E. 2522 and its subordinate laws
- The Bangkok Regulations on Building Control of B.E. 2544 or Municipal laws
- The Energy Conservation Promotion Act of B.E. 2535 and its subordinate laws
- The Ministerial Regulation on Indicating of Type or size of Buildings and Standards, Criteria and Methods for Designing Buildings for Energy Conservation of B.E. 2552
- National Environmental Quality Promotion Act of B.E. 2535 and its subordinate laws
- Town Planning Act of B.E. 2518 and its subordinate laws
- The Ministerial Regulations for the Implementing of the Bangkok Metropolitan Administration Town Planning of B.E. 2556
- The Condominium Act of B.E. 2522 and its subordinate laws
- The Notification of the Metropolitan Rapid Transit Authority: Engineering requirements relating to the use of land by the owner or possessor in lawful immovable property under the Mass Rapid Transit Project, in the case of underground construction, and it subordinate laws
- Laws and regulations related to rail safety requirements construction around rail operation areas

6. MAJOR ACTIVITIES DURING THE PROJECT DEVELOPMENT

Contents	Duties and Responsibilities		Timing	Approval Authority
	The Private Co-investor	SRT		
Commencing the Environmental Impact Assessment (EIA) for the development plan created by the Private Co-investor	Arranging for EIA (submits to SRT)	SRT files paperwork as a petitioner	Before construction	The National Environment Board (NEB) and EEC Office
Development Master Plan that contains details on land use, building utility, building elements, structures, and infrastructures	The Private Co-investor creates and maintains the precise development plan during the contract period	SRT files paperwork as a petitioner	Before applying for EIA	EEC Office
Design of roads and infrastructure that have details on road connectivity and standardized infrastructures	The Private Co-investor's engineers design for traffic connectivity and quantity of infrastructures needed (Submits to SRT)	SRT files paperwork to related agencies	Before construction and applying for EIA	MEA / PEA. MWA / PWA/Bangkok / Municipality
Construction for roads and central infrastructures	Construction contractors of the Private Co-investor presents construction duration, forms of connectivity, and quality of infrastructures needed (Submits to SRT)	SRT files paperwork to related agencies and permission to operate	Before construction	MEA / PEA. MWA / PWA/Bangkok / Municipality
Detailed design of the buildings and structures	Construction contractors of the Private Co-investor (Submits to SRT)	SRT files paperwork to related agencies for approval	Before construction and applying for EIA	Bangkok / Municipality

Contents	Duties and Responsibilities		Timing	Approval Authority
	The Private Co-investor	SRT		
Construction and Structures	Construction contractors of the Private Co-investor (Submits to SRT)	SRT files paperwork to related agencies for construction permit	Before construction	Bangkok / Municipality

7. Implementation to follow recommended environmental protection and impact mitigation measures

Private Co-investor has to follow technical methodology for environmental protection and impact mitigation measures for project development on both construction and operation stage. The following table is presented environmental protection and impact mitigation measures as a result of Initial Environmental Examination (IEE) study which was conducted by SRT during Feasibility Study Stage.

Environmental protection and impact mitigation measures must be executed and included in the condition of contract since contractor bidding for practicing during construction stage and when construction finished related agency must be implemented to follow the measures on operation stage.

However if the Private Co-investor propose the development that type or scale of business required Environmental Impact Assessment (EIA) under the regulation according to Announcement of Ministry of Natural Environment and Environment as of 24 April 2012, Private Co-investor must conduct EIA study by own budget and request SRT to submit ONEP for getting approval from EEC environmental board before starting construction. After EIA approval, environmental protection and impact mitigation measures as recommended by EIA study are needed to be applied strictly.

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan

Construction Stage

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.1 Topography	• Installing temporary fence around construction site boundary especially the side that is closed to public area, other private area. Along the side connected to public space, cover walkway is required for prevention accident of materials drop out or falling and to obscure visual pollution as well as to prevent dusty dispersion and to reduce noise pollution. Fencing height is recommended at least 3 meters. Signboard to show construction site boundary is also needed.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Arranging construction instruments and equipment neatly	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installing information board at the construction site to inform contact name of project owner, address and contact channel for receiving request or suggestion.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.2 Soil Resources	• Construction of soil retaining wall and installation of Sheet Pile around excavation area to avoid landslide	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• In case of soil excavation or land levelling, soil compaction is needed. The compaction finishing is needed to be smooth and regular to avoid top soil erosion especially in reany season.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Drainage system around construction site is needed to be provided such as temporary drainage dish to convey water to temporary sump for prevention of eroded sand and sediment spilling outside. Installation of sedimentation pond is required before draining out to public conduit.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor & SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.2 Soil Resources (Continued)	• Observation and monitoring of Sheet Pile movement is required gradually along the construction period.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• In case of pebble stone or soil dropping from project constructing operation, wiping and cleaning tidily is required. If there is any damage occurred to neighbor housing due to project operation, compensation must be paid. Fixing correction and support aid must be handled immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• During Sheet Pile uninstalling, if there is occurred nearby landslide that cause collapse to nearby constructed existing, uninstallation must be stopped urgently and fixing or compacting must be done immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.2 Soil Resources (Continued)	• Not to carry soil resources during rush hours and night time	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• All carrying truck drivers must be trained to follow the traffic rules strictly to preserve truck carrying route for mitigation of traffic impact.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Truck carrying weight must be controlled not to be exceeded as regulated to avoid road deterioration and truck speed must be limited not to be exceeded over the velocity of 30 kilometers per hour.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.3 Geological and Seismic Circumstance	• To design building structure in accordance with related regulation especially on load design, strength, resistance, durability and soil foundation to effectively receive vibrating and seismic force as of BE2550 and building design standard for seismic resistance design as of MorYorPhor 1302 (BE2552) of Public Works and Town Planning Department, Ministry of Interior	Construction Site	Design Period	Contractor under Private Co-Investor &SRT
	• To provide qualified engineer for monitoring building structures or approving shop drawings regularly during construction period	Construction Site	Design and Construction Period	Contractor under Private Co-Investor &SRT
	• To provide emergency plan for seismic condition or other emergency cases including with installation of noticeable emergency exit signboard and revising plan annually for most appropriation.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Meteorology and Air Quality	• 3 meters height of Metal Sheet installation for boundary fencing is required especially along the side that is connected to public area or other private belongings.The fence must be in good condition along construction period stage to prevent accidental from material falling or dusty dispersion. Installation of signboard and information board to present construction site boundary is also needed to inform public that unrelated people are prohibited to enter the site.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Project nameboard presented contact person, communication address is needed to be installed at the noticeble point to inform the public obviously.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Meteorology and Air Quality (continued)	• Entrance-Exit Point must be closed and secured all the time and will be opended only for project vehicle entry or exit. Surface area must be kept clean and non residue of soil, pebble, sand or dusty until the construction is finished.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Canvas curtain or small mesh netting must be installed around the constructed building by fixing with outer scaffolding since ground floor to the top during construction. And must be kept in good condition along construction period to prevent dusty dispersion to nearby area.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide temporary covered-chute for dropping construction material waste from high elevation of the building to prevent dusty dispersion.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Meteorology and Air Quality (continued)	• Spraying water 2 times a day, once in the morning and another in the evening, around construction material stock pile such as rock material, sand material stock pile to reduce dusty dispersion.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Arrangement compliants system and requisition approach for fact and cause findings to execute problem solvings.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Periodically investigate truck engine especially to those using diesel oil to keep emission as standard required.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Try to manage construction schedule not to let different engine types operate at the same time to minimize the emission as much as possible.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Meteorology and Air Quality (continued)	• Arranging construction material stock pile by minimize sizing of stock pile as necessary. When finish soil excavation, top soil must be covered by impervious pavement such as asphaltic or concrete to maintain top soil.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Not to let engine operation when not on duty.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide cleaner to manage waste from soil or sand materials dropping around the site. Whenever found muddy or wetted soil droppings onto the surface, cleaning by water is needed immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Meteorology and Air Quality (continued)	• Measures for managing material waste - Material waste must be definitely covered by clothing when carrying on the truck for both on the top and the other 3 side openings. - Material waste must be managed daily to move out of the site to minimize the waste on the site. Whenever carrying out could not be operated, the material waste must be relocated to appropriate location to keep clean and convenient stock until the time of getting out.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
1.5 Noise Level	• Foundation work and other activities that generate loud noise must be constructed during 08.00-17.00 O'Clock only for not to disturb nearby community.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.5 Noise Level (continued)	• Investigate and maintain engine and tools in good condition and ready for using. Covering material for reducing noise must be applied as much as possible.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Not to operate various activities those generate noise at the same time.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Maintain material carrying truck in good condition, not to generate noisy, and control speed limit not to exceed 30 kilometers per hour.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Install equipment to reduce vibration and noisy as suggested by machinery supplier.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.5 Noise Level (continued)	• Setting workplan, selecting tools or equipment and applying construction method to minimize disturb noise including with keeping good maintenance to all engine that generate noise.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide site engineer for construction supervision and control construction in line with engineering principle to minimize impact to neighbouring area.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• 3 meters height of metal sheet fencing must be installed around construction site to obscure visual pollution and reduce noise disturbance.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installing signboard to receive request from neighbouring residents at entry-exit point including with provision of authorization to get request. Investigating the site gradually to get ready for correction whenever case occurred caused by the project.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.5 Noise Level (continued)	• Design construction site layout plan to keep longest distance of machinery/ equipment generating noise away from nearby housing/building.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Keeping shut down of machinery/engine whenever not in use.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Setting up traffic arrangement for both inside and outside of construction site by controlling material carrying truck velocity not exceeding 30 kilometers per hour. Honk the horn and stepping on the accelerator are prohibited especially nearby community.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.5 Noise Level (continued)	• Installing information board to describe construction details for information to nearby public. On the board, the project name, responsible person and contacting details including with phone numbers must be presented.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Noise Quality monitoring must be operated at all time during construction of piling and foundation.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• The contractor must keep controlling the worker activities not to generate noisy such as preventing occurrence caused by alcohol drinking/ quarreling that creates noise disturbance to neighbors.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Not to face engine noise source directly to the closely connected neighbors.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.6 Vibration	• Piling and Foundation construction must be operated during 8.00-17.00 O'Clock only.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Before starting construction, there must be project owner officer and contractor to visit and inform neighbor people. Contact phone number to project construction supervisor must be given to the people for direct contacting. Foundation and piling schedule must be informed clearly in details.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Opinion box must be installed at the guard house including with officer must be in place prior to request or in case of complaint about vibration problem. Monitoring and Control of Vibration must be executed and in case of vibration complaint problem occurred, solution must be urgently approached.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.6 Vibration (continued)	• There must be engineers for construction supervision closely and control the construction to conform regulated standard and generate least impact.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Measures to investigate impact on neighbor buildings regarding project foundation construction. - Investigate nearby area about change on slope or terrain compared to before project started.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	- Investigate elevation of neighbor buildings for both horizontally and vertically by using leveling measurement both before and after project construction. - Investigate physical conditions of nearby buildings.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.6 Vibration (continued)	• Providing compensation for nearby buildings that proven damage caused by project construction. Moreover the project must correct the fault and support help immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
1.7 Hydrology and Surface Water Quality	• For piling of construction materials, existing removed and trees cuttings the piling stock must be located far away from nearby canal at least 100 meters to prevent deposition due to rainfall drainage into the canal. Stock piling must be clear when construction finished.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Site operators must be careful to oil spill.Whenever oil or chemical transfer operation, container must be provided sufficiently to make sure that there will not be oil contamination to nearby surface water sources.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.7 Hydrology and Surface Water Quality (continued)	• The contractor must have to plan for soil excavation and cut-fill balance or land leveling in advance. In the area of soil cut-fill nearby water sources, work could be speed up and if the construction period is in rainy season top soil could be compacted densely and uniformly. The embankment to prevent canal water contamination by construction materials could be provided.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Temporary office of the project must install wastewater treatment package especially anaerobic system to control wastewater quality effluent as required by environmental regulation standard.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.7 Hydrology and Surface Water Quality (continued)	• Toilets for workers must be installed sufficiently as regulated including with anaerobic wastewater treatment system.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Coordinate local administration office to provide service for vacuum toilet truck regularly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Promote saving water campaign to workers inside temporary office such as close the tap when not in use to minimize wastewater generation.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
1.8 Hydrology and Underground Water Quality	• Toilets for workers must be installed sufficiently as regulated including with anaerobic wastewater treatment system.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.8 Hydrology and Underground Water Quality (continued)	• Disposal piling must be prohibited on the construction site for both vacant area and around workers residence to prevent leached to water sources.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
2. Biological Environmental Resources				
2.1 Terrestrial ecology	• Activities that causes noisy, vibration and dusty must be avoid to not disturb nearby wild animals.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Prevention of oil spill and waste leached must be careful to not harmful to nearby wild animals.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Using of highly efficient construction material and good maintenance to reduce noise, dust and smoke which may affect to wild animals and natural resources.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
2. Biological Environmental Resources				
2.1 Terrestrial Ecology (continued)	• During construction, if found forbidden wood as regulated by law, the wood must be removed to appropriate site of SRT land.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
2.2 Aquatic Ecology	• During construction mitigation measures for surface, water caring must be operated strictly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
3. Human Use Value				
3.1 Water Use	• Workers must be awarded to use water efficiently.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Leakage investigation must regularly be operated to get ready for maintenance promptly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Water storage tank must be in place for sufficient water security.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.2 Wastewater and Soil Waste Management	• Toilets for workers must be installed sufficiently as regulated including with anaerobic wastewater treatment system.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Toilet wastewater tank must be pumped out regularly for sanitary treatment.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• When construction finished, toilet wastewater tank must be pumped out by local administration for sanitary treatment and the hole of temporary wastewater treatment must be completedly filled immidiately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Drainage system and sedimentation pond must be installed inside the construction site before drainage out to public drainage conduit or channel.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.2 Wastewater and Soil Waste Management (continued)	• Public drains must be empty in case of clogging or public conduits must be empty at least once in 6 months.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Workers must use water as necessary.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Toilets must be cleaned regularly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
3.3 Drainage and Flood Protection	• Drainage system and sedimentation pond must be installed inside the construction site before drainage out to public drainage conduit or channel.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Public drains must be empty regularly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.4 Solid Waste Disposal Management	• Provide appropriated disposal containers that is fully covered individually, suitable and sufficient to stock solid waste disposal before taken away by related local agency.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• There must be at least 3 types of containers to facilitate the dry, the wet and the hazardous distributed around the construction site for carrying and collecting the waste. The garbage bin must be investigated to be in good condition.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Enjoin the workers to dispose in the provided container strictedly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Coordinate to Local Agency for sanitary disposal regularly to empty the garbage containers.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.4 Solid Waste Disposal Management (continued)	• Disposal receiving containers must be investigated regularly to avoid insect and disease carrier. Broken container must be replace promptly when found.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Promote the contractor for reuse material to reduce waste or to sell some kind of material as recycle material for others.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
3.5 Transportation	• Control load limit of every truck as regulated by law.	Transportation Vehicle	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Enjoin truck driver to follow the traffic regulation strictly and being very careful when passing through community.	Transportation Route	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Install traffic sign such as speed limit, construction site for both inside and outside of the site. At the entry-exit point and along the approach, traffic signboard to guide direction to the entrance-exit gate must be installed obviously.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.5 Transportation (continued)	• Maintaining truck engine to be in good condition for not to cause noisy.	Transportation Vehicle	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Arrange security guard to facilitate safe and convenient traffic control around the entry-exit for all construction working period.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Setting measures not to let the contractor transporting soil and construction material during rush hour to minimize traffic impact.	Transportation Vehicle	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Material truck must be covered completely and tightly by canvas for protecting both dusty dispersion and material falling.	Transportation Vehicle	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Enjoin the truck driver to be concentrated careful when arriving the intersection or road junction especially when cutting off the traffic flow.	Transportation Route	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.5 Transportation (continued)	• Make sure every single time that the truck carryings and wheels are neatly clean before going out to the public.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• When muddy or material waste falling from the truck onto the traffic surface inside the site, cleaning must be operated immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Laying down thick metal sheet covering all truck traffic lane inside the construction site to prevent muddy truck from raining.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide cleaner for cleaning road junction especially at entrance-exit gate and nearby.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Limit vehicle speed not exceeding 30 kilometers per hour when passing through community area.	Transportation Vehicle	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Concerned Location	Duration/ frequency	Responsible Agency
3. Human Use Value				
3.5 Transportation (continued)	• Installing warning sign for car user observation that the construction is existed.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Setting arrangement for soil and material trucks to be parking only inside the construction site.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
3. Value for Human Use				
3.6 Energy and Electrical Power	• Enjoin worker to save electrical use such turning on the electrical switch only when in use.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Investigate electrical line system and electrical equipment to be in good condition and ready to use at all time. Keeping on good maintenance whenever found any defect.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Placing Sticker "Saving Energy" at noticeable location around worker residential zone both inside and outside of the construction site.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.1 Socio-Economic	• Setting up measures for monitoring and control not to allow workers annoying or intruding the area other than the project area. There must be worker head to investigate, control and punishing whenever found violate to prevent worker causes troubles to surrounding neighborhood, i.e; - Not to cause quarrelling. - Not to make noisy or drink alcohol after 20.00 O'Clock. - Not allow to accommodate outsiders without advance permission. - Not allow to lit fire around worker residentials without advance permission. - Gambling is prohibited. - Robbing or burgling is prohibited, not allow to destroy community asset. The punishment will be expelled.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.1 Socio-Economic (continued)	• Carefully not to let the material waste falling to destroy neighbour asset.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installing announced board to inform projectimplementation, construction schedule and present messages to apologize for people's inconvenience due to construction.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Bring public hearings suggestions to set up environmental protection and impact mitigation measures. Any compliants occurred during construction must be solved immediately such as protection measures on dust, noise, smoking, traffic problem and material falling.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installing 3.00 meters high fencing around workers camping outside the construction site.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.1 Socio-Economics (continued)	• Installing project nameboard to inform contact number around workers camping outside the construction site at the location that face to public.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide sufficient lighting around workers residence.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provide security guard at entrance-exit gate of workers residence for 24 hours service to facilitate traffic and to prohibit workers to go out of the worker camp in the late night.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
4.2 Public Health	• Consideration of workforce recruitment must be prioritize to local people. Foreign workers must have documents as required by law.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.2 Public Health (continued)	• Workers recruitment must consider by using health condition as one of the criteria to prevent epidemic.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Health investigation must be considered before recruited and health examination for workers must be operated once a year.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• First aid service must be available onsite including with standing by vehicle for transferring to nearby hospital.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Hygiene must be strict for workers.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Sanitary service facilities for workers must be hygiene	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.2 Public Health (continued)	- Water for drinking and using must be available and sufficient during worktime. - Lighting on the construction site and worker residence must be sufficient. - Disposal containers must be provided and in place sufficiently and must be empty regularly.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	- Wastewater drain must be cleaned regularly to not clogging by food waste. - Hole inside the wall of worker residence must be filled to avoid mice. - Destroy sources of disease from mosquito, fly, mice and others as appropriated. - Keep the garbage bin or bag covered at all time. - Provide chemical treatment to prevent disease regularly	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.2 Public Health (Continued)	• Measures for mental health watching on workers and community: - Providing strong and clean residentials for workers. - Balancing work time and recreation time appropriately. - Setting measures for monitoring and control workers not to interrupt or intrude other housings by allocate worker head to keep on monitoring and punishment whenever found violation. To prevent workers from creating troubles to neighbor residents such as not to allow quarrelling, not permitting to accommodate outsiders without permission in advance, not to allow setting fire inside residential camping area without permission in advance, gambling must be prohibited. - To limit construction schedule for activities that generate noisy during 8.00-17.00 O'Clock only for undisturb to recreation time of surrounding community.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety	• Investigating equipment everytime before starting to use	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Provision of worker head to investigate and monitor conditions of electrical wire regularly. Providing maintenance soonest whenever found any broken to prevent sparking, short circuit and accidentally electrical shocked occurring to construction worker.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Keeping arrangement to electrical equipment and construction material stock tidily and clean.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Setting monitoring measures to control workers such as prohibition of fire sparking around workers camping without permission. Prohibition of smoking while working, etc.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• Setting up worker head for monitoring and giving penalty whenever found violation.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installing signboard to receive request at entry-exit point including with provision of authorization to get request. Investigating the site gradually to get ready for correction whenever case occurred caused by the project.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• Provision of dry chemical fire extinguisher at the place that is easy to get whenever needed.	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Condition of contract for contractor selection must be including with safety management which cluases mentioned about safety protection, health and sanitation provision for construction workers as listed below: - Setting measures to control and prohibit residents inside the construction site not to create impact to nearby residents including with exact penalty for violation. - Providing and controlling of safety equipment - Investigation of every tools and equipment for safety working	Construction Site and worker residence	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• The contractor must provide personnel safety equipment appropriately and sufficiently for using of workers such as safety hat, safety shoes, safety eyeglasses, safety gloves, safety belt, mesh for prevention of falling from the high, welding mask for lighting and sparking prevention, dusty prevention mask, safety ear plug, etc.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Investigate and control to use personnel safety equipment correctly and appropriately to type of work.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installation Metal Sheet fencing of 3. 00 meters height must be in place around the construction site boundary to protect invasion to closed area and to obscure from visual pollution of construction activities.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• Prioritizingly to recruit workers from local residents. In case of using foreign workers, work permission must be approved. • Construction material and equipment must be arranged tidily and cleanly.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Providing security guard at entry-exit point for 24 hours operation for traffic facilities and preventing workers to going out in the night.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Installation of petition board at entry-exit location including with providing officer to get petition and site survey. Whenever finding occurrence caused by the project, the correction must be operated immediately.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• Installation of warning sign for safety working at necessary area such as "construction site".	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Providing investigator to monitor and investigate working methodology, equipment and machinery conditions, and working environment before starting work to secure safety working. • Providing of appropriate consumption water, disposal management, waste and soil waste management sufficiently for not to spreading diseases.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-1 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Construction Stage of Area Development around Makkasan (Continued)

Construction Period

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
4. Values for Quality of Life				
4.3 Fire Protection and Safety (continued)	• First aid equipment and standing by ambulance must be provided inside the construction site for getting ready to be used in case of needed when severe injuries occurred or transferring to nearby hospital required.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• To provide investigation of electrical wire using inside the project regularly and operating maintenance when found defection to avoid sparking, short circuit or accidentally caused injury to construction workers.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Training courses for construction workers and related operators must be conducted to create awareness for accidental prevention and protection.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT
	• Providing Officer for safety management to control practicing in accordance with measures for prevention and environmental impact mitigation.	Construction Site	At All Time of Construction Period	Contractor under Private Co-Investor &SRT

Table 7.4-2 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Operation Stage of Area Development around Makkasan

Operation Stage

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.1 Topography	• Keep environmentally clean and good condition both inside the boundary and nearby.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
1.2 Soil Resources	• Providing plantation of grass, bush and tree inside the project site and keeping green for soil erosion protection.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
1.3 Meterology and Air Quality	• Keeping velocity limitation of entry-exit vehicles not exceeding 30 kilometers per hour.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Installation of warning board "Engine running during parking is prohibited" at several noticeable location sufficiently to be covered visibility of building parking lots. Enjoin the authorities practicing strictly to reduce environmental impact on air pollution, noise pollution and vehicle heating generation.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control

Table 7.4-2 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Operation Stage of Area Development around Makkasan (Continued)

Operation Stage

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.3 Meterology and Air Quality (continued)	• Installation of noticeable signboard for not to accelerate the engine around parking area and internal roadway.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Keeping clean to roadway and pathway for dusty dispersion prevention.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Selecting efficiently standardized power generator including with low emission.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Provision of investigator for monitoring power generator to get ready for use at all time. Maintenancing must be operated soonest whenever defective found.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Provision of investigator to keeping green area in good condition and replacing whenever damage found.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control

Table 7.4-2 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Operation Stage of Area Development around Makkasan (Continued)

Operation Stage

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.3 Meterology and Air Quality (continued)	• Keeping set back of the building as regulated by law. Not to do construction or planting sustainable green tree on the set back space.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Keeping green area in good condition along operating period to promote sustainable development and secure environment as well as to create perspective and giving prioritize to quality of live for living residents and surroundings.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
1.4 Noise Level	• Limiting of entry-exit vehicle velocity not exceeding 30 kilometers per hour.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Selecting efficiently standardized power generator including with low noise pollution generation.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control

Table 7.4-2 Environmental Protection and Impact Mitigation Measures retrieved from IEE Study conducted by SRT during Feasibility Study for Operation Stage of Area Development around Makkasan (Continued)

Operation Stage

Environmental Resources	Environmental Protection and Impact Mitigation Measures	Location for Operation	Duration/ frequency	Responsible Agency
1. Physical Environmental Resources				
1.4 Noise Level (continued)	• Provision of investigator for monitoring power generator to get ready for use at all time. Maintenancing must be operated soonest whenever defective found.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control
	• Provision of investigator to keeping green area in good condition and replacing whenever damage found.	Project Site	At All Time of Operation Period	Private Co-Investor under SRT Control